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MARINE SCIENTIFIC RESEARCH GOVERNANCE IN THE ARCTIC OCEAN

Thesis for the M.A. Degree in Globalization and International Development,
Faculty of Social Sciences

Under the supervision of
Professor Donald McRae and Professor Eda Kranakis

by

Arvind Anand

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ABSTRACT

The legal regime that has come to regulate the conduct of marine scientific research activities has evolved over time, from Admiralty law to the Law of the Sea, environmental law, the laws relating to intellectual property rights over data, samples and results, and international trade laws dealing with the import, export and use of genetically modified macro and micro-organisms, compilation of data and trade secrets.

Arctic Ocean remains unique and vulnerable. The Arctic Climate Impact Assessment (ACIA, 2005) has documented substantial observational evidence that the sea ice cover is undergoing profound changes including: a steady decrease in extent with larger areas of open water during summer; decreasing coverage of multi-year sea ice in the Central Arctic Ocean; and, thinning of sea ice throughout the Arctic Ocean. These changes have implications for a host of marine uses such as shipping, offshore development, fishing indigenous hunting, tourism, including marine scientific research.

Marine scientific research cooperation in the Arctic Ocean is vital for our understanding of basic natural mechanisms. The 1982 United Nations Convention on the Law of the Sea (UNCLOS III) has created a consent regime for coastal states to manage, control, and promote marine scientific research in offshore areas within their national jurisdiction. Arctic states, as a party to the UNCLOS III (except USA), have promulgated laws and regulations on foreign-related marine scientific research conducted within their jurisdictional waters. This work focuses on the legal regime for marine scientific research in general and will explore the present legal governance of Arctic Ocean marine scientific research under the UNCLOS III in particular.

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Chapter I- Introduction

I.1. Context

The Arctic is a region of greater economic and environmental importance than is suggested by its relatively small area and remoteness. The Arctic Ocean comprises only about 5% of the area of the global ocean yet contains about 25% of the global continental shelf. Arctic continental shelves are thought to contain vast mineral resources but remain relatively unexplored. The presence of abundant stores of oil and gas near the North Pole is hardly a secret. The United States Geological Survey assessment released July 23rd 2008, estimates 90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids may remain to be found in the Arctic, of which approximately 84 percent is expected to occur in offshore areas. The problem has always been getting to them, and getting their contents out of the ground. Drilling operations in the far north have to deal with subzero temperatures, marauding ice floes, violent seas, and the logistical difficulties that come with transporting oil and gas from remote, often offshore locations.

The Arctic Ocean accounts for only about 1.5% of the volume of the global ocean, yet receives about 10% of global river runoff, and thus is influenced by inflow of fresh water and entrained materials to a greater extent than other oceans. Because of the great commercial and environmental significance of the region, it is of vital importance to gain fundamental knowledge about the Arctic Ocean and adjacent ice-bearing seas as well as the processes that link this area to the global system.

Arctic Ocean remains unique and vulnerable. Unique because it is the only large enclosed sea that alternates between polar night and day; in addition, it features a persistent ice cover that serves as an effective barrier to the sort of ocean-atmosphere exchanges that are commonplace in other parts of the world. These circumstances make for a marine environment that is very different from that of other oceans, and one that scientists are

still trying to understand. The Arctic Ocean is also vulnerable: with a deep central basin that is essentially cut off from the world ocean, it serves as a catch basin for the long-term retention of contaminants that originate locally from coastal states, from shipping and related industrial activities, or from remote sites after transportation via atmosphere and surface currents. Moreover this part of the Arctic Ocean is covered with sea ice for most of the year and thus difficult to reach. Therefore very little scientific information is currently available about the diversity of life in this region of the world although this information is urgently needed to build a baseline of data to evaluate the impacts of changing environmental conditions, including warming and ice melt in the Arctic over the last four decades (Knutson, et al., 2006).

Because of these characteristics, Arctic research has become a very big deal globally, with China, Denmark (and Greenland), Finland, France, Germany, Iceland, Italy, Japan, Netherlands, Norway, Poland, Russia, Sweden, Switzerland, the UK, India, and the USA all being major players. International cooperation in marine scientific research and ocean observations is needed. Marine scientific research represents one field of endeavour that would no doubt benefit from a greater spirit of openness and cooperation in the Arctic: the outcome of such a collaborative activity would substantially increase our understanding of the region, and would contribute towards the establishment of a solid foundation for decisions that affected the social, economic, and environmental wellbeing of northern societies. Specifically,

- The 1982 United Nations Convention on the Law of the Sea's (hereinafter as **UNCLOS III**) extended maritime jurisdiction by coastal states has created a situation where self-reliance in marine science is needed to ensure that their new rights, especially to control resource exploration and exploitation, and the conduct of research can be exercised and that they can benefit from this new situation for socio-economic development.
- Diversification of ocean uses and the evolution of national goals in marine affairs call for flexibility in the use of available national facilities and skills in order that countries are able to respond to an array of problem.

- Increasingly, effective scientific input to development activities calls for multi-disciplinary and interdisciplinary research with multiple applications (Charnock, 1984; Leydesdorff, 2001).
- Negotiations concerning access by others to zones of national jurisdiction make it in the interests of both coastal countries and researching states wishing access to these zones, that there be competent scientific bodies on both sides. A similar argument applies to the transfer of marine technology.
- As a result of jurisdictional changes in the ocean regime, states again find it increasingly necessary to take an active part in bilateral and multilateral arrangements to ensure effective use and conservation of shared resources and to deal with major oceanic phenomena having bearing upon their economies.
- States are faced, at the political level, with the need to formulate marine policies for development and management of large new areas of territory under their state control. This calls for substantial inputs of scientific information and oceanographic data and thus for a proper formulation of a national marine science policy.

1.2. Literature Review

1.2. 1. Present Trends

Basic trends point very clearly to the increasing importance of the marine scientific research and international research cooperation in the Arctic Ocean- melting ice, the International Polar Year (IPY), and the UN Convention on the Law of the Sea (UNCLOS) (Macnab et.al., 2007).

1.2.1.1. Melting Ice-Changing Marine Access in the Arctic Ocean. Marine access in the Arctic Ocean changed in unprecedented ways during the second half of the 20th century (Winton, 2006a, b; NOAA Magazine, 2006, GFDL, 2007). The new data from the National Snow and Ice Data Center (NSIDC) shows that on 19 September, the area covered by ice fell to 5.35 million sq km (2.01 million sq miles), the lowest recorded since 1978, when satellite records became available (Figure 1.1.). The satellite image on

the left shows the minimum concentration of Arctic sea ice in 1979, while the image on the right shows the concentration of sea ice recorded on Sept. 21, 2007. The observations showed 2.06 million square miles of sea ice as late as Sept. 19. That's the lowest measurement of Arctic sea ice cover ever recorded, it is also 20 percent less than the average of end-of-summer ice pack cover measurements recorded since 1978.) Figure 1.2- the straight line tracks a more than 8% decline per decade, at this rate there may be no ice at all during the summer of 2060.

Figure 1.1. Arctic Sea Ice Extent on September, 1979 (Left) and September, 2007(Right). Note the large areas of open water north of Alaska and Siberia which are already occurring in the Summer Arctic.
Source: National Snow and Ice Data Center

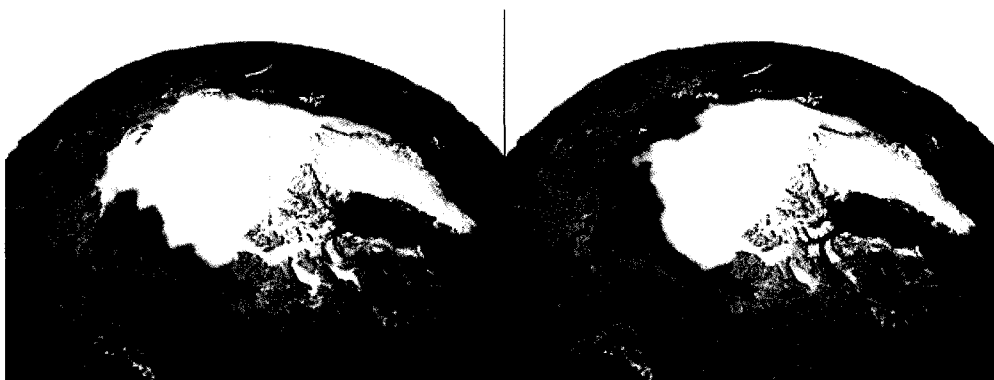
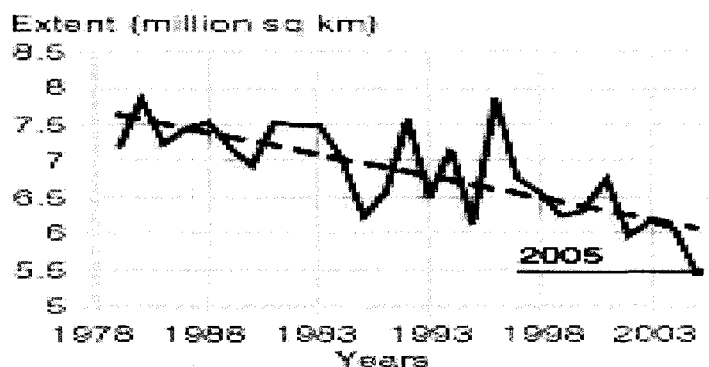


Figure 1.2. Arctic Sea Ice Extent Decline per Decade. Source: National Snow and Ice Data Center



The Arctic Climate Impact Assessment (ACIA, 2005) has also documented substantial observational evidence that the sea ice cover is undergoing profound changes including: a steady decrease in extent with larger areas of open water during summer; decreasing coverage of multi-year sea ice in the Central Arctic Ocean; and, thinning of sea ice

throughout the Arctic Ocean. All evidence points to: (a) the Arctic climate is now warming rapidly and much larger changes are projected; (b) Arctic warming and its consequences have worldwide implications; (c) Arctic vegetation zones are projected to shift, bringing wide-ranging impacts; (d) animal species' diversity, ranges, and distribution will change; (e) many coastal communities and facilities face increasing exposure to storms; (f) reduced sea ice is very likely to increase marine transport and access to resources; (g) thawing ground will disrupt transportation, buildings, and other infrastructure; (h) indigenous communities are facing major economic and cultural impacts; (i) elevated ultraviolet radiation levels will affect people, plants, and animals; and (j) multiple influences interact to cause impacts to people and ecosystems (Comiso, 2004). Hence the warming of the Arctic could mean more circumpolar transportation and access for the rest of the world—but also an increased likelihood of overexploited natural resources and surges of environmental refugees. Melting ice is facilitating access to expanded oceanic regions that historically have remained inaccessible to scientific research on account of their widespread and persistent ice cover (Macnab et.al., 2007). International cooperation is needed as: (a) Ocean processes extend across national boundaries (Bernal, 2007); (b) the science challenge exceeds the capabilities of any one state; and (c) an internationally coordinated approach maximizes cost effectiveness and the use of finite resources and assets (Aagaard, et.al., 1999).

1.2.1.2. International Polar Year (IPY). Recognizing that the Arctic climate is a critical component of the global climate system with worldwide implications, there is a marked increase in marine scientific research activities. More opportunities exist for promoting coordination efforts of the Arctic science and technology collaboration in coming years. One is the International Polar Year (hereinafter as **IPY**), which is actually taking place over two years- from March 2007 to March 2009- and concerns both the Arctic and the Antarctic. The IPY is mobilizing legions of investigators for an intensive campaign of multinational and interdisciplinary research of the environmental variability and its coupling with human activities in the Polar Regions. Previous international polar years were observed in 1882-83, 1932-33, and 1957-58. Involving up to fifty thousands

scientists from sixty countries, this internationally coordinated campaign is cosponsored by the International Council for Science and the World Meteorological Organization. Hence IPY will raise awareness/profile and generate momentum for polar activities, and will be a springboard to increased understanding of, access to, and activity in the Polar Regions. Most of the marine scientific research activities under the IPY in the Arctic are to: (a) learn and understand more about the relationship between Arctic and climate change, and the world's environmental systems; (b) investigate the unknowns at the frontiers of science in the Arctic region; and (c) to use the unique vantage point of the Arctic to develop and enhance observatories studying the Earth's inner core, the Earth's magnetic field, geospace, the Sun and beyond.

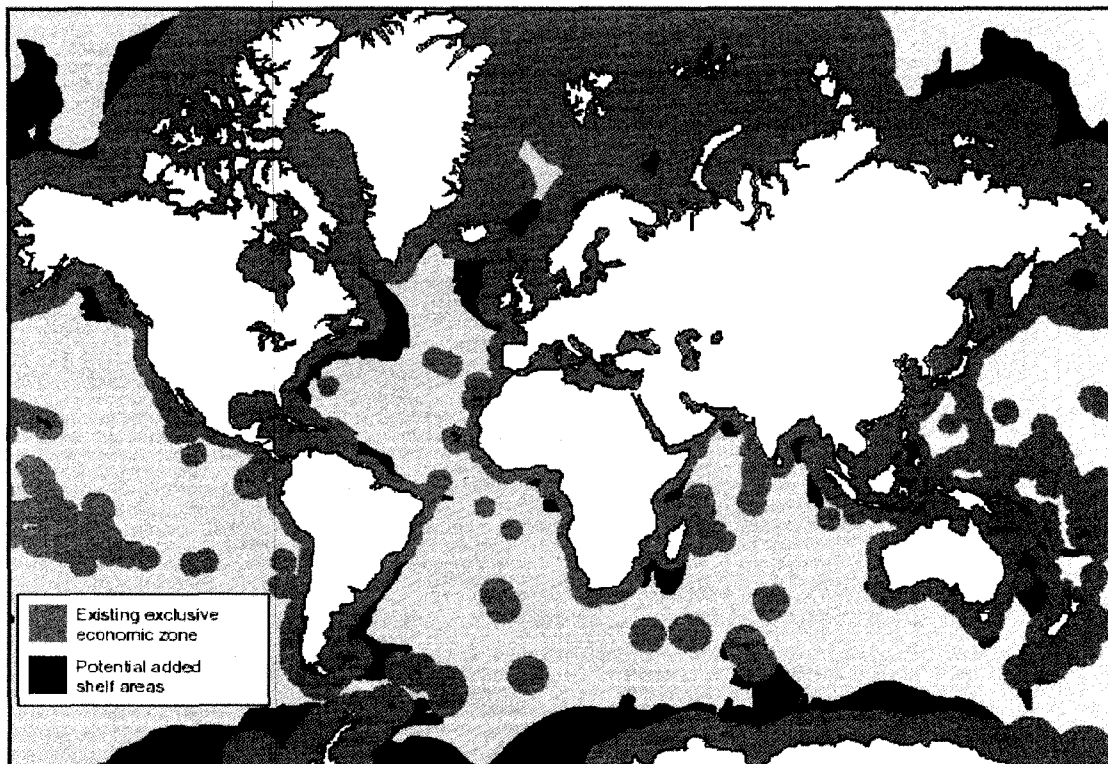
1.2.1.3. 1982 United Nations Convention on the Law of the Sea (UNCLOS III). UNCLOS III provides an opportunity for coastal nations to extend their sovereignty and environmental protection over the seafloor and subsurface beyond the present limit of 200 nautical miles, if the continental margin of the nation has certain shape characteristics. In order to gain this extended sovereignty, the nation must map the seafloor and demonstrate to the Commission on the Limits of the Continental Shelf¹ the how the seafloor in the region meets the specified requirements (Figure 1.3., and for definitions see Figure 1.4.). Hence UNCLOS III has prompted all five coastal states that front upon the Arctic Ocean (Canada, Denmark, Norway, the Russian Federation, and the USA) to initiate national programs for seafloor mapping and research in support of claims to the extended continental shelf beyond 200 nautical miles. In 2001, Russia filed a claim with the UN that its continental shelf extended over a majority of the Arctic Ocean — encroaching on areas that Canada, the U.S., and Denmark (Greenland) anticipated claiming for themselves. The latter nations filed protests, and the UN instructed Russia to submit a revised claim with more scientific data to justify its case (Verhoef & MacDougall, 2005).

¹ New Institution established under the UNCLOS III; the purpose of the Commission is to facilitate the implementation of the Convention in respect of the outer limits of the continental shelf beyond 200 M from the baselines from which the breadth of the territorial sea is measured. 10-year deadline for submissions.

Interest in the Arctic has taken a new dimension in the aftermath of the planting of a Russian titanium flag on the seabed under the North Pole. The Russian claim has created a new source of international tension due to the huge economic and geopolitical interests (a quarter of the world's oil and gas reserves plus tin, manganese, gold, nickel, lead, platinum and diamonds) that are hidden in the Arctic continental shelf. At contemporary prices the billions of barrels of oil and trillions of cubic feet of gas are worth hundreds of billions of dollars and are more readily accessible with the ice caps melting (Baev, 2007). The manner in which the Russian claim has been expressed has created anger amongst its allies not only because of its unilateral character, but also because of its incongruous and anachronistic legal approach as well as proactive nature. The act has been contested by the Arctic states proclaiming that it does not bolster the Russia's disputed claim to the Arctic continental shelf (Rifkin, 2007). Canada answered the Russian move with a clear message, highlighting plans to spend up to \$7.12 billion to build and operate eight patrol ships to help protect its sovereignty in the Arctic (Eckel, 2007). Recently a team from Durham University drawn up the first detailed map to show areas in the Arctic that could become embroiled in future border disputes (BBC News, August 5, 2008).

Taken together, these developments have spurred an unprecedented increase in research activity in the Arctic Ocean, with many projects assuming the character of an international collaboration. Motivated by the desire to maintain a productive momentum, investigators are seeking ways to channel the current round of activity into a longer-lasting program that will outlive the circumstances which led to its inception (Chapin, et.al., 1992; Macnab et.al., 2007).

Figure 1.3. UNCLOS” map of the Oceans (Light blue: The AREA; Dark blue: Exclusive Economic Zones; Red area: extended shelf (beyond 200 nm), up to 60 nations may have claims; Size of ‘red area’~ 15 million square kilometers (~ size of Canada)).
Source:- Fisheries and Oceans website



1.2. Development of a legal Framework for Marine Scientific Research

The UNCLOS III is the defining document of international oceans law. It has been in force since November 16, 1994. Its 157 signatories and 157 parties include all major developed countries. The UNCLOS III is the "constitution" of the oceans and governs many aspects of oceans affairs, ranging from fisheries and navigation to marine pollution and scientific research (Burke, 1976; Verhoef & MacDougall, 2005). It divides the sea floor into zones of national and international jurisdiction, recognizes coastal state's rights to the seabed up to 200 nm and beyond under special circumstances, and defines area outside national jurisdiction (The AREA) as "common heritage of mankind" (Figures 1.3. & 1.4.). It also has provisions on binding, compulsory dispute settlement procedures, and sets out the means by which a state is to delimit the outer edge of its continental shelf.

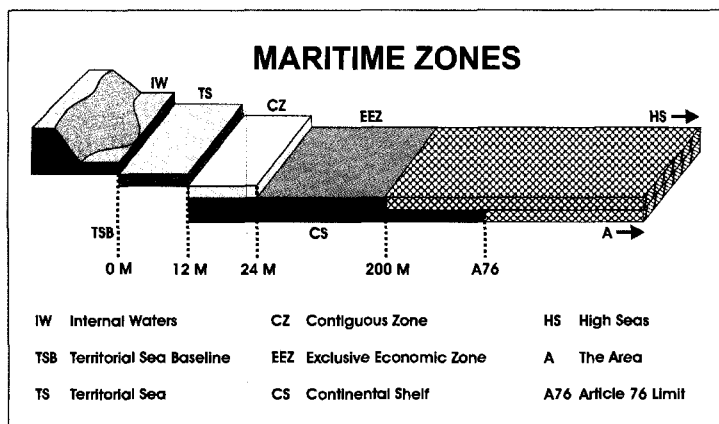


Figure 1.4. Diagrammatic representation of the seaward extents and overlaps of the maritime zones where a coastal state may exercise a range of sovereign rights and authorities. Source: Illustration posted on the website of Geoscience Australia

Marine scientific research may be defined here as the ensemble of observations and investigations that seek to understand the nature of the ocean environment and of the processes that occur within (Macnab *et.al.* 2007). A governance framework for international marine scientific research and international cooperation involves U.N. and non-U.N. agencies, intergovernmental organizations, regional arrangements and institutions. It covers most areas of marine activity. UNCLOS III provides an extensive legal framework for marine scientific research and other oceanographic research cooperation among states and competent international organizations in the Arctic Ocean as well. A consent regime has been created for coastal states to manage, control, and promote marine scientific research in offshore areas within their national jurisdiction. Specific provisions in Part XIII of the UNCLOS III seek to promote the facilitation of research, research co-operation as well as the publication and dissemination of knowledge resulting from marine research. However, the freedom to research is in no way absolute in the Arctic Ocean. Part XII of UNCLOS seeks to protect the marine environment (Vallarta, 1983).

UNCLOS III sets out a number of general principles for the conduct of scientific research (Schaefer, 1968; Winer 1976; Wooster, 1977, 1984, 1989; Fye, Knauss, Wooster, 1977; Caruso, 1978; Mangone, 1980; Soons, 1982, 1987; Roos, 1985). Marine scientific research: (a) must be exclusively peaceful; (b) must be conducted with appropriate scientific methods and means compatible with UNCLOS III; (c) must not unjustifiably interfere with other legitimate uses of the sea compatible with UNCLOS and shall be

duly respected in the course of such uses; and (d) must be conducted in compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment. Therefore, where research is taking place in the Arctic Ocean by states party to UNCLOS III these principles will apply. Arguably, these principles are of application to states not party to UNCLOS III by virtue of their now constituting customary international law ((Soons, 1982, 1987; Roos, 1985). Part XIII does not specify whether there are research activities which are not acceptable or how research must be conducted beyond outlining those very general principles (Soons, 1982, 1987; Roos, 1985; Knauss, 1985, 1987, 1991; Ross & Healey, 1983; Ross & Knauss, 1982; Sullivan 1985; Ross & Fenwick, 1988; Fenwick, 1992; Birnie, 1995, 2002; Roach, 1996; Wegelein, 2005).

As a general rule, a coastal state enjoys privileged levels of authority in the zones adjacent to its territory, the authority diminishing progressively with increasing distance from the coastline (Soons, 1982; Ross & Landry 1987; Roach, 1995). Conversely, other states must progressively relinquish freedoms as they penetrate deeper into the zones where a coastal state exercises jurisdiction. Table 1.1 describes maritime zones and summary of coastal state rights. Within the 12 nautical mile Territorial Sea (TS) that is adjacent to its territory, a coastal state has the exclusive authority to regulate, authorize, and conduct MSR. Within its Exclusive Economic Zone (hereinafter as **EEZ**), i.e. within 200 nautical miles, a coastal state also has the right to regulate, authorize, and conduct MSR, but in normal circumstances it is expected to grant consent to other states that wish to engage in research for peaceful purposes and for the greater benefit of mankind (Soons, 1982, 1987; Roos, 1985). This consent is subject to certain conditions and procedures which are spelled out in Part XIII of UNCLOS (Nordquist, 1985; Roach, 1995).

In the Arctic Ocean, the EEZs of the five coastal states are well-defined to all intents and purposes: their outer limits are situated 200 nautical miles beyond the Territorial Sea Baselines (TSB) of the coastal states, and when combined, they form an unbroken belt that completely encircles the Ocean's outer rim while totally enclosing the High Seas

zone in the centre (Figure I.5.) where all states may exercise the freedom of the High Seas (Dunlap, 1997, Johnston, 2003).

Table I.1. Maritime zones and summary of coastal state rights (Source: Macnab 2006)

Maritime Zone	Distance from TSB	Summary of Coastal State Rights	Levels of State Rights
Internal Waters	N/A	Comparable to sovereignty on land	
Territorial Sea	12	As for Internal Waters, but granting innocent passage to vessels of other states	
Contiguous Zone	24	As for EEZ, plus laws pertaining to customs, fiscal, immigration, or sanitary matters	
Exclusive Economic Zone (EEZ)	200	Resource ownership; structures on the seabed; scientific research; environmental preservation	
Continental Shelf	>200	Jurisdiction over non-living resources on and beneath the seabed	
High Seas	N/A	Freedom of the High Seas	
Area	N/A	Mineral rights managed by International Seabed Authority	

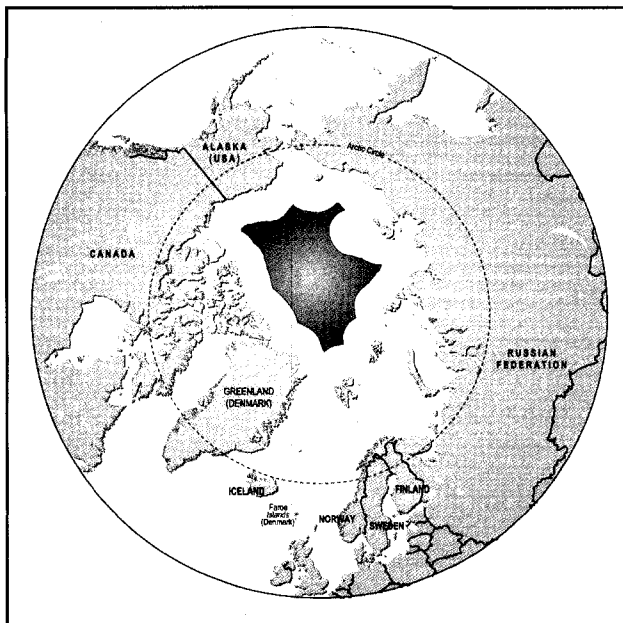


Figure I.5. Map of northern land boundaries, illustrating how the border between Canada and the USA, and the border between Norway and the Russian Federation, extend to the coast of the Arctic Ocean. The dark grey area in the centre of the Arctic Ocean is a High Seas enclave surrounded by the cumulative Exclusive Economic Zones of the five Arctic coastal States. (Source: Illustration posted on the website of GRID-Arendal)

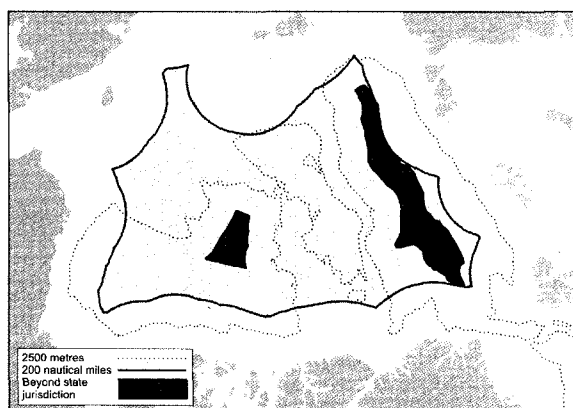
The Extended Continental Shelf ((hereinafter as **ECS**) presents a different set of circumstances: this zone lies beyond the 200 mile limit of the EEZ, with a maximum

extent that is determined in accordance with the technical provisions of Article 76 of UNCLOS. In this area, a qualified coastal state does not enjoy full sovereignty, but it is entitled to exercise certain sovereign rights. Its authority for regulating MSR is less all-encompassing than in the EEZ: in principle, it can only withhold consent in the case of designated zones that have been set aside for exploitation or detailed exploratory operations (Colson, 2003, 2004; Verhoef & MacDougall, 2005).

At present, nowhere in the Arctic Ocean (nor in the entire world, for that matter) has an ECS been formally established, however two of the Arctic coastal states (Norway and Russia) have submitted proposed outer limits to the Commission on the Limits of the Continental Shelf (Macnab 2006a,b). The other three Arctic states (Canada, Denmark, and the USA) are assembling the necessary data sets in support of their cases. It is only a matter of time, therefore, until an ECS is proclaimed for the first coastal state, to be followed by the others in succession (Verhoef & MacDougall, 2005).

A provisional analysis suggests that the cumulative Extended Continental Shelves of the Arctic coastal states could encompass most of the central Arctic Ocean, leaving two zones where coastal states could not exercise sovereign rights (Figure 1.6.). These two zones form a part of the Area, which incorporates all components of the global seabed that lie beyond national jurisdiction, and where mineral resources on and below the seabed comprise the 'common heritage of mankind' (Verhoef & MacDougall, 2005).

Figure 1.6. A preliminary analysis of public domain data suggests that when combined, the extended continental shelves of the five Arctic coastal States could potentially occupy most of the Arctic Ocean beyond 200 nautical miles, as shown here in light grey. The two dark grey zones would not meet the criteria of Article 76, and therefore would lie beyond the jurisdiction of any coastal State. Source: Macnab et al., 2001



Within this context, the ability to perform marine scientific research in the Arctic Ocean has emerged as an issue freighted with significant political overtones (Macnab, 2006a,b). With the prospect of seeing most of that ocean encompassed by the EEZs and ECSs of the Arctic coastal states, other states have been expressing concern about the potential loss of access to regions where important scientific questions remain to be answered.

Although the UNCLOS III purports to create favorable conditions for the conduct of marine scientific research, the coastal state has the right to require consent for all marine scientific research within the 200-mile EEZ, and the constraints on coastal state discretion are few indeed (Ross & Fenwick, 1988; Fenwick, 1992). Accordingly, states that wish to encourage international cooperation in marine science are likely to respond favorably and in a timely fashion to requests for such consent, while states which find reason to hamper the conduct of research have no lack of tools to do so in the UNCLOS III (Soons, 1982; Nordquist, 1985). The UNCLOS III has provided no mechanism by which a decision to delay, disrupt, or disapprove a request for clearance can be questioned or independently reviewed (Soons, 1982, 1987; Roos, 1985). Also the consent regime has been interpreted unevenly by states, with some coastal states refusing to grant consent where it might reasonably have been expected (Roach 1996), and some others imposing conditions (Gakdorisi and Vienna, 1997).

The UNCLOS III has defined the maximum limits of jurisdiction which states may exercise (both geographically and in terms of the type of authority which may be used). There is no rule of international law which prevents states from establishing less stringent jurisdiction over marine scientific research or other activities should they, in the exercise of their sovereignty, choose to do so (Soons, 1982, 1987; Roos, 1985). Several states, including the U.S., have chosen to impose jurisdiction over marine scientific research in ways that are less restrictive than provided for under the UNCLOS (Roach 1996).

Developments in technology are another area which introduces uncertainty into the operation of the Arctic Ocean marine scientific research legal governance. Automatic Floating Stations, Ocean Data Acquisition Systems, Remotely Operated Vehicles and

Autonomous Underwater Vehicles are all enabling marine scientific research to be carried out more or less remotely, without the need for vessels to enter EEZ's, except, possibly, for recovery purposes. Another development which could not have been foreseen when the UNCLOS III was being drafted was the amount of surveying and research which could one day be conducted by satellite. The question of whether it is necessary or even practicable for coastal states to require consent for such surveying is as yet unanswered (Soons, 1982; Roach 1996).

UNCLOS includes the right of the coastal state to participate in the project and reports and access to data and samples (Soons, 1982; Nordquist, 1985). Access to data concerns by coastal states does also bring some interesting issues/questions (Ysern, 2003). What reasonable right of use can a coastal state expect for data supplied by a foreign researcher? Some researchers/institutions/government archives feel that it is reasonable to set restrictive conditions on the use of the data by the coastal state (Flemming, 1987; Ross & Fenwick, 1988; Fenwick, 1992).

1.3. Objectives and Organization

UNCLOS III has created a consent regime for the Arctic coastal states to manage, control, and promote marine scientific research in offshore areas within their national jurisdiction. The scope of this study is very broad- legal, policy development, and marine scientific research governance. Objectives of this work - a) to gain some insight into Arctic state(s) perspectives (both as a coastal state as well as researching state) on the international regime to marine scientific research (through the works of Wooster, Knauss, Soons, Roos, Fenwick, Birnie, Roach, Nordquist, & Wegelein); and b) to assess the effect of extended coastal state jurisdiction upon marine scientific research in the Arctic Ocean. With these objectives in mind, the thesis examines: a) the international legal regime for marine scientific research in general, b) the Arctic Ocean marine scientific research legal governance, and c) the marine scientific research legal governance in Canada. This work demonstrates that the 1982 Law of the Sea Convention strongly

affects where scientific research is done and how it is done. It also influences the techniques and instrumentation.

Chapter 2 provides an overview of the Arctic Ocean and the Law of the Sea; Chapter 3 discusses the evolution of the international marine scientific regime, content of key provisions of the UNCLOS III pertaining to marine scientific research, and their effects on the conduct of marine scientific research activities. Chapter 4 examines the key provisions of the UNCLOS III for- international marine scientific cooperation; the knowledge and technology transfer, the optimum utilization of EEZ resources, the high seas fisheries research, the delimitation of the continental shelf, and the environmental protection and combat marine pollution. A later part of this chapter reviews the Arctic states practice dealing with marine scientific research regime. Chapter 5 investigates the legal framework of marine scientific research in Canada. Last chapter 6 summarizes the conclusions from the each chapter.

Chapter 2- Arctic Ocean and the Law of Sea

2.1. Context

The Arctic Ocean has long held a fascination for explorers and scientists of many countries (Table- 2.1.). Despite the numerous voyages of exploration, the nature of the central Arctic was unknown only 100 years ago; it was believed to be a shallow sea dotted with islands. During Nansen's historic voyage on the polarship *Fram*, which commenced in 1893, the great depth of the central basin was discovered. Analysis of data led Harris (1904) to postulate that the Arctic basin was divided by a barrier or ridge into two basins with different periods of fundamental oscillation.

After World War II, as elsewhere in the world oceans, knowledge of the true character of the Arctic sea floor started to become known. In 1948, the Soviet Union commenced a program of systematic exploration of the entire Arctic Ocean by carrying out ice landings by aircraft on the sea ice (Armstrong 1958) and by year-round occupation of more permanent ice stations (Weber 1983). The systematic exploration of the Arctic Ocean Basin by the United States commenced in 1951, by mounting airborne expeditions to the Canada Basin and, in later years, by means of ice island stations and nuclear submarine traverses. In 1959, the Canadian Polar Continental Shelf Project started a systematic program of charting the continental shelf from Canada –Alaska border to the Lincoln Sea (Weber 1983).

Table 2.1- Arctic Exploration Line. Source: Modified from the Woods Hole Oceanographic Institution

330 BC – 1000 AD	330 BC – Pytheas was the first person to record a description of the midnight sun, the aurora, and Polar ice. ~870 AD– Floki Vilgerdason, a Norwegian Viking, discovers Iceland 983 AD – Erik Thorvaldsson, discovers and settles in Greenland.
1594-1610	1594-1597: Willem Barents is named, makes three voyages trying to find a Northeast Passage. 1607-1610: Henry Hudson makes three voyages in search of the Northwest Passage to Asia through the Arctic Ocean.
1725-1742	In 1732, the Russian Admiralty organized the Great Northern Expeditions both on land and at sea to find the Northeast Passage along the coast of Siberia. Expeditions mapped thousands of kilometers of the coast of Siberia, discovering numerous bays, gulfs, capes and islands. Mikhail Lomonosov participated in the Great Northern Expeditions for 20 years. He suggested a scheme of currents in the Arctic Ocean, classified sea ice types, and explained the role of the sun as a source of heat in the Arctic. He also made a map of the Arctic with ocean at the North Pole—an idea not the generally accepted at the time.
1776-1779	James Cook sailed on the ships <i>Discovery</i> and <i>Resolution</i> on his final voyage of exploration along the west American coast and up to Bering Straits as far as 70°41' N with the hope of finding the Northwest Passage.
1819-1831	The search for the Northwest Passage is resumed. William Edward Parry, takes his first voyage. 1819-1822: John Franklin sets out on an overland and canoe expedition up the Coppermine River to explore the north coast of America 1821-1823: William Edward Parry leaves on his second voyage in search of the Northwest Passage with his ships <i>Hecla</i> and <i>Fury</i> . 1824-1825: Parry sails on his third and final voyage to the Canadian Arctic. 1827: Parry heads north again, this time attempting to reach the North Pole via Spitsbergen. He reaches 82°45' N and establishes a farthest north that stands for 52 years. 1831: James Clark Ross resumed the search for the Northwest Passage. He is the first to reach the North Magnetic Pole.
1845-1873	Sir John Franklin's expedition aboard <i>Erebus</i> and <i>Terror</i> sails in search of the Northwest Passage.
1878	Baron Nordenskiöld completes the first successful navigation of the Northeast Passage.
1879-1882	Lt. George Washington DeLong commands an ill-fated expedition attempting to reach the North Pole via the Bering Strait.
1882-1884	Adolphus Greely leads expedition to Ellesmere Island as part of the First International Polar Year (1882-1883) to set up a new observation station in the Arctic.
1886-1909	The Peary Arctic Club, led by US Navy engineer Robert Peary, organizes 8 expeditions to the Arctic.
1893-1895	Wreckage from the <i>Jeannette</i> expedition (1879-1882) is found by Inuits on the southwest coast of Greenland—more than 2900 miles from where it sank. This leads Norwegian scientist and explorer, Fridtjof Nansen, to believe that there must be an ocean current that moves the ice across the Arctic from Siberia. To prove it, he builds a special ship, called <i>Fram</i> , for the expedition. The <i>Fram</i> departs from Bergen, Norway in 1893. Three months later, at a point closer to Alaska than Norway, she is frozen into the ice at a latitude of 78°N. For three years, the ship is carried by the ice across the Arctic, but never gets further north than 86°N.
1903-1905	Norwegian explorer, Roald Amundsen, completes the first successful navigation of the Northwest Passage.
1910-1915	The Russian Arctic Ocean Hydrographic Expedition represented an effort by the Imperial Russian Navy to explore, survey, and chart the Northern Sea Route with a view to developing it as a commercial route. The expedition used two specially built icebreaking research vessels, <i>Tamyr</i> and <i>Voygach</i> . They spent three years working west along the Arctic coast of Siberia, sounding, surveying, and pursuing scientific work as they went, and produced an impressive volume of scientific data.
1918-1925	Norwegian explorer Roald Amundsen sets his sights on the North Pole.
1930	Sir Hubert Wilkins acquires a submarine from the US Navy and prepares her for an undersea expedition to the North Pole, renaming her <i>Nautilus</i> . The leader of the scientific staff is Harald Sverdrup, who is to make measurements from a specially rigged diving compartment. The submarine heads into the pack ice north of Spitsbergen in August 1931, but the diving plane becomes damaged. The submarine can no longer cruise very far under the ice, and so can make oceanographic observations only outside of the ice pack. However, the <i>Nautilus</i> does make several short runs under ice, demonstrating that submarines can operate in and under the ice pack.
1958	A US nuclear-powered submarine, also called <i>Nautilus</i> , passes under the North Pole, but does not surface, on its third attempt. The same year, the nuclear-powered submarine, <i>Skate</i> , became the first vessel to surface at the North Pole.
1970-1990s	Many modern scientific expeditions are launched to study the Arctic Ocean. Studies of the geology, biology, chemistry and physical oceanography are on-going, and use ice stations, ice breakers and, more recently, autonomous underwater vehicles. Some of the important ones are: Arctic Ice Dynamics Joint Experiment (AIDJEX) 1970-1976; The Lomonosov Ridge Experiment (LOREX) 1979; FRAM I 1979; FRAM II 1980; YMER 1980s; FRAM III 198; Eurasian Basin Experiment (EUBEX) 1981; FRAM IV 1982; Canadian Expedition to Study the Alpha Ridge 198; Marginal Ice Zone Experiments (MIZEX) 1983 & 1984; Canadian Ice Island 1984-93; ARKTIS Polarstern cruises 1984, 87; Marginal Ice Zone Experiments (MIZEX) 1987; Coordinated Eastern Arctic Experiment (CEAREX) 1987-88; Oden 1991; The Leads Experiment (LEADDEX) 1992; Laptev Sea System 1992-1996; Polar Star 1993; Arctic Ocean Section (AOS) study 1994; The Surface Heat Budget of the Arctic Ocean 1997-98; Arctic Regional Exercise Activity (AREA) ice camp operations 1960s-1990s; and the Scientific Ice Expeditions 1993, 1995 to 1998..
1993-1998	The first scientific trip to the Arctic by a nuclear-powered submarine is made by <i>Pargo</i> in the summer of 1993. During the cruise, underway data (bathymetry, gravity anomaly, temperature, salinity, ice draft, and images of the underside of the ice) are collected in the deep Arctic. The success of this program leads to the Scientific Ice Expeditions (or SCICEX) cruises continuing between 1995 and 1998 using the submarines <i>Cavalla</i> , <i>Pogy</i> , <i>Archerfish</i> , and <i>Hawkbill</i> . For 3 to 6 weeks, each of these cruises collects data within the central Arctic basins.
2007-2008	International Polar Year in 2007-2008 will provide an opportunity to engage the upcoming generation of young Earth System scientists and to get the public to realize just how much the cold ends of the sphere we all live on really do influence us. Building on technological developments, such as earth observation satellites, autonomous vehicles and molecular biology techniques, there will be new expeditions to investigate polar systems.

The Lomonosov Ridge was discovered by the Soviet scientists in 1948 (Gakkel, 1958; Burkkhanov 1956). The Alpha Ridge was first recognized as a distinct feature by soundings taken from drifting station ALPHA during the International Geophysical Year (Hunkins 1961). In 1959, Soviet scientists published second bathymetric map of the Arctic Ocean (Gordienko & Laktionov 1960), and a number of bathymetric studies published in the 1960s delineated the major physiographic provinces of the Arctic (Heezen & Ewing, 1961; Ostenso, 1962; Gakkel, 1962; Dietz & Shumway, 1961; Dibner, et.al. 1965; DeLeeuw, 1967; Hunkins, 1968; Johnson, 1969; Ritchie, 1969). The 1970s were marked by the publication of more detailed charts by Heezen & Thrap (1975), Sobczak & Sweeney (1978), Johnson et.al. (1979), followed by Perry et.al (1986).

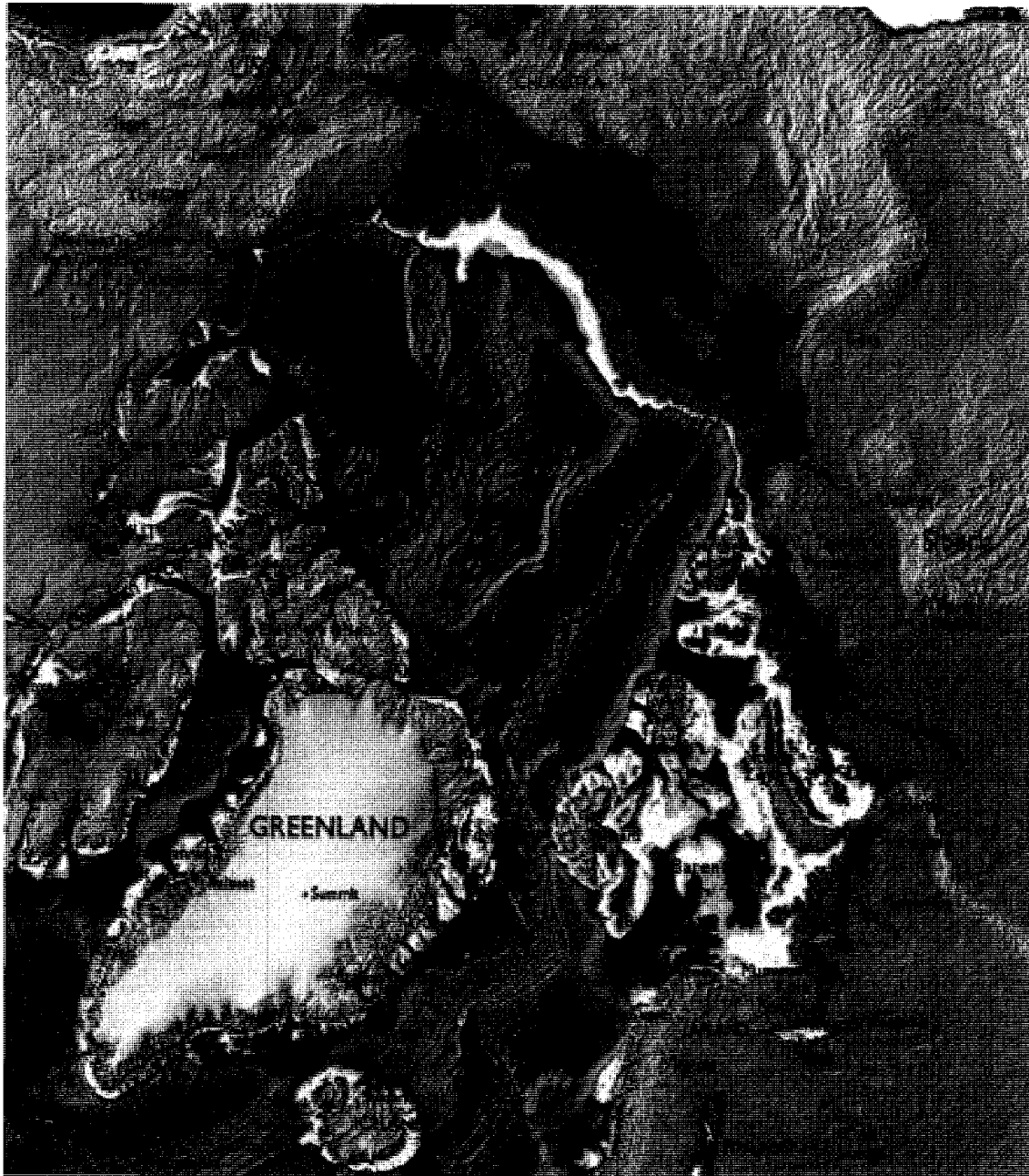
The Arctic conquest has taken a new dimension in the aftermath of the planting of a Russian titanium flag on the seabed under the North Pole.

2.1.1. General Features. The Arctic Ocean has an area about 14.056 million km² which is the smallest of the world's four oceans (Duxbury et al., 1994) An important characteristic of the Arctic Ocean is that it is predominantly semi-enclosed with the only major outlets being the Bering Strait into the North Pacific Ocean and the Fram Strait into the North Atlantic (Figure 2.1). Because of this characteristic, some commentators refer to the Arctic as being a "*Polar Mediterranean*"(Rey, 1982).

The Arctic Ocean consists of the deep Arctic Basin, continental shelves, and marginal plateaus. Located on the very wide European and Siberian shelves are five major epicontinental seas, the Kara, Barents, Laptev, East Siberian, and Chukchi seas (Figure 2.2.). The much smaller Beaufort and Lincoln seas overlie part of the generally narrow continental shelves that fringe the North American and Greenland margins of the Arctic Ocean (Table 2.2). Three subparallel submarine ranges divide the Arctic Basin into four major sub-basins (Figure 2.3). The Lomonosov Ridge, which crosses the Arctic Basin near the North Pole, divides it into the Eurasia and Amerasia Basins. In turn, the Euroasia

Basin is subdivided into Nansen and Amunden Basins by the Arctic Mid-Ocean Ridge, and

Figure 2.1. Topographic features of the marine Arctic (International Bathymetric Chart of the Arctic Ocean; <http://www.ngdc.noaa.gov/mgg/bathymetry/arctic/arctic.html>)



the Anerasia Basin is subdivided into Makarob and Canada Basins by the Alpha and Mendeleev Ridges (Figure 2.4). The deepest parts of the Arctic Ocean, which lie on either side of the Lomonosov Ridge, are more than 4000 m. The depth at the North Pole is 4270 m.

Table 2.2. Arctic Continental Shelves

Region	Depth of Shelf Break	Width (Kms)	References
East Greenland	350-450	20-300	Johnson & Eckhoff, 1966
Eliesmere	250-400	60-85	Weber, 1986
Canadian Beaufort	400-650	65-180	Canadian Hydrographic Services
Western Beaufort	70-100 (Extended Shelf 200-800)	70-120	Grantz et.al., 1981
Chukchi	65-70(Extended Shelf 300-500)	900	Hill et.al., 1984
East Siberian	100-400	700-800	Naugler et.al, 1974
Laptev	100-200	200	Holmes and Creager (1974)

Figure 2.2. The Arctic Ocean & Marginal Seas. Source GSC File.

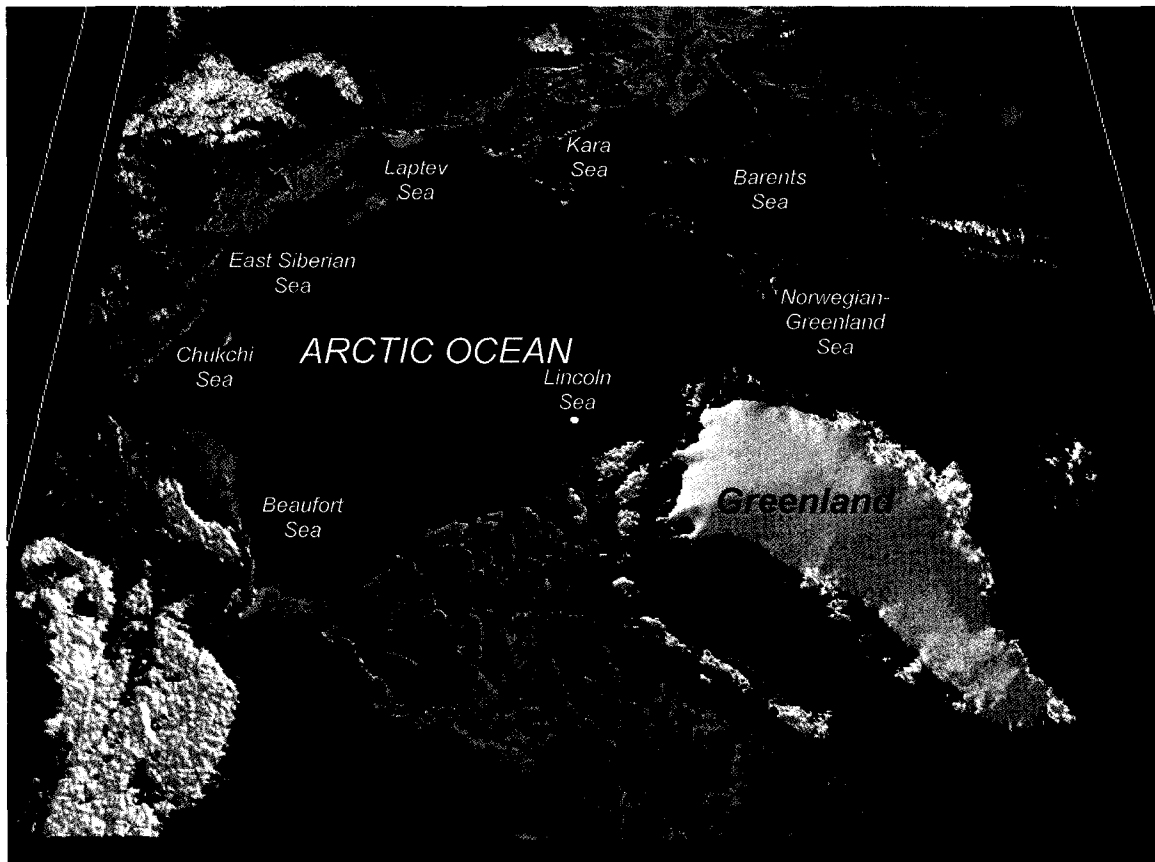


Figure 2.3. Basins of the Arctic Ocean. Source GSC File.

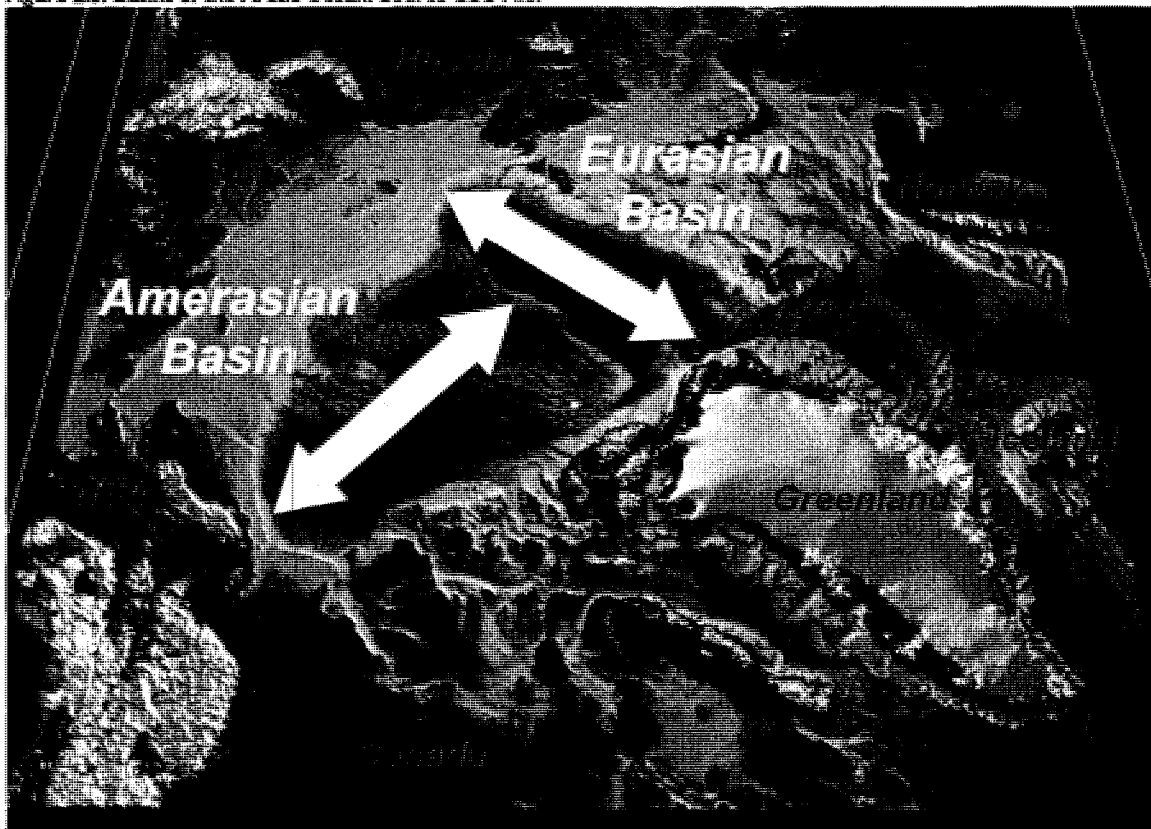
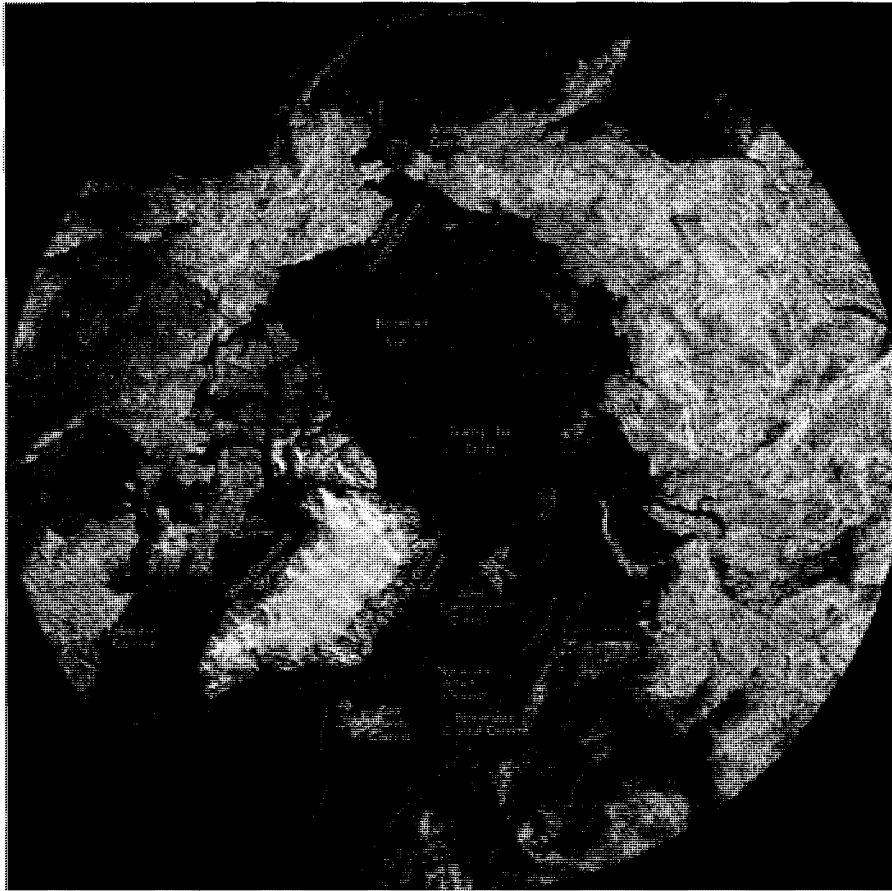


Figure 2.4. Map showing major physiographic features of the deep central Arctic Ocean Basin. Source- Jakobsson et al., 2003



2.1.2. Arctic Ice and Water Currents. A major feature of the Arctic Ocean is the permanent ice-cover (Duxbury et al., 1994). This ice, which is in most cases very old sea ice frozen into massive packs, not only permanently covers the North Pole but also reaches to the coastlines of some of the far northern islands in the Arctic such as the Canadian Arctic Archipelago and northern Greenland (Poulsen, 2004). At its annual maximum during winter, the pack ice reaches 10 million km², which constitutes about 30 percent of the world's sea ice. The Arctic pack ice slowly circulates around the North Pole. During the summer thaw, some finds its way south into more open and warmer waters. This especially occurs in the Fram Strait, and to a lesser extent in the Bering and Davis Straits. As in regions where the ice is under pressure, large pressure ridges, up to 20 m, can be formed. These pressure ridges, which can be a major barrier to icebreakers, may help mix the near-surface waters as the ice moves. Large parts of some of the marginal seas (Chukchi, Laptev, and Kara seas) and some of the Beaufort Sea become mostly ice-free for part of the summer. Much of the Eurasian coastline becomes navigable, if not completely ice-free, in the summer. It represents a major shipping route for communities in northern Russia. Seasonal production of ice over the large continental shelves strongly influences the structure and properties of the water column in the central regions (Rothwell, 1992; Timtchenko, 1996; Meyer et.al., 2005; Rothwell. 2006). Bering Strait is shallow (45 m), restricting the flow of water from the Pacific Ocean into the Arctic Ocean. Water from the Atlantic Ocean flows into the Arctic Ocean through Fram Strait and the Barents Sea. Deeper water exchanges through Fram Strait, 2500 m deep, though communication with the main part of the North Atlantic is restricted to the upper 800 m by the Greenland-Scotland Ridge farther to the south. Water flows out of the Arctic Ocean through Fram Strait and the Canadian Archipelago (Figure 2.5). There is a large fresh-water flow into the Arctic Ocean. About 90% of river input comes from Siberian rivers and about 10% from North American rivers, primarily the Mackenzie River. An un-assessed amount comes from other runoff land drainage.

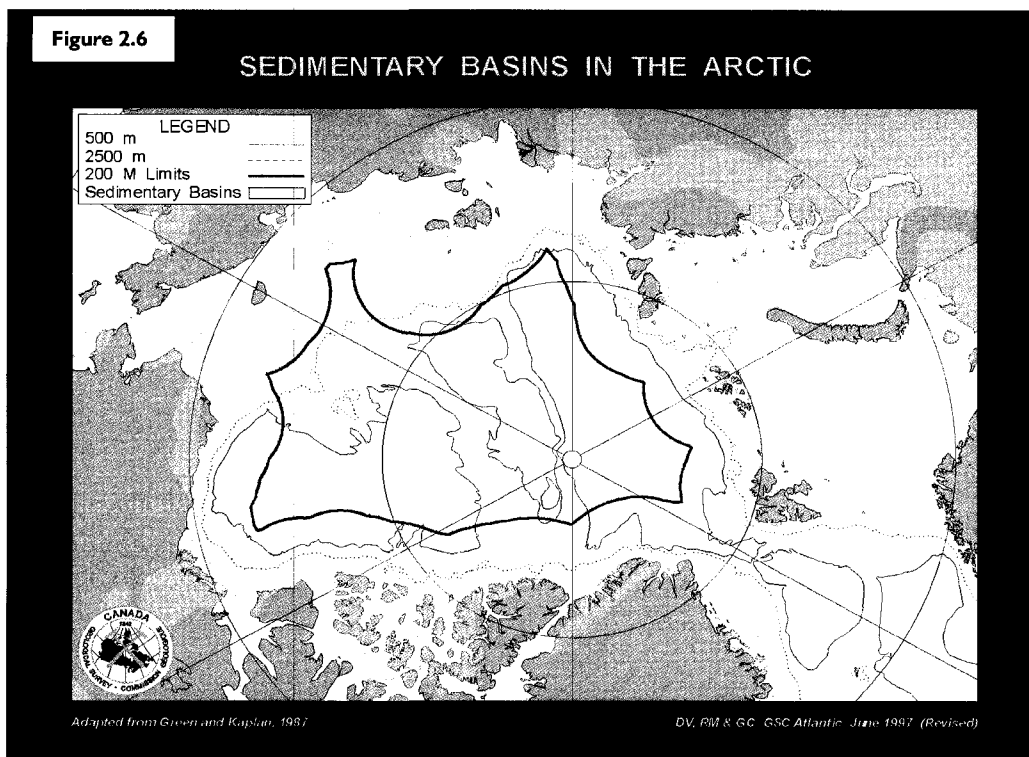
Figure 2.5. Surface currents in the Arctic Ocean, Source: Arctic Monitoring and Assessment Program, 1998



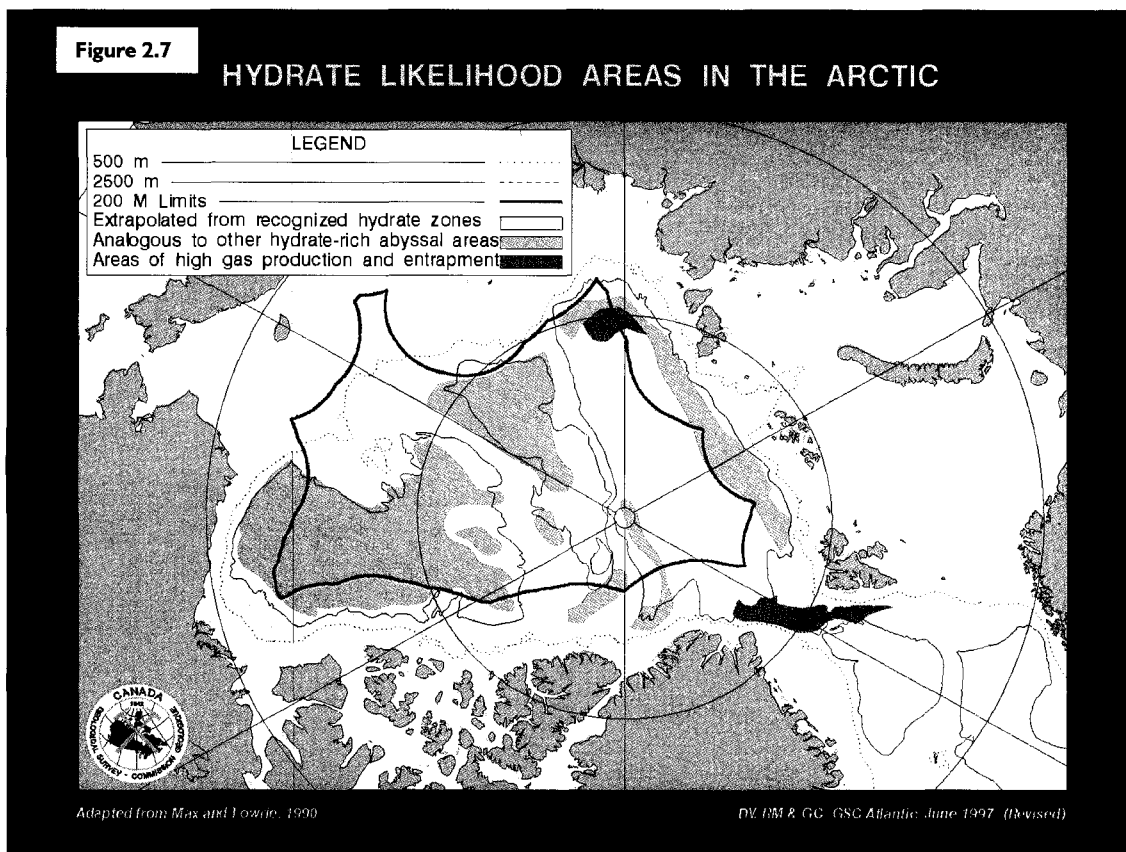
For many months of the year, daylight is weak or absent. Air temperatures over the Arctic Ocean range from a little above freezing in summer to an average of -35°C (-31°F) in January. Temperatures as low as -50°C (-58°F) have been recorded.

2.1.3. Arctic Resources. Arctic Ocean is rich in natural resources: living and non-living, renewable and non-renewable. It holds a significant share of the world's oil and gas, and gas hydrates reserves (Voren, 1993; Macnab & Haworth 2001; King 2007) (Figure 2.6.). The United States Geological Survey (USGS) estimates that up to 90 Billion Barrels of Oil and 1,670 Trillion Cubic Feet of Natural Gas in the Arctic Region, about 84 percent of the estimated resources are expected to occur offshore (USGS Press Release, July 23, 2008). London-based consultancy Wood Mackenzie estimates that at least 166 billion barrels of oil and gas might lie undiscovered in the near-shore Arctic (Meyer et al.,

2005). There could be much more in areas closer to the North Pole. Russian scientists claimed they found evidence of 70 billion barrels of oil and natural gas reserves on the Lomonosov Ridge, a huge rock formation that extends through the North Pole from Siberia to Greenland (Klepikov, et al., 2005). Several areas in the Arctic also show potential for having gas hydrate accumulations (Max, 1992) (Figure 2.7.). Three provinces are in North America and four are in Russia: (1) northern Alaska, (2) the Mackenzie Delta-Beaufort Sea region, (3) Sverdrup basin of Canada, (4) Western Siberia basin, (5) Lena-Tunguska province (Vilyuy basin), (6) Timan-Pechora basin, and (7) several sedimentary basins in northeastern Siberia and the Kamchatka area. Additionally, (8) the Svalbard archipelago (Norway) and (9) sedimentary basins under the ice cap of Greenland (Denmark) may have pressure and temperature conditions favorable to the formation of gas hydrates. Geologists estimate that 200000 trillion cubic feet of natural gas are locked solid in Arctic and offshore ice. In addition to these, significant quantities of other mineral resources might also be present in the Arctic Ocean. Control of Arctic resources is an extremely valuable prize. These resources become more accessible as global warming melts the sea ice and opens the region to commercial navigation.



Marine living resources have been subject to exploitation because indigenous people relied upon such resources for subsistence. While commercial whaling has been curbed due to a combination of scarcity of the resource and international regulation, substantial exploitation of other Arctic fisheries continues in the Barents and Norwegian Seas. A similar position exists with respect to some species of seals.



2.2. The Development of Law of the Sea and Arctic Ocean

During the 20th century, four official attempts were made to codify the peacetime rules for the law of the sea. On none of these occasions, however, were the Arctic Ocean included as a distinct issue that merited legal attention or legal treatment (Traavik & Østreng, 1974; Harders, 1987; Rothwell, 1992; Timtchenko, 1996). The first attempt at codification instigated by the League of Nations in 1924, culminated in The Hague Conference of 1930. While a draft convention on the nature of and right to territorial waters was produced, no agreement could be reached on the critical question of delimiting the breadth of the territorial sea. In any event, no mention was made of ice-

covered regions or the need to develop special legal consideration for ocean space in the Arctic. Yet, this draft did have subsequent influence. During the 1950s, the United Nations International Law Commission (hereinafter as **ILC**) drew heavily from the 1930 Hague draft articles in preparing its report on the status of the law of the sea, which formed the basis of the work done by the First United Nations Conference on the Law of the Sea (hereinafter as **UNCLOS I**) that met in Geneva in 1958.

2.2.1. Geneva Conventions on the Law of the Sea (UNCLOS I). The goal of UNCLOS I was to develop and codify the law of the sea on the basis of convention drafts prepared by the ILC. This was achieved through the adoption of four conventions that dealt with the *territorial sea*, the *high seas*, the *continental shelf*, and *fishing and conservation of living resources on the high seas*. An optional Protocol was also adopted concerning the obligatory settlement of disputes over the interpretation or application of these conventions. These instruments were the first ever codification of the law of the sea and represented a milestone in international legal development. However, there were important gaps on certain critical issues, namely, a standard breadth for the territorial sea, enforceable conservation rules for fishing, and a uniform definition for the continental shelf.

Perusal of the proceedings of UNCLOS I reveal that during the negotiations, the terms "Arctic," was never mentioned (United Nations official records 1958-1959), much less critically discussed as particular considerations pertinent to ocean law matters. Yet, the Arctic Ocean is integral portions of the world ocean, to which codification of these conventions is directly intended. Consequently, while UNCLOS I did not explicitly designate or address the legal issues or status of polar seas, the ocean space surrounding the Arctic region clearly fell under the codification of international law that emanated from the conventions produced at the Conference.

The problem of territorial sea limits was addressed at UNCLOS I, though left unresolved. In Arctic waters, the question of a territorial sea remained a relevant

concern, as all the littoral states in the region (Canada, the United States, the Russian Federation, Norway, Iceland and Denmark) claimed territorial waters ranging in breadth from three to 12 nautical miles. The concept of such a territorial sea became firmly fixed as a legal rule by the 1958 *Convention on the Territorial Sea and Contiguous Zone*, which affirms that sovereignty of a coastal state extends to a belt of sea adjacent to its coast. While UNCLOS I was not able to agree upon a fixed limit for the territorial sea, this Convention did establish legal rules that codified the customary norms of territorial waters and the right of Arctic states to assert such a claim. Not surprisingly, all Arctic states had made such territorial sea claims.

The 1958 *Convention on the Continental Shelf* recognizes the exclusive sovereign rights of coastal states to the seabed and subsoil resources of any continental shelf, inclusive of those in Arctic region, to a water depth of 200 meters, or beyond that limit, to a depth where the "superjacent" waters permits the exploitation of natural resources of the shelf. If a coastal state chooses not to exploit such resources, its sovereign rights will preclude any other state from undertaking such exploitation without its express consent. For Arctic states, in particular, legal implications of having a continental shelf offshore the Arctic rim were clarified and codified.

Another convention adopted by UNCLOS I was the *Convention on Fishing and Conservation of Living Resources of the High Seas*, which reaffirmed the freedom of all states' nationals to fish in and on the high seas, subject to certain rights and interests of coastal states. States whose national's fish for certain stocks in some high seas areas can adopt measures deemed necessary for conservation of the stock, and when other states are also fishing for the stock cooperation in management of the fishery is expected. In the case of disputes, any concerned state can initiate proceedings leading to a binding decision by an impartial body, ostensibly a special commission appointed in accordance with provisions in the Convention.

Finally, UNCLOS I adopted the *Convention on the High Seas*. This instrument, which formalized much of what had been customary law of the sea, set out a number of standards that constitute basic rules of the contemporary law of the sea, many of which relate specifically to the Arctic Ocean. The waters “*not included in the territorial sea or in the internal waters of a state*”, that is waters beyond the control of any state or group of States, are known traditionally as the high seas (Cueller 1983). Nearly all of what is considered to be deep Arctic Ocean Basin falls within the high seas. Access to the high seas, inclusive of waters in the Arctic, belongs to all states, and no state may validly assert sovereignty over them. Freedom of the high seas includes, for both coastal and non-coastal states, the freedoms of navigation, laying pipelines and cables, over-flight, and fishing. Moreover, every state has the right to sail ships under its flag in the Arctic’s high seas. Warships sailing in the deep Arctic Ocean retain complete immunity from jurisdiction of any state, other than that of the flag state. The Convention on the High Seas also obligates parties who have ships sailing under their flag to ensure safety at sea, with regard to use of signals, manning of ships, construction, equipment, and seaworthiness of ships. Such fundamental principles of safety for shipping are critical for navigation through the rough ice-infested Arctic waters. Also of great import to the Arctic region, all parties to the Convention are obligated to require masters of their vessels to render assistance to any person found at sea, and to proceed with all possible speed to the rescue of persons in distress.

2.2.2. *1982 UN Convention on the Law of the Sea (UNCLOS III)*. While the 1958 Geneva Conventions were an important step in the development of the law of the sea they by no means resolved all ocean issues at that time and contained significant gaps. This was evident by the fact that in 1960 a Second UN Conference on the Law of the Sea (UNCLOS II) was convened in order to resolve outstanding issues concerning the territorial sea and a fisheries zone. Notwithstanding the failure of this Conference, the impetus continued for further development of the law of the sea and in 1973 the Third United Nations Conference on the Law of the Sea (UNCLOS III) commenced. At its conclusion in 1982, the largest multilateral international legal instrument had been

negotiated in the form of the UNCLOS III, containing 320 Articles, and 9 annexes, governing all aspects of ocean space. The Convention stands among the major achievements of the United Nations because it addresses a multitude of issues: territorial limits, economic jurisdiction, navigational rights, conservation and management of living resources, a marine scientific research regime and a system of settlement of disputes, among other things. Important features of the UNCLOS III which are important to this work:

- defines major maritime zones - Territorial Sea (Articles 2 to 16); Contiguous Zone (Article 33); Exclusive Economic Zone (Articles 55 – 75); Continental Shelf (Articles 76 to 85); and High Seas (Article 136).
- Article 76 refers to “continental shelf” as a juridical - and not a geomorphological - term which applies to an area of the seabed, beyond the territorial sea, falling under the sovereign rights of the coastal state for the purpose of exploring it and exploiting its natural resources. The natural resources consist of mineral and other non-living resources of the seabed and subsoil, together with living organisms belonging to sedentary species.
- definition of the continental shelf contained in article 76 of the Convention takes into consideration two possibilities: In the first case, the breadth of this zone is limited to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured. This occurs where the outer edge of the continental margin does not extend beyond 200 nautical miles. In the second case, the outer edge of the continental margin extends beyond 200 meters from the baselines. In this instance, the coastal state may delineate its continental shelf to a breadth greater than 200 nautical miles, in accordance with the criteria specified in article 76. The breadth of this Extended Continental Shelf shall not exceed 350 nautical miles, or in the alternative, extend beyond 100 nautical miles from the 2,500 metre isobath. In this case, the coastal state must pass the Appurtenance Test – the continental shelf must be the natural prolongation of the land territory of the state to the outer edge of the continental margin. Information on the limits of the continental shelf extending beyond 200 nautical miles shall be submitted by the coastal state to the Commission

on the Limits of the Continental Shelf. Beyond 200 nautical miles, coastal states will have to make modest payments or contributions in kind in respect of the exploitation of mineral resources of their continental shelf. These payments shall be made through the International Seabed Authority, which shall distribute them to state Parties to the Convention, taking particularly into account interests and needs of developing states (Colson, 2003, 2004).

- created three institutions to deal with special tasks (The International Seabed Authority; The International Tribunal for the Law of the Sea; and Commission on the Limits of the Continental Shelf)
- the Commission on the Limits of the Continental Shelf is to facilitate the implementation of the UNCLOS III in respect of the outer limits of the continental shelf beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured (Colson, 2003, 2004). Among the most significant achievements of the Commission are the adoption of Scientific and Technical Guidelines (CLCS/II) which are intended to provide assistance to coastal states regarding the technical nature and scope of the data and information which those states must submit to the Commission to enable it to make recommendations on the outer limits of the continental shelf beyond 200 nautical miles, and of annexes to the Guidelines (CLCS/II/Add.I). The Scientific and Technical Guidelines deal with geodetic, bathymetric, geophysical and other methodologies stipulated in article 76 for the establishment of the outer limits of the continental shelf, using such criteria as determination of the foot of the slope of the continental margin, sediment thickness and structure of submarine ridges.
- If a coastal state intends to establish, in accordance with article 76, the outer limits of its continental shelf (ECS) beyond 200 nautical miles, the Convention requires that “it shall submit particulars of such limits to the Commission on the Limits of the Continental Shelf along with supporting scientific and technical data as soon as possible but in any case within 10 years of the entry into force of this Convention for that state” (article 4, Annex II to the UNCLOS III). Due to strong concern of many states regarding a difficulty to complete the preparation of their submission before

2004 a shift of about 4.5 years of the 10-year deadline (May, 2009) was decided during the Meeting of States Parties in 2001.

For the Arctic states and Arctic Ocean these developments were of course very significant (Nordquist, 2005; Stokke, 2007). There are specific provisions in the UNCLOS III dealing with the unique law of the sea issues which arise in the Arctic Ocean. That is Article 234 (referred sometimes as Arctic Clause) which addresses pollution of the marine environment in ice-covered areas. Notwithstanding the self evident issues of drawing baselines along ice-covered coastlines, the status of ice under the law of the sea, the management of Arctic marine resources, no real attempt was made at UNCLOS III to address these questions (Rothwell, 1992; Timtchenko, 1996).

2.3. Issues Linked to Arctic Ocean and the Law of the Sea

UNCLOS III contains a number of provisions calling for a new vision of Arctic Ocean management (Rothwell, 1992, 1994; Timtchenko, 1996).

2.3.1. Arctic Shipping and Rights of Passage. A review of the history of the law of the sea demonstrates a tension between the rights of coastal states to progressively assert more extensive offshore sovereignty and jurisdiction and the rights of maritime states to enjoy freedom of navigation (McRae, 1976, 1983; O'Connell 1982; Lamson, 1987; Perry, 1997; Johnston, 2002; Pharand, 2007). Maintaining the notion of *mare liberum* - the freedom of the seas - that the oceans were not subject to national appropriation and that vessels enjoyed a complete and absolute freedom of the seas. Much of the 20th century, the notion of the freedom eroded by the extension of coastal state sovereignty and jurisdiction (Rothwell, 1992, 1994; Timtchenko, 1996; Pharand, 2007). Straits have presented a particular problem because of their great significance as corridors through which international maritime traffic passes. Following the acceptance of a 12 nautical mile territorial sea and the consequential revised claims of coastal to an extended territorial sea, straits have increasingly become enclosed within territorial sea areas. The importance of ensuring the need for a navigation regime which permitted continuous

passage of vessels through straits was confirmed in the UNCLOS III on the Territorial Sea and Contiguous Zone which provided that innocent passage of foreign through “*straits which are used for international navigation*” could not be suspended (Article 16(4)). The UNCLOS III has taken the regime of passage through international straits a step further by providing for a special regime of transit passage in Part III. These provisions essentially allow international shipping to pass through straits with the minimum of interference, provided that activities which may substantially impact upon the sovereign integrity and interests of the coastal state are not engaged in (Perry, 1997). The right of transit passage is to be enjoyed through “*straits which are used for international navigation between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone*” (Article 37).

Shipping issues have been of ongoing importance in the Arctic (Johnston, 2002). Here coastal state regulation of shipping has been more contentious due to the greater accessibility of navigation routes and their commercial and strategic importance. Because of the ice-covered nature of much of the Arctic Ocean, shipping issues arise in the waters adjacent to continental coastlines which during certain times of the year are free from ice and are suitable for navigation (Lamson, 1987). The growing evidence in support of global warming and its impact on the ice cover in the polar oceans would suggest that in the future even more areas will become ice-free resulting in greater ease of navigation (Moritz, 2002; Winton, 2006a,b). However, even ice-covered areas, especially in the Arctic, are not as difficult to navigate in as was previously the case. It has long been thought that specially built ice-breakers would be capable of navigating through Arctic ice and that there is the potential for the development of a sea route crossing the Arctic Ocean. In 1977, this potential was demonstrated when the Soviet nuclear-powered icebreaker *Arktika* became the first surface vessel to reach the geographic North Pole (Bulter 1978, Froloy 1993). There has also been a long history of submarine navigation of Arctic waters in the post World War II era with the UK, US and Russia all using Arctic waters as a region for the strategic deployment of nuclear powered submarine (Critcheley, 1984; Tunaander, 1989) . However, the main focus here is the operational

potential of traditional cargo carrying commercial vessels in Arctic waters, especially the Northwest Passage and Northeast Passage (Perry, 1997; Newton, 2005). While the transit passage regime developed by the UNCLOS III in principle provides for greater certainty in navigation through polar straits, the proclamation of baselines around parts of the Arctic in particular has resulted in some debate as to the particular navigational regime which is in place. In the case of both the Northwest and Northeast Passages therefore, issues remain regarding whether certain waters were always subject to innocent passage by international shipping, were always legitimately considered internal waters, are parts of “historic bays”, or now comprise the waters of an international strait (Perry, 1997; Nordquist, 2005).

2.3.2. Marine Environmental Protection. Like other oceans of the world, Arctic Ocean is protected by the existing international legal regime dealing with marine pollution (Newbury, 1980; Lamson, 1987; Rothwell, 1992; Timtchenko, 1996; VanderZwaag, 1997; Nordquist, 2005; Skjærseth, et.al., 2006). To that end major conventions such as the 1973 International Convention for the Prevention of Pollution from Ships (MARPOL) and its 1978 Protocol, and the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (London Convention) apply in Arctic waters. However, notwithstanding the extent and relative success of these international regimes, Arctic waters remain particularly susceptible to the effects of marine pollution as demonstrated in the case of the Exxon Valdez oil spill in Prince William Sound, Alaska, in March 1989 (VanderZwaag, 1997).

The UNCLOS III contains some very important provisions dealing with the protection of the marine environment (Young & Osherenko, 1994; Stokke, 2007). Under the provisions of Articles 192 to 196, states are required to establish environmental laws to protect and preserve rare and fragile ecosystems and endangered or threatened species; not to transform one type of pollution to another or not to transfer damage or hazards from one area to another; and to establish laws to prevent, reduce and control pollution

resulting from the use of technologies or the introduction of species, alien or new, which may cause harmful changes to the marine environment (VanderZwaag,et.al., 2001).

Relating to global and regional cooperation (Articles 197-201), states must cooperate at the appropriate international level for the purpose of promoting studies, undertaking scientific research, acquiring knowledge about pollution, studying the risks and remedies for pollution to the marine environment and the exchange of such data and research work. States must also cooperate at the appropriate international level for the formulation and elaboration of international rules, taking into account regional features for the development of contingency plans to respond to pollution incidents, and through competent international organizations to establish scientific criteria for the formulation and elaboration of international rules to prevent pollution of the marine environment (VanderZwaag,et.al., 2001).

Section 5 (Articles 207-212) and Section 6 (Articles 213-222) of Part XII outline the necessary areas for national legislation and the respective enforcement provisions relating to land-based sources of pollution, pollution- from activities in the Area, from the seabed, from or through the atmosphere, dumping and vessel-source pollution. Generally, states will be required to "establish laws regarding the prevention, reduction and control of pollution" from these various sources (Young & Osherenko, 1994). Concerning land-based sources, dumping and pollution from or through the atmosphere, states will also have to specifically adopt laws and regulations to prevent, reduce and control, "to the fullest possible extent, the release of toxic, harmful and noxious substances, especially those which are persistent". With regard to seabed and Area activities, states engaged in such activities are required to develop measures dealing, generally, with the regulation of such operations including equipment design, construction, etc. These laws should be no less effective than those established by the International Seabed Authority. In the area of vessel-source pollution, states are required to enact regulations with respect to flag vessels which ensure their safe operation at sea. This includes measures for preventing accidents and dealing with emergencies, preventing intentional and unintentional

discharges and regulating the design, construction, equipment, operation and meaning of vessels (Stokke, 2007).

For the Arctic, the reference in article 234 (hereinafter as **Arctic Clause**) to "ice-covered areas" is of great importance as it provides states with the ability to implement more stringent marine pollution provisions within their adjacent polar EEZs (Huebert, 2001, 2004). However, it is doubtful whether article 234 goes any further so as to be read as a provision conferring upon Arctic states the ability to implement extensive marine pollution provisions for those parts of the Arctic Ocean which fall beyond coastal state EEZ limits. Nevertheless, it is recognition of the special importance of ice-covered waters which are within the limits of national jurisdiction and that adjacent coastal states have a responsibility and interest to protect those waters (Article 234).

Other provisions in the UNCLOS III and developments in the law of the sea more generally may allow for greater cooperative action to be taken to protect Arctic Ocean (Young & Osherenko, 1994; VanderZwaag, et.al., 2001). One possibility is that the Arctic Ocean be classified as an "enclosed" or "semi-enclosed sea" (Alexander, 1974), but debated by others (Harden, 1986) -then Article 123 urges all littoral states to cooperate in coordinating conservation and exploitation of living resources, protection of the marine environment, and scientific research policies and programs.

2.3.3. Trans-boundary Fish Stocks. Currently, commercial fishing in the Arctic Ocean has been limited by the distribution of fish habitat and short fishing seasons. Due to impacts of climate change, ocean temperatures may shift, causing fish to enter new habitats and creating more favorable fishing conditions in the Arctic Ocean. The UNCLOS III contains some very important provisions dealing with trans-boundary living resources (VanderZwaag, 1997; Stenlund, 2002; Stokke, 2007). Article 63 requires states to coordinate management of overlapping fish stocks within the EEZs or of fish stocks straddling the EEZ and high seas. Article 64 requires states to cooperate to ensure conservation and promote optimum utilization of highly migratory species, in particular

tuna. Article 66 requires states to cooperate in conserving and managing trans-boundary anadromous stock (those fish that spawn in rivers and spend much of adult life at sea, such as Arctic char). Article 65 requires states to cooperate in conserving marine mammals and in the case of cetaceans (whales, porpoises, dolphins) requires states to work for conservation through appropriate international organizations.

2.3.4. Indigenous Peoples. Arctic has been inhabited by several different groups of peoples, including the Inuit, Sami, the Nenets, the Yakut and the Chukchi. These peoples have traditionally lived a subsistence culture and many communities were located along coastal areas because of the abundance of sea life (Nuttall, 2000). The Inuit (who inhabit parts of Alaska, northern Canada and Greenland) in particular developed a culture which depended on the exploitation of animals found on the sea ice. As a result, rights over and the ability to use sea ice for traditional purposes have great significance to these peoples. Indigenous peoples in the Arctic have increasingly become concerned about not only the protection of their culture but also environmental impact and bodies such as the Inuit Circumpolar Conference (ICC) have helped to give a political voice to those concerns. There has also been a gradual process of reconciliation of land claims throughout some parts of the Arctic, especially in Canada and the United States, which have significant implications for adjacent maritime areas. Any discussion of Arctic law of the sea issues therefore needs to take into account the existing and potential rights of Arctic indigenous peoples over maritime areas and marine resources, and their concerns for marine environmental protection (VanderZwaag & Pharand 1983).

2. 4. Maritime Claims

There is little about Arctic maritime zone claims which are particularly distinctive to the Arctic- most reflect a standard law of the sea approach (Shusterich, 1984; Rothwell, 1992; Timtchenko, 1996; Macnab, 2006a,b; Oude Elferink, 2001a,b; Oude Elferink & Rothwell, 2001; Scovazzi, 2001; Elferink & Johnson, 2006; Stokke, 2007). Canada, Denmark (Greenland), Finland, Iceland, Norway, Sweden and Russia have ratified the 1982 UNCLOS (Table 2.3 and Annex 1). Only USA has not ratified. Summary of most of

the Arctic states claim 12 nm territorial seas, their continental shelf boundaries extend to the continental margin or to 200 nm or claim EEZ according to coordinates or by coordination with neighboring states or by treaty and 200 nm is appended in Annexes. Table 2.4 provides a summary of current claims to maritime zones in the Arctic. Detailed summary notes with respective Acts, Orders, Decrees is provided in Annex 2.

The USA is not a party to UNCLOS 1982. The USA claims sovereignty over a 12nm territorial. Over 12 nm contiguous zone, it may exercise the control necessary to prevent infringement of its customs, fiscal, immigration, or sanitary laws or regulations within its territory or territorial sea, and to punish infringement of the above laws and regulations committed within its territory or territorial sea. The USA also claims jurisdiction and control over natural resources and sea bed of the continental shelf beneath the high seas but contiguous to the coasts of the United States. The USA recognizes the sovereign rights of the coastal state over a 200 nm EEZ measured from the baseline. In this zone, the USA claims sovereign rights for the purpose of exploring, exploiting, conserving and managing of the natural resources of the waters, seabed and subsoil of the zone, as well as the production of energy from water, currents and winds (Charney, 1992; Smith & Roach, 1992).

Table 2.3. Arctic states and the Law of Sea Conventions.

<http://www.un.org/Depts/los/index.htm>

State Party	1958 Territorial Sea	1958 High Seas	1958 Fishing/ Conservations	1958 Continental Shelf	1982 UNCLOS
Canada				X	X
Denmark	X	X	X	X	X
Finland	X	X	X	X	X
Iceland					X
Norway				X	X
Russian Fed.	X	X		X	X
Sweden				X	X
USA	X	X	X	X	

Table 2.4. Current Claims to Maritime Zones in the Arctic.

<http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/claims.htm>

	Territorial Sea	Contiguous Zone	Exclusive Economic Zone	Continental Shelf (+outer limit)	Fisheries Zone
Canada	12	24	200	CM/200 ²	
Denmark	12 ³	24	200/DLM ⁴	200m/ EXPL. ⁵	200 ⁶
Finland	12 ⁷	14 ⁸	Defined by coordinates	200/EXPL.	* ⁹
Iceland	12		200	CM/200	
Norway	12	24	200	CM/200	200 ¹⁰
Russian Fed.	12	24	200	CM/200	
Sweden	12		DLM	200m/EXPL.	
USA	12	24	200 ¹¹	CM/200	

2.5. The Extended Continental Shelf

As mentioned above, the Article 76 of the UNCLOS III requires a coastal state to submit information on the limits of its continental shelf beyond 200 nautical miles to the Commission on the Limits of the Continental Shelf (hereinafter as CLCS), within the applicable 10 year time limit (Gardiner, 1987; Rothwell, 1992; Timtchenko, 1996; Colson, 2003, 2004). The Commission shall make recommendations to the coastal state on matters related to the establishment of the outer limits of the continental shelf. To do that, Arctic coastal states have already launched mapping programs, using sound produced by ship-towed seismic arrays to probe sea-floor geology and multibeam sonars to draw detailed three dimensional maps of the Ocean bottom. Using these maps, states might be able to justify extending their boundaries up to 350 nautical miles offshore if

² Outer edge of the continental margin, or to 200 nautical miles where the outer edge does not extend up to that distance.

³ Act No. 200 of 7 April 1999 on the delimitation of the territorial sea does not apply to the Faroe Islands and Greenland but may become effective by Royal Decree for those parts of the Kingdom of Denmark with the amendments dictated by the special conditions prevailing in the Faroe Islands and Greenland. As far as Greenland is concerned, the outer limit of the external territorial waters may be measured at a distance shorter than 12 nautical miles from the baselines.

⁴ The symbol DLM is used when national legislation establishes the limits of a given zone by reference to the delimitation of maritime boundaries with adjacent or opposite States (or to a median (equidistant) line in the absence of a maritime boundary delimitation agreement).

⁵ Depth of exploitability (200m - depth of 200 metres.)

⁶ For Greenland and Faroe Islands.

⁷ Extends, with certain exceptions, to 12 nautical miles, unless defined by geographical coordinates. In the Gulf of Finland, the outer limit of the territorial sea shall at no place be closer to the midline than 3 nautical miles, according to the Act amending the Act on the Limits of the Territorial Waters of Finland (981/95).

⁸ Two miles beyond the outer limits of the territorial sea.

⁹ Defined by coordinates.

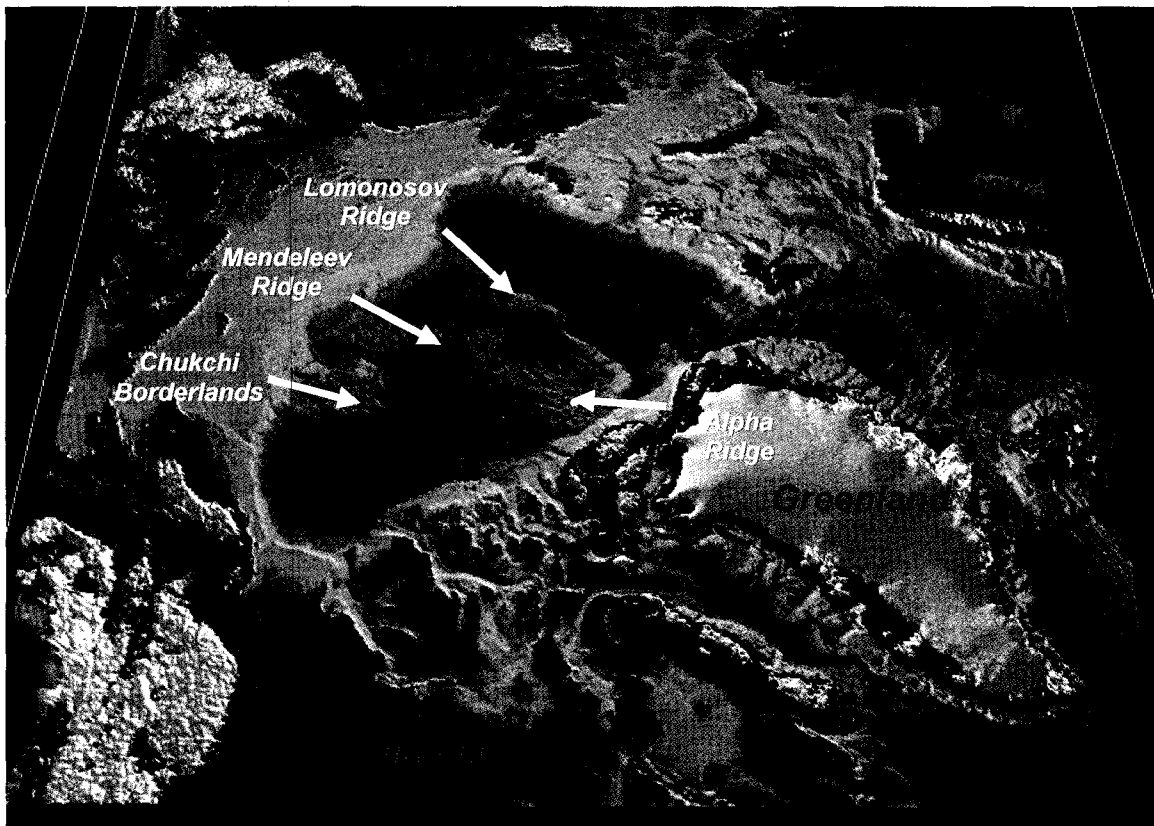
¹⁰ Jan Mayen and Svalbard.

¹¹ Includes Puerto Rico, U.S. Virgin Islands, American Samoa, Guam, Johnston Atoll, Palmyra Atoll, Midway Island, Wake Island, Jarvis Island, Kingman Reef, Howland Island, Baker Island, Northern Marianas, and Navassa Island.

there is an obvious shelf. Under more complicated scenarios, however, governments will need to show that submerged ridges are part of their continental crust, or lay claim to piles of sediment that have slid off the continental margin.

In the Arctic, there are three areas beyond 200 nautical miles from the coast that may eventually be included in the continental shelves of the coastal states (Rothwell, 1992, Timtchenko, 1996, Oude Elferink, 2001a,b). By far the largest of these is formed by the central part of the Arctic Ocean, which is surrounded by the 200 nautical mile zones of Canada, Denmark (Greenland), Norway (Svalbard), the Russian Federation and the United States (Figure 2.8).

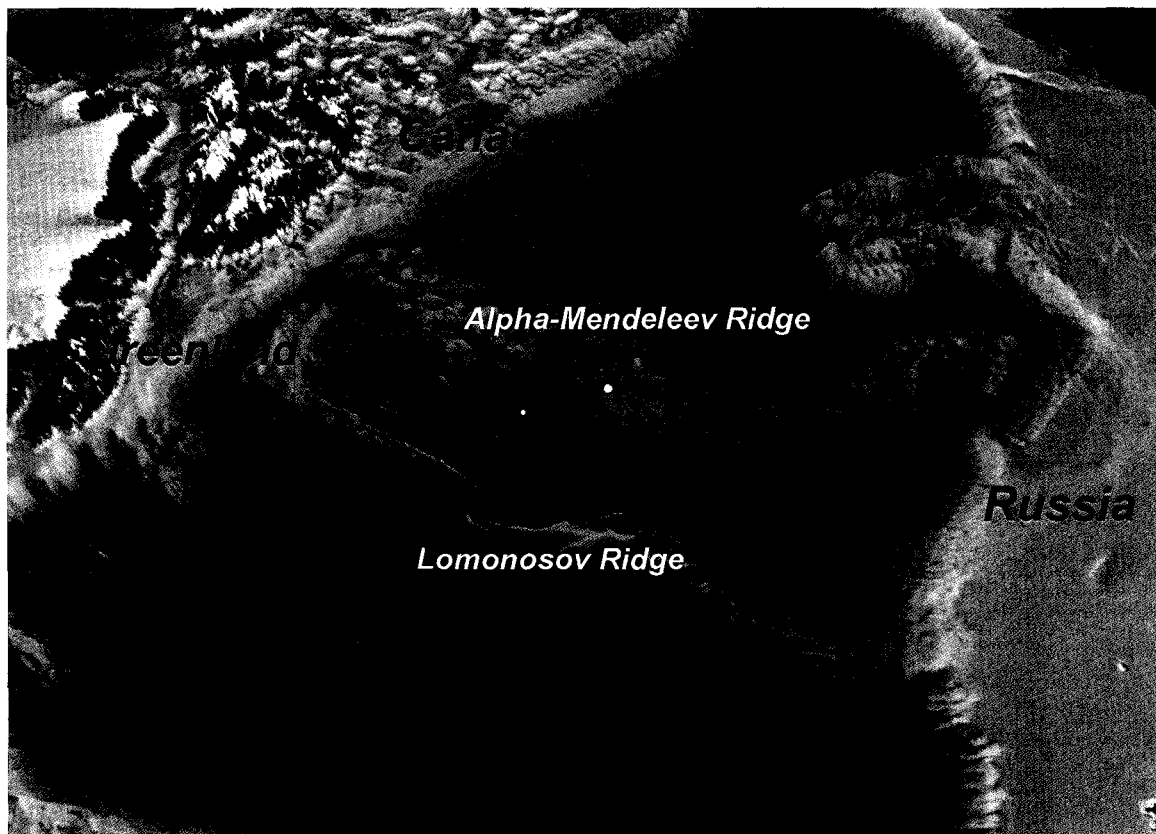
Figure 2.8. Natural Prolongations in the Arctic Ocean. Source- GSC File.



Two smaller areas are situated in the Barents Sea and the western part of the Norwegian Sea. The area in the Barents Sea (commonly referred to as the "Loop-hole") is surrounded the 200 nautical mile zones of Norway and the Russian Federation and the area in the Norwegian Sea by those of Denmark (Greenland and the Faroe Islands), Iceland and

Norway (Jan Mayen, Svalbard and its mainland coast). The establishment of the outer limits of the continental shelf in the Barents Sea does not seem to raise complicated issues of interpretation in respect of Article 76 (Oude Elferink, 2001a,b). Russia's submission is in temporary abeyance ((Brubaker, 1999), pending the presentation of new supporting information to the CLCS (Macnab, et.al. 2007); Norway's submission remains in the hands of the CLCS. A Russian Federation claim is based on the idea that the Alpha-Mendeleev Ridge System, a huge undersea formation that bisects the Arctic, is an extension of the nation's land mass. But the Canada and other Arctic states disagree. The other three Arctic states (Canada, Denmark, and the USA) are assembling the necessary data sets in support of their cases. A provisional analysis suggests morphological breaks in natural prolongations (Macnab, personal communication) (Figure 2.9).

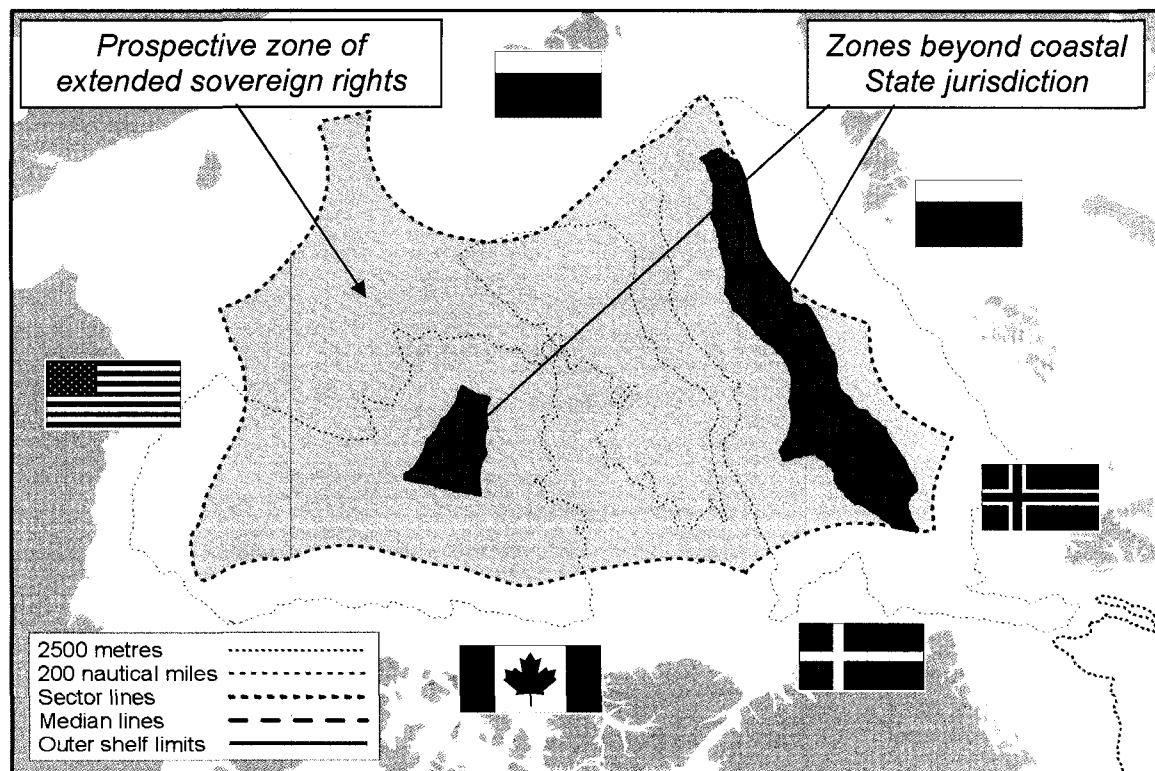
Figure 2.9 The Arctic Ocean: Morphological Breaks In Natural Prolongations. Source- GSC File.



Therefore it is only a matter of time until the first Arctic Extended Continental Shelf is proclaimed, to be followed by the others in succession. A provisional analysis suggests

that only two areas in the central part of the Arctic Ocean are situated beyond both constraint lines defined in article 76(5) of the UNCLOS III (parts of the Canada Basin, the Gakkel Ridge, and the high seas enclave in the Norwegian Sea) possibly cannot be included in the continental margin as defined in article 76 of the LOS Convention and where Arctic coastal states could not exercise sovereign rights (Macnab, 2004). These two excluded zones form a part of The Area (Figure 2.10.), which incorporates all components of the global seabed that lie beyond national jurisdiction, and where mineral resources on and below the seabed comprise the 'common heritage of mankind'.

Figure 2.10. The central Arctic Ocean: an enclave of combined continental shelves? (Source Macnab, 2006a,b)



2. 6. Maritime Agreements

The list of Arctic maritime agreements among Arctic states is summarized in Annex 3 (Source- <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/europe.htm>)

Norway/Russian Federation - The first maritime boundary agreement was concluded in 1957 between Norway and the Soviet Union to establish the boundary between Norway and the Russian Federation in the Varanger Fjord. A first segment of this boundary

delimited the territorial sea of both states. The parties further agreed that they would not extend their territorial sea beyond the second segment of the boundary, which is in large part within 12 nautical miles from the relevant baselines.

Denmark/Canada- Denmark and Canada have delimited part of their continental shelf through an agreement concluded in 1973. The boundary line also has been used to divide the fishing zones of the two states (Stewart, 1991). The boundary, which measures nearly 1500 nautical miles, starts in the Davis Strait, at approximately 200 nautical miles from the relevant coasts. The northern terminal point of the boundary lies in the Robeson Channel, just before it enters into the Arctic Ocean. The area to the north of this latter terminal point still has to be delimited. A small part of the boundary in the Kennedy Channel has not been delimited, because of a sovereignty dispute over Hans Island. The boundary stops within less than 300 meters to the south and the north of the island, which is about 1 kilometer in diameter.

Russian Federation/United States - The conclusion of a maritime boundary agreement by the then Soviet Union (Russian Federation) and the United States in 1990 were probably in large part related to resource concerns (fisheries and hydrocarbons) in the Bering Sea. However, for the Soviet Union another consideration may have been that the Agreement delimits maritime zones in the Chukchi Sea. The 1990 Agreement also delimits the continental shelf beyond 200 nautical miles between the United States and the Russian Federation. The 1990 Agreement, which is applied provisionally, has not yet entered into force because the Russian Parliament thus far has not given its approval to ratification.

Denmark, Iceland and Norway- Denmark, Iceland and Norway have delimited the boundaries of their 200 nautical mile zones in the northwestern Atlantic Ocean through a number of consecutive agreements. Two agreements of 1980 and 1981 between Iceland and Norway establish that the fishery zone and continental shelf boundary between Jan Mayen and Iceland coincide with the outer limit of the Icelandic 200 nautical mile zone.

The continental shelf is only delimited in areas which are within 200 nautical miles from the coasts of both states.

The agreement delimiting the continental shelf also establishes a joint development zone, which straddles this boundary. Limited weight was also given to Jan Mayen in a 1995 Agreement between Denmark and Norway implementing the Judgment of the ICJ in the Jan Mayen case.

2.7. Pending Delimitation Issues

Source- <http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/index.htm>;

Rothwell, 1992, Timtchenko, 1996)

The Barents Sea (Norway/Russian Federation)- Negotiations on a maritime boundary between Norway and the Soviet Union (Russian Federation) were first proposed by Norway in 1967. Since then, Norway and the Russian Federation (until 1992 the Soviet Union) have been meeting regularly to discuss this issue. Both states have to delimit a maritime boundary in the Barents Sea and the Arctic Ocean. The relevant coasts for this boundary in part are formed by the mainland coasts. For other areas the Russian Islands of Novaia Zernlia and Franz Joseph Land and the Svalbard archipelago of Norway provide the relevant coasts. The central part of the Barents Sea is beyond 200 nautical miles from the coasts, but seems to be situated well within the continental margin. Another area beyond 200 nautical miles, which may be part of the continental shelf of both states under article 76 of the UNCLOS III is situated to the north of Franz Joseph Land and the Svalbard archipelago.

The Beaufort Sea (Canada/USA)- Canada and the United States have to delimit their territorial sea and 200 nautical mile zones in the Beaufort Sea. Available information suggests that there does not exist any, or only a limited, overlap of continental shelf beyond the 200 nautical mile limit in this area. The existence of different views concerning the location of their maritime boundary first transpired when Canada and the

United States negotiated on a continental shelf boundary (1976 and 1977) and defined the limits of their 200 nautical miles zones. Canada applied a meridian (141° W) to define the lateral limit of its zone with the United States in the Beaufort Sea, whereas the United States employed the equidistance method (Stewart, 1991). This resulted in an overlapping area of some 6,250 square nautical miles. This area is mainly of importance for its hydrocarbon potential.

The Lincoln Sea (Canada/Denmark)- Canada and Denmark still have to delimit the boundary of their 200 nautical mile zones in the Lincoln Sea to the north of the terminal point of the boundary agreed upon in 1973. Reportedly, at the time the 1973 Agreement was concluded it was agreed upon not to extend the boundary further north until more would be known, about the area and its resources (Stewart, 1991).

Greenland/Svalbard- A final area of overlapping 200 nautical mile zones is situated between Greenland and Svalbard. There seem to have been some contacts between Denmark and Norway over the delimitation of this area, but there apparently is no urgent need for a delimitation.

The Continental Shelf Beyond 200 Nautical Miles- Apart from the continental shelf boundaries in areas beyond 200 nautical miles from the coast discussed above, there are a number of other areas in which these continental shelves may overlap between neighboring states (Macnab, 2006a,b; Kunoy, 2007). These delimitations thus far do not appear to have been discussed in any detail between the states concerned. The present attention for the definition of the outer limits of the continental shelf beyond 200 nautical miles in conformity with article 76 of the UNCLOS III may induce the states concerned to also look into its delimitation (Oude Elferink, 2001a,b). However, although states have to address the issue of overlapping areas, they are not required to delimit these before making a submission to the CLCS.

Chapter 3- Marine Scientific Research and the Law of the Sea

3.1. Context

Marine scientific research refers to activities whose purpose is to expand general scientific knowledge of the marine environment. The research combines direct observation of this environment with a systematic search for understanding of the processes that control it (Wooster, 1974; Roach, 1996). So marine scientists are explorers as well as scientists, and much of the world's ocean is yet to be explored (Charnock, 1984).

Because of the range of scientific knowledge required to understand all of the processes involved, marine scientific research is usually divided into a variety of disciplines (Bateman, 2005). In fact there is a great deal of overlap between the disciplines, because many aspects of the marine environment are influenced by interacting physical, chemical and biological processes (Charnock, 1984). Activities undertaken include: physical and chemical oceanography, marine biology, fisheries research, scientific ocean drilling and coring, geological/geophysical studies, as well as other activities with a scientific purpose. It is this interdisciplinarity which makes marine scientific research activities more interesting (Dzurek, 1991; Heffernan, 2007; Bernal, 2007). Research cruises and shore-based field expeditions often involve scientists from a range of different scientific backgrounds working together to solve key questions concerning marine environmental phenomena (Soegiarto, 1990). Success depends on weather conditions and on sophisticated and sometimes temperamental instrumentation (Vargas, 1985). Such expeditions are hard work and often extremely uncomfortable, but also highly stimulating and rewarding.

Part XIII of UNCLOS III deals with marine scientific research and it is implemented by the Intergovernmental Oceanographic Commission (hereinafter as **IOC**) of UNESCO through its Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS). IOC/ABE-LOS is an Intergovernmental body composed of two national experts (one with training in the Law of the Sea and the other with training in marine sciences) from IOC Member

states. Other major international institutions and cooperation in marine scientific research are: the International Council for the Exploration of the Seas (ICES), the Scientific Committee on Oceanic Research (SCOR), and North Pacific Marine Science Organization (PICES). The organizational purpose of each is to further investigation of the Ocean and its resources (Charnock, 1984; Wooster 1989, 1990).

This chapter, as a general introduction on marine scientific research, attempts to provide an overview of marine scientific research legal framework. It discusses the evolution of the international legal regime which first formerly affected marine scientific research in 1958, and considers the effects that this regime had on marine research. The current regime, UNCLOS III Part XIII, is considered in two phases: (a) the content of the marine science provisions, and (b) their effects on the conduct of marine scientific research. The conclusion examines the impact which has had on the marine scientific research.

3.1.1. Definition of Marine Scientific Research. UNCLOS III does not explicitly define marine scientific research, and therefore does not define which activities are included in, or excluded from, the marine scientific research (Soons, 1982; Roach, 1996). Obvious questions are: *what is research, where can it be undertaken, who is responsible for conducting the research and to whom does the data belong.*

Article 277 paragraph (a) of UNCLOS III includes a non-exhaustive list of activities that may be considered to be part of "marine scientific and technological research". This provision indicates that these activities are indeed part of marine scientific research and, as a result, fall into the ambit of the marine scientific research regime under Part XIII of UNCLOS III. The results of marine scientific research are generally made publicly available (Article 249).

"Survey activities", "prospecting" and "exploration" are dealt with in other parts, notably Parts II, III and XI, and Annex III of UNCLOS III rather than Part XIII (Bernal, 2007). Consequently, it may be argued that these activities do not fall under the regime of Part XIII.

3.2. Evolution of the Marine Scientific Research Regime

Prior to the 1950's marine scientists were relatively free to work anywhere in the world's oceans outside a nation's territorial sea. There was no accepted international law governing marine scientific research (Wooster, 1977; Knauss, 1985). Where permission was required, it was generally for activities to be carried out in the territorial sea, and arrangements were often made through informal contacts with scientists in the coastal states (Kildow, 1973). Since the end of the World War II interest in the oceans and its resources has steadily grown, and with this interest coastal states began to make expansive claims of jurisdiction or sovereignty over the waters adjacent to their coasts (Wooster 1984). In 1945, the USA issued the Truman proclamations- one "*claiming control over the natural resources of the seabed on its continental shelf* (Proclamation No. 2667) "and the other claiming a "*conservation zone in those in those areas of the high seas contiguous to the coasts of the United States wherein fishing activities have been or in the future may be developed and maintained on a substantial scale* (Proclamation No. 2668)" - other nations soon emulated and exceeded the claims of the United States (Hollick, 1981; Koh, 1984). In 1947, Peru and Chile extended their national sovereignty out to 200 miles.

Additionally, scientific and technical developments increased interest in the resource potential of the oceans. By the 1950s, seismic reflection profiling had become an important source of maritime information. Bathymetric mapping led to the theory of plate tectonics and contributed to an understanding of the geophysics of mineral deposits. Interest in marine science further broadened globally, leading to such major ocean-related programs as the International Geophysical Year, the Deep Sea Drilling Project and the International Decade of Ocean Exploration (U.N. Office for Ocean Affairs and the Laws of the Sea, 1991).

In an effort to cope with the unsettling trend toward greater claims of national jurisdiction in the ocean (Mangone, 1980), as well as the increased scientific attention

being paid to marine resources, the United Nations held its First Conference on the Law of the Sea (UNCLOS I) in 1958. The Conference adopted four conventions, as discussed in chapter 2: the Convention on the Territorial Sea and the Contiguous zone, the Convention on Fishing and Conservation of the Living Resources of the High seas, the Convention on the High seas, and the Convention on the Continental Shelf (See Annex 4 for Summary). The Convention on the Continental Shelf entailed the first specific restriction on the conduct of marine scientific research in an international context (Ross & Landray, 1987), providing in part (Article 5 (8)):

The consent of the coastal state shall be obtained in respect of any research concerning the continental shelf and undertaken there. Nevertheless the coastal state shall not normally withhold its consent if the request is submitted by a qualified institution with a view to purely scientific research into the physical or biological characteristics of the continental shelf, subject to the proviso that the coastal state shall have the right, if it so desires, to participate or to be represented in the research, and that in any event the results shall be published.

The rights of the coastal states to explore and exploit the resources were extended “to a depth of 200 meters, or beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources” (Article 1). The inability of the Conference delegates to agree on either the maximum breadth of the territorial sea or “exploitability” language for the continental shelf doctrine led to the Second Conference on the Law of the Sea. It met in 1960 in Geneva (UNCLOS II), but again failed to resolve these issues.

Marine scientific research encompasses essentially four discrete types of oceanographic research (Burke, 1976; Duxbury, 1994):

1. Physical oceanography, which studies waves, tides, currents, magnetism, heat exchange, etc.;
2. Chemical oceanography, which is concerned with the ocean's complex chemical composition;

3. Marine biology, studying the plant and animal organisms of the oceans; and
4. Marine geology and geophysics, which is primarily concerned with the topography and properties of the ocean floor.

Each of the marine sciences has research needs which cannot be confined to specific parts of the ocean or to selected regions (Wegelein, 2005). Ocean waters, for example, are not homogeneous so that measurements of properties in one area cannot be extrapolated to others, continental shelf studies for purely scientific purposes cannot be confined to the shelf off the United States or any other state, and studies in biological oceanography illustrate most dramatically the need for research in a great variety of ocean regions (Committee on Oceanography, National Academy of Sciences, 1996):

Research on benthic organisms, particularly animals, is hampered even more than research on plankton by the great number of species, most of which are not well known. Since the species are not usually as widely distributed as planktonic organisms, each geographic region must be studied separately from even a taxonomic viewpoint.

Ocean scientists contend that “*unimpeded access to all parts of the oceans is vital to the accomplishment of their work*”. Since schools of fish, geologic structures, and current cross multiple zones, it may also require transit through zones of more than one coastal state (Brown, et.al. 1977; Fabian, 1973, Charney, 1977).

The Continental Shelf Convention of 1958 (UNCLOS I), the extension of jurisdiction by coastal states over adjacent portions of the high seas following the Truman Proclamations of 1945, the failure to arrive at any agreement on the breadth of the territorial sea (UNCLOS II), as well as various proposals for exclusive fishing zones in combination with the territorial sea, had complicated the conduct of marine scientific research in at least four respects (Schaefer 1968):

- (a) creating uncertainty as to the geographical extent of jurisdiction of the coastal state with respect to the continental shelf and exclusive fisheries zones;

- (b) creating uncertainty as regards the kinds of research which were subject to control by the coastal state;
- (c) creating uncertainty regarding the procedures to be followed in obtaining permission to conduct marine research; and
- (d) creating the prospect that portions of the ocean would become inaccessible if coastal state permission was not obtained.

Before the preparatory sessions for the UNCLOS III, which were held in New York and Geneva (1971-73), three regional agreements on Ocean policy affirmed the right of coastal states to expand the limits of their jurisdiction and to control scientific research. In 1970, 15 Latin American States met in Lima and approved a "*Declaration of the Latin American States on the Law of the Sea*", Resolution 5 of which requires prior authorization for the conduct of scientific research. The Caribbean states met in Santa Domingo in 1972 and confirmed the right of coastal states to claim a 200 mile 'patrimonial sea' within which they have the "right to regulate the conduct of scientific research" (Hjertonsson, 1973). African nations expressed their position at a meeting of the Council of Ministers of the Organization of African Unity (OAU), held at Addis Ababa in 1973, and affirmed the right of coastal states to establish a 200 mile EEZ, wherein scientific research shall only be carried out with the consent of the coastal state (Okoye, 1973; Elias, 1988). These declarations together with the discussions at the Fourth Session of Sub-Committee III of the Law of the Sea Preparatory Committee in Geneva on 17 July-18 August 1972, indicate a strong preference on the part of a significant number of states, for the most part developing, for coastal state control of scientific research in areas off their coasts. These states have been successful in having this reflected in the informal draft treaty texts at UNCLOS III (Ross, 1985).

In summary, the needs of the marine scientific community regarding the international legal regime which governed marine scientific research in 1970s may be summarized as follows:

1. to clarify the precise degree of jurisdiction which coastal states had over scientific research in the various international maritime zones (Brown 1969);
2. to devise some mechanism to facilitate the granting of consent where it was required (Adams, 1987);
3. to seek some agreement on a new conventional regime for marine research that would reduce coastal state control to the minimum necessary for the protection of legitimate state interest (Birnie, 1995); and
4. to ensure that no unnecessary impediments were incorporated into any new regime which might be developed for the seabed or water column above it (Burke 1976).

Also the positions taken by states on the issue of freedom of marine scientific research are fairly well defined during the UNCLOS III. The developed countries who possess a significant oceanographic research capability, such as the USA, Japan, the UK, France and the Federal Republic of Germany, generally support minimal restrictions, while the developing countries of Latin America, Asia and Africa demand expanded coastal state control. Nevertheless, these groups are not monolithic and perspectives may vary depending on factors other than a state's status as developed or developing (Bello, 1974; Franssen, 1973,1976; Shapley, 1973).

3.3. Key Provisions of UNCLOS III Pertaining to Marine Scientific Research

Although other portions of the UNCLOS III contain provisions relating to marine scientific research, most of the Articles pertaining to marine scientific research are addressed in Part XIII (Annex 5). UNCLOS – Part XIII Marine Scientific Research sets out the internationally agreed requirements for research vessels working in foreign waters.

All states and “competent international organizations” have a right to conduct marine scientific research on the seabed and in the water column beyond the limits of coastal state EEZs (Articles 87, 143, 256, and 257). Coastal states have the exclusive right to

authorize and regulate the conduct of marine scientific research in their internal and archipelagic waters as well as their territorial seas (Article 245). In the EEZ and on the continental shelf, the coastal state may withhold its consent to the conduct of marine scientific research in five situations (Article 246). Three of these involve projects which:

- (a) are of direct significance for the exploration and exploitation of natural resources, whether living or non-living;
- (b) involve drilling, the use of explosives or the introduction of harmful substances into the marine environment; or
- (c) involve the construction, operation or use of artificial islands, installations or structures.

Consent may also be withheld:

- (d) if inaccurate information regarding the nature and objectives of the project was supplied to the coastal state; or
- (e) if the researching state has outstanding obligations to the coastal state from a prior research project.

Even though paragraph 3 of Article 246 requires that coastal states grant consent “*under normal circumstances*” and “*establish rules and procedures ensuring that . . . consent will not be delayed or denied unreasonably,*” these provisions have only a limited effect on coastal states and offer no guidance as to what is unreasonable (Adams, 1987; Ross & Landry, 1987). Further, in seeking to challenge a denial as unreasonable, the researching state can not obtain a review through the compulsory dispute settlement provisions of Article 297. Paragraph 4 of Article 246 states that “*normal circumstances may exist in spite of the absence of diplomatic relations between the coastal state and the researching state,*” suggesting that marine scientific research may be conducted in the absence of diplomatic relations between the coastal state and the researching state (Soons, 1982).

Nevertheless, it does not consider other relations or political conditions. For example, the coastal state may decide that certain military or economic conditions warrant a ban on marine scientific research in its EEZ. Thus, it would appear that the coastal state has

considerable discretion in deciding what constitutes “normal circumstances” (Soons, 1982; Roach, 1996).

Article 248 describes the items of information which the research request must contain and requires submission to the coastal state at least six months in advance (Roach, 1996). Applications for clearances to work in foreign waters are made through a Standard Form A which sets out the information required for such clearances under the conditions set out under UNCLOS III. In this respect the UNCLOS III more clearly delineates the information to be provided than did the 1958 Geneva Convention. However, some coastal states have interpreted this duty expansively and demanded crew lists and vital ports of call and a complete itinerary (1958 Convention on Fishing and Conservation of the Living Resources of the High Seas). Another potentially burdensome provision for the researching state is Article 249, which lists “duties” of compliance - a set of additional criteria upon which the coastal state may deny a research clearance request (1958 Convention on the High Seas). First, the researching state may be required to cover the costs of participation in the project by coastal state scientists. This may include not only participation on board the research vessel at sea but possibly the “preparatory” and “evaluation” stages of the project also (U.N. Office of Ocean Affairs and Law of the Sea, 1991). Other required conditions may include the duty to provide “*preliminary reports as soon as practicable*” with the “*final results and conclusions after the completion of the research*”; the obligation to provide access to “*all data and samples*”; to provide an “*assessment of such data, samples and research results*”; and to “*inform the coastal state immediately of any major change in the research program*” (Article 249, Paragraphs (h), (c), (d), (e) and (f)). These provisions apply to research projects coming under “the duty to grant consent in normal circumstances” according to Article 246, paragraph 3. In all other cases, the coastal state may set any conditions it deems appropriate (Soons, 1982).

On the positive side, Article 252 encourages timely responses from the coastal state to research requests, by implying consent unless the coastal state responds within four months. But, if for example, the United States does not accede to the Convention, as a

nonmember it may not be entitled to this privilege of implied consent (Ross and Landry 1987; Ross & Fenwick, 1989; Roach, 1996). A further note of uncertainty is contained in Article 253, which would permit the coastal state to suspend or cancel research activity in its EEZ or on the continental shelf once the research vessel is under way for either not complying with the provision of Article 249 (duties which the coastal state may impose as a condition of consent) or for failure to conduct the research in accordance with the information communicated according to Article 248 (the duty to provide information to the coastal state). What makes this provision so troublesome for the researching state is the fact that under Article 253 the coastal state may suspend research authority and the researching state has no recourse (Soons, 1982).

Coastal state authority over marine scientific research is virtually absolute in its internal waters and 12 mile territorial sea, qualified but not significantly in its 200 mile EEZ - a marked change from pre UNCLOS III (Ross, 1985, 1987; Ross & Landry, 1987; Ross & Fenwick, 1989) . Why? What happened to the traditional Grotian notion that the rule of freedom of the seas reigned throughout this vast expanse of ocean? What happened to the carefully drafted Geneva Conventions on the Law of the Sea?

3.4. Effect of Extended Coastal State Jurisdiction upon the Marine Scientific Research

3. 4.1. Coastal State Regimes Affecting Marine Scientific Research. Prior to UNCLOS III, unsettling and diverse claims of coastal state jurisdiction seaward had become a concern of many maritime countries; these claims were negotiated during the treaty process into a comprehensive and coherent regime of coastal state jurisdiction (Ross & Landry 1987). Essentially ten regimes were established by UNCLOS III: internal waters, the territorial sea, international straits, archipelagic waters, Exclusive Economic Zones, the continental shelf, high seas, islands, enclosed or semi-enclosed seas, and the "Area." Of these five will be considered as primarily relevant to marine scientific research:

1. **Internal Waters.** Coastal states have absolute sovereignty over internal waters, which generally include harbors, lakes, and rivers. This regime extends landward

from the baseline from where the territorial sea is measured - normally the low-water line along the coast (Stevens, 1986). Note here, not all states have established baseline claims. Where coasts are deeply indented or are fringed with islands, a system of straight baselines is established to demarcate inland waters from the territorial sea (Article 7). Access to inland waters, except in cases of force majeure, must be preceded by a request for coastal state approval (Stevens 1986).

2. The Territorial Sea. UNCLOS III, Article 2, significantly extends coastal state sovereignty over the airspace, sea surface, water column, and subsoil of the territorial sea from three (the previous norm) to twelve nautical miles (UNCLOS III section 2). However, coastal state jurisdiction in its territorial sea is subject to the right of “innocent passage” (Article 17). Passage is considered innocent when it is “continuous” and “expeditious,” but may include “stopping and anchoring” if incidental to ordinary navigation, or to provide assistance to persons, ships, or aircraft in distress (Article 19). Navigation and passage is considered prejudicial if any of a list of activities is conducted, including the carrying out of research or survey activities. Article 21 specifically recognizes the right of coastal states to regulate “marine scientific research and hydrographic survey” (Article 21(g)). That authority is reiterated in Article 245:

Coastal states, in the exercise of their sovereignty, have the exclusive right to regulate, authorize, and conduct marine scientific research in their territorial sea. Marine scientific research therein shall be conducted only with the express Consent of and under the conditions set forth by the coastal state.

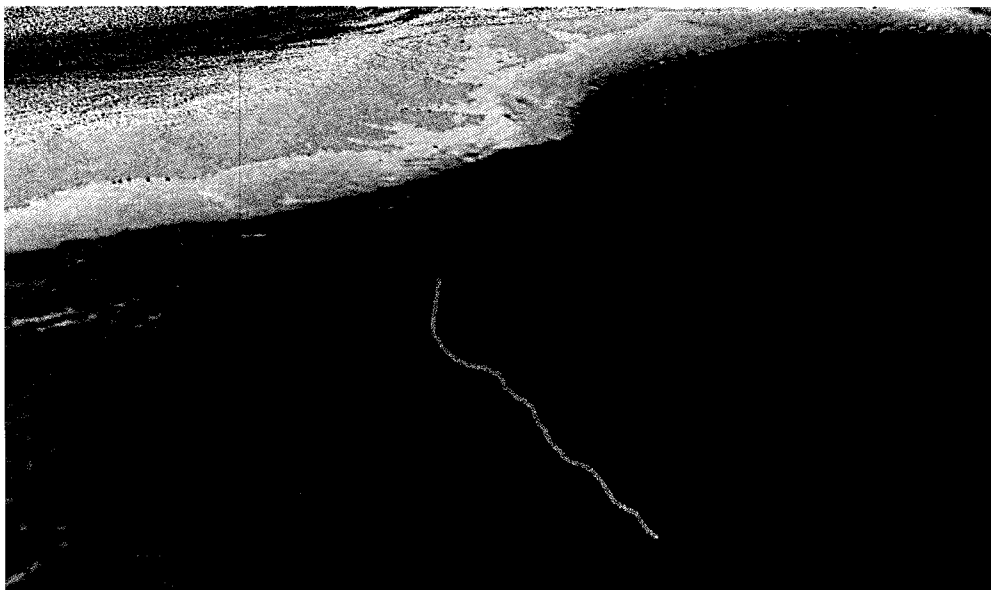
3. The Exclusive Economic Zone (EEZ). Perhaps the single most significant provision of this section of the Treaty is Article 56, which recognized the coastal state's limited sovereignty over a 200 nautical mile expanse of ocean beyond the territorial sea. This comprises an area of approximately 40 percent of the ocean's surface. The coastal state is recognized as having “sovereign rights” over all resources, living and non living, in its EEZ, as well as limited jurisdiction over a variety of activities in the zone, including marine scientific research (Article 246).

The guidelines for conducting marine scientific research in the coastal state's EEZ were discussed earlier, and essentially grant the coastal state a paramount interest in controlling access for purposes of marine research (Ross & Fenwick, 1989).

4. The Continental Shelf. The 1958 Convention on the Continental Shelf defined the continental shelf of a coastal state to include an area beyond the coastal baseline seaward to a depth of 200 meters or “beyond that limit, to where the depth of the superjacent water admits the exploitation of the natural resources of the said areas” (Gutteridge, 1959). Article 76 of UNCLOS III expands the definition of the continental shelf to include “*the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.*” Analysts’ estimate that up to 60 nations could benefit from this provision as it allows a nation to claim more territory if it can prove that the addition is a “natural prolongation” of its land mass (Verhoef, et.al., 2005). New Zealand officials, for instance, hope to add 2 million square kilometers, a 50% rise, and India could gain 1 million square kilometers. The United States could add territory off its northeast and northwest coasts and in Arctic waters off Alaska, holding an estimated \$1.3 trillion in resources. Using the new maps documenting depth and shape of the sea floor and the thickness of bottom sediments, countries might be able to justify extending their boundaries up to 350 nautical miles offshore if there is an obvious shelf (Oude Elferink, 2001). Some of the claims have already sparked controversy (Scovazzi, 2001; Oude Elferink, 2001). One challenge is pinning down a key baseline called the “foot of the slope”—the point at which the descending continental slope touches down on the relatively flat ocean bottom (Ross & Fenwick, 1989). But the line isn’t easy to define on jumbled, real-world sea floors. Figure 3.1.- a three dimensional view of the sea floor provides a clearer view of the foot of the continental slope than do older

methods. Governing marine scientific research, the provisions of Articles 246 through 255 apply to marine research on the continental shelf. However, research on the continental shelf beyond 200 nautical miles may not be conducted without coastal state consent if such areas have been designated by the coastal state as “*areas in which exportation or detailed exploratory operations focused on those areas are occurring or will occur within a reasonable period of time*” (Article 246(6)). Marine scientific research in the water column beyond the 200 nautical mile boundary is not subject to coastal state control regardless of any extended continental shelf jurisdiction (Article 78).

Figure 3.1. A 3D view of the sea floor. Photo provides a clearer view of the foot of the continental slope (red line) than do older methods (orange line).



5. The High Seas and the Deep Seabed "Area". UNCLOS III, Article 87, recognizes marine scientific research as a freedom of the High Seas. Article 86 defines the high seas as "*all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a state, or in the archipelagic waters of an archipelagic state.*" Prior to UNCLOS III, marine scientific research was not expressly noted as a freedom of the high seas. Research on the sea floor and

water column of the High Seas is unrestricted, except as noted in Part XI - the "Area":

- I. *Marine scientific research in the Area shall be carried out exclusively for peaceful purposes and for the benefit of mankind as a whole, in accordance with Part XIII.*
- II. *The Authority may carry out marine scientific research concerning the Area and its resources, may enter into contracts for that purpose. The Authority shall promote and encourage the conduct of marine scientific research in the Area, and shall co-ordinate and disseminate the results of such research and analysis when available.*
- III. *States Parties may carry out marine scientific research in the Areas. States Parties shall promote international co-operation in marine scientific research in the Area by:*
 - a. *Participating in international programs and encouraging co-operation in marine scientific research by personnel of different countries and of the Authority;*
 - b. *Ensuring that programs are developed through the Authority or other international organizations as appropriate for the benefit of developing states and technologically less developed states with a view to:*
 - (i) *strengthening their research capabilities*
 - (ii) *training their personnel, and the personnel of the Authority in the techniques and application of research;*
 - (iii) *fostering the employment of their qualified personnel in research in the Area;*
 - c. *Effectively disseminating the results of research and analysis when available, through the Authority or other international channels when appropriate.*

The Articles of the text concerning research installations or equipment in the marine environment are quite straightforward in that they basically codify the good sense of non-interference with shipping (Roach, 1996). They further provide for identification and

warning signals, safety zones around scientific installations and equipment, and generally follow what is required of normal safe marine operations in the marine environment. Also included in this section is the requirement that installations do not create any legal basis for status of islands or territorial seas, EEZ or continental shelf delimitations (Soons, 1982).

3.4.2. Responsibility and Liability. Section 5 of Part XIII, which concerns responsibility and liability, assures that all activities of marine scientific research are conducted under the provisions of the UNCLOS III. It is the duty of the requesting or sponsoring states to comply with the UNCLOS III provisions. States sponsoring such activities are further legally liable for damages caused by their natural or juridical persons, and will be required to compensate parties for such damages (Article 263). Likewise, damages to the marine environment which arise from such marine scientific research are the responsibility of the sponsoring state, whether undertaken by the state or on its behalf (Soons, 1982).

3.4.3. Dispute Settlement Mechanisms. Part XV of UNCLOS requires member states to settle their disputes peacefully, and provides a selection of methods for compulsory dispute settlement in the event that they are otherwise unable to reach an agreement (Roach, 1996). Where an agreement is not reached, a party may submit the dispute to one of four methods of third party adjudication or, for certain subject matters, compulsory conciliation. The four methods of third party arbitration provided by UNCLOS are:

1. the International Tribunal for the Law of the Sea (ITLOS). ITLOS is composed of 21 judges and sits in Hamburg, Germany;
2. the International Court of Justice (ICJ);
3. an Annex VII arbitral tribunal. This is a five-member tribunal established by the parties, pursuant to Annex VII of UNCLOS, to resolve the particular dispute between the parties; and
4. a special arbitral tribunal. This tribunal, established by the parties pursuant to Annex VIII of UNCLOS, provides a component for fact-finding with respect to fisheries,

protection and preservation of the marine environment, marine scientific research and navigation, including dumping, followed by arbitration.

Article 264 provides that “*disputes concerning the interpretation or application of the provisions of [the 1982] Convention with regard to marine scientific research shall be settled*” in accordance with the sections on “*compulsory procedures entailing binding decisions*” and the limitations and exceptions thereon, set out in Part XV, “Settlement of Disputes,” Parts 2 and 3, respectively. Marine scientific research exempted from compulsory dispute settlement includes the general right to regulate, authorize, and conduct marine scientific research in the EEZ or on the continental shelf (Roach, 1996).

Article 265, Interim Measures, provides that pending settlement of a dispute authorized marine scientific research will not begin or continue “*without the express consent of the coastal state concerned.*”

3.5. Coastal State Marine Scientific Research Regimes and Limitations on the Marine Scientific Research

The expansion of coastal state territorial claims was often coupled with state policies or regimes regulating marine scientific research in their offshore zones. All coastal states have claimed some form of offshore jurisdiction, and to date most of them have regimes to authorize and regulate marine scientific research (Fenwick, 1992; Roach, 1996). Anyone involved in marine scientific research must develop a new awareness of the legal and political constraints placed on their ability to conduct ocean research (Ross & Landry 1987; Ross & Fenwick, 1988; Churchill & Lowe 1999). Most coastal states have chosen to follow the provisions of UNCLOS III regarding their regimes controlling marine scientific research (as coastal states may request, as a condition of approving marine scientific research, participation in the research or that scientific observers be allowed aboard during research cruises in their waters), although some have enacted regulations which are more stringent or in some other respect are inconsistent with the Treaty (Wooster, 1977; Scholz, 1980; Fenwick, 1992; Kimbell, 1995). Thirty years ago a marine

scientist could find several coastal oceans with similar scientific characteristics, so access presented fewer problems (Kildow, 1973). Today, however, much current research is either site-specific (for example hydrothermal vent research) or requires many sites across an array of political boundaries, as in large-scale international research programs investigating atmosphere-ocean interaction (Kimbell, 1995). And further, the coastal oceans are central to some of the most interesting and environmentally pivotal oceanographic studies, for it is primarily in coastal areas that we observe the upwelling of ocean currents, the input of pollutants and chemicals that affect aquatic life, and human impact on ocean systems (Charnock, 1984; Franckx, 1998; Committee on Major U.S. Oceanographic Research Programs, 1999; Committee on the Ocean's Role in Human Health, 1999; Newton, 2002)

Alfred Soons (1982) identified essentially five differences between the "old regime" (pre UNCLOS III) and the "new regime" (that was established to govern marine scientific research by the UNCLOS III):

- a. The new regime is clearer with respect to the scope and geographical extent of coastal state jurisdiction.
- b. Developing countries will be in a much better position to benefit from marine scientific research.
- c. The new regime is much more specific in regulating procedures related to ocean research.
- d. A much greater administrative burden is created and placed on both the researcher and the coastal state.
- e. Marine scientific research will be changed and made more difficult.

3.6. Impact of UNCLOS III on Marine Scientific Research

Number of studies have undertaken to assess the consequences of the agreement for marine scientific research e.g. Schaefer, 1968; Winer 1976; Wooster, 1977, 1984, 1989; Fye, Knauss, Wooster, 1977; Caruso, 1978; Mangone, 1980; Soons, 1982, 1987; Roos, 1985; Knauss, 1985, 1987, 1991; Ross & Healey, 1983; Ross & Knauss, 1982; Sullivan

1985; Ross & Fenwick, 1988; Fenwick, 1992; Birnie, 1995, 2002; Roach, 1996; Churchill & Lowe 1999. To assess the impact of UNCLOS III on marine scientific research was one of the hot issues, as quoted by Wooster (1984) in his paper "Sea Law and Ocean Research: View from the Northwest" as- "*The Convention provisions governing research were not sought by US scientists. They are designed to benefit the coastal state at the expense of the researching entity*". He further depicts, as "*The new regime should strengthen scientific capabilities of Third World coastal states and serve to promote the cooperative study of oceanic phenomena and processes. Thus the benefits of research will be extended to all participants.*"

Later work of Knauss (1994) depicts, "*..... the new Convention may ease the difficulties we have had in recent years in gaining access to waters whose resources are controlled by other nations.For the past 12 years, US marine scientists have lived with worst of both the 1958 and the 1982 Conventions, accepting the exclusive economic zone and the other juridical classifications of the 1982 Convention and obligations that go with doing research in these areas.*" John Knauss also appeared willing to share collectively some of the blame for the limits placed on marine scientific research: "*A number of the access problems were of our own making. Many of us made little effort to welcome aboard scientists/observers from the local coastal state who could make little contribution to our planned program. Foreign offices and others became suspicious when results, even data reports, took several years to be submitted or were never received.*"

In 1992, Fenwick completed a study of US oceanographic community experiences in conducting marine scientific research in foreign waters from 1964 to 1990. From 1964 to 1967 records did not suggest problems in obtaining research clearance. However, there was a sharp increase in the number of requests denied between 1966 and 1970 -a total of 32 requests were either denied or delayed to extinction. In 1972, the state Department standardized procedures for processing research clearance requests, so the records for purposes of analysis became available in written form and from one source. And the whole process of clearance transactions was becoming more regularized. During

the period from 1972-1978, some 441 clearance requests were identified and 407 were of known outcome. Of these, 7 percent were denied and 21 percent were effectively denied through delay. Data from 1979-1984, indicated a total of 589 requests with 53 program were not carried forward for lack of action. Data from the next period up to 1990, the marked increase in research clearance requests (1467) between 1985 and 1990 is an indication of the increasing number of coastal states having adapted extended maritime claims and regimes of jurisdiction for marine scientific research. During this period, research clearances denied totaled 38, less than 2.5 percent of the total number of requests, although the number of delays and associated problems attributed to coastal states causing research project cancellations totaled 222 - approximately 15 percent of the research requests tendered. Conclusions of this was (1) marine scientists were reducing requests to work in areas either where the chances of receiving permission are low or where the costs are high in terms of time and effort to satisfy coastal state requirements; (2) some of the unsuccessful requests are the result of coastal state requirements which were more restrictive than UNCLOS III provides; and (3) one of the most difficult requirements for U.S. marine scientists to meet is that of UNCLOS III, Article 248, which requires a six-month notice of request.

In summary, through extensive literature review, following conclusions could be drawn:

1. the UNCLOS III legal framework for the marine scientific research has encouraged international cooperation in marine scientific research that is clearly witnessed by Global Ocean Programs and their successes (See Tables 3.1. and 3.2.);
2. UNCLOS III is not only affecting where marine scientific research is done, but will continue to affect how it is done;
3. A greater effort is being made to develop joint programs with marine scientists in those states in whose waters the research is to be conducted. Also, there has been some increase in large internationally sanctioned research programs; and
4. Research techniques including the use of satellites and drifting buoys - surface and subsurface -have dramatically increased. It is likely that the need for marine science

will only expand as the world demand for resources, both living and non-living increases.

Table 3.1. Selected Major Global Ocean Science Programs. Source- Committee on Major U.S. Oceanographic Research Programs, National Research Council, 1999

CLimate VARIability and Predictability (CLIVAR) is a program to study of seasonal-to-interannual climate variability and predictability of the global ocean-atmosphere-land system. It is the continuation of the World Climate Research Program (WCRP) programs Tropical Oceans and Global Atmosphere program (TOGA), which was officially completed in 1994, and the World Ocean Circulation Experiment (WOCE), whose field work ends with a 1996-98 Atlantic Ocean experiment.

Coastal Ocean Processes (CoOP) is a program that seeks to increase our quantitative understanding of the cross margin transport of biogeochemical material. CoOP encompasses the disciplines of biological, chemical, geological, and physical oceanography, plus marine meteorology. CoOP process studies will characterize cross margin transport on shelves where different physical mechanisms dominate.

Global Ocean Ecosystems Dynamics (GLOBEC) is a research initiative called for by the oceanographic, marine ecology, and fisheries communities to address the question: what will be the impact of changes in our global environment on populations and communities of marine animals comprising marine ecosystems?

Joint Global Ocean Flux Study (JGOFS) is a multi-investigator program organized to investigate fluxes of carbon and related biogenic elements between air and sea and in the ocean. Each year some 40 percent of CO₂ generated by burning fossil fuels are added to the atmosphere and transferred to the sea. The imprint of this signal provides a significant perturbation of ocean chemistry. The build up of atmospheric CO₂ can enhance greenhouse effects, which may contribute to global alterations in temperature, sea level height, river runoff, and sediment flow.

Ocean Drilling Program (ODP) is an international partnership of scientists and research institutions organized to explore the evolution and structure of Earth. ODP provides researchers around the world access to a vast repository of geological and environmental information recorded far below the ocean surface in seafloor sediments and rocks. By studying ODP data scientists gain a better understanding of Earth's past, present, and future.

Ridge Inter-Disciplinary Global Experiments (RIDGE) is an initiative designed to integrate exploration, experimentation, and theoretical modeling into a major research effort to understand the geophysical, geochemical, and geobiological causes and consequences of the energy transfer in the global rift system through time. Its long-term strategy is to obtain a sufficiently detailed spatial and temporal definition of the global mid-ocean ridge system to construct quantitative, testable models of how the system works, including the complex interactions among the magmatic, tectonic, hydrothermal, and biological processes associated with crustal formation.

The Tropical Ocean Global Atmosphere (TOGA) program was a major component of the World Climate Research Program (WCRP) aimed at the prediction of climate phenomena on time scales of months to years. Underlying TOGA was the premise that the dynamic adjustment of the ocean in the tropics is far more rapid than at higher latitudes. Thus, disturbances emanating from the western Pacific Ocean (such as El Niño) may propagate across the basin on time scales of weeks as compared to years for corresponding basin-wide propagation at higher latitudes. The significance of shorter dynamic time scales near the equator is that they are similar to those of highly energetic atmospheric models. This similarity allows the formation of coupled modes between the ocean and the atmosphere. TOGA also demonstrated the predictability of El Niño and developed the observational and modeling capability for skillful experimental predictions.

World Ocean Circulation Experiment (WOCE) is an effort by scientists from more than 20 nations to study the large-scale circulation of the ocean. WOCE has employed several satellites, dozens of ships, and thousands of instruments to obtain a basic description of the physical properties and circulation of the global ocean during 1990-1998. WOCE also has supported regional experiments, the knowledge from which should improve circulation models, and it is exploring design criteria for long-term measurements with which to assess the representativeness of the global "snapshot."

Table 3.2. Some Accomplishments of the Selected Global Ocean Science Programs. Source- Committee on Major U.S. Oceanographic Research Programs, National Research Council, 1999

COASTAL OCEAN PROCESSES (CoOP)

- Improved understanding of cross-shelf transport of nutrients, dissolved organic material, and particulate matter; and
- Enhanced nearshore monitoring systems, including integrated use of shipboard sensors, towed instrument arrays; and moorings.

GLOBAL OCEAN ECOSYSTEM DYNAMICS (GLOBEC) PROGRAM

- Improved understanding of physical oceanographic phenomena on juvenile cod and haddock populations; and
- Improved understanding of the persistence of transients in structured ecological models.

JOINT GLOBAL OCEAN FLUX STUDY (JGOFS)

- Improved understanding of the roles of physical and biological controls on carbon cycling;
- Improved understanding of the role of the North Atlantic in the global carbon; and
- Improved modeling of oceanic carbon dioxide uptake.

OCEAN DRILLING PROGRAM (ODP)

- Evidence for effects of climate change on hominid evolution;
- Evidence for bolide impact as a major factor in the terminal Cretaceous mass-extinction;
- Evidence for periodicity in global climatic cycles;
- Increased understanding of the fluid recycling in subduction zones; and
- Increased understanding of the life history of mantle hot spots.

RIDGE INTER-DISCIPLINARY GLOBAL EXPERIMENTS (RIDGE)

- Completion of "first-of-its-kind" global multibeam bathymetry synthesis from the mid-ocean ridge system;
- Increased understanding of mid-ocean ridge morphology, geophysical structure, and petrology; and
- Recognition of wide range of tectonic settings and diversity of fauna associated with mid-Atlantic hydrothermal systems.

TROPICAL OCEAN GLOBAL ATMOSPHERE (TOGA) PROGRAM

- Created and maintained the TOGA Observing System (including the TOGA TAO [Tropical Atmosphere-Ocean] array);
- Developed coupled atmosphere-ocean models for simulation of El Niño Southern Oscillation (ENSO) ENSO;
- Increased understanding of the causes of ENSO and the variability of its appearance; and variability of its appearance; and
- Demonstrated ability to predict ENSO events up to six months in advance.

WORLD OCEAN CIRCULATION EXPERIMENT (WOCE)

- Proved the utility of space-borne instrumentation for observing global changes in sea surface height and other parameters;
- As part of the overall hydrographic program, obtained the first global tracer fields for CFCs, the He/Tr pair, and carbon-14;
- Obtained the first concurrent global observations of the surface and midwater velocity fields, defining the latter for the first time;
- Obtained data on the importance of diapycnal mixing in modifying water masses below the sea surface and its implications for modifying thermohaline circulation;
- Obtained improved in situ and model-derived data on air-sea fluxes and increased understanding of the role of ocean circulation in the fluctuating heat budget of the air-sea system; and
- Improved ocean general circulation models for better understanding of absolute time-varying large-scale ocean circulation.

Chapter 4- Legal Framework for International Marine Scientific Research Cooperation in the Arctic

4.1. Context

Marine scientific research is a multifaceted discipline. A spirit of cooperation is natural in this discipline. In addition to its multidisciplinary and its reflexivity, the scientific enterprise is organized at various levels of aggregation (Charnock, 1984; Leydesdorff, 2001) and under certain conditions it is possible at some of these levels to convert resources and results into the one another (Latour & Woolgar, 1979). Three kind of cooperation were explored - (a) knowledge networking at individual level, (b) at organizational level, and (c) culminating into country/regional/global level.

Increasingly, marine scientific research is also becoming a complex technology. *In situ* observations sample the physical, chemical, and biological properties of the Ocean (Aagaard, K., et.al. 1999). Numerical models use the equations of motion and thermodynamics to depict and forecast the ocean. A realistic model requires high-resolution bathymetry and enough observations to describe the initial state and regional forcing functions of the ocean. Satellite remote sensing, autonomous instruments and platforms offer cost-effective, long-term monitoring of the environment that can update and validate the model. Application of the model to water/ice quality issues, for example, requires an understanding of the interplay between the physics, biology, and chemistry of the Ocean (Yates & Roonwal, 1994; Aagaard, K., et.al. 1999; NOAA Magazine, 2006). Cooperation is the only cost-effective means for the research to accomplish its mission and meet its requirements to leverage the investment, enhance the transition process, and exploit new technologies (Wegelein, 2005). Global research efforts provide flexibility to the countries to address multidisciplinary and multispatial issues that lie beyond the capabilities of individual nations or traditional scientific disciplines.

4.1.1. Why Arctic Co-operation? Research has shown us that the Arctic Ocean is a vital part of the world ocean climate system with a profound influence on the "conveyor belt"

circulation of the ocean's deep waters. Significant changes are occurring in the Arctic region. Climate models indicate that the effect of global warming will be stronger in the Arctic than elsewhere (Moritz 2002; Foley 2005; Weaver & Hillaire-Marcel 2004). Observed changes in the Arctic are altering its role in the world-in areas of commerce, transportation, resource extraction and national security (Hansen & LaMotte, 2006).

Arctic Ocean hold unique information on the past behavior of the Earth System (Committee on the Arctic Research Vessel, Ocean Studies Board 1995; Poulsen, 2004; Comiso & Parkinson 2004). Researchers are striving to understand the responses of physical, biological, and social systems within the Arctic to global changes, and how changes in the Arctic may affect the rest of the globe. Multidisciplinary and multinational research initiatives are contributing a regional perspective to the development of a thorough scientific understanding of the Earth system, providing the foundation for understanding climate fluctuations and long-term climate change, as well as vulnerabilities to changes in other important environmental factors (Chapin et al. 1992; Chapin & Korner 1995, Arctic Monitoring and Assessment Program 1997; Nuttall & Callaghan 2000).

Arctic Ocean also offers interesting opportunities for industrial and commercial development, for example in the field of bioprospecting. Finally, the growing interest in world's undiscovered oil and gas reserve lie under Arctic Ocean also making it necessary to carry out further joint research to deal with the challenges of exploration and production in Arctic areas (Rothwell, 1992, Timtchenko, 1996; Hansen & LaMotte, 2006).

4.1.2. Arctic Research Cooperation Some Present Trend. International cooperation is at the heart of the Arctic marine scientific research (Table 4.1). International cooperation is existed in the Arctic as (a) Ocean processes extend across national boundaries; (b) the scope and scale of the Arctic research challenges lie beyond the capabilities of individual nations or traditional scientific disciplines; (c) research operations tend to be expensive

and time-consuming. An internationally coordinated approach maximizes its effectiveness and the use of finite resources and assets; and (d) new Ocean technological capabilities offer the potential to make major advance in the Arctic science. These include autonomous instruments and platforms capable of operating in extreme conditions of cold and darkness, high bandwidth global communications systems, and high powered numerical Earth System Simulators. The time is ripe to exploit these through cooperation to achieve significant scientific advances.

The new cooperation is further needed for the development of jurisdictional map of the Arctic Ocean (Oude Elferink & Rothwell, 2001). All Arctic coastal states have defined their Territorial Sea Baselines (TSB), and in consequence their Internal Waters. However, some problems remain in areas where

coastlines are ice-covered or subject to seasonal changes and where there is disagreement over what constitute a proper straight baseline (Scovazzi, 2001). The latter disagreements have risen to prominence in the matter of shipping rights through the Northern Sea Route which skirts the north coast of the Russian Federation, and through the Northwest Passage that traverses the Canadian Arctic Archipelago (Oude Elferink, 2001). The states have initiated projects to define the outer limits of their juridical continental shelves (Figure 4.1), according to the provisions of UNCLOS Article 76 (where the delimitation is based upon geological and bathymetric criteria). The implementation of Article 76 may lead to competing continental shelf claims between neighboring and opposite states (Malakoff, 2002). The resolution of these claims will almost certainly affect the extent of affected states' sovereign rights, including the

Figure 4.1 The present Arctic High seas (Red line- EEZ)
Source: GSC File, Verhoef et.al. 2005



management of seabed resources. To reduce the prospect of acrimony in the resolution process, there is need for active collaboration in the delimitation and partitioning of their outer continental shelves (Macnab et al., 2007). Another important benefit of coordinating these operations is that it would increase the pool of stakeholders in the Arctic Ocean mapping efforts by extending to coastal states an incentive to upgrade their survey coverage and to enhance their technical skills and facilities while

Figure 4.2. Canada's Possible Claim
The red zone is the EEZ; EEZ boundaries with USA need negotiations; The white zone or part of it may be claimed under Article 76.
 Source: GSC File, Verhoef et.al. 2005



Figure 4.3. Simplified Version of Russian Claim
Dec. 2001: Russia submitted claim; Area within black line- total area claimed by Russia; Green Area- area claimed beyond 200nm.
 Source: GSC File, Verhoef et.al. 2005



contributing to a major international research. The resulting partnerships would no doubt prove to be a fertile ground for international cooperation and exchange aimed at improving understanding of the world ocean (Macnab et al., 2001).

Numerous bodies exist to stimulate and coordinate multinational and multidisciplinary Arctic marine research activities. The existing framework of cooperation on Arctic issues has evolved through a set of cooperative “soft law” agreements. International cooperative agreements include the Arctic Environmental Protection Strategy (AEPS), the Arctic Council, the International Arctic Sciences Committee, and the Polar Code/Guidelines for Ships Operating in Arctic Ice-Covered Waters, etc; the most relevant international treaty for the marine scientific cooperation is the UNCLOS III.

Table 4.1. Major Arctic Ocean Expeditions and Research Activities (1970- Current)

<p>Arctic Ice Dynamics Joint Experiment (AIDJEX) 1970-1976. (Examined the mechanisms of sea ice mechanics and heat balance, acquired data on external stresses, and provided evidence of subsurface eddies below the sea ice).</p> <p>The Lomonosov Ridge Experiment (LOREX) 1979. (Studied submarine mountain range in the Arctic Ocean)</p> <p>FRAM I 1979. (Studied the geophysical and oceanographic conditions over the Nansen-Gakkel Ridge).</p> <p>FRAM II 1980. (Research concentrated on underwater acoustics, marine geophysics, and physical oceanography).</p> <p>YMER 1980. (Oceanographic and meteorological measurements, deep ocean cores, Fram Strait region).</p> <p>FRAM III 1981. (Studied the polar front between water masses, wave propagation experiments in the sea ice, underwater acoustics, and geophysical properties of the Nansen basin and Yermak Plateau).</p> <p>Eurasian Basin Experiment (EUBEX) 1981.</p> <p>FRAM IV 1982. (Hydroacoustics, geophysics, and physical oceanography investigations, Nansen basin)</p> <p>Canadian Expedition to Study the Alpha Ridge (CESAR) 1983. (Marine geology, chemical oceanography, heat flow investigations, satellite navigation, gravity and seismic studies)</p> <p>Marginal Ice Zone Experiments (MIZEX) 1983 & 1984. (Understand the Marginal Ice Zone).</p> <p>Canadian Ice Island 1984-93. (Seismic experiments, ice coring, and heat flow measurements to determine the structure of the ice island and seafloor, and physical and biogeochemical oceanography).</p> <p>ARKTIS Polarstern cruises 1984, 87. (Physical, chemical, biological, and geological research of Eurasian Basin).</p> <p>Marginal Ice Zone Experiments (MIZEX) 1987. (Experiments in the north Greenland Sea).</p> <p>Coordinated Eastern Arctic Experiment (CEAREX) 1987-88. (Studied the processes regulating exchange of momentum, heat, and biomass in the Norwegian and Greenland Seas north to Svalbard).</p> <p>Oden 1991. (Transects the Eurasian Basin).</p> <p>Leads Experiment (LEADEX) 1992. (Drifting ice camp deployed in the Beaufort Sea, north of Prudhoe Bay).</p> <p>Laptev Sea System 1992-1996. (Study mechanisms involved in past and ongoing climatic variation in the Laptev Sea, with emphasis on the interaction between the sea and the Lena River).</p> <p>SIMI 1993 & 1994. (Ice mechanics ice camps).</p> <p>Polar Star 1993(Survey the geology of the Northwind Ridge and Canada Basin,).</p> <p>Arctic Ocean Section (AOS) 1994. (Biological, chemical, and physical oceanography investigations; Multiple warm cores in the Atlantic layer were observed; and Biogeochemical measurements were obtained).</p> <p>Surface Heat Budget of the Arctic Ocean (SHEBA) 1997-98. (An icebreaker was frozen into the perennial pack ice and left to drift for a full year. The ship served as a floating scientific research station)</p> <p>AREA Ice Camps 1960s-1990s. (US Space and Naval Warfare Command annually conducted Arctic Regional Exercise Activity (AREA) ice camp operation)</p> <p>Scientific Ice Expeditions (SCICEX) 1993, 1995 to 1998. (Scientific trips by a nuclear powered submarine to the Arctic collected bathymetry, gravity anomaly, temperature, salinity, ice draft, and images)</p> <p>Other Major Projects</p> <p>Beaufort Gyre Freshwater Experiment (Study of fresh water accumulation and release mechanism and a role of fresh water in Arctic climate variability)</p> <p>Western Arctic Shelf-Basin Interactions (SBI) (Understand how the Arctic shelves communicate with the interior basin from a coupled physical--biogeochemical standpoint.)</p> <p>The Arctic and Subarctic Ocean Flux (ASOF) (Monitor and understand the oceanic fluxes of heat, salt and freshwater at high northern latitudes and their effect on global ocean circulation and climate).</p> <p>A Study of Environmental Arctic Change (SEARCH) (Understanding the full scope of the changes going on in the Arctic).</p> <p>The Arctic Community-wide Hydrological Analysis and Monitoring Program (CHAMP) (Understanding physical, biological, and biogeochemical controls on the components of the integrated arctic hydrologic cycle, and addressing linkages between the land and ocean).</p> <p>North Pole Environmental Observatory (NPEO) (Take the pulse of the Arctic Ocean and learn how the world's northernmost sea helps regulate global climate).</p> <p>Joint Western Arctic Climate Study (JWACS) (Canadian Basin and the Mackenzie Shelf examining the impacts of climate variability on living and physical ocean processes).</p> <p>Integrated Ocean Drilling Program's Arctic Coring Expedition (ACEX) carries out an international marine drilling program through multiple platforms.</p> <p>Integrated Arctic Ocean Observing System (IAOOS) (fate of perennial sea ice and the climatic and social effects of its disappearance)</p> <p>Arctic-Sub-Arctic Ocean Fluxes (ASOF) (Subprogram of inter-SEARCH (International Study of Environmental Arctic Change) and an endorsed project of CLIVAR (Climate Variability and Predictability Study)).</p> <p>Shelf-Basin Exchange Initiative (SBE)(Forum for idea exchange and coordination of on-going and planned shelf-basin exchange science projects and goals in a pan-Arctic sense)</p> <p>International Arctic Polynya Program - Polynyas in the Arctic's Changing Environment (IAPP-PACE) (Address the physical, chemical and biological role of polynyas in the Arctic)</p> <p>Arctic Paleo-River Discharge (APARD)</p> <p>Siberian River Run-off (SIRRO)</p> <p>Greenland Sea Project (GSP)</p>
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In this Chapter, the first part reviews the global and regional institutional and legal frameworks for scientific cooperation in the Arctic. The second part explores the key provisions of the UNCLOS III for international marine scientific cooperation for: the marine scientific research activities; the knowledge and technology transfer; the optimum utilization of EEZ resources; the high seas fisheries research; the delimitation of the continental shelf; and the environmental protection and combat marine pollution. The third and last part provides an overview of Arctic states practice dealing with marine scientific research and other oceanographic research cooperation.

4.2. Global and Regional Legal Framework for Marine Scientific Cooperation

The framework for international marine scientific research and other marine research cooperation involves U.N. and non-U.N. agencies, intergovernmental organizations, regional arrangements and institutions. It covers most areas of marine activity (See Table 4.2). This section focuses only on the cooperative frameworks in the Arctic as well as the UN systems.

4.2. 1. Cooperation in the Arctic System. Since the end of the Cold War, attempts have been made to develop international instruments to improve international cooperation in the Arctic. The initiatives most important to this discussion are the Arctic Environmental Protection Strategy (AEPS), the Arctic Council, and the Polar Code. New opportunities for international cooperation in the Arctic region arose even before the Cold War ended. In a speech in Murmansk in 1987, Mikhail Gorbachev made the first overture for improved cooperation. He called on Arctic coastal states to forsake the military rivalries that had hindered circumpolar cooperation. Specifically, he called for the development of a “zone of peace” in the Arctic Ocean (Timtchenko, 1996). Gorbachev’s reforms were the catalysts that led to the first real improved international cooperation in the Arctic. Most of the new efforts addressed environmental issues, spurred by scientific evidence of the effect of global warming as well as the impact of global pollution in the region. Number of different international initiatives are falling into a number of distinct categories (Young 1989, Huebert 1998). Numbers of global treaties have application in

the Arctic, only one international treaty – on the conservation of polar bears -- deals specifically with the region (Scrivener, 1989). Several observations can be made regarding the existing agreements and arrangements that relate to the Arctic (Table.4.3):

- a) International cooperation in the Arctic involves an institutional complex in contrast to an institutional system. Unlike Antarctica, in which the Antarctic Treaty System (ATS) has evolved into an integrated and coherent governance system, in which the provisions of the UNCLOS III add up to a comprehensive institutional system, the Arctic is marked by a proliferation of cooperative arrangements addressing distinct issues, encompassing a variety of spatial areas, and including different types and configurations of actors (Rothwell, 1992, Timtchenko, 1996).
- b) This institutional complex is, for the most part, made up of soft-law arrangements based on agreements that are relatively imprecise and not legally binding, in contrast to hard-law arrangements, which are embedded in the more precise provisions of conventions or treaties that are legally in force. Again, in the contrast with the Antarctic, which has a comprehensive treaty developed over a number of decades, the Arctic has no binding legal regime. It consists of a series of related conventions and protocols that are all legally binding and in force. The Ottawa Declaration on the Establishment of the Arctic Council is an informal ministerial declaration that is cast in very general terms and has few of the attributes of a legally binding agreement. The founding document of the Northern Forum is an agreement among sub-national units of government that have no standing under international law and no authority to enter into legally binding arrangements (Rothwell, 1992, Timtchenko, 1996).

There are exceptions to this propensity to rely on soft-law arrangements in the Arctic. The 1973 Agreement on the Conservation of Polar Bears and several of the fisheries agreements dealing with the Bering Sea, for instance, are legally binding arrangements. Nevertheless, it is fair to conclude, and this is the second distinguishing feature, that the rapidly evolving institutional complex in the Circumpolar North exhibits a striking tendency to rely on soft-law arrangements.

Table 4.2 Selected International Agreement, Regional and Science Bodies for Marine Scientific Research Cooperation in the Arctic

Focus Area	Selected International Agreement, Regional and Science Bodies
Marine Scientific Research Cooperation for Fisheries and Living Resource	<p>International Fisheries Agreements and Organizations 1946 International Convention for the Regulation of Whaling; 1966 International Convention for the Conservation of Atlantic Tunas; 1972 Convention Concerning the Protection of World Cultural and Natural Heritage; 1973 Agreement on the Conservation of Polar Bears; 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora; 1979 Convention on the Conservation of Migratory Species of Wild Animals; 1992 Convention on Biological Diversity; 1992 Commission for Sustainable Development; 1995 United Nations Fish Agreement; 1995 International Conservation and Management Measures by Fishing Vessels on the High Seas; 1995 US.-European Union High Level Fisheries Consultation Agreement;</p> <p>Fisheries Science Groups International Council for the Exploration of the Sea; North Pacific Marine Science Organization; Organization for Economic Co-operation and Development – Fisheries; United Nations Food and Agriculture Organization Fisheries Department</p> <p>Selected Fisheries Bodies Inter-American Tropical Tuna Commission; International Commission for the Conservation of Atlantic Tunas; North Atlantic Salmon Conservation Organization; North East Atlantic Fisheries Commission; North Pacific Anadromous Fish Commission; Northwest Atlantic Fisheries Organization; Permanent Commission for the Conference on the Use and Conservation of the Marine .</p> <p>Regulatory Bodies Inter-American Tropical Tuna Commission; International Commission for the Conservation of Atlantic Tunas; International Halibut Commission; International Whaling Commission; North Pacific Fur Seal Commission.</p>
Marine Scientific Research Cooperation for Marine Environment and Marine Pollution	<p>1969 International Convention on Oil Pollution Preparedness, Response and Cooperation International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Intervention Convention) and its Protocol; 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its Protocol; 1973 Convention for the Prevention of Pollution from Ships; 1989 Convention on the Control of Trans-boundary Movement of Hazardous Wastes and Their Disposal (Basel Convention); 1991 Convention on Environmental Impact Assessment in a Trans-boundary Context (Espoo Convention); 1995 Global Program of Action on Protection of the Marine Environment from Land-based Activities; Convention on Access to Information, Public Participation in Decision making and Access to Justice in Environmental Matters (Arhus Convention); 1996 Convention for the Protection of the Marine Environment of the Northeast Atlantic (OSPAR Convention); 1997 Arctic Offshore Oil and Gas Guidelines for Regulators; 1997 Guidelines for Environmental Impact Assessment in the Arctic; 1998 Arctic Council's Field Guide for Oil Spill Response in Arctic Waters; 1999 Protection of the Arctic Marine Environment from Land-Based Activities; 2002 Arctic Offshore Oil and Gas Guidelines</p>
Marine Scientific Research Cooperation in the UN System and others	<p>In UN System: Intergovernmental Oceanographic Commission; UNEP, WMO, IMO, IHO, and IAEA. There are three principal mechanisms: Oceans and Coastal Areas of the Administrative Committee (SOCA), the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), and the Inter-Secretariat Committee on Scientific Programs relating to Oceanography (ICSPRO).</p> <p>Others: Arctic Council, University of Arctic, Barent Euro-Arctic Council, International Arctic Science Committee, Nordic Council of Ministers, Northern Forum, Standing Committee of Parliamentarians of the Arctic Region 27 UNEP/GRID-Arendal, WWF International Arctic Program</p>

- c) Major international arrangements in the Arctic have been given roles that are highly restricted. Contrast this with the Antarctic Treaty System (ATS), which sets forth specific rules prohibiting military activities, the disposal of radioactive wastes, the extraction of nonrenewable resources, and governing the conduct of scientific research within the treaty area. The ATS has the authority to make decisions about matters ranging from the setting of allowable harvest levels for the region's fisheries to the designation of Specially Protected Areas. The Arctic Council has sought to define a role for itself in the creation of action plans (e.g., the Arctic Council Action

Plan to Eliminate Pollution of the Arctic, or ACAP) and the performance of projects (e.g., the Arctic Climate Impact Assessment, or ACIA).

- d) Institutional complex in the Arctic is the prominence it accords to a variety of non-state actors. In some cases, this is a consequence of explicit agreements (Young & Osherenko, 1994; VanderZwaag, *et.al.*, 2001). The Arctic Council recognizes Indigenous peoples' organizations as Permanent Participants; the members of the Northern Forum are sub-national units of government; and the International Arctic Science Committee is made up of representatives of academies of sciences. But other cases simply reflect practices that have emerged in the absence of explicit opposition on the part of the governments of states. The trans-boundary activities of bodies like the Inuit Circumpolar Conference and the Sami Council, which represent peoples whose ancestors resided in the Arctic long before the advent of modern states and the establishment of national boundaries, are particularly notable in this context.

For marine scientific research cooperation arrangement, in particular, of the International Arctic Science Committee (IASC) is important. It is similar to SCAR, the Scientific Committee for Antarctic Research. The IASC facilitates cooperation in all aspects of Arctic research by promoting interdisciplinary programs and providing support throughout the region, it is an important link within the Arctic scientific community. Five important initiatives provided a renewed impetus for marine scientific research cooperation under this umbrella are: (1) Arctic Monitoring & Assessment Program; (2) Conservation of Arctic Flora & Fauna; (3) Emergency Prevention, (4) Preparedness & Response; and (5) Protection of the Arctic Marine Environment; Sustainable Development Working Group. These have provided a renewed impetus for Arctic research to improve the understanding of critical environmental issues facing the region. Other organizations also exist to serve the region like the Arctic Ocean Sciences Board (AOSB), the ArcticNet, Arctic Research Consortium of the United States, Circum-arctic Environmental Observatories Network, International Council for the Exploration of the Sea, Svalbard Science Forum the Nordic Council, the Sammi Council, the Inuit Circumpolar Conference, the Northern Forum, the North Atlantic Marine Mammal

Commission, the Council of the Barents Euro-Arctic Region, and the Standing Committee of parliamentarian of the Arctic Region (Young & Osherenko, 1994; Stokke, 2007).

More opportunities exist for promoting coordination efforts of science and technology collaboration in coming years. One is the International Polar Year (IPY), which is actually taking place over two years- from March 2007 to March 2009- and concerns both the Arctic and the Antarctic. Previous international polar years were observed in 1882-83, 1932-33, and 1957-58. Involving up to fifty thousands scientists from sixty countries, this internationally coordinated campaign is cosponsored by the International Council for Science and the World Meteorological Organization.

4.2.2. Cooperation in the UN System. Over the past decades, UN agencies have sponsored and organized a series of marine scientific and technological programs. The implementation of these programs has played an essential role in promoting the development of marine science and technology of the world. A good illustration is the International Decade of Ocean Exploration endorsed by the United Nations, which produced, among many other things, the series of controlled ecosystem experiments that added substantially to our appreciation of pollution effects and food chain dynamics. In 2000, the UN Informal Consultative Process on Oceans and the Law of the Sea listed marine science and technology as one of the topics for consultation. This resulted very positive and far-reaching influence on the development of marine science and technology on a worldwide basis. The interest in climate change has stimulated such projects as TOGA (Tropical Ocean Atmosphere Program); WOCE (World Ocean Circulation Experiment) and CLIVAR (Climate Variability and Predictability). Global Ocean Observing System (GOOS) program is involved in systematic and Scientific Observation of Global Oceans. Joint Global Ocean Flux Studies (JGOFS), Sea Level Monitoring and Modeling (SELMAM), Coral Reef Monitoring (GCRMN) are implemented region wise. These international programs have boosted the activities in ocean sector in the participating countries.

Table 4.3. Major forms of cooperation in the Arctic (partial list)

Region-wide, Multi-purpose Forums

- **Arctic Council** (created by the Ottawa Declaration in 1996, the Arctic eight members. Five important initiatives- Arctic Monitoring & Assessment Programme; Conservation of Arctic Flora & Fauna; Emergency Prevention, Preparedness & Response; Protection of the Arctic Marine Environment; Sustainable Development Working Group)
- **Standing Committee of Parliamentarians of the Arctic Region** (national parliaments of the Arctic states and the European Parliament; cooperation is carried on by a Standing Committee.)
- **Northern Forum** (network of sub-national or regional governments from ten northern countries; brings these leaders together to address common political, environmental and economic issues)
- **Polar Bear Regime** (the UN Environment Program works with governments to designate specially protected areas for wildlife around the world. In 1973, Canada, the U.S., Denmark, Norway and the former U.S.S.R. signed the International Agreement on the Conservation of Polar Bears and their Habitat. The goal is to protect ecosystems of the bears, particularly their denning and feeding areas and migration routes.)

Functionally/Spatially Limited Intergovernmental Regimes

- **Barents Sea Fisheries Regime**
- **Bering Sea Pollock Agreement**
- **Jan Mayen/Iceland Joint Development Zone**
- **American-Norwegian-Russian Environmental Agreement**
- **Canada/US Arctic Cooperation Agreement**

Nongovernmental Arrangements

- **Arctic Ocean Sciences Board** (facilitate Arctic Ocean research by the support of multinational and multidisciplinary natural science and engineering programs.)
- **Inuit Circumpolar Conference** (exists to unite Inuit peoples from Alaska, Canada, Greenland and Russia, particularly around resource development and self-determination issues).
- **International Arctic Science Committee** (a non-governmental organization whose aim is to encourage and facilitate cooperation in all aspects of Arctic research, in all countries engaged in Arctic research and in all areas of the Arctic region.)
- **Russian Association of Indigenous Peoples of the North**
- **Saami Council** (is the first first trans-boundary organization of Arctic native peoples.)
- **Nordic Council** (established in 1952 to promote dialogue and joint action on regional issue.)
- **International Union for Circumpolar Health** (encourages and support research and exchange of scientific information in the circumpolar health sciences.)
- **Circumpolar Universities Association**
- **ArcticNet** (brings together scientists and managers in the natural, human health and social sciences with their partners in Inuit organizations, northern communities, federal and provincial agencies and the private sector to study the impacts of climate change in the coastal Canadian Arctic.)
- **Circumpolar Conservation Union** (protection of the ecological and cultural integrity of the Arctic for present and future generations)

Mixed Arrangements

- **Barents Euro-Arctic Region** (works on common environmental and sustainable development challenges in the Barents Sea area.)
- **North Atlantic Marine Mammal Commission** (promotes the sustainable utilization of living marine resources, in particular all cetaceans and pinnipeds.)

Global Regimes Relevant to the Arctic

- **Law of the Sea**
- **Ozone Layer Protection: Montreal Protocol**
- **Climate Change: Convention on Climate Change**
- **Biodiversity: Convention on Biological Diversity**
- **Whaling- International Convention for the Regulation of Whaling**

Marine scientific research cooperation in the UN system is two tiered- (a) upper level includes Intergovernmental Oceanographic Commission (IOC-recognized as the competent international organization), Food and Agriculture Organization (FAO), United Nations Environment Programme (UNEP), World Meteorological Organization (WMO), International Maritime Organization (IMO), International Hydrographic Organization (IHO), and International Atomic Energy Agency (IAEA); and (b) level two are the *Subcommittee on Oceans and Coastal Areas of the Administrative Committee (SOCA)*, the *Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP)*, and the *Inter-Secretariat Committee on Scientific Programs relating to Oceanography (ICSPRO)*.

IOC of UNESCO was founded in 1960, and organizes its cooperative ocean science activities around the following programs: ocean science, ocean observation, ocean services, and training, education and mutual assistance. The IOC assists governments to address their individual and collective ocean and coastal problems including the Arctic Ocean through the sharing of knowledge, information, and technology and through the coordination of national programs. IOC Issues include: Marine Environmental Protection; Fisheries and Ecosystems; Climate Change; Ocean Observing and Monitoring; Coastal Area Management; Data and Information Management; and Disaster Mitigation. IOC's program is subdivided into ocean science projects, operational observing systems and ocean services. Among the science projects, participation in the World Climate Research Program has high priority. It includes the World Ocean Circulation Experiment and a climate variability and predictability study. Other studies focus on global ocean data assimilation and the CO² cycle. With respect to marine environmental protection, studies dealing with marine living resources have high priority. Subjects include noxious algal blooms and threats to coral reefs and large marine ecosystems. Scientific studies dealing with non-living resources focus on possible impacts of deep-sea exploitation of marine mineral resources. There exist research programs for the investigation of marine pollution, which will form the basis for a routine ocean monitoring. Operational oceanographic services are another program area of the IOC with a growing range of

applications. Its prime focus is on the development of a Global Ocean Observing System. There are other services carrying out worldwide sea-level observations, routine operational ship-of-opportunity programs involving merchant ships, and data buoy observations. Finally, the IOC participates in the Global Climate Observing System by contributing marine observations through GOOS. It is also involved in activities aimed at integrating the separate global observing programs into a global observing strategy.

Within the framework of the ocean services, the IOC promotes the worldwide assembly and processing of oceanographic data. This is to be achieved by a system of national and worldwide data centres through which users can obtain all data and information that is available. The IOC also participates in an ocean-mapping project, mainly in co-operation with the International Hydrographic Organization. The project involves the development of a system of general bathymetric charts supplemented by a large number of regional projects aimed at producing detailed bathymetric charts of the different ocean areas.

4.2.2.1. ABE-LOS. The IOC and its members are engaged in international and regional cooperation with other U.N. and non-U.N. agencies involved in marine science and satellite oceanography. In terms of annual reports coverage, it is important to IOC's to seek to collect information on the marine scientific research clearance process implemented by coastal and researching states. For this, the Advisory Body of Experts on the Law of the Sea (ABE-LOS) is established in 2001. The ABE-LOS gives advice to the IOC Assembly, Executive Council and/or the Executive Secretary with regard to the possible role of the IOC in implementing UNCLOS III. To date, the ABE-LOS has held discussions relating to UNCLOS III Parts XIII of marine scientific research, and XIV of transfer of marine technology. With regards to Part XIII, the ABE-LOS has debated the meanings and extent of implementation of UNCLOS III Articles 246.5(a), 247 and 251. At the time of writing, there is an update of this material, in the form of Questionnaire 3 on the practice of states in the field of marine scientific research and transfer of marine technology (TMT), in relation to Article 251, UNCLOS III. All activities of the ABE-LOS have direct bearing on the Arctic Ocean as well.

4.3. The Legal Framework for International Marine Scientific Research and other Marine Research Cooperation under the Law of Sea Conventions

Many of the scientific challenges that are associated with the Arctic transcend national boundaries, and their satisfactory resolution can only proceed on the basis of cooperation among coastal states. This cooperation requires a pooling of interests, along with a willingness to engage in multiparty debate and decision-making with a view to initiating collective action that will lead to some greater good.

4.3.1. Evolution of Marine Scientific Cooperation Concepts under Law of Sea Conventions.

Prior to the UNCLOS III, the legal framework for international ocean science cooperation was very limited. In the 1958 Geneva Conventions cooperation is focused on pollution and fisheries issues. Under the Geneva Convention on the High Seas, Article 24, "*States must adopt national measures to prevent pollution of the seas by the discharge of oil from ships, pipelines, or resulting from the exploitation or exploration of the sea-bed and its subsoil*". Articles 25(1) and 25 (2) of the Convention on the High Seas, obligates all states to take cooperative measures with competent international organizations in order to prevent pollution of the seas or air space above from the dumping of radio-active waste, materials, or other harmful agents. The 1958 Convention on the Fishing and Conservation of the Living Resources of the High Seas requires states to conserve high seas fisheries through the adoption of national measures and cooperative arrangements with other states (Article 1), or enter into negotiations for the adoption of agreements and measures aimed to conserve (Article 4) or seek a settlement by resorting to a Special Commission (Article 9), or seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means, as provided for in Article 33 of the U.N. Charter. Any conservation measures adopted by the Commission must be based on scientific findings that demonstrate the necessity, adequacy and the practicality of the measures. The Convention recognizes the interests of states to take part in cooperative fisheries research aimed to conserve fish stocks adjacent to its coast. *The Convention on the Continental Shelf* makes no reference to the need for states to engage in cooperative

fundamental oceanographic or other scientific research concerning the continental shelf and undertaken there.

4.3.2. Key Provisions of UNCLOS III Pertaining to the International Marine Scientific Research and other Marine Research Cooperation. The UNCLOS III provides an extensive framework for marine scientific research and other oceanographic research cooperation among states and competent international organizations in the Arctic (Annex 6). UNCLOS III Annex VIII, identifies the main agencies dealing with these efforts. The Arctic Ocean is considered as enclosed or semi-enclosed seas. Part IX of UNCLOS III defines the meaning of 'enclosed or semi-enclosed sea' (Article 122), and calls for cooperation between states that border such seas (Article 123). Part IX encourages Arctic coastal states to coordinate their actions in:

- the management, conservation, exploration, and exploitation of living resources;
- the protection and preservation of the marine environment;
- the development of policies and programs of scientific research;
- the constructive involvement by other interested states or organizations.

Direct cooperation among states in Arctic Ocean has already taken place, mainly bilaterally and sometimes regionally on issue based. States are also under a reciprocal obligation to promote actively the flow of information and scientific data and the transfer of knowledge resulting from research (Article 143). The results may be disseminated through the International Seabed Authority or other international channels as appropriate. Particular emphasis is placed on dissemination of results to developing states to facilitate their marine scientific research capabilities independently of other states (Article 244(I)). This process should be further advanced by the requirement that, unless otherwise agreed, communications concerning proposed projects are to be made through appropriate international organizations (Article 250).

Thus there is a legal, if not a moral, incentive for Arctic coastal states to implement a regional framework of transboundary cooperation that would enable them to devise effective solutions for common problems.

4.3.2.1. Provisions for cooperation on the marine scientific research. UNCLOS Part XIII provides a framework for Arctic coastal states to cooperate with researching states and competent international organizations in the promotion of marine scientific research activities, by creating favorable conditions for such activities through the adoption of bilateral or multi-lateral agreements, and through the publication and dissemination, using appropriate channels, of information concerning marine scientific research programs, and knowledge resulting from marine scientific research activities. A cooperative regime is provided whereby a coastal state member of a bilateral agreement with an researching states and international organization, is deemed to have authorized the conduct of marine scientific research activities in its EEZ or its continental shelf, if it does not express any objections to the agreed specifications, within four months of notification by the organization to the coastal state, whether the project is carried out directly by the former, or under its auspices (Article 247).

More specifically, all states and competent international organizations, irrespective of their geographical location, and competent international organizations, have the right to conduct marine scientific research in the Arctic, subject to the rights and duties of coastal states under the UNCLOS III. All states' includes land-locked states. Specific provisions in Part XIII seek to promote the facilitation of research (Article 239), research co-operation (Articles 242 and 243) as well as the publication and dissemination of knowledge resulting from marine research (Article 244). However, the freedom to research is in no way absolute in the Arctic Ocean. It is subject to Part XIII of the Convention. Article 240 of Part XIII sets out a number of general principles for the conduct of scientific research:

- Must be exclusively peaceful
- Must be conducted with appropriate scientific methods and means compatible with UNCLOS.

- Must not unjustifiably interfere with other legitimate uses of the sea compatible with UNCLOS and shall be duly respected in the course of such uses.
- Must be conducted in compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment.

Therefore, where research is taking place in the Arctic Ocean by states party to UNCLOS III these principles will apply. Arguably, these principles are of application to states not party to UNCLOS III by virtue of their now constituting customary international law. Part XIII does not specify whether there are research activities which are not acceptable or how research must be conducted.

4.3.2.2. Provisions for cooperation on the knowledge and technology transfer. A wealth of information about the environment and the potential impacts of development in the Arctic have been developed. The technological advances of industry and the potential impact of climate change on the region mean that each new project requires a review and assessment of the existing knowledge base before investing in more scientific studies. Part XIV of UNCLOS requires adopting specific measures to upgrade the scientific and technological capacities of the great majority of coastal states. It requires states and competent international organizations to adopt measures such as the establishment of relevant technical programs for the transfer of marine technology and technical assistance, and the promotion of equitable contractual terms and arrangements for such transfer (Article 268 (a) to (d)). They also include the holding of professional conferences, seminars and symposia on scientific and technological subjects, the promotion of scientific and technology expert exchanges, and the adoption of joint ventures and other forms of bilateral and multi-lateral cooperation (Article 269). Most importantly, states and competent international organizations must utilize existing bilateral, regional and multi-lateral programs and develop new ones (Article 276); and create regional centers "to stimulate and advance" the conduct of marine scientific research activities by developing states and foster the transfer of marine technology (Article 277). These regional centers are under an obligation to: (a) organize conferences, seminars and

symposia; (b) acquire and process marine scientific research and technological data and information; (c) disseminate promptly the results readily available for publication; (d) publicize relevant national policies, compile and systematize information concerning the marketing of technology, contracts and other arrangements relating to patents; and (e) engage in technical cooperation with other states in the region (Article 277 (a) to (i)).

4.3.2.3. Provisions for cooperation on the optimum utilization of EEZ resources. The Arctic poses substantial stocks of marine living resources that flourish in the sub-Arctic waters. They are among most productive in the world, in particular Bering Sea. The main objective of UNCLOS in these fields of cooperation is to strike a balance between the needs of states for optimum utilization and the overarching goal of preventing practices that endanger EEZ living resources by overexploitation.

UNCLOS requires states and competent international organizations must cooperate in preventing the overexploitation of the living resources of the EEZ, by taking national, sub-regional, regional or global measures (Article 61(2)). To this end, states must contribute and exchange, on a regular basis, through competent international organizations, available scientific information on catch, fishing efforts and other relevant data concerning the conservation of fish stocks, with participation by nationals of other states allowed to fish in the EEZ (Article 61(5)) especially when the latter have engaged in "*substantial efforts in research and identification of stocks*" (Article 62(3)).

states bordering enclosed or semi-enclosed seas are bound to cooperate with competent international organizations to coordinate and cooperate in the conservation, exploitation and exploration of their living resources (Article 123). Moreover, Part XIV requires states to cooperate in actively promoting the transfer of marine science and marine technology on fair and reasonable terms in general and, in particular, to promote also development of marine science and technological capacity of states needing and requesting technical assistance in this. All states must similarly carry out efforts-with regard to straddling stocks and highly migratory species within and beyond the EEZ (Article 64). However,

the principle of "*optimum utilization*" of EEZ resources does not apply to marine mammals. states shall cooperate in the conservation, management and study of marine mammals, and can establish regulations more restrictive than those implemented that the International Whaling Commission and other competent international organizations in this field (Article 65).

4.3.2.4. Provisions for cooperation on the high seas fisheries, deep sea mineral and genetic resources. With regard to the fishing of high seas resources beyond the limits of national jurisdiction, UNCLOS requires states to cooperate in their conservation and to enter into negotiations with other states exploiting identical living resources or different resources in the same location (Article 118). Such regional or subregional conservation measures shall be based on the "*best scientific evidence available*", including information on catch, fishing effort statistics, and other relevant data. Such information shall be contributed and exchanged on a regular basis through competent international organizations (Articles 119.1(a) and 119.2).

Minerals occur on the seabed in two forms: polymetallic nodules, and seabed massive sulphides. Exploitation of seabed massive sulphides is currently the only economic source of seabed minerals. Most exploration is being carried out within the territorial waters (such as Polynesia, New Zealand and Japan), rather than in international waters. The deep sea is important for biodiversity and rare and newly discovered species. Industries moving into the deep sea include mineral extraction, bioprospecting and possibly carbon storage. The environmental impacts of these activities are not fully known and further scientific knowledge of the deep sea is required.

4.3.2.5. Provisions for cooperation on the delimitation of the continental shelf. UNCLOS does not bind states to cooperate, however states must cooperate in the negotiation of the outer limits of continental shelf boundaries and abide by the decisions made by the Commission on the Limits of the Continental Shelf (CLCS) in this regard. The CLCS may cooperate with the IOC, the International Hydrographic Organization (IHO) and other

competent international organizations “with a view to exchanging scientific and technical information” which may assist it its task (Annex II, Article 3.2).

An analysis of public-domain data (Macnab et al., 2001) has shown that Canada, Denmark acting on behalf of Greenland, Norway, the Russian Federation, and the USA are entitled to develop extended continental shelves that cumulatively could occupy most of the central Arctic Ocean. Russia submitted its continental shelf claim in 2001; the largest portion of the claim encompassed about one third of the central Arctic Ocean, with proposed outer limits subject to bilateral negotiations with neighboring states. Norway submission remains in the hands of the CLS. Canada and Denmark have embarked on a cooperative program to collect data in the Lincoln Sea, but the presentations of their respective submissions are not expected to occur for several years. The United States has not yet ratified UNCLOS, however for the past few years, American agencies have been engaged in extensive Arctic mapping operations for the express purpose of developing a continental shelf limit (Gardner et al, 2006). In the central Arctic Ocean, the northward convergence of all five extended continental shelves could lead to overlapping claims between adjacent and opposite states. In due course, affected coastal states will need to agree on where to place the boundaries that define their respective continental shelves. All of these need an ongoing process of communication, consultation, and collaboration. Indeed, Part IX of UNCLOS advocates cooperation among the coastal states that border enclosed or semi-enclosed seas such as the Arctic Ocean.

4.3.2.6. Provisions for cooperation on the environmental protection and combat marine pollution. UNCLOS codifies and creates extensive rights and obligations with respect to the protection of the marine environment both within the jurisdiction of coastal states and on the high seas. There are provisions relating to environmental protection in every area of the seas and provisions covering all forms of marine pollution. While UNCLOS provides member states with a firm legal basis in international law upon which to develop further domestic legislation on environmental protection and, Arctic coastal states domestic legislation in many respects already exceeds UNCLOS standards for the prevention of pollution and the protection and preservation of the marine, atmospheric

and ice-covered area environments (Young & Osherenko, 1994; VanderZwaag, et al., 2001).

UNCLOS III requires states to adopt non-discriminatory measures to prevent, reduce and control pollution of ice-covered areas of the Arctic whose ecological balance could be irreversibly affected by navigation, when severe climatic conditions and the year-long presence of ice may place exceptional hazards or obstructions to navigation (Article 234). States are also under an obligation to: (a) cooperate in this regard on a global or regional basis, directly or through competent international organizations (Article 197); (b) notify other states and competent international organization of any imminent or actual damage (Article 198); and cooperate to minimize its potential effects (Article 199). States and competent international organizations are also obligated to undertake studies and programs of scientific research that encourage the exchange of information and data concerning marine pollution, on a regional or global basis, including its causes, extent, exposure, risks and remedies thereof (Article 200). They shall establish rules, standards and recommended practices and procedures based on appropriate scientific criteria (Article 201). States and competent international organizations are under an obligation to refrain from polluting the marine environment (Articles 192 to 194). In particular, they must reduce and control the intentional or accidental introduction of alien species into the marine environment (Article 196). This obligation is particularly pertinent from the perspective of the Arctic Ocean iron fertilization experiments. Article 194 (5), provides for an obligation to take special measures necessary to protect and preserve rare and fragile ecosystems.

Moreover, Part XII also introduces a number of procedural obligations in connection with monitoring the effects of polluting activities (Article 204) and undertaking environmental impact assessments (Article 206). It should be noted though, that the environmental impact assessment requirement under Article 206 of UNCLOS III only operates where a state and competent international organization has reasonable grounds for believing that planned activities under their jurisdiction or control may cause

substantial pollution or may cause significant and harmful changes to the marine environment. And even then an environmental impact assessment is only necessary in so far as is practicable. Such high threshold would probably have the effect of excluding most proposed experiments from the obligation to carry out an environmental impact assessment.

International cooperation to protect the Arctic marine environment also occurs under the rubric of regional and bilateral agreements, such as those between the United States and Russia, Norway and Russia, Canada and Russia, and among the Nordic countries (Hillary & Pagnan, 1999; Legare & Pagnan, 1999). Other important global instruments particularly relevant for marine protection are the 1946 International Convention on the Regulation of Whaling; the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention of 1974); the Convention for the Prevention of Pollution from Ships (MARPOL, 1973, 1978 and its Protocols); the Convention on Biological Diversity (1992); the 1995 United Nations Agreement on Straddling Stocks; the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973); the Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1983); and the Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention, 1972).

Specific Arctic initiatives in this area are the Regional Program of Action for the Protection of the Arctic Marine Environment from Land-Based Activities (1999) and Arctic Offshore Oil and Gas Guidelines for Regulators (1997), the upcoming Arctic Offshore Oil and Gas Guidelines for Industry by the Oil and Gas Producers Association and IUCN, and the Arctic Council's Field Guide for Oil Spill Response in Arctic Waters (1998) and Guidelines for Environmental Impact Assessment in the Arctic (1997). In addition to the international array of agreements, each Arctic country has its own extensive legislative corpus that can be used to protect the Arctic marine environment and its biodiversity. Federal states, such as Canada, Russia, and the United States, tend to

have a great many highly specific laws. Canada has over 20 pieces of legislation it can apply to marine issues, and several of the Native land-claim settlement acts incorporate marine conservation measures. The United States legislative holding is even larger, with nearly 30 pieces of legislation (Pagnan, 1999). The Nordic countries also have legislation, but less of it. For example, five of the Nordic countries have broadbased nature acts under which a wide variety of protection and conservation measures can be authorized. Greenland and Finland have enacted framework legislation directed specifically at protection of their marine environment, and both Greenland and Iceland have passed acts on hunting marine mammals.

4.3.2.7. Provisions for cooperation in the marine scientific research activities in the Area. Part XI of UNCLOS III deals with research taking place on or under the deep seabed (the Area) must be carried out for the benefit of mankind as a whole (Article 140 (1), Article 143(1)). Within this framework states may develop best possible practices and cooperation to mutual benefit and in the interest of the Arctic scientific community as a whole. This may include, for instance, regional cooperation in the application of the consent regime as set out for conduct of marine scientific research in coastal waters. It may also include facilitation, in cooperation between the states/parties involved, of research activities by unmanned equipment like drifting buoys and sub-surface floats.

There are additional provisions which seek to ensure environmental protection (Article 145) and the obligations in connection with the publication and dissemination of research are re-enforced (Article 143 paragraph 3(c)). The Legal and Technical Commission (LTC) set up under Part XI must have the relevant expertise in exploration, exploitation and processing of mineral resources, oceanology, other economic and legal matters relating to ocean mining and most importantly, expertise on the protection of the marine environment. Particularly, the LTC shall establish a marine pollution monitoring program

4.4. Practice of Arctic States

Several scientific institutions and organizations in the USA, Canada, Russian Federation, Sweden, Denmark, and Finland devoted their efforts primarily to the study of the Arctic

Ocean and seas (Macnab, 2006a,b; Kunoy, 2007). Arctic states Ocean research portfolios are, in essence, being re-balanced to take advantage of new interdisciplinary research approaches, sophisticated research and computational tools, and the availability of shared assets such as personnel and research platforms (U.S. Commission on Ocean Policy, 2004). New ocean research priorities are providing the states with the scientific and technical means to redefine its relationship with the ocean for the better: developing the understanding and capability to forecast ocean processes; providing the scientific information needed to support ecosystem-based management; and accelerating deployment of an ocean-observing system that will, in turn, advance both forecasting and adaptive ecosystem-based management capabilities (NSTC Joint Subcommittee on Ocean Science and Technology, 2006). All Arctic states possess domestic and ocean-going research vessel fleets, and are listed as National Oceanographic Data Centers within the IOC/IODE system for the dissemination and exchange of oceanographic data.

The extent of Arctic states involvement in international scientific cooperation programs is voluminous. They are parties to CITES and the CBD. They engage in cooperation in fisheries, living resources, marine pollution through the programs outlined above. Essentially, they participate in most of the FAO, UNEP, IMO, WMO, and other U.N. system programs. They also participate and collaborate in IOC's training and educational programs designed to enhance scientific and technological capacity building in the-field of oceanography in developing states. The legal and institutional frameworks for marine scientific research and other oceanographic research cooperation are vast. All states have implemented boundaries in conformity to the UNCLOS III, and implemented marine scientific research legislation and guidelines in a manner generally consistent with Part XIII. There are, however, pending boundary claims in the Arctic that may have significant impact on the conduct of marine scientific research activities in the outer edge of the continental shelf of states, pursuant to Articles 246 (6) & 246(7). These negotiations will enhance the role of the U.N. Commission on the Limits of the Continental Shelf and will require extensive use of evidence arising from marine scientific research activities, to support expansionary and/or conflicting claims by states (Colson, 2003, 2004).

4.4.1. Jurisdictions over Marine Scientific Research. Table 4.4 shows summary of the Arctic states legislation on jurisdictions over marine scientific research.

Canada claims sovereign rights for the purpose of exploring and exploiting the natural resources of its EEZ and continental shelf; it claims jurisdiction over marine scientific research in its EEZ (Article 13(b)(ii) of the 1996 Oceans Act), and implements a marine scientific research clearance procedure requiring permission for foreign vessel entry into Canadian ports and for the conduct of marine scientific research activities in Canadian zones of maritime jurisdiction. Canada also exercises prescriptive and enforcement jurisdiction to prevent pollution and environmental damage by foreign vessels, including ice-breakers conducting marine scientific research activities, in the waters of-its Arctic Ocean archipelagic territory.

Denmark has adopted Act No. 411 on the Exclusive Economic Zone, which entered into force on 1 July 1996. The rights in the EEZ are defined in accordance with 1982 UNCLOS. Denmark handles requests for marine scientific research projects in the waters of Denmark, Greenland and the Faroe Islands. Denmark implements two marine scientific research forms to process foreign clearance requests in Danish maritime waters and Greenland. Government instructions require applications for permission to conduct marine scientific research to be made through diplomatic channels at least 30 days before the start of the research cruise. A standard application form, "Notification of Proposed Research Cruise" (the ICES form), is to be used. Permission is granted in nearly all cases. However, sometimes permission for research in the territorial sea is conditional on participation of a Danish observer on board. As a general rule, copies of reports on research results must be submitted afterwards. Lead time is three months.

There is no specific legislation concerning the conduct of marine research under Finland's jurisdiction. The rules concerning marine research by foreign vessels are to be found in the Continental Shelf Act of 1965 and in the Surveillance Decree of 1989. The Act on the Fishery Zones makes no mention of marine scientific research and, in the absence of an

EEZ, marine research within the fishing zone has in fact been regarded as a freedom of the High Seas.

Iceland exercises jurisdiction over "scientific research" in the economic zone and requires prior consent for the conduct of scientific research in the economic zone and the continental shelf, processed six months in advance of the activities. The legislation dealing with marine scientific research is no. 41 from year 1979.

Norway exercise jurisdiction over the conduct of marine scientific research activities by foreign researchers in Norway's internal waters, territorial sea and economic zone and on the continental shelf (Crown Prince Regent's Decree on 30 March 2001). The Norwegian marine scientific research regulations apply to foreign nonmilitary ships and international organizations, and regulate the conduct of marine scientific research not related to natural resources. Consent sought six months in advance from the Norway's Department of Fisheries is required for marine scientific research in internal waters, the territorial sea, EEZ and on the continental shelf.

Russia exercise jurisdiction over the conduct of marine scientific research activities by foreign researchers in areas under their maritime jurisdiction. Clearance for foreign marine scientific research vessels must be submitted through official channels at least six months prior to the intended activities.

Sweden exercises jurisdiction over "scientific research" in the economic zone and in the Continental Shelf. The rules concerning marine research by foreign vessels are to be found in the Continental Shelf Act of 1966, the Swedish Exclusive Economic Zone Act of 1992, the Swedish Exclusive Economic Zone Ordinance of 1992; the Environment Act of 1998; Environment Ordinance of (1998, 900), and the Protected Areas Act according to the Environment Act of 1998. Clearance for foreign marine scientific research vessels must be submitted through official channels at least four to six weeks prior to the intended activities.

Table 4.4. Classification of National Legislation on Marine Scientific Research by Zones of National Marine Jurisdiction.

Source- <http://www.un.org/Depts/los/index.htm>

Country	Territorial Sea	Marine Internal Waters	Exclusive Economic Zone	Continental Shelf
Canada	- Oceans Act of 18/12/1996	Oceans Act of 18/12/1996	- Oceans Act of 18/12/1996	- Oceans Act of 18/12/1996
Denmark	- Ordinance Governing the Admission of Foreign Warships and Military Aircraft to Danish Territory in Time of Peace, 1999 - Act No. 200 of 7/4/1999 on the delimitation of the territorial sea - Executive Order No 242 of 21/4/1999 - Order No. 191 of 27/5/1963 on the Delimitation of the Territorial Sea of Greenland	- Act on the Contiguous Zone, 24/6/2005 - Executive Order on the Demarcation of the Danish Contiguous Zone, 29/6/2005	- Act No. 411 of 22/05/1996 on Exclusive Economic Zones - Royal Decree of 7/6/1963 concerning the exercise of Danish sovereignty over the Continental Shelf	- Consolidated Act no. 1101 of 18/11/ 2005 relative to the Continental Shelf - Consolidated Act no.526 of 11/6/2002 on the use of the Danish Subsoil
Finland	- Act amending the Act on the Delimitation of the Territorial Waters of Finland (981/95 of 3/3/1995, in force from 30/7/1995)		- Act on the Exclusive Economic Zone of Finland, 26/11/ 2004 - Government Decree on the Exclusive Economic Zone of Finland, 2/12/ 2004	- Law No. 149 of 5/3/1965 concerning the Continental Shelf
Iceland	Law No. 41 of 1/6/1979 concerning the Territorial Sea, the Economic Zone and the Continental Shelf		Law No. 41 of 1/6/1979 concerning the Territorial Sea, the Economic Zone and the Continental Shelf	Law No. 41 of 1/6/1979 concerning the Territorial Sea, the Economic Zone and the Continental Shelf
Norway		- Regulations relating to foreign MSR in Norway's internal waters, territorial sea and economic zone and on the continental shelf (Crown Prince Regent's Decree of 30/3/2001)	- Regulations relating to foreign MSR in Norway's internal waters, territorial sea and economic zone and on the continental shelf (Crown Prince Regent's Decree of 30/3/2001)	- Regulations relating to foreign MSR in Norway's internal waters, territorial sea and economic zone and on the continental shelf (Crown Prince Regent's Decree of 30/3/2001)
Russia	- Federal Act on the internal maritime waters, territorial sea and contiguous zone of the Russian Federation, 17/7/1998	- Federal Act on the internal maritime waters, territorial sea and contiguous zone of the Russian Federation, 17/7/1998	- Decree of the Presidium of the Supreme Soviet of the USSR on the Economic Zone of the USSR - Federal Act on the exclusive economic zone of the Russian Federation, 2/12/1998	- Decree of the Presidium of 6/2/1968 on the Continental Shelf - Resolution No. 564 of 18/7/1969 of the Council of Ministers of the USSR concerning Procedure for Carrying out Work on the Continental Shelf and the Protection of its Natural Resources - Decision of the Presidium of the Supreme Soviet of the USSR of 13/9/1969 concerning the Application of the Decree of the Presidium of the Supreme Soviet of the USSR concerning the Continental Shelf of the USSR Federal Law on the Continental Shelf of the Russian Federation, 25/10/1995
Sweden			- Act on Sweden's economic zone; promulgated on 3/12/1992 Ordinance on Sweden's Exclusive Economic Zone, issued on 3/12/1992	Act No. 314 of 3/6/1966 Concerning The Continental Shelf
USA			- Proclamation 5030 by the President of the United States of America on the Exclusive Economic Zone of the United States of America, 10/3/1983	

The USA does not claim jurisdiction over marine scientific research in its EEZ as a policy to encourage other coastal states to adopt liberal policies towards foreign marine scientific research activities in their national waters. However, the USA recognizes the right of coastal states to exercise such jurisdiction "if that jurisdiction is exercised in a manner consistent with international law". Consent of the USA is required for foreign marine scientific research activities in USA waters "if an only if" any portion of the activities is conducted within the territorial sea, or the activities intended in the EEZ involve the study of marine mammals, the taking of commercial quantities of marine resources, or involve "contact with the USA continental shelf". This means that marine

scientific research activities relating to the USA EEZ or its continental shelf resources are regulated, and marine scientific research in the territorial sea is subject to prior consent.

4.4.2. Implementation of Marine Scientific Research Regime. In the case of Canada, the Department of External Affairs is the central organ entrusted with foreign marine scientific research clearance procedures and approval. Canada's implementation of marine scientific research guidelines has been very flexible. The current lead time required for submission to Canada is three months. All communications must be submitted through official channels. Canada reserves the right to participate or to be represented on board the foreign research vessel and to negotiate the content of the proposed research. Marine scientific research clearance requests process by foreign state is described in detail in Chapter 5.

In Denmark, the Department of International Law (Danish Ministry of Foreign Affairs) is the official channel for handling requests for marine scientific research projects in the waters of Denmark, Greenland and the Faroe Islands. Denmark's implementation of the marine scientific research regime is consistently less cumbersome (Soons, 1982). The Department has developed a form which follows the informational requirements of UNCLOS Article 248 (Similar to UN Draft Form A- See Annex 7). It also requires assistance in the assessment or interpretation of research results and arrangements for the embarkation/disembarkation of observers and participants on board foreign marine scientific research vessels. The participation of Danish scientists is encouraged, but appears not to be a condition for clearance. An observer may be placed on board any foreign research vessel undertaking marine scientific research in the territorial sea of Denmark. Multiple copies of preliminary and final reports and other publications must be provided to Danish authorities.

In Finland, the Ministry for Foreign Affairs is the central organ entrusted with foreign marine scientific research clearance procedures and approval. Prior authorization is required for scientific research with regard to the resources of the continental shelf. The

request for authorization shall be submitted to the Ministry for Foreign Affairs "well in advance", in practice at least 14 days prior to the intended cruise. Since research cruises to Finland's fishery zone usually take place in the framework of bilateral or multilateral agreements, permission is under normal circumstances granted even for underwater research. Within the territorial sea of Finland the procedure is more detailed, with express restrictions on certain kinds of research activities. According to the Surveillance Decree, an alien may not carry out military reconnaissance within Finnish territory. Permission from the Ministry of Defence is required for mapping or sounding for the purpose of hydrographic survey and for underwater research by foreign vessels. Permission may be granted unless it is detrimental to the surveillance of the territorial integrity and the security of the state. Until 1996 Governmental research vessels were required to comply with the requirement of prior notification (two days prior to the intended passage) of innocent passage through Finland's territorial sea. The requirement of prior authorization (six days prior to the intended passage or entry) of other than innocent passage through the territorial sea as well as of entry into the internal waters of Finland still applies. These procedures do not apply to civil research vessels, which are treated in the same way as commercial vessels; Movements of research vessels within the territorial sea may also be restricted with respect to routes and anchoring due to the existence of military protection areas.

In Iceland, Ministry of Foreign Affairs handles requests for marine scientific research projects. Iceland's legislation paraphrases Articles 246(3) (normal circumstances) and 246(5), as well as Article 248 for information to be provided, pursuant to Part XIII, 1982 UNCLOS. Clearance into Monaguesque waters granted in normal circumstances, if it complies with the principles laid down in Article 240, 1982 UNCLOS, which are paraphrased. A competent international organization authorized by the Minister of State shall not require clearance, unless the marine scientific research activities are intended in a "protected sea area.". Marine scientific research activities, including the use of "installations and facilities," must comply with detailed regulations for the protection of the marine environment, domestic and international, obtaining "obligatory insurance or

financial security" to cover for the vessel operator's potential liability. Research results shall be communicated to the Minister of State within one year after the completion of the research.

Marine scientific research clearance by Norway depends upon the provision of information to be supplied to Norway paraphrases Article 248, 1982 UNCLOS, and the Standard form. Applications to engage in marine scientific research shall be sent to the Directorate of Fisheries by the researcher, research institution or international organization that is to conduct the research. The application shall be sent six months before the planned start-up date for the project. It further requires details of "liability insurance." The Norwegian Coast Guard reserves the right to inspect a research vessel or installation "by coercive means" if the latter are used for activities that fall within sovereign rights, or are taking place in the territorial sea. In all other situations, in line with Article 253, 1982 UNCLOS, the research vessel may be ordered to suspend its activities and leave, but the Norwegian authorities reserve the right to enforce other relevant provisions, including enforcement measures. Scientific installations and structures will have 500 m safety zones around them, will bear identification markings and shall comply in all other respects with internationally agreed rules.

The Russian marine scientific research regulations and guidelines are extensive and virtually paraphrase the provisions of Part XIII, 1982 UNCLOS. The legislation implements the implied consent regimes provided in Articles 252 and 247, UNCLOS. Jurisdiction over marine scientific research is claimed in the EEZ established in 1984 by the former USSR. Lead time for foreign clearance requests is six months and applications must be submitted through diplomatic channels. However, the EEZ legislation provides for prosecution and possible detention of vessels for all forms of pollution resulting in severe damage or the threat of severe damage to the coastline, related interests or resources. Although this provision does not appear in the 1996 legislation, the 1984 law sets a penalty of up to 10,000 rubles on foreign vessels conducting marine research in the EEZ without consent. If the violation causes extensive damage or other severe

consequences, or are committed repeatedly, penalties include a 100,000 ruble fine and the possible seizure of the vessel, equipment, instruments or other objects used in the transgression. Grounds for refusal of foreign marine scientific research clearance for activities in and on Russia's continental shelf are outlined in special legislation and follow closely the 1982 UNCLOS provisions. These include, but are not limited to, security threats, prospecting for mineral or harvesting of biological resources, incompatibility between the marine scientific research activities and the protection of living and non-living resources from pollution, the conduct of drilling, use of explosives, introduction of harmful substances into the marine environment, construction of any type of installations or structures not mentioned in the clearance request, and those marine scientific research activities that create "impediments" to other activities conducted by Russia under its sovereign rights and jurisdiction over the continental shelf. The 1998 Russian EEZ legislation requires foreign clearance requests to be submitted both in English and Russian translations. In essence, the new law restates previous legislation and follows closely the provisions of the 1982 UNCLOS. It introduces definitions to the effect that marine scientific research includes "basic or applied research and experimental projects conducted for these purposes, aimed at obtaining knowledge on all aspects of natural processes occurring on the seabed and in its subsoil, in the depths of the water, and in the atmosphere." Resource research covers "applied scientific research projects aimed at studying, exploring, and commercial exploitation of living and non-living resources." The latter are approved only under licenses marine scientific research is dealt with in Section IV Resource and Maritime Scientific Research. Any foreign marine scientific research project is subject to Russia's annual marine scientific research plan. Information to be provided follows closely the Standard form. Participation by Russian scientists is a condition for clearance in both types of research.

Sweden uses the OALOS Standard form, modeled on the ICES form (similar to Annex 7), for marine scientific research clearance requests. Sweden's legislation paraphrases Articles 240 and 246, 1982 UNCLOS, placing particular emphasis on the protection of the marine environment and consent for non-resource related marine scientific research

activities. Breaches of the regulations authorize Swedish authorities to order the cessation and/or "stoppage" of the foreign activities, in line with Article 253, 1982 UNCLOS, and Sweden reserves the right to adopt "any additional measures that might be required" to that effect. In the territorial sea, permission must be obtained for the conduct of marine scientific research activities. Conditions attach to the granting of clearance and depend on whether the research is useful "from a Swedish point of view," whether access to data will be obtained and Swedish scientists will participate in the activities. These conditions are in line with Article 245, 1982 UNCLOS, since the coastal state has sovereign rights to regulate marine scientific research in the territorial sea and can impose any conditions it deems fit, provided these are consistent with international law. Marine scientific research in the continental shelf may be subject to research results being made available to the Swedish authorities and regulated under a different regime. Fisheries research in the Fishing Zone requires notification through official channels and coordination with the Swedish Coast Guard.

In the USA, The US Department of State implements Part XIII, UNCLOS 1982, by using Article 250 official communications when seeking consent for the conduct of marine scientific research activities in foreign coastal waters and when processing foreign requests for clearance on behalf of foreign vessels intending to conduct marine scientific research activities in U.S. waters. USA State Department standardized procedures for processing research clearance requests. The usual "path" of a clearance request includes the following steps: 1) A plan for marine scientific research is developed, funding is secured, a proposal is submitted to a research vessel operating institution which schedules a distant water cruise; 2) the research vessel operating institution submits the requests to the USA State Department. The State Department has developed a form which follows the informational requirements of UNCLOS Article 248 (copy attached as Appendix E); 3) the Research Vessel Clearance Office, Department of State, may decide that coastal state jurisdiction over the proposed project is not recognized, or forward the request to the appropriate coastal state through the USA Embassy there; and the coastal state has several options: it can approve, deny the requests, or request further

information. However, under UNCLOS, Article 252, if the coastal state does not respond within four months, consent can be implied.

4.4.3. Marine Scientific Research Regime Implementation Patterns. Compliance with the marine scientific research Articles of the UNCLOS III has implications for the Arctic state(s) both as a researching state(s) and as a coastal state(s). As a researching state(s), Arctic state(s) is/are bound by the rules and regulations governing the conduct of research under a consent regime, under obligations to make their marine scientific expertise and infrastructure more responsive to the needs of developing countries, and under obligations to report research plans and results. As a coastal state on the other hand, Arctic state(s) has/have benefited from the marine scientific research articles by having recourse to data and samples obtained by foreign ocean research being carried out off their shores.

4.4.3.1. Observed pattern—the 2003-2005 IOC Secretariat's Survey of State practices. During 2003-2005, the Intergovernmental Oceanographic Commission (IOC) Secretariat's conducted the survey of IOC member state practices in the fields of marine scientific research and transfer of related marine technology (see Annex 8 for Questionnaire no. 3). The purpose of the survey and the subsequent data compilation and analysis was to: (i) to assess the problems encountered in the implementation of the marine scientific research regime as established by Part XIII of UNCLOS; (ii) to assist states in establishing generally accepted guidelines, criteria and standards for the transfer of marine technology (TMT) in accordance with Article 271 of UNCLOS; and (iii) to inform the international community as to the status of marine scientific research and TMT and practical issues raised in their implementation. There were questions relating to the frequency of marine scientific research requests made to and by states, and the results of those requests. There were also questions relating to the actual mechanics of making and dealing with requests, in terms of dedicated national legislation and bodies designated to process the requests. Participation by nationals of the requested states in research being conducted by applicant third party states was also covered.

Table 4.4 shows the results of the 71 IOC member States Survey. Following are important findings:

- 57% have national legislation for marine scientific research. Many states have transposed the text of the UNCLOS III literally into domestic legislation-at least in part. Others deviate in terminology which indicates uncertainty as to the interpretation of the coastal state's rights under the UNCLOS III, or in substance, ranging from provisions deviating in substance to absent legislation with respect to marine scientific research. Considerable variety among Asian states; little or broad reference to Part XIII in African and Latin American states, with clear departures among the latter, and only for the group of Western European states and USA and Canada "a substantial degree of conformity with the UNCLOS III regime.
- 33% requested technical assistance to draft/update/revise national legislation on marine scientific research.
- The majority of states claim 'jurisdiction' or 'exclusive jurisdiction' over research, or 'exclusive jurisdiction to authorize, regulate and control scientific research' with little further elaboration (also Fenwick 1992). 92% have administrative procedures for the handling of marine scientific research requests. 58% do not have a specific application form.
- The vast majority of states do not engage in ocean going research, or in the conduct of marine scientific research activities in zones under foreign sovereign rights and jurisdiction. The majority of states do not possess oceanographic research vessels, the facilities nor, in general, the capacity required to undertake marine scientific research activities. 48% conduct marine scientific research in waters not under their sovereignty or jurisdiction; of them
 - 44% have experienced implied consent
 - 72% have experienced (hosted) foreign observers
- 15% have exercised implied consent in waters under their jurisdiction

- consider the start date
 - 37% the specified starting date of the research plan
 - 15% the date the research plan is approved
 - 10% the date the RV departs from home port
 - 45% the date the research operation begins in waters under state's national jurisdiction
 - 6 (10%) other
- 90% have sent scientists as observers aboard foreign RVs while in waters under state's national jurisdiction
- 67% state's observers represent the government while aboard foreign RVs
- 78% have sent observers aboard foreign RVs while in waters under state's national jurisdiction; of them
 - 89% report on research activities carried out
 - 83% ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document
 - 66% act as an official channel for possible communications between the vessel and the state government
 - 87% take the opportunity to be trained in the field of work defined in the marine scientific research project
- 60% plan to provide equipment aboard the RV for use by coastal state observers
- 82% require researchers provide relevant authorities copies of data and samples
- 75% require researchers provide/assist relevant authorities with assessment of results
- 92% publish and disseminate research results at the national, subregional/ regional and international levels
- 10% suspended/stopped marine scientific research conducted in waters under state's national jurisdiction for non-compliance with UNCLOS Articles 248 and 249.

Table 4.4 - Marine Scientific Research/Practices of Member States/Conclusions and IOC Questionnaire No. 3

Information Details

Column 2: National legislation
 Column 3: Official channels established to handle requests for MSR projects
 Column 4: Approximate number of requests for authorization your country has received annually (1998-2002)
 Column 5: Research requests were approved
 Column 6: Research requests were approved
 Column 7: Other (specify, e.g., special arrangements for requests consent)
 Column 8: Does your country conduct MSR in areas that are not under your sovereignty or jurisdiction?
 Column 9: If yes, as a researching state, has your country benefited from the procedure of implied consent as stated in Article 257
 Column 10: If yes, as a researching state, has your country benefited from the procedure of implied consent as stated in Article 257
 Column 11: Do you have your vessel implied consent to allow research to be conducted in waters under your jurisdiction by another country?
 Column 12: What comprises the accepted sharing state of the MSR project in your country? 1: The specified starting date of the research plan, 4: The date the actual research operation begins in waters under your national jurisdiction? 5: Other

Column 13: Has your country already sent scientists as observers on board foreign research vessels?
 Column 14: Do the observers/inspectors your government on board foreign research vessels?
 Column 15: What are the functions/assignments of the observers on board? A: To report on research activities carried out; B: To ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document; C: To act as an official channel for possible communications between the vessel and your government; D: To have the opportunity to be trained in the field of work defined in the MSR project; E: Other (Please specify)
 Column 16: Does your country require that researchers provide the relevant authorities with copies of data and samples? (Article 249 (1)(f))
 Column 17: Does your country require that researchers provide and/or assist the relevant authorities with an assessment of research results? (Articles 249 (1)(g) and 249 (1)(h))
 Column 18: During the last five years, how many foreign vessels have undertaken MSR in the waters under your national jurisdiction and international level the research results and/or conclusions of the research project? (Articles 249 (1)(i) and 249 (1)(j))
 Column 19: Has your country ever required suspension/cessation of MSR project conducted in waters under your national jurisdiction for non-compliance with Article 249 and 249 of UNCLOS?
 Column 20: How (regulatory provisions, port of call conditions or other requirements) do you generally plan to provide equipment (on board the research vessel) for use by a potential observer from that country state?

Country	31A - Legislation	31A - Official Channels	31B - Number of Requests Received Annually	31C - Percent Approved	31D - Form	31E - Add'l Form	31A - Conduct MSR Abroad	31A - Experienced Article 252	31B - Employ 252	31A - MSR Staff	31A - Observers	31B - Employ Experienced Observers	31B - Employ Govt Res.	31A - Govt Rep. Function	31A - Equip. for Observer	31C - Require Data	31D - Require Analy	31E - Dist. Data	31F - Total Foreign RVs	31G - Suppl. Csts.	31H - Port Begins
Algeria	N	Y	2	100	N	N	Y	Y	N	1	Y	Y	N	A, B, D	N	Y	Y	Y	3	N	Null
Angola	N	Y	5	100	N	N	Y	Y	N	1	Y	Y	N	A, B, C, D	Y	Y	Y	10	N	N	same as all vessels Normal laws and regulations
Argentina	Y	Y	4	75	N	N	Y	Y	N	1	Y	Y	Y	B, D	Y	Y	Y	20	N	N	same as all vessels Normal laws and regulations
Australia	N	Y	30	100	N	N	Y	Y	N	Null	Y	Y	Y		Y	Y	Y	Null	N	N	
Bahamas	Y	Y	80	100	Y	Y	N	Y	Null	Y	Y	Y	Y	A, B, C, D	Y	Y	Y	11	N	N	Customs/Immigration Station
Bahrain	N	Y	5	100	N	Y	N	Y	Y	1	Y	N	Y	A, B, C, D	Y	Y	Y	1	N	N	no tax or customs, other regulatory provisions apply
Brazil	Y	Y	6	97	Y	Y	Y	N	N	4	Y	Y	Y	A, B, C, D	N	Y	Y	Null	Y	Y	no tax or customs, other regulatory provisions apply
Bulgaria	Y	Null	Null	Null	Null	Null	Y	Y	Y	1	Y	Y	Y	A, B, C, D	Y	Null	Null	Null	N	N	Standard international requirements
Cameroon	N	N	0	N/A	N	N	N	Y	Y	Null	Y	N	Y	C, D	Y	Y	Y	1	N	N	None
Canada	Y	Y	103	98	N	N	Y	N	N	4	Y	Y	Y	A, B, C, D, E	Y	Y	Y	411	N	N	Standard international requirements for foreign ships and crew
China	N	Y	3	100	N	N	N	N	N	4	Y	Y	Y	A, B, D	Y	Y	Y	4	N	N	Null

Country	31A - Legislation	31A - Official Channels	31B - Number Requests Received Annually	31C - Percent Approved	31D - Form	31E - AADT Forms	31EA - Conduct MSR Award	31EA - Experienced Above 252	31EB - Employ 252	31EA - MSR Start	31EB - Observers	31EB - Employ Experienced Observers	31EB - Employ Govt Rpts	31EB - Govt Reps Foundation	31EB - Equip. for Observer	31EC - Require Data	31ED - Require Any	31EE - Dis. Data	31EF - Total Foreign Rts	31EG - Shipl. Cons.	31EH - Port Facility
China, Peoples Republic of	Y	Y	9	72	Y	Y	Y	N	N	5	Y	N	Y	A, B, C	Y	Y	Y	51	Y	N	
Columbia	Y	Y	4	100	N	N	Null	Null	Null	Null	Null	Null	Null	A, B, D	Null	Null	Null	Null	Null	Null	
Congo	N	Y	4	100	N	N	N	N	N	4	Y	N	Y	A, B, D	Y	Y	Y	4	N	Null	
Ecuador	N	Y	3	100	N	N	N	Y	Y	1	Y	Y	Y	D	N	N	Y	10	N	Null	
Egypt	N	Y	3	70	Y	Y	Null	Null	Null	4	Y	Null	Y	A, B, C, D	Y	Y	Y	14	Y	Null	
El Salvador	Y	Y	1	100	Y	Y	N	N/A	N	5	Y	N/A	Y	A, B, C, D, E	N/A	Y	Y	10	N	Y	
Finland	Y	Y	20	100	Y	Y	N	N/A	Null	4	N	Y	N/A	N/A	Y	Y	Y	Null	Null	Y	
France	Y	Y	40	7	N	N	Y	N	Y	1	Y	Y	Y	A, B, C	Y - if seafloor	Y	Y	2d	Y	Y	
Gabon	N	Y	Null	Null	N	N	N	N/A	Y	3	Y	N/A	Y	A, B, C, D, E	N/A	Y	Y	4	N	Y	
Germany	Y	Y	36	100	N	N	Y	?	N	1	?	?	?	?	Y	Y	Y	?	N	Y	
Guinea	N	N	?	?	N	N	Y	Y	Y	1, 2, 3, 4	Y	Y	Y	A, B, C, D	Y	Y	Y	5	N	Null	
Iceland	Y	Y	15	?	Y	N	Y	Y	N	4	Y	Y	Y	A, B, D	Y	Y	Y	10	N	Y	
Indonesia	Y	Y	?	85	Y	Y	N	N/A	Y	1, 2, 3, 4	Y	Y	Y	A, B, C	Y	Y	Y	?	Null	Null	
Ireland	N	Y	50	100	Y	Y	Y	Y	N		Y	Y	Y	A, B, C, D, E	Y	Y	Y	11	N	Null	
Italy Coast	N	Y	1	100	N	N	N	Y	N	4	Y	N	Y	A, B, C, D, E	Y	Y	Y	?	N	Null	
Jamaica	N	Y	4	100	N	N	0	Y	N		Y	Y	Y		Y	Y	Y	?	N	Null	
Japan	Y	Y	10	100	Y	N	N/A	N	N	4	N	N	N	N/A	N	Y	Y	52	N	Null	
Kenya	Y	Y	1	100	N	Y	Null	N	Y	4	Y	Y	Y	A, B, D, E	Y	Y	Y	1	N	Y - tax	
Koweit	N	Y	0	N/A	Null	N	Y	N	Y	1	Y	N	N	A, B, D	Y	Y	Y	12	N	?	
Lebanon	N	Y	Null	Null	Null	N	Null	Null	N		Null	Null	Null		Y	Y	Null		Null	?	

Country	31A - Legislation	31A - Official Channels	31B - Number Requests Approved	31C - Percent Approved	31D - Form	31E - A41 Forms	31A - Conduct MSR Abroad	31A - Experienced Aides 232	31B - Employ 232	31A - MSR Staff	31B - Observers	31B - Employ Experienced Observers	31B - Employ Govt Reps	31B - Govt Reps Function	31B - Equip. for Observer	31C - Require Data	31D - Require Aids	31E - Dis. Data	31F - Total Foreign RPS	31G - Shipl. Ctrs.	31H - Port/Require
Madagascar	Y	Y	10	80	N	Y	Y		Y	1	Y	Y	Y	A, B, C, D	Y	Y	Y	12	Y	Y	immigration control, port fees take into account agreements with national authorities & researching institute
Malaysia	Y	Y	5	100	Y	Y	N/A		N	1, 2, 4	Y	N	Y	A, B, C, D	Y	Y	Y	5	N	?	
Mauritius	N	Y	2	100	N	N	N/A		Y	4	Y	N/A	Y	A, B, C, D	Y	Y	Y	8	N	standard protocol for vessels	
Morocco	Y	Y	Null	Null	N	N	N		Null	2	Y	Null	Null	Null	Y	Y	Y	Null	Null	Null	equipment deployed and retrieved is exempt from tax
Myanmar	N	Null	0	N/A	N	N	N/A		N	1	Y	N	Y	A, B, C, D	Y	Y	Y	2	N	Null	
Norway	Y	Y	3	100	N	N	Null		Y	1	Y	Y	Y	D	Y	Y	Y	14	N	Null	
Netherlands	N	Y	50	100	Y	N	Y		N	4	N	Y	Null	Null	Y	N	Y	48	N	standard protocol for vessels	
New Zealand	N	Y	5	100	Y	N	N		N	4	Y	Y	Y	A, B, D	Y	Y	Y	25	N	Null	
Nicaragua	N	N	N/A	N/A	N	N	N/A		N/A	N/A	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Null	all customs and tax requirements apply
Nigeria	Y	Y	25	92	Y	Y	Y		N	4	Y	Y	Y	A, B, C, D	Y	Y	Y	?	N	Null	
Oman	Y	Y	88	99	Y	N	Y		Y	5	Y	Y	Y	A, C, D	Y	Y	Y	84	N	Null	
Pakistan	N	Y	2	50	N	N	N/A		N	4	Y	N	Y	A, B, C, D	Y	Y	Y	1	N	Null	
Paraguay	N	Y	1	100	N	N	Y		Y	5	Y	Y	Y	A, B, C, D, E	Y	Y	Y	8	N	?	
Peru	N	Y	7	100	N	N	Y		N		N						Null		N	No special restrictions	
Philippines	N	Y	8	100	N	N	Null		Y	4	Y	Y	Y	A, C, D	Y	Y	Y	?	N	Y	
Poland	Y	Y	6	100	Y	N	N		N	4	Y	Y	Y	A, B, D	Y	Y	Y	29	Y	Y	
Portugal	Y	Y	Null	Null	N	Null	Null		Y	Null	Y	Y	Y	A, B, C, D	Y	Y	Y	Null	Null	list of national "codes"	
Republic of Korea	Y	Y	49	100	N	N	Y		N	1	Y	Y	Y	A, D, E	Y	Y	Y	233	N	EU standards	
Romania	N	Y	1	100	N	Y	N		N	1	Y	Y	Y	A, B, C, D	Y	Y	Y	6	N	Null	

Country	31A - Legislation	31A - Official Channels	31B - Number Requests Received Annually	31C - Percent Approved	31D - Form	31E - ADI Form	31F - Conduct MSR Award	31G - Experienced Andon 252	31H - Employ 252	31I - MSR Start	31J - Observers	31K - Employ Experienced Observers	31L - Employ Golf Props	31M - Govt Range Function	31N - Equip. Observ	31O - Require Data	31P - Require Army	31Q - Data Data	31R - Total Foreign MS	31S - Supp/ Crew	31T - Port/Requirements
Russian Federation	Y	Y	106	78	Y	N	Y	Y	4	4	Y	N	Y	A, B, C	Y	Y	Y	83	N	standard	
Saint Lucia	Y	Y	4	7	N	N	N/A	N	4	4	Y	Y	N	A, C, D	N/A	Y	Y	16	N	?	
Senegal	N	Y	3	100	N	N	N/A	N	2, 4	2, 4	Y	N/A	Y	A, B, D	N/A	Y	Y	4	N	set of national exemptions for RVE	
Senegal	Y	Y	10	80	Y	N	Y	Y	Null	Null	Y	Y	Y	A, B, C, D	N	Y	Y	24	N	Null	
Sierra Leone	Y	Y	1	100	N	N	N	7	2	2	Y	Y	N	D	N	Y	Y	5	Null	Null	
South Africa	Y	Y	3	100	N	N	N	N	4	4	Y	Y	N	A, B, C	N	Y	Y	14	Null	Null	
Spain	N	Y	10	Null	N	N	N	N	4	4	Y	Y	N	A, B, C	N	Y	Y	6	N	custom, port taxes, bags	
Sri Lanka	N	Y	10	100	Y	N	N/A	N	1, 2, 3, 4, 5	Y	Y	Y	Y	A, B, C, D	Y	Y	Y	6	N	standard international requirements	
Sweden	Y	Y	300	98	Y	N	Y	N	1	1	N	N	N/A	N/A	N	Y	Y	354	N	standard international requirements	
Switzerland	N	N	0	0	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	N/A	N/A	N/A	N/A	N/A	N/A
Syrian Arab Republic																					
Tanzania, United Republic of	N	Y	50	?	Y	N	N/A	Y	2	2	N	N	N	A, B, C, D	N/A	N	Y	Null	?	all customs and immigration requirements apply	
Thailand	Y	Y	0	N/A	Null	Null	N/A	Null	Null	Null	Null	Null	Null	A, B, C, D	Y	Y	Y	N/A	N	Null	
Togo	Y	Y	7	7	N	N	Null	Null	5	5	Null	Null	Y	A, B, D	Null	Null	Null	Null	N	Null	
Tunisia	Y	Y	15	Null	Y	N	N/A	N	1, 2, 3, 4	Y	Y	N/A	Y	A, B, D	N/A	N/A	Y	7	N	N/A	
Turkey	N	Y	6	100	N/A	N/A	Y	N	Other	Y	Y	Y	Y	A, B, C, D	Y	Y	Y	23	N/A	N	
Ukraine	N	Y	3	100	N	N	Null	N	1	1	N	Y	Y	D	Null	Y	Y	7	N	Null	
United Kingdom	N	Y	80	88	N	N	Y	Null	1	1	N	Y	Y	N/A	Y	Y	Y	383	N	to be supplied	
USA	Y	Y	70	100	Y	N	Y	N	1	1	N	Y	N/A	N/A	Y	Y	Y	5	N	no objection	
Vietnam	Y	Y	2	80	Y	N	N/A	Null	1, 2, 3, 4	Y	Y	N	Y	A, B	Y	Y	Y	5	N	no objection	

Particular to the Arctic states, discernible patterns observed by the IOC Survey as follows (Table 4.5):

- All Arctic states have national legislation for marine scientific research, processed marine scientific research clearance requests through official channels, and complied with the standard lead time. Most have transposed the text of the UNCLOS III into domestic legislation- at least in part. Denmark retains its rights under international law and requires three months lead time. Finland requires prior permission for research on the continental shelf. Sweden requires prior permission which can be obtained with a 4-6 weeks lead time. Iceland law requires consent for research in Icelandic territorial waters, economic zone, and on the shelf; all request must be processed through the Ministry of Foreign Affairs and be submitted six months prior to intended start of the project. Consent must be obtained for research in waters under Norwegian jurisdiction from the Directorate of Fisheries; applicants are advised to comply with separate legislation before entering Norwegian jurisdiction; lead time for application is six months; Norwegian follows closely the provisions of Part XIII. The Russian Federation requires application for consent six months prior to the research cruise; consent may be refused on the grounds of national security and threats to environment. In Canada, marine scientific research is within the powers, duties and functions of the Minister of Fisheries and Oceans as provided in section 4 of the Department of Fisheries and Oceans Act. In addition, section 42 and following of the Oceans Act may apply to marine scientific research. However, the Oceans Act provisions are not specific as the provisions of Part XIII. There are no regulations made under the authority of the Oceans Act that governs marine scientific research. The USA policy regarding the Exclusive Economic Zone and the territorial sea was established with Presidential Proclamations 5030 and 5928, respectively. Accordingly, advance USA Department of State consent is required for marine scientific research if and only if: a) Any portion of the research is conducted within the USA territorial sea; b) Any portion of the research within the USA EEZ involves the study of marine mammals or endangered species; c) Any portion of the research within the USA EEZ requires taking commercial quantities of marine resources; or d)

Any portion of the research within the USA EEZ involves contact with the USA continental shelf.

- Number of marine scientific research requests received annually in the range of 300 (Sweden) to 15 (Iceland) during 1998-2002. Others received annual requests for authorization - Norway (68), Finland (20), Russia (106), USA (70), Canada (103), and Denmark (200). Of those, approximately percentage approved varies from 100 to 78. No denials are registered from Finland and the USA. 78 percent requests are approved in Russia.
- Most of the Arctic states do not have their own application form for requesting consent (Article 255). Finland, Iceland, Denmark, Norway, and Sweden used the format of model of the International Council for the Exploration of Sea (ICES). In the USA, clearance requests must be submitted in the U.N. Guide Draft Standard Form A (See Annex 7). Canada has flexible guidelines. Only Russia required more details. Finland requires additional form to be filled for marine scientific research in the Territorial Seas.
- Most of Arctic states (except Finland) have/had participated in or carried out the marine scientific research activities in waters not under their jurisdiction.
- Countries like Iceland, Denmark, Norway, Sweden and Russia have benefited from the procedure of implied consent as stated in Article 252 of UNCLOS III to conduct research in the waters of another coastal state.
- Only Norway and Russian Federation exercised implied consent in waters under their jurisdiction where as Canada, Denmark, Iceland, Sweden, and the USA have not utilised implied consent to allow research to be conducted in waters under their jurisdiction by another state. Most listed security as the rationale for not employing the implied consent regime.

- Sweden, Denmark, and the USA consider the start date of the marine scientific research project the specified starting date of the research plan whereas Finland, Canada, Iceland, and Russian Federation regard as the date the research operation begins in waters under state's national jurisdiction. Norway deems date registered at their Directorate of Fisheries. It means, researchers need to be acutely aware of the coastal state's perspectives on such specifics as "start dates" when applying for clearance.

- Article 249 sets forth specific conditions with which a state sponsoring research in the EEZ or the continental shelf of a coastal state must comply. These include the right of the coastal state to participate in the project, in particular through inclusion of scientists on board research vessels; provision to the coastal state of reports and access to data and samples; assistance to the coastal state, if requested, in assessing and interpreting data and results; and ensuring that results are made available internationally as soon as practicable. Looking at the Survey results, Canada, Denmark, Iceland, Norway, and Russian Federation have sent government scientists as observers on-board foreign research vessels in the framework of a marine scientific research project conducted in the waters under national jurisdiction. Canada, Finland, Denmark, Iceland, and Norway has/have the national research vessel(s) hosted foreign observers. Roles and responsibilities of observers vary with country he/she belong. For example Russian observer report on research activities carried out, ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document, and act as an official channel for possible communications between the vessel and government. Iceland and Norway seize the opportunity to be trained in the field of work defined in the marine scientific research project. Canada, Finland, Iceland, Russia Federation and the USA provide equipment aboard the research vessel for use by coastal state observers. All Arctic states reserves the right to request access to the results and copies of data and samples of marine scientific research conducted by foreign ships in maritime zones under their sovereign rights and jurisdiction. Canada, Russian

Federation, Sweden, and the USA also require researchers provide/assist relevant authorities with assessment of results. All Arctic states publish and disseminate research results and annual reports of their marine scientific research activities.

- During the last five years, marine scientific research undertaken by the foreign vessels in the waters under national jurisdiction range from 411 (Canada) to 64 (Norway); and no Arctic state has suspended/stopped marine scientific research conducted in waters under state's national jurisdiction for non-compliance with UNCLOS Articles 248 and 249.

Table 4.5 – Marine Scientific Research/Practices of the Arctic States/Conclusions and IOC Questionnaire No. 3

Country	31A - Legislation	31B - Official Channels	31B - Number of Requests Received Annually	31C - Percent Approved	31D - Form	31E - Addl Forms	31F - Conduct MSR Abroad	31G - Experienced Article 252	31H - Employ MSR Staff	31I - Employ Observers	31J - Experienced Observers	31K - Employ Govt Reqs	31L - Govt Reqs Function	31M - Equip. for Observer	31N - Require Data	31O - Require Ready	31P - Diss. Data	31Q - Total Foreign Rts	31R - Susp/ Cess	31S - Port. Require
Canada	Y	Y	103	98	N	N	Y	N	4	Y	Y	Y	A, B, C, D, E	Y	Y	Y	Y	411	N	standard customs, immigration and other provisions for foreign ships and crew
Denmark	Y	Y	200	95	Y	N	Y	N	1	Y	Y	Y	B, C, D	N	Y	Y	Y	200	N	standard customs and regulations
Finland	Y	Y	20	100	Y	Y	N/A	Null	4	N	Y	N/A	A, B, D	Y	Y	Y	Y	70	N	no special exemptions
Iceland	Y	Y	15	?	Y	N	Y	N	4	Y	Y	Y	A, B, C, D	Y	Y	Y	Y	64	N	Fees
Norway	Y	Y	88	99	Y	N	Y	Y	5	Y	Y	Y	A, C, D	Null	Y	Y	Y	83	N	standard
Russia	Y	Y	106	78	Y	N	Y	Y	4	Y	N	Y	A, B, C	Y	Y	Y	Y	354	N	standard international requirements
Sweden	Y	Y	300	98	Y	N	Y	Y	1	N	N	N/A	N/A	N	Y	Y	Y	363	N	standard international requirements to be supplied
USA	Y	Y	70	100	Y	N	Y	N	1	N	Y	N/A	N/A	Y	Y	Y	Y	363	N	standard international requirements to be supplied

Information Details

Column 2: National legislation
 Column 3: Official channels established to handle requests for MSR projects
 Column 4: Approximate number of requests for authorisation your country has received annually (1999-2002)
 Column 5: Percent requests were approved
 Column 6: Use a specific model for application form for requesting consent?
 Column 7: Other specialised application form(s) for requesting consent?
 Column 8: Does your country conduct MSR in areas that are not under your sovereignty or jurisdiction?
 Column 9: If yes, as a researching state, has your country benefited from the procedure of implied consent as stated in Article 252?
 Column 10: If yes, as a researching state, has your country benefited from the procedure of implied consent as stated in Article 252?
 Column 11: Is your country a coastal state? If so, do you or have you utilised implied consent to allow research to be conducted in waters under your jurisdiction by another country?
 Column 12: What constitutes the expected starting date of the MSR project in your country? 1 - The specified starting date of the research plan, 4 - The date the actual research operation begins in waters under your national jurisdiction? 5 - Others
 Column 13: Has your country already sent scientists as observers on-board foreign research vessels?
 Column 14: Do the observer(s) represent your government or board foreign research vessel?
 Column 15: What are the functions/assignments of the observers or board? A - To report on research activities carried out? B - To ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document? C - To act as an official channel for possible communications between the vessel and your government? D - To take the opportunity to be trained in the field of work defined in the MSR project? E - Others? Please specify.
 Column 16: If your country decides to undertake a MSR project, in waters under the national jurisdiction of another coastal state, do you generally plan to provide equipment on-board the research vessel for use by a potential observer(s) from that coastal state?
 Column 17: Does your country require that researchers provide and/or assist the relevant authorities with an assessment of research results (Article 249 (1d))?
 Column 18: Does your country require that researchers provide and/or assist the relevant authorities with an assessment of research results and / or conclusions of the research project (Articles 249 (1e) and 249 (1f))?
 Column 19: If your country performs research, does it publish and disseminate at the national, subregional/regional and international levels the research results and / or conclusions of the research project (Articles 249 (1g) and 249 (1h))?
 Column 20: During the last five years, how many foreign vessels have undertaken MSR in the waters under your national jurisdiction for the following types of research?
 Column 21: Has your country ever required suspension/cessation of MSR project conducted in waters under your national jurisdiction for non-compliance with Article 248 and 249 of UNCLOS?
 Column 22: What regulatory provisions, such as customs or tax requirements, apply to foreign research vessels while in your ports?

4.4.3.2. *Observed pattern- Arctic States practices in foreign EEZs.* According to UNCLOS III, a researching state should apply for consent to conduct marine scientific research in foreign EEZ in advance. UNCLOS article 249 also defines 'duty to comply with certain conditions' of researching states. To understand the implementation issues faced by the Arctic states to conduct marine scientific research in foreign EEZ, the works of Ross and Landary(1987), Soons(1988), Knauss and Katsourous (1986), Ross and Fenwick (1988), Fenwick (1992), Roach (1996), Churchill and Lowe (1999) are very useful. These studies are invaluable, but present a number of limitations posed by the vastness and scope of the undertaking. Soons's work focused on European region, Roach's and Knauss and Katsourous's focused solely on the experiences of the U.S. as an oceanographic research state, and Fenwick provided detailed statistics on the U.S. scientists clearances in foreign waters to 1990 without carrying out an analysis. The following lists some problems generally encountered by the Arctic oceanographic research community when dealing with some foreign coastal:

I. *UNCLOS III is not only affecting where marine scientific research is done, but will continue to affect how it is done.* Judith Fenwick (1992) provided detailed statistics on the U.S. scientists' clearances in foreign waters from 1964 to 1990 (also discussed in the Chapter 3). There are discernible patterns observed in her work:

- a. marine scientists were reducing requests to work in areas either where the chances of receiving permission are low or where the costs are high in terms of time and effort to satisfy coastal state requirements;
- b. some of the unsuccessful requests are the result of coastal state requirements which were more restrictive than UNCLOS III provides; and
- c. one of the most difficult requirements for U.S. marine scientists to meet is that of UNCLOS III, Article 248, which requires a six-month notice of request.

In 1996, Capt. Roach summarized some problems generally encountered by the USA oceanographic research community when dealing with some foreign coastal as follows:

- a. delays in responding to requests for vessel clearances;
- b. last minute denial of permission to conduct the research;
- c. requiring all data, regardless of format, be provided immediately prior to departure from last port of call;
- d. requiring the data be provided within a fixed time after leaving the coastal states' waters, rather than following completion of the cruise; requiring copies of data collected in international waters or in waters under another country's jurisdiction;
- e. requiring data to be held in confidence and not placed in the public domain;
- f. requiring cruise reports to be submitted in other languages than English;
- g. requiring more than one observer to be on board;
- h. requiring the observer to be on board during non research legs of a voyage;
- i. requiring the request for research and port call to be submitted other than through the foreign ministry;
- j. failure by the foreign ministry to forward cruise reports to the cognizant organizations; and
- k. slow or incomplete staffing and co-ordination among interested coastal state bureaucracies.

Churchill and Lowe (1999) notes that, in addition to above, several states such as Côte d'Ivoire, Honduras, Indonesia, Morocco and Tanzania require the explicit consent of the coastal state to be given for research to be carried out in the EEZ, but little detail is given. He further notes that-

- a) Italy may comply with the UNCLOS III regime regarding its continental shelf, not claiming a EEZ, however it does not include a provision for implied consent;
- b) States with legislation clearly diverging from the UNCLOS III marine scientific research regime are Trinidad and Tobago. These require that the results of research done on their continental shelves are their property and may be

published only with express consent, that research data and specimens are their property, and that their consent is required for the participation of researchers who are not nationals or nationals of the flag state of the research vessel; and

- c) Brazil requires authorization for research to be given only if the research contributes to Brazil's scientific and technological development and derives from contracts with Brazilian institutions.

2. *There are issues link to deployment and use of research installations* (Churchill and Lowe 1999). Marine scientific research often involves emplacement of fixed structures, buoys and other floating objects as well as the use of unmanned submersibles, named ocean data acquisition systems (ODAS). These are dealt with in their own regime. Deployment and use of ODAS which can be considered 'artificial islands, installations and structures' would be governed by Articles 60 and 80 with the corresponding discretionary powers and jurisdiction for the coastal state (Churchill and Lowe 1999). No guidance is given regarding the characteristics such as size and permanence that an object must possess to qualify as 'artificial islands, installations and structures'. For ODAS which do not have this form, such as buoys and other floating objects and are used for applied research, the coastal state has discretion to refuse their deployment under Article 249(2). The impending interruption of important ODSA observations and/or refusal of their deployment is of significant concerns to the Ocean science community. Plans to reduce or refuse negatively affect both research projects and observational programs (Scientific Committee on Oceanic Research, 2006).
3. *There are issues linked to the dispute settlement with regard to marine scientific research.* Roach (1996) notes marine scientific research problem areas involve two issues. These are a) the duty of the coastal state to grant consent in normal circumstances for marine scientific research projects in the EEZ or on the continental shelf, and b) the duty to establish rules and procedures ensuring that such consent will not be delayed or denied unreasonably. Various states appear to be recalcitrant

in implementing completely the marine scientific research regime consistent with the UNCLOS III, and the researching state has little leverage in requiring compliance. There likewise exists little incentive for such coastal states in changing their laws, regulations or procedures. Compulsory dispute settlement is available for marine scientific research disputes under Article 297(2). The exceptions to this include that a coastal state may regulate, authorize and conduct marine scientific research in the EEZ or on the continental shelf under 246(1) and a coastal state may decide to withhold consent for marine scientific research in its EEZ or on the continental shelf consistent with Article 253(Churchill & Lowe 1999). There are many high profile cases where coastal states did not give consent for the USA's research organization to conduct marine scientific research in their EEZs. Later, coastal state and the USA agreed to hold working-group meetings under Agreement on Science and Technology Cooperation between USA and a coastal states to facilitate application procedures (Ross & Fenwick, 1988).

Chapter 5 Legal Framework for the Marine Scientific Research Governance in Canada

5.1. Context

Canada's ocean heritage stretches back to the development of our nation. The roots of Canada lie in Aboriginal peoples finding their sustenance in the Arctic ice and waters, and the waters of both coasts, and the courageous crossings of the Atlantic by Cabot in 1497, Cartier in 1534 and Champlain in 1603.

Canada's commerce was founded on ocean trading. Ocean transport, communications, fishing, tourism and recreation have helped forge Canadian identity (Canada's Oceans Strategy 2002). The oceans are as much a part of Canada's soul as the Rockies, the Prairies and the Canadian Shield. Canada has the world's longest coastline- 240,000 km; an Exclusive Economic Zone of almost 8,000,000 km² – six times larger than the combined landmass of the UK, France and Germany; and second largest continental shelf area in the world – 6,500,000 km² (Department of Fisheries and Oceans Canada's Fast Facts, 2007). The islands in the Canadian Arctic form the world's largest archipelago. Eight of the provinces and both territories border salt water. The USA, France, and Denmark (Greenland) share international maritime boundaries with Canada.

Canadians have always cared deeply and passionately about oceans. For the past few decades, that passion has been directed towards securing international recognition of Canada's jurisdiction over those waters and their resources (Johnston, 1985). Canadians have been of one voice in pushing for strong international agreements on ocean management rules (McRae, 1989; McRae & Munro, 1989; Oceans Action Plan, 2005). In 1958, Canada took a leadership position at the first United Nations Conference on the Oceans. In 1967, Canadians spearheaded discussions that led, after many years, to a UNCLOS (Buzan, 1982; Beesley, 1989; Riddell-Dixon, 1989; McDorman, 2004). In 1995,

Canada was in the forefront in reaching U.N. agreement on straddling and highly migratory fish stocks (McDorman, 2004).

This chapter will not detail the developments of Canada's domestic marine scientific research, nor assess the laws and regulations directly applicable to Canada's domestic marine scientific research rather it will provide an overview of the Canada's legal governance of marine scientific research conducted solely or jointly by global scientific community in the sea areas within Canada's national jurisdiction.

5.2. Development of Oceans Policy and Legal Framework

As in other countries, Canada's Oceans Policy and Legal Framework evolved over a long period of time as the result of combined internal and external forces (Juda, 2003; Oceans Action Plan, 2005). A brief chronology of major milestones helps to understand its evolution.

5.2.1. The Confluence of Events. The first Conference on the Law of the Sea was convened in 1958, to further develop international law pertaining to the governance and protection of the world's oceans. At this Conference, and at a second in 1960, several coastal states, including Canada, supported a doubling of the territorial sea to six miles, with an adjacent fisheries zone of a further six miles. These negotiations were unsuccessful and in 1964, Canada passed the Territorial Sea and Fisheries Zone Act which established a nine mile fishing zone outside the three mile limit (Johnston, 1985).

In 1969, the American-owned S.S. Manhattan sailed through Canada's Northwest Passage without approval from Canada. Public outrage led to speedy passage of the Arctic Waters Pollution Prevention Act in 1970 to regulate navigation in the Northwest Passage and to create a 100 nautical mile Pollution Prevention Zone around the Canadian Arctic Archipelago. In 1971, it amended Shipping Act to extend pollution control to all Canadian waters. As well, in 1972, Canada established a 12 nautical mile territorial sea through the enactment of the Territorial Sea and Fishing Zones Act. Meanwhile, over

fishing by foreign vessels in the waters off Canada's coast continued to increase. In 1973 a third UN Conference of the Law of the Sea was convened in an effort to achieve international consensus. Canada declared a 200 mile fishing zone on 1977. This 200 mile zone can be seen as an implementation of the relevant articles of the UNCLOS (Johnston, 1985).

In 1985, the voyage of the American-owned icebreaker *Polar Sea* once again reignited the controversy between the USA and Canada. The Government announced the measures to maintain the natural unity of the Canadian Arctic archipelago, and to preserve Canada's sovereignty over land, sea, and ice undiminished and undivided. The *Arctic Cooperation Agreement* signed between two Governments, in which the USA promised to request Canadian consent before sending an icebreaker through the Northwest Passage.

In the second half of the 1980s, environmental issues began to achieve a higher priority in the Government's agenda. This was caused in part by the growing international awareness of global environmental degradation, highlighted by the Global Commission on Environment and Development (also as the Brundtland Commission). One of the Commission's main contributions was the popularization of the concept of sustainable development. The Government's main effort was centered on the Green Plan. As originally conceived by then Minister of Environment, Lucien Bouchard, the Green Plan was intended to ensure that all actions undertaken by the Government were done so in an environmentally sensitive manner. The existence of this policy framework resulted in a greater willingness of the Canadian Government to identify the sources of pollutants and to take measure to reduce the level of pollutants.

In 1994, the Government recognized that Canada's Ocean policies had been fragmented, causing over-exploitation of the fisheries and the degrading of the Ocean environment. Efforts were directed towards the development of a national policy and adequate legislation necessary so as to obtain a better management of Ocean and coastal spaces

and resources. The combination of political willpower and the presence of certain fishing and pollution problems contributed to the establishment and development of the national ocean policy (Mageau et.al. 2005).

Canadian Parliament passed the declarations of support in the passing of Bill C-29 in 1994, an Act to amend the Coastal Fisheries Protection Act and the Canada Shipping Act to enable Canada to implement the agreement for the implementation of the provisions of the UNCLOS III (*a brief Statement on the Canadian position is described in next section*). This legislation enabled Canada to take action to protect important fish stocks on the high seas which straddle Canada's 200-mile limit and other international fisheries treaties or future agreement regarding the conservation and management of straddling stocks (1995 United Nations Fish Stocks Agreement).

In November of the same year, the Minister of Fisheries and Oceans elaborated and distributed a paper for public debate on the vision for better ocean management in Canada. This debate was comprised of the government and the community in general and concluded with the elaboration of the Oceans Act. This was adopted by the Canadian Parliament on December 18, 1996, and came into force January 31, 1997. The Oceans Act has three parts. Part I: Canada's Maritime Zones- Recognizing and establishing the maritime zones over which Canada exercises jurisdiction in accordance with the UNCLOS III. Part II: Oceans Managements Strategy- This part sets forth that the Minister of Fisheries and Oceans, in collaboration with other authorities and entities, is required to lead and promote the development and implementation of a national strategy for the management of estuarine, coastal and marine ecosystems. The part further stipulates that the national strategy should be based on the principles of sustainable development, the integrated management of activities and the precautionary approach. Part III: Powers, Duties and Functions of the Minister- This part bestows on the Minister of Fisheries and Oceans the lead authority for the implementation of the Act.

Through the 1996 Oceans Act, Canada was the first country in the world to adopt comprehensive oceans management legislation, and the Act still represents a global benchmark for Oceans legislations (Juda, 2003). The Act formally establishes Canada's jurisdiction as a coastal state over its ocean areas and their resources. The Act is compatible with the UNCLOS and global rules on the management of oceans resources and the marine environment. It defined national maritime zones as consisting of Canada's Internal Waters, Territorial Sea, Contiguous Zone, Exclusive Economic Zone and the Continental Shelf. The legislation incorporated all relevant existing law that Canada has, of course covering full rights and jurisdiction over Internal Waters, our fishing zones off the Atlantic, Pacific and Arctic coasts, including the Gulf of St. Lawrence, the Bay of Fundy and Queen Charlotte Sound, Hecate Strait and Dixon Entrance, and our rights with respect to the Continental Shelf. Canada has rights to living organisms belonging to sedentary species in or on the Shelf and jurisdiction over the exploration and exploitation of minerals and non-living resources of the seabed and subsoil. The Canada Oceans Act, therefore, provided the authority to create marine protected areas in order to safeguard ocean biodiversity and endangered species. Most significantly, Canada's environmental regulations and enforcement authority are extended to the new Contiguous Zone and the EEZ. Canada's oceans are entitled to the same environmental protection as Canada's land.

After the enactment of the Oceans Act, the Minister of Fisheries and Oceans led the process of the implementation of the regulations established by the Act and the development of Canada's Oceans Strategy on July 2002. The Canada's Oceans Strategy is developed on the basis of the principles of sustainable development, integrated management and the precautionary approach; and has as main objectives: (1) to increase the understanding and protection of the marine environment, (2) to support sustainable economic opportunities and (3) to demonstrate international leadership in oceans management.

After the release of Canada's Oceans Strategy, the Government of Canada considered it necessary to develop an Oceans Action Plan, in order to guide the implementation of the Strategy. Working groups and interdepartmental committees for deputy ministers and assistant deputy ministers were established and appointed in order to develop the Plan. The Oceans Action Plan was released on May 27, 2005 by the Minister of Fisheries and Oceans, who had lead the process. Canada's Oceans Action Plan elaborated as the overarching umbrella for the coordination and implementation of ocean activities is based on four interconnected pillars: 1) International Leadership, Sovereignty and Security; 2) Integrated Oceans Management for Sustainable Development; 3) Health of the Oceans; and 4) Ocean Science and Technology (Oceans Action Plan, 2005).

Fisheries and Oceans Canada (DFO) has also undertaken dozens of consultation processes on various topics affecting the fishery and the conservation of fish and fish habitat in the past few years. In December 2006, the Government introduced a modernized Fisheries Act in the form of Bill C-45. On September 14, 2007 the 1st session of this Parliament ended, marking the end of further consideration of Bill C-45. The government has introduced Bill C-32 to amend the Fisheries Act.

The brief chronology above helps to understand and specify how these instruments, Bill C-29, Oceans Act, Canada's Oceans Strategy and Canada's Oceans Action Plan, are related in the building a legal framework and the Ocean policy's development process in Canada. This process included not only the enactment of the necessary legislation, but also the development of policies, pivotal projects and the establishment of relations between the many relevant levels (Annick de Marffy, 2004).

5.3. Canada's Position at the UNCLOS III, and Canada Ratification

During the debate on the new legal regime, Canada was one of the most active participants in the negotiations and drafting the text for the regulation. Canada interest in the Convention stems from: a) Canada's general support for the rule of law and multilateral processes; b) Canada's geography, including a substantial continental shelf; c) the development of stable ocean law and substantial rights for the coastal concerning

fisheries, navigation, pollution prevention, marine scientific research, and mineral resources of the continental shelf (Johnston, 1985). These interests were clearly spelled out in the initial phases of UNCLOS III. The Minister of Energy, Mines and Resources, Hon. Donald Macdonald, in his speech to the American Society of International Law, February 1, 1975, described broad Canadian delegation objectives at the first substantive session of the UNCLOS III (June- August 1974) in these terms:

“Coastal states should obtain confirmation of their rights over the resources of their submerged continental margins and substantially increased rights respecting their offshore living resources, the protection of the marine environment and the control of scientific research..... The traditional laissez-faire policies should be replaced by general notions of rational use, taking due account of the essential and indispensable elements of freedom of navigation..... The international areas of the seabed and ocean floor should be reserved for the benefit of all and submitted to controls embodied in a powerful new international entity.”

He further listed a number of areas of concerns, in the Continental Shelf. *“.....acceptance of a 200-mile limitation on coastal state rights would have the effect of depriving Canada of her rights over the resources of extensive areas of Canada juridical continental shelf, that is, Canada continental margin”* on Anadromous species, *“Salmon, because of its special life-cycle, does not lend itself to proper management and utilization solely within a 200-mile zone; and on the controls respecting the prevention of pollution. “....There exists along Canada's northern and eastern shores especially sensitive environmental conditions and natural obstacles to navigation (ice) that warrant the adoption of standards more stringent than those embodied in existing international rules.”*

A brief summary of Canada's interests and position at the UNCLOS III and its broad implications is presented in Annex 9.

Canadian position on the regime established by UNCLOS III for the conduct of marine scientific research and marine technology transfer is very clear and supportive as it

contains an appropriate balance between the rights of coastal and other states (Johnston, 1985). Main features includes Canadian interests and positions are: (a) Canada has important coastal state interests to protect and Canada's consent for marine scientific research in waters under Canada's sovereignty or jurisdiction is essential; (b) the regime represents a very delicately balanced compromise between competing interests. It is essential that this balance is preserved and that there is no encroachment on the freedom for states to conduct marine scientific research in the water column beyond the EEZ and in accordance with the consent regime elaborated within the EEZ and on the continental shelf; (c) Canada supports continued discussions of the status and trends of and threats to deep seabed genetic resources and the implications for marine scientific research and commercial bioprospecting, as well as for biodiversity in the global commons. The regime also provides significant benefits to Canada in terms of (i) the opportunity to participate in the research, (ii) the accessibility of the results of the research, and (iii) the transfer of marine technology.

The 1993 Red Book "Creating Opportunity: The Liberal Plan for Canada" called for Canada to ratify UNCLOS III. In March 1995, Cabinet approved ratification of UNCLOS "on a date to be determined by the Minister of Foreign Affairs and the Minister of Fisheries and Oceans in consultation with their colleagues". Ratification was, however, delayed due to concerns about the UNCLOS III inadequate provisions regarding the conservation and management of straddling fish stocks, which has been an issue of concern on Canada's east coast. Later these concerns were resolved by the entry into force of the 1995 United Nations Fish Stocks Agreement (UNFA). Canada became a party to UNFA on August 3, 1999.

In 1996 Speech from the Throne called for Canada to ratify UNCLOS III. In September 2002, the Minister's Advisory Council on Oceans recommended that Canada urgently ratify UNCLOS III because of the tangible benefits that would flow from the ratification. Finally Canada ratified UNCLOS in Nov. 6, 2003. With Canadian membership in UNCLOS III it give Canada the opportunity to participate in, and influence the

deliberations of, the institutions established by UNCLOS, including the International Tribunal for the Law of the Sea (ITLOS), the International Seabed Authority (ISA) and the Commission on the Limits of the Continental Shelf (CLCS). In addition, ratification allow Canada to: definitively delineate the outer edge of its continental shelf and provide certainty as to its maximum extent; have access to binding mechanisms for the peaceful settlement of law of the sea disputes; and, provide a more secure business environment for Canadian telecommunications companies having interests in submarine cables, through the operation of article 79.

At the ratification event Nov. 6, 2003, the Government of Canada position is spelled out by the Ministers from various Departments (Annex 10). Minister of Foreign Affairs Hon. Bill Graham said *"UNCLOS ratification will provide a strong foundation for Canada to continue its collaborative and innovative approach to oceans issues."* Minister of Fisheries and Oceans Hon. Robert Thibault held *"Canada is committed to marine conservation, partnership and greater scientific understanding of Canada's oceans. UNCLOS will strengthen international cooperation in the sustainable development of natural resources in a way that balances our common economic, social and environmental goals."* Natural Resources Minister Hon. Herb Dhaliwal believed *"Ratification of UNCLOS opens the door for Canada to secure international recognition of the full extent of our vast continental shelf, which is one of the worlds richest in seabed resources"*.

Canada also ratified Part XI of the Agreement contains provisions on deep seabed mining at the same time.

Hence ratification of UNCLOS opened the door for Canada: (1) secure for Canada the outer limits of the continental shelf off Canada's east coast and Arctic and ensure the necessary certainty for hydrocarbon resource development and seaward extent of jurisdiction over sedentary species; (2) support the "Arctic clause" that Canada negotiated into the UNCLOS text which recognizes the coastal state's right to apply national marine pollution laws in ice-covered areas; and, (3) allow Canada to play a full role in the UNCLOS institutions (ISA, CLCS, ITLOS), and the Meetings of the Parties

which are shaping, implementing and applying UNCLOS and in the formal review of the provisions of UNCLOS. Canadian scientists are conducting mapping surveys to establish with certainty where the country's continental shelf begins and ends. Particulars of the outer limits of these continental shelves will be submitted to the CLCS by the end of 2013—10 years after Canada ratified the convention. Canada's extended continental shelf in the Atlantic and Arctic oceans is approximately 1,750,000 square kilometres—an area equivalent to the size of Canada's three Prairie Provinces (Figure 5.1.). Federal Budget in 2004 announced \$70 million over 10 years for mapping to substantiate the claim.

5.4. Legal Framework for the Marine Scientific Research in Canada

5.4.1. Marine Scientific Research Activities in Canada. Since Canada has the largest coastline in the world, most of its extensive marine scientific research and other research activities are carried out in national maritime zones and in cooperation with foreign fleets.

Scientific research at sea has a long history in Canada. The Canadian Hydrographic Service was established in 1883 and the Pacific Biological Station was in 1910. This represented Canada's early commitment to oceans related research work (Fillmore and Sandilands 1983). In that early post-Confederation period, and well into twentieth century, hydrographers were the major Canadian presence with respect to its oceans. In time, this was followed by the Royal Canadian Navy (1910), the Canadian Coast Guard (1962) and more recently the Department of Fisheries and Oceans (1979).

World attention to oceans issues really came into focus with the 1957 International Geophysical Year. More than 70 countries participated in an international study, looking at the marine scientific research and where it was headed. As a direct result, in 1962 Canada established the now world renowned Bedford Institute of Oceanography in Bedford, Nova Scotia. Following that, Canada created a network of oceans research facilities across the country. These are: the Huntsman Marine Laboratory in St. Andrews,

New Brunswick (1969); the Centre for Inland Waters in Burlington, Ontario (1972); the Fisheries and Oceans Laboratories on the University of Manitoba campus in Winnipeg, Manitoba (1973); and the Northwest Atlantic Fisheries Centre in St. John's, Newfoundland (1978). The Institute of Ocean Science in Patricia Bay, B.C. was officially inaugurated in 1979, Institute for Ocean Technology was established in 1985, and the Maurice Lamontagne Institute in Ste-Flavie, Quebec opened in 1987.

Over a relatively short period, therefore, Canada built substantial research facilities to undertake marine scientific research. Their joint purpose has been to research the impact of land-sea-atmosphere interactions on climatic conditions, to understand the interrelationships of chemical-physical-biological processes that occur in the oceans depths, and generally to work towards the conservation of living resources of the sea. Most of oceanographic and marine research activities are heavily focused on Canadian maritime coastal and offshore areas. Some activities are also carried out in foreign maritime areas, and Antarctica. The activities include Canadian-German and Canadian-Danish cooperation in geology, geodetic, hydrographic, oceanographic, climatological and biological research off North Greenland and Ellesmere Island. International hydrographic cooperation with New Zealand has focused on acquiring multibeam data in the Ross Sea and Balleny Islands of the Antarctic shelf. Canada also cooperates with Ireland to map the seabed of the continental shelf surrounding Ireland.

There are seven ocean-going research vessels accredited to the Canadian fleet. The Canadian Coast Guard Service (CCGS) has four research vessels of 20 meters and under in length, engaged in a wide range of scientific programs, including stock assessment, fisheries and habitat research and geophysical surveys of Canadian Arctic waters.

The Department of Fisheries and Oceans (DFO) has the largest scientific infrastructure in the country with major laboratories in all of its regions. These laboratories have significant programs in fish and invertebrate stock assessment in support of the management function, habitat and environmental science including contaminants studies,

aquaculture and resource enhancement science, ocean science and hydrography, including the production of navigational charts and tide and current study and prediction. Scientific expertise is reflected in several fields at the DFO. The Canadian Hydrographic Service (CHS) is responsible for surveying, measuring, describing and charting the physical features of our coastal waters and coastal zones. CHS data is used to produce navigational charts, tide and current tables, and sailing directions in order to ensure safe navigation. Fisheries Science at the DFO provides the scientific basis for conservation and sustainable use of fishery resources such as fish, invertebrates and marine mammals. Aquaculture and experimental biology activities contribute to progress in fisheries research and to development in aquaculture technology. Ocean Sciences at the DFO conduct research on the physical and biological oceanographic phenomena, ocean climate studies and environmental descriptions. Operational oceanography features an important modelling component which contributes to providing services such as ice movement predictions, current patterns, etc. Environmental Science at the DFO aims at providing the scientific knowledge and tools that are necessary for the evaluation of impacts of human activities on the aquatic environment, in support to the management and protection of fish habitat and to the conservation of the coastal zone and oceans in general.

Provincial governments have wildlife resource management expertise and the federal departments of Environment and Natural Resources have expertise in environmental science and geoscience respectively, the latter including undersea geoscience. Research expenditures in Canada on fisheries, habitat and ocean related work are largely by the federal government through the programs of departments such as Fisheries and Oceans, Environment, and to a smaller extent, Natural Resources. Much of the spending supports the programs conducted directly by the departments themselves through their own research institutions and projects, and through support of infrastructure such as laboratories and vessels. From time to time, special federal programs become available, such as the Program on Energy Research and Development (PERD), the Ocean Action

Plan (OAP), etc. which provides special funding for directed research which meets the objectives of the respective Program.

The National Research Council of Canada (NRC) and a system of grants administered by the federal government also supports research in the country, much of it through applications for research grant funding submitted by university faculty members for direct research grant support or for infrastructure grants to equip and operate facilities. In British Columbia, the five western Canadian universities operate a marine station, the Bamfield Marine Station, on a cooperative basis with a combination of university funding support and federal grants. The provincial governments also support some aspects of research and development, particularly applied research. For example in British Columbia, the Provincial Government has provided considerable support for research and development expenditures related to the aquaculture industry, and is currently developing a new program for fisheries-related expenditures to address problems in the industry affecting coastal communities and habitat restoration.

The Canadian private sector is strong in a number of aspects of marine science and engineering and in many cases, is a world leader in certain types of technology (Marine and Ocean Industry Technology Roadmap, 2005). NRC's Institute for Ocean Technology is providing technical expertise in support of Canada's ocean technology industries. In 2003 the Institute officially opened its Ocean Technology Enterprise Centre, a facility to assist in the growth and development of new ventures in ocean technology. Canada has strength in submersible design and construction, innovative manned, remote and autonomous undersea vehicles, propulsion systems, diving equipment, acoustics, remote sensing technologies, survey and hydrographic systems, fuel cells and battery designs, deep sea mooring technology, ocean buoy technology, satellite and space equipment with relevance to marine applications, electronic charts and navigation systems, vessel traffic control systems, specialty solvents, contaminant ultra-trace analysis, and environmental consulting and marine engineering services. In addition, the biotechnology industry is well developed in Canada and has a number of innovative technologies for

ocean-related applications. Programs are available through federal sources such as Western Economic Diversification to support R&D development involving private sector companies and partnership building is encouraged through those funding programs.

Canada is a member of various organizations of the UN system linked to Oceans use, and participates actively in the international initiative such as Global Ocean Forum, etc.

5.4.2. Legal Regime of Marine Scientific Research. In Canada, under constitutional arrangements, responsibility for the sea coast and inland fisheries rests with the Federal Government. In practice, most of the administrative responsibility for the inland freshwater fisheries of the country has been delegated to the Provinces who manage those resources on behalf of the federal government. Therefore, the federal government is responsible for management of the marine fisheries, marine scientific research, and also retains direct responsibility for anadromous species such as salmon which migrate from freshwater to the sea and return to freshwater rivers and lakes to reproduce.

Many federal acts directly or indirectly impact upon the use of Canadian ocean spaces (Table 5.1). Canadian legislation important to management of fisheries, habitats, marine scientific research, and the oceans includes the Fisheries Act, the Canada Oceans Act and other related legislation and regulations under the Acts to provide for an enforcement function. Both the Fisheries Act and the Canada Oceans Act are the responsibility of the Minister of Fisheries and Oceans. The Fisheries Act provides for the direct management and protection of fisheries with appropriate regulations and includes provisions to protect fish and fish habitat against damage and loss. Functions of the Department include conservation, protection and management of fisheries resources and their habitats, science, hydrography, provision of vessel harbor support to the fishing industry, navigational aides and vessel traffic control, search and rescue and maritime safety, pollution response to marine spills, and a variety of related programs. The Department of Environment, another federal department, also has a major role to play in the setting of

environmental standards and guidelines and regulation of industrial and other forms of pollution.

Provincial governments also have responsibilities for natural resource management and environmental protection through their delegated responsibilities as described above but also due to their regulatory powers over industry and commerce in their respective jurisdictions. Thus the provinces have regulations with respect to pollution control, aquaculture licensing, water and land use activities, and the shoreline and shoreline resources.

Marine scientific research is within the powers, duties and functions of the Minister of Fisheries and Oceans as provided in section 4 of the Department of Fisheries and the Oceans Act, “...is responsible for coordinating, promoting and recommending national policies and programs with respect to fisheries science, hydrography, oceanography and other marine sciences”. In addition, sections 42 and following of the *Oceans Act* may apply to marine scientific research. However, the *Oceans Act* provisions are not as specific as the provisions of Part XIII of UNCLOS. There are no regulations made under the authority of the *Oceans Act* that govern marine scientific research. The *Coasting Trade Act* also has related provisions. Section 14 of *Oceans Act* defines sovereign rights and jurisdiction of Canada and section 44 of the *Oceans Act* establish guidelines for marine scientific research by foreign ships.

Table 5.1. Federal Departments, Acts and Regulations Linked to the Marine Scientific Research Governance

Department	Legislation	Notes
Fisheries and Oceans Canada	Oceans Act	The Act provides for development and implementation of a national strategy, plans for integrated management, and establishment of marine protected areas
	Fisheries Act	The Act protects and conserves fish and marine species and their habitat, and authorizations are required for alterations of habitat. The Act also contains a prohibition on dumping deleterious substances that affect fish and fish habitat without an authorization. This section is enforced by Environment of Canada under an agreement between departs.
	Navigable Waters Protection Act	The Act protects navigable waterways, and requires authorization for designated actions and any alternation to waterways.
	Canada Shipping Act	The Act regulates shipping, marine liability for shipping, and oil pollution prevention and emergency preparedness. Canadian Coast Guard is lead agency for latter two matters.
	Coastal Fisheries Protection Act	Monitoring, control and surveillance.
Indian Affairs and Northern Development	Canada Petroleum Resources Act	Regulates interest in petroleum in relation to frontier lands.
	Arctic Waters Pollution Prevention Act	The Act regulates oil and gas activities and shipping In Arctic waters Act places limits on liability for oil and gas activities.The Act incorporates aspects of the regime of the Canada Shipping Act for shipping, including oil pollution prevention and emergency preparedness.
	Nunavut Land Claims Agreement Act	Puts into effect land claim agreement.
	Western Arctic Claims Settlement Act	Puts into effect land claim agreement (Inuvialuit).
National Energy Board	Canada Oil and Gas Operations Act	The Act authorizes exploration and development of oil and gas on lands in the Northwest Territories, and in offshore waters of the Arctic Ocean. Authorizations Include safety, health and environmental measures.
Environment Canada	Canadian Environmental Protection Act	Provides for establishment of Marine Environmental Protection Act Quality Guidelines; ocean disposal; and control of land-based sources of pollution, offshore oil and gas, and toxic substances.
	Canada Wildlife Act	Wildlife conservation, research and interpretation, especially through partnerships and establishment of protected marine areas for wildlife.
	Canadian Environmental Assessment Act	The Canadian Environmental Agency reports to the Minister, who is ultimately responsible for implementation of the Act Integration of environmental factors into federal planning and decision-making.
	Fisheries Act (sections 36-42)	Control of pollution from land-based sources, toxic substances, offshore oil and mineral resources development.
	Government Organization Act	Assigns responsibility for ice services, marine weather and marine climate..
	Migratory Birds Convention Act, 1994	Migratory bird conservation.
Heritage Canada	National Parks Act and proposed National Marine Conservation Act	The department establishes and operates national parks and other types of conservation areas in the Canadian Arctic. Parks may be terrestrial or marine.
	Food and Drugs Act	Ensures safe use of marine species for human consumption.
Transport Canada	Arctic Waters Pollution Prevention Act	The department implements aspects of the Act.
	Canada Shipping Act	Services for the safe, economical and efficient movement of ships in Canadian waters.
Foreign Affairs and International Trade	Coasting Trade Act	Governs the granting of authority to foreign vessels wishing to conduct marine research within Canada's Exclusive Economic Zones.
	Foreign Affairs and International Trade Act	Maritime boundary disputes, Law of the Sea
	Oceans Act	Establishes Canadian maritime boundaries.
Natural Resources Canada	Resources and Technical Surveys Act	The department responsibilities extend to the "full" Canadian land mass including submerged lands for surveys
	Department of Natural Resources Act	The department implements terrestrial part of Canada's land mass.
	Canada Lands Surveys Act	Legislated oceans responsibility
	Oceans Act	The department implements aspects of the Act.
	Canada Petroleum Resources Act	Regulates interest in petroleum in relation to frontier lands.
	Arctic Waters Pollution Prevention Act	Provisions concerning natural resources in areas of the Canadian Arctic for which the Minister has administrative responsibility.
National Defense	National Defense Act	Maritime Command.
	Canada Shipping Act	Search and rescue.
	Emergencies Act	Permits temporary measures to ensure safety and security of Canadians.
Industry Canada	Telecommunications Act	International submarine cables
	National Research Council Act	Established NRC, which includes marine engineering, marine biology research.
	Natural Sciences and Engineering Research Act	Established NSERC, which provides grant support to universities.

Compliance with the marine scientific research regime contained in Part XIII of the UNCLOS III has implications for Canada both as a coastal state and as a researching state. As a coastal state, Canada has (a) promulgated laws and regulations on foreign-related marine scientific research conducted within its jurisdictional waters; and (b) Canada research's benefited from the marine scientific research regime by having recourse to data and samples obtained by foreign research vessels in our EEZ and by having more control over ocean research being carried out off Canadian shores. As a researching state (a) we are bound by the rules and regulations governing the conduct of research under a consent regime; (b) we make our marine scientific expertise and infrastructure more responsive to the needs of developing countries; and (c) we are under obligation to report research plans and results.

5.4.3. Marine Scientific Research Clearance Process. There are official channels established to handle requests for marine scientific research projects in waters under Canada's sovereignty or jurisdiction. Requests are handled by the Department of Foreign Affairs and International Trade Canada (DFAIT). Marine scientific research requests and approvals are done on a state-to-state basis. DFAIT has a process in place, complete with consultations and distribution to all relevant line departments and agencies for granting marine scientific research approvals. Canadian requirements for embassies to prepare the content for a diplomatic note have been in place since May 1983 when they were communicated to accredited missions in Ottawa. Here is the summary of these requirements:

- Foreign states or their agencies wishing to conduct a research in waters under Canadian jurisdiction and/or wishing to enter a Canadian port will apply for permission in each instance through DFAIT at least 45 days calendar days in advance of the proposed date of entry into ports and/or waters under Canadian jurisdiction;
- When applying for permission, the request should include complete documentation of the vessel's proposed activities i.e. name, length, beam, etc of the vessel the names of the master and chief scientist, the number of the vessel's scientific component;

exact dates of arrival and departure to and from ports and/or waters under Canadian jurisdiction; a detailed map of proposed areas to be researched and a resume for the chief scientists;

- An exchange of scientific data is required when research is conducted in waters under Canadian jurisdiction.
- Canada reserves the right to participate or to be represented in the proposed research or investigations in waters under Canadian jurisdiction.
- Canada reserves the right to negotiate the content of the proposed research or investigation
- Once criteria above have been met, DFAIT will consult with the appropriate Canadian authorities and in due course notify the requesting state that permission has been granted or refused.

5.5. Marine Scientific Research Regime Implementation Issues and Gaps

International regime established by UNCLOS III for the conduct of marine scientific research and marine technology transfer received mixed response in Canada. The regime: (a) necessitates the establishment of administrative machinery to implement the marine scientific research regime; (b) put pressure on Canada to make its marine scientific expertise and infrastructure more responsive to the needs of Developing Countries; (c) impose obligations to report research plans and results; and (d) encounter problems in obtaining data from foreign researcher/competent international organizations. In terms of gaps- there is no process in place for clearance requests from the private institutions.

5.5.1. Establishment of Administrative Machinery to Implement the Regime. The implementation of the marine scientific research regime results in the generation of paper work any time Canadian research vessels work anywhere other than in waters under Canadian jurisdiction or on the high seas (Department of Fisheries and Oceans, DFAIT, files and reports, 1995-2005). Requests from foreign countries to conduct research on Canadian waters have similar effects. For example Article 245 and 246 states that the consent of coastal states is required for research undertaken in their

territorial sea, and EEZs. Articles 244, 248, 249, 250, 252, 253, and 254 all list details of the formalistic procedures which must be followed in making an official request and in the conduct of research projects. These rules, regulations and duties are very explicit with Article 248 alone containing six conditions which must be met when undertaking research in the EEZ or on the continental shelf. Any requests related to the conduct of research, the availability of data and the distribution of reports, whether the requests originate in Canada or abroad would fall upon desk officer and legal experts to make sure that all provisions of the regime have been fully taken into considerations even to the point of considering the rights and privileges of neighboring land-locked and geographically disadvantaged states in some instances. On the benefit side, requests from foreign countries to conduct research in Canadian waters have created opportunities for Canadian scientists to carry out inexpensive research and obtain inexpensive data. The problem here is that cruises planned by foreign countries seldom mesh with Canadian research priorities. To some extent this particular problem could be overcome by the joint program planning.

5.5.2. Obligations to Developing Countries in the Conduct of Research. Article 249 ensures the right to coastal states to participate, without payment of any remuneration or any requirement to contribute towards costs, in research projects in their EEZ or on their continental shelf. In few cases in the past Canada was obliged to accommodate scientists and technicians from the developing states on our vessels entirely at our own expense (Department of Fisheries and Oceans files and reports, 1995-2005). Normally such accommodation is offered as a matter of course; but the marine scientific research regime makes the practice compulsory and even put Canada under an obligation to provide such accommodation to scientists from landlocked and geographically disadvantaged states (Article 254). In addition we are obliged to provide the coastal state with preliminary reports, data on request at final reports.

Participation, as implied in Article 249, would presumably extend even to the inclusion of scientists from the developing states in the planning of research projects. More

important, however, are the obligations inherent in paragraph 2 of Article 244 which call for states to promote:

“the strengthening of autonomous marine scientific research capabilities of developing states through inter alia programs to provide adequate education and training of their technical and scientific personnel.”

5.5.3. *Obligations to make Research Plans, Results and Information Readily Available.* Several Articles are designed to make the sharing of research information obligatory. Consider, for example, the implications of Article 244. It calls for states to: *“make available... information on proposed major programs and their objectives as well as knowledge resulting from marine scientific research.”* Canadian scientists as a matter of course make their research results freely available via internet. Indeed it is in their interests to do so. Publish or perish. Canadian scientists also obliged to divulge any information on proposed major programs and their objectives. However, up to now, the requirements that would have to be satisfied to constitute fulfillment of the terms of this Article are not clear, it is obvious that some formal mechanism would have to be put in place to ensure that planned research program were made known internationally.

With regard to the undertaking marine scientific research in the EEZs or on the continental shelf of coastal states, however, the obligations are more clearly stated. Paragraph 1(b) of Article 249 stipulated that researching states must *“...provide the coastal state, at its request, preliminary reports, as soon as practicable, and with the final results and conclusions after the completion of the research.”* while paragraph 1 (e) of the same article goes on to say that researching states must *“ensure... that the research results are made internationally available through appropriate national and international channels as soon as possible.”* Failure to comply with these Articles means strained international relations so it is important that a framework be established to ensure that these details are looked after.

5.5.4. *Access to Data and Information.* Ratification of UNCLOS opened the door for Canada to secure international recognition of the full extent of its vast continental shelf. In some areas, this shelf extends beyond 200 nautical miles, and the exclusive jurisdiction over natural resources in the continental shelf goes beyond 200 nautical miles to the outer limit of the shelf. Canadian scientists are conducting mapping surveys to establish with certainty where the country's continental shelf begins and ends. In 1994, the Geological Survey of Canada (GSC) and the Canadian Hydrographic Service (CHS) performed a desk-top study of Canada's offshore areas in the context of Article 76. For this study, all bathymetric and geological data were compiled and analyzed to establish the provisional outer limits of the continental shelf. The results (Fig. 5.1) demonstrated that Canada could possibly extend seabed jurisdiction over regions in both the Atlantic and Arctic oceans (Verhoef & MacDougall, 2005). The 2004 Federal Budget announced funding of \$70 million over 10 years for the survey work that is required to conclusively establish the limits of Canada's entire continental shelf off its Atlantic and Arctic coasts. The delivery of the UNCLOS program is the joint responsibility of three federal departments: the GSC (NRCan) is responsible for seismic surveys; CHS (DFO) is responsible for bathymetric surveys; and Foreign Affairs Canada will provide legal advice on UNCLOS and the CLCS and will co-operate in the preparation and presentation of the submission. Through the collaborative CHS-GSC program, the application of UNCLOS provides a unique opportunity for geoscientific and geomorphological data of the seafloor to be used to define the legal outer limit of the Canadian territory.



Figure 5.1. The Canadian case-Current and Prospective Offshore Jurisdiction (Exclusive Economic Zone (red line) ~ 4 million square kilometers; Area outside 200 nm (white line): Atlantic Ocean ~ 1 million square kilometers; Arctic Ocean ~ 3/4 million square kilometers; Pacific Ocean— not certain). Source Verhoef & MacDougall, 2005.

Figure 5.2. The Atlantic Program. Source Verhoef & MacDougall, 2005

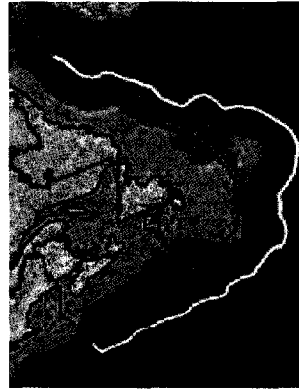


Figure 5.3. The Arctic Program. Source Verhoef & MacDougall, 2005

Canada possible claim in Arctic (The red zone is the EEZ ; EEZ boundaries with USA and Denmark need negotiations; and the white zone or part of it may be claimed under Article 76)

The Atlantic program (Figure 5.2) is collecting bathymetry information focused along the Grand Banks margin and seismic data focused along the Scotian and Labrador margins. A significant amount of seismic data has already been collected along the Scotian margin, mainly by the oil and gas industry. In contrast, the Arctic program (Figure 5.3) is not straightforward. First the Arctic Ocean has complicated seafloor geology, and secondly circumstances for data collection in that area are much more difficult. Moreover, there is the potential for overlapping claims from the neighbouring countries. Various issues/problems reported in obtaining data from foreign researchers as well as from the competent international organizations (Jacob Verhoef, Ron Macnab, NRCan, personal communications) have been:

- Foreign researchers who plan and carry out surveys and whose careers depend on publishing the results can be reluctant to provide copy of their data to our national archive – the nature of their business perhaps relates more to getting than giving data.
- Copyright/data ownership – with respect to the party that pays for and acquires the data, and to the coastal state, when it receives a copy of the data, and to any enhanced data product that it might generate: (a) what reasonable right of use can a coastal state expect for data supplied by a foreign researcher?(b) Some researchers / institutions/government archives feel that it is reasonable to set restrictive conditions on the use of the data by the coastal state; (c) Whether it reasonable for a coastal state to require full data ownership of data supplied, at least after a reasonable period of time in order to allow the foreign researcher time for completion of MSc /PhD studies and publication of the results?
- What data can a coastal state can reasonably be expect to receive: whether a paper copy only or all field and processed data in digital form?
- When after the completion of a survey, can a coastal state reasonably expect to receive data?
- Whether it is reasonable for a foreign researcher to: request the coastal state to pay for data? or supply only an abbreviated cruise report, and represent that the full report and a complete copy of the data must be purchased or traded? or represent that research data will only be supplied to the coastal state if an equivalent value of data is exchanged? or supply partial, in-accurate, un-edited, unusable data or data in unreadable formats and leave it to the coastal state to decipher?
- It has been startling to discover that it is not uncommon for research institutions and government archives of researching states to be unable to find recently acquired research data from within Canada's EEZ because it has been lost or never archived, or the researchers involved have moved on, taking the data with them.
- It is not only developing countries that suffer from limited capacity for data management and archiving functions. Developed countries may also have limited

capacity for supplying even modest volumes of archived data. An arrangement must then be made by the coastal state for a paid service.

- Foreign research can have limited benefits to the coastal state. The foreign researcher may want to withhold newly acquired data until MSc and PhD research projects have been completed and published and furthermore may want to make immediate use of national data archived by the coastal state for such research and publication. This involves very little skills transfers or empowerment to Canadian institutions but commands a significant amount of staff time.
- Some of the planned research is in conflict with Canada's own national research programs. A decision must then be made whether to commit national resource to serving the foreign or the domestic program.
- Some research applications do not contain enough information for the coastal state to make an informed decision regarding the issuance of a permit and some are received only weeks or days before (or after) the survey is due to start.
- Another difficulty has been that data received from foreign research has not been properly archived for a variety of reasons.
- It is not easy to obtain copy of cruise reports or digital data from our own academic institutions which participated in foreign surveys and received copy of the data.

5.5.5. No Process in place for the Clearance Requests from the Private Institutions. In Canada, there is no process in place for accepting and granting consent for requests from private institutions unless they come through diplomatic channels (Ken Wong, DFAIT, personal communication). Private parties can go through their foreign ministry and request approvals through official diplomatic channels. Private institutions can work through the State Department Foreign Ministries as per the processes set out in Part XIII of the 1982 United Nations Convention on the Law of the Sea, in particular, Articles 248 and 250. Such notification ensures that the appropriate Government of Canada contacts are provided with early notice and can facilitate your research activities. To deal with private institutions, some countries such as Australia and French Polynesia have chosen to deal with the Government-to-private institution relationship by way of MOU.

A recent case cited as an example. The US-based J. Craig Venter Institute carried out a research expedition in Nova Scotian waters in August 2003, in collaboration with DFO researchers. Venter took several water samples, extracting the marine microbes contained in those samples. They sent DFO a letter stating their intentions to publish the results of the research. When Venter wanted to publish its scientific findings, it was unable to provide the necessary documentation that it respected all necessary marine scientific research procedures. Scientists were not aware of approvals and clearances before conducting the research. Eventually DFAIT got involved and the agreed solution consisted of the following: for future expeditions, Venter would work through the State Department who in turn will contact DFAIT.

Chapter 6- Summary and Conclusions

Three contemporary developments are having a significant impact on marine scientific research in the Arctic Ocean: melting ice, the International Polar Year (IPY), and the 1982 UN Convention on the Law of the Sea (UNCLOS III).

The decrease of the Arctic pack-ice is the most striking change. The trend is facilitating access to expanded oceanic regions that historically have remained inaccessible to scientific research on account of their widespread and persistent ice cover. This trend will bear large impact on Arctic ecosystems and to human societies in the Arctic region. Important scientific questions and efforts for the global scientific community in the future will be on: climate change and impact research; climate- and environmental monitoring; mapping of bio- and geosystems; Arctic history; and arctic technology. All these activities need a great deal of cooperation and a legal framework.

The Arctic coastal states are looking for an edge in claiming continental shelves. The current surge of the interest in the shelf grows out of the UNCLOS III, which gave each of coastal states control of an EEZ. These areas contain valuable energy, mineral, and biological resources. Using the new maps and scientific information, the Arctic states might be able to justify extending their boundaries up to 350 nautical miles offshore if there is an obvious shelf. One challenge is pinning down a key baseline called the "foot of the slope". But the line isn't easy to define on jumbled, real-world sea floors. Even in relatively clear topography, opinions can vary. Shelf claims, however, are likely to be dogged by scientific and legal questions. The Arctic conquest has taken a new dimension in the aftermath of the jingoistic planting of a Russian titanium flag on the seabed under the North Pole.

The International Polar Year (IPY) marks the largest-ever international program of scientific research focused on the Polar Regions. Thousands of scientists and researchers from more than 60 nations around the globe are participating in IPY throughout this year and next. This effort is a key to unlocking Arctic riches.

Hence, all these developments (melting ice, the IPY, and the UNCLOS III) have spurred an unprecedented increase in research activity in the Arctic Ocean, with many projects assuming the character of international partnerships. The marine scientific research projects are evolved toward an increasingly integrative, rather than disciplinary, approach to studying the Arctic Ocean. Scientists from a variety of disciplines investigating many components of the arctic system

The 1982 United Nations Convention on the Law of the Sea (UNCLOS III) sets out extensive provisions for conducting marine scientific research (Part XIII), for international marine scientific research cooperation (Articles 242-244), for development and transfer of marine technology (Part XIV), and for protecting the marine environment (Part XII) which are applicable both within and outside areas of national jurisdiction. Although there is broad acceptance of the basic principles contained in the UNCLOS III, there is still a continued need to encourage states toward uniform and consistent application of these principles in their national policy and practice. Following are key provisions of the UNCLOS III relevant to the development of legal framework for marine scientific research and on the protection and preservation of the marine environment in the Arctic Ocean:

- Part IX advocates cooperation among the coastal states that border enclosed or semi-enclosed seas such as the Arctic Ocean.

- Part XIII has created a consent regime for coastal state to manage, control, and promote marine scientific research in offshore areas within their national jurisdiction. In their territorial sea, Arctic coastal states have the exclusive right to regulate marine scientific research (Article 245). In the EEZ and on the continental shelf, marine scientific research shall also be conducted with the prior

consent of the coastal state. However, such consent for peaceful purposes is to be granted “*in normal circumstances*” and “*shall not be delayed or denied unreasonably*”, except under certain specific circumstances identified in article 246 of the Convention. In the case the consent of the state is requested and such state does not reply within six months, the research state or international organization may proceed with the research project on the basis of implied consent (Article 252). Articles 242-244 advocates’ international cooperation and promotion of international through co-operation, publication and dissemination of information and knowledge. Duty to place identification markings on installations or equipment and to use adequate warning signals to ensure safety of navigation (Article 262).

- Part XII has established international legal regime on the protection and preservation of the marine environment. Article 192 sets forth the general obligation of states to protect and preserve the marine environment. Obligation of the coastal states to establish international rules and standards regarding vessel sourced pollution, and to re-examine them from time to time as necessary (Article 211(1)). Article 210 contains regulations specifically related to the prevention, reduction and control of pollution by dumping. Article 197 advocates’ international cooperation “in formulating and elaborating international rules, standards and recommended practices and procedures consistent with the Convention, for the protection and preservation of the marine environment ...”. Duty of a state, which becomes aware of existing or imminent pollution likely to cause damage, to immediately notify other states, which it deems likely to be affected by such damage (Article 198), and the states to co-operate in contingency planning and emergency response (Article 199). There are number of provisions designed to safeguard the marine environment from pollution caused by “seabed activities subject to national jurisdiction” such as Article 235, on “Responsibility and Liability”.

- Part XIV encourages states and International Organizations to cooperate in promoting the development and transfer of marine technology on fair and reasonable terms and conditions in order to help developing countries to access the benefits of Oceans and Seas.

Amongst the oceanographic researching states of the world, Arctic states stands in the top. Whereas the U.S.A. and the Russian Federation lead the pack, Canada, Norway, Sweden and Denmark are recognized as being about on equal footing with such scientifically advanced nations as the U.K., Japan, France and the Federal Republic of Germany.

Arctic states implement the marine scientific research regime as researching states in foreign waters, and also as coastal states.

As a researching state in foreign waters, the most common request of coastal states is for cruise reports and data or samples. Fewer foreign states request embarkation on a research vessel as a right based on the UNCLOS III. An increasing number of foreign states require a particular application format for the clearance. Arctic state(s) also conduct marine scientific research in the EEZ's of plural coastal states in cruise. In practice, cruises are planned from scientific points of view at first. Then, researchers take international politics into consideration. Since EEZ borders are determined out of oceanographic scopes, Arctic states often wish to conduct marine scientific research in the EEZ's of plural coastal states. Moreover, it is difficult to tell where EEZ borders are exactly located many borders are in dispute. Thus, Arctic state desires a clearance for a researching state to apply for consent to conduct marine scientific research in the EEZ's of plural foreign coastal states. Using the recorded experiences of USA oceanographers conducting marine scientific research in foreign waters, it is not so unrealistic to expect that many of the same problems exist generally.

- I. delays in responding to requests for vessel clearances (contra Article 246(3) and the U.N. Marine Scientific Research Guide);

2. last minute denial of permission to conduct the research (contra Article 246(3) and the U.N. Marine Scientific Research Guide);
3. requiring all data, regardless of format, be provided immediately prior to departure from last port of call (contra Article 249(1)(b));
4. requiring the data be provided within a fixed time after leaving the coastal states' waters, rather than following completion of the cruise (contra U.N. Marine Scientific Research Guide);
5. requiring copies of data collected in international waters or in waters under another country's jurisdiction (no right under UNCLOS III);
6. requiring data to be held in confidence and not placed in the public domain (contra Article 249(1)(e));
7. requiring cruise reports to be submitted in other languages than English (UNCLOS III silent, U.N. Marine Scientific Research Guide suggests writing in a language which can be read by scientists of the coastal state);
8. requiring more than one observer to be on board ('practicable' under UNCLOS III Article 249(1)(a));
9. requiring the observer to be on board during non research legs of a voyage (contra Article 249); requiring the request for research and port call to be submitted other than through the foreign ministry (contra Article 250);
10. failure by the foreign ministry to forward cruise reports to the cognisant organizations (UN Marine Scientific Research Guide suggests also sending a copy directly to the coastal state scientists involved); and
11. slow or incomplete staffing and co-ordination among interested coastal state bureaucracies (UN Marine Scientific Research Guide indicates the need for the coastal state to have a single office to process applications).

As a coastal state(s), the marine scientific research regime implementation patterns of the Arctic States emerged from the 2003-2005 Intergovernmental Oceanographic Commission Secretariats' Survey as follows:

- there is formal establishment of EEZs, and all states have enacted special legislation dealing with marine scientific research;
- all states require the use of diplomatic channels for clearance requests (most have designated one office in the Foreign Ministry to process them, and sometimes to coordinate interdepartmental consultations);
- all states used an marine scientific research application form (most of them were based on ICES, which is similar to the UN Standard Form A- Annex 7);
- the officially required lead time varies considerably (from 30 days (Denmark) through 2 months (Greece), 3 months (Belgium, the Netherlands, and the United Kingdom), 4 months (France) to 6 months (Ireland, Italy, Portugal, and Spain), although it appears that these official lead times are in some cases not strictly enforced);
- most states listed security as the rationale for not employing the implied consent regime;
- Arctic states show very high approval rates for marine scientific research applications;
- researchers need to be acutely aware of the coastal state's perspectives on such specifics as "start dates" when applying for clearance;
- all states routinely require the submission of post-cruise reports on research results (Observers, when employed by the Arctic state, typically serve multiple purposes); and
- Arctic states are sharing their data.

Canada was a major participant in, and a beneficiary of the development of the UNCLOS III. It has promulgated laws and regulations on foreign-related marine scientific research conducted within its jurisdictional waters. Canada's imprint is all over UNCLOS III:

- the "Arctic clause";
- 200 mile zones;
- equitable sharing of deep seabed mineral resources with developing states;

- national authority over the continental shelf beyond 200 miles attained by including revenue-sharing and definite outer limits determinations; and
- significance marine environmental protection obligations.

Canadian position has been that the application of the UNCLOS III will help avoid uncertainty and contribute to peace and security by reducing the risk of conflict over competing ocean uses, both within and beyond the limits of national jurisdiction.

Compliance with the marine scientific research articles has implications for Canada both as a researching state and as a coastal state. As a researching nation, Canada also directly affected by the provisions of the marine scientific research articles of the UNCLOS III. As a coastal state on the other hand, Canada stands to benefit from the marine scientific research regime by having recourse to data and samples obtained by foreign ocean research being carried out off Canadian shores.

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Annexes

Annex I-Summary of Arctic States the 1982 Law of Sea Convention (UNCLOS III). Source-
<http://www.un.org/Depts/los/index.htm>

STATE	DATE	NOTES
CANADA	Dec 82	Signed Convention.
	Jul 94	Signed Part XI Agreement.
	Nov 2003	Ratified Convention and Part XI Agreement.
DENMARK	Dec 82	Signed Convention.
	Jul 94	Signed Part XI Agreement.
	Nov 2004	Ratified Convention and Part XI Agreement. Denmark's ratifications normally include the Faroe Islands and Greenland.
FINLAND	Dec 82	Signed Convention, with Declaration requiring prior notification by warships and non-commercial government vessels transiting territorial sea, and declaring that Art 35(c) exception to transit-passage regime is applicable to Aland Strait.
	Jul 94	Signed Part XI Agreement.
	Jun 96	Ratified Convention and Part XI Agreement.
ICELAND	Dec 82	Signed Convention.
	Jun 85	Ratified Convention.
	Jul 94	Signed Part XI Agreement.
	Jul 95	Bound by Part XI Agreement.
NORWAY	Dec 82	Signed Convention.
	Jun 85	Ratified Convention.
	Jul 94	Signed Part XI Agreement.
	Jul 95	Bound by Part XI Agreement.
RUSSIAN FEDERATION	Dec 82	Signed Convention.
	Mar 97	Ratified Convention; bound by Part XI Agreement.
SWEDEN	Dec 82	Signed Convention, with Declaration of understanding that rights and duties of neutral States are not affected by the Convention.
	Jul 94	Signed Part XI Agreement.
	Jun 96	Ratified Convention and Part XI Agreement.
UNITED STATES OF AMERICA	Jul 94	Signed Part XI Agreement. [Presidential Order of 10 Mar 83 states that U.S. recognizes customary navigation and overflight rights as reflected in the LOS Convention.]

Annex 2- Summary of Maritime Claims. Source- <http://www.un.org/Depts/los/index.htm>

CANADA

TYPE	DATE	SOURCE	LIMITS	NOTES
TERRITORIAL SEA	Jan 97	An Act Respecting the Oceans of Canada (Oceans Act)	12nm	Repealed Territorial Sea and Fishery Zones Act.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	1763	Royal Proclamation		Established closing lines for St. Lawrence River.
	Jul 1906	Amendment to Fisheries Act		Claimed Hudson Bay as historic waters.
	1938	Sec. 2, Custom Act, Chap. 42, RSC		Redefined St. Lawrence River closing lines: Cape Rosiere to west end of Anticosti Island to mouth of St. Johns River.
	Oct 67	Order-in-Council 1967-2025		Established straight baselines (Labrador & Newfoundland).
	May 69	Order-in-Council P.C. 1969-1109		Established straight baselines (Nova Scotia, Vancouver Is., Queen Charlotte Islands).
	Feb 71	Order-in-Council P.C. 1971-366		Established fisheries closing lines for Fundy, St. Lawrence, and Queen Charlotte regions.
	May 72	Order-in-Council P.C. 1972-966		Revisions to straight baselines:
	Jan 86	Order-in-Council P.C. 1985-2739		Established straight baselines around Canadian Arctic Islands.
	Jan 97	Oceans Act		Appears to maintain above straight baselines and historical water claims.
	CONTIGUOUS ZONE	Jan 97	Oceans Act	24nm
CONTINENTAL SHELF	Jan 97	Oceans Act		Outer edge of continental margin as the submerged prolongation of the land mass of Canada consisting of the seabed and subsoil of the shelf, the slope and the rise, but not including the deep ocean floor with its oceanic ridges or its subsoil.
FISHING ZONE/EEZ	Feb 71	Order-in-Council P.C. 1971-366: Fishing Zones of Canada Order (Zones 1, 2, & 3)		Certain fishing zones prescribed with closing lines for Bay of Fundy, Gulf of St. Lawrence, Queen Charlotte Sound, Dixon Entrance, Hecate Strait.
	Jan 77	Order-in-Council P.C. 1977-1: Amendment to Fishing Zones of Canada (Zones 4 & 5)	200nm	Applied to Atlantic and Pacific coasts.
	Mar 77	Order-in-Council	200nm	Extended fishery zone in Arctic region.
	Sep 78	Order-in-Council Amendment to Fishing Zones of Canada		Extended fishery claim in Atlantic (Gulf of Maine area).
	May 94	Amendment to Coastal Fisheries Protection Act	200nm	Claims fishing jurisdiction beyond 200nm.
	Jan 97	Oceans Act	200nm	EEZ.
	Jan 97	Oceans Act		Fishing Zones defined as areas of the sea adjacent to the coast of Canada that are prescribed in the regulations.

DENMARK

TYPE	DATE	SOURCE	LIMITS	NOTES
TERRITORIAL SEA	May 99	Act No. 200 on the Delimitation of the Territorial Sea	12nm	Extends territorial sea from 3nm to 12nm. Preserves right of innocent passage through internal waters of Little Belt, Great Belt and the Sound. Does not apply to Faroe Islands or Greenland
	May 99	Ordinance Governing Admission of Foreign Warships and Military Aircraft to Danish Territory in Time of Peace		This Act revokes that of 1973, which had required warships and other state vessels to provide prior notice of transit in innocent passage.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	May 99	Executive Order 242	12nm	Straight baseline coordinates.
	Aug 2003	Executive Order No. 680		Amends May 99 Act No. 200 to provide straight baseline coordinates.
CONTINENTAL SHELF	Jun 63	Royal Decree	1958 DEF	
	Jun 71	Act No. 259		Establishes regulations on permitting activities on continental shelf. Amended Jun 1972, Dec 1977.
	May 99	Executive Order 242		Asserts sovereignty over shelf north of boundary defined by June 1965 agreement with Germany.
FISHING ZONE/EEZ	May 96	Act No. 411	200nm	Not applicable to Faroe Islands and Greenland
	Jun 96	Executive Order No. 584	200nm	Establishes boundaries in the Sound and the Baltic between EEZs of Denmark and Germany, UK, Sweden and Norway.
	Jul 2002	Executive Order No. 613		Amends above.

DENMARK DEPENDENCIES (Faroe Islands and Greenland)

TERRITORIAL SEA	May 63	Royal Ordinance No. 191	3nm	Greenland.
	Dec 76	Royal Ordinance No. 599	3nm	Faroe Islands.
	May 99	Act No. 200		Specifically excludes Greenland and Faroe Islands from extension to 12nm.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jan 77	Royal Ordinance No. 599		Straight baselines (Faroe Islands).
	Jan 77	Executive Order No. 629		Straight baselines (southern part of Greenland).
	May 80	Executive Order No. 176		Straight baselines (northern part of Greenland).
FISHING ZONE/EEZ	Jan 77	Decree No. 598	200nm	Fishing zone (Faroe Islands).
	Jan 77	Executive Order No. 629	200nm	Fishing zone (southern part of Greenland).
	May 80	Executive Order No. 176	200nm	Fishing zone (northern part of Greenland).
	Aug 81	Executive Order No. 437		Amends Greenland fishing limits.

ICELAND

TERRITORIAL SEA	Jun 79	Law No. 41	12nm	
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jun 79	Law No. 41		Revised straight baselines.
CONTINENTAL SHELF	Jun 79	Law No. 41	200nm/ CM	
	May 85	Regulation No. 196 of 9 May 85		Established limits of continental shelf where it extends beyond 200nm to the East, South and West of Iceland.
FISHING ZONE/EEZ	Jun 79	Law No. 41	200nm	EEZ. Use of equidistant lines where EEZ abuts that of neighboring state.

FINLAND

TYPE	DATE	SOURCE	LIMITS	NOTES
TERRITORIAL SEA	Jan 81 Dec 82	Decree Amend 656/80 Declaration upon Ratification of 1982 LOS Convention Decree No. 1069/89 MFA Circular No. NC-28		These four documents require foreign warships to provide advance notice before transiting territorial sea and setting out procedures for doing so. These were not revoked by 1995 Act.
	Jan 89 Dec 90			
	Jul 95	Act 981/95 (Amending the Act on the Border of the Territorial Waters of Finland)	12nm	In the Gulf of Finland, the outer limit of the territorial sea shall at no place be closer to the midline than 3nm.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jul 95	Act 981/95		Established new straight baselines (to remain in effect until 2024, revoking those drawn in 1956)
CONTIGUOUS ZONE	Dec 94	Customs Act No. 1466	14 nm	Extends two nautical miles further than the outer limit of the territorial sea.
CONTINENTAL SHELF	Mar 65	Continental Shelf Act, Act No. 149	1958 DEF	Baltic Sea, Gulf of Finland and Gulf of Bothnia all covered.
FISHING ZONE/EEZ	Jan 75	Fishing-Zone Act 839/74	12nm	Fishing zone.
	Dec 77	Amendment to Act 839/74		Fishing zone extended to continental shelf boundary with Sweden in Gulf of Bothnia.
	Jun 78	Amendment to Act 938/74	12nm	Around Bogskar Island, fishing zone extended from 11 to 12nm.
	Jun 78	Amendment to Act 839/74	12nm	Around Bogskar Island, fishing zone extended from 11 to 12nm.

NORWAY

TERRITORIAL SEA	Jan 2004	Act relating to the Territorial Sea and Contiguous Zone	12nm	Around mainland Norway, Jan Mayen and Svalbard. (EIF for dependencies postponed.)
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jun 2001	Royal Decree		Straight baselines around islands in the Svalbard Archipelago (replacing 1970 coordinates and extending around remainder of archipelago).
	Jun 2002	Royal Decree		Baseline coordinates for straight baselines around mainland Norway.
	Aug 2002	Royal Decree		Baseline coordinates for straight baselines around Jan Mayen.
CONTIGUOUS ZONE	Jan 2004	Act relating to the Territorial Sea and Contiguous Zone	24nm	Around mainland Norway only.
CONTINENTAL SHELF	May 63	Royal Decree	EXP	
FISHING ZONE/EEZ	Jan 77	Act No. 91 & Royal Decree of 17 Dec 76	200nm	EEZ: authorized foreign fishing beyond 12nm upon agreement with States concerned, and enabled fishery regulations.
	Jun 77	Royal Decree	200nm	Fisheries protection zone around Svalbard.
	May 80	Royal Decree; Agreement with Iceland	Up to 200nm	Fishing zone around Jan Mayen to agreed boundary with Iceland.

SWEDEN

TERRITORIAL SEA	Jul 79	Act on the Sea Territory of Sweden	12nm	Passage restricted to surface transit in Aaland Strait. In 1995, an early requirement that foreign warships must obtain permission to transit territorial sea was repealed.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jul 66	Law No. 374, Decree No. 375		Established straight baseline coordinates (amended in 1978, 1979).
CONTINENTAL SHELF	Jul 66	Act No. 314	1958 DEF	
FISHING ZONE/EEZ	Jan 93	Act and Ordinance on the Exclusive Economic Zone of 3 Dec 1992	varies	EEZ will not extend beyond midline between Sweden and neighboring States. Sets forth specific coordinates for outer limits of EEZ.

RUSSIAN FEDERATION

TYPE	DATE	SOURCE	LIMITS	NOTES
TERRITORIAL SEA	Jul 98	Federal Act on internal maritime waters, territorial sea and contiguous zone of the Russian Federation	12nm	
	Oct 99	Decision No. 1102		Regulations regarding foreign warship visits to Russian ports and passage in territorial sea.
ARCHIPELAGIC, STRAIGHT BASELINES, & HISTORIC CLAIMS	Jul 98	Federal Act on internal maritime waters, territorial sea and contiguous zone of the Russian Federation		The 1998 Act does not appear to have revoked Russia's historic bay claims. Russia claims Peter the Great Bay, and Demitri, Laptev, and Sannikov Straits, as historic, and thus internal, waters. The 1998 Act also authorizes the drawing of straight baselines and publication of new coordinates, which has not yet been done. Russian Federation baselines remain those set out in the Council of Minister's Decrees dated Feb 84 and Jan 85.
	Dec 2003	Joint Statement		With Ukraine, asserting that the Sea of Azov and Strait of Kerch are historic, internal waters of the two nations.
CONTIGUOUS ZONE	Jul 98	Federal Act on internal maritime waters, territorial sea and contiguous zone of the Russian Federation	24nm	
CONTINENTAL SHELF	Oct 95	Federal Act on the Continental Shelf of the Russian Federation	200nm	The Russian Federation has also filed with the Continental Shelf Commission under UNCLOS a claim for ownership of a prolonged continental shelf beyond 350nm in the Arctic Ocean.
FISHING ZONE/EEZ	Nov 98	Federal Act on the Exclusive Economic Zone of the Russian Federation	200nm	Also applies to all islands of the Russian Federation.

UNITED STATES OF AMERICA

TERRITORIAL SEA	Dec 88	Presidential Proclamation No. 5928	12nm	Territorial Sea extension from 3 to 12 nm. Also applies to "territories and possessions" (Guam, Puerto Rico, U.S. Virgin Islands).
CONTIGUOUS ZONE	Sep 99	Presidential Proclamation No. 7219 of Aug 2, 1999	24nm	
CONTINENTAL SHELF	Aug 53	Outer Continental Shelf Lands Act, 43 U.S.C. § 1331 (amended 1978)	1958 DEF	Seabed and subsoil appertaining.
	Apr 61			Became party to the 1958 Convention on the Continental Shelf.
FISHING ZONE/EEZ	Mar 83	Presidential Proclamation No. 5030	200nm	EEZ: applied to Puerto Rico, Northern Marianas, and overseas possessions; no claim to jurisdiction over scientific research.
	Jul 94	Exchange of Notes with Japan		Confirms with Japan that the "line of delimitation" of Japan's fishing zone is identical to the U.S. EEZ limits north of the Northern Marianas.
	Aug 95	Federal Register Pub. Not. No. 2237		Published coordinates of the EEZ.

Annex 3- Summary of Maritime Boundaries Agreements

(Source-<http://www.un.org/Depts/los/LEGISLATIONANDTREATIES/europe.htm>)

CANADA

Mar 72	Agreement	Territorial sea boundary agreement with France (St. Pierre and Miquelon)
Mar 74	Agreement	Continental shelf boundary agreement with Denmark (Greenland) EIF.
Oct 84	ICJ Judgment	Maritime boundary with United States (Gulf of Maine area) delimited by ICJ Chamber.
Jun 92	Court of Arbitration Decision	Boundary with France (St. Pierre & Miquelon) delimited.

DENMARK

Sept 21	Protocol	Territorial sea boundary with Germany in the North Sea. Amended. See also Executive Order No. 497 of 21 Dec 1923.
Jan 32	Agreement	Territorial sea boundary agreement with Sweden in the Sound. Amended. See also Executive Order No. 41 of 22 Feb 1932 and No. 117 of 5 Oct 1995.
Dec 65	Agreement	Continental shelf boundary agreement with Norway EIF. Amended 1968, 1974.
Jun 65	Agreement and Protocol	Continental shelf boundary agreement with Germany regarding North Sea. See also Executive Order No. 37 of 11 Jun 1966.
Feb 67	Agreement	Continental shelf boundary agreement with UK EIF.
Jun 69	ICJ Judgment	Established continental shelf boundaries with Germany in the North Sea.
Oct 70	Exchange of Notes	Establishes boundaries with Germany in Flensburg Fiord area of the Baltic Sea. Amended 1971.
Dec 72	Agreement	Continental shelf boundary agreement with Germany (North Sea) EIF. Establishes coordinates for areas not covered by 1969 ICJ judgment.
Sep 85	Agreement	Continental shelf and fishing zone boundary agreement with Sweden EIF.
Jun 89	Agreement	Continental shelf and fishing zone boundary agreement with GDR EIF.
Jun 93	ICJ Judgment	Delimited the continental shelf and fishing zones boundaries between Denmark and Norway. Established maritime boundary between Greenland and Jan Mayen.

DENMARK DEPENDENCIES (Faroe Islands and Greenland)

Mar 74	Agreement	Continental shelf boundary agreement with Canada (for Greenland) EIF.
June 80	Agreement	Continental shelf boundary agreement with Norway (between Faroe Islands and Norway) EIF.
June 93	ICJ Decision	Established boundary for fishing zones and continental shelf between Greenland and Jan Mayen (Norway).
Dec 95	Agreement and Protocol	Agreement with Norway on fishing zones and continental shelf between Greenland and Jan Mayen not covered by ICJ Decision. Protocol amending same in 1997.
Nov 97	Agreement	Continental shelf boundary agreement between Denmark, local government of Greenland, and Iceland regarding continental shelf and fishery zone boundaries between Greenland and Iceland.
May 99	Agreement	Continental shelf boundary agreement between Denmark, home government of Faroe Islands, and the UK regarding area between Faroe Islands and the UK.

FINLAND

May 66	Agreement	Continental shelf boundary with former Soviet Union (Gulf of Finland) EIF. See LIS No. 16.
Mar 68	Agreement	Continental shelf boundary with former Soviet Union (northeastern Baltic) EIF.
Jan 73	Agreement	Continental shelf boundary with Sweden (Gulf of Bothnia, Gulf of Finland) EIF.
Jul 80	Agreement	Fishing boundary agreement with the former Soviet Union EIF.
Feb 85	Agreement	Agreement with former Soviet Union delimiting EEZ, fishing zone, and continental shelf in Gulf of Finland and northeastern Baltic Sea. EIF.
Nov 86	Agreement	Agreement with former Soviet Union revising earlier continental shelf boundaries, EIF.
Jun 94	Agreement	With Sweden, delimiting EEZ, fishing zone, and continental shelf in the Åland and Northern Baltic Seas. EIF.
Oct 96	Agreement	Agreement with Estonia signed.
Jan 2001	Agreement	With Estonia and Sweden, to establish common maritime boundary point in the Baltic Sea.

ICELAND

Jun 82	Agreement (amended 1997)	Continental shelf boundary agreement with Norway (Jan Mayen) EIF.
Nov 97	Agreement	Continental shelf and EEZ boundary agreement with Denmark (regarding Greenland).

NORWAY

Jan 32	Grisbadarna Arbitration	Territorial sea boundary agreement with Sweden EIF.
Apr 57	Agreement & Protocol	Continental shelf boundary agreement with USSR for Varangerfjord EIF.
Jun 65 (Dec 78)	Agreement (& Protocol)	Continental shelf boundary agreement with United Kingdom EIF.
Jun 66	Agreement (amended 1968, 1974)	Continental shelf boundary agreement with Denmark (North Sea) EIF.
Apr 67	Agreement	Boundary between Norway and Sweden fishery areas (EEZ).
Mar 69	Agreement	Continental shelf boundary agreement with Sweden EIF.
Jun 80	Agreement	Maritime boundary agreement (continental shelf, fishery zone) with Denmark (Faeroes) EIF.
Jun 82 (Nov 97)	Agreement (& Protocol)	Continental shelf boundary (Jan Mayen) agreement with Iceland EIF.
Jun 93	ICJ Judgment	Maritime delimitation in the area between Greenland and Jan Mayen (Denmark v. Norway).
Dec 95 (Nov 97)	Agreement (& Protocol)	Maritime boundary agreement with Denmark delimiting continental shelf and fishery zone between Greenland and Jan Mayen.

RUSSIAN FEDERATION

Apr 57	Agreement & Protocol	Maritime boundary agreement with Norway for Varangerfjord EIF.
May 65	Agreement	Continental shelf boundary agreement with Finland (Gulf of Finland) EIF. (This boundary line was also adopted as the EEZ boundary in a 1980 agreement.)
May 67	Agreement	Continental shelf boundary agreement with Finland (northeastern Baltic Sea area). This boundary line was also adopted as the EEZ boundary in a 1980 agreement.
May 70	Agreement	Continental shelf boundary agreement with Poland EIF (boundary extended in 1989).
Jun 78	Agreement	Continental shelf boundary (Black Sea) agreement between Turkey and the former USSR signed; EIF May 81. See LIS No. 109. By an exchange of notes in 1987, this boundary line was adopted for the EEZ as well.
Jul 85	Agreement	Established boundaries of territorial sea, EEZ, fishing areas, and continental shelf with Poland (replaced 1958 agreement).
May 86	Agreement	Maritime boundary agreement with North Korea EIF.
Jun 88	Agreement	Delimiting continental shelf, fishing zone, and EEZ with Sweden.
1989	Agreement	Junction point of maritime boundaries with Poland and Sweden (Baltic Sea).
Jul 90	Agreement	Boundary agreement with U.S. (Bering Sea) signed.
Sep 90	Agreement	Frontier boundary agreement with South Korea; mostly the land boundary, it includes a line dividing the territorial seas of the two nations in the Sea of Japan.
Oct 97	Agreement	Maritime boundary agreement with Lithuania regarding EEZ, continental shelf.

SWEDEN

Jan 32	Agreement	Sweden and Denmark signed a declaration creating boundary in the Oresund. Revised by 1995 Agreement.
Mar 69	Agreement	Continental shelf boundary agreement with Norway EIF.
Jan 73	Agreement	Continental shelf boundary agreement with Finland (Gulf of Bothnia, Gulf of Finland) EIF.
Dec 78	Agreement	Continental shelf boundary agreement with Germany (GDR) EIF. Implemented by subsequent agreement in 1990.
Sep 85	Agreement	Boundary agreement with Denmark EIF.
Apr 88	Agreement	Continental shelf boundary agreement and delimitation of the Swedish fishing zone and the USSR economic zone in the Baltic Sea.
Jun 89	Agreement	Boundary agreement with Poland EIF (includes fishing jurisdiction).
May 90	Agreement	Tripoint agreement with Poland and former USSR EIF.
Jun 94	Agreement	EEZ and continental shelf boundary agreement with Finland regarding the Aland Sea and northern Baltic Sea.
Jul 95	Exchange of Notes	Revised Declaration of Jan 1932 with Denmark concerning the southern part of the boundary in the Sound (Oresund).
Apr 97	Agreement	Tripoint agreement with Latvia and Estonia in the Baltic Sea.
Nov 98	Agreement	Maritime delimitation agreement with Estonia (Baltic Sea) signed.
Jan 2001	Agreement	Tripoint agreement with Finland and Estonia in the Baltic Sea.

UNITED STATES OF AMERICA

Nov 76	Exchange of Notes	Maritime boundary agreement (EEZ) with Mexico for Pacific, Gulf of Mexico. (EIF by formal agreement in 1978)
Dec 77	Agreement	Maritime boundary agreement with Cuba signed; see LIS No. 110; provisional agreement effective 1/1/78, pending permanent EIF following exchange of instruments of ratification.
Nov 80	Agreement	Maritime boundary agreement with Venezuela EIF (Puerto Rico and U.S. Virgin Islands).
Jun 80	Agreement	Maritime boundary agreement with Cook Islands.
Oct 84	ICJ Judgment	Maritime boundary with Canada (Gulf of Maine and Georges Bank) delimited.
Jun 90	Agreement	Maritime boundary agreement with USSR signed (Alaska)
Jun 95	Agreement	Maritime boundary agreement with the U.K. (for the British Virgin Islands) EIF.
Jun 95	Agreement	Maritime boundary agreement with the U.K. (for Anguilla) EIF.
May 97	Agreement	Maritime boundary agreement with Niue.
Jun 2000	Agreement	Continental Shelf boundary agreement with Mexico in Gulf of Mexico beyond 200nm.

Annex 4- Summary- The 1958 Geneva Conventions on the Law of the Sea.

Source: Kalo et al., "Coastal and Ocean Law" (Houston: The John Marshall Publishing Co., 1994), 264-266.

The Convention on the Territorial Sea and the Contiguous Zone (Date of adoption- 29 April 1958; Place of adoption- Geneva, Switzerland; Entry into force- 10 September 1964; Parties (number) 52 (23 Oct. 2006))

The convention codified most of the traditional notions of national jurisdiction in the offshore oceans. That is, the sovereignty of coastal nations is limited to its internal waters, including bays of the ocean, and its territorial sea, subject only to the right of innocent passage for foreign-flag vessels transiting on the surface through the territorial sea. Because of the inability of the UNCLOS delegations to come to agreement on the maximum breadth of the territorial sea, the treaty makes no mention of its allowable width. It does, however, authorize a "contiguous zone," which can extend beyond the territorial sea to a maximum limit of 12 nautical miles.

The 1958 treaty allows coastal nations to exercise enforcement jurisdiction to prevent and punish violations of its customs, fiscal, immigration, and sanitary laws applicable to its territory or territorial sea. It does not authorize adoption of substantive laws on these topics in the zone, only enforcement actions. Because the contiguous zone is far more limited in its grant of authority to coastal nations than the sovereignty of the territorial sea and cannot extend beyond 12 miles, it is often persuasively argued that, despite the failure of the UNCLOS I and II delegations to establish a specific territorial sea width, it certainly can be no more than 12 miles under the Convention on the Territorial Sea and Contiguous Zone.

That convention also sets down several important rules on drawing baselines from which the breadth of the territorial sea (meaning whatever distance a coastal nation was claiming) was to be measured. The so-called normal baseline was established as the mean low-water line of the coast. The treaty allows coastal countries to draw exceptional, "non-normal" baselines along the outer points of especially convoluted coastlines and across the mouths of rivers and bay openings. "Bay" is a legal term applicable to coastal indentations, be they designated as gulfs or inlets or estuaries or even bays, deep enough and narrow enough at their mouths to justify, according to simple geometric limits, the drawing of baselines joining their outer headlands. "Historic" bays, not defined in the treaty, are allowed to ignore the limits.)

Baselines are significant for many reasons, not the least of which are that the waters landward of them are, of course, internal waters and that the outer boundaries of the territorial sea and the contiguous zone can be extended seaward by the use of "non-normal" baselines.

The Convention on the Continental Shelf (Date of adoption- 29 April 1958; Place of adoption- Geneva, Switzerland; Entry into force- 10 June 1964; Parties (number) 58 (23 Oct. 2006))

The convention codified the continental shelf doctrine, the custom created by the 1945 Truman Proclamation's claim and the favorable response of the international community. The doctrine recognizes coastal nations' sovereign rights in the natural resources of the seabed

and subsoil of the continental shelves adjacent to their coasts. Sovereign rights lie somewhere in between sovereignty and jurisdiction.

The convention gives to the coastal nation the exclusive right to explore the continental shelf and the exclusive right to exploit its resources. This concept is crucial to the new directions the law of the sea was even then embarking upon because, like the contiguous zone but with more significance, it demonstrated that the ancient barrier between the national sovereignty of the territorial sea and the community freedoms of the high seas beyond the territorial sea could be breached by the extension of less-than-sovereign national authority into the high seas.

Again, however, a major issue arose on the geographical limits of this national extension of authority. Geologically, the continental shelf is the submerged top of the continental platform and ends where the continental slope begins its steeper plunge toward the deep seabed. This outer natural boundary is, however, not precise enough for legal definition, so the treaty chose to establish the 200-meter isobath, a depth line that approximates the average natural limit and is also close to the 100-fathom line marked on nautical charts, as the initial outer boundary for the legal continental shelf. But, to provide for future growth of ocean technology, the Continental Shelf Convention also allows the further extension of the legal continental shelf beyond the 200-meter isobath to the depths of exploitability of the natural resources of the seabed and subsoil. Although some critics have argued that the combined legal continental shelves of the coastal nations could thereby some day cover the entire seabed, most authorities agreed that they could extend no farther than the inner edge of the deep seabed ("where the ball stops rolling," as one perceptive wag put it). In any event, as we shall see, the several questions raised by the exploitability test have no doubt been rendered moot by more recent developments.

The Convention on the High Seas (Date of adoption- 29 April 1958; Place of adoption- Geneva, Switzerland; Entry into force- 30 September 1964; Parties (number) 63 (23 Oct. 2006))

The convention was, as its Preamble states, almost entirely a codification or "restatement" of the customary law of the sea as it existed in 1958. In the convention, the high seas are defined as the area seaward of the outer boundary of the territorial sea. Four specific "freedoms of the high seas" are listed: (1) freedom of navigation (meaning both surface and submerged); (2) freedom to fish; (3) freedom of over-flight; and (4) freedom to lay cables and pipelines on the sea floor. The treaty makes clear, however, that customary international law might recognize other freedoms, and the International Law Commission's deliberations leading to its draft of the High Seas Convention indicate that freedom of scientific research could be a "fifth freedom." In the exercise of their freedoms of the high seas, nation-states must give reasonable regard to other states in their exercise of the same freedoms. For many years, these provisions not only guided the conduct of its parties, including the United States, but were also frequently said by the World Court and publicists to reflect customary law binding on all states. Thus, no nation-state could unreasonably interfere with most high seas activities of other states and their flag vessels and aircraft. The convention includes a short list of exceptions to this broad rule of noninterference, such as control of piracy and drug trafficking, but perhaps its principal significance lay in its strong reaffirmation of the traditional Grotian notion that the rule of freedom of the seas reigned throughout the vast expanse of the ocean beyond relatively narrow territorial seas. This was a victory for the maritime states,

who undoubtedly hoped to nip in the bud the trend toward expansion of national jurisdiction into the high seas. Of course, the continental shelf doctrine, the contiguous zone, and the failure of UNCLOS I to agree on a territorial sea breadth were at the same time important reflections of that very trend.

The Convention on Fishing and Conservation of the Living Resources of the High Seas and its eventual fate, when viewed from our historical perspective, reveal a lot about the extension-of-national-jurisdiction trend and the failure of the 1958 Geneva conventions to stop it or even slow it down. Of the four treaties, the Fishing Convention is the clearest attempt to resolve the growing tension between the maritime countries (especially the United States), who wanted to preserve the greatest extent of the freedoms of navigation and over-flight, and non-maritime coastal states, who particularly resented the prospect of foreign fishing fleets continuing to exercise the freedom to fish the high seas off their shores.

The Fishing Convention would allow coastal nations to unilaterally set nondiscriminatory conservation rules: for all fishing for threatened stocks in the high seas beyond their territorial seas, provided that negotiations for international agreement on such rules had failed and provided further that fishing regulations would eventually be set by compulsory and binding international arbitration. Although the Fishing Convention received the requisite two-thirds favorable vote for adoption at UNCLOS I and gathered enough ratifications to come into force, it was effectively a failure. None of the leading distant water fishing nations became parties and, since the treaty could not be legitimately characterized as a codification or articulation of customary international law, these states had no obligation to observe high seas fishing regulations set unilaterally by the countries off whose coasts they fished. Thus, if high seas fishing were to be regulated at all, it would have to be by bilateral or multilateral international agreement.

Annex 5- Marine Scientific Research UNCLOS III provisions governing marine scientific research in the exclusive economic zone (EEZ) and on the continental shelf are contained primarily in Section 3 of Part XIII.

I. General Obligations

Article 192

States have the obligation to protect and preserve the marine environment.

Article 193

States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment¹.

2. Planning Phase

Article 250

Communications concerning the marine scientific research projects shall be made through appropriate official channels, unless otherwise agreed.

Article 248

Duty to provide information to the coastal State States and competent international organizations which intend to undertake marine scientific research in the exclusive economic zone or on the continental shelf of a coastal State shall, not less than six months in advance of the expected starting date of the marine scientific research project, provide that State with a full description of:

- (a) the nature and objectives of the project;
- (b) the precise geographical areas in which the project is to be conducted;
- (c) the expected date of first appearance and final departure of the research vessels, or deployment of the equipment and its removal, as appropriate;
- (d) the name of the sponsoring institution, its director, and the person in charge of the project; and
- (e) the extent to which it is considered that the coastal State should be able to participate or to be represented in the project.

Article 255

Measures to facilitate marine scientific research and assist research vessels

States shall endeavour to adopt reasonable rules, regulations and procedures to promote and facilitate marine scientific research conducted in accordance with this Convention beyond their territorial sea and, as appropriate, to facilitate, subject to the provisions of their laws and regulations, access to their harbours and promote assistance for marine scientific research vessels which comply with the relevant provisions of this Part.

¹ The treaty imposes a combination of several general requirements that should be considered in addition to the obligation to protect and preserve the marine environment: the obligation to cooperate on a global and regional basis, and the obligation to adopt, implement and enforce the cooperatively agreed upon standards at a national level - see 23 Case W. Res. J. Int'l L. 83 (1991).

3. Obligations of Researching State

Article 249

1. States and competent international organizations when undertaking marine scientific research in the exclusive economic zone or on the continental shelf of a coastal State shall comply with the following conditions:

- (a) ensure the right of the coastal State, if it so desires, to participate or be represented in the marine scientific research project, especially on board research vessels and other craft or scientific research installations, when practicable, without payment of any remuneration to the scientists of the coastal State and without obligation to contribute towards the costs of the project.

The researching state shall provide preliminary reports and final results; access to all data and samples, and an assessment on request; remove all installations and equipment and inform the coastal State of any changes in the program. Published results involving natural resources require prior approval.

Article 254

Rights of neighboring land-locked and geographically disadvantaged States

1. States and competent international organizations which have submitted to a coastal State a project to undertake marine scientific research referred to in article 246, paragraph 3, shall give notice to the neighbouring land-locked and geographically disadvantaged States of the proposed research project, and shall notify the coastal State thereof.

4. Approval Process

Article 252

Implied consent

States or competent international organizations may proceed with a marine scientific research project six months after the date upon which the information required pursuant to article 248 was provided to the coastal State unless within four months of the receipt of the communication containing such information the coastal State has informed the State or organization conducting the research that:

- (a) it has withheld its consent under the provisions of article 246; or
- (b) the information given by that State or competent international organization regarding the nature or objectives of the project does not conform to the manifestly evident facts; or
- (c) it requires supplementary information relevant to conditions and the information provided for under articles 248 and 249; or
- (d) outstanding obligations exist with respect to a previous marine scientific research project carried out by that State or organization, with regard to conditions established in article 249.

Article 246

Marine scientific research in the exclusive economic zone and on the continental shelf

3. Coastal States shall, in normal circumstances, grant their consent for marine scientific research projects by other States or competent international organizations in their exclusive economic zone or on their continental shelf to be carried out in accordance with this Convention exclusively for peaceful purposes and in order to increase scientific knowledge of the marine environment for the benefit of all man-kind. To this end, coastal States shall establish rules and procedures ensuring that such consent will not be delayed or denied unreasonably.
4. For the purposes of applying paragraph 3, normal circumstances may exist in spite of the absence of diplomatic relations between the coastal State and the researching State.
5. Coastal States may however in their discretion withhold their consent to the conduct of a marine scientific research project of another State or competent international organization in the exclusive economic zone or on the continental shelf of the coastal State if that project:
 - (a) is of direct significance for the exploration and exploitation of natural resources, whether living or non-living;
 - (b) involves drilling into the continental shelf, the use of explosives or the introduction of harmful substances into the marine environment;
 - (c) involves the construction, operation or use of artificial islands, installations and structures referred to in articles 60 and 80;
 - (d) contains information communicated pursuant to article 248 regarding the nature and objectives of the project which is inaccurate or if the researching State or competent international organization has outstanding obligations to the coastal State from a prior research project.

Article 247

Marine scientific research projects undertaken by or under the auspices of international organizations

A coastal State which is a member of or has a bilateral agreement with an international organization, and in whose exclusive economic zone or on whose continental shelf that organization wants to carry out a marine scientific research project, directly or under its auspices, shall be deemed to have authorized the project to be carried out in conformity with the agreed specifications if that State approved the detailed project when the decision was made by the organization for the undertaking of the project, or is willing to participate in it, and has not expressed any objection within four months of notification of the project by the organization to the coastal State.

Article 257

Marine scientific research in the water column beyond the exclusive economic zone

All States, irrespective of their geographical location, and competent international organizations have the right, in conformity with this Convention, to conduct marine scientific research in the water column beyond the limits of the exclusive economic zone.

Annex. 6- Provisions of UNCLOS III pertaining to the Marine scientific research Cooperation (Part IX, Part XI, Part XII, Part XIII, and Part XIV)

1. General Principles for the Conduct of Marine Scientific Research (Section of Part XIII)

Article 240

In the conduct of marine scientific research the following principles shall apply:

- (a) marine scientific research shall be conducted exclusively for peaceful purposes;
- (b) marine scientific research shall be conducted with appropriate scientific methods and means compatible with this Convention;
- (c) marine scientific research shall not unjustifiably interfere with other legitimate uses of the sea compatible with this Convention and shall be duly respected in the course of such uses;
- (d) marine scientific research shall be conducted in compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment.

2. Co-operation of States Bordering an Enclosed or Semi-enclosed Sea (Sections of Part IX)

Article 122. Definition

For the purposes of this Convention, 'enclosed or semi-enclosed sea' means a gulf, basin or sea surrounded by two or more States and connected to another sea or the ocean by a narrow outlet or consisting entirely or primarily of the territorial seas and exclusive economic zones of two or more coastal States.

Article 123. Co-operation of States bordering enclosed or semi- enclosed seas

States bordering an enclosed or semi-enclosed sea should co-operate with each other in the exercise of their rights and in the performance of their duties under this Convention. To this end they shall endeavour, directly or through an appropriate regional organization:

- (a) to co-ordinate the management, conservation, exploration and exploitation of the living resources of the sea;
- (b) to co-ordinate the implementation of their rights and duties with respect to the protection and preservation of the marine environment;
- (c) to co-ordinate their scientific research policies and undertake where appropriate joint programmes of scientific research in the area;
- (d) to invite, as appropriate, other interested States or international organizations to co-operate with them in furtherance of the provisions of this article.

3. Co-operation on the Marine Scientific Research Activities (sections of Part XIII)

Article 239. Promotion of marine scientific research

States and competent international organizations shall promote and facilitate the development and conduct of marine scientific research in accordance with this Convention.

Article 242. Promotion of international co-operation

1. States and competent international organizations shall, in accordance with the principle of respect for sovereignty and jurisdiction and on the basis of mutual benefit, promote international co-operation in marine scientific research for peaceful purposes.
2. In this context, without prejudice to the rights and duties of States under this Convention, a State, in the application of this Part, shall provide, as appropriate, other States with a reasonable opportunity to obtain from it, or with its co-operation, information necessary to prevent and control damage to the health and safety of persons and to the marine environment.

Article 243. Creation of favourable conditions

States and competent international organizations shall co-operate, through the conclusion of bilateral and multilateral agreements, to create favourable conditions for the conduct of marine scientific research in the marine environment and to integrate the efforts of scientists in studying the essence of phenomena and processes occurring in the marine environment and the interrelations between them.

Article 244. Publication and dissemination of information and knowledge

1. States and competent international organizations shall, in accordance with this Convention, make available by publication and dissemination through appropriate channels information on proposed major programmes and their objectives as well as knowledge resulting from marine scientific research.
2. For this purpose, States, both individually and in co-operation with other States and with competent international organizations, shall actively promote the flow of scientific data and information and the transfer of knowledge resulting from marine scientific research, especially to developing States, as well as the strengthening of the autonomous marine scientific research capabilities of developing States through, inter alia, programmes to provide adequate education and training of their technical and scientific personnel.

Article 247. Marine scientific research projects undertaken by or under the auspices of international organizations

A coastal State which is a member of or has a bilateral agreement with an international organization, and in whose exclusive economic zone or on whose continental shelf that organization wants to carry out a marine scientific research project, directly or under its auspices, shall be deemed to have authorized the project to be carried out in conformity with the agreed specifications if that State approved the detailed project when the decision was made by the organization for the undertaking of the project, or is willing to participate in it, and has not expressed any objection within four months of notification of the project by the organization to the coastal State.

4. Co-operation on the Knowledge and Technology Transfer**Article 268. Basic objectives**

States, directly or through competent international organizations, shall promote:

- (a) the acquisition, evaluation and dissemination of marine technological knowledge and facilitate access to such information and data;
- (b) the development of appropriate marine technology;
- (c) the development of the necessary technological infrastructure to facilitate the transfer of marine technology;
- (d) the development of human resources through training and education of nationals of developing States and countries and especially the nationals of the least developed among them;
- (e) international co-operation at all levels, particularly at the regional, sub-regional and bilateral levels.

Article 269. Measures to achieve the basic objectives

In order to achieve the objectives referred to in article 268, States, directly or through competent international organizations, shall endeavour, inter alia, to:

- (a) establish programmes of technical co-operation for the effective transfer of all kinds of marine technology to States which may need and request technical assistance in this field, particularly the developing land-locked and geographically disadvantaged States, as well as other developing States which have not been able either to establish or develop their own technological capacity in marine science and in the exploration and exploitation of marine resources or to develop the infrastructure of such technology;
- (b) promote favourable conditions for the conclusion of agreements, contracts and other similar arrangements, under equitable and reasonable conditions;
- (c) hold conferences, seminars and symposia on scientific and technological subjects, in particular on policies and methods for the transfer of marine technology;
- (d) promote the exchange of scientists and of technological and other experts;
- (e) undertake projects and promote joint ventures and other forms of bilateral and multilateral co-operation.

Article 276. Establishment of regional centres

1. States in co-ordination with the competent international organizations, the Authority and national marine scientific and technological research institutions, shall promote the establishment of regional marine scientific and technological research centres, particularly in developing States, in order to stimulate and

advance the conduct of marine scientific research by developing States and foster the transfer of marine technology.

2. All States of a region shall co-operate with the regional centres therein to ensure the more effective achievement of their objectives.

Article 277. Functions of regional centres

The functions of such regional centres shall include, inter alia:

- (a) training and educational programmes at all levels on various aspects of marine scientific and technological research, particularly marine biology, including conservation and management of living resources, oceanography, hydrography, engineering, geological exploration of the sea-bed, mining and desalination technologies;
- (b) management studies;
- (c) study programmes related to the protection and preservation of the marine environment and the prevention, reduction and control of pollution;
- (d) organization of regional conferences, seminars and symposia;
- (e) acquisition and processing of marine scientific and technological data and information;
- (f) prompt dissemination of results of marine scientific and technological research in readily available publications;
- (g) publicizing national policies with regard to the transfer of marine technology and systematic comparative study of those policies;
- (h) compilation and systematization of information on the marketing of technology and on contracts and other arrangements concerning patents;
- (i) technical co-operation with other States of the region.

5. Co-operation on the optimum utilization of EEZ resources

Article 61. Conservation of the living resources

1. The coastal State shall determine the allowable catch of the living resources in its exclusive economic zone.
2. The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation. As appropriate, the coastal State and competent international organizations, whether subregional, regional or global, shall co-operate to this end.
3. Such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the economic needs of coastal fishing communities and the special requirements of developing States, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether subregional, regional or global.
4. In taking such measures the coastal State shall take into consideration the effects on species associated with or dependent upon harvested species with a view to maintaining or restoring populations of such associated or dependent species above levels at which their reproduction may become seriously threatened.
5. Available scientific information, catch and fishing effort statistics, and other data relevant to the conservation of fish stocks shall be contributed and exchanged on a regular basis through competent international organizations, whether subregional, regional or global, where appropriate and with participation by all States concerned, including States whose nationals are allowed to fish in the exclusive economic zone.

Article 62. Utilization of the living resources

1. The coastal State shall promote the objective of optimum utilization of the living resources in the exclusive economic zone without prejudice to article 61.
2. The coastal State shall determine its capacity to harvest the living resources of the exclusive economic zone. Where the coastal State does not have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements and pursuant to the terms, conditions, laws and regulations referred to in paragraph 4, give other States access to the surplus of the allowable catch, having particular regard to the provisions of articles 69 and 70, especially in relation to the developing States mentioned therein.
3.

Article 64. Highly migratory species

1. The coastal State and other States whose nationals fish in the region for the highly migratory species listed in Annex I shall co-operate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal State and other States whose nationals harvest these species in the region shall co-operate to establish such an organization and participate in its work.
2. The provisions of paragraph 1 apply in addition to the other provisions of this Part.

Article 65. Marine mammals

Nothing in this Part restricts the right of a coastal State or the competence of an international organization, as appropriate, to prohibit, limit or regulate the exploitation of marine mammals more strictly than provided for in this Part. States shall co-operate with a view to the conservation of marine mammals and in the case of cetaceans shall in particular work through the appropriate international organizations for their conservation, management and study.

6. Co-operation on the Environment Protection and Combat Marine Pollution

Article 192. General obligation

States have the obligation to protect and preserve the marine environment.

Article 193. Sovereign right of States to exploit their natural resources

States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment.

Article 194. Measures to prevent, reduce and control pollution of the marine environment

1. States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.
2. States shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.
3. The measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment. These measures shall include, inter alia, those designed to minimize to the fullest possible extent:
 - a. the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping;
 - b. pollution from vessels, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, preventing intentional and unintentional discharges, and regulating the design, construction, equipment, operation and manning of vessels;
 - c. pollution from installations and devices used in exploration or exploitation of the natural resources of the sea-bed and subsoil, in particular measures for preventing accidents and dealing with emergencies, ensuring the safety of operations at sea, and regulating the design, construction, equipment, operation and manning of such installations or devices;
 - d. pollution from other installations and devices operating in the marine environment, in particular measures for preventing accidents and dealing the design, construction, equipment, operation and manning of such installations or devices.
4. In taking measures to prevent, reduce or control pollution of the marine environment, States shall refrain from unjustifiable interference with activities carried out by other States in the exercise of their rights and in pursuance of their duties in conformity with this Convention.
5. The measures taken in accordance with this Part shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

Article 197. Co-operation on a global or regional basis

States shall co-operate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended

practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.

Article 198. Notification of imminent or actual damage

When a State becomes aware of cases in which the marine environment is in imminent danger of being damaged or has been damaged by pollution, it shall immediately notify other States it deems likely to be affected by such damage, as well as the competent international organizations.

Article 199. Contingency plans against pollution

In the cases referred to in article 198, States in the area affected, in accordance with their capabilities, and the competent international organizations shall co-operate, to the extent possible, in eliminating the effects of pollution and preventing or minimizing the damage. To this end, States shall jointly develop and promote contingency plans for responding to pollution incidents in the marine environment.

Article 200. Studies, research programmes and exchange of information and data

States shall co-operate, directly or through competent international organizations, for the purpose of promoting studies, undertaking programmes of scientific research and encouraging the exchange of information and data acquired about pollution of the marine environment. They shall endeavour to participate actively in regional and global programmes to acquire knowledge for the assessment of the nature and extent of pollution, exposure to it, and its pathways, risks and remedies.

Article 201. Scientific criteria for regulations

In the light of the information and data acquired pursuant to article 200, States shall co-operate, directly or through competent international organizations, in establishing appropriate scientific criteria for the formulation and elaboration of rules, standards and recommended practices and procedures for the prevention, reduction and control of pollution of the marine environment.

Article 204. Monitoring of the risks or effects of pollution

1. States shall, consistent with the rights of other States, endeavour, as far as practicable, directly or through the competent international organizations, to observe, measure, evaluate and analyse, by recognized scientific methods, the risks or effects of pollution of the marine environment.
2. In particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment.

Article 206. Assessment of potential effects of activities

When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and shall communicate reports of the results of such assessments in the manner provided in article 205.

7. Marine Scientific Research Co-operation in the Area

Article 140. Benefit of mankind

1. Activities in the Area shall, as specifically provided for in this Part, be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States, whether coastal or land-locked, and taking into particular consideration the interests and needs of developing States and of peoples who have not attained full independence or other self-governing status recognized by the United Nations in accordance with General Assembly resolution 1514 (XV) and other relevant General Assembly resolutions.
2. The Authority shall provide for the equitable sharing of financial and other economic benefits derived from activities in the Area through any appropriate mechanism, on a non-discriminatory basis, in accordance with article 160, paragraph 2 (f) (i).

Article 143. Marine scientific research

1. Marine scientific research in the Area shall be carried out exclusively for peaceful purposes and for the benefit of mankind as a whole, in accordance with Part XIII.
2. The Authority may carry out marine scientific research concerning the Area and its resources, and may enter into contracts for that purpose. The Authority shall promote and encourage the conduct of marine scientific research in the Area, and shall co-ordinate and disseminate the results of such research and analysis when available.

3. States Parties may carry out marine scientific research in the Area. States Parties shall promote international co-operation in marine scientific research in the Area by:
 - a. participating in international programmes and encouraging co-operation in marine scientific research by personnel of different countries and of the Authority;
 - b. ensuring that programmes are developed through the Authority or other international organizations as appropriate for the benefit of developing States and technologically less developed States with a view to:
 - i. strengthening their research capabilities;
 - ii. training their personnel and the personnel of the Authority in the techniques and applications of research;
 - iii. fostering the employment of their qualified personnel in research in the Area;
 - c. effectively disseminating the results of research and analysis when available, through the Authority or other international channels when appropriate.

Article 145. Protection of the marine environment

Necessary measures shall be taken in accordance with this Convention with respect to activities in the Area to ensure effective protection for the marine environment from harmful effects which may arise from such activities. To this end the Authority shall adopt appropriate rules, regulations and procedures for inter alia:

- (a) the prevention, reduction and control of pollution and other hazards to the marine environment, including the coastline, and of interference with the ecological balance of the marine environment, particular attention being paid to the need for protection from harmful effects of such activities as drilling, dredging, excavation, disposal of waste, construction and operation or maintenance of installations, pipelines and other devices related to such activities;
- (b) the protection and conservation of the natural resources of the Area and the prevention of damage to the flora and fauna of the marine environment.

Annex 7- Marine Scientific Research, A Guide to the Implementation of the Relevant Provisions of the United Nations Convention on the Law of the Sea.

UN DRAFT STANDARD FORM A

Application for Consent to Conduct Marine Scientific Research in Areas Under National Jurisdiction of

(name of coastal state)

Date:

I. General Information

1.1 Cruise name and/or number:

1.2 Sponsoring institution:

Name:

Address:

Name of Director:

1.3 Scientist in charge of the project (CV recommended to be included):

Name:

Address:

Telephone:

Fax:

Email:

1.4 Scientist(s) from coastal state involved in the planning of the project:

Name(s):

Address:

1.5 Submitting officer:

Name and address:

Nationality:

Telephone:

Fax:

Email:

2. Description of Project (Attach additional pages as necessary)

2.1 Nature and objectives of the project:

2.2 Relevant previous or future research cruises:

2.3 Previously published research data relating to the project:

3. Methods and Means to be Used

3.1 Particulars of vessel:

Name:

Nationality (Flag state):

Owner:

Operator:

Overall length (meters):

Maximum draught (meters):

Displacement/Gross tonnage:

Propulsion:

Cruising & Maximum speed:

Call sign:

Method and capability of communication

(including emergency frequencies):

Name of master:

Number of crew:

Number of scientists on board:

3.2 Aircraft or other craft to be used in the project:

3.3 Particulars of methods and scientific instruments (Types of samples and data, Methods to be used, Instruments to be used)

3.4 Indicate whether harmful substances will be used:

3.5 Indicate whether drilling will be carried out:

3.6 Indicate whether explosives will be used:

4. Installations and Equipment

Details of installations and equipment (dates of laying, servicing, recovery; exact locations and depth):

5. Geographical Areas

5.1 Indicate geographical areas in which the project is to be conducted (with reference in latitude and longitude):

5.2 Attach chart(s) at an appropriate scale (1 page, high-resolution) showing the geographical areas of the intended work and, as far as practicable, the positions of intended stations, the tracks of survey lines, and the locations of installations and equipment.

6. Dates

6.1 Expected dates of first entry into and final departure from the research area of the research vessel:

6.2 Indicated if multiple entry is expected:

7. Port Calls

7.1 Dates and names of intended ports of call:

7.2 Any special logistical requirements at ports of call:

7.3 Name/Address/Telephone of shipping agent (if available):

8. Participation:

8.1 Extent to which coastal state will be enabled to participate or to be represented in the research project:

8.2 Proposed dates and ports for embarkation/disembarkation:

9. Access to data, samples and research results

9.1 Expected dates of submission to coastal state of preliminary reports, which should include the expected dates of submission of the final results:

No more than 30 days from the end date of the cruise.

9.2 Proposed means for access by coastal state to data and samples:

9.3 Proposed means to provide coastal state with assessment of data, samples and research results or provide assistance in their assessment or interpretation:

9.4 Proposed means of making results internationally available:

Revised by IOC on 4 August 2006

Annex 8- IOC QUESTIONNAIRE N°3

THE PRACTICES OF STATES IN THE FIELD OF MARINE SCIENTIFIC RESEARCH

- *Questionnaire n°3 – Section One* : Conduct of marine scientific research in waters under sovereignty or jurisdiction of a coastal State.

This questionnaire responds to IOC Resolution EC-XXXV.7 adopted by the 35th session of the IOC Executive Council (Paris, 4-14 June 2002) and of Resolution A/RES/56/12 of the UN General Assembly.

GENERAL	
1. Name of State	
2. Name of contact person responsible for completing this form	
3. Organization	
4. Address	
5. Telephone number	
6. Fax number	
7. E-mail address	

Questionnaire n°3

CONDUCT OF MARINE SCIENTIFIC RESEARCH (MSR) IN WATERS UNDER SOVEREIGNTY OR JURISDICTION OF A COASTAL STATE

I NATIONAL LEGISLATION ON MARINE SCIENTIFIC RESEARCH

A. Does your country have legislation in force to implement the UNCLOS provisions related to MSR, as well as other international instruments relevant to MSR?

YES NO

- If yes, please provide the IOC Secretariat with a copy of your existing national legislation or administrative procedure.
- If no, would your country be interested in requesting technical assistance to draft/update/revise its specific national legislation on MSR?"

II. CONSENT

A. Are there official channels established to handle requests for MSR projects in waters under your country's sovereignty or jurisdiction, in accordance with Article 250 of UNCLOS?

YES NO

If yes, please provide names, address and contact information.

B. What is the approximate number of requests for authorisation your country has received annually, over the last five years (1998-2002)?

C. Approximately how many of these requests were approved?

D.. Taking into account Article 255 of UNCLOS, has your country created an application form for requesting consent?

YES NO

If yes, does your country use a *specific* model for application form(s) like those prepared by international organisations, e.g. model of the International Council for the Exploration of Sea, model of the UN/OLA/DOALOS standard, etc.?

YES NO

If yes, which model did you or are you use/using?

E. Taking into account Article 255 of UNCLOS, has your country created any other specialised application form(s) for requesting consent?

YES NO

If yes, please provide a copy of this/these specific form(s) to the IOC Secretariat.

III. APPLICATION REQUIREMENTS FOR FOREIGN COUNTRIES INTENDING TO CONDUCT MSR PROJECTS IN THE WATERS UNDER SOVEREIGNTY OR JURISDICTION OF YOUR COUNTRY

A. Does your country conduct MSR in areas that are not under your sovereignty or jurisdiction? If yes, as a researching State, has your country benefited from the procedure of implied consent as stated in Article 252 of UNCLOS to conduct research in the waters of another coastal State?

YES NO

B. Is your country a coastal State?

If so, do you or have you utilised implied consent to allow research to be conducted in waters under your jurisdiction by another country?

YES NO

If yes, why?

If no, why not?

IV. PROCEDURES AFTER CONSENT FOR MSR PROJECT IS GRANTED BY THE COASTAL STATE

- A. What constitutes the expected starting date of the MSR project in your country?
- (i) The specified starting date of the research plan?
 - (ii) The date the research plan is approved?
 - (iii) The date the research vessel departs?
 - (iv) The date the actual research operation begins in waters under your national jurisdiction?
 - (v) Others If others, please specify.
- B. Status of observers (Article 249 1a)
- (i) Has your country already sent scientists as observers on-board foreign research vessels in the framework of a MSR project conducted in the waters under your national jurisdiction?
 YES NO
 - (ii) Has/have the research vessel(s) of your country hosted foreign observers?
 YES NO
 - (iii) Do the observer(s) represent your government on board foreign research vessel?
 YES NO
 - (iv) What are the functions/assignments of the observers on board:
 - a) To report on research activities carried out?
 YES NO
 - b) To ensure that the type of research undertaken and the area where the research is conducted conforms to the official notification document?
 YES NO
 - c) To act as an official channel for possible communications between the vessel and your government?
 YES NO
 - d) To take the opportunity to be trained in the field of work defined in the MSR project?
 YES NO
 - e) Others? Please specify.
 - (v) If your country decides to undertake a MSR project in waters under the national jurisdiction of another coastal State, do you generally plan to provide equipment (on-board the research vessel) for use by a potential observer(s) from that coastal State?
 YES NO
- C. Does your country require that researchers provide the relevant authorities with copies of data and samples (Article 249 (1c))?
 YES NO
- D. Does your country require that researchers provide and or assist the relevant authorities with an assessment of research results (Article 249 (1d))?
 YES NO
- E. If your country performs research, does it publish and disseminate at the national, subregional/regional and international levels the research results and / or conclusions of the research project (Articles 249 (1e))?
 YES NO
- F. During the last five years, how many foreign vessels have undertaken MSR in the waters under your national jurisdiction for the following types of research?

(i)	Fishery	<input type="text"/>
(ii)	Pollution	<input type="text"/>
(iii)	Geology	<input type="text"/>
(iv)	Oceanography	<input type="text"/>
(v)	Hydrology	<input type="text"/>
(vi)	Other	<input type="text"/>
	Total	<input type="text"/>

G. Has your country ever required suspension/cessation of MSR project conducted in waters under your national jurisdiction for non-compliance with Article 248 and 249 of UNCLOS?

YES

NO

H. What regulatory provisions, such as customs or tax requirements, apply to foreign research vessels while in your ports?

Annex 9- Summary of Canadian Position on the selected Issues at the UNCLOS III

(Source: Department of Natural Resources', Department of Foreign Affairs and International Trade's , Department of Fisheries and Oceans' discussion papers, reports, and files 1975- 92)

The breakdown of the Canadian position as follows: (A) Exclusive economic zone (that further includes preservation of the marine environment, marine scientific research, fisheries); (B) the Continental Shelf (Article 76); (C) the International Sea-Bed Area; and (D) the peaceful settlement of disputes.

A. Exclusive Economic Zone (EEZ)

General Provision.

One of the most novel concepts to emerge from the negotiations has been the 200-mile Exclusive Economic Zone (EEZ). It was born from Latin American and African claims to a 200-mile territorial sea, not necessarily as a method of extending coastal State sovereignty, but as a method of controlling vital fishery resources necessary for food and foreign exchange. Maritime states were not prepared to accept claims to a 200-mile territorial sea, but they were prepared to accept a regime based on functional need i.e. that the coastal State would be given jurisdiction within the 200-mile zone for certain things vital to it, such as fishing and mineral resources, but in general freedom of navigation would be maintained. The coastal State has sovereign rights for the purpose of exploring and exploiting the living and non-living resources of the sub soil and superjacent water of a 200 mile exclusive economic zone (EEZ) off its coast. The coastal State has jurisdiction over all artificial islands, installations and structures used for economic purposes, which would be built in the EEZ.

The articles establishing the EEZ are really balance of interests between the coastal and maritime states with both agreeing to less protection than they wanted in the 200-mile zone on the basis that each one had the right to engage the other in binding dispute provisions under the terms of the Convention, This balance is in fact the key in determining whether both freedom of navigation and coastal State interests over such things as the preservation of the marine environment can be protected in the EEZ. If there were no Law of the Sea treaty, or one which lacks universal acceptance, there are no rights or obligations to third party dispute settlement except among parties to the Convention. If there no compulsory dispute settlement, then both the coastal and maritime States might question why they should respect the concessions they made in exchange for the right to obtain binding settlement of an EEZ dispute.

The three main areas of jurisdiction over the EEZ are the control over fisheries, maritime pollution and marine scientific research.

Canadian Interests

The formal creation of an EEZ to Canada's advantage by creating a firm legal basis upon which to exercise jurisdiction for the protection of the marine environment, over scientific research, artificial islands, etc. Key interests in the EEZs: (a) preservation of the marine environment and (b) marine scientific research; and (c) fisheries.

(a) Preservation of the Marine Environment

- i. To secure support for the "Arctic clause" which recognizes the coastal State's right to apply national marine pollution laws in ice-covered areas;
- ii. To obtain a comprehensive on the protection of the marine environment from pollution from all sources, and to promote the adoption of international standards to this end;
- iii. To ensure that coastal states have the right to take necessary measures for the protection of their environment in waters under their jurisdiction, including measures respecting discharges and dumping from vessels, vessel design and operation;
- iv. To secure adequate powers of enforcement of both national and international anti-pollution standards by the coastal State as well as to require flag States to apply such standards to their vessels; and
- v. To promote the development of international law on compensation for damages arising from marine pollution incidents.

(b) Marine Scientific Research

- i. To retain sovereign jurisdiction over MSR in internal waters and the territorial sea and, in accordance with the provisions of the 1958 Continental Shelf Convention, over all research "concerning the continental shelf and undertaken there";
- ii. To make scientific research in the EEZ subject to agreement between the coastal State or States undertaking such research; and
- iii. To make such research beyond the limits of national jurisdiction subject to a system of notification and registration.

(c) Fisheries:

- i. To the exclusive right to the exploitation of the fishery resources within its zone, but with a concomitant duty to manage and conserve those resources so as to promote the objective of optimum utilization while ensuring that the sustainability of those resources is not endangered by overexploitation.
- ii. As fish respect no boundaries, there are some fish stocks that straddle the 200 mile limit between the EEZ and the high seas. Conservation problems can be created when foreign vessels fishing on the high seas abuse their right to fish by overexploiting the resource to the extent that the maintenance of the stock within the EEZ is threatened.

UNCLOS III Supports Canadian Interests

(a) Preservation of the Marine Environment

Chapter Part XI of the UNCLOS III on the Protection and Preservation of the Marine Environment which serves as the basis of further rules at the global, regional or national levels. The fundamental principle is that all State parties have fundamental duty to protect and preserve the marine environment; this duty expressly encompasses all sources of pollution, including land based sources. The convention contains a number of particular obligations including: ensuring that maritime activities under their jurisdiction or control are conducted so as not to cause damage to other States or their environment; taking measures designed to minimize to the fullest extent possible the release of harmful substances from land based sources, through the atmosphere or from dumping and to cooperate globally and regionally on scientific and technical approaches to pollution problems, including assistance to developing States. States must notify other States likely to be effected by imminent or actual damage caused by pollution and are further obliged to cooperate in the development of contingency plans. These are consistent with Canadian legislation (e.g. Canada Shipping Act,

Arctic Waters Pollution Act, etc.). Canada gain support for the “Arctic clause” that Canada negotiated into the UNCLOS text.

(b) Marine Scientific Research

Requests for permission to conduct marine scientific research in Canada’s 200 mile zone are conducted on the basis of a foreign government through diplomatic channels. The Department of Foreign Affairs (DFAIT) developed the marine scientific research request clearance process. Where DFAIT consults a standing interdepartmental committee regarding the request which is either granted, rejected, amended or made subject of certain conditions. A foreign ship conducting research in the zone without permission would be in violation of the Coasting Trade Act which reserves to Canadian ships a range of activities of a commercial nature. The Act exempts those foreign ships “operated or sponsored by a foreign government that has sought and received the consent of the Secretary of State for Foreign Affairs to conduct marine scientific research”.

(c) Fisheries

The UNCLOS III provides for the freedom of fishing on the high seas and for the virtually exclusive jurisdiction of a flag State over ships entitled to fly its flag. To deal with flag of convenience (FOC) vessels that are found fishing straddling stock beyond Canada’s 200 mile zone on the east coast, there are number of tools that Canada could use to counter FOC activity. Diplomatic pressure could be exerted bilaterally and through NAFO to achieve withdrawal of the vessel, withdrawal of the vessel’s flag or permission from the flag State for Canada to take action. Where urgent action is necessary to prevent destruction of straddling stock, Bill C-29 enables Canada to arrest FOC vessels. UNCLOS III creates the possibility for an FOC State to bring Canada to dispute settlement action taken under Bill C-49.

B. The Continental Shelf

General Provision

Under the UNCLOS III, Coastal States enjoy exclusive sovereign rights for the exploration and exploitation of the non-living and sedentary living resources of the continental shelf. The continental shelf is comprised of the seabed and subsoil within the 200 mile EEZ, plus any physical extension of the shelf beyond the 200 mile limit. Unlike the EEZ, which has to be proclaimed, the continental shelf exists without any necessary action on the part of the coastal State. However, where the shelf extends beyond 200 miles, the coastal State must officially define the external limit in order to enjoy the benefits vis-à-vis other States and to exclude other states from exploiting the resources.

Canadian Interests

The single most important provision in part VI from the Canadian standpoint is Article 76, "Definition of the Continental Shelf", since it sets out the seaward extent of the jurisdiction of a coastal state over offshore mineral resources. The foregoing is of great economic significance to Canada. This is one of the most fundamental UNCLOS III issues. In brief, Canadian interest therefore:

- (a) To ensure security respecting the outer limits of the continental shelf off Canada’s east coast and Arctic;
- (b) To ensure the necessary certainty for hydrocarbon development and seaward extent of national jurisdiction over sedentary species; and

- (c) To make marine scientific research beyond the limits of national jurisdiction subject to a system of notification and registration.

UNCLOS III Supports Canadian Interests

Maintain exclusive sovereign rights over the natural resources (including sedentary species of fish), in accordance with the provisions of the 1958 Geneva Conventions; and b) obtain confirmation of Canada's views that these rights extend to the outer edge of the continental margin. UNCLOS III also provides for the establishment of a Commission on the Continental Shelf to advise on the determination of the outer edge of the continental margin, that is, the limit of national jurisdiction over the continental shelf. The coastal State must submit to the Commission the particulars of the limit that it has delineated, along with supporting technical and scientific data within ten years of the entry into force of the Convention for that State. The Commission examines the data and issues recommendations upon which the coastal State will base its final, binding limits. Canadian scientists are conducting mapping surveys to establish with certainty where the country's continental shelf begins and ends. The UNCLOS III provisions on the limits of coastal State jurisdiction have been considered as extremely favorable to coastal State such as Canada. To obtain broad support for such limits, the Conventions include provisions on the payment of royalties to the International Seabed Authority by the coastal State for the exploitation of non-living resources on the shelf beyond the 200 mile limit.

C. The International Sea-Bed Area

General Provision

In Part XI, UNCLOS sets forth the principles and rules governing the sea-bed and ocean floor beyond the limits of national jurisdiction. Concerns regarding these provisions were primarily responsible for the reluctance of industrialized States to become Parties to the UNCLOS III. These concerns were addressed in separate amending agreement adopted by the General Assembly in July 1994. It recognizes the political and economic changes, including market – oriented approaches. This agreement provides in particular for : a cost effective and evolutionary approach to the establishment of the International Seabed Authority and its organs; the initial functions of the seabed mining arm of the Authority, the Enterprise, being undertaken by the Secretariat of the Authority; the Enterprise operating on a joint venture basis with private operations; deletion of the previous obligation on parties to fund the first Enterprise mine site; the deletion of the requirement for mandatory transfer of technology to the Enterprise; the formula that regulated the level of seabed mineral production being replaced by a requirement that all such production be based on market principles.

Canadian Interests

- (a) To have access to the mineral resources of the international seabed areas on a fair and equitable basis; and
- (b) To ensure that the exploitation of these resources does not disrupt Canada's market for minerals, especially nickel, copper and cobalt.

UNCLOS III Supports Canadian Interests

Establishment of an international authority with comprehensive powers allowing for an orderly and rational development of the resources of the international seabed area for the benefit of all states. Canada concerns have been resolved. With ratification participate fully in

the governing Council of the International Seabed Authority and protect the interests of Canadian mining companies.

D. The Peaceful Settlement of Disputes

General Provision

Part XV of UNCLOS obliges Parties to settle their disputes peacefully, and provides a selection of methods for doing so in the event that they are otherwise unable to reach agreement. Where an agreement is not reached, a party may submit the dispute to one of the four methods of third adjudication or, for certain subject matters, compulsory conciliation. The four methods of third party arbitration provided by UNCLOS are (a) International Tribunal for the Law of the Sea (ITLOS); (b) the International Court of Justice (ICJ); (c) an Annex VII arbitral tribunal; and (d) a special arbitral tribunal.

Canadian Interests

To avoid uncertainty and contributes to international peace and security by reducing the risk of conflict over ocean-related disputes.

UNCLOS III Supports Canadian Interests

Canada's general approach to dispute settlement is to be supportive of international institutions, while recognizing the need for timeliness, flexibility and adequate input into the process should Canada be engaged. The mechanisms put in place under UNCLOS create an obligation for contracting Parties to settle their disputes peacefully and provide variety methods to do so.

**Annex 10- News Release, November 6, 2003 (4:30 p.m. EST) No. 171.....CANADA
RATIFIES UNITED NATIONS CONVENTION ON THE LAW OF THE SEA**

The Government of Canada today announced that Canada is ratifying the United Nations Convention on the Law of the Sea (UNCLOS). Minister of Foreign Affairs Bill Graham will sign Canada's instrument of ratification on November 6, 2003, and it will be deposited with the UN Secretary-General immediately thereafter.

UNCLOS is the culmination of decades of international negotiations. It provides the framework for international oceans law, governing many aspects of oceans affairs, from fisheries and navigation to marine pollution and scientific research.

"By ratifying UNCLOS, we are affirming our belief in the application of the rule of law to our oceans," said Minister Graham. "UNCLOS ratification will provide a strong foundation for Canada to continue its collaborative and innovative approach to oceans issues."

Ratification of the Convention will allow Canada to enjoy the benefits of UNCLOS, including acquisition of the means to delimit the outer edge of its continental shelf. Canada is also gaining a voice in UNCLOS institutions, such as the International Seabed Authority. Canada will now be able to speak on oceans issues on an equal footing with its peers and participate in decisions of importance to Canada.

"UNCLOS will strengthen international cooperation in the sustainable development of natural resources in a way that balances our common economic, social and environmental goals," said Minister of Fisheries and Oceans Robert Thibault. "Canada is committed to marine conservation, partnership and greater scientific understanding of Canada's oceans."

"Ratification of UNCLOS opens the door for Canada to secure international recognition of the full extent of our vast continental shelf, which is one of the world's richest in seabed resources," said Natural Resources Minister Herb Dhaliwal. "Canada is committed to the sustainable development of our natural resources, contributing to their economic importance and to a strong society and communities."

Canada will also ratify the 1994 Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea. Part XI deals with the mineral resources of the deep seabed. At the time of ratification, Canada will also file a declaration with the UN Secretary-General regarding its choice of dispute settlement forums for disputes arising under the Convention.

UNCLOS entered into force in 1994 and is one of the world's most widely accepted treaties. Canada's ratification brings the number of parties to 144.