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Shipping in Antarctica : can safety and environmental protection be addressed considering the existing legal regimes?

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SHIPPING IN ANTARCTICA

Can Safety and Environmental Protection be Addressed Considering the Existing Legal Regimes?

By

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DECLARATION

I certify that all material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

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ABSTRACT

Title of Dissertation: **Shipping in Antarctica: Can Safety and Environmental Protection be addressed regarding the existing legal regimes.**

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Antarctica is the southernmost continent on the planet and the continent dedicated to peace and science. It is a pristine place still free of high levels of pollution. However, Antarctica is also a place with plenty of natural resources and undiscovered beauties, which make this place an attractive place for carrying out commercial shipping activities like fishing and tourism. Regulations ruling these activities in the Antarctic are also quite exceptional, with a high complexity as a result of an undefined regime of sovereignty, which makes the applicability of a common legal standard there difficult.

Are the present legal regimes enough to deal with everyday more ships operating in Antarctic waters? Are existing regulations sufficient and appropriate to control and minimize the environmental challenges and perils for ships operating in Antarctic ice?

These questions are the main core of this research describing current issues in Antarctica as regards the shipping industry, analyzing problems related with fishing activities and ship-borne tourism, regarding safety and environmental challenges, unveiling problems concerning oil spills and ship-source operations; current standard training of seafarers; equipment of ships and Search and Rescue capabilities among others.

Safety and environmental protection seems to be not well understood today, so new regulations need to be made. Therefore, proper enforcement through Flag States and Port State Control in a second tier is urgently needed; this will prevent as far as possible future accidents. In the meantime, as regulations and jurisdiction problems are not properly addressed, shipping will continue to threat the marine Antarctic ecosystem and endanger safety of life at sea in a place where extreme weather conditions and rough seas are usual.

Key words:
Antarctica, safety, environmental protection, Antarctic Shipping, fishing, ship-borne tourism.

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LIST OF ABBREVIATIONS

AAD	Australian Antarctic Division
AECO	Association of Arctic Expeditions Cruise Operators
AFS	International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001
ASOC	Antarctic and Southern Ocean Coalition
AT	Antarctic Treaty
ATCM	Antarctic Treaty Consultative Meeting
ATS	Antarctic Treaty Secretariat
ATS	Antarctic Treaty System
BWM	International Convention for the Control and Management of Ship´ Ballast Water and Sediments, 2004
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources, 1982
CCAS	Convention for the Conservation of Antarctic Seals, 1972
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973
COMNAP	Council of Managers of Antarctic Programs
CRAMRA	Convention on the Regulation of Antarctic Mineral Resource Activities, 1982
DE	Sub-Committee on Ship Design and Equipment
EEZ	Exclusive Economic Zone
FAO	The Food and Agriculture Organization of the United Nations
GPS	Global Positioning System
HCA	IHO Hydrographic Commission on Antarctica
IAACS	International Association of Classification Societies
IAATO	International Association of Antarctica Tour Operators
IAS	Invasive Aquatic Species
ICRW	International Convention for the Regulation of Whaling, 1946
ICSU	International Council of Scientific Unions
IHO	International Hydrographic Organization

ILO	International Labour Organization
IMO	International Maritime Organization
INT	International Chart Scheme for Antarctic Waters
IUCN	International Union for Conservation of Nature
IUU	Illegal, Unreported and Unregulated
IWC	International Whaling Commission
LL	International Convention on Load Lines, 1966
LSA	Life Saving Appliances
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the 1978 Protocol relating thereto (MARPOL 73/78), as amended. (1995, 1998, 2000)
MEPC	Marine Environment Protection Committee
MRCC	Maritime Rescue Co-ordination Centre
MSC	Maritime Safety Committee
NET	National Environmental Trust
NGO	Non-Governmental Organizations
NOx	Nitrogen Oxide
PEPAT	Protocol on Environmental Protection to the Antarctic Treaty, 1991
PSSA	Particularly Sensitive sea Area
ROCRAM	The Operative Network for Regional Cooperation among Maritime Authorities of South America, Cuba, Mexico and Panama
SA	Special Area
SAR 1979	International Convention on Maritime Search and Rescue, 1979
SAR	Search and Rescue
SCAR	Scientific Council of Antarctic Research
SECA	Sulphur Emission Control Area
SOLAS	International Convention for the Safety of Life at Sea, 1974, as amended.
Sox	Sulphur Oxide
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978/1995, as amended.
TBT	Organotin Tributylin
UK	United Kingdom

UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea, 1982.
UNFSA	United Nations Fish Stocks Agreement, 1995
UNWTO	United Nations World Tourism Organization
USA	Unites States of America
WGS	World Geodetic System
WWF	World Wildlife Fund

Chapter I

Introduction

1. CHAPTER ONE: INTRODUCTION

1.1 Introduction and objective of the research

Antarctica, also known as the white continent, has been a point of interest for the international community since its discovery. This largely economic interest as regards seals and whale catching was evolving during the last part of 19th and the first part of the 20th century becoming territorial claims and constituting a political problem. With the inception of the Antarctic Treaty (AT) in 1959, a new era for Antarctica started where the core of the activities was focused on peace and science. Nevertheless, with the world population increase, the development of new technologies and the growth of trade, new challenges for Antarctica have arisen as regards safety and environmental protection. For obvious reasons shipping has been the main source of transport in the Antarctica. Currently, the continent is not only subject to governmental activities such as research, but also commercial activities like fishing and tourism. The special legal condition of Antarctica, based on provisions stated in AT and its relationship with the United Nations Convention on the Law of the Sea (UNCLOS) 1982 is today affecting seriously the applicability of several legal instruments mostly developed by the International Maritime Organization (IMO), to ensure safer navigation in cleaner oceans. The latter, added to some ship accidents which have occurred in the past few years, has raised the query if safety and environmental protection can, in fact be properly addressed within the framework of the existing legal regimes.

These questions, as well as the variety of issues affecting safety and environmental protection about shipping activities in Antarctica, are the objectives of the present research and will be analyzed looking for determining whether the existing regulations are enough or need to be improved, providing some recommendations at the end regarding the problems identified.

1.2 Research methodology

Shipping in Antarctica has been growing steadily in recent years. The complexity of legal regimes coexisting there, the number of accidents recently occurred, as well as the author´s working experience there, has motivated the author to develop a research to identify comprehensively the legal situation, in addition to safety and environmental challenges today faced in the Southern Ocean.

A qualitative research approach was followed, reading and analyzing several books, articles and reports since this issue is not well known and there is not much information available as regards the chosen subject, considering that Antarctic shipping as a whole is an issue recently in process in IMO.

1.3 Difficulties appreciated during the research

First of all, in the opinion of the author there are some limitations as regards the extension that a dissertation should have. The number of words allowed, complicate the depth to which different issues can be investigated. In this case the general topic is relatively broad and in the author´s personal view, safety and environmental protection are narrowly related, so either one issue or the other, analyzed separately cannot be comprehensively understood concerning an integral issue like Antarctic shipping.

In reality, although the level of discussion and analysis presented has been carefully elaborated, there is not enough space for analyzing all issues thoroughly because of space constrains do not permit these details.

Some other difficulties were found in the form of the limited amount of information at WMU and other local libraries. This became a major issue, since it was very time consuming to get information from more distant libraries which could not be visited. However, it should be said that there is a number of WMU subscriptions to important journals and databases where important material was retrieved, which were really useful and important to reach the final goal.

Chapter Two
Antarctica facts and figures

2. CHAPTER TWO: ANTARCTICA: FACTS AND FIGURES

2.1 General overview

2.1.1 Geographical aspects

Antarctica is a unique continent. Its morphology and extreme climate has no similarity anywhere in the world and this characteristic is mainly attributable to the tectonic evolution that occurred there. According to scientists, Antarctica was a key element of the supercontinent called Gondwanaland, as can be seen in Figure 2-1, conformed by Africa, Australia, India, New Zealand, South America and the Antarctica; and its geological history is narrowly related and defined by the evolution of Gondwanaland.

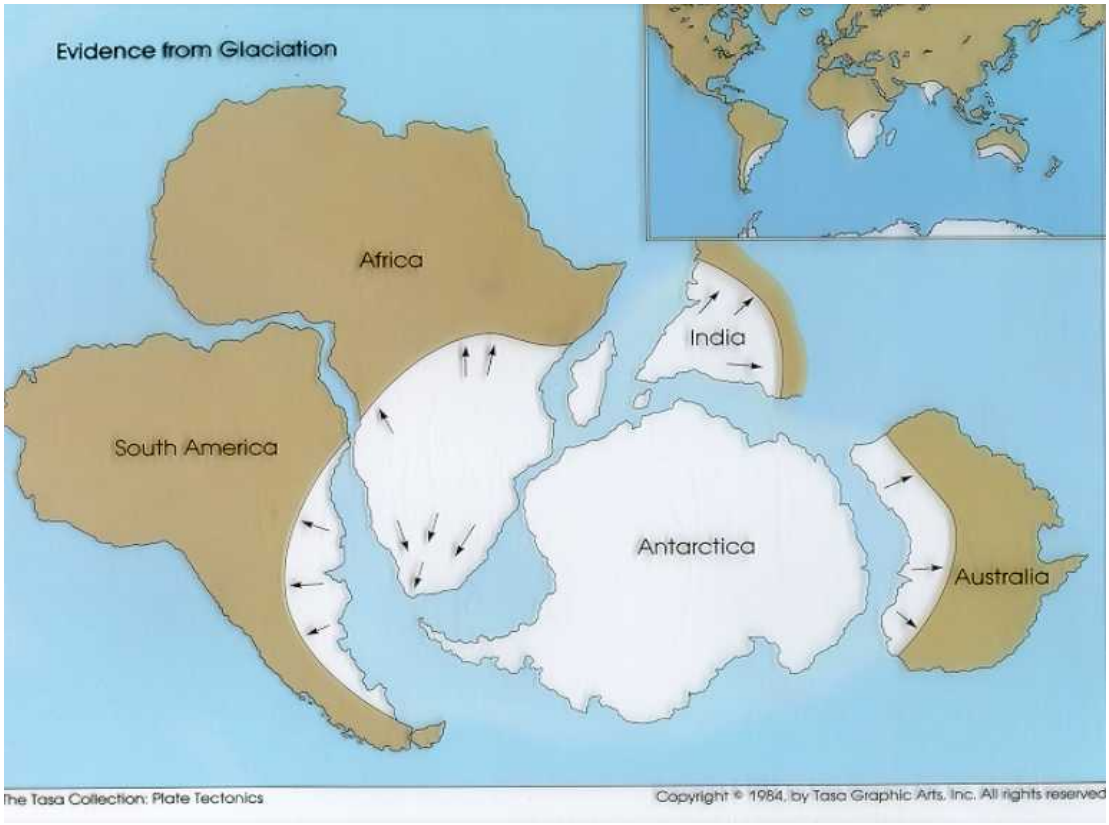

Figure 2-1: Evolution of Antarctica.
Source: (Tasa Graphic Arts. Inc., 1984 as retrieved from Google Images, 2009)

Antarctica is the continent of extremes; it is the highest continent on the planet with an average height of 2,000 meters above the sea level. It contains almost 80% of fresh water and is also the continent with lower humidity, as well as the lowest average temperature. There are several factors that make Antarctica an extreme continent climatically speaking. Nevertheless, the links and behavior of these factors are still not well known. Regular observation of the Antarctic weather started during the 70s, and just in a few sites (bases) it is possible to get reliable data from 100 years ago.

The name Antarctica comes from the Greek term “Antarktikos”, meaning the “opposite of the Arctic”. This is a continent that surrounds the South Pole. The most common definition of Antarctica enshrines the territories located up to 60º south, coinciding with the zone established under the Antarctic Treaty. Its stone surface is around 14,000,000 square kilometers, equivalent to 10% of the land area of the planet. Its shape is almost circular with 4,500 kilometers of average diameter and it possesses a narrow peninsula with an “S” shape projected over the southern part of South America (McGonigal, 2008).

The “Transantarctic Mountains”, one of the largest mountain ranges in the world dividing the continent into two parts, the Oriental Antarctica and the Occidental Antarctica from Cape Adare in northern Victoria Land (southern part of New Zealand) to Coats Land eastern shores of the Weddell Sea. The Oriental Antarctica is older with an estimated age of 3 billion years, being the Occidental part a recent one. The average height of these mountains is about 3,000 meters, although the highest mountain is the Vinson Massif with 4,897 meters above sea level and located in the Elllsworth Mountains.

The main part of the Antarctica is covered by ice; the average thickness that covers the continent is 2,500 meters and the maximum thickness registered is 4,776 meters located in Adélie Land (Bagley, 2002).

2.1.2 The Antarctic Ocean

The Antarctic Ocean, also called the Southern Ocean extends from the Antarctic coast to 60º south, also known as the conventional limits of the Atlantic, Pacific and Indian Oceans, as shown in Figure 2-2. It is the second smallest ocean in extension (only the Arctic is smaller). Formally its extension was defined by the International Hydrographic Office in 2000, and fully agrees with the limits established by the Antarctic Treaty (AT).

Figure 2-2: Extension of the Southern Ocean.
Source: (CIA Factbook, 2003 as retrieved from Wikipedia, 2009)

The Antarctic Continent is completely surrounded by The Antarctic Ocean. This ocean has a surface of 20,327,000 km^2, a number that includes outlying seas like the Amundsen Sea, Bellinghausen Sea, Ross Sea, Weddell Sea and part of the Drake Passage.

The temperature of the sea varies between +10ºC to -2ºC. Cyclonic storms move towards east clockwise, around the continent. These storms are very intensive because of the difference in temperature between the ice and the open ocean. The physical oceanography is dominated by the Antarctic Circumpolar Current with the strongest wind and currents on the planet. This marine current is the biggest on the Earth, with 21,000 kilometers in length and moving 130 million m^3/s of water, one hundred times more water than all the rivers together, over the surface of the planet and usually generating high waves.

During winter the ocean is frozen until 65º south towards the Pacific, and until 55º south towards the Atlantic, but in some bays the strong winds coming from the interior of the continent, keep the coastline free of ice also during winter time. An ice layer surrounding Antarctica appears usually at the end of March with a minimum range of 2.6 million km^2, increasing during the following months and reaching an average of 18.8 million km^2 in September with an average of one meter in thickness. (The Columbia Electronic Encyclopedia, 2007).

2.1.3 Icebergs

Antarctic icebergs and pack ice that float in the ocean belong to ice shelves connected with dry land that had been broken off, mainly due to seasonal warming lately accelerated by the global warming. Some icebergs can contain amazing volumes of ice as illustrated in Figure 2-3, reaching many square kilometers in size and constituting a serious threat to navigation in the Antarctic Ocean (McGonigal, 2008).

Figure 2-3: Antarctic icebergs.
Source: (NOAA Photo Library, 2006 as retrieved from Live Science, 2009)

2.1.4 Review of Human Activities in Antarctica

The approach, discovery, exploration and permanent occupation of the Antarctic Continent has been affected by several factors. Among them can be pointed out the economic interest as a starting point regarding the research of new natural resources. Nonetheless, although the economic interest was the initial and permanent force behind, it was not the exclusive reason that brought human beings to Antarctica. Expansionist ideas during the 18th century fostered some countries to new discoveries and possessions of those lands located in the far south of the planet. Thus, the discovery of the Sub-Antarctic Islands was produced and then, the other insular and coastal territories and finally the conquest of the South Pole.

At the beginning of the 20th century, epic histories about the conquest of the South Pole represented a unique statement for countries involved in the race to the pole, about being the first country to stick their flag in those regions. The adventurous spirit of these heroic explorers, the national and personal honor putting at stake and the magnitude of its achievements, considering the available resources at that time,

had written glorious historic pages in their respective origin countries and some of them had been tinged with drama, desolation and death.

On the other hand, the period between wars accentuated the necessity of establishing sovereign possessions in the Antarctic, and was at that time when the territorial claims of seven countries were materialized, standing still until today.

After the first half of the 20th century, with the AT in place, scientific research and peace keeping became the core and the main reasons for the occupation of Antarctica. At the end of the century, environmental protection has been added also as basic pillar that supports the group of countries gathered together, under the umbrella of the Treaty to manage the most remote place of the planet. Today, Antarctica has become a unique joint model of international management, which even if it was based upon the peace keeping and scientific research, it was strengthened with the protection of its natural resources as it will be explained later.

2.2 Legal regimes surrounding Antarctic waters

2.2.1 Antarctic Treaty System 1959 and Environmental Protocol 1991

As the Antarctic exploration advanced, it started raising some conflicts among the nations involved. For example the UK declared under its property certain parts of the Antarctic Continent based on its polar discoveries, but Chile and Argentina did not accept this unilateral resolution. Later, New Zealand and Australia were involved when the United Kingdom (UK) surrendered parts of its sovereignty to them. Some territories were also annexed by France and Norway, but all of these distributions were based more or less on unilateral resolutions by every country, keeping and worsening the conflict during an important part of the 20th Century.

The call for an international meeting to discuss the legal status of the Antarctica and its use regime came up in 1957, during the celebration of the International Geophysics Year. The success of the developed research in the Antarctic Continent

in such opportunity, where scientist from both sides of the so called Iron Curtain were working, lead the US President Dwight Eisenhower, to claim a compromise among those nations with an active presence in Antarctica. The objective was to ensure cooperation in the conservation of Antarctica, avoiding unilateral actions against the general interest of mankind. At that time, in the middle of the Cold War, the general fear was that any of the superpowers could start the exploitation of the Antarctic resources breaking the fragile geopolitical balance. The aforementioned, and the positive experience of the international scientific collaboration, motivate the creation of the Scientific Council of Antarctic Research (SCAR)[1] in Antarctica, a branch of the International Council of Scientific Unions (ICSU). This was also a motivation for those twelve States that keep research bases in Antarctica, to initiate a negotiation process finalizing in December 1 of 1959 with the signing of the AT[2]. The Treaty entered into force two years later, establishing a validity period of thirty years, and setting a procedure for denunciation. The text of the treaty itself consists of 16 articles preceded by a declaration of principles where the following main goals of the Treaty were established:

- The preservation of the Antarctica for peaceful purposes.
- The promotion of free interchange of scientific research
- Denuclearization and demilitarization of the continent.
- Frozen of territorial claims during the Treaty validity.[3]

Nevertheless, it was necessary to go deeper looking for agreements and the Antarctic Treaty was only the first step to address an effective international compromise over the use and preservation of the Antarctic Continent. During the first years of its existence, the number of countries joining the Treaty was very low, although the interest of third countries was increasing, due to the entry into force of new legal instruments (Barboza, 1999).

[1] See more information in Scientific Committee on Antarctic Research website, www.SCAR.org

[2] The first signatories countries to Argentina, Australia, Belgium Chile, France, Germany, New Zealand, Norway, South Africa, The Soviet Union, United States of America and the United Kingdom,

[3] For more information about Antarctic Treaty, also see National Science Foundation Office of Polar Programs website, www.nsf.gov

The whole Antarctic legislation, consisting of the AT and its subsequent regulations, receive the name of the Antarctic Treaty System (ATS). ATS among others, is constituted by the Agreed Measures for the Conservation of Antarctic Flora and Fauna, adopted in Belgium in 1964[4], the Convention for the Conservation of the Antarctic Seals[5] (CCAS), signed in London in 1972, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), signed in Canberra in 1980[6], and the Convention on the Regulation of Antarctic Mineral Resource Activities (CRAMRA), which was negotiated during 1982 and 1988 but never entered into force[7]. The main reason why CRAMRA never entered into force was the rejection to sign by Australia and France. Some other AT parties later did the same and starts looking for a comprehensive environmental protection regime, that at the same time ban all mining activities in the Antarctic Continent. This event finally provides the necessary atmosphere for the appearance of the most important AT subsequent regulation, the 1991 Protocol on Environmental Protection to the Antarctic Treaty (PEPAT). It was adopted in October 1, 1991, and entered into force on January 14, 1998 after ratification by all Antarctic Treaty Consultative Parties (ATCP). It contains an introduction, 27 Articles and 5 Annexes in force since its inception and a new Annex VI not yet in force dealing with liability matters. PEPAT has constituted an important effort to address empty spaces existing in the Treaty regarding environmental protection, requiring environmental impact assessments for activities to be developed in the future, before their inception in the region. Without any doubt, the main issue of PEPAT is the recognition of the Antarctic Region as a land of science and as a natural reserve, forbidding all activities related with mineral exploitation for at least 50 years.

Other novel areas in PEPAT include issues related with strengthened measures regarding conservation of fauna and flora, waste disposal, protected areas, the creation of a Committee on Environmental Protection, and liability arising from environmental emergencies (not yet in force)[8] (Antarctic Treaty Secretariat, 2009).

[4] See Center for International Earth Science Information Network (CIESIN) website http://sedac.ciesin.org

[5] Ibid [3]

[6] See CCMALR website http://www.ccamlr.org

[7] Ibid [3]

[8] For more information see Secretariat of the Antarctic Treaty Website www.ats.aq

The AT established an international system which has been questioned several times regarding its legitimacy. The AT is not managed by an international organization and it has been developed in a functional way through the time. Therefore, the system itself has evolved to solve some particular problems and functionalities linked to human activities in Antarctica. CCMLAR deserves a special mention, because in the case of this convention, a specialized organization was established for its conservation (CCMLAR, 2009).

The AT is a decentralized system in which State Parties and the Scientific Committee (SCAR) have a direct participation, in a nongovernmental nature and narrowly linked to the relevant science for the adoption of decisions and measures. The obligation upon scientific cooperation imposed in the Treaty, is operating consequently in those two levels.

The system itself is an organism of negotiation and agreements, which operates through a consultative mechanism leading to recommendations of different measures that can be compulsory if all ATCP finally ratify them.

A rule of double consensus can be identified for the entry into force of measures previously adopted. The latter, because measures or recommendations are approved by individual countries in a first step, but they will not enter into force until approval by all Consultative Parties. This situation accentuates the especial personality of the Antarctic System in comparison with other existing forums in the international community (Remiro, 1997).

2.2.2 Antarctic Treaty: Merits and deficiencies

The legal system established in the Treaty has been and it will continue to be an international regime with limited participation of countries and not all of them also with the same status within the organization. It should be recognized anyhow, that the AT had been able to regulate the use of the continent and the surrounding ocean.

The AT has been successful in terms of ensuring peace and stability in the region, and also in dealing with territorial claims, especially those overlapping claims like the

Argentinean, Chilean and British in the Antarctic Peninsula. The AT also has been successful in building a solid scientific cooperation (Peterson, 1988).

The main reason for the AT success is its adaptive capacity which has been evidenced throughout the years, adapting its structure to be compatible with the needs of its members and the international community, regarding for instance environmental issues like pollution. Part of its success can also be derived from the lack of immediate economic value of the Antarctic Continent. Consequently, it seems to be that there is no country today with a pressing material incentive to treat disrespectfully the existing rules and regulations in place.

There is other interest that brings together the members with the AT, like demilitarization and the promotion for the joint use of the continent to avoid in the short term demands that cannot be granted to keep the balance in place. All these aspects in one way or another has contributed to improving international cooperation, whenever the issue of sovereignty has not been questioned

Finally, the AT has proportioned a useful tool to differentiate which countries are really interested in Antarctica and which are not.

Putting aside the issue of sovereignty for an undefined period of time, was not a pleasant thing for some signatory countries, which would rather see their titles and demands recognized by the other parties.

Although it is evident that the Treaty has stopped what might be an endless source of confrontation, not all of them have been avoided. For instance, the quasi war between Argentina and Chile in 1979 has hidden behind the curtain, some problems over the projection of the Picton, Lenox and Nueva Islands over the Antarctic territory. Some similarities are also hidden behind the war for the Falkland Islands/Malvinas between Argentina and the UK in 1982 (Orrego, 1988).

The AT has installed in the Antarctic area a system that has frozen all territorial claims, and the acceptance of sovereignty for one or more single countries is unlikely in a near future.

As well as not solving the main issue of sovereignty, the Treaty has faced some institutional challenges. Since its inception, the Treaty developed a complex net of arrangements for the establishment of scientific research, environmental protection,

conservation of mineral resources and tourism. On the other hand, even though the AT is not an international organization as such, maybe in a near future, it could go into this direction. In fact PEPAT established an agreement for the creation of a Secretary, located in Buenos Aires, Argentina. The establishment of a Secretary solved a relevant problem, the lack of continuity among meetings of AT members. There are also some areas which the organizational structure of the Treaty has not yet solved such as the lack of coordination with the United Nations (UN) in areas such as the Law of the Sea and regulations for tourist activities.

2.2.3 The Antarctic Treaty System and the Law of the Sea

2.2.3.1 The Antarctic Treaty System

The case of the Antarctic Ocean has generated special interest during the past few years, because of the uniqueness of the Antarctic legal regime in place, which considers the provisions of CCAMLR extending beyond 60ºS, towards North.

In fact, the AT was negotiated before the appearance of the United Nations Convention on the Law of the Sea (UNCLOS), which became operative in 1961, and continuous improvements have been made on the maritime arena during the following 30 years (Vidas, 2000).

The AT as stated previously is an instrument that has been evolving quickly throughout time. Since its inception it ensures the continent as a zone of peace, freezing territorial claims and keeping them in a status quo condition. This situation allowed overcoming sovereignty conflicts in the region, prompting scientific research. The AT unfolds rules and values to be applied to the Antarctic Continent as well as the surrounding maritime spaces.

In a second stage, the situation of mineral and marine living resources has determined new orientations of the system from an international cooperation system point of view, in addition to changes in realities and perspectives with regard to the

existing links between the system and the international community, in a broader sense (Jabour-Green & Haward, 2002).

2.2.3.2 The United Nations Convention on the Law of the Sea

UNCLOS is the most important multilateral instrument since the approval of the UN Chart, and represents the equilibrium of maritime interest of more than 150 countries all over the world.

The convention was the result of the development of the International Law of the Sea.

Currently 158 States have ratified or acceded to UNCLOS which is considered as the Oceans Constitution because of the issues embraced, looking for establishing a widespread legal universal status for the seas and oceans of the world.

Essentially UNCLOS differentiates three zones under the Convention regime which are:

- Maritime zones under jurisdiction of the Coastal State, like internal waters, Territorial Sea and Exclusive Economic Zone (EEZ).
- The High Seas beyond those areas.
- International Seabed Area, which corresponds to the deep seabed beyond jurisdiction of any State (also called the Area) (Cassese, 2005).

One of the main contributions of UNCLOS was the consolidation of the EEZ with 200 nautical miles and the recognition of sovereign rights to Coastal States upon their mineral and living resources in this area.

Since UNCLOS inception, a new stage in the history of international affairs was initiated. The importance of this instrument lies in establishing an adequate legal framework to strengthen a harmonized relationship among countries, with regard to maritime activities, settling procedures for solving problems in case of any controversy in almost all aspects related to the ocean.

Notwithstanding, it is important to identify the links between the ATS and UNCLOS, to determine the effective applicability of the Law of the Sea currently in place in the Southern Ocean; since UNCLOS as a convention was designed to be applicable to all oceans, so the convention also applies to the Southern Ocean in general. However, some exceptional conditions must be analyzed.

The problem of applicable jurisdiction at sea in Antarctica is mainly based on the legal status of the territories located there (Joyner, 1992).

Article VI of the AT established that its regulations apply to the region located south of 60º S, including all ice shelves but it also stated “nothing in the present Treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area.”

In a nautical chart of the Antarctic region, it is easy to recognize that the circle located in the latitude 60º South, contains almost with absolute certainty the entire Antarctic waters.

The official text of UNCLOS defines High Seas as “... all parts of the sea that is 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.” It also establishes all aspects regarding the freedom of the High Seas related to its use and the banning of sovereign rights of any state in this area (UN Convention on the Law of the Sea, 1982).

The definition above mentioned compared with the state practice followed in the Southern Ocean, shows that the Antarctic coast since the inception of the AT has generated a presumption of a juridical status surrounding waters corresponding to the High Seas (Thorp, 2009).

This very especial High Seas condition is still argued among scholars, but one undeniable thing is the statement done in Article VI of AT. This is a very exceptional peculiarity in the international maritime law arena, where the coast line would not generate any other maritime zone different than the High Seas. Another interesting issue of this outstanding condition of the High Seas is that is currently restricted in its scope. This as a consequence of the restriction of its economic potentiality through other conventions inserted in the ATS, like CCAS and CCAMLR, a unique

situation again in the framework established to the oceans (Jabour-Green & Haward, 2002).

Regarding pollution, the Article 234 in Part XII of UNCLOS “Ice Covered Areas” deserves special attention. It provides Coastal States with the rights to establish appropriate regulations, to avoid situations of ship source pollution in ice-covered areas within the EEZ. This Article address and recognizes the complexity of dealing with marine pollution coming from ships in ice-covered areas, recognizing also the severity of the potential damages to the environment. The only and the main problem that can be foreseen in this Article, falls on the issue of addressing a specific maritime zone like the EEZ, which seems to be fully applicable in the Arctic. However, in the Antarctic, since there is no recognition of sovereign Coastal States, there is no recognition of EEZ; so this Article can be considered useless, until the sovereign problems can be solved, a situation unpredictable at least in the near future (Nordquist, 1991).

Concerning PEPAT, it contains a complete Annex IV dealing with marine pollution prevention in the AT area. Unfortunately, it has no reference at all relating to UNCLOS, which is the legal framework in ocean matters, establishing in Part I, Article 1(4), a clear definition about “Pollution of the Marine Environment” (Vidas, 2000).

Regarding boundary delimitation among claimant parties, in the AT is possible to identify two trends: Those countries that have overlapping maritime claims like Argentina, Chile and the UK, and those that do not have this problem. Concerning the first group, it is possible to appreciate that not all of them are looking for solving the problem. Moreover, they seem to agree with keeping this situation unresolved. This, mainly because maritime boundaries come together with continental claims and no one of these countries will be able to renounce their claims, a situation that actually makes impossible any potential determination of boundaries. Another interesting challenge pertaining to maritime boundaries can also be appreciated for the unclaimed sector of Antarctica.

There are also some other important issues regarding the relationship between the ATS and UNCLOS, like the establishment of baselines and the Antarctic Continental

Shelf delimitation; however, since those subjects are not relevant to the present research, they will not be addressed.

2.2.3.3 The problem of enforcement

Enforcement comes with clear regulations and the capacity to effectively supervise the compliance of the law. This is really a very complex issue in the Antarctic region, since there is no recognized sovereign state and regarding maritime zones only the High Seas is recognized. Furthermore, the ATS and UNCLOS seem to fail in solving this matter, generating several problems regarding safety, environmental protection and liability and compensation for ship source pollution in the Antarctic Ocean, a situation that will be treated in Chapter III.

2.2.4 Relationship between the Law of the Sea and IMO Conventions

2.2.4.1 Background of IMO and UNCLOS

IMO was born with the name of IMCO (Inter-Governmental Maritime Consultative Organization), through a Convention agreed with the sponsorship of the UN in Geneva on March 17 1948, and started its work as such in January 1959. The name IMO was adopted later in 1982 (IMO, 2002). It is currently constituted by 169 Member States and three Associated Members.

The history of IMO and its relevant conventions is longer than the history of UNCLOS. In fact the history of UNCLOS started in 1958 when the first UN Conference on the Law of the Sea was held in Geneva, adopting four conventions regarding Territorial Sea and Contiguous Zone, Continental Shelf, the High Seas and Convention on fishing and conservation living resources in the High Seas.

At that time, some IMO conventions were already in place, for example the International Convention for the Safety of Life at Sea (SOLAS). Notwithstanding,

there were another two UN Conferences regarding the Law of the Sea in 1960 and 1973-1982, where finally in Jamaica was adopted UNCLOS 1982, currently in place.

Since 1973, IMO has had an active role in the development of UNCLOS. At that time most of the IMO instruments had been accepted by the international maritime community. Consequently, the IMO Secretariat initiated the corresponding work, with the aim to guarantee that IMO instruments are in concordance with the principles established at that time in the future UNCLOS convention (Comisión Permanente del Pacífico Sur, 2007).

As a result, in Annex VIII, Article 2(2) of UNCLOS[9], IMO is clearly recognized as the rightful organization to deal with maritime affairs and the appropriate agency where states should debate, develop and update suitable standards and regulations as regards safety, security and environmental protection in the maritime field.

The final purpose of the commented Article was to avoid unilateral positions by states regarding rules and regulations, instead of a global and agreed standard to ensure fairness. The fulfillment of the goals of UNCLOS is fostered through the development of IMO standards, today fully recognized all over the world (UN Convention on the Law of the Sea, 1982).

IMO Conventions could be classified principally falling under four categories:

- Conventions fostering safety at sea.
- Conventions dealing with preventing and combating marine pollution.
- Conventions regarding legal aspects of liability and compensation.
- Conventions concerning the facilitation of maritime trade.

UNCLOS appropriately has been called the framework convention due to its universal acceptance and the widespread coverage of the contents embraced. This

[9] Annex VIII, Article 2 "list of Experts" " The list of experts shall be drawn up and maintained, in the field of… navigation, Including pollution from vessels and by dumping, by the International Maritime Organization, or in each case by appropriate subsidiary body concerned to which such organization, programme or commission has delegated this function."

constitutes a real basis for new instruments and a real link with the UN specialized agencies, such as the Food and Agriculture Organization (FAO), The International Labor Organization (ILO) and IMO. There are several provisions in UNCLOS that can be considered as general provisions and can only be put into operation through detailed and explicit regulations in other international forums, like for example IMO. Moreover, in UNCLOS, there are a number of provisions talking about "internationally agreed rules, standards and recommended practices and procedures", "applicable international rules and standards" and "applicable international instruments", which require that States should comply with, establishing an obligation clearly stated in UNCLOS (Joyner, 1992).

2.2.4.2 IMO role in Antarctica, a key issue to improve safety and environmental protection

Concerning Antarctica, as it was stated before, UNCLOS like any other legal body is not perfect, so that in Antarctic issues there are several issues unresolved. However, considering the provision of UNCLOS regarding the duties and responsibilities of the Flag States, stated in Part VII, Article 94, there can be observed a vast potential to improve safety and environmental protection in Antarctica through IMO forum[10]. IMO instruments are mainly technical rather than political or jurisdictional, not affecting the interest reflected in AT. The latter can be perfectly appreciated in point (5) of the aforementioned Article[11], where States are clearly bound to be ruled by "the accepted international regulations". In this case, it can clearly be concluded that those international regulations, correspond to the provisions acknowledged in IMO conventions in matters related to safety of life at sea, marine pollution, manning of ships and liability and compensation. Although in the Antarctic region it is possible to observe a problem between ATS and UNCLOS,

[10] See Part VII, Art. 94 in the following link retrieved from UN Webpage, http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm

[11] Art. 94 (5) In taking the measures called for in paragraphs 3 and 4 each State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.

this is merely related to the spatial scope of jurisdiction regarding the maritime zones. This aspect does not limit whatsoever the scope of safety and environmental protection regarding shipping (Oceans and Law of the Sea: Division for Ocean Affairs and the Law of the Sea, 2007).

Even though in Antarctic waters, ATCP have adopted regulations concerning safety and environmental standards[12], it should be recognized that the international organization with the competent expertise to address those issues is IMO. In concordance, close collaboration between ATCP and IMO, for developing improvements in standards concerning safety and environmental protection should be developed. These, taking into account the increasing number of ships and the increasing number of accidents during the last years in Antarctica. Today, all ATCP are also member of IMO, situation that encompass a potential not fully developed yet, but without doubt it could be fruitful. At present, regarding polar waters IMO has only developed the Guidelines for ships operating in Arctic ice-covered waters, which was approved in 2002. Currently there is a work in process to make the guidelines applicable to the Antarctic. However, at the moment they are not applicable to the Antarctic region (Vidas, 2000).

From the very beginning of UNCLOS history, safety has been a substantial part in the Law of the Sea. A prove of this is Article 10 of the Convention on the High Seas 1958[13]. It was developed during the First Conference of the Law of the Sea, held in Geneva in 1958. Later in UNCLOS 1982, these provisions were even expanded and more detailed, adding also stipulations regarding protection of the marine environment (UN, Diplomatic Conferences, 2009).

Considering the status of the High Seas installed in the waters surrounding Antarctica, IMO instruments are relevant in the achievement of these goals.

[12] These environmental standards have been adopted mainly through the inception of PEPAT 1991.

[13] Convention on the High Seas 1958. Article 10, "1. Every State shall take such measures for ships under its flag as are necessary to ensure safety at sea with regard, inter alia, to: (a) The use of signals, the maintenance of communications and the prevention of collisions; (b) The manning of ships and labor conditions for crews taking into account the applicable international labor instruments; (c) The construction, equipment and seaworthiness of ships. 2. In taking such measures each State is required to conform to generally accepted international standards and to take any steps which may be necessary to ensure their observance.

SOLAS is the most important convention concerning maritime safety, including important prescriptions regarding safety of navigation, construction of ships, life saving appliances and communications. It also includes important provisions for the development of new conventions and codes, like the case of the 1979 Search and Rescue Convention (SAR 1979), which established a global network to deal with emergencies at sea.

The International Convention on Load Lines 1966 (LL 1966) came with the necessity to avoid overloaded ships, which can endanger its stability jeopardizing the safety of people on board and provoking casualties. This convention set procedures for establishing minimum freeboard limits where ships can be loaded, depending the region where they will be sailing.

The International Convention for the Prevention of Pollution from Ships 73 as Modified by the Protocol 1978 (MARPOL 73/78), has contributed to sharply diminishing pollution in the sea. This convention is a comprehensive instrument embracing almost all forms of pollution coming from ships in six technical annexes, regulating the design of ships, equipments and appropriate means for its cleaning operations.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW 78) has been important setting the minimum standards accepted internationally for qualification, training and certification of competences of seafarers, as well as the working hours and rest periods on board the ships. In 1995 it was amended after a comprehensive review of existing procedures on board ships, mainly to introduce familiarization training and basic safety training, ensuring that seafarers have a duly respond in case of emergencies (ANAVE, 2008).

As this Convention is highly relevant in Antarctic waters especially where ships are sailing in rough seas and ice laden waters, this issue will be discussed thoroughly in the next Chapter.

Although there are some other Conventions applicable to ships, those already mentioned are the main IMO instruments embracing the operation of a ship. Enforcement of the ratified conventions is a main responsibility of the Flag States.

However, Port States also have authority to verify the fulfillment of these requirements, an important issue when ships are going to remote areas like Antarctica.

2.3 Conclusions of the Chapter

Antarctica is the most incredible and unexplored landscape in the world which makes it attractive for visitors; nevertheless, Antarctic conditions are unpredictable, being a continent of extremes, with the windiest, driest, coldest and most desolate places on earth.

Antarctica is regulated by the ATS, which was created with the purpose of regulating the activities developed in Antarctica and eventually to provide a solution to the problem of sovereignty and territorial claims. The AT was the best possible solution for the Antarctic region when it came into force, providing an effective answer to a considerable amount of problems as regards political, legal and scientific issues related with the future of Antarctica. Nevertheless, nobody can certainly deny that the future of the regime imposed by the ATS might be a mine field.

UNCLOS and the ATS coexist in a complex relationship. UNCLOS internationally recognized as the Constitution of the Oceans surprisingly seems to fail in addressing the existing problems of the Southern Ocean. Whilst ATS tacitly recognizes the applicability of the Law of the Sea to the Antarctic waters, it does not state anything regarding offshore jurisdiction. This situation has created a sort of legal vacuum that seriously endangers the future of the environment, as well as safety of life at sea, mainly because of the increasing activities in a not properly regulated area.

However, although UNCLOS did not address the jurisdictional problems of Antarctica concerning maritime jurisdiction, the scope of safety and environmental protection in Antarctic waters is not affected at all. This, because the provisions stated in this Convention were intended to every single signatory Country,

recognizing also IMO as a technical competent body to regulate the maritime field. Thus, through the development of IMO instruments, it will be possible to address existing safety and environmental issues, minimizing risk of possible accidents. Subsequently, there are real capabilities to be exploited concerning safety and environmental protection as regards shipping. As a result, a closer work between the AT and IMO is desirable to achieve appropriate standards concerning safety and environmental protection, considering that today all ATCP are also IMO members and taking into account the increasing number of ships visiting Antarctica.

Chapter III

Maritime challenges facing Antarctic waters: Safety and Environmental gaps affecting shipping activities

3. CHAPTER THREE: MARITIME CHALLENGES FACING ANTARCTIC WATERS: SAFETY AND ENVIRONMENTAL GAPS AFFECTING SHIPPING ACTIVITIES.

3.1 Physical and spatial challenges

3.1.1 Climate change in Antarctica

Climate change is mainly a handmade provoked alteration affecting the global composition of the atmosphere and disturbing the natural climatic variability which can be seen in a period of time. Substantially, the phenomenon will affect the current development of plants, animals and human life on the planet, because of its close relationship with the critical alteration of environmental conditions (Hoffman, Ochoa & Tin, 2005).

The climate change phenomenon is affecting Antarctic flora and fauna and will affect fishing and shipping industries in a near future. Observation has shown that the Antarctic Peninsula is more sensitive than the rest of Antarctica to increases in the annual average temperature, where there is no indication of rising. The increase of temperature has been 2 or 3 times faster than the standard of the rest of the world during the last 50 years, as can be seen in Figure 3-1.

The Antarctic flora is reduced to two species of plants and can only be seen in the Antarctic Peninsula. Considering geographic allocation and its quantity, those species have been spreading increasingly during the last decades. It may have been as a result of higher temperatures in the Antarctic Peninsula (Cool Antarctica, 2009).

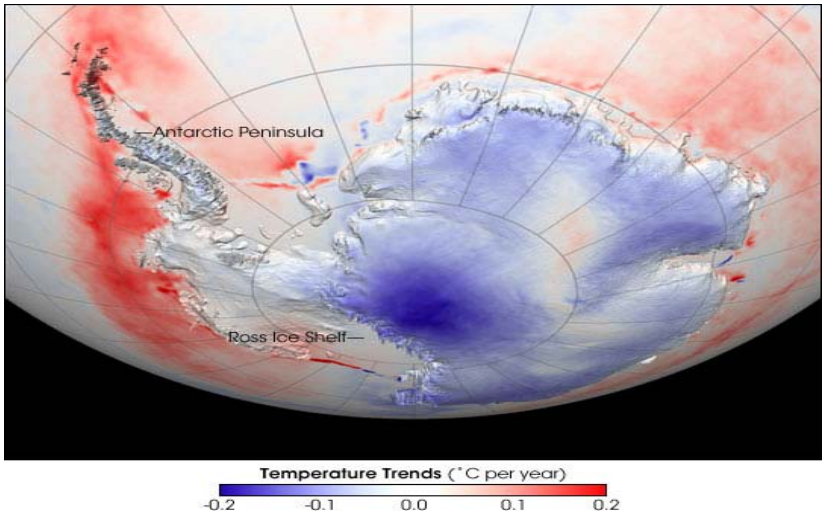

Figure 3-1: Temperature Trends in Antarctica.
Source: (NASA, 2006 as retrieved from Cool Antarctica, 2009)

The Antarctic fauna will be heavily affected due to the increase of temperature of Antarctic waters which is affecting the food chain. A good example of this is phytoplankton, serving as food for small crustaceans like krill and growing mainly under black ice. Therefore, a reduction in marine ice in Antarctica will imply a reduction of krill which is the main food of species like whales and penguins.

Entire species of marine animals and fishes are under menace nowadays because of the rise of temperatures as they will not be able to survive in warmer waters. Some Adélie penguins communities for instance have already diminish by 30% in Antarctica, due to deterioration of their habitats (Seas at Risk, 2008).

Regarding safety issues related to Antarctic navigation, an increase of free floating ice shelves is expected, because of the rise of temperatures in the region. It will jeopardize safety of navigation and also cause the appearance of areas which previously were covered by ice. Those areas are not fully recognized cartographically speaking, constituting major risk to safe navigation (The Antarctic and Southern Ocean Coalition, 2007).

3.1.2 The Arctic and Antarctica

Surrounding the poles of the planet are located the Polar Regions. Polar ice caps, are usually located inside the Polar Circles (66º33′) in both poles.

Although both regions look similar, the author of the present research has estimated useful to analyze the similarities and differences between the Arctic and Antarctica. This, as a way to identify what measures can be considered in common in a future development of a Polar Code.

3.1.2.1 Similarities

The Arctic and Antarctic Polar Regions, located in the North and the South Pole respectively, are the coldest places all over the planet. The long periods of light and darkness, their extreme temperatures as well as their harsh environment, make them inaccessible for most of people.

Both regions are mainly covered by ice, as a result of the accumulation of winter snow that could not be melted by sunlight during the summer. Polar Oceans have plenty of icebergs, rough weather and sea conditions which make navigation difficult and dangerous in these areas.

Regarding wildlife, both regions reveal the existence of interesting and particular species which constitute a great attraction for tourist.

Considering shipping activities, both regions are subjected to the cruise tourism industry (Marinebio, 2009).

3.1.2.2 Differences

Maybe the most obvious difference between the Arctic and Antarctica is their geographical conditions as shown in Figure 3-2; the Arctic is an ocean surrounded

by land and the sea in this place is mainly frozen. The earth surrounding this ocean is usually cold and covered with snow almost the whole year. Regarding the fauna, the Arctic is poorer than Antarctica in terms of diversity of species as well as in abundance.

On the other hand, Antarctica is a mass of land surrounded by water. Here, the polar ice cap is colder than the Arctic and the earth is always covered with snow and ice that only melts alongside the coast during summer. The ocean surrounding Antarctica is frozen during winter, doubling the extension of the ice cover.

More than 80% of the volume of fresh water of the planet is stored in the Antarctic ice cap (National Snow and Ice Data Center, 2009).

Concerning ice, there is also some differences. In the Arctic, multiyear ice is more common, because the current system of the Arctic Ocean is not strong enough to disperse and make the ice retreat consistently. The opposite situation can be seen in Antarctica, where the dispersion ratio of ice is considerable, mainly due to the existence of the Weddell and the Ross seas, with the presence of permanent circular currents. The latter, disperses the ice in summer, diminishing the formation of multiyear ice, but also increasing the risk posed in the navigation, as in this area multiyear ice is more dispersed.

The response to vulnerabilities such as environmental damages will also be different, considering the legal and political regimes of marine spaces in the Arctic and Antarctica, where the regime of the High Seas is applicable.

Regarding the human population the Arctic has a history of Aboriginal inhabitants, while Antarctica never has had local population living there; only recently when the installation of bases started, human beings have been present more permanently.

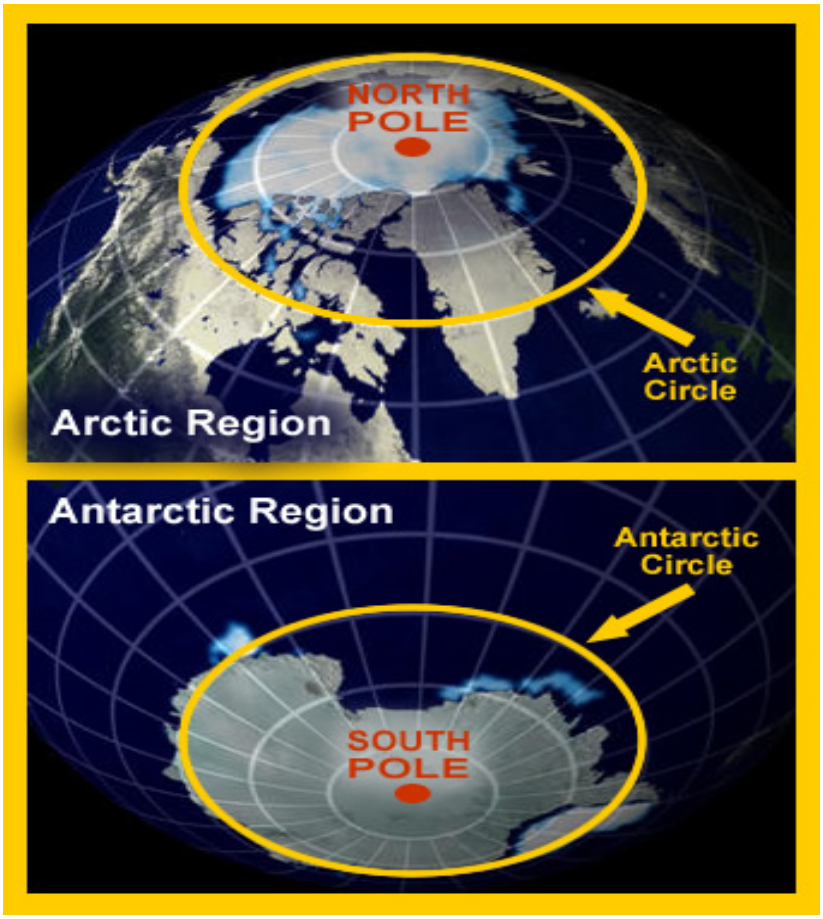

Figure 3-2: Geography of Earth's Polar Regions.
Source: (Windows to the Universe, 2008 as retrieved from Google Images, 2009)

Commercially speaking from the shipping point of view, ship based tourism started in Antarctica in the late 1950s, whereas in the Arctic it started in the early 1980s. Consequently, in Antarctica since 1991, the International Association of Antarctica Tour Operators (IAATO)[14] has been operating, setting guidelines for an environmentally friendly development of activities for tourists and operators in the Antarctic. In the Arctic, even though there is the Association of Arctic Expeditions Cruise Operators (AECO)[15] established in 2003, it only covers the region of

[14] For further information about IAATO see Chapter II, 2,xx and also see the website http://www.iaato.org/

[15] For further information about IAATO see the website http://www.aeco.no/

Svalbard, Jan Mayen and Greenland, just one part of the Arctic and with no participation yet in international forums (AECO, 2007; IAATO, 2009).

From the legal viewpoint in Antarctica there is the ATS, which is a complete system dealing with sovereignty as well as environmental issues, whereas the Arctic has not yet such an instrument.

Summarizing, although some people might think that polar issues are almost the same, it can be seen that there are several interesting and important differences between both polar regions, a situation that should be considered in the policy making process.

3.2 Shipping activities in Antarctica

3.2.1 Fishing

The main marine living resources in the Southern Ocean are penguins, whales, seals, fishes, krill and squids, among others. The use of these resources starts two centuries ago and as shown in Figure 3-3, it is characterized by a progressive overexploitation.

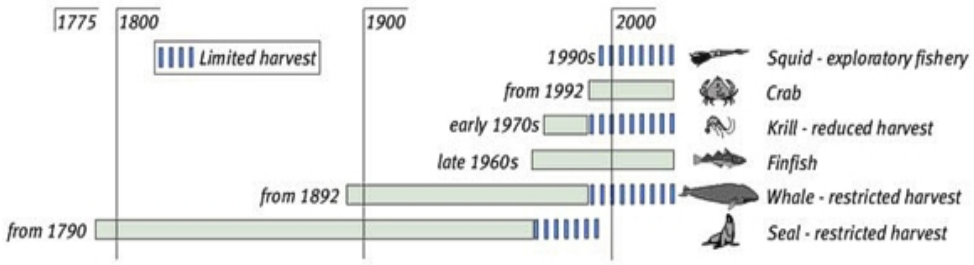

Figure 3-3: Commercial Exploitation of Marine Living Resources in the Southern Ocean. Source: (Fallon, 2002 as retrieved from Lighthouse Foundation, 2006)

The exploitation of the Antarctic marine living resources has been characterized by an intense and sporadic fishing, originating in much of the cases the drastic drop of the stocks. This is the case of the seals and elephant seals during the 19th century and whales and krill during the 20th century.

Concerning regulations about fishing of Antarctic marine resources, it was initiated with the International Convention for the Regulation of Whaling (ICRW), established in 1946, which created the International Whaling Commission (IWC); followed by the CCAS, established in 1972 and CCAMLR, established in 1982 (International Whaling Commission, 2009).

3.2.1.1 Species under threat

As the problem of overexploitation of fishing stocks all over the world has become serious, during the past years, a resurgence interest over fishing in Antarctic waters can be seen. Although there are numerous species at risk in the Southern Ocean, some of them are considered more relevant due to their special connotation.

3.2.1.2 Whales

The whale hunt in the Southern Ocean started formally in 1904, when Norway installed the first whaling station in South Georgia Island. Since then, seven different species has been widely exploited with a decreasing of the hunt during and after the Second World War. In the 1960s large scale hunting started again, principally by Japan.

After two decades of whale catching with a minimum control and with an evident reduction of the whale stock, IWC proposed a moratorium for all commercial whale capture, which entered into force in 1986 and is still in place (International Whaling Commission, 2009).

Whales today are generally under more pressure than any time before. This is because the populations have been reduced. In addition due to overfishing the populations may be stressed due to reduced availability of food. Other biological characteristic of whales that make them even more sensitive is that they have a very slow reproduction potential. In contrast with for example most fish species, whale reproduction is very slow, conceiving one calf every one or two years and after being born, the calf needs more than one year of mother care before it can survive by itself. At the same time, to be an adult and be able to reproduce will take several years. That is the reason why the whale population takes a long time to recover after commercial exploitation (Aguayo, 1999).

Despite the moratorium on commercial whale hunting the Japanese Government has announced their decision to allow the hunt of a large number of whales for scientific research. This is a highly controversial decision although formally a country may hunt whales for scientific purposes.

Obviously there are legal implications behind the announced hunt. In UNCLOS the freedom of the High Seas is clearly stated and over this freedom, rests the regulation that comes with ICRW, reducing the hunting of whales with commercial purposes to zero since 1986. However, since the inception of the moratorium, Iceland, Japan and Norway have granted extraordinary authorizations for captures for scientific purposes, catching more than 11,000 whales until today. Those authorizations were legal and precisely that is where the problem is located, because only member States can authorize the hunting of whales for scientific purposes.

Under this premise, Japan in its first scientific program has authorized the hunting of 6,800 Minke whales in the Southern Ocean. This is at least enigmatic scientifically speaking, since in the previous years the Japanese interest in this specie has been marginal, provoking serious objections from other members of the Scientific Committee of IWC (CIESM, 2004).

3.2.1.3 Patagonian Toothfish

The Patagonian toothfish (*Dissostichus eleginoides*) is a protected species under CCAMLR. Its worldwide commercial perspective has created a big interest in the international community, as a consequence of growing fishing efforts and the stock drop. Unfortunately, there is not much information available regarding its biology, volumes of capture and commercial circuits.

Patagonian toothfish is known with several names around the globe, for instance in Argentina, Chile and Uruguay it is known as Merluza Negra where it is relatively cheap; in Japan it is known as Mero, while in the US it is known as Chilean Sea Bass, whose meat is sold at high prices. Patagonian toothfish as can be seen in Figure 3-4, is a large fish located usually in cold waters, but also sometimes in temperate waters in depths from 50 to 2,500 meters. In some cases it has been captured even at 3,500 meters, mainly in the Southern Ocean around most of the Sub-Antarctic Islands and also in the Southern Atlantic, Indian and Pacific (North of the Antarctic Convergence).

Figure 3-4: Patagonian Toothfish (*Dissostichus eleginoides*).
Source: (Fallon, 2002 as retrieved from Lighthouse Foundation, (2006))

This long-lived species lives in normal conditions around 24 years and its growth is rather slow. The first sexual maturity happens after nine to ten years, when it reaches a measure of 90 to 100 centimeters. Biomass studies have revealed that the species shows relatively low natural densities, and precisely those factors make this resource especially sensitive to overexploitation.

Illegal unreported and unregulated (IUU) fishing activities, started in the middle of the 1980′s and in 1997 already 3,2 million tons have been extracted, endangering this species and obliging CCAMLR to establish protective measures. Today, it is estimated an average of 100,000 tons of capture a year and in case of continuing this pattern, the living stock will reach a critical level that probably impede its recovery. Some environmental international organizations like the International Union for Conservation of Nature (IUCN) and National Environmental Trust (NET), have said that this resource could suffer its commercial extinction soon with the current fishing pattern (Australian Antarctic Division, 2008).

This species is highly appreciated in restaurants and food distribution chains, especially in Europe and the US and its capture are very profitable even if the level of capture is low, which constitutes an incentive for unlawful fishing.

Concerning control against IUU fishing, the Australian position is remarkable on this issue, developing activities for stopping IUU fishing like the chasing of the Uruguayan fishing vessel Viarsa I in August 2003[16]. During the past few years, Australia has also established cooperation agreements with countries like France and South Africa to chase illegal fishing fleets (Australian Government, 2003).

Unfortunately, not all countries have the enforcement capacity and the will of Australia. Even worse is the indirect support provided by some CCAMLR Parties to unlawful fishing activities, offering for example supply services to ships with a well known record of illegal fishing activities.

3.2.1.4 Krill

Antarctic krill (*Euphausia superba*) is a little crustacean zooplankton that can reach the size of 6 centimeters. In the middle of the 70s scientists started to understand that krill played a fundamental role in the Antarctic marine ecosystem. In fact, its abundance constitutes an important element in the food chain for a number of animals like albatrosses, petrels, fishes, squids, penguins and whales. Krill occurs in

[16] For more information see http://www.minister.defence.gov.au/Hilltpl.cfm?CurrentId=3088

large numbers, reaching very high densities in some areas of the Southern Ocean. Biomass studies states that krill represent the biggest biomass all over the world and rough estimates said that it fluctuates between 220 and 440 million tons, estimating that natural renovation take place every two years (Australian Antarctic Division, 2009).

The feasibility of exploitation of the krill stock as a source of food has been a frequent controversy among scientists during the last decade. Some of them estimate that the abundance of krill is big enough, so exploitation for human consumption will not endanger the existence of the Antarctic fauna. However other specialists are not supporting these statements. Especially now, when studies have revealed that the amount of krill in the Southern Ocean is smaller than before as Figure 3-5 shows, probably because of less sea ice surrounding Antarctica during winter particularly in the Antarctic Peninsula.

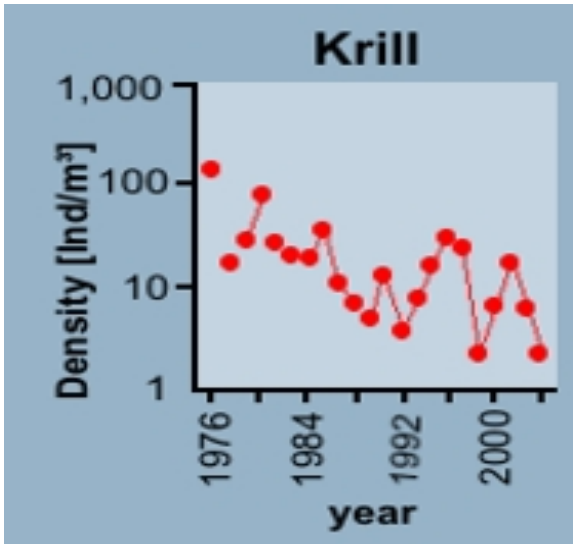

Figure 3-5: Krill Density in the Atlantic Sector.
Source: (Atkinson, 2004 as retrieved from Lighthouse Foundation, 2006)

In 1979, after several studies, it was established that krill posses a high content of fluor and do not fulfill the requirements for human consumption. Nonetheless, with the development of new technologies for krill processing, the quantity of fluor can be reduced to acceptable levels, a situation that has stimulated again fishing efforts, in

countries like Japan, Poland and Russia during the past few years. Some other commercial uses for krill have been developed, like food for aquaculture industry and nutritional supplements among other products.

Krill plays and essential role in the ecosystem of the Southern Ocean, due to its function in the food chains and food web. Additionally, recent studies have shown that krill also plays an important role against global warming, contributing to remove Carbone Dioxide (CO^2) when it consumes phytoplankton in the surface of the ocean and thus, removes faeces in the deep of the ocean (Australian Antarctic Division, 2008).

Traditionally, krill fishing operations have been made through trawling, producing a phenomenon of incidental capture of marine mammals like seals. This fact has been considered just recently by CCAMLR after receiving some reports by scientific observers on board fishing vessels, suggesting that trawlers start using exclusion mechanisms to minimize incidental captures.

3.2.1.5 Illegal Fishing

Fishing activities carried out by ships under flags of convenience are a complicated issue in the Southern Ocean. There are several fishing companies registering their ships in countries such as Belize, Panama or Vanuatu and operating their ships in the Southern Ocean. These countries are not part of the PEPAT and CCAMLR, so their activities are unregulated as regard quotas, techniques and target species. Subsequently, they are avoiding the obligations imposed by these legal bodies which are looking for controlling stocks and providing a sustainable management. The lack of control mechanisms over fishing activities in the Southern Ocean is a contributing factor to convert this situation into a potentially serious problem (Cool Antarctica, 2009).

3.2.1.6 The need for an accurate Exploitation Regime

Concerning an exploitation regime, unfortunately, there are no 100% accurate studies that can provide certainty over a suitable regime of exploitation. Currently, CCAMLR has been trying to determine criteria for making decision over limits of capture to ensure a sustainable development of the activity. This is difficult today because the Antarctic ecosystem is not fully understood, and is also heavily affected by illegal fishing. Consequently, there is no certainty over a suitable regime due to mainly the lack of appropriate data. At present, CCAMLR is using a system based on geographic areas of the Southern Ocean called Units of Exploitation, which also have been subdivided in smaller areas considering feeding areas of predators, geographic distribution of krill and fishing behavior. Figure 3-6 describes the areas already designated in the Antarctic Peninsula, South Oarkney Islands and South Georgia (Cool Antarctica, 2009).

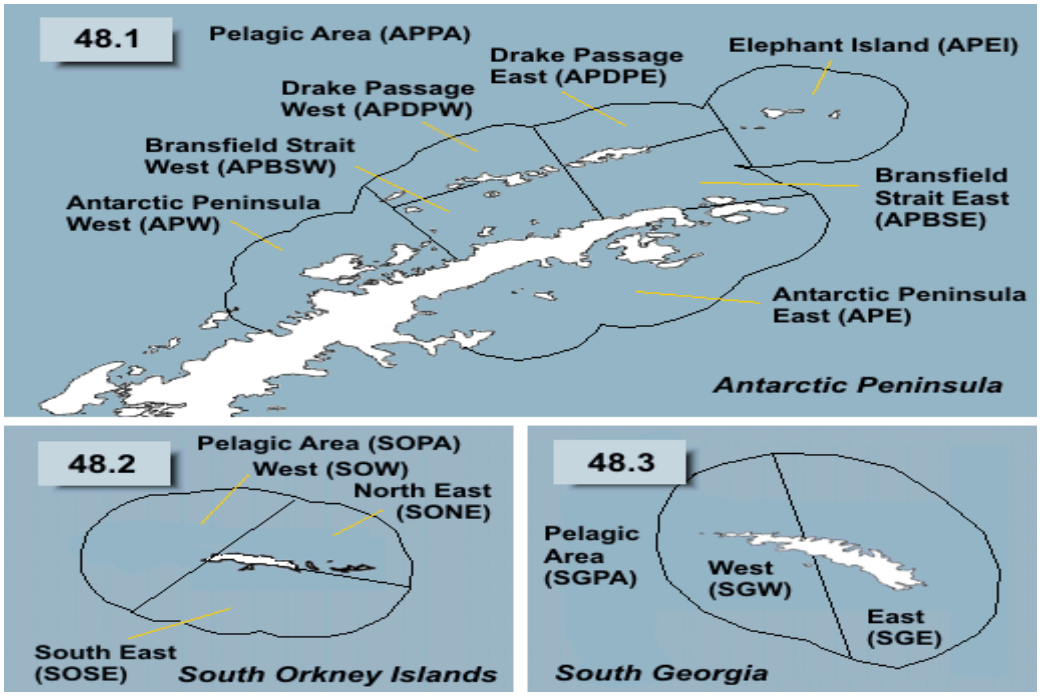

Figure 3-6: Model of CCAMLR Geographic Areas.
Source: (WG-EMM, 2003 as retrieved from Lighthouse Foundation, (2006))

CCAMLR is a leader organization as regards ecosystem management, applying to its regulations and recommendations innovative concepts such as the precaution principle and the ecosystem management. The ecosystem focus and precaution principle in the management of fishing was adopted subsequently by a number of national and international organizations, including FAO, the European Union Marine Strategy and the Unites States Commission for the Oceans. Nevertheless, good intentions of CCAMLR are weakened by their own statute which obliges their members to take decisions through consensus. For this reason sometimes only one negative vote can block an important conservation measure (The Antarctic and Southern Ocean Coalition, 2008).

3.2.2 Tourism

3.2.2.1 Yacht-based tourism

Yachting in Antarctic waters is not really important from the commercial operations point of view. The common start points for these pleasure craft are usually Ushuaia (Argentina), Punta Arenas and Puerto Williams (Chile), because these are the nearest departure points to Antarctica. There is also possible to find some yachts departing from South Africa, Australia and New Zealand (Bertram, 2007).

However, there are several problems with yachts, mainly because of four reasons:

1. Minimum control over these boats by their flag states.
2. Different regulations among states regarding these types of boats, which make difficult the enforcement of regulations.
3. There are no legally binding international regulations today in place for these boats, regarding for instance safety standards of construction.
4. There are no agreed international standards regarding training and certification of people sailing yachts; so is almost impossible to confirm

whether the experience and level of knowledge is sufficient to sail in Antarctic waters.

Unfortunately, the number of yachts visiting Antarctica is increasing and there is no official statistics about the current scale and trends in a near future. The information exchange among the 5 Antarctic Gateway Countries is also a problem[17], mainly because it is in its infancy. As a result, it is almost impossible to have a clear overview of the yachts sailing in Antarctica for SAR purposes. The main worries regarding yachting in Antarctica, seems to be focused on safety rather than environmental issues. Self sufficiency, health of people on board, and the issue of who pays in case of SAR operations are today the dominant subjects in forums like the Council of Managers of National Antarctic Programs (COMNAP). This because there have been previous experiences with really high costs and usually assumed by National Antarctic Programs, involving the use of national scientific bases, movements of ships and aircraft (Bauer, 2001).

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3.2.2.2 Ship-borne tourism

One of the major challenges today faced by the Antarctic system, regarding environmental equilibrium and its protection is represented by the Antarctic tourism, which has been growing sharply through the years, as can be seen in Figure 3-7.

Tourism in Antarctica was initiated in the 1950s with Argentina and Chile carrying more than 500 tourists to the Shetland Islands. Notwithstanding, Antarctic Expedition Cruise is a concept initiated in 1966 by the Swedish citizen Mr. Lars-Eric Lindblad. Mr. Lindblad conducted the first tourist expedition to Antarctica in a chartered Chilean Navy ship, matching the concept of expedition with education. Since then, the ship-borne tourist industry has been growing steadily, based in companies operating ships under a self-sufficient model (International Association of Antarctica Tour Operators, 2009).

[17] The Five Antarctic Gateway countries to Antarctica are Argentina, Australia, Chile, New Zealand and South Africa.

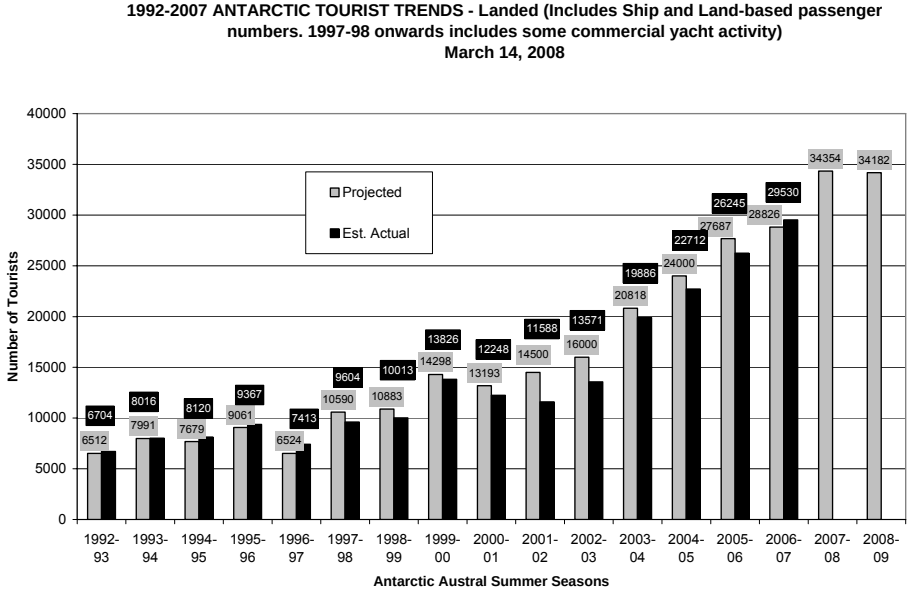

Figure 3-7: 1992-2007 Antarctic Tourist Trends.
Source: (IAATO, 2007 as retrieved from IAATO, 2009)

Antarctica is a continent physically isolated with an extreme climate but also plenty of natural beauties that constitute a big tourist attraction.

Nowadays fishing and Antarctic tourism are the only commercial activities formally recognized as such by all AT members.

In 1991, seven private tourist operators realizing Antarctic excursions created IAATO, with the purpose of promoting and practicing environmentally sound and safe cruises to Antarctica. After 18 years, IAATO has 105 members, gathering almost all cruise ships with a transport capacity over 12 passengers participating in Antarctic cruises (International Association of Antarctica Tour Operators, 2009).

According to IAATO documents presented in ATCM in the latest Antarctic Summer season around 52 ships were operating in Antarctica mainly in the area of the Antarctic Peninsula, carrying about 45 to 500 passengers (Joyner, 2007).

The main area where the Antarctic tourism is concentrated is the North West part of the Antarctic Peninsula, covering the Elephant Island, South Shetland Archipelago,

Deception Island and Bransfield and Gerlache Straits. The reason behind, is the fact that this area possesses four matchless advantages:

1. Easy access from Ushuaia (Argentina) and Punta Arenas (Chile) (Closest port to Antarctica).
2. Big diversity of sceneries and wildlife.
3. The presence of a number of historic milestones and scientific stations.
4. Relatively mild weather conditions during summer with less marine ice than other Antarctic places.

More than 80% of tourists comes from the North Hemisphere, and travel by plane mainly to South America (Argentina – Chile). There are also tourists going to New Zealand, Australia and South Africa and then boarding a ship or another plane to Antarctica.

IAATO statistics reveals that 46,049 tourists visited Antarctica in the season 2007-2008, a number with an astonishing increase during the last years, being today 9 times more than the number of scientists working there. Nevertheless, this number is a bit misleading, since the numbers are not considering the crew and staff of the ships visiting Antarctica. An estimation regarding the total number will be around 70,000 people a year. Anyhow, according to industry estimations the estimated number of passengers for the next two years would be lower due to the effects of the economic crisis (International Association of Antarctica Tour Operators, 2009).

Regarding tourists, it seems to be that visitors´ profile has been changing in recent years. At present, tourists not only are looking for expedition cruises like before, but also amenities and entertainment like casinos on board. As a result, during the past few years bigger cruise ships carrying around 3,000 passengers has been sailing mainly around the Antarctic Peninsula.

Concerning the age of the people visiting Antarctica, these passengers are mainly people of advanced age with a high purchasing power and not always with a developed sensibility as regards the natural Antarctic heritage (United Nations Environment Program, 2007).

From the overall number of people travelling to Antarctica in 2008, 74% disembarked on the continent from ships with a capacity of 50 to 500 passengers, 14% visited Antarctica in luxury cruises with an average capacity of 3,000 passengers without disembarking, 9% just flew over Antarctica and other 3% visited Antarctica in Yachts (International Association of Antarctica Tour Operators, 2009).

There has been a big debate recently concerning tougher regulations for Antarctic tourism and Antarctic shipping, as regards safety of life at sea and environmental protection. This was accentuated after the sinking of the M/S Explorer in Bransfield Strait in November 2007, following a collision with ice, as shown in Figure 3-8. Fortunately, all 154 passengers and crew were rescued alive as the weather conditions were good, a not frequent situation in this area[18] (Bureau of Maritime Affairs, 2009).

The sinking of the M/S Explorer has not been the only accident in Antarctic waters. There have been several during the past few years, but the importance of the Explorer lies in that it was an ice-strengthened ship and also was the first ship sunk in Antarctic waters. This accident, increased awareness about important issues regarding safety and environmental protection and also move up the question about whether a larger vessel in case of an accident, could be so fortunate regarding loss of lives and environmental damages, a situation that will be discussed afterwards (Mercator Media, 2009).

[18] For more information see the Explorer marine casualty report in http://www.cruisejunkie.com/Explorer%20-%20Final%20Report.pdf

Figure 3-8: Sinking of M/S Explorer in November 2007.
Source: (Mercator Media, 2009 as retrieved from Maritime Journal Archive, 2009)

3.3 Issues arising from shipping activities in Antarctica

3.3.1 Operational issues regarding safety

3.3.1.1 Ship design

During the past few years several accidents have occurred in Antarctica. The Explorer accident demanded a rescue operation of more than 150 passengers and crewmembers and also generated environmental damage, as a consequence of the fuel on board and other types of equipment not well assessed yet.

This accident as well as the experience of previous misfortunes has raised the question of whether the ships visiting Antarctica are well fitted or not. This by virtue

of what is stated in Annex IV, Article 10 of PEPAT[19], producing a long debate in different ATCM. In accordance, since 2000 the ATCP through COMNAP designated a group of experts to evaluate the applicability of the draft that IMO was working on, for the development of the 2002 IMO Guidelines for ships operating in Arctic ice-covered waters. Thus, COMNAP group of experts stated that the Arctic guidelines with some changes could be applicable to Antarctic conditions (Antarctic Treaty Secretariat, 2004).

The initial idea was that the ATCP would develop and approve a temporary directive, as a way to speed up a solution in Antarctica, and submitted to IMO for a subsequent approval based on the Arctic guidelines. Then, IMO should determine whether the development of Antarctic guidelines or a Polar Code would be the best option. Meanwhile, this interim mechanism will allow a faster application of recommendations at least for ships brandishing AT members flags. Once IMO has solved the problem through an instrument addressing the problem, those recommendations would be repealed to avoid possible conflicts or inconsistent arguments.

Although the previous approach has the potentiality to address the problem for AT member's flagged ships, the extent of ships not covered by these recommendations will be substantial. For example, today is estimated than 50% of cruise ships operating in Antarctica are flagging the flag of Bahamas, Liberia and Panama, three of the biggest open registries and not AT members. For this reason this approach was not successful, so it was deemed that the problem can only be effectively addressed through the involvement of IMO. In concordance, ATCP in 2004 formally through a document[20], required to the Maritime Safety Committee (MSC) to extend to Antarctica the existing IMO Guidelines for ships operating in Arctic ice-covered waters[21]. In 2007, IMO through its Ship Design and Equipment Sub-Committee (DE) started to work formally on a harmonization of the Arctic guidelines, considering the necessary amendments that should be made to make them applicable to Antarctic

[19] Article 10 of Annex IV of the Protocol provides: "In the design, construction, manning and equipment of ships engaged in or supporting Antarctic operations, each Party shall take into account the objectives of this Annex".

[20] (MSC 79/8/2 and MSC 79/INF.2)

[21] (MSC/Circ.1056-MEPC/Circ.399)

waters. DE, considered a general update of the 2002 Arctic guidelines, mainly as regards technical developments concerning ship construction issues like damage stability, double bottoms, the International Association of Classification Societies (IACS) unified requirements for polar ships and the Finnish ice navigation rules[22]. This, taking into consideration that Antarctic navigation entails uncertain meteorological and sea conditions in an area commonly surrounded by ice. In that sense, additional measures concerning ship design and stability are needed, since the probability to hit an ice is certainly big enough. Developing especial provisions for Antarctic intended ships, will improve safety of life at sea and environmental protection in this area, addressing important problems such as ice accumulation in ships superstructure attributable to weather conditions. It has considerable impact on ship stability, affecting in addition the effectiveness of external fire extinguishing equipment like nozzles, piping, valves and also life saving appliances (International Maritime Organization, 2008).

During the debate process of Antarctic guidelines, some controversies arose about certain issues such as, special considerations with those passenger ships going to Antarctic waters only during summer season, and the applicability of the guidelines to fishing and other vessels. In that sense, some nongovernmental organizations (NGO) like The Antarctic and Southern Ocean Coalition (ASOC), supported by some IMO Member States like Australia pushing for tougher regulations, whereas IAATO supported by other Member States, supported moderate positions regarding Antarctic shipping (The Antarctic and Southern Ocean Coalition, 2008).

Another problem arising from the Sinking of the M/S Explorer is that the Arctic guidelines, which are intended to be extended to Antarctica, concerning stability and ship construction are only applicable for new ships. Therefore, the problem remains with existing ships sailing in Antarctic waters, some of them more than 20 years old. Those ships are not fulfilling any especial criteria, which can ensure an appropriate safety standard for people on board, as well as the protection of the environment. Consequently, Australia submitted to DE 51 in March 2008, the suggestion that existing ships operating in polar waters should fulfill at least the requirements of SOLAS as amended in 1981. This due to the enhanced safety considerations

[22] See more information in the Finnish Maritime Administration Website www.fma.fi.

adopted in that edition, which are deemed as suitable minimum requirements for existing ships (International Maritime Organization, 2007).

3.3.1.2 Life-saving appliances (LSA)

This is a relevant issue to be considered in the Southern Ocean, mainly for two reasons; first, weather and sea conditions make Antarctic waters one of the stormiest in the world, so in case of an accident enhanced life saving-appliances will provide higher probabilities to rescue people alive. Second, this is an issue largely fostered by IMO in SOLAS Chapter III, and MSC.1/Circ.1184[23] (International Maritime Organization, 2006).

Today, it is not compulsory to have on board enhanced life saving-appliances for ships going to Antarctic waters, such as immersion suits, albeit usually there are a number of them on board, but not for all passengers and crew. At the present time, there are no clear regulations to address this issue and the only model that can be considered is the Arctic guidelines developed by IMO[24]. These guidelines identify a number of provisions regarding collective and individual survival equipment, but only for new polar class ships. A problematic situation will be generated, if the guidelines are making applicable as such in Antarctica, regarding the conditions to be fulfilled for carrying those enhanced equipment. Parameters of temperature and quantity of ice are used for establishing what survival equipment will be required. Thus, where the average daily temperatures expected will be below 0º Celsius, individual survival equipment will be needed. Collective survival equipment will be required only when it is expected to find an quantity of ice that impede the descent and turning on of survival craft (International Maritime Organization, 2002). Analyzing current Antarctic ship operations, it can be concluded that in the case of ships sailing around the Antarctic Peninsula (which statistically speaking is the majority case) during the

[23] MSC.1/Circ. 1184 "Enhanced Contingency Planning Guidance for Passenger Ships Operating in Areas Remote from SAR Facilities", 31 May 2006. These guidelines provide enhanced guidance for passenger ships operating in areas remote from SAR facilities, dealing with Enhanced contingency planning assistance for these ships considering SOLAS and SAR Convention provisions as well as the ISM Code.

[24] MSC/Circ. 1056 – MEPC/Circ.399 "Guidelines for Ships Operating in Arctic Ice Covered Waters".

summer season, these two conditions probably cannot be fulfilled. This situation is irregular because it could lead to a misjudgment as regards safety standards and risks involved in operations in this particular area of Antarctica. Subsequently, an objective assessment regarding the different Antarctic geographical conditions should be made. This with the aim of establishing the adequate enhanced life saving-appliances, that should be carried on board. As it was stated before, the Arctic and Antarctica although looking similar, they have several differences concerning for example the kind of ice that can be found.

3.3.1.3 Nautical charts

The problem of Antarctic nautical charts is an old issue. It comes with the AT signature. At that time, only scientific research and their associated logistic operations were considered in Antarctica and tourist activities were not foreseen whatsoever. As a result, at that time Antarctic hydrographic work was not considered as a priority considering that the ships flow was also not considerable to initiate an activity like that. Nonetheless, with the explosive growing of ship-borne tourism in Antarctica, the lack of appropriate nautical charts has become a problem, increasing the risks for grounding with their associated consequences.

The incidence of ice has been another relevant factor limiting the development of nautical charts. Antarctic sea ice has two sources, marine ice and ice floes coming from the Antarctic ice cap and reaching the sea in big territorial extensions. Ice limits several areas of Antarctic waters that surely can be navigable. This is one reason why at present, vast Antarctic areas are not duly charted yet; being common in several Antarctic charts the existence of warnings regarding this situation.

A considerable number of Antarctic nautical charts are a compilation of air photographs for mapping purposes as well as hydrographic draft, which in some cases were the only available methods to obtain information about some inaccessible areas. These procedures compared with the standards settled by the International Hydrographic Organization (IHO) are inadequate. Therefore not all nautical charts have their datum referred to the World Geodetic System (WGS).

Consequently, the positions obtained from satellites using the Global Positioning System (GPS) cannot be accurately drawn in these charts. Moreover, some of them have considerable errors as regards distance considered in the charts, in some cases several miles, a reason why the utility of them can be considered only relative as a way of reference regarding the coastline.

Two periods in the production of Antarctic nautical charts can be identified. Before 1994, when the Antarctic coverage was mainly produced by some IHO Member States in an inconsistent way and with particular purposes; and after 1994, when IHO agreed to develop an International Chart Scheme for Antarctic Waters south 60º of latitude (INT). The aim of INT was mainly to ensure appropriate charts, providing coverage for accessing those areas often visited by cruise vessels, as well as permanent scientific bases. The main technical introduction was the implementation of WGS-84 as a common geodetic datum. Today it is possible to find nearly 100 charts under this scheme and roughly half of them are covering the Antarctic Peninsula.

Maintenance of INT is a task of the IHO Hydrographic Commission on Antarctica (HCA), a special branch of IHO, composed of 23 Member States dealing with the development of activities for improving cartography in Antarctica (International Maritime Organization, 2003). Further information concerning INT and the HCA are provided in Appendix C.

IHO in some papers has stated that Antarctica is properly schemed for the safe passage of vessels in the area. Checking the publication IHO S-59 “Status of Hydrographic Surveying and Nautical Charting in Antarctica” at a glance, it seems that Antarctica today is almost duly charted. However, an important number of those charts were done before 1980, most of them are concentrated mainly in the most visited areas and just a few charts were done using multibeam ecosounding technology (Gorziglia, 2002).

The general state of the region regarding nautical charts is still poor, with few charts properly developed under modern standards. Consequently, the area could not be considered accurately charted for safe navigation. Moreover, at present bringing on board nautical information from several countries regarding the same area, still remains as a normal practice on several ships sailing across Antarctic waters. This

with the purpose of comparing and contrasting nautical information available, which can help in the decision making process for safety purposes.

3.3.1.4 Crew competency for ice navigation

Shipping in Antarctica has being growing steadily and during the past few years several accidents have been reported in Antarctic waters. Although in ATCM and IMO the necessity for tougher standards has been recognized, regarding safety construction and equipment of ships, the human factor is an outstanding issue that should not be forgotten (International Maritime Organization, 2003). Relevant again result the experience of the M/S Explorer, where the basic cause, according to the Liberian report, was the ship Master´s misjudgment, regarding the kind of ice where they were entering. The master of the M/S Explorer was an experienced officer in the Baltic Sea; however the ice conditions in Antarctic waters have proven to be rather different than the Baltic ice conditions (Bureau of Maritime Affairs, 2009).

In order to minimize the accident probabilities, adequate training according to the conditions to be faced is crucial. Currently, the STCW Convention does not consider special training courses regarding navigation in those areas (International Maritime Organization, 2008). The 1978 STCW Convention was the first IMO instrument setting "Minimum"[25] standards internationally for harmonizing education and training standards for seafarers. Previously, it relied exclusively on each country requirement, producing considerable differences in educational and training levels, threatening safety at sea. The convention establishes standards to be complied with, but also allows countries to develop higher standards concerning education and training. Unfortunately, this is not a common practice. Regarding Antarctic navigation, the history seems to be repeated again. Today, some countries are developing and offering training courses for Antarctic navigation like Argentina and Chile, without the existence of minimum standards formally recognized in the STCW Convention. Proposals have been made as regards Antarctic training and certification. In that sense, significant is the formal joint proposal made by these

[25] The Author has used Quotes to stress the word minimum.

countries to IMO to solve the problem. The final aim is establishing this issue as mandatory under STCW. At a local level, these countries also has been very active promoting the idea in different forums like, ATCM and ROCRAM[26], to raise awareness and gain support among other countries to speed up the entry into force of mandatory training courses for Antarctic navigation[27] (International Maritime Organization, 2009).

3.3.1.5 Risk assessment

Especially during the last three years, there has been some news in the media involving ship accidents in Antarctica. Some of them, as a result of natural events like unexpected winds and some other provoked by human error and thus, increasing risks in human lives and the environment. As a result, the image of ATCP, tourist companies and also non AT countries, involved in Antarctic shipping activities have been seriously compromised. In recent years, the number of ships visiting Antarctica has been growing steadily, accordingly with the tourist tendency. In Antarctica several risks are threatening safe navigation, and currently there are no formal studies carried out, as regards risk assessment and risk management for shipping activities like for example in the Baltic Sea (Helsinki Commission, 2009).

Risk management is considered an organized, logical and realistic structure to be established for reducing, monitoring and controlling the probability and consequences of an accident or unfortunate event. The whole methodology process refers mainly to hazards identification, risk estimation, risk evaluation, control measures establishment and implementation of control measures. The process of risk management can also be understood in two stages. The first stage is related with the perception and understanding of the problem, encircling the processes of hazard identification and risk assessment; whereas the second stage is associated with the solutions of the problems previously identified, encompassing the process

[26] The Operative Network for Regional Cooperation among Maritime Authorities of South America, Cuba, Mexico and Panama.

[27] MSC (86/23/2) Safety measures for navigation in Antarctic area. Proposal submitted by Argentina and Chile.

of risk control option, implementing physical, administrative, and supervisory or management barriers to minimize the probabilities, as well as the consequences of an accident or unfortunate event (Harm-Ringdahl, 2004).

A proper risk assessment and a risk management plan stated in the form of contingency planning for Antarctic shipping, should be considered as a tool to minimize the probabilities of future accidents.

ATCP issued in 2004, the Resolution Nº 4 regarding insurance and contingency planning for tourism and non-governmental activities in the AT area, in accordance with Article VII (5) of AT. The idea behind was to minimize potential impacts and the avoidance of additional cost for tourist and non-governmental activities, fostering the interchange of information and ensuring reasonable self sufficiency and insurance coverage in case of incidents or accidents involving human lives and damage to the environment. However, the provisions in this resolution are general and vague and enforcement of this measure relies exclusively upon every ATCP. Moreover, today there are several ships sailing in Antarctica under flags of countries not signatories to the AT (Antarctic Treaty Consultative Meeting, 2004).

Notable also results the efforts deployed by IAATO to ensure compliance with this resolution. Nevertheless, IAATO is an organization fostering self regulations for private tourist operators and not all of them today are part of IAATO (International Association of Antarctica Tour Operators, 2009).

An important tool for contingency planning and risk assessment could be considered the IAATO's Vessel Database. Although this is a relatively new tool, used by IAATO member cruise companies, since 2008 it allows full access to Antarctic MRCC countries and the UK. This provides a good overview of where ships are located and the availability of resources in case of an emergency (International Association of Antarctica Tour Operators, 2008).

Nevertheless, as it was described previously, the first stage of risk assessment considers the understanding of the problem, and this process is narrowly related with hazard identification and risk assessment; this stage could be considered very formless and almost inexistent. This could be explained due to the fact that ATS was designed to address sovereignty issues among claimants, scientific research and

the prohibition of military activities in a first step and environmental issues in a second stage. Shipping activities derived from tourist activities has never been an issue under the ATS, despite the fact that this is one commercial activity formally recognized by all AT members. But now the situation has changed, the latest events have raised awareness about potential disastrous accidents involving human lives and environmental damage. Today in Antarctica, contingency planning is done mainly in compliance of PEPAT, which requires risk assessment mainly regarding environmental impacts of activities. Nevertheless, it says nothing about risk assessment regarding safety of shipping activities in Antarctica. Moreover, ship-borne tourism has been identified as an activity with a minor or transitory impact, so these activities can proceed with just an initial environmental evaluation and certifying appropriate procedures for verifying the impact of the activity (Antarctic Treaty Consultative Meeting, 2005).

3.3.2 Operational issues regarding environmental protection

3.3.2.1 Operational vessel-source pollution

One important source of marine pollution has been cruise ships. Since the very beginning they have been a luxury and comfort emblem. However, behind this image appears another dimension related with environmental issues. In fact, some cruise ships today can be considered truly floating cities, carrying 5,000 people on board.

A medium size cruise ship carrying an average of 3,000 passengers can generate daily an average of:

- 115 Tons of black waters,
- 960 Tons of greywater[28],
- 3 Tons of bilge water,

[28] Greywater is meant to include drainage from dishwasher, shower, laundry, bath and washbasins drains.

- 1,000 Tons of ballast water containing foreign species being introduced in different ecosystems at the moment of discharge,
- 7 Tons of garbage and solid waste,
- 60 liters of toxic chemicals,
- Air pollution equivalent to 12,000 cars. (Oceana, 2008)

In Antarctic waters different kind of ships are operating, such as fishing vessels, governmental vessels, yachts and cruise ships. Nonetheless, considering the number of people carried on board, cruise ships without any doubt pose a major threat to the environment. Ship-borne tourism activities in Antarctica are mainly carried out through smaller vessels, transporting a maximum average of 500 passengers. Nevertheless, bigger ships started operating in 2006 with the M/V Golden Princess carrying more than 3,000 people on board, so considering the growing Antarctic tourist trend; operational vessel-source pollution is an important issue to be considered.

3.3.2.1.1 Marine pollution (garbage, sewage and greywater)

Concerning marine pollution there are three important legal instruments applicable to Antarctic Waters, the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, 1972 (London Convention); MARPOL 73/78 and Annex IV of PEPAT. MARPOL and PEPAT are consistent in several aspects. However, in some parts of them there are some differences to be analyzed. MARPOL Annexes I, II and V, regarding discharges of oil, noxious liquid substances and garbage, strictly forbid any discharge south of 60º, because Antarctica was declared under these Annexes as Special Area, being consistent with provisions stated in Annex IV of PEPAT. Nevertheless, some provisions in Annex IV of PEPAT were done to be more stringent than the provisions of MARPOL 73/78, especially regarding sewage issues, which are stated in Article 6 of Annex IV of PEPAT. One probable reason for that could be that provisions developed in this Article, were

done before the entry into force of Annex IV of MARPOL 73/78 and also that Antarctica has not the status of Special Area under this Annex.

The amount of sewage[29] and greywater discharged has increased during the last ten years, as a result of a steady increase of ships operating in Antarctica, particularly cruise ships. Sewage and greywater contains pathogens harmful to the environment, even when treated. Sewage impact can potentially create changes in community composition, with an estimated higher effect in marine invertebrates.

Actually regarding sewage, PEPAT established in its Article 6 of Annex IV, that ships certified to carry more than 10 people, are banned to discharge sewage into the sea within 12 miles of land or ice shelves. Out of this area, sewage stored in a holding tank can only be discharged in a moderate regime whit a speed not less than 4 knots, making also applicable the use of sewage record books where appropriate (Australian Antarctic Division, 2009).

In the case of MARPOL 73/78, it applies its rules to ships over 400 gross tonnages which are certified to carry more than 15 persons and also establishes the compulsory use of sewage systems in its Regulation 9. Regarding the discharge regimes, there are considerable differences because MARPOL Annex IV authorizes those ships carrying sewage systems according to regulation 9.1.2[30], to discharge at a distance of more than 3 nautical miles from the nearest land and sewage which is not comminuted, at a distance of more than 12 nautical miles, previously stored in holding tanks and when the ships is en route proceeding at not less than 4 knots (MARPOL 73/78, 2009).

This situation makes Annex IV of PEPAT more stringent than MARPOL 73/78, but only for states Parties to PEPAT that are not Parties to Annexes IV and V of MARPOL 73/78. This because PEPAT 1991 also stipulates in Annex IV, Article 14 that “With respect to those Parties which are also Parties to MARPOL 73/78, nothing

[29] According to MARPOL 73/78, Sewage means: 1.- drainage and other wastes from any form of toilets and urinals; 2.- drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises; 3.- drainage from spaces containing living animals; or 4.- other waste waters when mixed with the drainages defined above.

[30] Regulation 9.1.2 identify a sewage comminuting and disinfecting system approved by the Administration.

in this Annex shall derogate from the specific rights and obligations thereunder." This can be considered an unusual legal situation.

3.3.2.1.2 Invasive species

Together with fishing activities, global warming and ozone depletion, the problem of invasive species through hull fouling and ballast water is one of the most important threats to Antarctic biodiversity at an individual level as well as at an ecosystem level.

The imposed risk of invasive species[31] is more relevant, bearing in mind that Antarctic and Sub-Antarctic habitats are subject to a constant increase of temperature and also a sustained increase of human activities in the region.

One of the most efficient ways of introducing invasive species is the ship movements in Antarctica. As regards Antarctic shipping, there are two places where invasive species can be carried. One is the fouling of various plants and animals on the hull of the ships, and the other is through the release from ballast water carried on board ships.

Considering that Antarctic shipping has been growing steadily and this situation will probably continue in the future, the risk of introduction of invasive species will increase considerably.

As an example, significant results the situation of the North Atlantic Spider Crab (*Hyas araneus*), currently found in the Shetland Islands. According to studies, its introduction resulting impossible *Perse* due to the distance involved (Tavares & De Melo 2004).

Since the International Convention for the Control and Management of Ships Ballast Water and Sediment (BWM 2004) is not yet in force, there are no legally binding rules already in place regarding this issue (Globallast Partnership, 2009). At a local

[31]Invasive Species are those which are introduced to a region and compete against native species. In many cases they lead to the decline or extinction of native species.

level in Antarctica in 2006 ATCM through Resolution 3 (2006)[32], recommended *inter alia* the Adoption of Practical Guidelines for Ballast Water Exchange in the Antarctic Treaty Area (ATCM, 2006). At IMO level these Guidelines where analyzed and further developed and in 2007 IMO drafted the Guidelines for Ballast Water Exchange in the Antarctic Treaty Area. The guidelines maintain the core of Resolution 3 (2006), and also recognize Antarctica as a Special Conservation Area together with those provisions adopted under AT, establishing the basis for IMO to develop future measures in closer cooperation with the AT.

Regarding the guidelines, these establish that ships which have ballast tanks must have a Water Management Plan prepared in advance. The Plan should consider the Antarctic conditions and its difficulties for exchanging ballast water, establishing also the minimum distance where this operation should be carried out and the exception, in case this operation cannot be carried out according to the established procedure. Another important issue stated in the guidelines is related with the cleaning of ballast tanks and sediments[33] (International Maritime Organization, 2007).

As stated previously, the main problem is still the lack of a legally binding instrument, so duly enforcement through Flag States is urgently required to minimize potential impacts, considering that an important number of vessels visiting Antarctica are not belonging to AT members.

3.3.2.1.3 Coating and anti fouling paints

Since a long time ago, prevention and removal of problems originated by fouling has been an object of a number of studies. Antifouling paints, anti-rust paints and cathode protection make up an application and prevention system for ships. Getting an adequate hull protection is an important objective, since the selection of a good antifouling system can maintain a clean hull for a long period of time. This have a direct incidence in the fuel consumption of ships as well as in maintenance, increasing the operative time of the ships without entering dry-dock for this purpose.

[32] ATCM Resolution 3 (2006) *Ballast Water Exchange in the Antarctic Treaty Area.*

[33] See Resolution MEPC.163(56) Guidelines for Ballast Water Exchange in the Antarctic Treaty Area.

The problem of antifouling paints mostly lie in that they kill not only algae and other forms of life attached to the ship's hull, but also kill other life forms notoriously (Ship Repair Journal, 2009). Antarctica has not been exempt of this reality and evidence of that has been collected for example in the surrounding waters of the U.S. McMurdo Station. There infected samples have been collected with high levels of Tributyltin (TBT), a component of antifouling paints nowadays forbidden since the inception of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS 2001)[34], as a legally binding instrument in 2008 (Newscientist, 2009). Nevertheless, although the convention bans the use of organotins and other harmful substances as antifouling components, there have been some discussions among scientists regarding the replacement substances already approved as new antifouling systems. The discussions have been focused mainly on copper and herbicides, which potentially will cause damage to non-target organisms as well.

Another problem with the AFS Convention is that it was intended for ships over 400 GT engaged in international voyages. However, for ships less of 400 GT and bigger than 24 meters engaged in international voyages, a Declaration on Antifouling Systems signed by the owner or an authorized agent must be on board. It should also be accompanied with suitable documentation confirming the kind and quality of the antifouling used, through a paint receipt or invoice (International Maritime Organization, 2008). Mainly in Argentina and Chile currently several pleasure yachts offer adventure expeditions to Antarctica, some of them bigger than 24 meters. Nonetheless, as long as a trip to Antarctica is not an International Voyage as defined by SOLAS[35] (considering actual territorial claims), then there is a gap regarding compliance. Thus, duly enforcement by Flag States is needed to ensure environmental protection of Antarctica in those matters (Khee-Jin Tan, 2005).

[34] The International Convention on the Control of Harmful Anti-Fouling Systems on Ships was adopted on 05 October 2001, entering into force on 17 September 2008, banning the use of organotins and other harmful substances in anti-fouling paints applied on ship's hull.

[35] According to SOLAS Chapter I, Part A, Regulation 2, an International Voyage means a voyage from a country to which the present Convention applies to a port outside such country, or conversely.

3.3.2.1.4 Air pollution

Marine diesel engines are considered the biggest pollutants in comparison with other marine propulsion means like gas turbines. This concept is not really true, since modern engines are capable of producing low levels of carbone dioxide (CO^2), carbone monoxide (CO) and general hydrocarbons. Nevertheless, the real problem of marine diesel engines is the usage of residual fuels containing high levels of pollutants like sulphur. Sulphur become sulphur oxide (Sox) after combustion and generates high levels of nitrogen oxides (Nox). Although marine diesel engines produce undesirable levels of pollution, still they are the main propulsion system in the marine industry because they use the cheapest fuel available.

The Annex VI of MARPOL 73/78 established limits regarding Sox and Nox from exhaust of ships. It also forbids deliberate emissions of ozone depleting substances, as well as the incineration on board of certain substances corresponding to packing materials, contaminated packets and polychlorinated biphenyls (PCB). Annex VI, also allows the establishment of Special Emission Control Areas (SECAS), controlling Sox emissions and limiting the content of sulphur in used fuels to 1,5%. Annex VI also introduced a technical code regarding Nox of marine diesel engines (International Maritime Organization, 2008).

Concerning Antarctica there are two situations that deserve consideration; first, Antarctic tourism is an activity not well studied yet in terms of atmospheric emissions, so there is no certainty about the current level of air pollution (Ross, 2006). In this context, it is interesting to underline for example the information regarding levels of air emissions in different tourist destinations provided by the United Nations World Tourism Organization (UNWTO), as shown in Figure 3.9. In this figure can be appreciated that a combined flight and cruise to Antarctica from Europe, implies several times the amount of air emissions than domestic holidays. According to UNWTO estimations, a medium tourist trip last 4.15 days, causing emission levels of 0.25 Tons of CO^2. In comparison, a flight from the Netherlands to Antarctica by plane and then cruise ship cause around 9 Tons of CO^2 (World Tourism Organization, 2008).

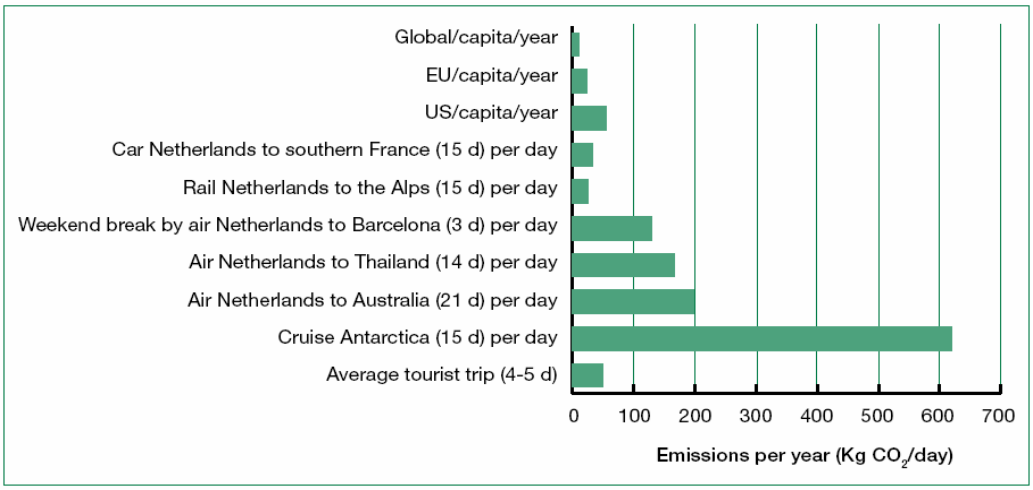

Figure 3-9: Average of daily Air Emissions per tourist-day in different destinations. Source: (WTO, 2008.)

The second situation that deserves consideration is the current relationship existing between MARPOL 73/78 and PEPAT. Article 13 of Annex IV of PEPAT[36], establishes that provisions of the Annex should continuously be revised by Parties and including new amendments and new regulations under MARPOL 73/78, to achieve the objectives of the Annex (Australian Antarctic Division, 2009). Currently, nothing so far has been done regarding the inclusion of MARPOL Annex VI into PEPAT, so an update of Annex IV of PEPAT should be done, as it was considered in the aforementioned Article (Jaap, 2005).

3.3.2.1.5 Marine noise pollution

This kind of pollution could be considered relatively new, although it has been present in the environment for a long time. At present, the maritime industry is not really aware of this, because there are no legally binding provisions obliging the

[36] Annex IV (Prevention of Marine Pollution) of Protocol on Environmental Protection to the Antarctic Treaty, Article 13: Review. "The Parties shall keep under continuous review the provisions of this Annex and other measures to prevent, reduce and respond to pollution of the Antarctic marine environment, including any amendments and new regulations adopted under MARPOL 73/78, with a view to achieving the objectives of this Annex."

industry to adopt measures concerning this problem. This because their effects are not so visible like other sources of pollution already regulated; a situation which does not mean that this source of pollution is less harmful.

Sound is the faster energy source spreading around the oceans and mainly comes from ship's noises like engine rooms, propellers, ecosounding devices and sonar. Undersea noise pollution is a real menace for marine ecosystems, affecting for example species like cetaceans, which have a characteristic hearing channel and being more or less sensitive to certain sound frequencies, disturbing acoustic information with other individuals living in communities. What complicates the problem even more is the fact that different kinds of ships generate different patterns of undersea noise, making the estimation of effects in the environment difficult for experts. Anyhow, what is clear now is that cargo and passenger ships produce higher levels of noise, as their engine rooms are noisier than other ships like for instance ice-breakers (Antarctic Treaty Consultative Meeting, 2006).

In Antarctica marine acoustic systems are mainly used contributing to a safe navigation. For example echo-sounders are used to measure depth, monitoring the position of submerged icebergs and the production of hydrographic charts. In that sense in 2006, during the COMNAP meeting XVII in Bulgaria, it was agreed that research on identification of the types of marine acoustic systems currently installed on National Program vessels will be carried out and the obtained information will be delivered to SCAR for further analysis[37] (Antarctic Treaty Consultative Meeting, 2006). Concerning regulations, nothing so far has been considered regarding marine noise pollution, neither IMO nor ATCP have enacted any guidelines in this regard. On this subject at MEPC 59 this matter was discussed looking for the development of technical guidelines[38] (International Maritime Organization, 2009).

[37] It was the first attempt for find out the dimension of the problem and details of 22 vessels were received. The outcomes of the research show six different types of acoustic systems, to as navigational aids; 1) Single beam echo-sounders, 2) Multi beam echo-sounders. The other four used for research; 1) Acoustic Doppler Current Profilers (ADCP), 2) Air guns, compressors and arrays, 3) Biological echo-sounders, 4) Sub-bottom profilers. However it is only a first step and is not considering commercial vessels where the quantity of ships visiting Antarctica is bigger.

[38] MEPC 59 was held 13-19 July 2009. The report of a technical group designated was analyzed with the intention of future development of voluntary technical guidelines for ship-quieting technologies and also operational practices to reduce undersea noise.

3.3.3 Ship accidents

In the last 16 years, maritime traffic in Antarctica has increased more than seven times, from 35 during the season 1992/93 to 258 the last summer. In the last 2 years 6 accidents occurred, as can be seen in Appendix D and in one of them a ship sunk fortunately without victims. The boom of Antarctic cruises started in the early 1990´s, increasing the number of ships sailing especially in the Antarctic Peninsula. Unfortunately, the size of ships has also grown, carrying some of them more than 3,000 people on board. This, added to safety issues previously discussed regarding safety[39], increase the probability of ship accidents with unforeseen results, evidencing some weaknesses and threats that will be treated next.

3.3.3.1 Search and rescue

In consideration of the hazards associated to Antarctic navigation and the increase of maritime traffic during the past few years, accidents like grounding or collision with ice are an expected scenario. Safety of life at sea and the duty of rendering assistance in case of a ship accident, are old customs as well as obligations stated in important instruments like UNCLOS[40] and SOLAS[41]. In these instruments obligations are recognized for ships in the vicinity and Coastal States regarding assistance. The International Convention on Maritime Search and Rescue, 1979 (SAR 1979), materialized the idea, intended to develop a worldwide coverage SAR

[39] Safety issues like the lack of appropriate crew training for Antarctic navigation, lack of appropriate rules regarding ship design, inadequate life saving appliances and the quality of nautical charts and aids to navigation.

[40] UNCLOS Article 98. “Duty to render Assistance”; 1. Every State shall require the Master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers; (a) to render assistance to any person found at sea in danger of being lost; (b) to proceed with all possible speed to the rescue of persons in distress, if informed of their need of assistance, in so far as such action may reasonably be expected of him; (c) after a collision, to render assistance to the other ship, its crew and its passenger and, where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call. 2. Every Coastal State shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea and, where circumstances so require, by way of mutual regional arrangements co-operate with neighboring States for this purpose.

[41] SOLAS Chapter V “Safety of Navigation”, Regulation 7 – Search and rescue services.

plan, offering a structure for cooperation among states for the rescue of people in distress (International Maritime Organization, 2009). After the adoption of the SAR Convention, IMO divided the world in 13 SAR areas, where countries also have delimited their responsibility areas. In Antarctica, Argentina, Australia, Chile New Zealand and South Africa have SAR responsibilities, as can be seen in Figure 3.10.

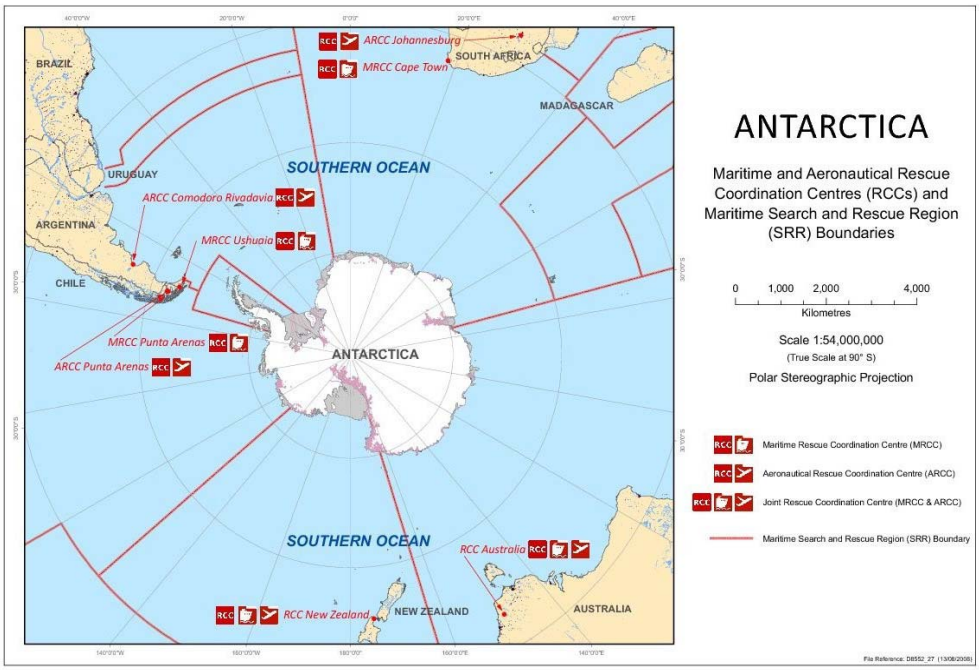

Figure 3-10: SAR Regions in Antarctica.
Source: (COMNAP, 2008, Report – Antarctic SAR Workshop, Appendix 5.)

In terms of SAR operations, Antarctica is a complex scenario. Geography and climate are particularly complex, but without any doubt the most complex issue surrounding Antarctic SAR operations is remoteness. In fact, the whole region lacks due facilities and assets for carrying out a prompt operation and the continuous deployment of means will also be very expensive for the 5 countries aforementioned. Therefore, prevention should be considered as an important priority not only for shipping, but also for air operations considering that prevention is directly proportional to the reduction of emergencies requiring SAR operations (Antarctic Treaty Consultative Meeting, 2008).

3.3.3.2 Oil pollution

From the different kinds of environmental pollution, just a few have the damage dimension of an oil spill. Examples such as the Exxon Valdez and the Prestige are difficult to forget.

Antarctica has not been exempt from this problem as can be seen in Figure 3.11. There have been some important accidents causing important oil spills, like the sinking of the Argentinean transport Bahía Paraíso in Arthour Harbour, in the Antarctic Peninsula in January 1989. This accident caused an average spillage of 600,000 liters of diesel, affecting an area of 100 km2 and the sinking of the M/S Explorer causing an average spillage of 185,000 liters of bunker and 24,000 liters of lubricants, affecting an area of 40 km2 (Conservation Science Institute, 2007).

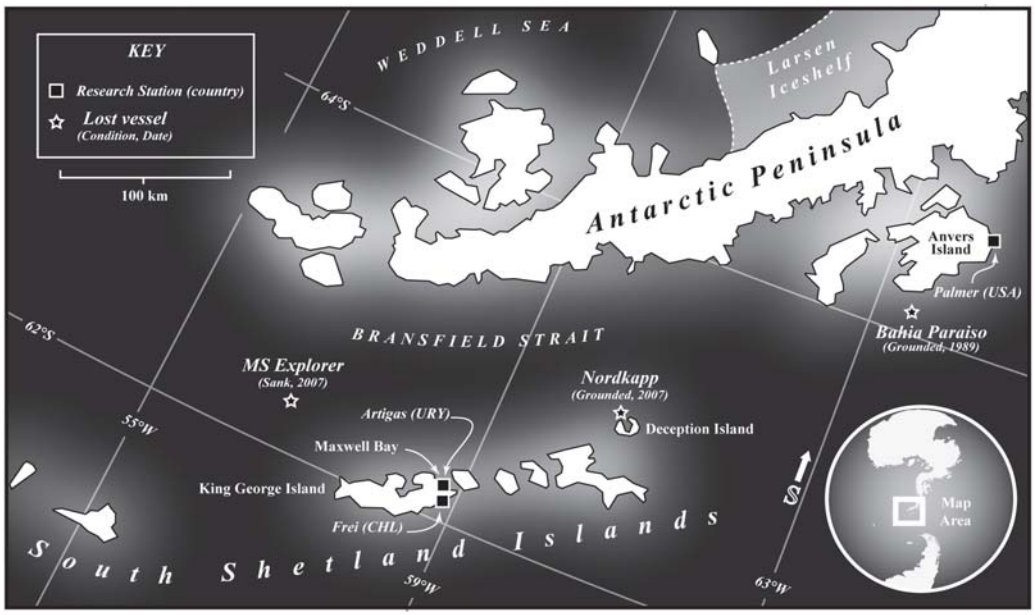

Figure 3-11: Location of major accidents causing oil spills in Antarctica.
Source: (InfoNorth, 2008. Vol 61, Nº 2, June 2008)

The nature of cleaning operations in cold waters is quite different than the operations realized in warm ones. The complexity of operations relies mainly on weather and ice conditions, in addition to the changes suffered by the spillage itself due to low temperatures. When air temperatures reach 20º below the fluidity

temperature of oil, it becomes more viscous. In the case of a heavy grade oil spill, for example, it will basically become a sort of tar. In the case of lighter oils like gasoline and diesel, the majority will be evaporated and dissipated naturally. Nevertheless, this process is drastically slowed down by the effect of temperatures. The surplus will form small particles semi-solids remaining in the water for a long time. As a result, the wildlife will be severely affected because of the toxicity of oil, causing physical damage and toxic contamination by ingestion and inhalation. It will also generate less availability of food, affecting the whole food web and producing ecological damages difficult to measure (Australian Maritime Safety Agency, 2003). A description of available techniques for oil spills combating can be found in Appendix E, since this is not the main scope of this research.

3.3.3.3 Liability and compensation in case of accidents involving oil spills

After an oil spill, there will always be two important questions to solve: Who will clean up and restore the place affected and of course the most important who will pay for it?

Antarctica regarding issues of liability and compensation by oil spills is trapped in a very special legal condition. Today, IMO liability conventions in place, such as the International Convention on Civil Liability for Oil Pollution Damage of 1969 (CLC 1969) in the case of Tankers, or the International Convention on Civil Liability for Bunker Oil Pollution Damage 2001 (BUNKERS 2001) in the case of ships carrying oil as bunker on board (oil for ship consumption), only apply in territorial waters and EEZ (International Maritime Organization, 2009). Considering the special status of Antarctica, where the AT has frozen all territorial claims and expressly declared that waters surrounding Antarctica are subject to the regime of the High Seas, there is no convention presently covering these matters in Antarctic waters.

With the entry into force of PEPAT and according to Article 16[42], Parties undertake to elaborate procedures relating to liabilities arising for activities developed in Antarctica. It was the key provision for the development of Annex VI of PEPAT, which was adopted in June 2005. This Annex was developed to address issues of liability arising from environmental emergencies derived from scientific research, tourism and all other governmental and non-governmental activities carried out in the AT area. However, this Annex also has some important deficiencies, for the sake of argument it does not includes fishing vessels. This is an important issue considering the number of fishing vessels operating in Antarctic waters and the fact that some accidents have already occurred there (Australian Antarctic Division, 2009). Unfortunately, this important Annex is not yet in force since until today it is not ratified by all ATCP, so the issue of liability and compensation for environmental damages in Antarctic waters remains in a legal vacuum.

3.3.3.4 Wreck removal

This is an issue not so new in Antarctica and two different situations must be recognized. First in the Shetland Islands and the archipelagos located in the west coast of the Antarctic Peninsula, there are several existing ship wrecks mainly corresponding to Antarctic whaling settlements. Those settlements are today recognized as historic heritage and their possible risks to the environment were identified as almost inexistent by the international scientific community (HISTAMAR, 2003). Second, considering the increasing number of ships visiting Antarctica today, grounding involving a total loss is not unlikely at all.

Regarding this issue, the new International Convention on the Removal of Wrecks was adopted in 2007 not being in force yet (International Maritime Organization, 2007). Nevertheless, when this convention enters into force, it will not be useful as

[42] Article 16 of PEPAT "Liability", establish that; "Consistent with the objectives of this Protocol for the comprehensive protection of the Antarctic environment and dependent and associated ecosystems, the Parties undertake to elaborate rules and procedures relating to liability for damage arising from activities taking place in the Antarctic treaty area and covered by this Protocol. Those rules and procedures shall be included in one or more Annexes to be adopted in accordance with Article 9 (2).

such in Antarctica, because the considered implementation area of the Convention as defined in Article 1 (1) [43], is the EEZ of a State, so as long as Antarctic waters remain according to existing legal regimes in a condition of the High Seas, it will remain in a legal uncertainty.

3.4 Conclusions of the Chapter

Antarctica as regards maritime safety and environmental protection is facing several challenges today. The biggest challenges can be identified in climate change, shipping activities, fishing and tourism.

In the long-term, climate change is one of the major threats affecting the Antarctic ecosystems. With the increase of ocean temperature and shipping activities, invasive species have arrived with unforeseen consequences for the Antarctic ecosystem.

Antarctic shipping has grown steadily over the last few years and several issues have arisen as a result of such activities, as regards safety of life at sea and environmental protection.

Operational ship-source pollution, as a result of the increasing number of ships in the Southern Ocean, has become an important issue to be considered and as long as there are no accurate studies confirming the level of the impact, it is difficult to appreciate the environmental damage comprehensively.

As regards fishing, the problem of IUU fishing, is affecting sustainability of the activity and threatening the marine ecosystem. The development of a new exploitation regime must be an urgent priority. Although CCAMLR has applied interesting concepts, such as the precaution principle, its operative structure

[43] International Convention on the Removal of Wrecks, Article 1 (1), "For the purpose of this Convention: 1) "Convention area" means the exclusive economic zone of a State Party, established in accordance with international law or, if a State Party has not established such a zone, an area beyond and adjacent to the territorial sea of the State determined by the State in accordance with international law and extending not more than 200 nautical miles from the baselines from which the breadth of its territorial sea is measured.

complicates effective actions mainly because of the consensus mechanism needed for putting in place new measures. This is weakening its work and delaying the effectiveness of their policies.

Ship-borne tourism has been growing steadily in recent years. Recent accidents have shown several weaknesses in the area of safety and environmental protection. If such issues are not addressed promptly, sooner or later a disaster involving human lives and significant environmental damage will occur.

Chapter IV
Possible Improvements and Recommendations for Addressing Existing Problems

4. CHAPTER FOUR: POSSIBLE IMPROVEMENTS AND RECOMMENDATIONS FOR ADDRESSING EXISTING PROBLEMS

4.1 Improvements and recommendations concerning fishing activities

As stated in the previous Chapter, during the past few years IUU fishing in Antarctic waters has increased. Patagonian toothfish and krill today are the most demanded species. CCAMLR since its inception has been dealing with regulations for controlling and managing fishing activities in a sustainable way. Accordingly, CCAMLR adopted an ecosystem approach for its management, looking not only for ensuring the viability and recovery of captured species, but also for ensuring the continuity of ecological relationships among the different species shaping the Antarctic marine ecosystem (Joyner, 1992). IUU fishing, as well as the lack of control and enforcement capacity, has proven that CCAMLR has not been as successful as it was expected. In 2000, CCAMLR adopted the Catch Documentation Scheme (CDS) and according to this measure every unloading of Patagonian toothfish should go accompanied by a Catch Document Form (CDF), following a procedure detailed in Appendix F[44]. This has been an important step for stopping IUU fishing. However, considering that currently the situation regarding krill is uncertain, as explained before, this measure could also be extended for krill unloading, getting a better overview and control as regards this species, which is recognized as a keystone species in the Antarctic food web (Organization for Economic Co-operation and Development, 2004).

Another measure that can be implemented in order to solve the problem of uncontrolled and undocumented unloading in countries not parties to CCAMLR can be the inclusion of krill and toothfish in Appendix II[45] of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Currently, CITES has been ratified by 175 countries and is recognized for its

[44] Appendix F. "Explanatory Memorandum on the Introduction Catch Documentation Scheme (CDS) for Tootfish (Dissostichus Spp.)".

[45] Appendix II of CITES includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.

efficiency in regulating international trade of several endangered species (CITES, 2009). Although it was proposed earlier by Australia, it did not get enough support and only Patagonian toothfish was proposed at that time. The inclusion of both species in CITES seems to be the ideal supplement for giving support to CCAMLR measures.

In 2004, CCAMLR adopted the inception of a Vessel Monitoring System (VMS). This system became fully binding for contracting Parties in May 2005, as a way to provide satellite tracking of fishing vessels operating inside the CCAMLR area. It also had the purpose of contrasting the validity of information contained in the CDF forms as regards the area where the resource was captured. This report system delivers information directly to their respective Flag States and CCAMLR Secretary. However, this measure still has several limitations. One problem is that it is only applicable once ships have entered the CCAMLR area (Rayfuse, 2004). Consequently, a ship is allowed to disconnect the VMS system during the passage to the convention area. The latter, could potentially allow entrance of fishing vessels to the CCAMLR area doing illegal captures without leaving any evidence of this irregularity. Therefore, CCAMLR should look inside the organization (Member Parties) for the mandatory use of the VMS during the whole crossing. A closer work with FAO to encourage non CCAMLR countries will be also very valuable to implement this measure, improving control mechanisms to reduce illegal unloading. Moreover, this is in accordance with the FAO Code of Conduct for Responsible Fisheries and the International Plan of Action to Prevent, Deter and Eliminate IUU Fishing.

Another measure that can be useful is the promotion through CCAMLR and FAO of the ratification of the United Nations Fish Stock Agreement, 1995 (UNFSA). It can be considered as the most important international agreement governing high seas fisheries. UNFSA is an important tool to address IUU fishing, especially regarding the provisions stated in Article 21(1)[46] concerning sea boarding inspections and

[46] United Nations Fish Control Agreement. Article 21(1). " In any high seas area covered by a subregional or regional fisheries management organization or arrangement, a State Party which is a member of such organization or a participant in such arrangement may, through its duly authorized inspectors, board and inspect, in accordance with paragraph 2, fishing vessels flying the flag of another State Party to this agreement, whether or not such State Party is also a member of the organization or a participant in the arrangement, for the purpose of ensuring

regarding Port State Control according to Article 23[47]. So far 75 States are members of this Agreement, almost half of UNCLOS Parties; hence the bigger number of States Parties, the higher the possibility to prevent and deter IUU fishing (Organization for Economic Co-operation and Development, 2004).

4.2 Improvements and recommendations concerning environmental protection

4.2.1 An attempt to solve jurisdiction problems

Currently Antarctica is immersed in a legal vacuum as regards environmental protection. The presumed condition of the High Seas of Antarctic surrounding waters leaves Antarctica legally defenseless in case of an environmental disaster like an oil spill, since today there is no liability regime in place applying in the High Seas. The problem itself is not easy to solve and for the sake of argument, a number of theories as regards administrative models for Antarctica have been developed (Lee, 2005). However, nothing so far could make a presumption over a replacement in a near future of the ATS for a new comprehensive administrative regime. Moreover, ATS has been recognized over time for its success in changing

compliance with conservation and management measures for straddling fish stocks and highly migratoty fish stocks established by that organization or arrangement.

[47] United Nations Fish Control Agreement. Article 23. (1) " A Port State has the right and the duty to take measures, in accordance with international law, to promote the effectiveness of subregional, regional and global conservation and management measures. When taking such measures a Port State shall not discriminate in form or in fact against the vessels of any State. (2) A port State may *Inter Alia,* inspect documents, fishing gear and catch on board fishing vessels, when such vessels are voluntarily in its ports or at its offshore terminals. (3) States may adopt regulations empowering the relevant national authorities to prohibit landings and transshipments where it has been established that the catch has been taken in a manner which undermines the effectiveness of subregional, regional or global conservation and management measures on the high seas. (4) Nothing in this article affects the exercise by States of their sovereignty over ports in their territory in accordance with international law."

the potential militarization of Antarctica, into a continent of peace and science, evolving according to current needs by incorporating a wide-ranging environmental regime. Unfortunately the same legal argument of freezing sovereignty has created weaknesses regarding enforcement of the ATS and international instruments concerning environmental protection. A complicated issue mainly for countries not members to AT, which today are a considerable number (Rothwell, 2002). In the case of Antarctic waters, today enforcement of legal regimes is an exclusive duty and jurisdiction of Flag States. Nevertheless, ineffective control over ships by some Flag Sates is an issue of relevance in a place like Antarctica, where no coastal state sovereignty is recognized (Vukas, 2000). The logical conclusion is that the problem could be solved if the sovereignty issue is properly addressed. Looking for an answer, three proposed approaches could be considered:

A. There have been some approaches before suggesting the internationalization of Antarctica with the purpose of creating a sort of international government. Nonetheless, the latter imply the renunciation to territorial claims freezing by the AT (Lee, 2005). An alternative proposal would be to keep the AT and develop a new administrative authority similar to a fictitious state, only for exerting jurisdiction in matters of protection of the marine environment and developing maritime zones. This will imply possible amendments in Article IV of AT and the replacement of the Article VI as regards the High Seas freedom for states in Antarctic waters. It will also imply the introduction of a new Part in UNCLOS. The probable benefits include the solution of existing problems concerning the applicability of existing IMO Conventions, regarding for example liability and compensation. Another feasible benefit could be the usage of the International Tribunal of the Law of the Sea for the disputes arising for example in case of oil pollution, since this new authority will be dealing with a single Country, and also this tribunal is constituted by members of different geographical groups.

B. The other alternative, considers an arrangement for a special recognition of maritime jurisdiction by the international community over those claims made by AT claimant countries. At present, almost all AT claimant parties have declared Antarctic maritime zones today frozen by the treaty and the

authenticity of those claims rest on the recognition of the other states. Thus, recognition could be negotiated as in the previous proposal, being limited only to legal prosecutions in case of marine environmental damage. This proposal will also solve the main issue of liability and compensation in case of marine pollution. However, there will be a problem to solve as regards this proposal. Today 7 countries maintain territorial claims over Antarctica and three of them, Argentina Chile and the UK have overlapped claims. It will pose a major challenge as regards jurisdiction. A similar situation regarding jurisdiction can be appreciated in an area of Antarctica not claimed yet by any country (Scepanovic, 2003).

Both proposals discussed above need further studies and evaluation and although they could look politically incorrect as regards current legal regimes, it should be considered that those legal regimes were enacted in a time when current levels of shipping activities in Antarctica were unexpected and unforeseen.

C. The third proposal is to do nothing and probably this will be the position which will prevail at least in the short-term. Therefore, other measures concerning safety and environmental protection should be made.

4.2.2 Development of an Antarctic MOU for Port State Control (PSC)

PSC[48] became during the past few years the last shackle in the chain of ships compliance verification. This is because some Flag States have failed in fulfilling their duties according to internationally accepted marine standards (International Maritime Organization, 2009). This issue takes a special relevance in the case of Antarctica. Currently, nearly 100% of ships stop in the so called Antarctic gateway countries[49]. Thus, it can be a powerful tool to ensure that ships going to Antarctic waters are full in compliance with all international rules to minimize risk in such a

[48] PSC is one way of exerting authority by States in waters submitted to national jurisdiction. It consist of inspection carried out to foreign ships in national ports, to which maritime international instruments are applicable and which the local State is party and inserted in domestic law.

[49] Antarctic gateways countries are mainly recognized as Argentina, Australia, Chile, New Zealand and South Africa.

remote area like Antarctica. As a way of harmonizing PSC procedures, the development of an Antarctic Memorandum of Understanding (MOU) is proposed. The aforementioned will also be beneficial in helping enforcement of PEPAT provisions, considering the increasing number of ships visiting Antarctica, a situation seeming to continue in the future. This could be reached through an agreement among departure States setting minimum requirements for instance to Tourist Vessels, a situation considered in Article VII of AT(5)[50] (The Antarctic and Southern Ocean Coalition, 2003).

4.2.3 Development of a new liability convention

Today liability and compensation is only covered by Annex VI of PEPAT. However, this important Annex is not yet in force, and has several weaknesses as it was stated before (Australian Antarctic Division, 2009). In that sense, in case issues of jurisdiction will not be solved (a situation that will probably happen), the development of a new liability convention for the Southern Ocean will be highly beneficial to solve existing problems in that area. This new convention should be developed with a different approach compared to liability conventions today in place, since existing conventions were designed to cover the territorial sea and EEZ, and these maritime zones are not yet recognized in Antarctic waters. Thereby, an approach based in geographical coordinates could be further considered (Zovko, 2005; The Antarctic and Southern Ocean Coalition, 2009).

[50] AT; Article VII(5) "Each Contracting Party shall, at the time when the present Treaty enters into force for it, inform the other Contracting Parties, and Thereafter shall give them notice in advance, of (a) all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory; (b) all stations in Antarctica occupied by its nationals; and (c) any military personnel or equipment intended to be introduced by it into Antarctica subject to the conditions prescribed in paragraph 2 of Article I of the present Treaty.

4.2.4 Antarctic Peninsula as a Particularly Sensitive Sea Area (PSSA)

PSSA is a concept developed by IMO, to introduce more stringent rules as regards safety and environmental protection in an area which is considered unique taking into consideration scientific, socio-economic or ecological motivations and which currently is exposed to damage because of international maritime activities (International Maritime Organization, 2006). This concept has been successful in implementing special measures to minimize risk and currently there are 11 PSSA and one extended PSSA in place, as can be seen in Appendix G. Although Antarctica is considered Special Area under Annex I, II and V of MARPOL 73/78, the PSSA concept is not exclusive with the existing designation of Special Area. Currently, the Antarctic Peninsula fulfills the criteria established by IMO for a PSSA. It concentrates nearly 90% of ship-borne tourism, which has been increasing steadily every year (International Association of Antarctica Tour Operators, 2009), and it is scientifically recognized as a place of feeding and breeding during summer and autumn for several species like penguins and whales (Ducklow, Baker, Martinson, Quentin, Ross, Smith, Stammerjohn, Vernet & Fraser, 2007).

It should be studied within the AT forum, the feasibility[51] of designating the Antarctic Peninsula as a PSSA. If applicable, it will provide a powerful tool for the designation of areas to be avoided, minimizing risk of casualties, improving environmental protection and allowing ships routing, which will also be beneficial in terms of SAR operations.

[51] Currently, there are no PSSA designated in waters flaunting the conditions of High Seas yet ; although Resolution A.982(24) "Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas", has no provisions denying the applicability of this concept in the high seas, the provisions stated in paragraph 7.10 as regards the details of actions to be taken pursuant domestic law, for the failure of a ship to comply with the requirements of the associated protective measures, should be carefully analyzed.

4.2.5 Sewage treatment

As stated in Chapter III, today MARPOL 73/78 is less stringent than PEPAT coexisting in a complex situation as regards sewage treatment in Antarctica (Jaap, 2005). In that sense an amendment could be introduced to designate Antarctica as Special Area under MARPOL Annex IV (not existing today). Thus, regulations stated in MARPOL Annex IV concerning Antarctica (as a Special Area) could be established on *par* with PEPAT, since today there is not enough scientific evidence regarding the real dimension of sewage effects in Antarctic ecosystems. Therefore, a precautionary approach will be a way to deal with this problem (Rothwell, 1996). Another aspect is that currently almost all ships have treatment plants meeting IMO requirements for sewage discharge, so in practice a high percentage of ships meet the provisions of MARPOL 73/78 rather than provisions settled in Annex IV of PEPAT.

4.2.6 Air Pollution

Considering the information provided as regards ships emissions in Antarctica (World Tourism Organization, 2008), and also that currently Antarctica is declared Special Area under Annex I, II, and V; ATCP should study the feasibility of a proposal for designating Antarctica as a SECA under provisions of MARPOL Annex VI. This is a matter of increasing importance, considering the growing number of ships operating in Antarctica and provisions stated in PEPAT as regards Antarctic environmental protection (Jaap, 2005).

4.3 Improvements and recommendations concerning safety issues

4.3.1 Promotion and development of Antarctic forums

The special legal condition of Antarctica accentuates problems such as enforcement and control of fishing agreements, SAR operations, and as it was discussed previously, PSC approaches. Accordingly and following other regional examples, the promotion of different forums would be beneficial in terms of sharing resources and improving capabilities for example among SAR systems and oil combating teams for the so called Antarctic Gateway Countries[52]. Concerning SAR, in 2008 the first SAR workshop among countries sharing SAR responsibilities in Antarctica was carried out in Chile. The purpose was to discuss practical issues, analyze potential SAR scenarios and strengthen links among them. Important outcomes were obtained at the end, and a new workshop will be held in Argentina in November 2009, looking for bilateral and multilateral agreements concerning maritime and aviation SAR (Antarctic Treaty Consultative Meeting, 2009).

4.3.2 Risk assessment and contingency planning

Considering the nature of shipping in Antarctic waters involving several hazards and the fact that not all ships belongs to AT countries, it is imperative to define them in a comprehensive way, determining whether they are acceptable or not. Thus, closer work between ATCP, IMO, private tourist stakeholders represented for instance by IAATO and NGO's involved in Antarctic matters like ASOC, should be established to reach consensus regarding the assessment and management of risks in Antarctic waters. This is a matter of importance, considering that risk estimation, is rather subjective, as it relies on the judgement of people carrying out the assessment. Therefore, the appreciation of risks can differ among experts, and a comprehensive

[52] Ibid [17]

working group will be able to generate better results in order to increase awareness regarding this important matter (Leschine, 2002).

The results obtained should raise proposals to minimize the potential impacts of risks involved in Antarctic shipping and stimulate the implementation of technical solutions. This can be made through the development of new regulations or simply improving accurate contingency planning procedures, with the final goal of addressing not only those threats coming from potential accidents, but also those threats coming from ship operations in general. In that sense, it is good to bear in mind that with more ships sailing in Antarctic waters, the risk of maritime casualties and marine pollution will increase.

4.4 Proposals for improving Flag State compliance and obedience of AT provisions in the Southern Ocean

Today several ships sailing to Antarctica belong to flags of countries not members of AT, so as a way to improve Flag State compliance with international instruments and the ATS, two proposals are suggested:

First, a system of rewards might be implemented by ATCP; encouraging vessels to switch flags to party countries and punishing those vessels that continue operating out of the system, with the final goal of improving Flag State control and implementation. Benefits could be granted implementing lower fares and tax rates in the Antarctic Gateway Countries[53] for those vessels flagging AT member flags and increasing them for non-member vessels. Another way of punishing those vessels operating out of the system is denying visits to scientific stations, since they belong to Treaty Parties and this activity is one of the pillars of ship-borne tourism in Antarctica. The only problem met in this approach could be located in domestic regulations on ATCP. This, because some ATCP are currently not allowing multinational crews in ships under their flags, affecting the cost for shipping

[53] Ibid [17]

operators, a situation that might constitute a hurdle. However, this is an alternative that deserves further studies.

Second, as stated before, closer and collaborative work among AT members and other forums, such as IMO and FAO could improve compliance with international standards, encouraging also the obedience of provisions existing in ATS, since they are in concordance with safety and environmental protection.

4.5 Main technical standards to be addressed in the short-term for Antarctic shipping operations

Currently, in the opinion of the author, there are three main areas that require urgent consideration, because they will decrease potential risks and harmful effects to ship safety and the environment: Ship construction and equipment; quality of fuel and crew competency.

Concerning ship construction and equipment as stated in Chapter III, all ships operating in Antarctica should have suitable ice classification and enhanced LSA equipment, such as enclosed life boats and immersion suits for all crewmembers and passengers. This because in case of an accident, there is a high probability of bad weather and rough sea conditions, so an ice classed ship duly equipped is in line with the precautionary approach that should prevail on Antarctic trips.

Regarding quality of fuel, due to the special legal regime governing the southern ocean, the physical challenges to be faced in case of cleaning operations and the potential damage to the environment, the banning of heavy grade oil for ship consumption is an urgent matter to be considered by IMO as an amendment to MARPOL Annex I.

As regards crew competency, the review and introduction of new regulations in the STCW convention concerning training and certification in ice-covered areas is crucial. The latter, due to a properly equipped ship without properly qualified crew can be catastrophic.

The provisions mentioned should be considered also for fishing vessels, since they are also operating in the Southern Ocean, and some accidents involving fishing vessels have already occurred in Antarctic waters.

4.6 Provisions not considered in this Chapter

Some issues previously mentioned were not deeply analyzed as regards proposals for improvements, since they are currently under study, revision or development in forums like IMO. This is the case for example with the extension of the Guidelines for ships operating in Arctic ice-covered waters to be applicable in Antarctica, the inclusion of mandatory provisions in the STCW as regards training and certification for Antarctic navigation, and the banning of heavy grade oil usage in Antarctic waters. A brief summary of those issues is given in Appendix H.

Chapter V
Conclusions

5. CHAPTER FIVE: CONCLUSIONS

5.1 Summary and general conclusions

Shipping has a number of impacts on Antarctica and the Southern Ocean and considering the existing legal vacuum, the unpredictable and generally hostile weather conditions and its remoteness, there is an increasing threat for the environment and safety of life at sea, as human activities are growing.

UNCLOS was designed to provide global governance on sea related issues; nonetheless, today it fails in addressing the existing situation in the Southern Ocean. On the other hand, the frozen jurisdiction settled by AT currently makes impossible the applicability of liability and compensation regimes and other international instruments concerning environmental protection. As regards liability and compensation for accidents arising from shipping activities, Annex VI of PEPAT could be recognized as a first step in addressing this problem.

Although UNCLOS in the scope of jurisdiction has not effectively dealt with the Antarctic problem, its technical scope concerning safety and environmental protection is not restricted whatsoever. Thus, IMO as a recognized competent body has a vital role in strengthening regulations concerning safety and environmental issues. Another benefit of IMO instruments lies in their widespread acceptance. Therefore, closer work between ATCP and IMO is desirable and is likely to be fruitful in the future.

The biggest challenges affecting the Antarctic environment today are related to the climate change and the sharp growth of shipping activities in the past two decades.

Concerning shipping activities, today safety and environmental protection cannot be addressed properly as regards the existing legal regimes. At present, several issues remain unsatisfactory addressed or are simply not regulated.

With the growing number of vessels in the Southern Ocean, operational ship-source pollution has become an issue. In addition, invasive species has been discovered in Antarctic waters with unforeseen consequences. The situation is particularly

worrying, since very few areas of Antarctica and the seas around the continent are covered by any monitoring programs to be able to detect ecological changes.

Regarding fishing, the lack of an appropriate exploitation regime and the widespread IUU fishing are a potentially serious threat to the marine ecosystem. Again the lack of systematic monitoring over large areas is making this situation particularly serious.

Accidents in Antarctica have already occurred and will continue to happen as long as the number of ships sailing in Antarctica continues growing. Fortunately, until now a minimum loss of lives has taken place. Nevertheless, there are clear signs that the environmental problems are increasing as do the number of incidents involving ships. This has increased the awareness in the international community, regarding the lack of an appropriate legal framework, the technical problems in the area and the increasing threats to the environment.

As Antarctic waters have the legal status of the High Seas, the problem of jurisdiction and enforcement in Antarctica cannot be thoroughly addressed at the present time; since shipping from the very beginning has been an activity ruled by the freedom of the high seas. However, the role of Flag States is essential to achieve compliance with international instruments. Unfortunately, not all Flag States comply with their international commitments. As a consequence the risk for accidents and environmental impacts increase. Similarly, the problems associated with overfishing and IUU fishing are not fully addressed by Flag States. To ensure fulfillment of Flag States obligations with the international conventions, PSC has an important role to play.

To improve the accuracy not only of PSC, but also of other important issues like SAR, the development of international forums like an Antarctic MOU, or regional agreements concerning SAR will be highly appreciated, as a way of minimizing risk and potential accidents.

Finally, it is the reflection of the author that the management of shipping in the seas around the Antarctica should be oriented towards precaution instead of prevention, as prevention more or less accepts and deals with certain levels of risk, while

precaution requires a higher level of commitment to deal with environmental as well as safety threats.

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Appendices

7. Appendix A : Signatory Countries to the Antarctic Treaty

The Antarctic Treaty (AT) deals with Antarctic international relations as regards sovereign issues among claimant countries, freezing all territorial claims and declaring Antarctica as a continent dedicated to peace and science banning military activities on the continent

It was opened for signature in 1959 and entered into force in 1961. Originally, there were 12 signatory countries. The treaty established that Member Countries of the United Nations can accede to it at any time. Today there are two categories of members: Consultative Parties and Non Consultative Parties. There are two conditions to be an ATCP; one is being one of the original signatory countries or being a Country carrying out significant scientific research there. ATCP are entitled to attend Antarctic Treaty Consultative Meetings (ATCM) and participating in the policy making process while non ATCP are not (Rothwell, 1996)

Today, there are 47 signatories and 28 of them are Consultative Parties. Table 1 considers Consultative Parties, while Table 2 considers Non Consultative Parties (ATS, 2009).

Table 7-1: Consultative Parties to AT

Country	Entry into force	Consultative status
Argentina	23 Jun 1961	23 Jun 1961(*)
Australia	23 Jun 1961	23 Jun 1961(*)
Belgium	23 Jun 1961	23 Jun 1961(*)
Brazil	16 May 1975	27 Sep 1983
Bulgaria	11 Sep 1978	05 Jun 1998
Chile	23 Jun 1961	23 Jun 1961(*)
China	08 Jun 1983	07 Oct 1985
Ecuador	15 Sep 1987	19 Nov 1990
Finland	15 May 1984	20 Oct 1989

France	23 Jun 1961	23 Jun 1961(*)
Germany	19 Nov 1974	03 Mar 1981
India	19 Aug 1983	12 Sep 1983
Italy	18 Mar 1981	05 Oct 1987
Japan	23 Jun 1961	23 Jun 1961(*)
Korea (Republic of)	28 Nov 1986	09 Oct 1989
Netherlands	30 Mar 1967	19 Nov 1990
New Zealand	23 Jun 1961	23 Jun 1961(*)
Norway	23 Jun 1961	23 Jun 1961(*)
Peru	10 Apr 1981	09 Oct 1989
Poland	23 Jun 1961	29 Jul 1977
Russian Federation	23 Jun 1961	23 Jun 1961(*)
South Africa	23 Jun 1961	23 Jun 1961(*)
Spain	31 Mar 1982	21 Sep 1988
Sweden	24 Apr 1984	21 Sep 1988
Ukraine	28 Oct 1992	04 Jun 2004
United Kingdom	23 Jun 1961	23 Jun 1961(*)
United States	23 Jun 1961	23 Jun 1961(*)
Uruguay	11 Jan 1980	07 Oct 1985

(*) The asterisk in brackets marks the permanent consultative status of the original parties with a date of entry into force of 23 June 1961.

Table 7-2: Non Consultative Parties to AT

Country	Entry into force
Austria	25 Aug 1987
Belarus	27 Dec 2006
Canada	04 May 1988
Colombia	31 Jan 1989
Cuba	16 Aug 1984

Czech Republic	01 Sep 1993
Denmark	20 May 1965
Estonia	17 May 2001
Greece	08 Jan 1987
Guatemala	31 Jul 1991
Hungary	27 Jan 1984
Korea (DPRK)	21 Jan 1987
Monaco	30 May 2008
Papua New Guinea	16 Sep 1975
Romania	15 Sep 1971
Slovak Republic	01 Jan 1993
Switzerland	15 Nov 1990
Turkey	24 Jan 1996
Venezuela	24 Mar 1999

Source: (ATS, 2009)

8. Appendix B: Signatory Countries to the Protocol on Environmental Protection to the Antarctic Treaty

The Protocol on Environmental Protection to the Antarctic Treaty (PEPAT) was opened for signature on October 4, 1991 and entered into force on January 14, 1998. PEPAT designates Antarctica as a "natural reserve, devoted to peace and science"[54]. It was developed basically as a response against the intention of settling a regime of exploitation of mineral resources in Antarctica. PEPAT consists of six Annexes. Annex I to IV came together with the Protocol, entering into force in 1998. Annex V on Area Protection and Management, was adopted independently in 1991 and entered into force in 2002. Finally, Annex VI which deals with Liability Arising from Environmental Emergencies was adopted in 2005 but is not yet in force, waiting for the approval of all Consultative Parties (ATS, 2008).

Table 3 shows the signatory countries to PEPAT, which basically consist of all ATCP members and 5 Non Consultative parties.

Table 8-1: Parties of the Protocol on Environmental Protection to the Antarctic Treaty

Country	Entry into force
Argentina	14 Jan 1998(*)
Australia	14 Jan 1998(*)
Belgium	14 Jan 1998(*)
Brazil	14 Jan 1998(*)
Bulgaria	21 May 1998(*)
Chile	14 Jan 1998(*)
China	14 Jan 1998(*)
Ecuador	14 Jan 1998(*)

[54] PEPAT 1991, Article 2. Objective and Designation, "The Parties commit themselves to the comprehensive protection of the Antarctic environment and dependent and associated ecosystems and hereby designate Antarctica as a natural reserve, devoted to peace and science."

Finland	14 Jan 1998(*)
France	14 Jan 1998(*)
Germany	14 Jan 1998(*)
India	14 Jan 1998(*)
Italy	14 Jan 1998(*)
Japan	14 Jan 1998(*)
Korea (Republic of)	14 Jan 1998(*)
Netherlands	14 Jan 1998(*)
New Zealand	14 Jan 1998(*)
Norway	14 Jan 1998(*)
Peru	14 Jan 1998(*)
Poland	14 Jan 1998(*)
Russian Federation	14 Jan 1998(*)
South Africa	14 Jan 1998(*)
Spain	14 Jan 1998(*)
Sweden	14 Jan 1998(*)
Ukraine	24 Jun 2001(*)
United Kingdom	14 Jan 1998(*)
United States	14 Jan 1998(*)
Uruguay	14 Jan 1998(*)
Belarus	15 Aug 2008
Canada	13 Dec 2003
Czech Republic	24 Sep 2004
Greece	14 Jan 1998
Romania	05 Mar 2003

(*) Antarctic Treaty Consultative Parties (ATCP).

Source: (ATS, 2009)

9. Appendix C: Objectives, participants and future aims of the IHO Hydrographic Commission on Antarctica (HCA)

The IHO Hydrographic Commission on Antarctica is a technical Hydrographic Commission of the International Hydrographic Organization.

The objectives of HCA were settled in Article 3 of the Statutes of the Commission, as listed below:

1. To promote technical co-operation in the domain of hydrographic surveying, marine cartography, and nautical information within the Antarctic region.
2. To stimulate the Members, Associate Members and Observers forming the HCA to widen hydrographic activity in the region in accordance with Antarctic Treaty Consultative Meeting (ATCM) Resolution 3 of 2003 (Appendix C), and to encourage them to seek technical advice and assistance from the International Hydrographic Bureau (IHB) in establishing and strengthening their hydrographic capabilities in order to promote safe navigation in the region.
3. To facilitate the exchange of information between Hydrographic Authorities and with other organizations concerning surveys, research or scientific, technical and operational developments, to aid in the planning and organization of hydrographic activities in the widest sense of them.
4. To encourage Members, Associate Members and Observers forming the HCA to participate actively, of their own free will, on all possible occasions – whether in the form of advice or of assistance – in those hydrographic programmes requiring concerted action, but without prejudice to or Interference with their national activities.
5. To examine the implications, in its area of interest, of matters of general interest with which the IHO is concerned avoiding any interference with the prerogatives of the IHB and of any other Regional Commissions set up by the IHO.
6. To implement the INT chart scheme for the region and to monitor its suitability.

7. To define the needs for new surveys and if necessary to develop co-operative approaches to meet those needs.
8. To facilitate the provision and wide dissemination of information for scientific purposes.
9. To carry out studies as a Working Group of the IHO, when considered appropriate.
10. To develop an annual report of the status and plans for hydrographic surveys in the region, including updating and amplifying relevant IHO Publications.
11. The HCA may appoint working groups of Member and Associate Members interested in particular projects with the object of examining and executing such projects. (IHO, 2009)

Today HCA is constituted by 23 Members:

- Argentina
- Australia
- Brazil
- Chile
- China
- Ecuador
- France
- Germany
- Greece
- India
- Italy
- Japan
- New Zealand
- Norway
- Peru
- Republic of Korea
- Russian Federation
- South Africa
- Spain

- Uruguay
- United Kingdom (UK)
- United States of America (USA)
- Venezuela. (IHO, 2009)

Among Observer Organizations participating in HCA meetings are:

- Antarctic Treaty Secretariat (ATS)
- Council of Managers of National Antarctic Programmes (COMNAP)
- Standing Committee on Antarctic Logistics and Operations (SCALOP)
- International Association of Antarctic Tour Operators (IAATO)
- Scientific Committee on Antarctic Research (SCAR)
- International Maritime Organization (IMO)
- Intergovernmental Oceanographic Commission (IOC)
- General Bathymetric Chart of the Oceans (GEBCO)
- International Bathymetric Chart of the Southern Ocean (IBCSO)
- IHO Data Center for Digital Bathymetry (DCDB)
- Australian Antarctic Division
- Antarctica New Zealand (IHO, 2009)

In 2006, a Long Term Survey Plan identified main and branch corridors developing an approach for that, as can be seen in Figure 9.1. A Scheme of High Priority Surveys was derived from the plan and it was reported to the XXIX ATCM, where it was endorsed. Sadly, the improvements are still very slow.

Today the INT Chart scheme includes 100 charts. Nowadays two new charts proposed by Brazil to cover the area of Elephant Island are under consideration. It has to be kept in mind that from time to time new requirements arise. The procedure followed by the HCA before accepting a new chart into the scheme, considers a close examination by the HCA. In December 2009, is expected that 65 INT charts will have been published, leaving 35 in the pending list. Special attention shall be given to the modest expectation on future production, as listed below:

a) 3 charts are planned to be produced in 2010

b) 1 chart is planned for 2011

c) 4 charts are planned for 2012

d) 1 chart is planned for 2013

e) 0 chart is planned for 2014

f) 5 charts are planned for " no earlier than 2015"

g) 21 charts have not yet been considered in the planning.

It is evident that if there is no change in the priority assigned by Governments to hydrographic surveying and nautical chart production, it is likely that the existing INT Chart scheme will not be completed before year 2025 (ATS, 2009).

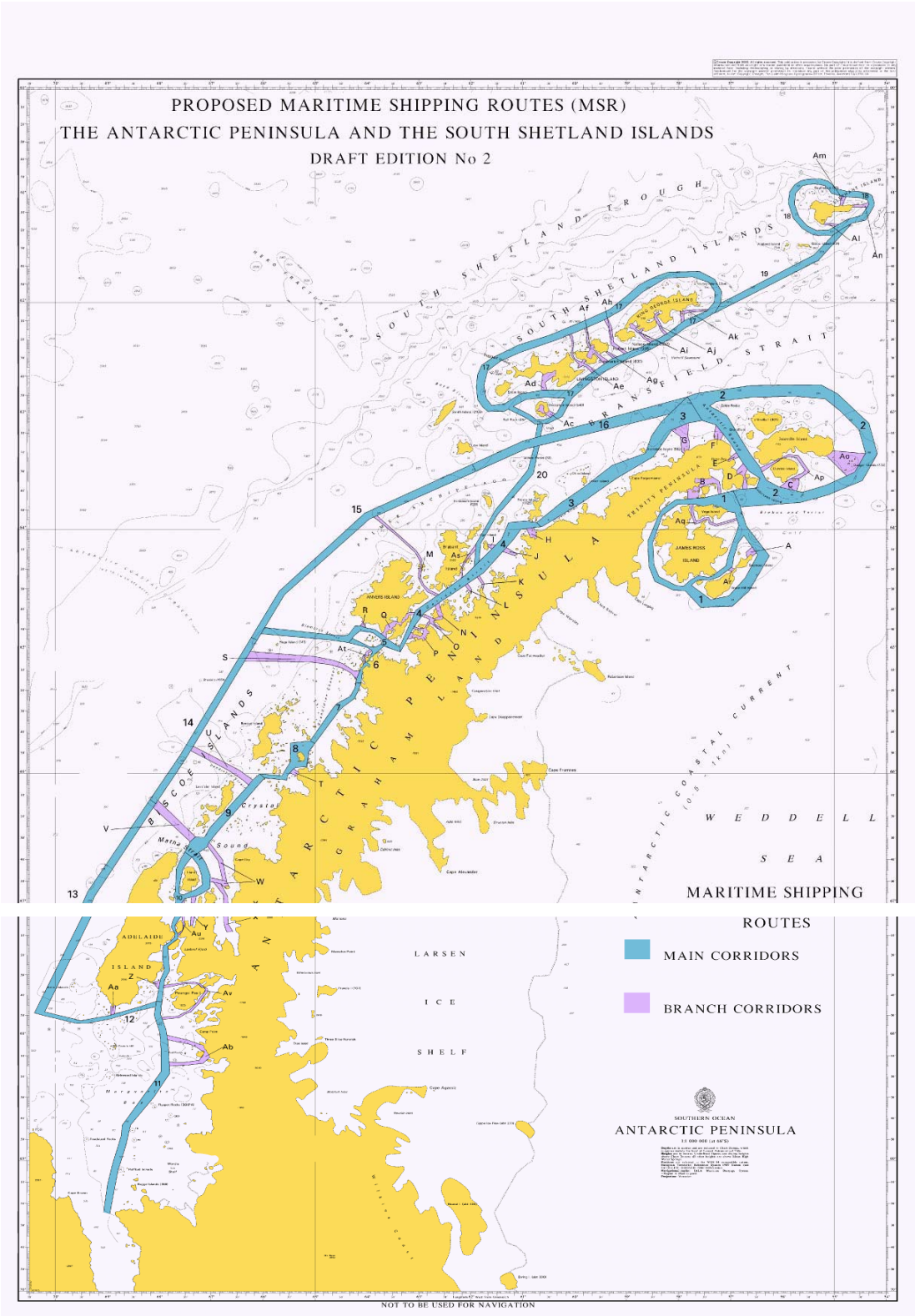

Figure 9.1: Scheme of High Priority Surveys

Source: (Antarctic Treaty Secretariat, 2009)

10. Appendix D: Main ship accidents occurred in Antarctica

Table 10-1: Main ship accidents in Antarctica occurred during the last 20 years

Year	Ship	Event
1989	**ARA Bahía Paraiso**	Ship struck a rock and capsized off Palmer Station spilling over 750 tonnes of marine diesel and jet fuel, Impacting birds and invertebrates with evidence of impacts measured three years after the spill.
1989	**BIC Humboldt**	The Peruvian scientific vessel grounded during a severe storm in Marian Cove, between Maxwell Bay and Potter Cove, on the south side of King George Island, spilling an unknown amount of oil.
2002	**M/V Clipper Adventurer**	Ship ran aground in the vicinity of Deception Island (King George Island, Antarctica). The ship was freed by a Chilean icebreaker. There was minor damage but no pollution occurred and there were no injuries.
2006	**M/V Lyubov Orlova**	The ship with 150 passengers onboard ran aground in Whalers' Bay while visiting Deception Island in the South Shetland Islands (en route to Antartica). A Spanish ship responded to the distress call and after an assessment waited for high tide and began towing operations. *The Orlova* was freed eight hours later and returned to Ushuaia on its own power.
2007	**M/V Nordkapp**	The *Nordkapp* ran aground in Whalers Bay, in the caldera of Deception Island. Approximately 350 tourists and crew were aboard when The ship ran aground. The ship was able to pull off the rocks under her own power, and no one was injured, but light blended marine diesel oil leaked into the ocean.
	F/V Nisshin Maru	The *Nisshin Maru*, a Japanese whale processing ship, suffered an explosion and caught fire in February 2007, resulting in the loss of one life and loss of power for several days.

	M/S Explorer	Reports indicated that the ship was holed by ice on the starboard side. After initial attempts failed to contain the damage, the order was given to abandon ship. All 154 people on board (91 passengers, 54 crew and 9 staff) were evacuated safely to the ship's lifeboats and zodiacs (small Inflatable boats). *The Explorer* was the first ship sunk in Antarctic waters.
	F/V Argos Georgia	The UK trawler *Argos Georgia* drifted for 15 days after losing power while fishing in the Ross Sea off Antarctica's northern coast on December 23 2007. Nobody were injured
	M/S Fram	The *M/S Fram* with about 300 passengers aboard, on December 30 suddenly lost power during night, the ship plunging into darkness. The ship drifted aimlessly and after a while starts moving towards a huge wall of ice, then slams right into it. The iceberg ripped open the ship, smashed a lifeboat, rending it useless. Finally, the captain regained control of the vessel after almost an hour adrift. Nobody were injured.
2008	**M/V Ushuaia**	The Panamanian flagged *MV Ushuaia,* grounded near Cape Anna in the NW of the Antarctic Peninsula, at the entrance to Wilhemina Bay, resulting in hull damage and the spillage of an unknown amount of fuel, on 4th December, 2008. The ship was evacuated and successfully refloated before returning to Punta Arenas for repairs.
2009	**M/V Ocean Nova**	The *Ocean Nova* grounded, reportedly in extremely high winds, on the Western Antarctic Peninsula. Nobody were injured.

Source: (ASOC, 2009)

11. Appendix E: Oil Combating Techniques in Ice-covered Waters

The Antarctic environment poses unique challenges to oil spill response technologies and techniques. While in some limited instances, arctic conditions might prove favorable to spill response; in most cases the Antarctic operating environment reduces the effectiveness of oil spill control and recovery methods and equipment.

Oil spill response methods are generally divided into three main categories: mechanical recovery, where oil is contained in an area using boom or natural containment and removed using skimmers and pumps; non-mechanical recovery where chemical countermeasures, burning, or bioremediation are used to degrade or disperse an oil slick; and manual recovery, where oil is removed using simple hand tools and techniques such as pails, shovels or nets.

Mechanical recovery and two major nonmechanical techniques – in-situ burning and dispersant application – to clean up or treat spilled oil are the most suitable methods for cold and ice-covered waters.

Mechanical recovery contains the spilled oil using booms, and collects it with a skimming device for storage and disposal. Booms are deployed from vessels or anchored to fixed structures or land. A number of different kinds of skimmers exist; they use suction, oleophilic materials or weirs to remove oil from the water's surface. Once the oil has been recovered, it must be transferred using pumps and hoses to temporary storage until it can be properly disposed of. Therefore, an effective mechanical recovery system requires that sufficient equipment and trained personnel are available and conditions are conducive to contain, recover, pump, transfer and store oil and oily wastes. Ultimately, all recovered wastes must be properly disposed of according to applicable regulations.

In-situ burning of spilled oil on the water's surface involves a controlled burn of floating oil that is contained to the appropriate thickness. The oil is ignited by releasing a burning, gelled fuel from a helicopter onto the oil, or by releasing an ignition device from a vessel or other access point. If successfully ignited, some or all of the oil will burn off the surface of the water or ice. There will always be some

residual non-volatile compounds that remain. This residue may float, sink or be neutrally buoyant depending upon the type of oil spilled and the conditions of the burn.

Successful ignition and burning require adequate slick thickness for ignition, minimal wind and waves, and oil that has not emulsified (incorporated water) too much. If a burn is inefficient, a mixture of unburned oil, burn residue and soot will form (NOAA, 2002). As in mechanical recovery, oil containment for ignition can be accomplished either with natural barriers or man-made booms that are both fire-resistant and able to withstand sea ice. Downwind emissions must be below threshold levels for sensitive populations (NRT, 1997). Chemical herders, currently under development, may thicken a slick to allow for ignition (Buist et al., 2006).

Dispersants are a group of chemicals sprayed or applied to oil slicks to accelerate the dispersion of oil into the water column. They do not remove oil from the water, but are intended to limit the amount of oil forming a slick on the water surface or shoreline by driving that oil into a dissolved phase. Dispersants are applied using spray nozzles, pumps and hoses, and can be applied from a vessel or aircraft. Dispersant operations are usually monitored from aircraft to make sure that the application is effective and on target. Dispersants have a limited timeframe for effective application, requiring a prompt, accurate application of the chemicals to the spilled oil with the oil type, emulsification, salinity, weather conditions and sea state all aligned.

Figures 11.1 to 11.3 show the typical components of t he three response systems described above. All three technologies require surveillance and spill tracking to identify the location, spreading and condition of the spilled oil in order to select and apply the appropriate response equipment and tactics. All three also require logistical support to transport equipment and trained personnel to the spill site, deploy and operate the equipment, and decontaminate the equipment when response operations are complete. Spill responders must be able to safely access the spill site in order to deploy the equipment. Accessing the spill site is often one of the biggest challenges, particularly in remote areas.

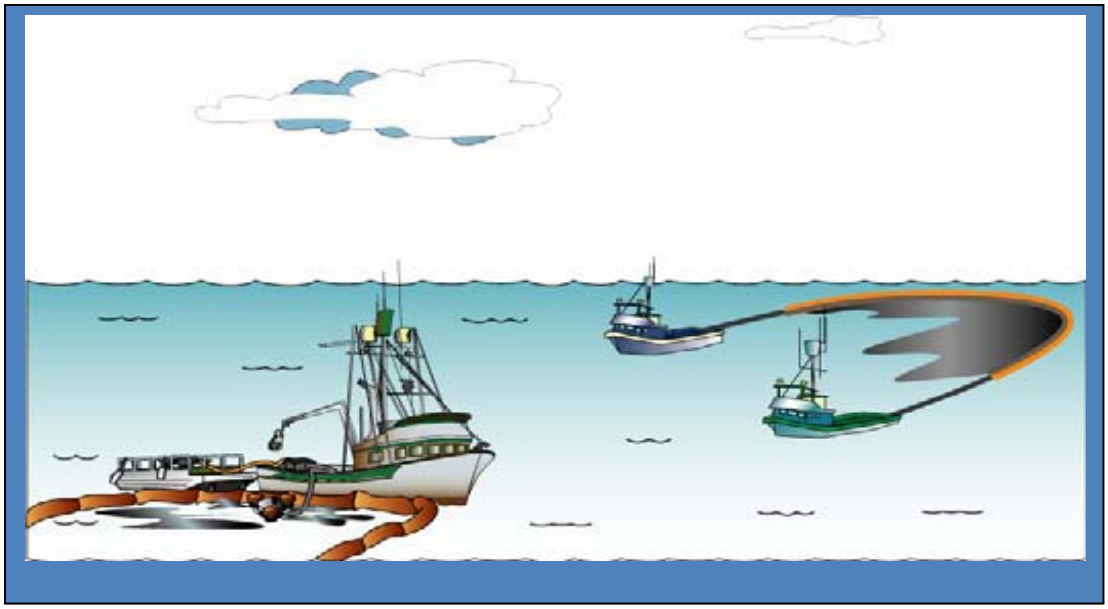

Figure 11.1: Typical on-water mechanical response system

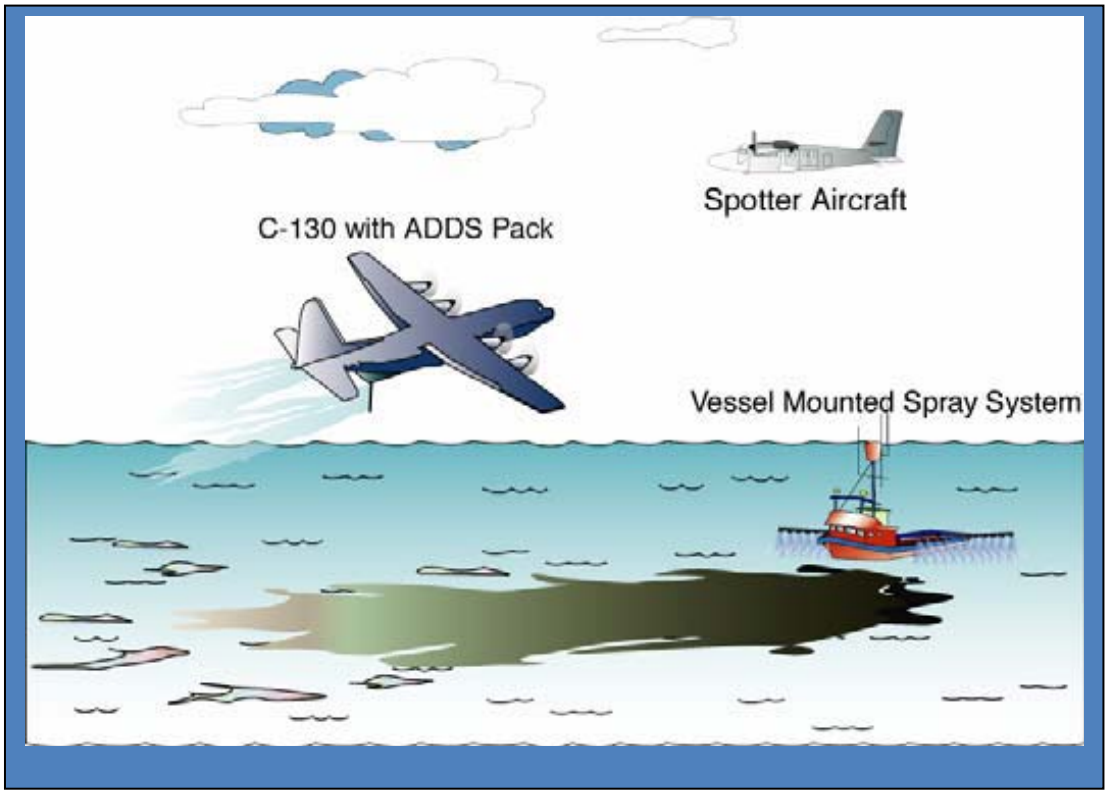

Figure 11.2 Typical on-water dispersant response system

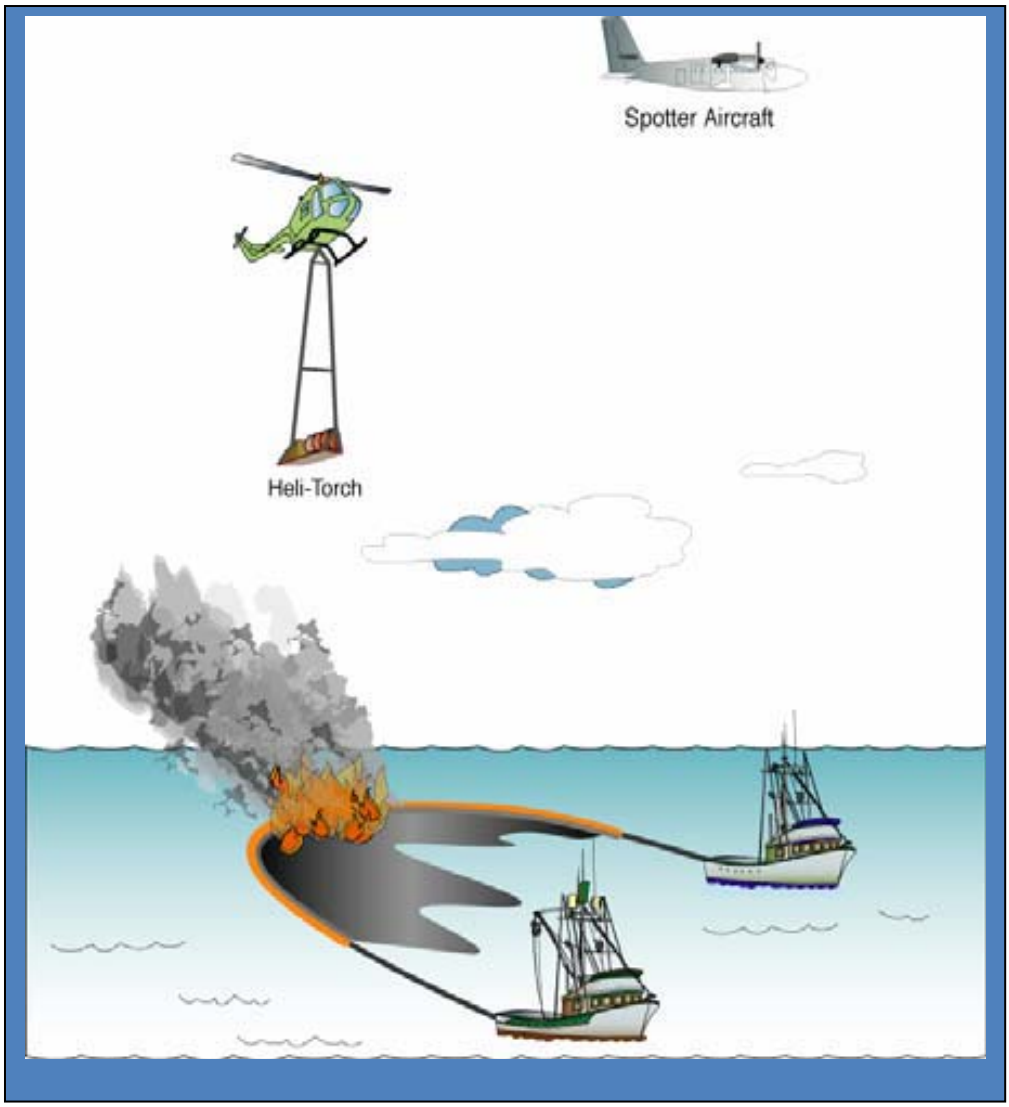

Figure 11.3 Typical on-water in-situ burning system
Source: Oil Spill Response Challenges in Arctic Waters - WWF

Table 11-1: Typical Antarctic conditions and potential impacts on spill response options

Conditions	Potential impacts on spill response			
	General constraints	Mechanical recovery	In-situ burning	Dispersants
Sea Ice[55]	Ice can impede access to the spill area, making it difficult to track and encounter oil. Remote sensing techniques are being improved and refined to detect oil under and among sea ice, but they are not yet mature. Ice can impede or limit vessel operations, especially for smaller work boats. Boats without ice-capable hulls should not operate in heavy ice conditions. Slush ice may clog seawater intakes or accumulate in vessel sea chests.	Containment boom can be moved, lifted or torn by ice. Skimmer encounter rate may be reduced by ice chunks, and skimmers and pumps may clog. Limited maneuverability may prevent or delay accurate skimmer or boom deployment. Attempts to deflect the ice from recovery areas may also deflect the oil. Ice must be separated from recovered oil. Ice may provide natural containment. Reinforced vessel hulls or ice scouts may be required. Ice movement can be unpredictable or invisible. Vessel operators must be experienced in the ice conditions of the area.	Certain ice conditions (i.e. slush ice) may reduce burn effectiveness or impede ignition. Fire boom deployment may become difficult or impossible. Residue recovery requires vessel support. Ice may provide natural containment, and burning in ice leads may be possible.	Oil under ice is inaccessible to dispersant application. Ice can dampen required mixing energy. Dispersants generally less effective at lower salinities. In most regions, dispersants are not considered an operational technology for use in sea ice.

[55] Sea ice is a prominent feature of the Antarctic marine environment. The generic term “sea ice” encompasses a wide range of ice conditions. Sea ice may be present year-round, or it may follow an annual freeze-melt cycle. Ice conditions may be described in terms of the formation of the ice or the percentage coverage. The World Meteorological Organization´s ice classification system and terminology are used in this description.

Conditions	Potential Impacts on spill response			
	General constraints	**Mechanical recovery**	**In-situ burning**	**Dispersants**
Wind	High winds can make it difficult to deploy effectively the crew, vessels, equipment required for a response. High winds can make air operations difficult or unsafe.	High winds can move boom and vessels off station or tear boom off the anchor point (Potter, 2004).	In-situ burning is not generally safe or feasible in high winds.	Accurate application of dispersants is difficult in high wind conditions.
Temperature	Prolonged periods of sub-freezing temperatures can impact personnel safety, or require more frequent shift rotations. Extreme cold temperatures may be unsafe for human operators. Cold may cause brittle failure in some metals. Cold air may freeze sea spray, creating slick surfaces. Icing conditions may make vessels unstable.	Skimmers freeze up. Freezing sea spray can accumulate on boom and cause it to tear, fail or over wash. Increased oil viscosity makes it difficult to recover and pump.	Extreme cold temperatures may make ignition more difficult or ineffective, and may cause burn to slow or cease.	Cold temperatures and increased oil viscosity may reduce dispersant effectiveness.

Conditions	Potential Impacts on spill response			
	General constraints	**Mechanical recovery**	**In-situ burning**	**Dispersants**
Limited visibility (including months of darkness in far southern areas)	Any condition that reduces visibility may preclude or limit oil spill response operations. Limited visibility may make it difficult or impossible to track the spill location and movement. Fog banks make vessel or aircraft operations extremely dangerous.	Accurate deployment of vessels and equipment requires sufficient visibility to deploy and operate equipment. Work lights may be used during darkness, if safety allows.	In-situ burning is not recommended during darkness (USCG, 2003). Aerial ignition and/or aerial monitoring require visual flight conditions.	Aerial application and/or aerial monitoring requires visual flight conditions. Vessel application requires visual confirmation of slick location.
Sea state	Waves can have varying impacts depending on their form. Short, choppy waves generally have a greater impact on a response than long ocean swells. Currents and tidal changes may also affect response operations.	Booms and skimmers do not function well at high sea states. Equipment must be suitable (rated) for typical sea states. Fast currents, changing tides and short period waves can make it difficult to keep boom and vessels on station. It is dangerous to maneuver booms and skimmers in rough seas. A common rule-of-thumb limitation for boom is a 2-3m significant wave height.	High sea state makes containment and ignition difficult and potentially unsafe.	High sea states typically enhance the effectiveness of chemical dispersants to disperse the oil.

Source: Oil Spill Response in Arctic Waters – WWF.

12 Appendix F: Explanatory memorandum on the introduction Catch Documentation Scheme (CDS) for Toothfish (Dissostichus Spp.)

1. Background

The scale of illegal, unregulated and unreported (IUU) fishing for toothfish (*Dissostichus* spp.) in the Southern Oceans is the most significant problem faced by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

During 1996–1999 the amounts of toothfish taken by IUU fishing have been of the order of 90 000 tonnes, more than twice the level of catches taken in CCAMLR regulated fisheries. This rate of extraction is unsustainable and has led to a significant depletion of tootfish stocks in some areas. In addition, the mortality of seabirds, principally albatross and petrel species, taken as a by-catch of the longline fisheries is also unsustainable and has resulted in declines in the populations of these species.

To address this problem a number of conservation measures have been introduced by CCAMLR over recent years relating to the toothfish fisheries in order to combat the problem of IUU fishing on the tootfish stocks. These measures in particular include:

• Flag State licensing requirement for all vessels in the fisheries;

• conservation measures fixing fishing levels for all toothfish fisheries in the Convention's waters;

• mandatory vessel monitoring systems (VMS);

• port inspections of landings and transshipments; and

• marking of vessels and fishing gear.

In addition there has been an intensification of control in the Convention Area. Consequently, the number of inspections followed by sanctions has also increased, reaching a peak in 1998.

2. Terminology

For the purposes of consistent implementation of CDS and completion of its associated forms the following descriptions are provided (notwithstanding normal trade terminology):

Recipient: The person(s) who assumes(s) responsibility for the catch in its harvested or processed form upon landing or transhipment, i.e. vessel owner; buyer(s); master of the vessel to which the catch is transhipped.

Landing: The initial transfer of catch in its harvested or processed form from a vessel to dockside or to another vessel in a port, where the catch has been recorded by the port state or flag state as landed.

Transshipment: Transferring catch in its harvested or processed form from one vessel to another vessel either at sea or in port without the catch having been recorded by the port state or flag state as landed.

Export: The movement in trade of a catch in its harvested or processed form from the original country, free trade zone, or regional economic integration organization of landing.

Import: The movement in trade of a catch in its harvested or processed form other than as a landing into a country, free trade zone or regional economic integration organization.

3. Catch Documentation Scheme

As a further means to address this problem which threatens the conservation of the toothfish stocks, the CCAMLR Commission adopted at its Eighteenth Meeting a conservation measure (170/XVIII) on the introduction of a Catch Documentation Scheme for *Dissostichus* spp.

The purpose for the introduction of this Scheme is:

(i) to monitor the international trade in toothfish;

(ii) to identify the origins of toothfish imported into or exported from the territories of Contracting Parties;

(iii) to determine whether toothfish imported into or exported from the territories of Contracting Parties, if caught in the Convention Area, was caught in a manner consistent with CCAMLR conservation measures; and

(iv) to gather catch data for the scientific evaluation of the stocks.

To meet this purpose, all landings, transshipments and importations of tootfish into the territories of Contracting Parties will require to be accompanied by a completed catch document. This will specify a range of information relating to the volume and location of catch, and the name and Flag State of the vessel.

This Catch Documentation Scheme became operative on 7 May 2000 and will be open to all Flag States irrespective of whether they are Members of CCAMLR or not. The Scheme applies to all catches of *Dissostichus* spp. regardless of whether they were taken as by-catch or as a result of targeted fishing.

Non-Contracting Parties to CCAMLR are invited to participate in the Catch Documentation Scheme for *Dissostichus* spp. To do so they will need to ensure that their vessels are provided with the standard *Dissostichus* catch documents for presentation to Contracting Party authorities as required.

4. Landing and transhipment procedures

4.1 Area

Toothfish are caught both inside and outside the CCAMLR Convention Area, as shown in figure 12.1. Each Contracting Party shall require that each shipment of *Dissostichus* spp.

imported into its territory be accompanied by the export-validated *Dissostichus* catch document(s) and, where appropriate, validated re-export documents that account for all the *Dissostichus* spp. contained in the shipment.

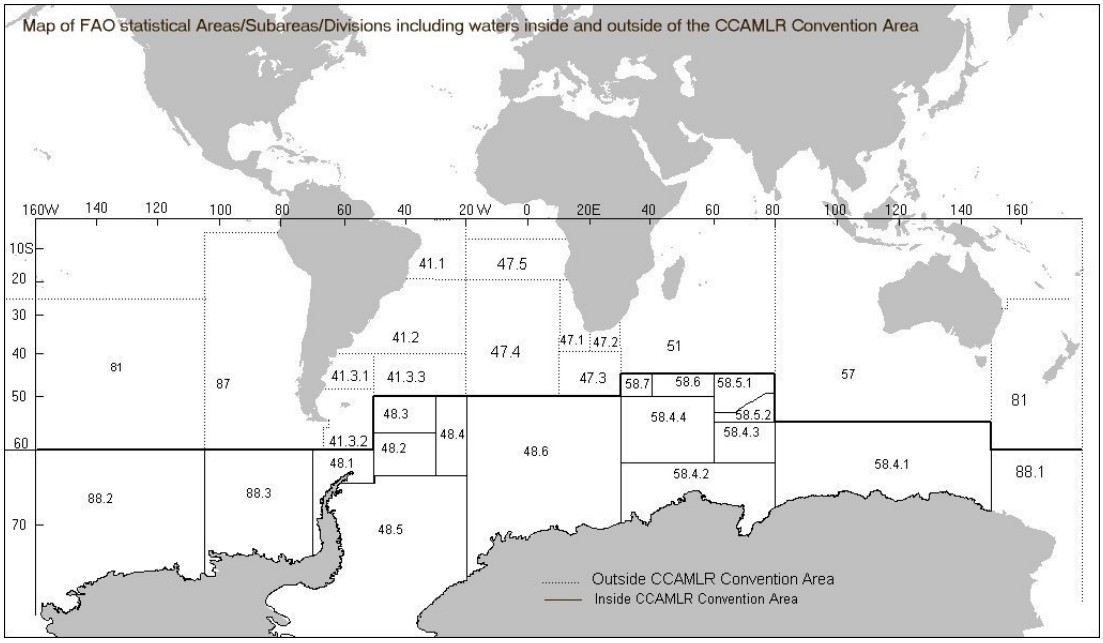

Figure 12.1: *Dissostichus spp.* catches areas.

Source: (CCAMLR, 2009)

4.2 Procedures

The document required will have the form of the attached catch document**.** Each Flag State shall provide the standard *Dissostichus* catch document forms to each of its flag vessels authorized to harvest *Dissostichus* spp*.* and only to those vessels.

On receipt of a request from a fishing vessel the Flag State will determine whether the catches that are intended for landing or transhipping are consistent with its authorization to fish and if so will issue the vessel with a unique Flag State confirmation number.

The document will need to be countersigned by a Port State official when the catch is landed. This signature will confirm that the catches landed agree with the details on the document. The person who receives the catch must also countersign the document and state on the document the amount of the landed catch that has been

received. In the case that the catch is divided on landing, copies of the catch document must be supplied by the master and completed by each receiver of a part of the landing.

In the case of transhipment, the master of a receiving vessel will sign the catch document presented by the fishing vessel master. When catches are landed from a vessel that has received a transhipment of tootfish the quantity of the toothfish to be landed must be confirmed by the countersignature of a Port State official on each catch document that was received from fishing vessels by the master of the receiving vessel. In all other respects the landing is treated similarly to a landing direct to port.

Originals of all copies of the document must then be returned to the Flag State of the fishing vessel that caught the fish, which will forward a copy to the CCAMLR Secretariat. The copies of the document that were provided to each receiver must remain with the catch throughout all subsequent transactions, including export and import.

Please note that for catches taken in CCAMLR waters, the Commission is seeking to determine whether catches have been taken in a manner consistent with CCAMLR conservation measures including those in Attachment A. Full details of the CCAMLR conservation measures currently in force can be obtained from the CCAMLR Secretariat.

5. Export and import procedures

In the event that a part of the catch is exported from the country of landing, the exporter must complete the export and intended import details on the *Dissostichus* catch documents that account for all toothfish contained in the shipment. The exporter must also obtain validation of the catch documents by the relevant official of the exporting state. If a shipment is re-exported, similar validation must be obtained from a relevant official of the exporting states and copies of the original catch documents attached.

On importation, the relevant authorities may, if appropriate, contact the Flag State of the vessel to verify the authenticity of the content of the Catch Document. In the event that Contracting Parties importation authorities receive a shipment of toothfish that is NOT accompanied by a valid catch document, the shipment will be detained. In the event that checks carried out by the importation authorities with the Flag State fail to verify the legitimacy of a catch document, importation of the shipment will not be authorized (CCAMLR, 2009).

6. Information

Should Flag States or fishing companies require further information or clarification on the operation of the Catch Documentation Scheme, they may contact the CCAMLR Secretariat at:

CCAMLR
PO Box 213
North Hobart 7002
Tasmania Australia
Telephone: 61 3 6231 0366
Facsimile: 61 3 6234 9965
Email: ccamlr@ccamlr.org

Attachment A to Appendix F

Conservation measures and other regulations, relevant to Toothfish fisheries in the convention area

LICENSING (CONSERVATION MEASURE 119/XVII, RESOLUTION 13/XIX)

The specific provisions of Conservation Measure 119/XVII and Article IV(c) of the System of Inspection must be complied with. Vessels must be licensed by their Flag States to fish in CCAMLR waters, and details of the license (name of vessel, time period(s) of fishing, area(s) of fishing, species targeted and gear used) must be sent to the CCAMLR Secretariat within seven (7) days of the issue of the license. Resolution 13/XIX urges all Contracting Parties, consistent with their domestic legislation, to avoid flagging a non-Contracting Party vessel or licensing such a vessel to fish in waters under their fisheries jurisdiction, if that particular vessel has a history of engagement in IUU fishing in the Convention Area.

Compliance with conservation measures

The provisions of all relevant conservation measures in relation to catch limits, fishing seasons, areas, and restriction of effort to named Parties must be complied with.

Data reporting

All toothfish fisheries require in-season catch reporting for the purposes of monitoring catch, as well as reporting of all catch, effort and biological data to CCAMLR (Conservation Measures **51/XIX, 121/XIX** and **122/XIX**), which must be complied with.

Scientific observation and inspection procedures

The relevant provisions of the CCAMLR Scheme of International Scientific Observation and the System of Inspection must be adhered to. In particular all vessels engaged in tootfish fisheries must carry a international scientific observer designated in accordance with the Scheme of Observation. Vessels fishing in the Convention's waters will be subject to inspection by inspectors designated under the System of Inspection.

Vessel monitoring and marking (Conservation Measures 148/XVII, ~~and~~ 146/XVII and Resolution 16/XIX)

All vessels and fishing gear must be marked according to internationally accepted standards and vessels should have on board an operational VMS reporting to the Flag State. In accordance with Resolution 16/XIX it was agreed that, on a voluntary basis, subject to their laws and regulations, Flag States participating in the Catch Documentation Scheme for *Dissostichus* spp. should ensure that their flag vessels authorized to fish for or transhipp *Dissostichus* spp. on the high seas maintain an operational VMS, as defined in Conservation Measure 148/XVII, throughout the whole of the calendar year.

Mitigating measures

Measures for the mitigation of incidental mortality of birds in longline fisheries must be complied with (Conservation Measures 29/XIX). These include the deployment of bird-scaring devices, appropriate line-weighting regimes, prohibition on the use of plastic packaging bands on board vessels and the use of frozen bait, the requirement for night-time setting of lines, and the prohibition on the discharge of offal during hauling. General by-catch provisions associated with toothfish fisheries must be complied with.

Use of ports not implementing the Catch Documentation Scheme for Dissostichus spp. (Resolution 15/XIX)

In accordance with Resolution 15/XIX it was agreed that Contracting Parties be urged:

1. Where they are unable to provide an authorized Flag State official(s) to monitor a landing for the purposes of validating *Dissostichus* Catch Documents, to discourage their flag vessels authorized to fish for *Dissostichus* spp. from using ports of Acceding States and non-Contracting Parties which are not implementing the Catch Document Scheme for *Dissostichus* spp.

2. To attach to the authorization to fish a list of all Acceding States and non-Contracting Parties that are implementing the Catch Documentation Scheme.

Other measures

Any proposed development of new fishing areas must conform to the conservation measures dealing with new and exploratory fisheries. These include the requirement for research and data collection during the exploratory phase of a fishery (Conservation Measures 31/X and 65/XII). Vessels will be subject to inspection by Port States on landing or transhipping catches (Conservation Measures 118/XVII and 147/XIX).

The above is only a synopsis of the relevant measures. Those intending to be engaged in the Catch Documentation Scheme are advised to consult the actual texts of the measures to ensure compliance with their provisions. (CCAMLR, 2009)

13. Appendix G: Existing Particularly Sensitive Sea Areas (PSSA)

A Particularly Sensitive Sea Area (PSSA) is an area that needs special protection through action by IMO because of its significance for recognized ecological, socio-economic or scientific reasons and which may be vulnerable to damage by international maritime activities. The criteria for the identification of particularly sensitive sea areas and the criteria for the designation of special areas are not mutually exclusive. In many cases a Particularly Sensitive Sea Area may be identified within a Special Area and vice versa.

An application for PSSA designation should contain a proposal for an associated protective measure or measures aimed at preventing, reducing or eliminating the threat or identified vulnerability. Associated protective measures for PSSAs are limited to actions that are to be, or have been, approved and adopted by IMO, for example, a routing system such as an area to be avoided (IMO, 2009)

Currently, the following PSSAS have been designated:

- the Great Barrier Reef, Australia (designated a PSSA in 1990)
- the Sabana-Camagüey Archipelago in Cuba (1997)
- Malpelo Island, Colombia (2002)
- the sea around the Florida Keys, United States (2002)
- the Wadden Sea, Denmark, Germany, Netherlands (2002)
- Paracas National Reserve, Peru (2003)
- Western European Waters (2004)
- Extension of the existing Great Barrier Reef PSSA to include the Torres Strait (proposed by Australia and Papua New Guinea) (2005)

- Canary Islands, Spain (2005)
- the Galapagos Archipelago, Ecuador (2005)
- the Baltic Sea area, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden (2005)
- the Papahānaumokuākea Marine National Monument, United States(2007)

14. Appendix H: Summary concerning issues under development in IMO

Extension of the Guidelines for ships operating in Arctic ice-covered waters to be applicable in Antarctica

During the last meeting of DE Sub-Committee (52nd session) held during 16-20 March 2009, was agreed the draft Guidelines for ships operating in Polar waters. These draft guidelines are based on the Guidelines for ships operating in Arctic ice-covered waters which were updated and extended for covering the Southern Ocean.

The draft guidelines consider provisions regarding construction, equipment; operations (including crewing); environmental protection and damage control and were submitted to MSC and MEPC for their approval in a first step and submission to the IMO Assembly that will be held during 23 Nov – 04 Dec. 2009 in a second step.

DE Sub-Committee also agreed the consideration of further development of the guidelines as a Code for ships operating in Polar waters which could eventually, be made mandatory (IMO, 2009).

Banning of heavy grade oils in Antarctic waters

During the last meeting (13th session) of the Sub-Committee on Bulk Liquids and Gases (BLG) held during 2-6 March 2009, were agreed the draft of amendments to MARPOL Annex I concerning Special requirements for the use or carriage of oils in the Antarctic area. The Draft amendments would add a new chapter 9 to MARPOL Annex I, with a new regulation 43 that would prohibit the carriage in bulk as cargo, or carriage and use as fuel, of: Crude oils having a density at 15ºC higher than 900 kg/m^3; oils, other than crude oils, having a density at 15ºC higher than 900 kg/m^3 or a kinematic viscosity at 50ºC higher than 180 or a kinematic viscosity at 50ºC higher than 180mm^2/s; or bitumen, tar and their emulsions.

An exception is also envisaged for vessels engaged in securing the safety of ships or in a search and rescue operation (IMO, 2009).

The draft amendments were submitted to the Marine Environment Protection Committee (MEPC). In that meeting held during 13-17 July 2009, assisting parties agreed to a permanent ban on the use and carriage of heavy fuel oil on ships operating in Antarctic waters. The proposed ban is expected to be approved in March 2010. However, a further debate is anticipated since there are interests of stakeholders for delaying the date of entry into force of this measure, arguing the high cost involved in the implementation process. (ASOC, 2009)

Crew competency for ice navigation

During the last meeting of the Sub-Committee on Standards of Training and Watchkeeping (STW-40) held during 2-6 February 2009, it was established a correspondence group coordinated by Norway, with the task of developing a preliminary proposed text for training guidance for personnel operating in ice-covered waters and submit its report to STW-41 in 2010. In this meeting was also agreed that at this stage, the correspondence group should not consider issues relating to applicability and concentrate on the technical guidance on training. In the development of its work, the correspondence group should take into account the comments and decisions made at STW 40, existing provisions in the STCW Convention and Code, the outcome of DE 52 relating to the amendments to the Guidelines for ships operating in Arctic ice-covered waters, and related documents submitted by members (IMO, 2009).