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Tomas Heidar (ed.), *New Knowledge and Changing Circumstances in the Law of the Sea* (Leiden/Boston, Brill Nijhoff), 2020, ISBN: 9789004437753, hardbound, £165.00, xxii + 476 pp.

New Knowledge and Changing Circumstances in the Law of the Sea is an impressive collection of scholarly contributions from leading legal and scientific experts on the challenges and opportunities presented by new scientific and technical developments on a range of ‘hot’ topics in the international law of the sea.

An introduction by the editor, H.E. Judge Tomas Heidar, now Vice-President of the International Tribunal for the Law of the Sea (ITLOS), notes that in the forty years since the negotiation of the 1982 United Nations Convention on the Law of the Sea (LOS), there has been a huge development in relevant scientific and technical knowledge. An overview of the legal developments after the negotiation of the LOS are given, including key agreements, institutions, and jurisprudence. Heidar notes that changes in scientific and technical knowledge have driven the development of the law of the sea historically, and that, so far, formal adaptation of this ‘living’ evolutionary instrument has been constrained by the complex and untested amendment procedures under Articles 311–316 of the LOS. This considered, the book aims to address the question ‘how does the law of the sea adapt to new knowledge and changing circumstances?’ Divided up into no less than eight parts, with 22 chapters, this compilation provides a valuable examination of issues across a broad spectrum of topics.

The first part concerns the scientific and technical interplay with the law of the sea which contains a solitary chapter by Judge Paik, offering a thought-provoking piece on the ITLOS and disputes involving scientific and technical matters. This showcases the Tribunal’s experience in coping with cases with scientific and technical aspects by using creative techniques and utilising its broad and flexible rules of evidence. Paik outlines the various factfinding tools available to the ITLOS, including in the adjudication of complex scientific or technical matters. Concluding that the development of the law of the sea cannot exist in a world by itself, future disputes involving scientific and technical matters are highlighted, including but not limited to maritime boundary disputes, disputes over marine living resources, or disputes relating to climate change impacts on the oceans.

The second part contributes to the ever-growing body of literature on marine genetic resources (MGRs) in areas beyond national jurisdiction (ABNJ) and the proposed legally binding instrument to regulate marine biological diversity in areas beyond national jurisdiction (BBNJ), currently under negotiation at the United Nations. Arnaud-Haond opens this part by stressing the balance which needs to be struck to maintain freedom of scientific research whilst also ensuring fair and equitable access to the benefits and knowledge accrued from said research. Jan Marciniak then turns to the key legal issues related to MGRs. The chapter argues that MGRs cannot be classified as the common heritage of (hu)mankind and they are therefore subject to the freedom of the high seas, an argument that seems compelling (pp. 56–63). Millicay discusses intellectual property rights and MGRs in ABNJ, arguing that neither the LOS nor the Agreement on Trade-related Aspects of Intellectual Property Rights address the issue of access and benefit-sharing in BBNJ, though they are not incompatible with each other. Millicay concludes by making the case for a *sui generis* regime for intellectual property rights in BBNJ. Two ‘practical’ solutions to benefit sharing in relation to MGRs are discussed by Morris-Sharma, building on previous chapters in this part and further

highlighting the divide between the high seas regime and the International Seabed Area regime.

Part three continues with the ABNJ theme, with one chapter focusing on conservation and management of marine biodiversity, and the other on fisheries. The first contribution by Frank highlights our growing knowledge of the connectivity between ABNJ ecosystems and coastal waters, as well as the need to protect this connectivity. Several 'governance gaps' are highlighted in the current framework for marine protected areas (MPAs) in ABNJ, including the lack of an overarching framework, fragmented and insufficient action at a sectoral and regional level, lack of effective monitoring, and limited collection and sharing of data. The chapter turns to the pertinent question of how the new BBNJ agreement can address and fill these gaps without conflicting with existing regulatory bodies and frameworks. The strengths and weaknesses of three governance approaches - namely a regional, hybrid, and global approach - are considered. Frank concludes that a global approach, utilising a conference of parties, would allow States to adopt functional MPAs and management plans while working with regional and sectoral bodies, without undermining their competence or relying on them for implementation. In the second and final chapter of this part, Barnes delivers very interesting considerations on the role of the BBNJ agreement in advancing international fisheries management. The case 'for and against' including fisheries in the scope of the agreement is made, with the warning that this is a political question, even though inclusion is preferable for conservation and governance purposes, and is also supported by extant international legal rules and institutions. Opportunities and hurdles for including fisheries in the agreement are presented and the chapter concludes that should the agreement have little or no influence on fishing activities in ABNJ, '[t]his would be both an environmental and legal tragedy' (p. 153).

Part four contains four excellent chapters on disputes concerning delimitation and delineation of the continental shelf beyond 200 nautical miles. Bernard and Schofield provide a valuable overview of disputes concerning delimitation of the continental shelf beyond 200 nautical miles, including the definition of the outer limits of the continental shelf, and the reader will benefit from a global review of submissions to the Commission on the Limits of the Continental Shelf (CLCS), and the different forms of continental disputes that currently exist though a review of international case law and submissions to the CLCS. This chapter is an incredibly comprehensive reference tool and is strengthened by a table containing a list and a brief description of continental shelf boundary agreements (pp. 176–178). Turning to State obligations in disputed areas of the continental shelf, Murphy outlines eight general rules that States should follow if a dispute exists. This particular chapter would make an excellent teaching tool and it will also prove valuable to academics, practitioners, and government officials. Becker-Weinberg covers the applicable international legal obligations on States with regard to joint development of resources in the case of overlapping continental shelf entitlements. How these obligations interact with those applicable to the Area and the high seas are also discussed and the chapter highlights that these complex interactions should be addressed to clarify the extent and limits of possible interference by coastal States with activities by other States in the Area and on the high seas. Looking forward, Busch explores the role of the CLCS in relation to disputes concerning submissions to it by coastal States, with a focus on the practice in implementing rule 46 of the CLCS Rules of Procedure. The chapter stresses that clarification is needed on the competence of the CLCS to decide if a dispute exists, and which disputes are within or outside the scope of rule 46.

Part five is a collection of four valuable contributions on seafloor highs, beginning with a scientific overview by Roest of the legal definitions in Article 76 of the Convention and the practice of the CLCS. Building on this introductory chapter, Baumert and Mayer focus on submarine ridges and submarine elevations and present three possible interpretations of Article 76(6) by the CLCS. A fascinating case study on the status of Reykjanes Ridge as considered in the Icelandic submission to the CLCS is presented by Gudmundsdottir, who argues that Reykjanes Ridge should be classified by the CLCS as a submarine elevation (and a natural component of Iceland's continental margin) instead of a submarine ridge. Highlighting that the submission by Iceland sparked controversy and disagreement within the CLCS, this resulted in an unclear recommendation by the CLCS. Several options for the Icelandic Government moving forward are presented, including requesting an advisory opinion from ITLOS on the interpretation of Article 76(6). This part is concluded with a contribution by Kunoy who makes use of a legal hermeneutic analysis on the classification of seafloor highs as submarine elevations that are natural components of the continental margin, with examples from the Central Arctic Ocean.

Part six contains a solitary chapter by Haeckel *et al*, which reviews the environmental impacts of deep seabed mining and provides concise policy recommendations to minimize or eliminate these impacts. This is an incredibly important contribution to the book. Deep seabed mineral resources and their exploitation can often be discussed with little or no nuance or acknowledgement that this is a diverse industry, targeting different resources with distinct environmental impacts. This comprehensive review will be of great use to any reader looking to get to grips with the various impacts of deep seabed mining.

Part seven covers several international legal issues brought about by sea level rise. This includes a scientific review on the topic by Mayer, followed by a chapter by Soons, which presents a well-considered analysis of the effects of sea level rise on the baselines and outer limits on maritime zones. Turning to international dispute settlement, Árnadóttir introduces how maritime boundaries are delimited and discusses the possible effects that changes in coastal geography may have on judicially settled boundaries. Hiourea and Torres Camprubí engage the reader with a stark overview of the legal and political proposals concerning disappearance of small island States due to sea level rise.

The final part comprises two contributions on the Central Arctic Ocean Fisheries (CAOF) Agreement - an excellent example of an international response to changing circumstances in the law of the sea. Balton provides the reader with an excellent overview of the CAOF Agreement, including the circumstances generating its necessity, its geographic scope and its aims, key obligations and principles, including the qualified prohibition of commercial fisheries in the CAOF Agreement Area. Short- and long-term approaches for implementing the CAOF Agreement are also suggested. Molenaar then illuminates for the reader the unique circumstances and processes that brought about the CAOF Agreement in the broader context of international fisheries law.

Overall, this is an impressive collection of scholarly contributions that will be invaluable reading for any researcher or practitioner interested in the future development of the law of the sea in response to global environmental change and developments in scientific and technical matters. Each chapter is an original contribution and together they are successful in illustrating the various ways the law of the sea has adapted to new knowledge and changing circumstances.

The collection pays an appropriate amount of attention to scientific and technical information. As outlined above, several parts contain comprehensive reviews of their topics, undertaken to provide context for subsequent legal discussions in other chapters. This is a brilliant editorial approach, since introducing the changes in knowledge and circumstances of particular topics truly enriches the following chapters in that part, making them considerably more accessible to non-specialists. This also allows subsequent chapters to delve deeper into issues from a legal perspective. These chapters are, of course, also valuable in their own right for those wishing to educate themselves on for example, the environmental impacts of seabed mining, or sea level rise - both hotly discussed topics.

Any prospective reader with an interest in the ongoing BBNJ negotiations in particular will benefit from the contributions in part two on MGRs and part three on MPAs and fisheries. However, it does seem odd that the collection contains no contribution on the two other pillars of the negotiations: environmental impact assessments and transfer of marine technology. Though the book is already rather well-packed, perhaps a chapter on each would have been beneficial and certainly would have fitted in well with the aim and scope of the volume.

Considerable weight is given in parts four and five to issues concerning the CLCS, one of the more opaque institutions in the law of the sea framework. Each of those eight chapters stand alone and yet still come together as an illuminating whole. The chapters concerning seafloor highs feel particularly original, providing the reader with a comprehensive overview and stressing the importance of seafloor highs for the interests of coastal States. It is these parts that will be rather valuable for those interested in matters relating to the continental shelf beyond 200 nautical miles for several years, considering the operational pace of the CLCS.

A final, minor, criticism is the absence of a conclusory chapter by the editor. A short piece bringing the 22 substantive contributions together, with some reflections on the future of the law of the sea, may have aided the reader in digesting the collection's central ideas and arguments. That said, bringing this vast range of topics and large number of contributions under one banner as a coherent and comprehensive whole is itself a sign of editorial excellence.

Mitchell Lennan

PhD Researcher, Strathclyde Law School, The University of Strathclyde
United Kingdom