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Abstract

International law is clear on most issues associated with the conduct of marine scientific research (MSR) and hydrographic surveying but what is not clear is whether or not another State might conduct hydrographic surveys in an exclusive economic zone (EEZ) without the prior authorization of the coastal State. This paper reviews what is involved with MSR, hydrographic surveys and military surveys before reaching the conclusion that trends in recent decades with technology, the utility of hydrographic data and State practice require that hydrographic surveys in the EEZ should be under the jurisdiction of the coastal State. Paradoxically the arguments for military surveys in the EEZ being outside the jurisdiction of the coastal State appear stronger than those applying to hydrographic surveying. The paper offers some guidelines related to the conduct of MSR and hydrographic surveying in the EEZ but is not able to do so with regard to military surveys. This latter aspect requires further consideration outside the scope of this paper.

Keywords

research, scientific, marine, surveys, hydrographic, overlaps, implications, differences

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HYDROGRAPHIC SURVEYS AND MARINE SCIENTIFIC RESEARCH: DIFFERENCES, OVERLAPS AND IMPLICATIONS

By

Sam Bateman*

**(Paper for the Honolulu Meeting on “The Regime of the Exclusive Economic Zone:
Issues and Responses” co-sponsored by the Ship and Ocean Foundation
Institute for Ocean Policy and The East-West Center, 9-10 December, 2003)**

ABSTRACT

International law is clear on most issues associated with the conduct of marine scientific research (MSR) and hydrographic surveying but what is not clear is whether or not another State might conduct hydrographic surveys in an exclusive economic zone (EEZ) without the prior authorization of the coastal State. This paper reviews what is involved with MSR, hydrographic surveys and military surveys before reaching the conclusion that trends in recent decades with technology, the utility of hydrographic data and State practice require that hydrographic surveys in the EEZ should be under the jurisdiction of the coastal State. Paradoxically the arguments for military surveys in the EEZ being outside the jurisdiction of the coastal State appear stronger than those applying to hydrographic surveying. The paper offers some guidelines related to the conduct of MSR and hydrographic surveying in the EEZ but is not able to do so with regard to military surveys. This latter aspect requires further consideration outside the scope of this paper.

INTRODUCTION

International law is clear on most issues associated with the conduct of marine scientific research (MSR) and hydrographic surveying. These activities require the prior authorization of the relevant coastal State in internal waters, the territorial sea (including by ships exercising the right of transit passage) and archipelagic waters (including by ships exercising the right of archipelagic sea lanes [ASL] passage)¹. All States have the “freedom of scientific research” on the high seas subject to Parts VI and XIII of the 1982

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¹ Articles 19, 21(g), 40, 44 and 245 of the 1982 UN Convention on the Law of the Sea (UNCLOS).

UN Convention on the Law of the Sea (UNCLOS) dealing with the continental shelf and the international regime for MSR respectively. Hydrographic surveying is listed along with MSR as an activity under the jurisdiction of the coastal State in the territorial sea² and as a prohibited activity during innocent³ and transit passage⁴ but there is no reference to hydrographic surveying elsewhere in UNCLOS. This may be because hydrographic surveying was considered to be outside the purview of MSR.⁵

Part XIII of UNCLOS provides that coastal States have the exclusive right to regulate, authorize and conduct MSR in their exclusive economic zone (EEZ) (including the contiguous zone) and on their continental shelf⁶. It then establishes an implied consent regime that allows other States and competent international organizations to proceed with a MSR project in the EEZ or on the continental shelf under certain circumstances even though the consent of the coastal State may not have been forthcoming⁷. In normal circumstances, the coastal State shall grant its consent to MSR projects carried out for peaceful purposes in order to increase scientific knowledge of the marine environment (sometimes characterized as “pure” scientific research)⁸. The coastal State is to ensure that such consent will not be delayed or denied unreasonably although there are a several specific situations under which the coastal State may withhold consent (including when such research is of direct significance to the exploration and exploitation of natural resources, both living and non-living)⁹.

This consensual regime is controversial and is unevenly interpreted by the international community. There has been some reluctance by researching States to resort to implied consent and some coastal States have failed to grant consent in circumstances when it might reasonably have been expected¹⁰ or have applied extra restrictions on MSR beyond those required by the UNCLOS regime¹¹. However, this paper is not concerned with these controversies. Rather it addresses hydrographic surveying and what is referred to by the United States as military surveying¹², and the extent to which if at all, these activities

² UNCLOS Article 21(1)(g)

³ UNCLOS Article 19(2)(j). The reference in this article is to “survey” activities” generally.

⁴ UNCLOS Article 40.

⁵ Ship and Ocean Foundation (SOF) and East-West Center (EWC), *The Regime of the Exclusive Economic Zone: Issues and Responses*, A Report of the Tokyo Meeting, 19-20 February 2003, Honolulu, East-West Center, 2003, p. 13.

⁶ However, the U.S. does not assert the right of jurisdiction over MSR within its EEZ but recognizes the right of other countries to assert that right. This was because of the U.S. interest in encouraging MSR and avoiding any unnecessary burden. President’s Ocean Policy Statement, 10 March 1983, as quoted in A.R. Thomas and James C. Duncan (eds), *Annotated Supplement to the Commander’s Handbook on the Law of Naval Operations*, International Law Studies Vol. 73, Naval War College, Newport, Rhode Island, 1999, p.44.

⁷ This consent regime is set out in UNCLOS Articles 246-252. A similar but much less detailed regime in respect of the continental shelf was provided in Article 5(8) of the 1958 Geneva Convention on the Continental Shelf.

⁸ UNCLOS Article 246(3).

⁹ UNCLOS Article 246(5).

¹⁰ J. Ashley Roach, “Marine Scientific Research and the New Law of the Sea”, *Ocean Development and International Law*, Vol. 27, 1996, pp. 59-72.

¹¹ George V. Galdorisi and Kevin R. Vienna, *Beyond the Law of the Sea – New Directions for U.S. Oceans Policy*, Westport, Praeger, 1997, p. 164.

¹² *Military surveying* is an expression used mainly by the United States to refer to marine data collection for military purposes only. The data might be classified or unclassified but is not normally disseminated to the

are captured by the UNCLOS regime for MSR, including where there are differences and overlaps between these activities and the implications that might flow out of these. Differences and overlaps with “military surveys” in the EEZ are only addressed to the extent that they inform the situation with hydrographic surveying although for reasons argued later, this paper takes the view that arguments for and against an unrestricted right to conduct military surveys in the EEZ differ significantly from those applying to hydrographic surveys.

The important issue of concern for this paper is whether or not another State might conduct hydrographic surveys in an EEZ (or on the continental shelf where it extends beyond 200 nautical miles from territorial sea baselines¹³) without the prior authorization of the coastal State. The controversy regarding the conduct of hydrographic surveys in an EEZ (and other types of “surveys” that are not resource related such as “military surveys”) was succinctly summed up in CSCAP Memorandum No. 6 on *The Practice of the Law of the Sea in the Asia Pacific* as follows:

Different opinions exist as to whether coastal State jurisdiction extends to activities in the EEZ such as hydrographic surveying and collection of other marine environmental data that is not resource-related or is not done for scientific purposes. While UNCLOS has established a clear regime for marine scientific research, there is no specific provision in UNCLOS for hydrographic surveying. Some Coastal States require consent with respect to hydrographic surveys conducted in their EEZ by other States while it is the opinion of other States that hydrographic surveys can be conducted freely in the EEZ.¹⁴

The United States regards military surveying as similar to hydrographic surveying and thus part of the high seas freedoms of navigation and overflight and other international lawful uses of the sea related to those freedoms, and conducted with due regard to the rights and duties of the coastal State¹⁵. The position of the United States is that while coastal State consent must be obtained in order to conduct MSR in its EEZ, the coastal State cannot regulate hydrographic surveys or military surveys conducted beyond its territorial sea, nor can it require notification of such activities.¹⁶ Similarly, the United Kingdom regards Military Data Gathering (MDG) as a fundamental high seas freedom available in the EEZ (the United Kingdom’s definition of MDG is included at Annex A)¹⁷. Other States, including China, have specifically claimed that hydrographic surveys might only be conducted in their EEZs with their consent¹⁸. In December 2002, China announced that it had enacted a new law explicitly requiring Chinese approval of all survey and mapping activities in China’s EEZ and stating that unapproved ocean-survey activity will be subject to fines and confiscation of equipment and data.¹⁹

public. Captain Pete Pedrozo, JAGC, USN, “Military Activities in the EEZ”, Powerpoint Presentation to USPACOM Military Operations and International Law Conference, Honolulu, September 2003.

¹³ As allowed by UNCLOS Article 76.

¹⁴ Council for Security Cooperation in the Asia Pacific (CSCAP), *The Practice of the Law of the Sea in the Asia Pacific*, CSCAP Memorandum No.6, December 2002 (available on website at www.cscap.org), pp. 3-4.

¹⁵ *Ibid.* footnote 3, p. 3.

¹⁶ Thomas and Duncan, *Annotated Supplement to the Commander’s Handbook*, p. 130.

¹⁷ Email from Mr. Chris Carleton, Head, Law of the Sea Division, United Kingdom Hydrographic Office.

¹⁸ SOF and EWC, *The Regime of the Exclusive Economic Zone*, p. 7.

¹⁹ *Ibid.* p. 39.

BACKGROUND

The conditions under which MSR might be carried out in the EEZ or on the continental shelf were one of the more controversial issues during the Third UN Conference on the Law of the Sea (UNCLOS III) leading to consensus agreement on UNCLOS²⁰. The establishment of the EEZ regime in UNCLOS brought under coastal State jurisdiction nearly one-third of the world's ocean space. This was also the part of the world's oceans where the greater part of MSR is conducted as most ocean phenomena occur along the edge of continents. Thus major researching States, particularly the United States, were concerned that with the introduction of the EEZ regime, they might lose access to large areas of ocean that were of great interest to MSR.

As established under UNCLOS, the EEZ is a zone of shared rights and responsibilities. It has become “a zone of tension between coastal State control and maritime State use of the sea”.²¹ A coastal State has sovereign rights for the purpose of exploiting, conserving and managing the living and non-living resources of the EEZ and jurisdiction, as provided for in relevant provisions of UNCLOS, in relation to the establishment of artificial islands, installations and structures; MSR; and the protection and preservation of the marine environment.²² However, other States also have rights and duties in the EEZ related to freedoms of navigation and overflight and of the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to those freedoms.²³ In exercising their rights and duties in an EEZ, the coastal State is required to have *due regard* to the rights and duties of other States²⁴ and vice versa²⁵.

One of the major difficulties at UNCLOS III in developing the EEZ regime was to strike a balance between the right of a coastal State to protect its interests in the EEZ and the needs of researching States to preserve conditions conducive to MSR. Prior to the establishment of the EEZ regime, waters in an EEZ had been part of the high seas with no restrictions on the freedom of research. The researching States were concerned at UNCLOS III that an unrestricted right of coastal States to control research in their EEZs would have detrimental effects on the pursuit of scientific knowledge that would not just be limited to the States concerned.

In particular the articulation of the principle that the coastal State had the right to regulate MSR activities in the EEZ was regarded by many researching States as inconsistent with the nature of the EEZ as a zone fundamentally different in character (“*sui generis*”) from

²⁰ Australian Department of Foreign Affairs, *Third United Nations Conference on the Law of the Sea, Sixth Session, New York, 23 May – 15 July 1977: Report of the Australian Delegation*, Canberra, Australian Government Publishing Service, 1977, p.63.

²¹ Captain George V, Galdorisi, USN(ret) and Commander Alan G. Kaufman, JAGC, USN, “Military Activities in the Exclusive Economic Zone: Preventing Uncertainty and Defusing Conflict”, *Californian Western International Law Journal*, Vol. 32, 2002, p. 257.

²² UNCLOS Article 56(1).

²³ UNCLOS Article 58(1).

²⁴ UNCLOS Article 56(2).

²⁵ UNCLOS Article 58(3).

the territorial sea²⁶. While the principle that, subject to conditions, the coastal State should not normally withhold its consent to purely scientific research into physical and biological characteristics of the continental shelf had been accepted in the context of that zone (by extension of the provisions of Article 5(8) of the 1958 Convention on the Continental Shelf), the researching States sought and were successful at UNCLOS III in having similar provisions applied to the regime for research in the EEZ.

A failure to distinguish clearly between the sovereignty a coastal State exercises in its internal waters and territorial sea (and archipelagic waters in the case of an archipelagic State) and the sovereign rights it exercises in its EEZ and continental shelf is at the core of many Law of the Sea related disputes among States.²⁷ There is a clear distinction between the concepts. *Sovereign rights* pertain to a functional jurisdiction (notably over resources and environmental protection) that is more limited in character than *sovereignty*. With regard to the EEZ, Article 89 of UNCLOS, which applies to the EEZ under Article 58(2), is quite clear that “No State may validly purport to subject any part of the high seas to its sovereignty”. Article 58(1) provides that, subject to relevant provisions of the Convention, all States enjoy the same freedoms of navigation and overflight in the EEZ that are available on the high seas.

DIFFERENCES AND OVERLAPS

Definitions

UNCLOS does not define the key terms “marine scientific research”, “survey activities”, “hydrographic survey”, or “military survey”.²⁸ Indeed attempts at UNCLOS III to include a definition of MSR in the Convention were not successful²⁹. However, the United States and some other Western countries, including the United Kingdom, regard the various activities as distinct. However, the distinction between the different activities is not always clear and may even be intentionally blurred to elude the jurisdiction of the coastal State³⁰.

The maritime powers believe that “survey activities” are not MSR and point out that UNCLOS distinguishes between “research” and “MSR” on the one hand, and “hydrographic surveys” and “survey activities” on the other primarily because these are sometimes referred to separately in the Convention³¹. While the coastal State might regulate MSR in its EEZ and on its continental shelf, the United States believes that

²⁶ Australian Department of Foreign Affairs, *Third United Nations Conference on the Law of the Sea*, p. 67.

²⁷ CSCAP, *The Practice of the Law of the Sea*, p. 4.

²⁸ Galdorisi and Vienna, *Beyond the Law of the Sea*, p. 164.

²⁹ Alfred H.A. Soons, *Implementation of the Marine Scientific Research Regime in the South Pacific – Final Report*, FFA Report 95/14 and SOPAC Joint Contribution Report 101, Honiara, Forum Fisheries Agency, 24 October 1994, p. 6.

³⁰ SOF and EWC, *The Regime of the Exclusive Economic Zone*, p. 31.

³¹ J. Ashley Roach and Robert W. Smith, *Excessive Maritime Claims*, International Law Studies Vol.66, Newport R.I., Naval War College, 1994, p. 247 and Soons, *Implementation of the Marine Scientific Research Regime*, p. 7.

hydrographic survey and military survey activities are freedoms that the coastal State cannot regulate outside its territorial sea³². They are freedoms captured by the expressions “other internationally lawful uses of the sea” related to freedoms of navigation and overflight in UNCLOS Article 58(1) and “*inter alia*” in UNCLOS Article 87(1).³³

The argument that the activities are different concepts is based on the way in which the expressions are used in several articles of UNCLOS. Article 19(2)(j) includes “research or survey activities” among those activities that are contrary to the right of innocent passage. Article 21(1)(g) authorizes the coastal State to adopt laws and regulations relating to innocent passage through the territorial sea in respect of “marine scientific research and hydrographic surveys”. This article is linked to Article 245, which gives a coastal State the exclusive right to “regulate, authorize and conduct” MSR in its territorial sea. Article 40, entitled “research and survey activities”, provides that foreign ships, including “marine scientific research and hydrographic survey ships, exercising the right of transit passage through an international strait” may not carry out “any research or survey activities” without the prior authorization of the States bordering the strait. By the application of Article 54, this rule also applies to ships exercising the right of ASL passage in archipelagic waters.

This prohibition against “any research or survey activities” is a general one against any kind of research carried out by foreign ships while exercising the rights of transit or ASL passage.³⁴ However, the collection of data by a ship during a passage (be it a research vessel or not) that is required for the safe navigation of the ship, such as depth sounding and wind speed and direction, cannot be regarded as either MSR or a survey activity.³⁵ As with innocent passage in the territorial sea and provided the vessel does not stop or acts in any other way that is not in accordance with making a normal direct passage through the strait or ASL, there is little possibility that the coastal State would be aware of any data collection.

Commentaries on UNCLOS and the various sessions of UNCLOS III leading up to agreement on the Convention throw little light on why “hydrographic surveying” was introduced into Articles 21(g) and 40 (only “survey” in Article 19(j)).³⁶ At the earlier Sea-Bed Committee, there were several related proposals all concerned with the activities

³² Roach and Smith, *Excessive Maritime Claims*, p. 249.

³³ Maritime powers disliked the EEZ regime because it potentially closed off large areas of water that had previously been high seas. Without having to list explicitly their military rights within the EEZ, the maritime powers wanted to ensure that the new EEZ regime would not exclude naval operations in the zone. This led to the so-called “Castaneda compromise” with the somewhat over-stated but ambiguous language evident, for example, in Articles 58 and 87 of UNCLOS. Galdorisi and Kaufman, “Military Activities in the Exclusive Economic Zone”, p. 271.

³⁴ Satya N. Nandan and Shabtai Rosenne (eds), *United Nations Convention on the Law of the Sea 1982 – A Commentary*, Dordrecht, Martinus Nijhoff, 1993, p. 352.

³⁵ Alfred H.A. Soons, *Marine Scientific Research and the Law of the Sea*, The Hague, Kluwer, 1982, p. 149.

³⁶ Commentaries consulted comprise Nandan and Rosenne, *United Nations Convention on the Law of the Sea*; Renate Platzoder (ed), *Third United Nations Conference on the Law of the Sea: Documents*, Dobbs Ferry NY, Oceana Publications, 1982; and Rene Jean Dupuy and Daniel Vignes (eds), *A Handbook on the New Law of the Sea*, Dordrecht, Martinus Nijhoff, 1991.

of warships, including one by the Soviet Union at the 1972 session of the Committee providing that warships in transit were not, *inter alia*, to undertake hydrographical work”.³⁷ A proposal by Fiji at the second session of UNCLOS III in 1974 became the origin of the final language of Article 40 after an earlier proposal by Fiji at the Sea-Bed Committee provided that foreign warships exercising the right of innocent passage through the territorial sea should not “undertake any hydrographical survey work or any marine research activities”.³⁸

Because hydrographic surveying is mentioned separately to MSR in several UNCLOS articles, some commentators claim that hydrographic surveying is not part of MSR.³⁹ For example, Soons considers that hydrographic surveying might be regarded as an internationally lawful use of the sea associated with the operation of ships or submarine cables and pipelines in accordance with Article 58 of UNCLOS, and can therefore be conducted freely in the EEZ.⁴⁰ However, it would be subject to coastal State jurisdiction if the activity were in connection with the exploration and exploitation of the natural resources of the zone. This would be the case, for example, if the hydrographic survey was being conducted as preliminary to, or in conjunction with a geophysical investigation of the oil and gas potential of a particular sea area. Bathymetric charts providing a description of seabed topography are a routine output of hydrographic surveys and are a basic tool of resource exploitation.⁴¹

Activities, such as hydrographic surveys and the collection of information that, whether or not classified is to be used for military purposes, are not considered by the United States to be MSR, and therefore, are not subject to coastal State jurisdiction.⁴² The United States considers that ‘survey’, ‘prospecting’ and ‘exploration’ are primarily dealt with in other parts of UNCLOS, notably Parts II, III, XI and Annex III rather than Part XIII.⁴³ The United Kingdom adopts a similar position (see Annex A).

The distinction between hydrographic surveying and MSR has been an issue with the Advisory Body of Experts on the Law of the Sea (ABE-LOS) established by the Intergovernmental Oceanographic Commission (IOC) but no conclusion has been reached. Predictably discussion came down to a debate between the representatives of the United States arguing that surveying activity was not subject to coastal State control while other delegates argued that they were.⁴⁴

³⁷ Nandan and Rosenne, *United Nations Convention on the Law of the Sea*, p. 350.

³⁸ *Ibid.*, pp. 350-351.

³⁹ Soons, *Marine Scientific Research and the Law of the Sea*, p. 125.

⁴⁰ *Ibid.* p. 157.

⁴¹ One of the first publications authorised by the International Hydrographic Bureau in 1932 was the General Bathymetric Chart of the Oceans (GEBCO). GEBCO is now in its 5th edition and is regarded as an essential tool of marine science on a global scale. It now operates under the joint auspices of the International Hydrographic Organization (IHO) and the UN’s Intergovernmental Oceanographic Commission (IOC). GEBCO’s website is at: <http://www.ngdc.noaa.gov/mgg/gebco/gebco.html>

⁴² *Ibid.* footnote 50, p.21.

⁴³ Thomas and Duncan, *Annotated Supplement*, footnote 50, p. 21.

⁴⁴ Some delegates questioned both the tone and certain contents of the presentation by the United States. IOC, ABE-LOS, *Report of the First Session*, Paris, 11-13 June 2001.

Marine Scientific Research

Marine scientific research (MSR) is the general term most often used to describe those activities undertaken in ocean and coastal waters to expand scientific knowledge of the marine environment⁴⁵. MSR includes oceanography, marine biology, fisheries research, scientific ocean drilling and coring, geological/geophysical scientific surveying, as well as other activities with a scientific purpose.⁴⁶ There is a tendency in practice to use the term MSR loosely when referring to all kinds of data collection (research) conducted at sea. However, not all data collection conducted at sea necessarily comes within the scope of the MSR regime established by UNCLOS. Many argue that other activities, such as resource exploration, prospecting and hydrographic surveying are governed by different legal regimes. However, these activities may be difficult to distinguish in practice and this is a large part of the problem.

MSR is sometimes categorized as either “fundamental” or “pure” research on the one hand or “applied”, “commercial” or “military” research on the other but the distinction between the two categories is often not clear.⁴⁷ The former refers to MSR intended to add to the scientific knowledge of the world, regardless of its application, while the latter refers to research conducted for a specific practical purpose.⁴⁸ However, this distinction between “pure” and “applied” research is in a Western tradition and may not appeal to Asian nations.⁴⁹

Oceanography is one dimension of MSR that is most often mixed up with hydrographic surveying. It may be either “pure” or “applied” and was defined during the First UN Conference on the Law of the Sea (UNCLOS I) in 1958 as:

the scientific study of ocean basins, the ocean and its contents. It was subdivided into four parts: (i) physical oceanography which dealt with waves, tides, currents, magnetism, heat exchange, etc; (ii) chemical oceanography, which was the chemistry of the complex mixture of substances in the waters of the sea; (iii) marine biology, which was the study of plant and animal organisms in the sea; (iv) submarine geology which included the geology of the sea bottom, the study of sedimentation processes, etc. Oceanography may also include the study of phenomena outside the oceans, such as meteorology.⁵⁰

⁴⁵ Thomas and Duncan, *Annotated Supplement to the Commander's Handbook*, footnote 50, p. 21.

⁴⁶ Roach and Smith, *Excessive Maritime Claims*, p. 248.

⁴⁷ E.D. Brown, *The International Law of the Sea, Volume 1 – Introductory Manual*, Aldershot, Dartmouth, 1994, p. 419.

⁴⁸ Soons, *Marine Scientific Research and the Law of the Sea*, p. 6.

⁴⁹ Sequoia Shannon and David J Dzurek, “Scientific Research” in Joseph Morgan and Mark J. Valencia (eds), *Atlas for Marine Policy in East Asian Seas*, Berkeley, University of California Press, 1992, p. 15.

⁵⁰ Dr. N.B. Schaefer, Expert at the First UN Conference on the Law of the Sea (UNCLOS I) as quoted in Brown, *The International Law of the Sea*, p. 419.

Most commentators are of the view that certain applied scientific research activities are excluded from the scope of Part XII of UNCLOS⁵¹. In particular the Convention provides a separate regime for resource exploration covering scientific research and data collection concerning natural resources, whether living or non-living, conducted specifically with a view towards exploitation (i.e. economic exploitation) of the resource⁵². The distinction between the two categories of research is significant in terms of the consensual regime for MSR in UNCLOS. In the case of pure research, consent should “in normal circumstances be given”, while in the case of applied research, the coastal State has complete discretion whether to give its consent or not.⁵³

Ships and a variety of other platforms, such as submersibles, installations and buoys or Ocean Data Acquisition Systems (ODAS), aircraft and satellites might conduct MSR. New technologies for marine data collection include remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs) and seabed landers. These systems potentially allow data for either civil or military purposes to be collected within the EEZ without the research ship actually entering the zone itself. They could be launched outside the zone on a pre-programmed mission of data collection.

The ships undertaking MSR might be categorized as oceanographic research vessels, hydrographic surveying vessels, seismic exploration vessels or fisheries research vessels. Hydrographic ships tend to be operated by navies or defense agencies, although civilian crews may man them, while the other categories of vessel are mostly operated by civilian agencies (see Annex B). However, few of these categories of vessel are exclusive. For example, an oceanographic vessel may conduct what may be classified as fisheries research and vice versa. Most hydrographic surveying vessels also have a capability to conduct oceanographic research and indeed may routinely do so as part of hydrographic surveying, e.g. the taking of bottom samples and the collection of data on currents and tidal streams. Many of the technologies used for MSR and hydrographic surveying are substantially the same. Both use precise navigation systems, multibeam sonars, current meters, seabed sampling devices, etc. However, despite these considerations, a hydrographic surveying vessel is usually just what it says it is.

Military Surveys

Military surveys refer to activities undertaken in the ocean and coastal waters involving marine data collection (whether or not classified) for military purposes⁵⁴. Such data is important, even essential, for effective submarine operations, anti-submarine warfare (ASW), mine warfare and mine countermeasures (MCM), particularly in waters such as the South and East China Seas where oceanographic and underwater acoustic conditions vary widely with uneven bottom topography, fast tidal streams and a relatively high level of marine life. Roach and Smith observe that:

⁵¹ Soons, *Marine Scientific Research and the Law of the Sea*, p. 125.

⁵² *Ibid.*

⁵³ R.R. Churchill and A.V. Lowe, *The Law of the Sea*, 3rd ed., Manchester, Juris Publishing, 1999, p. 406.

⁵⁴ Roach and Smith, *Excessive Maritime Claims*, p. 248.

Military surveys can include oceanographic, marine geological, geophysical, chemical, biological and acoustic data. Equipment used can include fathometers, swath bottom mappers, side scan sonars, bottom grab and coring systems, current meters and profilers. While the means of data collection used in military surveys may sometimes be the same as that used in MSR, information from such activities, regardless of security classification, is intended not for use by the general scientific community, but by the military.⁵⁵

Military surveying is an expression largely coined by the United States and as already mentioned, the United Kingdom talks about MDG in similar vein. These terms are not specifically addressed by UNCLOS and there is no language stating or implying that coastal States may regulate their conduct in any manner by coastal States outside their territorial sea or archipelagic waters⁵⁶. Thus the United States “reserves the right to engage in military surveys outside foreign territorial seas and archipelagic waters” and that to “provide prior notice or request permission would create an adverse precedent for restrictions on mobility and flexibility of military survey operation”.⁵⁷ Similarly the United Kingdom believes that States have a right to engage in MDG anywhere outside foreign territorial seas and archipelagic waters without prior notice to or permission from the coastal State (see Annex A).

Acoustic research is a particularly significant dimension of military surveying. This reflects the importance of knowledge of the propagation of sound in water to navies. Sound propagation can vary greatly from one sea area to the next depending on conditions of water density, chemistry, salinity and temperature and also on the geological and acoustic characteristics of the seabed. Apart from the collection of relevant oceanographic knowledge, acoustic research deals with underwater communications and telemetry, the performance of different types of sonar (i.e. passive and active, and active sonars of different power and frequency) and instrumentation and control systems (e.g. for ROVs). Some ships might be identified specifically as hydro-acoustic ships.

Geophysical surveying is another form of MSR that has considerable application in military surveying, particularly in support of ASW and submarine operations. Although magnetic anomaly detection (MAD) is less used now as a form of submarine detection, military survey vessels might still mount gravimeters and magnetometers as part of their research equipment outfit.

Intelligence collection activities conducted in the EEZ might also be considered as coming within the scope of “scientific research” and thus within the scope of the MSR regime in UNCLOS⁵⁸. However, the United States and other maritime powers are strongly of the view that while these activities are within the scope of research, they are

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Ibid. p. 249.

⁵⁸ SOF and EWC, *The Regime of the Exclusive Economic Zone*, p. 6.

associated with the freedoms of navigation and overflight in the EEZ and not under the jurisdiction of the coastal State. Intelligence collection data is only used for military purposes and is not released for public purposes. Again the boundaries between “military surveys” and “intelligence collection” may be difficult to determine and one vessel may concurrently undertake both activities although the external appearance of the vessel (e.g. the aerials on a signals or electronic intelligence vessel), the equipment it is operating (e.g. the type of sonar) and its movements (e.g. whether it is maneuvering, stopping or continually underway) should give a good lead on the nature of its data collection.

Whether particular military activities have *due regard* to the rights and duties of the coastal State and whether they are in accordance with the “peaceful purposes” provisions of UNCLOS involves other arguments that are beyond the scope of this paper. Suffice to note though that some military surveys (including military hydrographic surveys) would not be for peaceful purposes. Examples would include beach surveys, including the approaches to beaches, to support possible amphibious operations although generally these would be in the territorial sea and not the EEZ. Some hydrographic surveys to support submarine operations or contingency plans for mining or mine clearance would also not be for peaceful purposes and could imply a threat to the security of a coastal State. These surveys might include high-resolution bathymetric charts that could be used in the future to identify mines or “bottomed” submarines.

China took military action and lodged protests over the “hydrographic survey” operations by the USNS *Bowditch* (AGS-21) in Spring 2000 and fall 2002.⁵⁹ According to a spokesman for the Military Sealift Command, Far East, “USNS *Bowditch* was gathering hydrographic acoustic performance data in international waters around the Yellow Sea”.⁶⁰ Similarly in March 2001, India lodged protests with the United States and the United Kingdom over violations of its EEZ by military survey ships.⁶¹ The ships involved were the *Bowditch* and HMS *Scott*. The *Bowditch* was detected 30 nautical miles from Nicobar Island and was reportedly carrying out “oceanographic survey operations”.⁶² After having been sighted 190 nautical miles off Diu and later near Porbandar in the Arabian Sea, the *Scott* indicated it was carrying out military surveys and declined to provide any further information.⁶³ While classified as a hydrographic ship and manned by a naval crew, *Scott* is understood to be the Royal Naval vessel that is frequently engaged in hydrographic and oceanographic surveys in support of submarine operations.

USNS *Bowditch* is part of the Special Missions Program of the Military Sealift Command. Ships in this Program provide operating platforms and services for “unique” American military and Federal government missions, including oceanographic and hydrographic surveys, underwater surveillance, missile flight data collection and

⁵⁹ Lieutenant Commander Mike Studeman, “Pacific faces Crisis in Intel Analysis”, *USN Institute Proceedings*, January 2003, p. 66.

⁶⁰ Mark Oliva, “Before EP-3, China turned away U.S. research ship in international waters”.
<http://ww2.pstripes.osd.mil/01/may01/ed052001d.html> (accessed 12/10/2003)

⁶¹ The ships involved were the USNS *Bowditch* and HMS *Scott*, SANDNet weekly Update, March 14, 2001
(<http://www.nautilus.org/sand/Updates2001/V2N11.html>) (accessed 12/10/2003)

⁶² Galdorisi and Kaufman, “Military Activities in the Exclusive Economic Zone”, p. 294.

⁶³ Galdorisi and Kaufman, “Military Activities in the Exclusive Economic Zone”, pp. 294-295.

tracking, acoustic research and submarine support. The *Bowditch* is mentioned specifically on the web page for the United States Navy's Special Mission Program as an oceanographic and hydrographic survey ship that performs "acoustical, biological, physical and geophysical surveys" to provide "much of the military's information on the ocean environment".⁶⁴ The data collected helps to improve technology in undersea warfare and the detection of ships and submarines.

Hydrographic Surveying

A *hydrographic survey* is the obtaining of information in coastal or relatively shallow areas for the purpose of making nautical charts and similar products to support safety of navigation⁶⁵. A hydrographic survey may include measurements of the depth of water, configuration and nature of the natural bottom, direction and force of currents, heights and times of tides, and hazards to navigation. Hydrographic surveys may be necessary to determine the features that constitute baselines or basepoints and their geographical positions.⁶⁶ Basic requirements of hydrographic surveying are the abilities to take depth soundings and to fix the position of the surveying vessel accurately (notes on technological developments with hydrographic surveying and the organization of hydrographic services are included at Annex B). Ships mainly conduct hydrographic surveys although aircraft may also conduct them using light detection and ranging (LIDAR) equipment. Conceivably submarines could undertake hydrographic surveys but if the data was only for the safety of surface navigation, their use would not be economic.

The origins of hydrographic surveying lie in MSR and this partly explains why the boundary between MSR and hydrographic surveying is difficult to draw.⁶⁷ Early naval explorers such as James Cook, Mathew Flinders, Charles Baudin and George Vancouver were hydrographers themselves and usually had marine scientists embarked with them. Initially their hydrographic work was ancillary to the greater objectives of exploration and scientific research. These intrepid explorer-surveyors delineated the coastline, discovered safe routes for shipping, and fixed as accurately as they could the geographical position of their discoveries although normally they did not search closely for or investigate hidden rocks, reefs and shoals⁶⁸. That came later. Generally detailed hydrographic surveys to support the production of nautical charts were not commenced until the 1830s although an Admiralty Hydrographical Office had been established in London in 1795.⁶⁹

⁶⁴ Military Sealift Command web page, *Special Mission* (<http://www.msc.navy.mil/pm2/>) (accessed 12/10/2003)

⁶⁵ Thomas and Duncan, *Annotated Supplement to the Commander's Handbook*, p. 130. The International Hydrographic Dictionary published by the IHB defines a *hydrographic survey* as "A survey having for its principal purpose the determination of data relating to bodies of water. A hydrographic survey may consist of the determination of one or several of the following classes of data: depth of water, configuration and nature of the bottom; directions and force of currents; heights and times of tides and water stages; and location of topographic features and fixed objects for survey and navigation purposes."

⁶⁶ *Ibid.* p. 63.

⁶⁷ Gorina-Ysern and Tsamenyi, *Defence Aspects of Marine Scientific Research*, p. 7.

⁶⁸ Geoffrey C. Ingleton, *Charting a Continent*, Sydney, Angus and Robertson, 1944, p. 42.

⁶⁹ Commander R.J. Hardstaff RAN (Rtd), *Leadline to Laser – The Hydrographic Service Royal Australian Navy 1920-1995*, Sydney, RAN Hydrographic Office, 1995, p. xiv.

Until the advent of the Navstar Global Positioning System (GPS) in 1994 and the later Differential GPS (DGPS), it was extremely difficult for a hydrographic survey to be conducted without the support of the adjacent coastal State(s). Shore control was essential for accurate position fixing and this required the establishment of shore stations. Thus it was probably sufficient that UNCLOS should establish the jurisdiction of the coastal State over hydrographic surveying in the territorial sea without bothering with surveys further offshore. It is possibly not a coincidence that hydrographic surveying in the EEZ has only become controversial over the last decade or so with the introduction of GPS. Prior to that time, most surveys in the EEZ would only have been possible with the support of the coastal State because the accuracy of the survey depended on having shore stations in the vicinity of the survey area.

Although it could be argued that using LIDAR to conduct a hydrographic survey in an EEZ without the permission of the coastal State is part of the high seas freedom of overflight, it is most unlikely that any coastal State would accept such an argument. The low altitude of the aircraft, its repetitive flight pattern and the likely relatively shallow waters of the area being surveyed are all factors that would concern the coastal State and lead to its questioning of the purpose of the activity.

Hydrographic surveying is invariably a clear and distinct activity that, despite its use of similar equipments to that used in other forms of MSR, is not easily confused with other MSR activity. It is fairly obvious when a ship is conducting a hydrographic survey. It will be underway and following a regular pattern of sounding lines whereas a ship undertaking other activities, including oceanographic research and military surveys, may be more random in its movements stopping on occasions to conduct experiments or to take bottom samples.

The primary use of the data collected by hydrographic surveys is to compile nautical charts, and other documents to facilitate and ensure the safety of navigation and for use by others concerned with the marine environment such as ocean engineers, oceanographers, marine biologists and environmental scientists.⁷⁰ The Electronic Chart Display and Information System (ECDIS) is a new development that has emphasized the importance of hydrographic data. ECDIS combines real-time satellite navigational information with an electronic chart database to produce constantly updated, real-time, accurate information about the ship's position and intended movement.

Hydrographic surveying, virtually by definition, is conducted for peaceful purposes although some hydrographic data conducted by naval hydrographic surveying ships, such as bottom topography and deeper water surveys, may not immediately have relevance to

⁷⁰ This description of the science of hydrography and application is provided by the website of the International Hydrographic Organization (IHO) at www.iho.shom.fr. This is a particularly good website that provides a good description of the scope of hydrography and current issues, including capacity building and regional arrangements.

the safety of surface navigation or be released internationally⁷¹. Apart from navigational safety, important applications of hydrographic knowledge include planning the exploration and exploitation of marine resources, the determination of seaward limits of national jurisdiction, coastal zone management, national development (including building new ports and harbors), and the delimitation of maritime boundaries.⁷² Requirements have shown no sign of lessening over the years. Deeper draught vessels, recognition of the need to protect the marine environment, new patterns of maritime trade, the growing importance of seabed resources, increased exploitation of offshore oil and gas, and the new limits of national jurisdiction allowed under UNCLOS are all factors that have served to highlight the inadequacies of existing hydrographic knowledge.

There is a trend now within the International Hydrographic Organization (IHO)⁷³ to think of hydrographic knowledge of adjacent waters as an element of *national infrastructure*⁷⁴ and sustainable development. Nautical charts provide for the safety of navigation and facilitate maritime economic activity generally, including fishing, tourism and oil and gas exploration and exploitation. Roach has noted the relevance of hydrographic data and knowledge to national development:

In many areas of the world, the production of up-to-date charts has had a positive impact on economic development in coastal areas, stimulating trade and commerce and the construction or modernization of harbor and port facilities. By helping safety of navigation for ships transiting offshore, up-to-date charts also play a role in protecting coastal areas from the environmental pollution which results from wrecks of freighters and tankers carrying hazardous cargoes. Data collected during hydrographic surveys may also be of value in coastal zone management and coastal science and engineering.⁷⁵

Paradoxically this relevance of hydrographic surveying to economic development supports the view that hydrographic surveying in an EEZ should come within the jurisdiction of the coastal State. Hydrographic data in the EEZ clearly has economic value to the coastal State and the coastal State should be in a position to manage and control the release of such data, regardless of how and by whom it was collected. It is virtually impossible these days to identify any hydrographic data, including that

⁷¹ The secret surveys of the South China Sea conducted by the United States, United Kingdom and Japan in the 1920s and 1930s are fine examples of hydrographic surveys that were not released to the public for many years. David Hancox, and Victor Prescott, *Secret Hydrographic Surveys in the Spratly Islands*, Kuala Lumpur, Maritime Institute of Malaysia, 1997.

⁷² John Maschke, "The International Hydrographic Organization – an effective international regime?", *Maritime Studies* 107, July-August 1999, p. 9.

⁷³ The IHO is a technical organization that provides coordination between national hydrographic services. The IHO evolved from the International Hydrographic Bureau established in 1921. It is not part of the United Nations. The IHO is focused on maintaining the highest standards of hydrography and charting and ensuring common standards of nautical charting.

⁷⁴ See for example the discussion in Chapter 1 – The Need for a Hydrographic Service in IHO publication *M-2 - National Maritime Policies and Hydrographic Services*, International Hydrographic Bureau, Monaco, 2001 (available at <http://www.iho.shom.fr/PUBLICATIONS/download.htm>)

⁷⁵ Roach, "Marine Scientific Research", p. 60.

conducted by military surveying ships, which would not have some potential value to the coastal State. The coastal State requires such data to support developmental activities in the EEZ, both now and in the future, related to its sovereign rights for the economic exploitation of that zone. It might even be argued that hydrographic surveys come within the scope of “other activities for the economic exploitation and exploration” of the EEZ.⁷⁶

The provision of hydrographic services in adjacent waters is now an obligation under Regulation 9 of the International Convention for the Safety of Life at Sea (1974) (SOLAS Convention). This regulation requires that Contracting Governments provide hydrographic services including surveying and the issue of nautical charts and the IHO is now pursuing an active capacity building program whereby developed country members assist developing country members with developing their hydrographic capacity. While the geographical area of responsibility for surveying and charting is not specified, there is a clear implication that it extends beyond the territorial sea and archipelagic waters.

This argument can be taken further. Hydrographic data is a *tradable* commodity, as well as an essential element of the national infrastructure of the coastal State. The IHO has recognized this through the recent attention it has been giving to the issue of copyright over hydrographic data. No longer is it accepted that the navigational and hydrographic information on nautical charts issued by one country might be freely copied by another State on to its own nautical chart. In these days of economic rationalism, the free exchange of hydrographic data is not regarded as an acceptable way of doing business. Just as the coastal State regards MSR data as within its control and jurisdiction, the same might be said about hydrographic data. It is not just the intended functional use of MSR or hydrographic data (i.e. for economic purposes) that establishes the principle of coastal State jurisdiction but also recognition that such data has value in its own right.

There may be liability implications for a coastal State if a nautical chart it publishes of its adjacent waters does not contain the best available information. The rights and obligations of a coastal State in its EEZ suggest the leading role of the coastal State in the production of nautical charts for those waters and thus its interest, indeed a responsibility, in ensuring that published charts of those waters are accurate. This responsibility is evident in law suits about groundings that have been caused by inaccurate charts published by other States that were out of date compared with those issued by the coastal State. Even if the coastal State does not have an effective national hydrographic service, this is not justification for another State to presume a right to conduct hydrographic surveys in the EEZ of the coastal State.

Overlaps

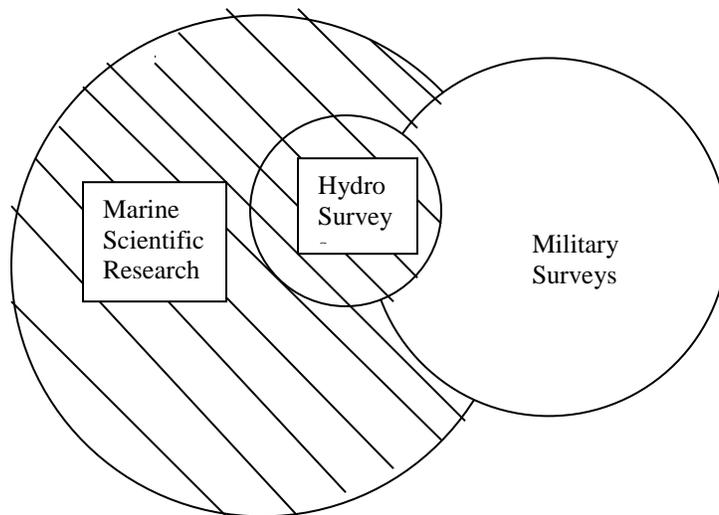
Figure 1 is a graphical depiction based on the discussion in this paper of the overlap between MSR, hydrographic surveying and military surveys. It shows the overlap between these three activities. Military surveys, particularly military oceanographic research, overlap to some extent with MSR but a lot of military surveying does not, particularly that which is more in the form of intelligence collection. Some forms of

⁷⁶ UNCLOS Article 56(1)(a).

acoustic research would also have no commercial or economic value. As depicted by the small circle overlapping both MSR and military surveys, hydrographic surveying may be conducted both for civil and military purposes but the nature of the activity will be essentially the same regardless of the actual purpose of the surveys.

The shaded areas in Figure 1 show the activities that, according to the arguments in this paper, are subject to the jurisdiction of the coastal State. These include all hydrographic surveying regardless of whether it is conducted for military or civilian purposes and all MSR with the exception of data collection, which is conducted for purely military purposes and has no economic value. Given contemporary uses of hydrographic data, it is difficult to sustain an argument that hydrographic surveying in the EEZ is outside the MSR regime in UNCLOS. Hydrography should be seen as an “applied” science that is part of MSR.

Figure 1 – The Overlap between Marine Scientific Research, Military Surveys and Hydrographic Surveying



IMPLICATIONS

Survey Activities in the EEZ

The Report of the Tokyo Meeting on the Regime of the EEZ sponsored by the Ship and Ocean Foundation (SOF) and the East-West Center opined that the rule determining what research activities in the EEZ were under the jurisdiction of the coastal State and what were not might hinge on *intent*.⁷⁷ Those activities that were intended for military purposes only or to support the safety of navigation would not be under the jurisdiction of

⁷⁷ SOF and EWC, *The Regime of the Exclusive Economic Zone*, p. 6.

the coastal State while those that were intended as *bona fide* MSR clearly were. However, recent trends and the developments discussed above have thrown real doubt on arguments that hydrographic surveying should be outside the jurisdiction of the coastal State. It is not sufficient to say that data collection for military purposes is outside the jurisdiction of the coastal State simply because it is intended for military purposes. A possible rule might then hinge both on intent and the economic value of the data to the coastal State. Any hydrographic data might be perceived as having value, now or in the future, whereas some data, including even some oceanographic data collected for military purposes, might be without value.

The Report of the Tokyo Meeting went on to observe that:

Regarding hydrographic surveys, the word ‘surveys’ was used in UNCLOS because the Treaty drafters consulted the International Hydrographic Bureau. The understanding was that ‘surveys’ related to territorial seas and straits used for navigation, not the EEZ. Hydrographic surveys meant surveys to enhance the safety of navigation and were not considered marine scientific research. If this is to be the understanding, when surveys are undertaken in the EEZ, they should be under a consent regime and the results should be made available to the coastal State.⁷⁸

This paper supports this conclusion. The argument that hydrographic surveys are not subject to coastal State permission because they are “for the benefit of all humankind to make navigation safer”⁷⁹ would seem to have lost strength over the years. Relevant factors include the wider utility of hydrographic data, recognition of its economic value to the coastal State and the implied responsibility of the coastal State for ensuring that hydrographic data in its EEZ is up to date.

An argument to support the unrestricted conduct of hydrographic surveying is often based on its close relationship with the safety of navigation. However, the fact that hydrographic surveying is not permitted in the territorial sea or during transit or ASL passage would appear to run against the argument that it is required for the safety of navigation and thus might be conducted in an EEZ without the permission of the coastal State. It might be expected that generally the waters of an EEZ are safer and more free of dangers than waters closer inshore in the territorial sea or archipelagic waters. Safety of navigation is more likely to be of concern in the territorial or in archipelagic waters yet hydrographic surveying in those waters without the consent of the coastal State is specifically prohibited.

Continental Shelf

It would seem indisputable that as a general principle, hydrographic surveying might be conducted without the prior authorization of the coastal State in areas where the claimed continental shelf extends beyond 200 nautical miles from territorial sea baselines. Coastal

⁷⁸ Ibid. p. 13.

⁷⁹ Ibid.

State rights over the continental shelf extend to the seabed and subsoil for the purpose of exploration and exploitation of the natural resources of the area.⁸⁰ Coastal States are not able to withhold their consent for research in those areas unless they have publicly designated an area in which resource exploitation or detailed exploratory operations will be carried out⁸¹.

Whereas coastal State permission for MSR of direct significance to the exploration and exploitation of marine resources is an absolute requirement in the EEZ, the need for coastal State permission only applies to certain designated areas of the part of the continental shelf that extends beyond 200 nautical miles from territorial sea baselines. Under the principle that hydrographic surveying is subject to the MSR regime in UNCLOS, it might also be concluded that hydrographic surveying should not be conducted in these areas designated by the coastal State.

State Practice

While the United States and the United Kingdom take the position that hydrographic surveying is not within the jurisdiction of the coastal State, other States clearly do not share this view. Both Australia and Canada are understood to seek permission of the coastal State before conducting hydrographic surveys in the EEZ of that State.

UNCLOS Article 255 exhorts States to adopt reasonable rules, regulations and procedures to promote and facilitate MSR, including access to harbours and assistance for research vessels. Although a thorough survey has not been conducted of State practice, it would seem that States in implementing this UNCLOS article usually do not refer separately to hydrographic surveying. National legislation governing the conduct of MSR in waters under national jurisdiction generally does not specifically identify hydrographic surveying as different to MSR.⁸² Such legislation is required to implement the UNCLOS regime at a national level and to specify requirements for national participation and the reports required by the coastal State.⁸³ While the fact that hydrographic surveying is not specifically mentioned could support the argument that it is different to MSR, it is rather more likely that coastal States in not mentioning it, are assuming that it is self-evident that it is captured by the MSR legislation.

Due to the political sensitivity of the issue, it is unlikely that the IHO would take a position on such matters. Decision-making in that organization is by consensus and it is most unlikely that consensus could be reached on this issue unless it was to accept a position, contrary to the views of the United States and some of its allies, that hydrographic surveying is outside the scope of the MSR regime in UNCLOS.

⁸⁰ UNCLOS Article 77.

⁸¹ UNCLOS Article 246 (6).

⁸² Based on a survey in Office for Ocean Affairs and the Law of the Sea, United Nations, *The Law of the Sea: National Legislation, Regulations and Supplementary Documents on Marine Scientific Research in Areas under National Jurisdiction*, New York, United Nations, 1989, pp. 143-154.

⁸³ Australia has established Foreign Research Vessel Guidelines (FRVG) as part of implementing Part XIII of UNCLOS but these make no reference to hydrographic surveying or other types of survey. Montserrat Gorina-Ysern and Martin Tsamenyi, "Defence Aspects of Marine Scientific Research", *Maritime Studies* 96, September-October 1997, p. 20.

Dispute Settlement

UNCLOS Article 59 provides a basis for the resolution of conflicts between States regarding the attribution of rights and jurisdiction in the EEZ. It explains that these disputes are to be resolved “on the basis of equity and in the light of all relevant circumstances, taking into account the respective importance of the interests involved to the parties as well as to the international community as a whole”.⁸⁴

The dispute resolution mechanism in UNCLOS could be used in respect of a dispute between a coastal State and a flag State regarding hydrographic surveying and MSR but is unlikely to be available in respect of a dispute involving military activities in the EEZ, including military surveys. UNCLOS Article 298 provides that States when signing, ratifying or acceding to the Convention may make an optional exception to the applicability of compulsory procedures entailing binding decisions. The circumstances include “disputes concerning military activities, including military activities by government vessels and aircraft engaged in non-commercial service”. The concern of the United States that the International Law of the Sea Tribunal (ITLOS), if the matter were referred to it, could rule that hydrographic surveying is governed by the MSR regime in UNCLOS might become a prime reason for the United States not to ratify the Convention.⁸⁵ While countries may opt out of the mandatory dispute resolution procedures with regard to military activities, this would not be so with hydrographic surveying.

However, in recent hearings before the Senate Committee on Foreign Relations, the Department of Defense strongly supported accession by the United States to UNCLOS primarily because the Convention “supports navigational rights critical to military operations”.⁸⁶ The Department acknowledged that it might be possible for the dispute resolution scheme in UNCLOS to intervene to determine whether or not military surveys in a country’s EEZ were consistent with UNCLOS. As a consequence, it recommended that on acceding to the Convention, the United States should make a declaration under UNCLOS Article 298 excluding military activities from mandatory dispute resolution procedures. An adverse ruling on military activities could have a major impact on the operational planning and security of the United States and it was for each party itself to determine whether an activity is “military” or not.⁸⁷

Looking to the Future

⁸⁴ UNCLOS Article 59.

⁸⁵ Email from Professor Jon van Dyke dated June 8, 2003.

⁸⁶ Department of Defense, Statement of Mr. Mark T. Esper, Deputy Assistant Secretary of Defense for Negotiations Policy, before the Senate Committee on Foreign Relations on the U.N. Convention on the Law of the Sea, October 21, 2003.

⁸⁷ Joint Chiefs of Staff, Statement of Admiral Michael G. Mullen, U.S. Navy, Vice Chief of Naval Operations, before the Senate Committee on Foreign Relations on the U.N. Convention on the Law of the Sea, October 21, 2003.

The Tokyo Meeting on the EEZ Regime concluded that based on current and planned asset acquisitions, military and intelligence gathering activities in EEZs are going to become more controversial and more dangerous.⁸⁸ The same might be said about military hydrographic surveying particularly that required to support submarine operations and ASW. The number of submarines in the Asia-Pacific region continues to grow and there is likely to be a concurrent increase in ASW capabilities as well as increased awareness of the importance of hydrographic knowledge.

The increased focus of the U.S. Navy and other Western navies on littoral operations also suggests that issues raised in this paper are going to become more significant in the future. Successful operations in the littoral depend heavily on good oceanographic and hydrographic knowledge of that environment, particularly for submarine operations, ASW, mine laying, minesweeping and amphibious operations. A coastal State might well argue that it gains some security by restricting the availability of knowledge on its coastal environment, including its EEZ.

Prospective Guidelines

Based on discussion in this paper, the following guidelines are proposed related to the conduct of hydrographic surveying and MSR in the EEZ:

- Coastal State consent should normally be granted to MSR in the EEZ conducted purely for scientific purposes.
- The collection of data that has utility for resource exploration (both living and non-living), conservation and management is entirely under the jurisdiction of the coastal State, which is not obliged to grant consent to such research by foreign vessels.
- The potential economic value and utility of marine data to the coastal State is a basic criterion in determining whether the collection of such data should be under the jurisdiction of the coastal State.
- Hydrographic surveying should only be conducted in the EEZ with the permission of the coastal State.
- In the interests of the safety of navigation, Coastal State consent for hydrographic surveying should normally be granted unless the surveys fall within one of the categories in UNCLOS Article 246(5).
- Hydrographic surveying may be freely undertaken in the claimed continental shelf extending beyond 200 nautical miles from territorial sea baselines except in areas designated by the coastal State in accordance with UNCLOS Article 246(6).
- These guidelines also apply to aircraft, AUVs, ROVs and other remotely operated devices conducting research or collecting data in an EEZ.
- These guidelines do not apply to the collection of data by a ship during a passage that is required for the safe navigation of the ship

⁸⁸ SOF and EWC, *The Regime of the Exclusive Economic Zone*, p. 62.

No guidelines have been proposed in relation to military surveys or MDG in the EEZ as further study is required of these issues. On the one hand, the collection of data for purely military purposes might be a high seas freedom that may be undertaken in the EEZ without the permission of the coastal State. On the other, some forms of military surveying might not have due regard to the rights and duties of the coastal State and could be prejudicial to the security of the coastal State. Typically this would be the case if the research or data collection were being undertaken to support contingency plans for operations against the coastal State.

CONCLUSIONS

The considerations that apply to the rights to conduct hydrographic surveys and military surveys in an EEZ are essentially different. Some hydrographic surveys might be conducted for military purposes, particularly to support safety of submarine navigation, but unlike military surveying, hydrographic surveying can be precisely defined. Most hydrographic surveying activity is readily identifiable as such whereas military surveys might involve a range of activities the precise purpose of which might be difficult to determine. This ambiguity might even be introduced intentionally by the researching State to confuse the real purpose of the work.

The distinction between different categories of surveying and MSR hinges on rather more than *intent* and the purpose of collecting the data. The potential economic value and utility of the data to the coastal State must also be considered. It is very difficult to say that hydrographic data collected today will not have some value in the future⁸⁹. A possible rule might recognize both intent and value with some military surveying activities not having any economic value or potential.

Paradoxically the arguments for military surveys in the EEZ being outside the jurisdiction of the coastal State appear stronger than those for hydrographic surveying in the EEZ. Military surveys might be more easily argued as an ancillary activity to the high seas freedoms of navigation and overflight available in the EEZ. The data collected is for military purposes only and is not normally released to the public. On the other hand and although naval vessels might be involved, hydrographic surveying has a certain “non-military” quality to it. It is associated with the safety of navigation but this is now more a reason for hydrographic surveys in the EEZ coming within the jurisdiction of the coastal State rather than for them being outside coastal State purview.

This paper concludes that hydrographic surveying in the EEZ is not a freedom of the high seas associated with navigation and overflight whereas military surveying and intelligence collection might well be. This latter aspect requires further consideration that is outside the scope of this paper. Hydrographic surveys in the EEZ require the prior authorization of the coastal State and should only be conducted with the involvement of

⁸⁹ The “secret” surveys of the South China Sea in the 1920s and 1930s are examples of surveys conducted in the past that came to have significant value in the future.

that State. Much State practice, including the working principles of the IHO (albeit unstated and not formalized), appears to support this position.

Annexes:

- A. Military Data Gathering (MDG) – The United Kingdom Definition of MDG
- B. Notes on Hydrographic Surveying

MILITARY DATA GATHERING (MDG)

THE UNITED KINGDOM DEFINITION OF MDG

Military Data Gathering (MDG) refers to activities in the ocean and coastal waters involving classified and unclassified marine data collection, by military or government owned or chartered vessels, for military purposes.

MDG can include the gathering of:

hydrographic, oceanographic, marine geological, geophysical, chemical, biological and acoustic data.

Equipment can include:

echo-sounders, swath systems, side-scan sonar, bottom grab and coring systems, current meters, expendable bottom penetrators and profilers.

While the means of data collection used in MDG may sometimes be the same as that used in Marine Scientific Research (MSR), information from such activities, regardless of the security classification, is intended primarily for military use and is not released to the scientific community.

Quick response military activities require rapid environmental assessment (REA) which requires immediate in theatre collection and computer based assessment of ocean and meteorological data to provide timely tactical support as an integral part of modern naval and air operations.

MDG activities are not specifically addressed in UNCLOS and there is no language stating or implying that MDG may be regulated in any manner by coastal States outside their territorial sea or archipelagic waters. It is fully consistent with UNCLOS that such MDG is a high seas freedom.

States have the right to engage in MDG anywhere outside foreign territorial seas and archipelagic waters. To provide prior notice or request permission for such work would create an adverse precedent and create unacceptable restrictions on the mobility and flexibility of military operations.

Military trials carried out at sea often involve research into the evaluation of underwater acoustic sensor systems. This can involve both the testing of equipment at sea and the measurement of marine conditions such as temperature, salinity, currents and sub-bottom profiles for use in developing equipment. The testing and development of military equipment at sea is also considered to be part of MDG.

NOTES ON HYDROGRAPHIC SURVEYING

Technological Developments

The basic requirements of hydrographic surveying are the abilities to take depth soundings and fix the position of the surveying vessel accurately⁹⁰. Hydrographic surveys to ensure the safety of navigation are usually extremely detailed with lines of sounding as close as 100 feet apart in shallow waters and further apart in deeper waters. The waters might also be swept by side-scan sonar to ensure there are no undetected dangers. In previous times, prior to the development of echo-sounders and sonar, waters would also be swept by wire in a process similar to mechanically sweeping for mines.

Traditionally depth sounding was by hand lead and line but mechanical sounding machines with an ability to sound the greatest depths of the ocean were introduced into service in the late 19th Century. Electronic echo sounding gear was introduced in the 1930s to provide a means of obtaining a sounding under a ship without the use of any form of measuring line and lead or sounding machine.

In measuring the depth of water by echo sounder, a ship emits an underwater sound impulse that travels outward through the sea at a uniform speed. On reaching the ocean bed, part of the sound is reflected, and returns to the ship in the form of an echo. The velocity of the sound in its passage to and from the ocean bed is known, and so by measuring the time interval between making the sound and hearing the echo return, the depth of water can be determined. Sonar is also used for hydrographic surveying with the near horizontal beam of the sonar equipment used to search for dangers that might lie between the lines of sounding run by the vessel. Modern oceanographic and hydrographic survey ships are fitted with multi-beam, wide-angle precision sonar systems that make it possible to chart continuously a broad strip of ocean floor.⁹¹

The original surveyor-explorers were dependent on precise astronomical navigation (i.e. using measurements of the altitude and transit of heavenly bodies) to fix the positions of their ships. Later hydrographic surveyors used shore control (i.e. based on predetermined fixed points on land) to fix the position of their ship precisely. This required triangulated shore stations fixed by astronomical position, prismatic astrolabes and timed by a chronograph. Once the system of shore control was established, the ship then could accurately fix her position by horizontal sextant angles between the shore stations plotted with a station-pointer.

⁹⁰ This discussion of the science of hydrographic surveying is based on Commander R.J. Hardstaff RAN (Rtd), *Leadline to Laser – The Hydrographic Service Royal Australian Navy 1920-1995*, Sydney, RAN Hydrographic Office, 1995, Technical Notes, pp. 181-213.

⁹¹ Military Sealift Command web page, *Special Mission* (<http://www.msc.navy.mil/pm2/>) (accessed 12/10/2003)

The advent of electronics and the introduction of systems such as LORAN and the Decca Navigator System after World War Two facilitated position fixing for offshore surveys but initially these systems were insufficiently accurate for more detailed inshore work. Thus systems such as Lambda, Hi-Fix and eventually Argo were introduced to provide long-range position fixing. However, these systems all required the establishment of fixed stations ashore in the proximate vicinity of the survey area and it was not until the introduction of the Navstar Global Positioning System (GPS) in 1994 and the later Differential GPS (DGPS) that a survey ship became independent of the need for shore stations in the vicinity of the survey area.

LIDAR Systems

Light Detection and Ranging (LIDAR) systems, also known as Laser Airborne Depth Sounding (LADS), were developed in the 1970s allowing aircraft to carry out depth sounding. The LIDAR aircraft continually fixes its position using a GPS navigation system. A laser system emits infra-red and green pulses with the infra-red being reflected from the sea surface and the green from the sea floor. The water depth is obtained by accurately measuring the time differences between the two reflections. Pre-planned tracks are flown over the survey area at an altitude of 500 meters and a speed of about 150 knots. LIDAR has the advantage of being able to cover a large survey area in a much shorter period of time than it would be possible with a ship-based system. However, LIDAR has some significant limitations.

LIDAR is dependent on water clarity. Although deeper depths can be obtained, LIDAR can log depths up to 70 meters in optimum conditions. Areas of turbidity degrade LIDAR performance. The sun at high altitude also causes unwanted reflections of light into the laser receiver and rough seas have the potential to increase water turbidity and degrade the accuracy of the calculated mean sea surface from the red laser pulse. Low cloud, rain and strong winds also provide difficulties for both the laser system and aircraft operations. However, LIDAR is now being used as a primary and sole source of data for nautical charts in many parts of the world. Thus Australia is making extensive use of LIDAR/LADS to chart wide areas of the Great Barrier Reef that had previously been largely uncharted. In 2002 Qatar conducted an *ab initio* survey of its entire east coast using LIDAR. This was done as an element of a 5-year national development plan.

Hydrographic Services

Generally all national hydrographic services are operated and funded by governments and in many cases these services are located within the nation's navy although civilian crews may man the hydrographic ships. In Australia, the national hydrographic service is part of the Navy but in Canada and Japan, for example, national hydrographic ships are civilian manned by agencies outside of Defense. In the case of the United States, hydrographic ships may be found both under the Department of the Navy in the Military Sealift Command and under a civilian agency, the National Oceanic and Atmospheric Administration (NOAA) although the U.S. Navy has no remit to conduct surveys in U.S.

waters. Civilian firms and research institutes operate many oceanographic and hydrographic ships in countries around the world although some of these may be dual-purpose vessels for both hydrography and marine scientific research (MSR) to the extent to which these activities can be separated.

The main criteria for determining whether the national hydrographic service should be located within the defense sector or elsewhere lies in the relative importance of military hydrographic data for military purposes and the possibility that hydrographic surveys might be required in an operational theater during a period of tension or war. For example, consideration has periodically been given in Australia to “out-sourcing” or “commercializing” the hydrographic function that is currently part of the Marine Science Force Element Group (FEG) in the RAN. However, for the reasons indicated, this step has never been taken. This position was vindicated during the East Timor crisis in 1999 when the RAN Hydrographic Service undertook extensive hydrographic surveying in and around East Timor to facilitate operations by the International Force East Timor (INTERFET).

Another possible factor for determining whether or not to locate the national hydrographic service in the defense sector is whether the country has submarines in its naval inventory. Submarine navigation introduces a different dimension to the national need for good hydrographic data. Submarines require navigational information, including knowledge of the bottom topography, to much greater depths than is required for surface navigation. This information might also be required in shallow waters if the submarines are used for intelligence collection and surveillance, including in waters that are normally only used for surface navigation.

Table 1 shows where the national hydrographic service is located for most countries around the world. Virtually all hydrographic surveying ships are operated by navies, government departments or agencies. Most major maritime countries with the notable exceptions of Canada, Germany, Japan, South Korea and the Scandinavian countries, locate their national hydrographic service within their navy or at least their defence sector. A majority of countries prefer to do so although for the most part, but with the few notable exceptions mentioned, these countries are small.

Table 2 shows similar data for oceanographic vessels. These vessels are mainly civilian operated either by government-run scientific establishments or by research institutes and universities. Their role is scientific research of the ocean’s physical, chemical and biological properties. They undertake extensive data-gathering cruises that are often part of an international effort involving ships of several nations (e.g. the World Ocean Circulation Experiment and the Global Ocean Observing System). Much of there research is “pure” scientific research that is subject to the implied consent regime in UNCLOS. The International Research Ship Operators Meeting (ISOM) is an informal meeting of operators of ocean research ships for the purpose of discussing issues of mutual interest and cooperation in support of MSR.

Table 1

LOCATION OF NATIONAL HYDROGRAPHIC SERVICE

National Hydrographic Service within Defence/Navy

Algeria	Guatemala	Romania
Albania	India	Russian Federation
Argentina	Indonesia	(both)
Australia	Italy	Saudi Arabia
Bangladesh (both)	Korea – North	Serbia and Montenegro
Bolivia	Malaysia	South Africa
Brazil	Mexico	Taiwan
Bulgaria	Myanmar	Thailand
Chile	Netherlands	Tonga
China (both)	Nigeria	Tunisia
Colombia	Oman	Turkey
Cuba	Pakistan	United Kingdom
Dominican Republic	Paraguay	United States (both)
Ecuador	Peru	Uruguay
Egypt	Poland	Venezuela
France	Portugal	Vietnam (both)

Note: Both means that there is a significant civil hydrographic service, as well as the one in the defence/military sector.

National Hydrographic Service in Civil Department

Belgium	Guinea	Liberia
Bahrein	Guinea-Bissau	Lithuania
Brunei	Guyana	Madagascar
Cambodia	Haiti	Malawi
Cameroon	Honduras	Malta
Cape Verde	Iceland	Monaco
Canada	Iran	Mozambique
Congo	Iraq	Namibia
Costa Rica	Ireland	New Zealand
Croatia	Israel	Nicaragua
Cyprus	Jamaica	Norway
Denmark	Japan	Panama
El Salvador	Jordan	Papua New Guinea
Estonia	Kenya	Philippines
Ethiopia	Korea – South	Senegal
Finland	Kuwait	Seychelles
Germany	Latvia	Sierra Leone
Ghana	Lebanon	Singapore

Slovenia
Solomon Islands
Sri Lanka
Surinam
Syria
Sudan
Sweden
Tanzania
Trinidad and Tobago
Ukraine
United Arab Emirates
United States (both)

Table 2

NATIONAL OPERATORS OF OCEANOGRAPHIC VESSELS

Civil Only

Australia	Italy	Peru
Denmark	Japan	Philippines
Ecuador	South Korea	Poland
Estonia	Libya	Russian Federation
Finland	Malaysia	South Africa
Germany	Netherlands	Turkey
Iceland	New Zealand	Ukraine
Israel	Norway	United Kingdom
India	Pakistan	Vietnam
Ireland		

Navy/Defence Only

Belgium	Morocco	Uruguay
Colombia	Myanmar	Venezuela
Indonesia	Tunisia	

Navy and Civil

Argentina	France	Spain
Brazil	Greece	Sweden
Canada	Lithuania	Thailand
Chile	Mexico	United States
China	Portugal	

SOURCES FOR TABLES:

Clifford Funnell and Bob Barton (eds), *Jane's Survey Vessels*, 3rd ed., 2002-2003, Coulsdon, Surrey, Jane's Information Group, 2003

International Hydrographic Organization, *Annual Yearbook 2003*, Rev. 3, Monaco.