Joint IAG-IHO Advisory Board on the Law of the Sea

11th ABLOS Conference 2023 - Abstracts

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The concept of "best available science" in the law of the sea

Several provisions in the law of the sea refer to the concept of "best available science", and urge decision-making to be based thereon. For example, the United Nations Convention on the Law of the Sea (UNCLOS) refers to "best scientific evidence available" in two provisions on the conservation of living marine resources, in Articles 61 and 119. Furthermore, Article 234 of the UNCLOS refers to "best available scientific evidence". However, none of these provisions, nor the UNCLOS in its entirety, explicitly explain what these phrases mean. Other international agreements include similar phrases. For example, the Paris Agreement on Climate Change includes various references to best available science, the UN Fish Stocks Agreement refers to "best scientific evidence available", and the recently adopted BBNJ Agreement refers to the concept of best available science no less than 10 times.
With several international treaties referring to this concept of best available science, it is important to understand what this concept means, and especially the qualifying thresholds linked to the concept. For example, what does "best" mean, or what does "availability" refer to? Is there a difference between "best" and "reliable"? To what extent can we distinguish between "science", "scientific information" and "scientific evidence"? This paper aims to explore the meaning of this concept in the law of the sea, by comparing the various concepts used in the aforementioned treaties, applying treaty interpretation methods, as well as looking into the drafting history. The aim is then to identify components of a possible interpretation of the concept of best available science and how it applies (or should apply) in the context of the law of the sea.

Dr Fayokemi Olorundami
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AN AMICUS CURIAE SUBMISSION TO ITLOS IN RELATION TO THE ADVISORY OPINION SOUGHT ON THE OBLIGATIONS OF UNCLOS STATE PARTIES TO MITIGATE CLIMATE CHANGE

When UNCLOS was signed in 1982, climate change was not a problem. In fact, it was not on the radar and therefore, UNCLOS did not address it. Protection of the marine environment was the closest thing to addressing climate change, but as the focus of marine environmental protection in UNCLOS is not the reduction of carbon emissions or the adaptation to climate change, it is arguable that UNCLOS is not fit for purpose as far as the mitigation and adaptation to climate change is concerned. Nevertheless, as oceans are a major carbon sink, vital to the solution of the climate crisis, the ITLOS has now been required to provide an advisory opinion on the obligations of UNCLOS State Parties to prevent, reduce and control pollution of the marine environment as far as it concerns climate change and their obligations to protect and preserve the marine environment also in relation to climate change. This paper will present as an amicus curiae submission advising the ITLOS on what the answer to the

questions asked by the small island States may be and it will do this by analysing customary international law, the UNFCCC and UNCLOS itself.

Dr. Bjørn Kunoy
Professor of International Law, University of the Faroe Islands

"Bridging Over Troubled Waters: Connection of Fixed Points"

"Article 76 of UNCLOS provides formula and constraints that allow the delineation of the outer limits of the continental shelf where the submerged prolongation of the coastal States` land mass extends beyond 200 M from the baselines from which the breadth of the territorial sea is measured. Consistent with Article 76(7) of UNCLOS, when connecting fixed points coastal States shall delineate the outer limits of the continental shelf by straight lines not exceeding 60 M in length. A question of quintessential importance is how to understand the expression ´fixed point` for purposes of delineating the outer limits of the continental shelf. The use of any point on a 200 M distance line as a ´fixed point` for purposes of delineating the outer limits under Article 76(7) of UNCLOS, provided only the straight line does not exceed 60 M, may be difficult to accommodate in international customary treaty interpretation rules. Yet, to disallow such bridging lines would inevitably appear irreconcilable with the case law concept ´single continental shelf` consistent with which no differences may be made with entitlements to areas within 200 M from the baselines vis-à-vis areas beyond the 200 M distance line. The Commission on the Limits of the Continental Shelf appears to have found a *modus vivendi*."

Robert van de Poll
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The Right Tools for a Crucial Job: How the Law of the Sea Facilitates Settled Maritime Boundaries and Accelerates Offshore Development

Recent geopolitical progress in the Eastern Mediterranean – namely the Maritime Boundary Line (MBL) Agreement between Lebanon and Israel – demonstrates that dialogue, diplomacy, and United Nations Law of the Sea (LOS) applications are the most effective means of establishing peaceful outcomes for coastal states seeking to resolve their MBLs. While nothing like a full-fledged peace agreement, the Lebanon-Israel deal and the process that led to it produced a significant reduction in regional tensions. One result has been a dramatic increase in the number of major international oil and gas companies (IOCs) interested in the region's undersea hydrocarbons, especially in offshore waters previously un- or under-explored, making possible a new era of peaceful energy development.

This joint paper outlines the major points of this diplomatic success story on a maritime frontier that had been one of the world's most volatile, as well as the prospective next steps for the near-term, including – hopefully – the resolution of other maritime boundaries in the East Med, including Lebanon-Cyprus, Lebanon-Syria, Syria-Turkey, Cyprus-Turkey, and Greece-Turkey. This paper will offer an analysis of the 27 October 2022 MBL agreement between Lebanon and Israel, plus a summary of the current status for all Eastern Mediterranean maritime frontiers, outlining waters still to be addressed.

The Lebanon-Israel example shows how LOS applications provide coastal states with a reliable, neutral, and unbiased mechanism for the sort of creative, good-faith diplomacy that can overcome even the most difficult obstacles. All of the region's countries would do well to learn from this experience, sit down for serious negotiations with their neighbors, and define their respective EEZs. In the short term, this would lay the groundwork for accelerated socioeconomic development. We see this already as IOCs now have plans to start drilling in the autumn of 2023 in waters which, until the MBL agreement, were among the world's most hotly disputed. In the long term, more such agreements and development would serve an even more important goal: that of peace.

Milena Maltese Zuffo, Milena Malteze Zuffo; Alisson Felipe Moraes Neves; Wânia Duleba
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International Responsibility of the Brazilian State arising from a possible environmental damage related to the exploration/exploitation of the Amazonas River Mouth

In 2014, the Brazilian Environmental Authority (IBAMA) received a request to explore the Amazonas River Mouth region. The request was originally submitted by BP Energy do Brasil Ltda and was transferred to the Brazilian State enterprise for offshore drilling, Petrobrás. In May 2023, IBAMA rejected such a request stating that: (i) there is limited knowledge about the environment of the area to be explored; (ii) in the case of environmental damage, there are two scenarios to be further studied relating to damages to the Brazilian coast and damages to French Guiana's waters; (iii) in 2016, the Great Amazon Reef System was identified in the region and no plan to minimise damages was presented in this sense, (iv) the nearest rehabilitation and de-oiled centre is located 48 hours from the region and any damage would amount to biodiversity loss, (v) there is little knowledge on how indigenous communities would be affected. Petrobrás submitted a new request in the same month. There are several controversial and political aspects surrounding the exploitation of the Amazonas River Mouth region. While stakeholders advocating for Petrobrás' request indicated that the exploration would be relevant to ensure energetic security and would be aligned with the company's strategic plan, environmental activists and the academia declared that potential damages could amount to irreversible environmental loss. This research did not intend to review such arguments and conclude whether the request should be granted. The research's main goal is to (i) identify the international rules applicable to the region, especially considering the location (near the French Guiana border), and (ii) analyse possible international consequences regarding an environmental damage. To achieve this goal, the research was based on a qualitative analysis of primary sources, primarily comprising international normative documents (hard law and soft law) and federal national documents, as well as a literature review on the topic. We argue that the exploitation presents a substantial risk in terms of legal, social, environmental and diplomatic reputation, especially considering UNCLOS Part XII, as the lack of a contingency plan against pollution and the lack of knowledge of the marine environment could amount to a breach of Articles 192, 193, 194, 199, and 208. The decision-making process should take into account not only the immediate economic benefits but also the long-term implications for Brazil, French Guiana and the Global community. The research was divided into three main sections. First, the research focused on understanding the environmental diversity of the region and the identification of the potential environmental damages regarding the exploration of the Amazonas River Mouth region, which was listed by IBAMA. Regarding oil exploitation in the mouth of the Amazon River, the discovery of a reef ecosystem in the area raises concerns about the possibility of oil spills contaminating this fragile environment. The lack of comprehensive studies in this region hinders the

environmental licensing process, and there is a need for international cooperation due to its proximity to French Guiana. Second, based on the potential damages, the research aimed at understanding the international conventions and rules applicable in order to identify international obligations of the Brazilian State that should be considered, especially those obligations undertaken by Brazil under UNCLOS, UNFCCC, the Paris Agreement, and CBD. Third, it was assessed whether Brazil is complying with the identified international obligations, whether environmental damage could amount to non-compliance with any of such rules, and what would be the remedies available. A potential oil spill in the mouth of the Amazon River could lead to diplomatic tensions with France and result in international court claims. Faced with these challenges, Brazil needs to strike a balance between economic development and environmental preservation.

Thaissa Meira
University of Basel

Consideration of the rights and obligations between scientific marine research and mineral resources exploration: privilege or fairness in the use of the ABNJ?"

My overarching PhD project question looks at how the law of the sea accommodates competing uses of the Area Beyond National Jurisdiction (ABNJ). Namely, these competing uses regard, on the one hand, marine scientific research (MSR), and on the other hand exploration for mineral resources.
The 1982 United Nations Convention on the Law of the Sea (LOSC) accommodates these current users of the ABNJ by means of duties and rights of "freedom of MSR"; "exclusive rights of the contractor" or "tenure of contact"; "due regard" for activities in the Are and other activities in the marine environment: and the duty to refrain from "unreasonable" or "unjustified interference" with other legitimate uses of the marine environment.
Against this abstract terminologies, this presentation asks how to accommodate the "freedom of MSR" against the "exclusive rights" of contractors and "tenure of contract" for mineral resources exploration. It could be that against this "exclusive right" mineral resources exploration contract sees themselves as privileged over MSR activities taking place in the same fraction of the Area. This presentation will assess the plausibility of this claim.

Professor Bjørn KUNOY
UFI

Determination of Admissible Land Mass for applying the 350 M Distance Constraint

Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS) is the legal cornerstone determing the allowable breadth of the continental shelf. It establishes formulae and constraints applicable for any coastal State intending to establish outer limits of the continental shelf.

Consistent with Article 76(5) of UNCLOS, the fixed points comprising the line of the outer limits of the continental shelf, either shall not exceed 350 nautical miles from the baselines or shall not exceed 100 nautical miles from the 2,500 metre isobath. Only the former constraint relies on the baselines, but without qualifying whether particular criteria apply to determining admissible terra firma that may generate applicable allowable distance constraint lines.

The practice of the Commission on the Limits of the Continental Shelf (CLCS) demonstrates

variable approaches. In some situations, islands within the sovereignty of submitting coastal States are not considerable admissible for purposes of establishing an allowable distance constraint line, due to different parameters whereas in other situations this question is not addressed at all.

This paper will address the approach(es) of the CLCS prior to analyzing its consistency with Article 76 of UNCLOS.

Johan Hollander
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Global climate change is contributing to elevated sea levels, increased coastal erosion and flooding.

Global climate change is contributing to elevated sea levels, increased coastal erosion and flooding. This accelerating trend has profound effects on coastal and urban areas, and is today a global issue. Infrastructure and flood defence systems have been instigated, often using hard structures such as groins and seawalls. However, hard structures may introduce additional problems by shifting erosion alongshore and eventually converting sandy beaches and dune landscapes into rock and concrete coasts. Loss of sandy beaches means loss of valuable ecosystems and their ecosystem services for coastal inhabitants. Previous actions to protect shorelines have not fully explored the efficiency, and sustainability of the ecosystem-based protection measures, particularly, the effectiveness of seagrass meadows in retaining sediments and protecting shorelines. With these coastal ecosystem-based adaptations, we not only can reduce the negative impacts of coastal erosion, but also facilitate combined impacts to increase biodiversity and ecosystem services on land and sea. I will present an inter-disciplinary project how to strengthen the coastal resilience against coastal erosion by combining terrestrial and marine ecosystem-based protection.

Tafsir Matin Johansson
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Dynamic Governance in the Application of Maritime Remote Inspection Techniques: Recommendations for Reform

Artificial Intelligence integrated robotic technologies provide innovative, perhaps even revolutionary new solutions under the auspices of the fourth industrial revolution. A cascade of innovations has led to state-of-the-art solutions by allowing the completion of tasks that are otherwise time consuming, risky and onerous. Among these innovations, remote inspection techniques (RIT), including unmanned aerial vehicles (UAVs), remotely operated vehicles (ROVs), and magnetic crawlers, have gained significant traction, particularly in response to the challenges posed by the COVID-19 pandemic. These alternatives have been embraced by classification societies due to their ability to navigate restrictive conditions. By capturing intricate data through real-time visual imagery, RIT boasts the capability to deliver inspection services with enhanced safety and efficiency, thereby driving the transformative digitization of the "ship survey" landscape. The groundwork for a paradigm shift has been laid. In this scope, the multi-robot (ship-hull) survey platforms currently explored have the potential to alter the manner in which massive structures are currently being inspected and maintained. This transformative shift stands to enhance the competitiveness of the shipping industry, opening avenues for improved regulations, standards, and environmental conservation. This transformative shift stands to enhance the competitiveness of the shipping industry, opening

avenues for improved regulations, standards, and environmental conservation. However, while the existing framework based on international common minimum standards is commendable, it raises several challenging concerns that might emerge post-implementation of available techniques. Considering those thorny issues, this presentation underscores pivotal components that collectively chart a course toward overcoming potential market growth barriers that could otherwise hinder progress in this techno-regulatory paradigm shift. Subsequently, the presentation offers an in-depth look into the qualitative regulatory blueprint, which has been developed by researchers at the World Maritime University under the European Union Horizon 2020 project "BUGWRIGHT2: Autonomous Robotic Inspection and Maintenance on Ship Hulls".

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Publicly available datasets as a tool for reconnaissance studies in the context of Article 76

Article 76 of the United Nations Convention of the Law of the Sea allows coastal states to extend their continental shelf beyond 200 nautical miles, throughout the natural prolongation of its land territory, to the outer edge of the continental margin. According to the Paragraphs 4(a) and 4(b), the limit of the continental margin can be delineated with two alternative methods: (i) a formula based on the sediment thickness, expressed as a percentage of the horizontal distance from the foot of the continental slope, or (ii) the distance of 60 nautical miles from the foot of the continental slope. Therefore, for the purpose of the delineation of the continental margin, bathymetric and geological/geophysical data are required. Single and multi beam echo sounder data must be employed for locating the foot of the slope, whereas multi-channel seismic reflection surveys are the most authoritative source of direct evidence for estimating the sediment thickness. Regardless, publicly available datasets such as global bathymetric grids and GlobSed model, a global 5-arc-minute total sediment thickness grid (Straume et al, 2019), represent reliable information for preliminary studies and also to identify the region enclosing the base of the continental slope. In this contribution, we discuss the use of the Globsed grid as a tool for reconnaissance studies and survey planning. We illustrate the method on an application example in the Bellingshausen Sea Region, west of the Antarctic Peninsula, where an updated sediment thickness estimation was recently released for the model, based on interpolated seismic reflection lines and well data. In this area, the limit between the oceanic and continental portions of the Antarctic Plate is marked by a passive margin different from the conventional models represented in the Scientific and Technical Guidelines. In this case, the margin is the result of the abandonment of a subduction trench. Nonetheless, the action of the ice has shaped this margin in the same manner as the classic model of passive margin, depositing a significant amount of sediments on its slope and rise.

As part of a preliminary study, we located the foot of the slope on four high-resolution bathymetric profiles, in an area not covered by proprietary seismic data. At each point of the profiles, we sampled the GlobSed grid to extract information about the sedimentary thickness and compute the formula. Results show that the outermost fixed points where the GlobSed-predicted thickness of sedimentary rocks is at least 1 percent of the shortest distance to the foot of the continental slope fall in the proximity of the arc of points located at 60 nautical miles from the foot of the continental slope. Therefore, this information can be used for the

identification of areas where seismic reflection surveys would contribute to the extension of the continental shelf in a more favorable way than the application of the FOS + 60 M line.

This preliminary study can be easily performed on other areas where reliable sediment thickness data are available. Publicly available datasets are an effective tool for making decisions about the identification of key areas where to conduct more accurate surveys in the context of the application of Article 76 and they can be particularly useful for projects with limited budgets.

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Definition of a hotspot ridge boundary by means of satellite data: The Easter hotspot case

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Semi-automatic detection of the coastline in complex climatic zones, using free satellite imagery sources and artificial intelligence methods.

Detection of coastlines holds significant importance for coastal States , as they represent a key input for territorial planning, as well as for studies in regard to ecosystems and coastal dynamics in general.
Traditionally, the determination of coastlines by means of conventional methods is a very expensive and time-consuming task for the States. However, the current satellite information, freely available, allows a high-precision (sub-pixel) identification of the land-sea interface, enabling regional studies of natural phenomenon, such as coastlines time variability, or coastlines changes after mega-earthquakes events. Moreover, open-access cloud-based computing resources simplify the analysis of large amounts of data without expensive computer requirements. The open access information, in addition to the open access computing resources in digital image processing, provide to the countries the possibility of defining, updating, and monitoring coastlines without substantial financial resources. For countries like Chile, which has a long coastline with rugged geography and extreme climatic zones, the use of these resources is a convenient option.
In this work, we present the use of freely available satellite images for the semi-automatic detection of the coastline in areas of southern Chile and Antarctica peninsula. We use images collections sourced from the Sentinel-2 multispectral optical sensor and the Sentinel-1 synthetic aperture radar sensor between January 2019 and January 2021. To process these images, Artificial Intelligence techniques (machine learning) were employed by using free platforms such as Google Colab, Google Earth Engine, and SNAP (Sentinel Application Platform) software for radar image pre-processing.
For the coastline detection, the machine learning algorithm "random forest" was used, it was fed with variables generated from the images previously mentioned, namely NDWI (Normalized Difference water Index), NDVI (Normalized Difference Vegetation Index), MSI (Moisture Stress Index) and the same sensor bands, while the radar images were used to generate digital elevation models, slope maps, among others outputs.
The obtained results show that between the dates of capture of the images, it is possible to identify the coastline and also to quantify their variability. This variability ranges between 2 and 4 pixels (20 up to 40 meters), and it identifies the seaward advance of the coastline, therefore, demonstrating that this methodology can be a useful tool for observing coastal dynamics and updating the coastline.

Keywords: Google Earth Engine, Coastline, Freely available satellite data, Artificial Intelligence, random forest

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Challenges and Prospects between the Freedom and the Jurisdiction: An Engagement between Submarine Cables and Marine Scientific Research

Submarine cables laid on the seabed are the foundation of the global communications network that facilitate the increasing globalisation and interconnectedness of the world. Today, submarine fibre-optic cables provides more than 99 per cent of the world’s telecommunications, including the internet, phones and the global finance network.

International law seeks to strengthen these systems by, inter alia, preserving the freedom to lay submarine cables in the exclusive economic zone (EEZ) and on the continental shelf. An important distinction must be made with regard to submarine cables used for marine scientific research, especially those specific purpose-built systems. The coastal State has jurisdiction over marine scientific research in the EEZ and on the continental shelf. States and competent international organizations that intend to lay scientific research cables in the EEZ and on the continental shelf must apply for a permit and comply with the conditions laid down by the coastal State and international law.
The legal distinction becomes blurry regarding the anticipated dual-purpose submarine cables, known as Science Monitoring And Reliable Telecommunications (SMART) cables, an initiative led by a Joint Task Force sponsored by three United Nations agencies. Recognising the advantages of the global submarine fibre-optic network, SMART cables propose to integrate sensors into future undersea telecommunications cables, creating the potential for seafloor-based global ocean observing systems for climate monitoring and disaster warning at a modest incremental cost. The first major SMART project was established in 2021 by Portugal linking Mainland Portugal, the Azores and Madeira, equipping the cable ring with environmental seismic detection.
This paper examines the challenges and prospects of the legal framework of SMART cables in the EEZ and on the continental shelf, and discusses how the law of sea could respond to these changes brought by technological development.

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Some Comments on the Activities of the Commission on the Limits of the Continental Shelf

The Commission on the Limits of the Continental Shelf is a treaty body of the United Nations Convention on the Law of the Sea. Its purpose is to facilitate the implementation, by coastal States, of Article 76 of the Convention in respect of the establishment of the outer limits of the continental shelf beyond 200 nautical miles (M) from their baselines. As a body of scientific experts, the Commission works at one of the rare interfaces between marine geosciences and Law of the Sea. Since its creation in 1997, the Commission has received 103 submissions from coastal States (including 10 revised submissions), containing the scientific and technical information in support of their outer limits. This presentation addresses two issues that are of concern in relation to its work and that were not necessarily predictable when the Convention was negotiated. The first issue relates to the lodging of a significantly larger number of submissions than anticipated by the drafters of the Convention which has led to substantial delays in the consideration. The second issue relates to the consistency – or lack thereof – over the past 20 years, of the Commission's scientific and technical interpretation in similar geological situations.
In 2011, the large number of Submissions received led the State Parties to request that the Commission meet at least 21 weeks per year at the UNHQ in New York, to speed up the work. However, the numbers show that, despite significant efforts, the waiting time for consideration of a new submission keeps increasing and now has reached 15 years. This poses significant problems for the scientific and technical teams involved in the submission, for example in maintaining the necessary expertise, but also in dealing with risks that the data and/or processing software becomes obsolete. In this presentation, we will analyze the track

record of the Commission, and make some predictions about future trends.
Since 2002, the Commission has published summaries of 38 recommendations to coastal States. One would expect that this body of documentation should follow a common practice when dealing with similar geological contexts. This, in turn, should allow the Commission to draw predictable conclusions at a more efficient pace. However, such does not appear to be the case. A number of recommendations to coastal States demonstrate significant differences in outcome for settings that would appear to be similar. This is particularly the case when considering technically challenging areas such as mid-ocean ridges and other seafloor highs, but also submarine fans. One coastal State, in its recent dealings with the Commission, insisted on the need for "established procedure and scientific consistencies institutionalized and established" 1) .

1) https://undocs.org/en/CLCS/57/2

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Continental Shelf in the Arctic: Past, Present, and Future

Most of the seabed in the Arctic Ocean falls under the jurisdiction of one or more of the five Arctic coastal States: Canada, Denmark (Greenland), Norway, the Russian Federation, and the United States. Based on the provisions in Article 76 of the UN Convention on the Law of the Sea, each of these countries asserts that it has "extended continental shelf" (i.e., continental shelf in areas beyond 200 nautical miles from the territorial sea baselines) in the Arctic.

This presentation will address legal and technical aspects of the regime of the extended continental shelf, with a focus on the actions of the five Arctic coastal States to establish their ECS limits in the Arctic. The presentation will feature a series of maps depicting the evolution of continental shelf limits in the Arctic over the past two decades, and also offer thoughts on the future evolution. Most notably, the United States has yet to release the outer limits of its continental shelf in the Arctic and elsewhere. The presentation will discuss expectations for the forthcoming U.S. ECS limits in the Arctic and particular issues facing the United States as a non-party to the Law of the Sea Convention.

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The Submerged Prolongation of Easter Island Province Continental Margin: A Replicable Scientific Rationale for Islands Atop Hot-Spot Seamount Chains

Articles 76 and 121 of the United Nations Convention of the Law of the Sea established that coastal states, including islands, are entitled to extend their Continental Shelf beyond 200 nautical miles from the coast baselines, throughout the natural submarine prolongation of its land territory. However, as portrayed in the Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf, for cases involving islands the delimitation of the Continental Shelf is often challenged by the non-traditional configuration of their continental margin. We present a novel, geologically self-consistent, and replicable rationale to determine the continuity and submerged prolongation of the land mass of islands located atop seamounts formed by hot-spot volcanic chains — a fundamental input to constrain the envelope containing the base of the continental slope. Our method relies primarily on the morphological continuity of the seafloor high and secondarily, on the distinct and continuous sub-bottom crustal structure of the volcanic chain, and can be implemented at a low cost with publicly available data. To illustrate this rationale, we use the example of the Easter and Salas y Gómez islands, part of the Easter Island Province (EIP) of Chile, and its submerged prolongation along the Salas y Gómez Ridge (SGR). These volcanic islands constitute one of the world's most representative examples of a hot-spot fed by a mantle plume, resulting in a thousands-of-kilometers-long chain of volcanic edifices along the SGR interrupting the Nazca plate. The ridge's crustal structure has been obliterated by new materials added by the plume, of different composition and density than the deep ocean floor (DOF). The SGR rocks grow older in the direction of plate motion and show a clear petrological affinity to enriched lavas of the type ocean island basalts, typically produced by mantle plumes, which are different from the rocks comprising the DOF formed at mid-ocean ridges.

First, we used high-resolution bathymetry and residual bathymetry analysis to determine the submerged continuity and extension of the seafloor high, starting at the island's land mass and following the crest of seamounts and saddles running along the SGR. We show that the continuous crest or "spine" of the ridge rises significantly higher above the depth and roughness of the DOF. Second, the width and length of the submarine mountain chain was mapped onto filtered bathymetric grids that accentuate the bathymetry marking a trend of peaks and saddles defining the ridge crest, over the relatively flat points belonging to the DOF. That resulted in an area enclosing the SGR, bounded by the base or "piedmont" of the mountain chain, which in turn defines the geomorphic extent of the submerged prolongation of the continental margin of the islands. Third, we used seismic reflection imaging, gravity anomaly and flexural modeling, to determine the lateral extension across the ridge of the thick, sub-bottom crustal root sustaining the mountain chain. The transition zone between the obliterated root's thick crust and the relatively thinner oceanic crust of the DOF, projected upward onto the ocean floor, spatially coincides with the geomorphically determined piedmont of the volcanic chain. Consequently, superposing these two independently determined areas flanking the sides of the SGR results in the region where the continental margin of EIP, represented by the submarine mountain chain, transitions into the DOF. Given that there are more than 30 islands located on hot-spot seamount chains, many of small developing states, we propose that such a workflow can be deployed broadly and affordably to support these types of cases for extension of the Continental Shelf.

Holly Leung
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The extended continental shelf in Nicaragua v Colombia: Identifying a customary rule based on CLCS submissions?

In its recent judgment in Question of the Delimitation of the Continental Shelf between Nicaragua and Colombia beyond 200 nautical miles from the Nicaraguan Coast (Nicaragua v Colombia), the ICJ identified a rule in customary international law which prohibited a State from claiming an extended continental shelf (”ECS”) that encroaches on maritime areas within 200 nautical-miles (“M”) of another State. While the ICJ had reached this conclusion based on States parties’ submissions to the Commission on the Limits of the Continental Shelf (“CLCS”), in which a vast majority of States parties had refrained from claiming an ECS that extends within the 200 M line of another State, the CLCS submissions do not indicate sufficiently widespread and uniform State practice nor opinio juris supporting the identification of a customary rule as asserted by the ICJ. On a closer examination of the existing CLCS submissions, three observations may be made.

First, there is mixed practice in relation to the permitted extent of ECS claims. While the majority of States in their CLCS submissions had deliberately placed the endpoint of their ECS at the 200 M line of neighbouring States even when, on technical grounds, their ECS could have encroached into another State’s 200 M zone, there are at least 10 occasions where States have claimed an ECS which extends within 200 M of neighbouring States’ baselines. States themselves are also inconsistent as to whether their ECS can extend into the 200 M maritime zone of another State. For example, in its submissions in respect of the areas of French Guiana and New Caledonia (2007) and French Polynesia (2018), France appeared to view its ECS as being limited by the exclusive economic zones (“EEZ”) of neighbouring States. However, in its submission in respect of Saint-Pierre-et-Miquelon (2014), France claimed an ECS which encroached into Canada’s EEZ.

Second, the majority of States which have limited their ECS claim to the 200 M of another State’s baseline in their CLCS submissions have not expressly stated the reasons for doing so. It is thus unclear whether States limit their ECS claims in view of a legal obligation to do so, especially as it is equally plausible that States limit their ECS claims so as to avoid objections from other States which may block or delay the CLCS mechanism.

Third, among the States which have provided reasons for limiting their ECS claims, there are certain CLCS submissions which are indicative of opinio juris. For example, Indonesia and Pakistan in their respective submissions had “defined” their ECS with regard to the 200 M line of neighbouring States, treating the 200 M line as a constraint for ECS claims not unlike legal constraints found in Art. 76 United Nations Convention on the Law of the Sea. However, there is insufficient opinio juris in this regard as the remaining submissions suggest that States self-constrain their ECS claims out of comity rather than in view of neighbouring States’ 200 M line as a legal constraint.

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Progress of China on the Naming of Undersea Feature Names

The standardization and systematization of undersea feature names can avoid the problem of

multiple names for one place and multiple locations for one name in the seabed, and provide concise tool and reference frame for people to identify, describe and manage the oceans. With the rapid development of seabed exploration technologies such as multi-beam echo sounders, a large number of new undersea features have been discovered and named, and there is increasing activity in terms of the naming of undersea features. In recent years, the undersea feature names in China have flourished. For quantitative terms, the undersea feature name proposals show an increasing trend. For the sea area, the undersea feature names span from the Pacific ocean, Atlantic ocean to Indian Ocean. For the way of submitting, it is achieved from the submission of domestic institutions to specialized agencies, respectively submitted by the China Committee Undersea Feature Names (CCUFN). In addition, China has established a system of naming rules embodying the Chinese traditional culture. This paper mainly summaries the progress of China on the naming of undersea feature names.
In the future, China will further grasp and apply the guidelines, principles and rules of the SCUFN, strengthen the investigation of the topography in seabed, make full use of the survey data available, actively participate in SCUFN international cooperation, and strive for the adoption of more undersea feature name proposals, make greater contributions to international maritime affairs.

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The equiratio method of matitime delimitation the Earth's Ellipsoid

At present, there are various technical methods for generating equidistant/equiratio lines, such as elastic-circle method, water-line method, map algebra method, and three-point method. If the conditions are set reasonably, theoretically, different methods can generate the same equidistant or equiratio lines. However, the three-point method seems to be the most widely used, and Caris is the implementation software of this method, which is widely used in international judicial decisions and bilateral countries. According to publicly available algorithms, the three-point method based on the Earth ellipsoid is easier to implement for calculating equidistant lines, but it is more difficult to generating equidistant lines and also requires relying on map projection to complete initial value calculations. The equiratio lines by the Caris is complex, becasuse the turning points is large. As a result, a great deal of adjustment and simplification is required, and simplifying the boundary line requires a complex diplomatic negotiation process. To solve these problems, we proposed a new three-point equidistance/equiratio method based on the Earth ellipsoid, which is called pendulum method. By choosing different geographical scenarios, we used the new method and CARIS to calculate the boundary and compared the demarcation results. The results demonstrated that the proposed method could generate an equidistance/equiratio line in various scenes using a unified algorithm. The algorithm was simple and efficient and was not limited by the map projection.

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World Maritime University

The people we need for the ocean we want: Gender equality in ocean science and ocean governance

The United Nations Decade of Ocean Science acknowledges the critical role of women and

gender equality in ocean science and ocean governance.
In this line, the World Maritime University-Sasakawa Global Ocean Institute Empowering Women Programme was endorsed as an Ocean Decade Action by IOC-UNESCO, and one of its main outcomes is the formulation of a Strategy and Action Plan to help deliver equal opportunities for full participation and leadership by women in ocean science and science-dependent governance systems. The Strategy and Action Plan aim to include practical and policy relevant recommendations to improve gender equality in ocean science and ocean governance systems, as well as guiding elements to consolidate women's participation and representation.
Through various levels of action research, collection of data and active engagement, the Empowering Women Programme has also influenced and materialized changes within intergovernmental processes.

The first example is the creation of the first version of the Gender Equality Plan for the International Council for the Exploration of the Sea (ICES), an intergovernmental organization which coordinates marine science in the North-Atlantic. The second example is the inclusion of gender sensitive language in the new legally binding treaty for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction, being the first Law of the Sea instrument with gender sensitive provisions. The third example is the inclusion of a stand-alone chapter on gender equality in the World Ocean Assessment III (WOA III), which is under development and will address the role of gender equality in achieving the Sustainable Development Goals; gender issues in ocean science and ocean governance systems and the importance of the collection of gender disaggregated data in these systems; as well as considerations of how the gender lens has been incorporated into ocean science and technology to strengthen science-based approaches.

The presentation will examine the broader perspective on women's representation and participation in international processes relating to the Law of the Sea through the three examples mentioned above, as well as provide a brief overview of the key elements included in the Gender Equality Strategy and Action Plan.

Renis Auma Ojwala
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Gender equality in ocean science for sustainable development: Analysis of ocean science institutions in Kenya

Despite the existing efforts and actions towards an equitable and sustainable ocean, structural and institutional barriers still hinder people, especially women, from fully participating in and contributing to ocean science. The systemic biases, lack of diversity among ocean science experts and lack of integrated ocean governance have exacerbated the declining ocean health globally, including in Kenya. The ocean is increasingly exposed to severe threats resulting from harmful human activities such as pollution and overfishing, which affects women and men differently due to their differentiated roles in this sector and society. However, there is little information on the status of gender equality in ocean science in Kenya. This paper addresses this gap by investigating the composition of students and staff in ocean science institutions in Kenya and exploring the challenges they face, as well as power relations, using an intersectional lens through questionnaires and in-depth interviews. This paper examined intersectional identities, including ethnicity, education, class and age. One hundred and two students and 80 ocean science staff responded to questionnaires and interviews, respectively. The findings revealed that there were considerable variations in terms of gender, generational

(age) and ethnic biases. Fewer female students were enrolled in ocean science programmes than their male counterparts, and female staff were underrepresented in all the institutions studied. Fewer early ocean science professionals were recorded than well-established researchers. Politically dominant ethnic groups were overrepresented among Kenyan institutions' students and staff groups. Based on these results, this paper highlighted the need for regular collection of gender-disaggregated data, mentorship programmes and gender-transformative policies to increase the participation of female students and staff in ocean science programmes in all institutions.

Clive Schofield
WMU-Sasakawa Global Ocean Institute, World Maritime University
Peter Bekker, Clive Schofield and Robert van de Poll

Transparency and Predictability in the Maritime Delimitation Process: Reverse-engineering the Somalia-Kenya Adjudicated Boundary

This presentation analyses the adjudicated boundary between Somalia and Kenya in the Indian Ocean through an integrated law-and-science approach. Using recent high-resolution satellite imagery and specialised boundary software, it seeks to 'reverse-engineer' the 12 October 2021 ruling of the International Court of Justice with a particular focus on issues of transparency and predictability. In particular, it highlights how ambiguities in the identification of base points underlying and the reliance on a relatively small-scale nautical chart based on dated surveys that does not reflect the physical reality of the relevant coast arguably undermine the authority of the adjudicated boundary which is the result of years of legal proceedings. Options are proposed with a view to addressing how technical support in decision-making on adjudicated boundaries can be enhanced with a view to reducing controversies and making the delimitation process more transparent and predictable.

Dr. Virginie Tassin Campanella, VTA Tassin – Public International Law Firm dedicated to Oceans & Seas Vice President of Scientific Council of INDEMER (Monaco)

Women and UNCLOS: the multi-dimensional roles of women in ocean governance

The United Nations Convention on the Law of the Sea (UNCLOS or the Convention) is widely acknowledged as one of the most comprehensive and influential instruments in public international law. Over the years, it has fostered cooperation and established a level playing field among States, serving as a stable and reliable framework able to address the challenges of our ever-evolving international society.

While the Convention itself does not explicitly address women and gender issues, UNCLOS is rooted in the United Nations Charter and, more importantly, is a dynamic instrument that complements other international law instruments and principles. In the context of women's rights and protection within maritime activities and the global ocean governance, various binding instruments (such as the Convention on the Elimination of All Forms of Discrimination against Women, the Convention on Transnational Crimes, the Covenant on Economic, Social, and Cultural Rights…), as well as international and regional policy commitments (including Agenda 2030 and many guidelines/recommendations adopted by international organizations and States…), offer a plethora of tools to ensure women's rights and protection.

Recent attention to women's roles, including in the ocean sector, has focused primarily on promoting women empowerment and equality in a representative sense, with the view to increase diversity and inclusivity at all levels. However, important obstacles remain in the implementation of existing rules and tools, including in the respect and valuation of women's contributions in the ocean sector and society at large.

This presentation will examine ongoing international and regional efforts and accomplishments in the inclusion and protection of women and their contributions, highlighting some of the challenges faced by developing and developed countries, as well as international institutions, in the ocean sector. Specific insights will also be provided on women's roles as custodians of UNCLOS and their contributions to the field of public international law.