Marine Data Collection: MSR, Surveys, Operational Oceanography, Exploration and Exploitation

By

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For the analysis that follows I use the generic term "marine data collection", a term without legal content, as the umbrella under which to consider the various activities for which the law of the sea provides varying regimes depending on the maritime zone involved.

Under "marine data collection" I list the following four categories, with seven subcategories:

- Marine scientific research (MSR)
- Surveys
  - o Hydrographic surveys
  - o Military surveys
- Operational oceanography
  - o Ocean state estimation
  - o Weather forecasting
  - o Climate prediction
- Exploration and exploitation[2] of
  - o Natural resources
  - o Underwater cultural heritage (shipwrecks).

The relevant maritime zones where these activities take place

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2 The term "exploitation" is used only in the sense of resource development and management.

are the territorial sea, the contiguous zone, the exclusive economic zone (EEZ), the continental shelf, the deep seabed beyond the limits of national jurisdiction (the Area), straits used for international navigation, and archipelagic sea lanes.

This paper examines what is involved in each of these activities, reviews the applicable legal regimes, and demonstrates that surveys, operational oceanography, and exploration and exploitation are not marine scientific research regulated by Part XIII of the Law of the Sea Convention;[3] rather they are subject to separate legal regimes.

Definitions and Distinctions

Even though none of these four categories and seven subcategories is defined in the law of the sea, including the Law of the Sea Convention, it is necessary to understand what they each factually entail to be able to appreciate the legal regime applicable to each.

The most heavily regulated is the first category, *marine scientific research* (MSR). The Law of the Sea Convention devotes a whole part, Part XIII, containing 28 articles in six sections, to the subject of MSR. Although not defined in the Convention, marine scientific research is the general term most often used to describe those activities undertaken in the ocean and coastal waters to

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3 The resolution of advice and consent, approved by the Senate Foreign Relations Committee on October 31, 2007, again recommending United States accession to the Law of the Sea Convention, includes the following understanding:

(5) The United States understands that "marine scientific research" does not include, inter alia,-

(A) prospecting and exploration of natural resources;

(B) hydrographic surveys;

(C) military activities, including military surveys;

(D) environmental monitoring and assessment pursuant to section 4 of Part XII; or

(E) activities related to submerged wrecks or objects of an archaeological and historic nature.

Congressional Record, December 19, 2007, p. S16004, available through the link at http://thomas.loc.gov/r110/r110.html; Senate Committee on Foreign Relations, *Convention on the Law of the Sea*, Executive Report 110-9, at 21 (2007), online at http://www.virginia.edu/colp/pdf/UNCLOS-Sen-Exec-Rpt-110-9.pdf. Further, the Executive Report provides that this "is an illustrative list; therefore, there are other activities, such as operational oceanography, that are not considered marine scientific research." *Id.* at 13. These understandings are identical to those contained in the 2004 Senate Executive Report on the Convention, Executive Report 108-10, p. 19, online at http://www.virginia.edu/colp/pdf/UNCLOS-Sen-Exec-Rpt-108-10.pdf.

expand scientific knowledge of the marine environment and its processes.[4] In this paper, the term "marine scientific research" applies only to that form of marine data collection regulated by Part XIII of the Law of the Sea Convention.

For the purposes of this analysis, there are two forms of *surveys*, hydrographic surveys and military surveys.

Hydrographic surveys are activities undertaken to obtain information for the making of navigational charts and for the safety of navigation. Hydrographic surveys include the determination of the depth of water, the configuration and nature of the sea floor, the direction and force of currents, heights and times of tides and water stages, and hazards to navigation. This information is used for the production of nautical charts and similar products to support the safety of navigation, such as Sailing Directions, Light Lists and Tide Manuals for both civil and military use.[5]

Military surveys involve the collection of marine data for military--not scientific--purposes. The data collected may include oceanographic, hydrographic, marine geological/geophysical, chemical, acoustic, biological and related data. The data collected may be in classified or unclassified form. The data is not normally available to the public or the scientific community unless it is unclassified and was collected on the high seas.[6]

The third category of marine data collection is operational *oceanography*. Operational oceanography is the routine collection

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4 *Compare* LOS Convention articles 243 ("scientists ... studying the essence of phenomena and processes occurring in the marine environment and the interrelations between them" and 246(3) "to increase scientific knowledge of the marine environment for the benefit of all mankind"). *Accord*, A.H.A. Soons, *Marine Scientific Research and the Law of the Sea* (The Hague: Kluwer Law and Taxation Publishers, 1982), p. 124. Japanese law does not define MSR. See A. Takada, 'Marine Scientific Research in the Exclusive Economic Zone and Japan-China Agreement for Prior Notification (1995-2001),' Japanese Digest of International Law JD(III)3, in *Japanese Annual of International Law*, No. 44, 2001 (Tokyo: The International Law Association of Japan, 2002), p. 134.

5 *Cf.* Definition 46, *in* International Hydrographic Bureau, *A Manual on* Technical *Aspects of the United Nations Convention on the Law of the Sea - 1982*, Special Pub. No. 51, (4th ed., 2006), Appendix 1, at Appendix 1-16, online at http://www.iho.shom.fr/publicat/free/files/S-51_Ed4-EN.pdf.

6 See U.S. Chief of Naval Operations, OPNAV Instruction 3128.9D, *Diplomatic Clearance for U.S. Navy Marine Data Collection Activities in Foreign Jurisdictions*, 5 April 2000, online at http://www.usa-federal-forms.com/usa-fedforms-dod-opnavinst/dod-opnavinst-3128-9d-nonfillable.pdf, and U.S. Naval Oceanographic Office, *Military Survey Capabilities of the Naval Oceanographic Office*, online at https://www.navo.navy.mil/survey/survey_cap.htm.

of ocean observations, such as temperature, pressure, current, salinity and wind, in all maritime zones. This data collection may be conducted in the oceans, at the air-sea interface, and in the atmosphere. This data is used for the monitoring and forecasting of weather (meteorology), climate, and ocean state (e.g., surface currents and waves). The data is transmitted from sensor to shore in near real time and is made available to the public in near real time. The components of operational oceanography are described in some detail below.

The fourth category of marine data collection is *exploration and exploitation* of natural resources and of underwater cultural heritage.

Exploration and exploitation of *natural resources* involves the searching for and removal of living or non-living natural resources found in the oceans or beneath the seabed. The term *"natural resources"* has four separate meanings in the law of the sea, depending on the maritime zone where they are located. The natural resources governed by the EEZ regime are the living and non-living natural resources (not further expressly defined) located within the EEZ.[7] The natural resources governed by the continental shelf regime are the mineral and other non-living resources of the seabed and subsoil, together with the living organisms belonging to sedentary species.[8] The natural resources of the deep seabed beyond the limits of national jurisdiction (the Area) are all solid, liquid or gaseous mineral resources *in situ* in the Area at or beneath the seabed, including polymetallic nodules;[9] this definition does not include living marine resources. The natural resources of the high seas regime are referred to as "the living resources of the high seas" and include fish and marine mammals.[10]

Exploration and exploitation of *underwater cultural heritage* involves the search for, recording of, and removal of items of cultural heritage, such as artifacts from shipwrecks. These items

7 LOS Convention, article 56(1)(a).

8 LOS Convention, article 77(4). Sedentary species are those organisms which, at the harvestable stage, either are immobile on or under the seabed or are unable to move except in constant contact with the seabed or subsoil. *Id.*

9 LOS Convention, article 133. When recovered from the Area, these resources are referred to in the Convention as "minerals".

10 LOS Convention, Part VII, section 2, articles 116-120.

are, of course, not natural but are man-made resources.

As will become evident from the following discussion of the legal regime applicable to each category and subcategory, and what is involved in each, neither form of survey or of exploration and exploitation, nor operational oceanography is MSR.

Legal Regimes

MARINE SCIENTIFIC RESEARCH (MSR)

Marine scientific research is regulated by Part XIII of the Law of the Sea Convention. MSR may not be conducted in the territorial sea,[11] the exclusive economic zone,[12] or on the continental shelf[13] without the permission of the coastal State. MSR may not be conducted while in transit passage through a strait used for international navigation without the prior authorization of the States bordering the strait.[14] Similarly, MSR may not be conducted while in archipelagic sea lanes passage without the prior

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11 LOS Convention, article 245, requires the express consent of and under the conditions set by the coastal State for the conduct of MSR in its territorial sea.

12 LOS Convention, articles 246, 248, 252-253 set the conditions for the conduct of MSR in the EEZ. In particular six months advance request is required and the results of the research cannot be distributed publicly until the results of the research are compiled and shared with the coastal State. Further, the coastal State may, in its discretion, withhold consent to the conduct of a MSR project of another State in its EEZ or on its continental shelf if the project, inter alia, is of direct significance for the exploration or exploitation of its natural resources, whether living or non-living, within its EEZ. LOS Convention, article 246(5)(a). The United States does not require its permission to conduct MSR in the U.S. EEZ unless any portion of the research is conducted within the U.S. territorial sea, any portion of the research within the U.S. EEZ involves the study of marine mammals or endangered species (16 U.S. Code § 1374(c)), any portion of the research within the U.S. EEZ requires taking commercial quantities of living marine resources (16 U.S. Code § 1857(2) & (4)), or any portion of the research within the U.S. EEZ involves contact with the U.S. continental shelf (43 U.S. Code § 1340). For further information see http://www.state.gov/g/oes/ocns/rvc (MSR authorizations); http://www.state.gov/g/oes/ocns.rvc/3504.htm (authorizations to conduct MSR in foreign EEZs); http://www.state.gov/g/oes/ocns/rvc/3503.htm (authorization to conduct MSR in US EEZ); and imbedded links. The requirements of other countries may be viewed at http://www.state.gov/www/global/oes/oceans/notices.html (notices to research vessel operators 1976-1999) and http://www/state/ogv/g/oes/ocns/rvc/24243.htm(country specific requirements). *See also* the *Handbook for International Operations of U.S. Scientific Research Vessels* published by the University--National Oceanographic Laboratory System (UNOLS) at http://www.gso.uri.edu/unols/for_cln.html.

13 LOS Convention, article 252 sets similar conditions for the conduct of MSR on the continental shelf.

14 LOS Convention, article 40. As archipelagic waters are under the sovereignty of the archipelagic State, article 49, that State's consent should be a prerequisite for the conduct of MSR in its archipelagic waters.

authorization of the archipelagic State.[15] Only in the case of MSR in the EEZ or on the continental shelf, is the coastal State required, in normal circumstances, to grant consent.[16]

On the other hand, article 256 provides that all States have the right to conduct MSR in the Area in conformity with Part XI, including article 143, and the Annex to the Implementing Agreement, sections 1(5)(h) and 2(1)(b).[17] The conduct of MSR in the high seas (i.e., the water column seaward of the outer limit of the EEZ, including the water column above the continental shelf beyond 200 nm) is a high seas freedom guaranteed by articles 78(1), 87(1)(f) and 257 of the LOS Convention.[18] Part XIII is silent on MSR conducted from above the surface of the ocean.[19]

SURVEYS

Like the other six forms of marine data collection, *hydrographic* surveys are not mentioned in Part XIII of the LOS Convention; surveys are, however, addressed in other Parts of the Convention. The Convention places some restrictions on the conduct of hydrographic surveys in close-in waters. Prior authorization is required from the coastal State to conduct hydrographic surveys in its territorial sea,[20] from the States

15 LOS Convention, article 54 incorporating article 40.

16 LOS Convention, article 246(3). Normal circumstances may exist in spite of the absence of diplomatic relations between the coastal State and the researching State. Id., article 246(4). Paragraph 5 sets out three circumstances in which a coastal State may, in its discretion, withhold its consent. Paragraph 6 qualifies that discretion regarding MSR projects on the extended continental shelf beyond 200 nautical miles. As article 246(3) has not been implemented in practice by coastal States, researchers have not been willing to exercise their right under the implied consent regime detailed in article 252.

17 LOS Convention, article 256.

18 *See further*, UN Office for Ocean Affairs and the Law of the Sea, *The Law of the Sea: Marine Scientific Research--A Guide to the Implementation of the Relevant Provision of the United Nations Convention on the Law of the Sea*, UN Sales No. E.91.V.3 (1991); R. R. Churchill and A.V. Lowe, *The Law of the Sea*, chapter 16 (Manchester: Manchester University Press, 3rd ed. 1999); Soons, *supra* note 4; M. Gorina-Ysern, *An International Regime for Marine Scientific Research* (Ardsley NY: Transnational Publishers, 2003); and F. H. Th. Wegelein, *Marine Scientific Research: The Operation and Status of Research Vessels and Other Platforms in International Law* (Leiden/Boston: Martinus Nijhoff Publishers, 2005).

19 See the discussion in Wegelein, supra note 18, at 247-270, 353, 356, 357 ("Part XIII is of no relevance to research activities from space"). Wegelein, at 269, concludes that "observations from space are akin to operational oceanography and thus are not covered by the provisions of the 1982 LOS Convention to begin with".

20 LOS Convention, articles 19(2)(j) and 21(1)(g). The same rule applies to ships in innocent passage in archipelagic waters. LOS Convention, article 52(1).

bordering straits used for international navigation to conduct surveys while in transit passage through the straits,[21] and from the archipelagic State to conduct surveys while in archipelagic sea lanes passage.[22]

Hydrographic surveys are not mentioned in the Parts of the LOS Convention governing the EEZ, continental shelf, high seas or the Area. Therefore, the conduct of hydrographic surveys in these areas is a high seas freedom associated with the operation of ships and aircraft.[23] Hydrographic surveys are not MSR.[24]

Military surveys, per se, are not mentioned at all in the LOS Convention. Because they are "surveys", the collection of marine data for military purposes in the territorial sea,[25] and on the continental shelf when they involve exploration or exploitation of natural resources of the continental shelf,[26] requires coastal State

21 LOS Convention, article 40.

22 LOS Convention, article 54 incorporating article 40. The Convention is silent on the conduct of hydrographic surveys in archipelagic waters. As archipelagic waters are under the sovereignty of the archipelagic State, article 49, that State's consent should be a prerequisite for the conduct of surveys in its archipelagic waters.

23 LOS Convention, articles 58(1) and 87. On the other hand, articles 7, 41(2) and 51(2) of the Surveying and Mapping Law of the People's Republic of China, as amended August 29, 2002, purport to preclude "foreign organizations and individuals" from surveying seaward of the territorial sea of "other sea areas under the jurisdiction of the People's Republic of China" without authorization from the relevant Chinese authorities. See http://www.gov.cn/english/laws/2005-10/09/content_75314.htm.

24 Department of State telegram, April 19, 1999, excerpted in M. Pickering, S. Cummins and D. Stewart (eds.), *Digest of United States Practice in International Law 1989-1990* (Washington: International Law Institute, 2003), p. 479. The United Kingdom has stated that "hydrographic surveys are not, and should not be, governed by UNCLOS Part XIII." *British Yearbook of International Law 1997*, 68 (Oxford: Clarendon Press, 1998), pp. 608-609. *Accord* B. H. Oxman, 'The Regime of Warships Under the United Nations Convention on the Law of the Sea,' 24 Va. J. Int'l L., 1984, pp. 809, at 846; Soons, *supra* note 4, at 157; Wegelein, supra note 18, at 80-81. *Contra,* Sam Bateman, 'Hydrographic Surveying and Marine Scientific Research in Exclusive Economic Zones,' and Guifang (Julia) Xue, 'Marine Scientific Research and Hydrographic Surveys in EEZ: to close up the Legal Loophole?,' forthcoming in the proceedings of the 2008 oceans conference, supra note 1. Japan appears to consider hydrographic surveys as MSR. See 'Japanese Digest of International Law JD(VIII)1,' 49 *Japanese Annual of International Law 2006*, (Tokyo: International Law Association of Japan, 2007), pp. 98, 100 ("The MSR is a hydrographic survey to study sea bottom topography in the South-west sea area of Japan Sea").

25 LOS Convention, article 19(2)(j). The sovereignty of a coastal State extends, beyond its land territory and internal waters, *inter alia*, to the adjacent territorial sea as well as to its bed and subsoil. LOS Convention, article 2. The sovereignty of an archipelagic State extends, beyond its land territory and internal waters, *inter alia*, to its archipelagic waters and the adjacent territorial sea. LOS Convention, articles 48 and 49(1).

26 LOS Convention, article 77(2), which provides that the coastal State's rights are exclusive and no one may undertake exploration or exploitation of its natural resources without the express consent of the coastal State.

permission. Seaward of the territorial sea, the conduct of military surveys is a high seas freedom, as they too are associated with the operation of ships and aircraft.[27] Military surveys are not MSR.[28]

OPERATIONAL OCEANOGRAPHY

Likewise, *operational oceanography* is also not mentioned in the LOS Convention.

It should be recalled that the Third UN Conference on the Law of the Sea decided that the collection of marine meteorological data is not marine scientific research regulated by Part XIII of the Law of the Sea Convention.[29] Clearly analogous to the collection of marine meteorological data is the routine collection of ocean observations that is distributed freely and openly, and that are used for the monitoring and forecasting of ocean state, weather (meteorology), and climate.[30]

The various operational oceanography programs and data collection instruments are next described to facilitate a better understanding why they are, for the most part, conducted in the exercise of the high sea freedoms of navigation and overflight. Nevertheless, some coastal States remain concerned that some or all of this data collected within their EEZs may be of direct significance for the exploration and exploitation of natural

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27 S.J. Cummins and D.P. Stewart (eds.), *Digest of United States Practice in International Law 2001* (Washington: International Law Institute, 2002), pp. 698-699. *See* G. V. Galdorisi and A. G. Kaufman, 'Military Activities in the Exclusive Economic Zone', 32 *Cal. W. Int'l L.J.* 2002, pp, 253, 294-295. A different view of military activities in the EEZ is set out in a proposed voluntary 'Guidelines for Navigation and Overflight in the Exclusive Economic Zone' prepared by a group of "senior officials and analysts primarily from countries of the Asia-Pacific region participating in the personal capacities," sponsored by the Japanese Ocean Policy Research Foundation, available at http://www.sof.or.jp/topics/2005_e/pdf/20051205_e.pdf. See also Wegelein, supra note 18, at 93-98, for a discussion of the possible interpretations.

28 Oxman, *supra* note 24, at 847; Senate Executive Report 110-9, supra note 3, at 13; U.S. talking points delivered to Republic of Korea Ministry of Foreign Affairs and Trade on December 3, 2001, State Department telegram 206366, November 30, 2001, American Embassy Seoul telegram 06429, December 7, 2001, *excerpted in* S. Cummins and D. Stewart (eds.), *Digest of United States Practice in International Law 2001* (Washington: International Law Institute 2002), pp. 698-699.

29 See attachment 2.

30 See Andrew C. Revkin, 'Scientists Work on Decade-Based Forecast for the Climate,' New York Times, May 1, 2008, p. A10, and N.S. Keenlyside, M. Latif, J. Jungclaus, L. Kornblueh & E. Roeckner, 'Advancing decadal-scale climate predictin in the North Atlantic sector, in Nature: International Weekly Journal of Science, vol. 453, no. 7191, May 1, 2008, abstracted online at http://www.nature.com/nature/journal/v453/n7191/full/nature06921.html#cor1.

resources, whether living or non-living, within their EEZs[31] and thus wish to have some say as to the collection and use of that data.

OPERATIONAL OCEANOGRAPHY PROGRAMS

Operational oceanographic programs all have the same characteristics: sustained, systematic, reliable and robust mission activities, with an institutional commitment to deliver appropriate, cost-effective products and services.

Moored Buoy Program

One example of an operational oceanographic program is the multi-national Tropical Atmosphere Observation (TAO) project for improved detection, understanding and prediction of El Niño and La Niña conditions in the Tropical Pacific Ocean. The TAO/TRITON[32] array consists of nearly 70 deep-ocean moorings, telemetering oceanographic and meteorological data to shore in real-time via the Argos satellite system.[33] The array is a major component of the El Niño/Southern Observing System, the Global Climate Observing System (GCOS), and the Global Ocean Observing System (GOOS). Development of this array was motivated by the 1982-1983 El Niño event, the strongest of the century up to that time, which was neither predicted nor detected until nearly at its peak. The event highlighted the need for real-time data from the tropical Pacific for both monitoring, prediction, and improved understanding of El Niño. The system has been operational since 1994. The operationally supported measurements of the TAO/TRITON array consist of winds, sea surface temperature, relative humidity, air temperature, and subsurface temperature at 10 depths in the upper 500 meters. Five moorings along the equator also measure ocean velocity. Additional moorings and/or enhancements to the basic measurement suite are often incorporated in the operational array to support research studies to understand specific physical processes not well measured by the existing network.[34]

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31 Cf. LOS Convention, articles 56(1)(a) and 246(5)(a). See note 12 above.

32 TRITON is the acronym for the Triangle Trans Ocean Buoy Network, located west of 165°E and maintained by the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). The TAO array east of 165°E is maintained by NOAA's Pacific Marine Environmental Laboratory (PMEL). France's Institut de recherché pour le developpement provides additional contributions.

33 For more information on Argos, see http://www.cls.fr/html/argos/ welcome_en.html.

34 See http://www.pmel.noaa.gov/tao/.

Global Drifting Buoy Program

Another example of an operational oceanography program is the global array of approximately 1,250 surface drifting buoys deployed to maintain buoys on a 5°x5° grid in most areas of the world's oceans. Surface drifting buoys measure surface currents, sea level barometric pressure, sea surface temperature, and may measure wind speed and direction, salinity and/or ocean color. The data is transmitted in near real-time via the Argos satellite system and has multiple uses.[35]

Argo Profiling Float Program

The global array of over 3,000 free-drifting profiling floats (Argo) measures the temperature and salinity of the upper 2000 meters of the oceans. This allows, for the first time, continuous monitoring of the temperature, salinity and velocity of the upper ocean, with all data being relayed and made publicly available within hours after collection.[36]

Global Sea Level Observing System (GLOSS)

One operational component of the Global Ocean Observation System (GOOS) is the Global Sea Level Observing System (GLOSS). GLOSS is an international component of GOOS,[37] a network of high quality global and regional sea level stations for application to climate, oceanographic, and understanding coastal sea level processes. The main component is a "Global Core Network" (GCN) of 290 sea level stations around the world for long-term climate change and oceanographic sea level monitoring. Applications of such data include prediction and detection of storm surge inundation and tsunami.

Ship of Opportunity Program (SOOP)

The primary goal of the Ship-of-Opportunity Program (SOOP) is to fulfill the requirements for collection of upper ocean data which have been established by GOOS and GCOS, and which can be met at present by measurements from ships of opportunity (SOO). SOOP is establishing itself as an operational program and is therefore participating in JCOMM and particularly in its Ship

35 See http://www.aoml.noaa.gov/phod/dac/gdp_drifter.html.

36 See http://www.argo.ucsd.edu/. As at 8 May 2008, there are 3138 active floats deployed. http://w4.jcommops.org/website/Argo/viewer.htm.

37 See http://www.jcommweb.net.

Observations Team.[38] Data management is taken care of through the Global Temperature Salinity Profile Program. The SOOP is directed primarily towards the continued operational maintenance and co-ordination of the XBT ship of opportunity network. As described in greater detail below, an XBT is an expendable temperature and depth profiling system that collects upper ocean thermal data in support of weather and climate prediction and ocean state estimation systems that are communicated in real time to oceanographic and meteorological services primarily via the GTS under JCOMM.

Other types of measurements are being made (e.g., conductivity, current profiles; pCO2; chlorophyll concentration). This network in itself supports many other operational needs (such as for fisheries, shipping and defense) through the provision of upper ocean data for data assimilation in models and for various other ocean analysis schemes. One of the continuing challenges is to optimally combine upper ocean thermal data collected by XBTs from Ships of Opportunity with data collected from other sources such as the TAO/TRITON array, Argo floats and satellites. However, it is considered most important to have the SOOP focused on supporting climate prediction in order to ensure the continued operation of the present network.[39]

Coordination of Programs

An international infrastructure has been established to coordinate, liaise, and/or interact with these operational implementation programs:

JCOMM

The Intergovernmental Oceanographic Commission (IOC) of UNESCO and the World Meteorological Organization jointly coordinate implementation of operational oceanographic programs through the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), as the scope and effort of global oceanographic observations exceeds the budget

38 The SOT includes the implementation panels for SOOP, VOS, and a program with the acronym ASAPP which launches radiosondes (weather balloons) from ships.

39 See http://www.brest.ird.fr/soopip/ and the JCOMMOPS website www.infremer.fr/ird/soopip/. See also S. Cook and A. Sy, 'Best Guide and Principles Manual for the Ships of Opportunity Program (SOOP) and Expendable Bathythermograph (XBT) Operations,' March 2001, at www.brest.ird.fr/soopip/doc/manuals/best_guide/ SOOP_best_guide.pdf.

and mandate of the individual intergovernmental organizations and individual Member Countries.

JCOMM coordinates, regulates and manages a fully integrated marine observing, data management and services system that uses state-of-the-art technologies and capabilities, is responsive to the evolving needs of all users of marine data and products, and includes an outreach program to enhance the national capacity of all maritime countries.[40]

JCOMM encourages real-time or near real-time reporting of data, and the full and open exchange of data through oceanographic data centers. Such collaboration occurs because observational data contribute to the prediction of meteorological conditions and other natural events.[41] The global scale of observations necessary to establish accurate predictions of natural events is necessarily beyond the capability of any coastal nation. Thus international cooperation is essential if individual nations are to benefit from the data collected.

Global Ocean Observation System (GOOS)

The Global Ocean Observation System (GOOS) is a permanent global system for observations, modeling and analysis of marine and ocean variables to support operational ocean services worldwide. GOOS provides accurate descriptions of the present state of the oceans, including living resources; continuous forecasts of the future conditions of the sea for as far ahead as possible; and the basis for forecasts of climate change.[42] GOOS forms the ocean component of the Global Climate Observing System (GCOS)[43] and the marine coastal component of the Global Terrestrial Observing System (GTOS).[44] A fundamental principle of GOOS is that all data acquired by the operational systems are freely and openly available in real time to any potential user through distribution via the GTS[45] and/or Data Distribution Centers (DACs) such as the two

40 See http://www.ioc.unesco.org/jcomm/.

41 See http://ioc.unesco.org/goos/.

42 See http://www.ioc-goos.org/.

43 See http://www.wmo.ch/web/gcos/gcoshome.html. The U.S. Global Climate Observing System Program is described in the *U.S. Detailed National Report to the Conference of the Parties to the United Nations Framework Convention on Climate Change* (August 2001) available at http://www.eis.noaa.gov/gcos/soc_ long.pdf.

44 See http://www.fao.org/gtos/.

45 See http://www.wmo.ch/web/www/TEM/gts.html.

DACs supporting the global array of Argo profiling floats.[46]

Data Buoy Cooperation Panel (DBCP)

JCOMM also coordinates contributions to the Data Buoy Cooperation Panel (DBCP). Principal objectives of the DBCP are:

(i) review and analysis of requirements for buoy data;

(ii) co-ordination and facilitation of deployment programs to meet requirements;

(iii) initiation and support of action groups;

(iv) improving the quantity and quality of buoy data distributed onto the Global Telecommunication System (GTS);

(v) information exchange and technology development; and

(vi) liaise with relevant international and national bodies and programs.[47]

DATA COLLECTION PLATFORMS AND INSTRUMENTS[48]

Data about the lower atmosphere and sea surface is collected from ships, balloons, visual observations, aircraft and satellites, while data about the water column is obtained from satellites, moored buoys, drifting buoys, profiling floats and eXpendable BathyThermographs (XBTs).[49]

The U.S. National Oceanic and Atmospheric Administration (NOAA) is involved in the collection of marine data through programs involving five different types of data collection instruments or platforms:

- surface moorings;
- global drifters;
- Voluntary Observing Ships (VOS);
- XBTs, deployed under several operational protocols; and
- Argo profiling floats.

Surface Moorings

Surface moorings such as those employed in the

46 See http://www.argo.ucsd.edu/ and http://w3.jcommops.org/cgi-bin/ WebObjects/ Argo.

47 See http://www.dbcp.noaa.gov/dbcp/index.html.

48 The information in this section is taken from http://www.aoml.noaa.gov/goos/goos-operational.php.

49 See http://www.aoml.noaa.gov/goos/goos-operational.php.

TAO/TRITON Program measure surface winds, air temperature, relative humidity, sea surface temperature, and ten subsurface temperatures from a 500 meter long thermistor cable. Measurements to determine salinity are also made on moorings in the TAO/TRITON program and are capable of being made on fixed moorings in generally. Daily-mean data are telemetered to shore in near real-time via satellites. A small subset of hourly values (2-3 per day) coinciding with satellite passes are also transmitted in real time. Hourly values of surface data are internally recorded and available after mooring recovery. Subsurface Acoustic Doppler Current Profiler (ADCP) moorings are deployed at a few equatorial sites. These data are available only after the moorings are recovered. Upper ocean currents are also measured at 4 to 5 discrete depths in the upper 300 meters using point Doppler current meters on nearby TAO surface moorings.[50]

Surface Drifting Buoys

NOAA, at its Atlantic Oceanographic and Meteorological Laboratory (AOML) operates a global Drifting Buoy Center that annually deploys, via Voluntary Observing Ships (VOS), research vessels and U.S. Navy aircraft, over 400 Drifters[51] in all three ocean basins. These drifters are tracked daily via the ARGOS satellite system through which their positions and sea surface temperatures (and sometimes other parameters) are processed and inserted on to the Global Telecommunications System (GTS) for global distribution.[52] Approximately 630,000 sea surface temperatures are collected annually via this program. Additionally, the Center performs the added function of a Data Acquisition Center (DAC) for the Global Drifter Program (GDP). When the deployed Drifters are verified as operational they are reported to the DAC. This effort insures that research quality Drifter data is available from other organizations and countries programs. The Global Drifter Program is a participating member of the IOC--WMO Data Buoy Co-operation Panel (DBCP) and, as such, represents NOAA in this international forum.

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50 See http://www.pmel.noaa.gov/tao/index.shtml and links.

51 For a detailed description of these drifters, see http://www.aoml.noaa.gov/phod/dac/gdp_drifter.html.

52 See http://www.aoml.noaa.gov/phod/dac/gdp.html for the location of these drifters.

Voluntary Observing Ships (VOS)

Meteorological information has been gathered by ships at sea for over 150 years. The International Convention for the Safety of Life at Sea, 1929, and it successor adopted in 1974 and subsequently amended, have encouraged the collection of meteorological data by ships at sea.[53] The data is collected by Voluntary Observing Ships (VOS) coordinated by the WMO. The data gathered pertains to the atmosphere above the sea (temperature, dew point, cloud, weather, visibility and pressure) and to the surface of the sea (temperature, waves, currents and ice). The data is collected for the preparation of forecasts and warnings to help route ships and avoid severe weather conditions, for the preparation of forecasts and warnings for offshore industries, for global models of the future state of the atmosphere, to monitor the state of the oceans, for climatological data banks serving many purposes, and to build long-term records to monitor changes in the climate of the earth.[54] The IMO has noted the critical importance of VOS meteorological reports to the provision of meteorological services to the mariner and encouraged increased participation in the scheme.[55]

NOAA GOOS Center operates a global fleet of about 400 domestic and foreign commercial vessels. The GOOS global fleet mostly represents a subset of the larger National Weather Service VOS fleet consisting of over 1500 vessels. These vessels voluntarily collect sea surface meteorological, sub-surface expendable bathythermograph, shipboard thermosalinograph or atmospheric observations. They deploy drifting buoys and highly instrumented Argo and Argo-type floats and sometimes tow continuous plankton recorders. The GOOS global VOS fleet is the mechanism used to collect observations and deploy instrumentation that transmit, in real-time, data to U.S. National Centers such as the National Center for Environmental Prediction.[56] In any given year this network provides the following approximate number of

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53 The current provision appears in regulation 5, Meteorological services and warnings, of chapter V of SOLAS, 1974, the text of which appears in attachment 3.

54 See http://www.bom.gov.au/jcomm/vos/vos.html and http://www.vos.noaa.gov/.

55 IMO Circular MSC/Circ.1017, 11 June 2001, 'Participation in the World Meteorological Organization Voluntary Observing Ships' Scheme', online at http://www.imo.org/home.asp.

56 See http://www.ncep.noaa.gov.

observations:

630,000 Sea Surface Temperature Observations from Drifting Buoys

200,000 Meteorological Observations

30,000 Thermosalinograph Observations

14,000 Expendable Bathythermograph Observations.

Expendable Bathythermographs (XBTs)

While many nations deploy XBTs locally or regionally, NOAA/AOML operates a global XBT program[57] that utilizes approximately 70 Voluntary Observing Ships (VOS) to monitor, on a monthly basis, 26 transects in all three ocean basins. Participating vessels utilize a Shipboard Environmental Data Acquisition System (SEAS) hardware/software installation to collect, quality control and transmit in real-time subsurface oceanographic observations (about 14,000 per year) and sea surface meteorological observations (about 200,000 per year).[58] The XBT is an expendable temperature probe that is manually launched from vessels approximately 4 times per day, along certain scientifically selected shipping lanes. The data transmitted via the wire link from the XBT probe is stored on the SEAS computer where it is processed and formatted for satellite message transmission. The transmitted data is routed to the GOOS Center where it is further quality controlled and then inserted on to the Global Telecommunication System (GTS) for global distribution. The National Centers for Environmental Predication (NCEP) use these data for weather and climate forecasting as well as for seasonal, interannual and decadel climate research. The XBT program is a participating member of the IOC-WMO Ship of Opportunity Program Implementation Panel (SOOPIP) and, as such, represents NOAA in this international forum.

High Density XBTs

Certain regions of the oceans require more observations than a volunteer ship's crew can adequately supply. Along these routes, scientific crew ride the VOS and sample the ocean with much

57 See http://www.aoml.noaa.gov/goos/uot/.

58 See http://seas.amverseas.noaa.gov/seas.

higher spatial resolution. These high density lines (HDX) resolve ocean features with more detail than the standard low density (LDX) sampling scheme.[59] NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML) runs five HDX lines with the following three objectives:

- to measure the upper ocean thermal structure in the center of the subtropical gyre in the North Atlantic and the South Atlantic;
- to investigate the meridional structure at the subtropical gyre and Gulf Stream in the North Atlantic; and
- to characterize both the mean and the time-dependent upper ocean properties of the tropical portion of the Meridional Overturning Circulation and of the shallow Subtropical Cell in the Tropical Atlantic.

Argo Profiling Floats[60]

Since October 31, 2007, Argo is now a global array of over 3,000 free-drifting profiling floats that measures the temperature and salinity of the upper 2000 meters of the ocean. This allows, for the first time, continuous monitoring of the temperature, salinity, and velocity of the upper ocean, with all data being relayed and made publicly available within hours after transmission. This program was started in 1999 to meet the challenge posed by the lack of sustained observations of the atmosphere, oceans and land that hindered the development and validation of climate models. This array is providing approximately 9,000 vertical profiles of temperature and salinity a month throughout the world's oceans are made available to operational centers world-wide and is free and open to anyone either via the Global Telecommunications System (GTS) or via two Global Data Assembly Centers (GDACs) in France and the United States. Argo has revolutionized the ability to observe the oceans providing, for the first time, global, synoptic pictures of the thermodynamic structure of the open ocean and some understanding of circulation; together with remotely-sensed data, model ocean circulation and ocean climate; and allowed

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59 See http://www.ncep.noaa.gov/phod/hdenxbt.

60 The factual information contained in this section is derived from the Argo home page, http://www.argo.ucsd.edu/. For information on how Argo floats work, see http://www.argo.ucsd.edu/FrHow_Argo_floats.html.

scientists to dramatically improve their understanding of the coupled ocean-atmosphere system for weather and climate prediction.

There is increasing concern about global change and its regional impacts. Sea level is rising at an accelerating rate of 3 mm/year, Arctic sea ice cover is shrinking and high latitude areas are warming rapidly. Extreme weather events cause loss of life and enormous burdens on the insurance industry. Globally, 8 of the 10 warmest years since 1860, when instrumental records began, have been in the past decade.

These effects are caused by a mixture of long-term climate change and natural variability. Their impacts are in some cases beneficial (lengthened growing seasons, opening of Arctic shipping routes) and in others adverse (increased coastal flooding, severe droughts, more extreme and frequent heat waves and weather events, such as severe tropical cyclones).

Understanding (and eventually predicting) changes in both the atmosphere and ocean are needed to guide international actions, to optimize governments' policies, and to shape industrial strategies. To make those predictions Argo was created to provide the information to develop improved models of climate and of the entire earth system (including socio-economic factors).

Argo deployments began in 2000; a total of 3138 Argo floats were in place on May 8, 2008.[61] The Argo array can be maintained at the level of 3000 as long as national commitments provide about 800 floats per year. The need for global Argo observations will continue indefinitely into the future, though the technologies and design of the array will evolve as better instruments are built, models are improved, and more is learned about ocean variability.

The final array of 3000 floats provides 100,000 temperature/salinity profiles and velocity measurements per year distributed over the global oceans at an average 3-degree spacing. Floats cycle to 2000m depth every 10 days, with 4-5 year lifetimes for individual instruments. All Argo data are publicly available in near real-time via the GTS and Global Data Assembly Centers (GDACs) in Brest, France[62] and Monterey, California[63] after an

61 See note 36 above.

62 http://www.coriolis.eu.org/.

automated quality control (QC), and in scientifically quality controlled form, delayed mode data, via the GDACs within six months of collection.

NOAA/AOML's Physical Oceanography Division provides the data management and real time quality control of profiling float data from the global Argo program.[64]

SUMMARY

The world's oceans exhibit wide variability on both spatial and temporal scales. While designated by basins (e.g., Atlantic, Pacific, Indian, Southern), boundaries used to delineate them are geographical and somewhat artificial as the oceans interact on global as well as regional scales. For example, changes in overturning circulations (North Atlantic, Southern Ocean) eventually will impact all of the ocean basins thereby manifesting changes regionally. Like the atmosphere, the oceans do not recognize geopolitical boundaries. Similarly, the oceans' interactions with the atmosphere often manifested through changes in weather and storm patterns are global processes, reflected regionally. Understanding of the global ocean provides the context for understanding and predicting regional and coastal variability. The key to understanding is observations, observations of the oceans globally, regionally and locally. The operational ocean observing system will allow nations to:

- Monitor, understand and predict weather and climate;
- Describe and forecast the state of the ocean, including living resources;
- Improve management of marine and coastal ecosystems and resources;
- Mitigate damage from natural hazards and pollution;
- Protect life and property on coasts and at sea; and
- Enable scientific research.[65]

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63 http://www.usgodae.org/argo/argo.html.

64 For additional information on Argo, see http://www.argo.net, http://www.aoml.noaa.gov/phod/ARGO/HomePage, and the Argo Information Center http://wo.jcommops.org/cgi-bin/WebObjects/Argo.

65 These six bullets are what GOOS is designed to do. See http://www.ioc-goos.org/content/view/12/26/. "Enable" means observe from which hypotheses are developed and tested, not conduct scientific research.

In view of the United States, operational oceanography is not MSR.[66] This author submits that the large-scale programs of oceanographic data collection, described above, that operate independently from the users of the data, distinguish operational oceanography from MSR. The IOC/ABE-LOS is considering the implications for the conduct of this form of marine data collection in the EEZ.[67]

The Law of the Sea Convention contains separate regimes for exploration and exploitation of natural resources and of underwater cultural heritage.

As noted above, the term *"natural resources"* has four separate meanings in the law of the sea, depending on the maritime zone.

Part V of the LOS Convention regulates exploration for and exploitation of the living and non-living natural resources located within the EEZ separately from the conduct of MSR within the EEZ.[68] Part VI of the Convention governs exploration for and exploitation of the mineral and other non-living resources of the seabed and subsoil, i.e., the continental shelf, together with living organisms belonging to sedentary species.[69] Part VI does not address MSR at all.[70] Thus it follows that, even though exploration and exploitation in both maritime zones are subject exclusive coastal State control, those activities are not MSR.[71]

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66 Senate Committee on Foreign Relations, 'Convention on the Law of the Sea', Executive Report 110-9, at 13 (2007), supra note 3, ("there are other activities, such as operational oceanography, that are also not considered marine scientific research"). Wegelein, supra note 18, at 116, notes that the procedures for advance access request to a coastal State is "impracticable" and the "scientific value of their measurements would be significantly impaired if drifters had to be retrieved before they enter foreign waters and not be re-released before permission is obtained; conversely, the exact date of entry can usually not be predicted ..., neither which foreign waters it may stray into."

67 See the reports of the seventh and eighth meetings of ABE-LOS through the link at http://ioc3.unesco.org/abelos/, click on "Meetings".

68 Compare LOS Convention articles 56(1)(a) and 56(1)(b)(ii).

69 LOS Convention, article 77.

70 MSR in the EEZ and on the continental shelf is regulated by Part XIII, article 246 of the Convention.

71 Because they directly implicate exploration or exploitation of the natural resources of the continental shelf, article 246(5) permits a coastal State to withhold its consent to the conduct of a MSR project on its continental shelf, inter alia, if (a) it is of direct significance for the exploration and exploitation of natural resources, whether living or non-living, (b) involves drilling into the continental shelf, or (c) involves the construction, operation or use of artificial islands, installations and structures.

Part XIII of the Convention and its Implementing Agreement regulate exploration for and exploitation of all solid, liquid or gaseous mineral resources *in situ* in the deep seabed beyond the limits of national jurisdiction at or beneath the seabed, including polymetallic nodules. Exploration and exploitation in the Area are subject to regulation by the International Seabed Authority. Article 256 provides that MSR in the Area is to be conducted in conformity with Part XI, particularly article 143. Hence, exploration and exploitation of mineral resources in the Area is not MSR.

Part VII, Section 2, governs the conservation and management of the living resources of the high seas.

Exploration for and exploitation of all forms of natural resources is not MSR.

On the other hand, *underwater cultural heritage* (UCH), principally shipwrecks, are not natural resources as that term is variously defined in the LOS Convention. UCH is addressed in only two articles of the LOS Convention, article 303 with regard to the contiguous zone, and article 149 with regard to archaeological and historical objects found in the Area. UNESCO has sought to provide a regulatory scheme for UCH found at sea.[72] However, the UNESCO Convention sought to provide coastal States authority to regulate the search for and recovery of UCH located seaward of a declared contiguous zone, contrary to the allocation of rights and duties in the LOS Convention.[73] Exploration for UCH is not MSR.[74]

This paper has demonstrated that not all methods of collection of data about the oceans is marine scientific research regulated by Part XIII of the Law of the Sea Convention. The means of data

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72 Convention on the Protection of Underwater Cultural Heritage, Paris, 2001, 41 ILM 40 (2002), http://unesdoc.unesco.org/images/0012/001232/1232783.pdf. As of November 24, 2007, the following 16 States have deposited their instruments of ratification or accession (in chronological order): Panama, Bulgaria, Croatia, Spain, Libya, Nigeria, Lithuania, Mexico, Paraguay, Portugal, Ecuador, Ukraine, Lebanon, Saint Lucia, Romania and Cambodia. http://portal.unesco.org/la/convention.asp?KO=13520&language=E (visited 8 May 2008). The convention will enter into force three months after the deposit of the 20th instrument of ratification, acceptance, approval or accession.

73 See R. Blumberg, 'International Protection of Underwater Cultural Heritage,' in: M. H. Nordquist, J. N. Moore and K. Fu (eds.), *Recent Developments in the Law of the Sea and China*, Center for Oceans Law and Policy, 29, (Leiden/Boston: Martinus Nijhoff Publishers, 2006), pp. 491-511, and online at http://www.state.gov/g/oes/rls/rm/51256.htm. See also http://www.history.navy.mil/branches/nhcorg12.htm and http://www.thc.state.tx.us/belle/.

74 Accord, Wegelein, supra note 18, at 218-219.

collection are often the same, and may appear indistinguishable from MSR. The data collected may be the same or different. The *parameters* collected and their *intended* use distinguish MSR from surveys, operational oceanography, and exploration and exploitation of resources.[75]

The paper has also demonstrated that proposals that all forms of marine data collection should be under coastal State control would deprive the people of all nations of the benefits of free and open access to data that enhance their safety and environmental protection.

While the lack of agreed definitions of the various methods for marine data collection has resulted in differences of views on the legal regimes governing them, this paper has sought to provide clarification and further understanding. Attachment 1 summarizes the regulatory authority for each of these activities in the various maritime zones.

This paper has also sought to demonstrate that the collection of data by operational oceanographic instruments and programs is not MSR[76] because:

- the data is immediately available to all nations for their benefit;
- the sum of the systems is greater than their parts and therefore nations must facilitate access and data sharing if each country is to benefit from conclusions that can be drawn from the large scale data sets (both in terms of size and time); and
- whether or not one agrees that operational oceanography is or is not MSR, Part XIII still encourages countries to collaborate and facilitate access to EEZs for such large-scale initiatives.[77]

Since most coastal States are members of IOC, which sponsors these operational programs, they should consistently

75 See the discussion in Wegelein, supra note 18, at 82-83.

76 Accord, Wegelein, supra note 18, at 181, 227 ("marine scientific research only begins where operational oceanography ends").

77 LOS Convention, articles 242, 244(1) & 246(3).

support them in their national policy.[78]

ATTACHMENT 1

Regulatory Authority

Activity	Territorial sea	EEZ/ Continental Shelf	High Seas	The Area	Straits/ASL
Marine scientific research	Coastal State	Coastal State	Flag State	Flag State/ISBA	Strait State/ Archipelagic State
Hydrographic survey	Coastal State	Flag State	Flag State	Flag State	Strait State/ Archipelagic State
Military survey	Coastal State	EEZ: Flag State; Shelf: coastal State	Flag State	Flag State	Flag State
Operational oceanography	Flag State/ Coastal State	Flag State	Flag State	Flag State	Flag State
Explore/exploit natural resources	Coastal State	Coastal State	Flag State	ISBA	Strait State/ Archipelagic State
Explore/exploit UCH	Coastal State	Flag State	Flag State	Flag State	Strait State/ Archipelagic State

ISBA = International Seabed Authority

ATTACHMENT 2

Resolution 16 (Cg-VIII) adopted by the World Meteorological Organization at its eighth congress in Geneva in April/May 1979 UN document A/CONF.62/80, 9 August 1979 Official Records of the Third United Nations Conference on the Law of the Sea, Volume XII, page 56 (1980)

The Congress,

Noting

(1) Resolution 2750C(XXV) of the United Nations General Assembly of 17 December 1970, by which the United Nations decided to convene the Third United Nations Conference on the

78 Accord, Wegelein, supra note 18, at 358-359.

Law of the Sea,

(2) The informal composite negotiating text prepared by the Conference, in particular part XIII, entitled "Marine scientific research",

(3) Action taken by the Executive Committee and the Secretary-General to ensure that the meteorological interests are adequately safeguarded during the consideration of relevant articles of the negotiating text,

Recalling that activities of the members of the World Meteorological Organization in the oceans fall under the following two major categories:

(1) Operational activities such as the collection of meteorological information from voluntary observing ships, buoys, other ocean platforms, aircraft and meteorological satellites,

(2) Research activities, both meteorological and oceanographic, such as those carried out during the Global Weather Experiment,

Considering

(1) That an adequate marine meteorological data coverage from ocean areas, in particular from those areas in the so-called "exclusive economic zone", is indispensable for the issue of timely and accurate storm warnings for the safety of life at sea and the protection of life and property in coastal and off-shore areas,

(2) That the International Convention for the Safety of Life at Sea, of 1960 specifies that the contracting Governments undertake, *inter alia*, to issue warnings of gales, storms and tropical storms and to arrange for selected ships to take meteorological observations,

(3) That members of the World Meteorological Organization have undertaken the responsibility of issuing warnings for the high seas and coastal waters according to internationally agreed procedures,

Expresses the hope that the legal provisions specified in the informal composite negotiating text which govern marine scientific research will not result in restrictions to operational meteorological and related oceanographic observational activities carried out in accordance with international programmes such as World Weather

and the integrated Global Ocean Station System;

Appeals to members to ensure that their delegations to the United Nations Conference on the Law of the Sea are made aware of the vital need for observational data from sea areas for the timely issue of weather forecasts and storm warnings,

Requests the Secretary-General to follow closely the developments in the Conference, in particular by ensuring representation at sessions of the Conference, as appropriate.

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Extract from the Oral Report of the Chairman of the Third Committee to the Third Committee at its 46th meeting, 20 August 1980
Official Records of the United Nations Third Conference on the Law of the Sea
Volume XIV, pages 102-103 (1982)

The Chairman, Mr. A. Yankov (Bulgaria)

4. [] announced that he had received from the World Meteorological Organization a letter in which it referred in particular to the work of the Eighth World Meteorological Organization held in Geneva. On that occasion, the organization had expressed its interest in research activities conducted in the oceans and, in particular, in the "exclusive economic zone". In a resolution which had been adopted by the Congress and had been distributed to the participants in the Conference (A/CONF.62/80), the organization had referred to some of its activities, including the collection of meteorological information from voluntary observing ships, and meteorological and oceanographic observational activities carried out in accordance with international programmes such as the World Weather Watch and Integrated Global Ocean Station System. Now that the Third Committee had completed the negotiation on the substantive questions before it, it was in a position to reply to the Secretary-General of the World Meteorological organization.

5. Since the formulation of draft articles on the legal regime for the conduct of marine scientific research came under his mandate as Chairman of the Third Committee, he was able to share the view of the Eighth Meteorological Congress that adequate marine meteorological data coverage, including that from areas

within the exclusive economic zone, was indispensable for timely and accurate storm warnings for the safety of navigation and for the protection of lives and property in coastal and offshore areas. In his opinion, the provisions on marine scientific research would not create any difficulties and obstacles hindering adequate meteorological coverage from ocean areas, including areas within the exclusive economic zone, carried out both within the framework of existing international programmes and by all vessels, since such activities had already been recognized as routine observations and data collecting which were not covered by Part XIII of the negotiating text. Furthermore, they were in the common interest of all countries and had undoubted universal significance. He informed the Committee that he intended to send a letter to the Secretary-General of the World Meteorological Organization along those lines. (Emphasis added.)

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Extract from the Report of the Chairman of the Third Committee
Document A/CONF.62/L.61, 25 August 1980
Official Records of he Third United Nations Conference
on the Law of the Sea,
Volume XIV, pages 133-134 (1982)

8. At the end of the 46th meeting of the Committee on 20 August, I referred to a letter addressed to me by the Secretary-General of the World Meteorological Organization (A/CONF. 62/80) in which was expressed the concern that some provisions on marine scientific research might have direct consequences on operational and research activities of the World Meteorological Organization over the oceans, particularly in areas off the coast of the coastal States, including the exclusive economic zone. The World Meteorological Organization had specifically in mind activities carried out under its Voluntary Observation Ships' Scheme which is an important element of the World Weather Watch and activities carried out under the projects and programmes of organizations such as the Marine Meteorological Services, the Tropical Cyclone Project and the Integrated Global Ocean Station System. The letter expressed concern that some provisions on marine scientific research might have a restricting effect on those activities of the World Meteorological Organization. I informed the Committee that in my reply to the Secretary-General of the World Meteorological Organization I will state that in my view the

pertinent provisions of the second revision of the text on marine scientific research would not create any difficulties or obstacles hindering adequate meteorological coverage from the ocean areas, including areas within the exclusive economic zone since such operational and research activities have already been recognized as routine activities within the terms of reference of the World Meteorological Organization and are of common interest to all countries with an undoubted universal significance. (Emphasis added.)

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Extract from the Official Records of the 134th Plenary Meeting of the Resumed Ninth Session of the Third United Nations Conference on the Law of the Sea, 25 August 1980, Volume XIV, page 15 (1982)

The Chairman of the Third Committee, Mr. A. Yankov (Bulgaria)

43. At the end of the 46th meeting of the Committee, he had referred to a letter which he had received from the Secretary-General of the World Meteorological Organization (A/CONF. 62/80) expressing concern that some provisions in the negotiating text on marine scientific research might have a restricting effect upon certain operational and research activities of the Organization. He informed the Committee that, in his reply to the Secretary-General of the Organization, he would that in his view the provisions of the second revision of the negotiating text on marine scientific research would not hinder adequate meteorological coverage from ocean areas, including areas within the exclusive economic zone, since such operational and research activities had already been recognized as routine activities within the Organization's terms of reference and were of common interest to all countries. (Emphasis added.)

ATTACHMENT 3

SOLAS REGULATION V/5 (2002)

Meteorological services and warnings

1- Contracting Governments undertake to encourage the collection of meteorological data by ships at sea and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation.* Administrations shall

* Refer to the Recommendation on weather routeing adopted by the Organization by resolution A.528(13).

encourage the use of meteorological instruments of a high degree of accuracy, and shall facilitate the checking of such instruments upon request. Arrangements may be made by appropriate national meteorological services for this checking to be undertaken, free of charge to the ship.

2- In particular, Contracting Governments undertake to carry out, in co-operation, the following meteorological arrangements:

1. to warn ships of gales, storms and tropical cyclones by the issue of information in text and, as far as practicable graphic form, using the appropriate shore-based facilities for terrestrial and space radiocommunications services.

2. to issue, at least twice daily, by terrestrial and space radiocommunication services**, as appropriate, weather information suitable for shipping containing data, analyses, warnings and forecasts of weather, waves and ice. Such information shall be transmitted in text and, as far as practicable, graphic form including meteorological analysis and prognosis charts transmitted by facsimile or in digital form for reconstitution on board the ship's data processing system.

3. to prepare and issue such publications as may be necessary for the efficient conduct of meteorological work at sea and to arrange, if practicable, for the publication and making available of daily weather charts for the information of departing ships.

4. to arrange for a selection of ships to be equipped with tested marine meteorological instruments (such as a barometer, a barograph, a psychrometer, and suitable apparatus for measuring sea temperature) for use in this service, and to take, record and transmit meteorological observations at the main standard times for surface synoptic observations (i.e. at least four times daily, whenever circumstances permit) and to encourage other ships to take, record and transmit observations in a modified form, particularly when in areas where shipping is sparse.

5. to encourage companies to involve as many of their ships as practicable in the making and recording of weather observations; these observations to be transmitted using the ship's terrestrial or space radiocommunications facilities for the benefit of the various

** Refer to regulations IV/7.1.4 and IV/7/1.5.

national meteorological services.

6. the transmission of these weather observations is free of charge to the ships concerned.

7. when in the vicinity of a tropical cyclone, or of a suspected tropical cyclone, ships should be encouraged to take and transmit their observations at more frequent intervals whenever practicable, bearing in mind navigational preoccupations of ships' officers during storm conditions.

8. to arrange for the reception and transmission of weather messages from and to ships, using the appropriate shore-based facilities for terrestrial and space radiocommunications services.

9. to encourage masters to inform ships in the vicinity and also shore stations whenever they experience a wind speed of 50 knots or more (force 10 on the Beaufort scale).

10. to endeavour to obtain a uniform procedure in regard to the international meteorological services already specified, and as far as practicable, to conform to the technical regulations and recommendations made by the World Meteorological Organization, to which Contracting Governments may refer, for study and advice, any meteorological question which may arise in carrying out the present Convention.

3- The information provided for in this regulation shall be furnished in a form for transmission and be transmitted in the order of priority prescribed by the Radio Regulations. During transmission "to all stations" of meteorological information, forecasts and warnings, all ship stations must conform to the provisions of the Radio Regulations.

4- Forecasts, warnings, synoptic and other meteorological data intended for ships shall be issued and disseminated by the national meteorological service in the best position to serve various coastal and high seas areas, in accordance with mutual arrangements made by Contracting Governments, in particular as defined by the World Meteorological Organization's System for the Preparation and Dissemination of Meteorological Forecasts and Warnings for the High Seas under the Global Maritime Distress and Safety System (GMDSS).