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Green cables – Development, opportunities and legal challenges; Part-II

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ABSTRACT

Modern submarine cables, largely known for their application in telecommunications and for providing connectivity whilst at sea, are increasingly being explored as marine environmental monitoring tools. Such submarine cables are often referred to as "telecom-marine data cables", "SMART cables", or simply "green cables". Though submarine telecommunication cables have been granted unique rights and freedoms by the United Nations Convention on the Law of the Sea (UNCLOS), but how are these to be treated and applied while gathering data for Marine Scientific Research (MSR), given national restrictions and sensitivities, is something that remains undefined in UNCLOS, and consequently, often ends up becoming the subject of a series of long-running disagreements between various States. This article is in two parts. While Part-1 has already appeared in the Winter 2018 Edition of Maritime Affairs and dealt with the developments and opportunities of the green cables. This concluding part lays special emphasis on the legal considerations involved in employing such dual-purpose cable and the efforts that can be made to address them.

KEYWORDS

Telecom-marine data cables; SMART cables; green cables; UNCLOS

Introduction

The motivation, importance, developments and opportunities of Green Cables for Marine Scientific Research (MSR) have already been discussed in Part-1 of this article (See Maritime Affairs, Winter 2018). Building upon that discussion, this second part proceeds to explore the legal aspects of both, MSR and the submarine telecommunication cables, (as defined in UNCLOS); followed by an examination of how and where these dual-purpose cables fit in the legal framework. It concludes by touching upon the possible way-ahead for these green cables.

Legal aspects

From a legal point of view, the rights and duties pertaining to the diverse fields of marine scientific inquiry and marine technology have been laid down in Part XIII and Part XIV respectively of UNCLOS, 1982 and in the 2010 United Nations publication entitled "Marine Scientific Research: A revised guide to the implementation of the relevant

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provisions of the UNCLOS".[1] Similarly, the universal right to enjoy the benefits of scientific progress has been established through several human rights instruments, such as Article 27 (1) of the Universal Declaration of Human Rights, and Article 15 (1) of the International Covenant on Economic, Social and Cultural Rights (ICESCR).[2] The framework set up by these conventions follows a sliding scale of jurisdictional rights for coastal States[3] that adequately balances competing uses and interests related to the submarine cables, but, acts only as a "framework". As such, it is important to remember that gaps still exist on the subject within the international legal regime. The success of this framework depends upon effective interpretation and implementation by relevant stakeholders, including international organisations, national governments, and the industry. These interpretations have, at times, been found to have fallen short in respect of certain issues and have caused a variety of consequential problems. Further, since the provisions of UNCLOS on MSR involve a compromise between States that favour absolute *freedom of the seas,* and those that demand absolute *control of MSR* within their EEZ and Continental Shelf, these issues remain ambiguous even today.[4]

If this were not enough, recent proposals of the International Telecommunications Union (ITU) to adapt telecommunication cables for dual-use (communication as well as climate monitoring) has created ripples of unrest amongst regulators,[5] as these dual-use cables raise complex issues as to whether the laying and repair of such cables are activities that will be subject to the prior consent of coastal States (as required for MSR) or whether they will be governed by the freedom of the seas (as provided to telecommunication cables), thus raising two fundamental questions;

(a) Do these dual-use cables fall within the legal scope of the freedom to lay submarine cables, enshrined in Articles 79 and 87 of UNCLOS? Or do these cables fall under the ambit of Part XIII of UNCLOS (which deals with MSR)?
(b) Will the data collected be freely available or will there be exceptions, especially from the viewpoint of national security? Who will control this data (though Article 249 (b) to (e) stipulates how the organisation undertaking MSR is to share the collected data with the coastal State) and what will be the associated stake of the financiers of these dual-use cables?

In order to attempt to answer these questions, we must begin by first understanding the regulations applicable to the submarine cables and MSR, and then delve into any legal inadequacies on the subject of handling these dual-use submarine cables, which may exist despite these regulations.

Marine scientific research and UNCLOS

As had been discussed in Part-1 of this article, the UNCLOS recognises MSR, surveys, and, the exploration and exploitation of living and non-living resources, as three separate categories of marine data-collection, but does not include an explicit definition of MSR. This anomaly has been reiterated in Part I, section B of the 2010 revised guide on MSR. Both, UNCLOS and the 1958 Geneva Convention on the High Seas,[6] recognise the concept of the EEZ, and exhort international organisations to desist from undertaking MSR activities close to the shore, so that MSR activities may be conducted without requiring the consent

of coastal States. In order to avoid arbitrary denial of the necessary consent, UNCLOS has provided rules to safeguard the rights of the international scientific community by limiting the rights of a coastal State and has established that the State in question may interfere with an on-going research project only to verify compliance, and to ask for the project's suspension or cessation, as the only forms of enforcement available to it. That said, the coastal States have been assured that the outcome of such research may not be used to stake any legal claims on the marine environment or its resources.[7] It is pertinent to mention here that in spite of these provisions, refusal of consent by a coastal State is still rather difficult to challenge. The IOC Advisory Body of Experts on the Law of the Sea (ABE-LOS) survey conducted in 2009-2013, records Japan permitting only 10 of the 52 requests that it received between 1998-2002; this is, in stark contrast to countries such as Russia which permitted 80 per cent of its requests, China which permitted 72 per cent, and UK which recorded only two refusals of the 80–90 requests made to it each year during the same period.[8]

In UNCLOS, the provisions regulating MSR are found mainly in Articles 238–265, under Part XIII of the Convention.[9] These Articles outline the general principles on MSR including detailed rules for conducting and promoting MSR exclusively for peaceful purposes and for the benefit of humanity, the need for international co-operation to promote MSR, rules for regulating scientific research installations or equipment, provisions for compensations for any damage that may be caused by conducting such research, the settlement of disputes, and interim measures that may be observed and enforced.

Part XIV of UNCLOS is binding upon MSR activities and regulates the development and transfer of marine technology that may be required for or result from MSR. Part XI, Articles 143 and 256 that deal with MSR in the Area[10] allow for the conduct of MSR by all States and competent international organisations[11] exclusively for peaceful purposes.[12] Similarly, in Part VIII, Articles 87 and 257 allow freedom to all States to conduct research beyond their EEZ[13] and in the high seas.[14]

It is essential to mention that "*operational oceanography*", (routine collection of ocean observations such as temperature, pressure, current, salinity, and wind) used for monitoring and forecasting weather, climate and ocean state is recognised as being distinct from MSR[15] by some commentators and governments.[16] However, the disagreement over the guidelines for the Argo float programme[17] is indicative of the fact that coastal States continue to disagree on whether to recognise operational oceanography as different from MSR.

What emerges as an understanding is that the right to conduct MSR[18] is available to all States,[19] (including land-locked States),[20] irrespective of their geographical location, and "competent international organisations"; is subject to the rights and duties of other States under the Convention; but may be conducted exclusively for peaceful purposes.[21]

An important definition that has been omitted is that of the term "competent international organisations". This term in Part XIII has been used as a general term, as opposed to the manner of its usage in other parts of the Convention. This implies that the "competence" of each organisation associated with MSR needs to be determined[22] before referring them to the relevant organisation. Similarly, UNCLOS does not distinguish between State sponsored and private organisations,[23] and merely refers to both of them as the "researching State".[24] This omission has the ability to result in a denial of a request for an organisation due to the negligent conduct of some other organisation having the same nationality.[25]

Submarine cables and UNCLOS

Countries recognised the need to protect submarine cables as early as 1884, and adopted the Convention for Protection of Submarine Telegraph cables (the 1884 Cable Convention),[26] which has since then been accepted as customary international law. These provisions have shaped the rights and obligations of States in regards to submarine cables set out in the Articles 26–30 of 1958 Geneva Convention on the High Seas,[27] Article 4 of the 1958 Convention on the Continental shelf,[28] and the UNCLOS,[29] The common thought in all these conventions, as mentioned in the preamble of UNCLOS, was

> the desire to establish a legal order for the seas and oceans which would facilitate international communication, promote peaceful use of the seas and oceans, equitable and efficient utilisation of their resources, the conservation of their living resources, and the study, protection and preservation of the marine environment.

In doing so, the international treaties established that the coastal States had certain rights and jurisdiction within specific areas that had to co-exist with traditional freedoms, thus putting in place certain norms that resulted in protecting the submarine cables and providing them a special status. These include the following norms:[30]

(a) Freedom to lay, maintain and repair cables outside of a nation's 12 nm territorial sea;
(b) National obligations to impose criminal and civil penalties for intentional or negligent injury to cables;
(c) Special status for ships laying and repairing cables;
(d) Indemnification for vessels that sacrifice anchors or fishing gear to avoid injury to cables;
(e) Obligations of cables crossing earlier laid cables and pipelines to indemnify repair costs for crossing damage; and
(f) Universal access to national courts to enforce treaty obligations.

The UNCLOS on the other hand protects cables in the EEZ, continental shelf, and high seas but does not do so in the territorial sea wherein, coastal States,[31] and archipelagic States[32] are under no obligation (from UNCLOS) to adopt laws and regulations to protect submarine cables. Outside the territorial waters, the provision to protect the cables is discussed under Articles 21,[33] 58,[34] 71,[35] 79,[36] 87,[37] 112-115[38] and 297(1)(a).[39] Of these, Articles 113–115 are based on three Articles in the 1884 Cable Convention, and are applicable to both, submarine cables laid in the EEZ under Article 58(2), as well as to those laid on the continental shelf.

Legal aspects of dual-use cables

Since telecom-marine data cables, SMART Cables, or green cables, do not fit into the existing categories of telecommunication cables or MSR under the law, they tend to fall between two proverbial stools, owing to which, there is a concern that some coastal States may choose not to extend the existing freedoms that submarine cables enjoy to these dual-use cables, even when they are being used for marine scientific data collection and may attract greater regulation that would lead to delays and added costs for the

telecommunication companies.[40] It is possible that while some States may permit them with additional restrictions, others may not; this in turn could end up leading to reconciliation between the coastal States and the stakeholders of the telecommunication industry. It is essential to recall that under Part XIII, Article 258 of UNCLOS,

> "the deployment and use of any type of scientific research installations or equipment in any area of the marine environment shall be subject to the same conditions as are prescribed in this Convention for the conduct of marine scientific research". Based on this understanding, the available protection to submarine cables stands jeopardised if the cables are used for a telecommunication-MSR dual purpose.

Who owns the data?

As envisaged in UNCLOS Part XI, Article 143, open access to knowledge, data and biological samples collected from the ocean are necessary to ensure that the benefits of such research are realised for all humanity. Hence, international cooperation, capacity building in MSR and the transfer of marine technology need to be encouraged in order to support enhanced participation, and to strengthen the research capacity of developing States as highlighted in UNCLOS Articles 143(3), 242, 243 and 244, and the Sustainable Development Goal 14 Target 8.[41] However, in the same breath, UNCLOS grants jurisdiction over the marine data collected depending on the marine zone from where this data has been collected under Article 245,[42] 246[43] and 247.[44]

Unfortunately, this recommended data sharing does not happen automatically, as Article 248 lays out in the duties of the researching agency stating that it is required to share the collected data with the concerned coastal State, but only if demanded. However, things are changing. Today, the world over, a drive for the openness of data exists, both from the funders and the scientists. Keeping this in mind, the ITU/WMO/UNESCO-IOC JTF[45] has proposed a framework to share sensor data from the proposed green cables within and between the private sector, governments, and the scientific community. Only time will tell whether this approach will succeed or not. As of now, any baseline data collected over the years by various researching agencies remains "controlled" with the coastal States, if not hidden.[46]

Over the past several years, intergovernmental and international organisations have helped the adoption of standards and protocols to enhance the exchange of data from MSR, whereby oceanographic data centres provide access to large volumes of data, making collaborative efforts possible. However, four main issues, namely, policy, legal, technological and economics plague data sharing. This in turn has prompted the identification of a number of commercial, ownership, and operational questions and issues[47] surrounding both, the data collected by these cables, and the cables themselves, such as:

(a) Since the funding for such research work often comes in as grants, the associated stake, (or ownership), of the collected data would automatically be implied and thus, needs to be addressed.
(b) Must the owner and the user of such dual-use cables necessarily be the same? Could the cables be owned by a commercial operator while being used for scientific research, with rights granted through an Irrevocable Right of Use?

(c) The transfer and process of commercial systems being employed for scientific functions can take years. Thus, in order to effectively facilitate and allow the sharing of data, the legal owner of the data acquired during this duration needs to be defined.
(d) Maintainability, (in terms of life cycle support), of these cables needs to be defined to ensure their continued availability.
(e) How is the scientific data so collected to be shared, especially in the case of transit States?
(f) Who would be responsible for filtering and controlling data related to national security and/or the exploration of the continental shelf and the exploitation of its natural resources?
(g) Who owns the intellectual rights for data, samples, and results (arising from MSR) that can be used for manufacturing products that have commercial value? Since the legal stand over such data has not been spelled out clearly in UNCLOS, there is a need to regulate such data under both, domestic and international intellectual property laws, as well as under private agreement between the coastal State and the researching agency. A case in point are the 62 European patents and 300 US patents for cancer drugs, as of 2003, which were based on the biodiversity research in Antarctica,[48] even though the area of research does not fall in the EEZ of either the US or Europe.
(h) How will cases such as the Pueblo[49] and the Glomar Explorer[50] be addressed if they happen again?
(i) Given the context of the US Navy Commander's Handbook on Naval Operations[51] defining military survey as " … the collecting of marine data for military purposes and, whether classified or not, is generally not made publicly available … ", and the UK Navy using a similar definition, with the term "military survey" being replaced with "military data gathering", how can good faith between nations (with regard to MSR) be developed?
(j) How would the issue of countries resorting to unregulated fishing under the garb of conducting Marine Scientific Surveys be addressed?[52]

Though ambiguity exists in the data control and sharing mechanism of dual-use cables, some lessons on data sharing can still be drawn from the Argo project,[53] an international global ocean observation system comprising around 3000 autonomous floats that drift freely in the ocean. Salient features of the Argo project are as follows:

(a) The deployment guidelines for the Argo floats indicate that:

> All the data obtained by the Argo Program floats once they enter the EEZ will be made freely available by the implementer, with the exception of data of direct significance for the exploration and exploitation of natural resources, whether living or non-living, which, to protect its sovereign rights and jurisdiction in its EEZ, the IOC Member whose EEZ the float enters formally requires the implementer not to be distributed.[54]

(b) The Argo data management user manual[55] defines the format for the sharing of scientific data.
(c) The procedures and data formats to be followed by the central data management team, Global Data Assembly Centres (GDACs), Data Assembly Centres (DACs)

and Argo Regional Centres (ARCs) are agreed upon internationally and are regularly reviewed and updated.

Similarly, the European Deep Sea Observatory Initiatives which include EuroSITES,[56] the European Multidisciplinary Seafloor and water-column Observatory (EMSO)[57] and the European Seas Observatory Network (ESONET)[58] have an open-access data policy.[59] The only exception to the free access of the data is when there is a notified issue of harm being caused to the environment or a threat to security by the release of the data. The NEPTUNE Ocean Observatory permits data access directly from the internet and allows people to run experiments from labs with this data. The Ocean Observatories Initiative (OOI) also provides open access to the core data collected, whereby any person can peruse the data from the core instrumentation and publish it as required.

Conflict areas

UNCLOS treats all types of submarine cables equally, be it for telecommunication or for transmission of power, or for commercial, military or scientific purposes. While UNCLOS grants special privileges to submarine telecommunication cables, ambiguity in defining MSR explicitly in the Convention has led to various interpretations of MSR. This has, at times, resulted in legal disputes over marine data collection rights, and is indicative of the kind of challenges that are likely to be experienced by States or organisations intending to develop telecom-marine data cables. It is necessary to mention that customary international law does not support such dual-use cables as MSR either. Thus, there is bound to be conflict especially when referring to UNCLOS on the subject of MSR since:

(a) UNCLOS defines the right of States and competent international organisations for the conduct of MSR in the various maritime zones, but does not define MSR anywhere per se (because of disputes at the time when the convention was being negotiated).
(b) While the Convention grants States the right to conduct MSR in water columns in the area beyond the limits of their EEZ,[60] since MSR itself is ill-defined, this right may be disputed.[61]
(c) The need for advance information of Argo profile deployment and time of possible entry in the State's EEZ by Intergovernmental Oceanographic Commission (IOC) may be interpreted as either acceptable (since it is MSR) or infringement of the freedom of navigation.
(d) There is ambiguity over whether UNCLOS should be considered as "customary international law" at all, especially since some States are not party to UNCLOS. While the preamble of the 1958 High Seas Convention makes it clear that the text being adopted represents the customary international law,[62] this is not the case for UNCLOS. In the words of the second President of UNCLOS III "[t]his Convention is not a codification Convention. The argument that the Convention codifies customary law or reflects existing international practice is factually incorrect and legally unsupportable".[63] However, since many of the provisions of UNCLOS form part of the customary international law and since the International Court of Justice has declared on several occasions that certain provisions of UNCLOS may be regarded as forming part of the customary international law,[64] this issue is left purely to individual interpretation.

(e) It is possible that the comprehensive regime laid down in UNCLOS for MSR may soon become superfluous with the development of remote sensing activities,[65] which allow the collection of data from space, and therefore go beyond the scope of the application of UNCLOS alone.[66]
(f) There is a likelihood that some States may try to define environmental monitoring using telecom-marine data cables as MSR which would open up the debate of legal freedom for MSR.
(g) There is already a fear amongst nations that submarine telecommunication cables can be used to gather intelligence.[67] Using the same submarine telecommunication cables for collecting real-time data in the garb of MSR will only compound this fear, as this might inadvertently lend legitimacy to underwater surveillance.
(h) Since marine pollution leading to climate change can be studied by monitoring the seas, there is a fear that this data might be used to identify and consequently reprimand States that are not doing their "bit" in observing proper steps to curb and control marine pollution.
(i) MSR can be used to provide a measure of the fish growth and availability in the ocean. With the necessary data, countries encouraging excessive fishing in their/other regions could be monitored in an effort to ensure that the marine species get protected.
(j) Since UNCLOS does not deal with the ownership of the data from these cables, it tends to create mistrust among the agencies/ States collecting the data, and those according necessary permissions to do so.

Comparison of the legal regime

As discussed in the preceding sections, legal differences exist between the submarine telecommunication cables and MSR as laid out in UNCLOS, and have been outlined and summarised in Table 1.

Given these differences, it is evident that in order for the prolific use of green cables to become a reality, there is a serious need for all the stakeholders to sit together and concede to addressing the legal differences that exist between MSR and dual-use cable activities. However, gathering coastal States that want unchallenged control of the EEZ as well as those States that remain unaffected by the natural calamities from the oceans to iron out their differences (so as to be able to use dual-use cables in the entire space of the ocean), may remain a distant dream.

The way ahead

As all ocean telecommunication cables are privately owned, it is natural for the world to look to these private players for the development of the requisite dual-use technology. However, the fact that dual-use cables are not supported legally by UNCLOS does not help inspire confidence in the industry, and are hence considered financially unviable. This has disallowed the use of an ocean-aware submarine telecommunication system thus far.

Since the use of Scientific Monitoring and Reliable Telecommunication (SMART) cables can offer real-time ocean floor data necessary to help avoid calamities and

Table 1. Comparison of legal issues for submarine cables and MSR.

	Marine Scientific Research	Submarine telecommunication Cables
Coastal State consent	Coastal State consent can be withheld in the EEZ and Continental Shelf under certain circumstances (Art. 245, 246)	No consent is required from the coastal State; merely an obligation to pay due regards. (Art. 58, 78, 79, 87)
Designation of "Off Limit" areas	Coastal States can designate off-limit areas in the EEZ and on the continental shelf for MSR (Art 246)	Areas in the EEZ and Continental Shelf cannot be placed off-limits. Limitation is obligation to pay due regard. (Art 58, 78, 79, 87)
Coastal State powers	MSR activities shall not interfere with activities undertaken by coastal States in the exercise of their sovereign rights. (Art 246)	No similar reservation of rights exists. On the contrary several limitations exist on the coastal State impeding the laying and maintenance of cables. (Art. 58, 79, 87)
Duties to provide information	Duty to provide the coastal State information such as the nature and objective of the project, methods to be used, vessel movement, sponsoring information and extent of participation of the coastal State in the project, exists. (Art 248)	No such requirement exists. (Art 58, 78, 79)
Obligations to allow participation	Duties of an MSR scientist are defined. (Art 249)	No such obligations exist. (Art 58, 78, 79)
Rights of landlocked and geographically challenged nations	Landlocked or geographically disadvantaged States (Art 249) have rights to participate in MSR, provided the coastal State does not object to their participation. (Art 254)	Landlocked or geographically disadvantaged States have no rights to participate in a submarine cable project. (Art. 58, 78, 79, 87)
Obligation to recover out-of- service cables	Unless otherwise agreed, the obligation to remove all installations or equipment when research gets completed exists. (Art. 249)	No obligation exists to recover international cables not in service outside of Territorial Seas. (Art. 58, 78, 79)
Coastal State powers to suspend or terminate services	Coastal State can suspend or require cessation of MSR for failure to comply with Art. 249 and the MSR operation must be terminated within a reasonable time. (Art 253)	Outside of Territorial Seas, there is no right of the coastal State to suspend, or require cessation of services, or terminate services upon notice by a coastal State. (Art 58, 78, 79)
Markings and registry requirements	Installations and equipment must bear identification markings indicating the State of registry. (Art 262)	No marking requirements or State of registry exists. (Art 58, 78, 79, 87, 112)
Third Party liabilities	Liability for damage caused by failure to comply with MSR requirements and pollution of the marine environment exists. (Art. 263)	Liability for damage to other cables or pipelines injured during laying and repair exists. (Art. 114, 115)

Source: Douglas R. Burnett (2011).[75]

climate change, a need exists to support MSR using such cables. This would mandate the enhancement of international cooperation so as to offer the necessary legal environment, and to facilitate the sharing of the costs involved in the technological development of these green cables, creating provisions to help with the open-access sharing of MSR data, samples and knowledge, while minimising the bureaucratic burdens that can hamper MSR. Some of the possible ways this can be done are:

(a) The option proposed by Commander Michael Matis[68] to ensure the safety of submarine cables could be extended for creating an environment of faith and sharing of data from dual-use cables. This, in return, would allow legal issues to be addressed amicably by all. Accordingly, a new undersea cable construction regulatory regime potentially modelled on the Maritime Safety & Security Information System (MSSIS)[69] could be developed to allow participants to provide a baseline to share environmental

data freely, to promote international trust, and to improve scientific data availability while ensuring cable security and access to global cable information. Such a model could also be used to coordinate between cable repair ships for speedier rectification of outages.

(b) Another possible solution is *global consent*. Though it may seem unlikely, it is important to remember that the extension of the territorial seas from 3 nm to 12 nm, and the creation of the continental shelf and of the EEZ till the edge of the high seas, was a result of an effort by the coastal States to develop fisheries and oil and gas resources. A similar necessity for scientific data to fight natural calamities and climate change would automatically offer the much needed "global consent" that would legally propel the development and use of dual-use cables.

(c) It is also possible to use the environmental monitoring capabilities of these cables in the high seas alone, as there is little legal ambiguity here. It may also be used in the EEZ and in the continental shelf areas of the States that recognise the concept of operational oceanography and exempt it from the rules governing MSR. However, doing so runs the risk of attracting the attention of States that claim that adding sensors to such cables in the high seas renders the entire cable in the domain of MSR. Therefore, perhaps the best bet in this case is to assess each case on its own merits, and determine whether they have enough legal or regulatory flexibility, and a business case for such deployment.

(d) While ownership of data may seem like a trivial problem, it may be permitted to be governed by the prevailing Intellectual Property Rights regimes (IPRs). However, in order for the regime of dual-use cables to succeed, it is essential for the ownership of such data to be classified as "*global commons*". This would instil confidence in the nations that the data so collected is not being used against their national security, thus enabling them to view MSR as being beneficial, rather than being detrimental, as it is perceived today.

(e) Finally, a legal reconciliation of UNCLOS to bring MSR in line with submarine cables will be required without fail. However, to do so the first step necessary is to develop confidence and faith between the various players, a field that is dictated more by political and economic constraints, and hence one that is not simple to achieve.

It is essential to mention here that UNCLOS III was a compromise between nations after close to seven years of hard work by the drafters. It thus seems unlikely that any further changes in international law will be possible in the near future. However, one needs to remember that it is only faith and goodwill amongst the nations along with the need of the affected nations to tackle natural disasters from the ocean that will be able to bring about the changes in regulations related to dual-cables. It is noteworthy that a country like Japan, that is ravaged repeatedly by disasters from the ocean, is against the use of dual-use cables[70] and hence the zeal to bring about a change of laws. On the other hand, the US Senate supports SMART or dual-use cables. A bill to this effect was passed by unanimous consent in the 114th Congress, 1st Session, as the *H. R. 34, Tsunami Warning, and Education, and Research Act* of 2015.[71]

Since, the most affected area due to ocean based natural disasters is the Asia-Pacific,[72] which is also home to the maximum number of submarine telecommunication cables running across the globe,[73] it is essential for the baton of policy change to be spearheaded

by the nations of Asia, namely China, Japan, ASEAN and India. Whether or not that will see the light of the day is debatable. However, for the immediate present, we need to develop the requisite technology to generate faith and results for these nations to create a need to amend the rules for the use of such dual-use cables.

Conclusion

MSR data from the oceans is essential for the well-being of humanity. It could have saved thousands of lives and billions of dollars in the 2004 tsunami, had it been available. The cheapest way to get this data is by modifying repeaters on existing submarine telecommunication cables, which only costs an additional 5–10 per cent of the existing submarine telecommunication cable system. However, differential legal treatment of the submarine telecommunication cables and MSR by UNCLOS makes things complicated. In the last 35 years, since UNCLOS has been in force, it has become clear that the original tensions of the developing States are increasing as they are becoming increasingly aware of what is at stake.

The need of the hour is a jurisdiction that appreciates the benefits offered by the sensors, and does not attempt to use UNCLOS as a roadblock while allowing the inclusion of sensors in the repeaters to create true "green cables".[74] On the other hand, MSR activities need to follow a set of rules of conduct and not be used as Trojan horses for destabilising the worlds' oceans. The rules need to address the legal differences discussed in Table 1 and be updatable. However, the determining factors of such rules will remain to be political and economic with no certainty of them being more effective than what they are currently.

Notes

1. The 2010 United Nations publication entitled "Marine Scientific Research: A revised guide to the implementation of the relevant provisions of the UNCLOS" https://www.un.org/Depts/los/doalos_publications/publicationstexts/msr_guide%202010_final.pdf
2. See, *for example*, William Schabas, "Study of the Right to Enjoy the Benefits of Scientific and Technological Progress and its Applications," in *Human Rights in Education, Science and Culture: Legal Developments and Challenges*, ed. Yvonne Donders and Vladimir Volodin (Paris: UNESCO, 2007), 273–308; Audrey Chapman, "Towards an Understanding of the Right to Enjoy the Benefits of Scientific Progress and Its Applications," *Journal of Human Rights* 8, no. 1 (2009): 1–36.
3. The rights of the Coastal States decline with increasing distance from the coast.
4. Kendall Freeman speakers notes 2005: Legal Aspects of Marine Scientific Research (MSR) and Part XIII of the UN Convention on the Law of the Sea (UNCLOS), 3, https://www.iho.int/mtg_docs/com_wg/ABLOS/ABLOS_Conf4/DanielPaper.pdf
5. R. Butler, "Using Submarine Cables for Climate Monitoring and Disaster Warning - Strategy and Roadmap," ITU Report 2012, https://www.itu.int/dms_pub/itu-t/oth/4B/04/T4B040000150001PDFE.pdf
6. 1958 Convention on the High Seas, adopted 29 April 1958, entered into force 30 September 1962, and superseded by UNCLOS for States that are parties to both.
7. See Article 241, Non-recognition of marine scientific research activities as the legal basis for claims.
8. IOC/ABE-LOS Survey, Responses to Questionnaire Number 3 Data Compilation and Analysis Sheet, section one Question II Parts B and C, http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3570

9. United Nations Convention on the Law of the Sea pt. XIII, Dec. 10 1982, [online], http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf
10. Area, defined in Article 1 of UNCLOS, as sea-bed beyond the limits of national jurisdiction.
11. See Article 256 UNCLOS for Marine Scientific Research in the Area.
12. See Article 143 UNCLOS for defining the principles governing the Marine Scientific Research in the Area.
13. See Article 257 UNCLOS for Marine scientific research in the water column beyond the Exclusive Economic Zone.
14. See Article 87 UNCLOS for application of the provisions of Freedom of the high seas.
15. Peter Ryder, A Possible Migration from Marine Scientific Research to Operational Oceanography in the Context of the United Nations Convention on the Law of the Sea (UNCLOS)," *Elsevier Oceanography Series* 69 (2003): 25–35, https://www.sciencedirect.com/science/article/pii/S0422989403800077
16. See, *for example*, Ryder at p.32; J. Ashley Roach, Marine Data Collection: Methods and the Law at 171–73, in FREEDOM OF THE SEAS, PASSAGE RIGHTS, AND THE 1982 LAW OF THE SEA CONVENTION (Myron H. Nordquist, Tommy T.B. Koh, and John Norton Moore eds., Martinus Nijhoff Publishers, 2009) ("Roach") at pp. 194–195, https://brill.com/abstract/book/edcoll/9789047427056/Bej.9789004173590.i-624_012.xml; Guidelines for the Implementation of Resolution XX-6 of the IOC Assembly Regarding the Deployment of Profiling Floats in the High Seas Within the Framework of the Argo Program, IOC RES. EC-XLI.4, Annex II, Executive Council, 41st Sess. (29 July 2008) at p.174, https://unesdoc.unesco.org/ark:/48223/pf0000179861 ("Argo Guidelines").
17. To resolve the concerns of some States related to their EEZ, the IOC has adopted Resolution XX-6, which requires that the States be notified of the deployment of floats into international waters, but that might drift into their EEZ. This notification is made by the AIC (Argo Information Centre). However, no general agreement exists for the deployment of floats into the EEZs, in particular in the enclosed seas.
18. See Article 238 UNCLOS for right to conduct marine scientific research.
19. See Article 256 UNCLOS for Marine Scientific Research in the Area.
20. See Article 254 UNCLOS for the rights of neighbouring land-locked and geographically disadvantaged states.
21. See Article 143 UNCLOS for defining the principles governing the Marine Scientific Research in the Area.
22. Satya N. Nandan, Introduction to Office for Ocean Affairs and The Law Of The Sea, Marine Scientific Research: A Guide To The Implementation Of The Relevant Provisions Of The United Nations Convention On The Law of The Sea vii, vii (United Nations 1991), 13.
23. Florian H. Th. Wegelein, *Marine Scientific Research: The Operation and Status of Research Vessels and Other Platforms in International Law 9* (Vaughan Lowe ed., 2005), 34.
24. See Article 246 UNCLOS for Marine Scientific Research projects in EEZ and on the Continental Shelf.
25. Satya N. Nandan, Introduction to Office for Ocean Affairs and The Law Of The Sea, Marine Scientific Research: A Guide To The Implementation Of The Relevant Provisions Of The United Nations Convention On The Law of The Sea vii, vii (United Nations 1991), at 13.
26. Adopted 14 March 1884 and entered into force on 1 May 1888.
27. 1958 Convention on the High Seas, adopted 29 April 1958, entered into force 30 September 1962 and superseded by UNCLOS for States that are parties to both.
28. 1958 Convention on the Continental Shelf, adopted 29 April 1958, entered into force 10 June 1964 and superseded by UNCLOS for States that are parties to both.
29. Adopted 10 December 1982, entered into force 16 November 1994.
30. As laid in the 1884 International Convention for Protection of Submarine Cables, *See,* for example, "About Submarine Telecommunications Cables", ICPC, October 2011, https://www.iscpc.org/documents/?id=1753
31. Article 21 (1) (c) UNCLOS for Laws and regulations of the coastal State on innocent passage.
32. Article 52 UNCLOS for Right of innocent passage.

33. Laws and regulations of the coastal State on innocent passage.
34. Rights and duties of other States in the exclusive economic zone.
35. Non-applicability of Articles on the right of land-locked States and right of geographically disadvantaged States.
36. Submarine cables and pipelines on the continental shelf.
37. Freedom of the high seas.
38. Submarine cables on high seas.
39. Settlement of disputes.
40. Countries like Peru and Argentina with the support of Japan have been vocal in this account, see, *for example*, Guidelines for the Implementation of Resolution XX-6 of the IOC Assembly Regarding the Deployment of Profiling Floats in the High Seas Within the Framework of the Argo Program, IOC RES. EC-XLI.4, Annex II, Executive Council, 41st Sess. (29 July 2008) at p.174, https://unesdoc.unesco.org/ark:/48223/pf0000179861 ("Argo Guidelines"); also see, for example, K. Bork, J. Karstensen, M. Visbeck, and A. Zimmermann, "The Legal Regulation of Floats and Gliders—In Quest of a New Regime?" *Ocean Development & International Law* 39, no. 3 (2008): 298–328, 308–10, https://www.tandfonline.com/doi/abs/10.1080/00908320802235338
41. SDG 14, Target 8 provides: "Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular Small Island developing States and least developed countries."
42. for territorial seas.
43. for EEZ and Continental shelf.
44. done by other international organisations.
45. The International Telecommunication Union (ITU), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC), and the World Meteorological Organization (WMO) established the Joint Task Force (JTF) in late 2012 after Workshops in Rome (2011) and Paris (2012).
46. The Future of the Law of the Sea, Bridging Gaps Between National, Individual and Common Interests, Editors: Andreone, Gemma (Ed.), 101, https://www.springer.com/in/book/9783319512730
47. Stephen Lentz and Peter Phibbs, *"Using submarine cables for climate monitoring and disaster warning - Engineering Feasibility Study,"* 2012, 32, https://www.itu.int/dms_pub/itu-t/oth/4B/04/T4B040000170001PDFE.pdf
48. Tim Daniel, "Marine Scientific Research under UNCLOS: A Vital Global Resource?" *International Hydrographic Review* 7, no. 2 (New Series) (August 2006), https://journals.lib.unb.ca/index.php/ihr/article/viewFile/20761/23922
49. The USS Pueblo was boarded and captured by North Korean authorities in 1968, under the accusation of spying while in North Korean territorial sea. The crew claimed that the ship was conducting routine research activities outside the North Korean territorial sea.
50. USNS Glomar Explorer while claiming to conduct research in 1974 for mineral deposits was actually proved to be searching for the Soviet submarine K-129 which was sunk in 1968.
51. Aug 2017, 2–11, www.jag.navy.mil/distrib/ … /CDRs_HB_on_Law_of_Naval_Operations_AUG17.pdf
52. In the late 1990's, Japan attempted commercial harvesting of the critically endangered southern bluefin tuna by attempting to use MSR as an excuse for its "experimental fishing programme.".
53. Resolution EC-XLI.4, Guidelines for the Implementation of Resolution XX-6 of the IOC Assembly Regarding the Deployment of Profiling Floats in the High Seas within the Framework of the Argo Program, http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=3085
54. Annex to Resolution EC-XLI.4, see 4.

55. Argo data management, 16 July 2002, User Manual, V1.0, http://www.argodatamgt.org/content/download/12107/80401/file/argo-dm-user-manual_v1.0.doc
56. A network of open ocean observatories across Europe and covers the North Atlantic to the Norwegian and Mediterranean Seas.
57. A European-scale network of multidisciplinary seafloor observatories from the Arctic to the Black Sea with the aim of long-term real-time monitoring of processes related to geosphere/biosphere/hydrosphere interactions.
58. Network of long-term multidisciplinary ocean observatories in deep waters around Europe.
59. EuroSITES: European Open Ocean Observatory Network, http://www.geo-tasks.org/geoss_portfolio/cross_cutting/cross_cutting_EuroSites_20101101.pdf
60. Article 257 UNCLOS Marine scientific research in the water column beyond the exclusive economic zone.
61. Submarine cables, environmental monitoring and international law, November 2015, ITU News, https://itunews.itu.int/en/NotePrint.aspx?Note=2857
62. Convention on the High Seas.
63. Florian H.Th. Wegelein, *Marine Scientific Research: The Operation and Status of Research Vessels and Other Platforms in International Law 9* (Vaughan Lowe ed., 2005), 273–4.
64. Delimitation of the Maritime Boundary in the Gulf of Maine Area (Can./U.S.), Judgment, 1984 I.C.J. 246, 94 (Oct. 12); Continental Shelf (Libyan Arab Jamahiriya/Malta), Judgment, 1985 I.C.J. 13, 34 (June 3)
65. Remote sensing is "the sensing of the Earth's surface from space by making use of the properties of electromagnetic waves emitted, reflected or diffracted by the sensed objects, for improving natural resources management, land use and the protection of the environment." U.N. GAOR, 29th Session, 95th plenary meeting at 1, U.N. Doc A/RES/41/65 (Dec. 3, 1986)
66. Florian H.Th. Wegelein, *Marine Scientific Research: The Operation and Status of Research Vessels and Other Platforms in International Law 9* (Vaughan Lowe ed., 2005), 247.
67. *See*, for example, Tara Davenport, "*Submarine Cables*, Cyber-security and International Law: An Intersectional Analysis," *Catholic University Journal of Law and Technology* 24, no. 1, Article 4, (2015): 92, https://scholarship.law.edu/cgi/viewcontent.cgi?article=1001&context=jlt
68. Commander Michael Matis, The Protection of Undersea Cables: A Global Security Threat, United States Army War College, (2012), http://www.dtic.mil/get-tr-doc/pdf?AD=ADA561426
69. https://mssis.volpe.dot.gov/Main/
70. Andy Palmer-Felgate, A Cable Owners Perspective on SMART Cables, April 2016, ITU Workshop, p. 17, https://www.itu.int/en/ITU-T/Workshops-and-Seminars/5-ws-smart-cable-systems/Documents/Abstracts-and-Presentations/S4P1_Andy_Palmer_Felgate-r1.pptx
71. Marino John, Think SMART Science Monitoring and Reliable Telecommunications, https://online.ptc.org/assets/uploads/papers/ptc16/SUN_Submarine%20Cable%20WS_Marino%20John.pdf, *Also see*, S. Rept. 114–146 - Tsunami Warning, Education, and Research Act of 2015, https://www.congress.gov/congressional-report/114th-congress/senate-report/146
72. Asia-Pacific region saw 48 per cent of the world ocean disasters in 2015, Disasters in Asia and the Pacific: 2015 Year in Review, p. 6, UNESCAP Report, https://www.unescap.org/sites/default/files/2015_Year%20in%20Review_final_PDF_0.pdf
73. As of 2017, there were over 420 submarine cables in service, stretching over 700,000 miles (1.1 million km) around the world (Nick Routley, Map: The World's Network of Submarine Cables, 24 August 2017, Visual Capitalist, https://www.visualcapitalist.com/submarine-cables/), which reduced to 378 submarine cables stretching over 1.2 million kilometres in 2019 (Submarine Cable Frequently Asked Questions, https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions). The network is clustered around information economy hotspots like Singapore and New York, but cables connect to just about anywhere.

74. Frequently Asked Questions, by ITU-WMO-UNESCO IOC Joint Task Force (JTF), https://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF_FAQs.pdf
75. Douglas R. Burnett, Understanding the differences under UNCLOS between submarine cables and marine scientific research, ITU Workshop, Rome, Italy, September 8–9, 2011, https://www.itu.int/dms_pub/itu-t/oth/06/5B/T065B0000050043PPTE.ppt

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