Issues Related to Delineating the Outer Limits of Myanmar's Continental Shelf in the Context of Article 76 of the 1982 United Nations Convention on the Law of the Sea

Mang Hau Thang

United Nations-Nippon Foundation Fellow
(2006-2007)

National University of Ireland
Galway
Republic of Ireland

Division for Ocean Affairs and the Law of the Sea
Office of Legal Affairs
United Nations, New York

Acknowledgements

First and foremost, I am glad to sing praises of the Holy Name of God the Almighty and Ever Living and thank His Amazing Grace in me for everything, particularly for this wonderful Blessing.

I would like to express my profound thanks to the Division for Ocean Affairs and the Law of the Sea (DOALOS), Office of Legal Affairs, United Nations and the Nippon Foundation of Japan for their cooperation in establishiment of this rewarding fellowship programme for developing coastal States in the field of Oceans Law and Policy.

Greatly pleased to mention my sincere thanks to the Ministry of Foreign Affairs of the Union of Myanmar of its kind consideration for this prestigious fellowship Programme.

My profound gratitude embraces Dr. Francois Bailet, Programme Advisor (DOALOS) for his professional support during my internship in DOALOS, Office of Legal Affairs, United Nations, New York.

Delighted to record my heartfelt thanks to my academic supervisor Professor Ronan Long, Director, Marine Law and Ocean Policy Centre, National University of Ireland, Galway, for his professional guidance.

I am sincerely indebted to those mentioned below for making this benevolent opportunity possible;

1. Daw Hla Myo Nwe, Minister Counsellor, Myanmar Embassy, Cairo, Egypt (Director, International Law and Treaties Division, MOFA) for her initiative to my nomination;
2. Director-General and staff of the Planning and Administrative Department, MOFA for their assistance;
3. Ambassador and staff of the Embassy of Myanmar in Kuala Lampur, Malaysia for their kind assistance in obtaining Irish visa;
4. Professor Clive Symmons, Faculty of Law, Trinity College, Dublin for his encouragement and valuable suggestion;
5. Dr. Anne Marie O' Hagan, Research Fellow, Marine Law and Ocean Policy Centre, NUI, Galway for her assistance in all forms;
6. Ms. Heather Murpy, Assistant to Professor Long, for her support; and
7. Permanent Representative and Ambassador of Myanmar to the United Nations and staff of the Myanmar Mission, New York for their kind help for accommodation.

Lastly, but importantly I am delighted to express my deepest appreciation to Mar Mar Htwe, my wife and all my sisters and brothers for their passionate support in their daily prayers.

Disclaimer

The views expressed herein are those of the author and do not necessarily reflect the views of the Government of the Union of Myanmar, the United Nations, the Nippon Foundation of Japan, and the National University of Ireland, Galway, Republic of Ireland.

Table of Contents

List of Tables

List of Figures

Issues Related to Delineating the Outer Limits of Myanmar's Continental Shelf in the Context of Article 76 of the 1982 United Nations Convention on the Law of the Sea

Abstract:

Empowered by the United Nations Convention on the Law of the Sea UNCLOS), Myanmar shall prepare implementing work on delineating its continental shelf in the Bay of Bengal in order to ensure timely submission to the Commission on the Limits of the Continental Shelf (CLCS). Given geological and geographical circumstances, the potential area of claim Myanmar would possess, is the average margin of 390,700 square kilometers in the Bay of Bengal. This paper shall explore the practical approaches of Myanmar's application of the sediment thickness formula. To this end, the paper mainly sheds light on Myanmar's universal guiding principle of "natural prolongation" from the legal perspective by examining the existing complex formulas as provided for in the Convention. Delineating its continental shelf possessing the requisite characteristics, is essential for Myanmar's economic interests related to oil and gas. The application of the Irish formula may bring Myanmar the maximum benefit to its present and future energy security.

I. Introduction

The continental shelf is of primary importance for oil and gas exploitation. In this regard, Myanmar is no exception to delineating its continental shelf. As a signatory to the United Nations Convention on the Law of the Sea (hereinafter: the Convention), Myanmar is one of the coastal States, has continental shelf characteristics which allow for the outer limits of the continental shlef to be claimed beyond 200 M. Myanmar (Burma)[1] demonstrated its interest in the issue of continental shelf delineation since the beginning of the Third United Nations Conference on the Law of the Sea in the 1970s. During the Conference in Caracas, the Myanmar delegation actively participated and consistently voiced the importance of continental shelf for its national interest. Given the geographical condition and geological circumstances, Myanmar delegation emphasised the natural prolongation doctrine in the Conference.

The Second Committee of Second Session was convened from 3 July to 28 August 1974 with a total of 46 meetings.[2] At the Eighteenth Meeting on the continental shelf, the Myanmar delegate U Kyaw Min stated that:

> The Myanmar delegation saw the continental shelf regime as an autonomous regime within the broader frame of the future regime of exclusive economic zone or parimordial sea. The continental shelf and water space should be viewed as forming a whole.[3]

He further expressed that:

> The Myanmar delegation believed that the doctrine of natural prolongation of the land territory into and under the sea had now attained the status of a basic principle of international maritime law, conferring on coastal States certain legal rights and powers which were original, natural and exclusive. Since the continental margin in the Bay of Bengal, whose water shed the entire sea coast of Myanmar, was very wide, the principle and modalities of delimiting the continental shelf

[1] Prior to 18 October 1988, Myanmar was officially called Burma.
[2] *1973-74 Official Records of the Third United Nations Conference on the Law of the Sea.* UN Sales Publications No. E. 75. V4. Vol. II, p. iii.
[3] *Ibid*., para. 89, p. 155.

> between States were of particular interest to Myanmar delegation. The most glaring omission in Article 6 of the 1958 Convention on Continental Shelf was the absence of any reference to the natural prolongation principle. That should be corrected in the new convention. Since that principle was the source of the continental shelf rights of coastal States, it should also form the basis for the establishment of continental shelf boundaries between States, wherever applicable.[4]

It is thus obvious that Myanmar regards continental shelf as an autonomous regime of the coastal State, recognizes the doctrine of natural prolongation as a legitimate right of coastal States and as a basic principle of international law. Myanmar considers and upholds "natural prolongation" as a universally accepted legal basis for delineating its continental shelf. In addition, Myanmar made a suggestion to the Conference for a definition of the continental shelf which took into account both the concepts of natural prolongation and geological interpretation.

[4] *Ibid*., paras. 90 and 92.

II. United Nations Convention on the Law of the Sea and Extended Continental Shelf

A. Article 76 and Entitlement

i. Principle of Natural Prolongation

Article 76 (1) of the Convention defines the continental shelf by reference to two alternative bases for entitlement: natural prolongation and distance from the coast. In the former case, the Article provides that:

> The continental shelf of a coastal State comprises the seabed and the subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin.

The logic of Article 76 is founded on the distinction between the terms "the continental shelf" and "the continental margin". Both terms are defined in Article 76 for the purpose of the Convention by incorporating both legal and scientific aspects. Paragraph 1 of Article 76 defines the continental shelf of a coastal State in terms of the "natural prolongation" of the coastal State's land territory, the outer edge of the continental margin, and a 200 M distance criterion. It is a common assumption that the term "natural prolongation" in this respect is directly linked to the physical nature of the continental margin (Figure1); however, this can not be strictly correct. In cases where the outer edge of the continental margin is less than 200 M from the baselines, the continental shelf of the State extends beyond the continental margin and up to that distance. In such cases, the continental shelf includes a part of "the deep ocean floor", which is explicitly excluded from the continental margin, according to paragraph 3 of Article 76 (Figure 2).

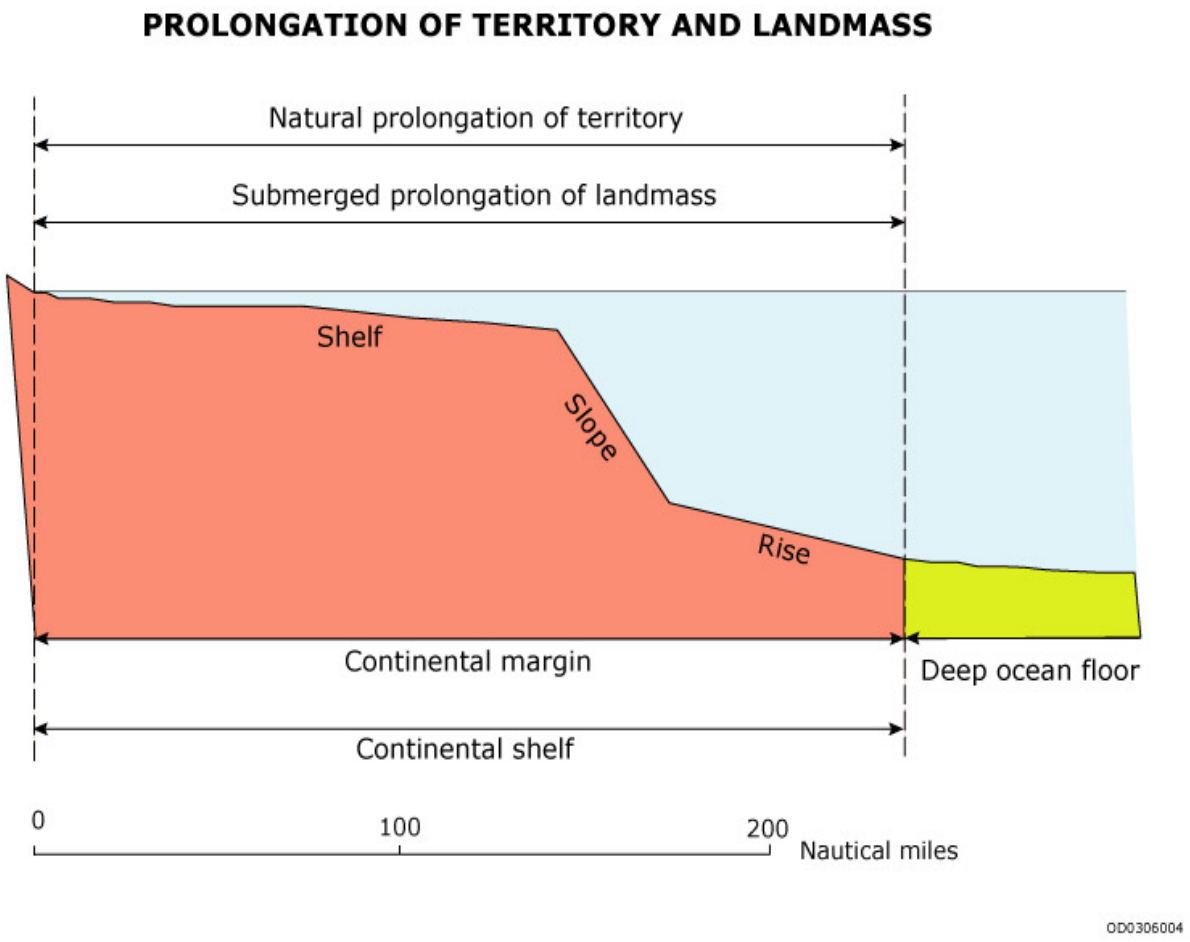


Figure (1) Natural prolongation directly linked to the physical nature of the continental margin

(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD-ROM

Therefore, "natural prolongation" in terms of the continental shelf is clearly different from the submerged prolongation of the continental margin. Thus, the term "natural prolongation" as used in paragraph 1 is strictly a legal concept that pertains to the "land territory", which is the area of land jurisdiction of the State; it does not, therefore, pertain to the physical extent of the continental margin.[5]

[5] Philip A. Symonds and Harald Brekke. "A Scientific Overview of Ridges Related to Article 76 of the UN Convention on the Law of the Sea." In *Legal and Scientific Aspects of Continental Shelf Limits*, Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds.). Koninklijke Brill NV, Leiden, The Netherlands. 2004. pp. 170- 171.

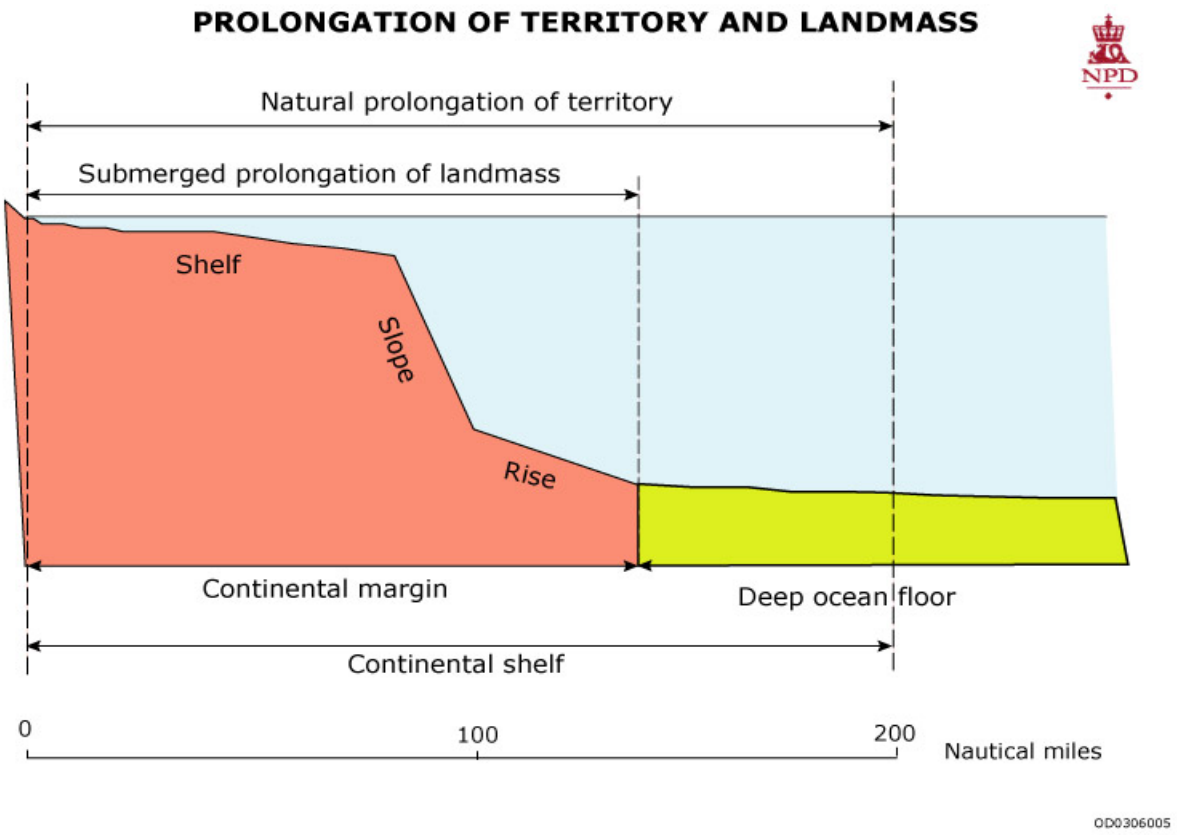


Figure (2) Continental shelf includes "deep ocean floor" excluded from continental margin. (Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD-ROM

In other words, to define the outer edge of the continental margin is of critical importance in the basis of natural prolongation or submerged prolongation of land territory. For continental margin plays a crucial role in determining the outer limits of the continental shelf.

Two elements in this definition have to be considered to establish the scope of application of the term 'natural prolongation.' On the one hand, the definition refers to the land territory, from which the natural prolongation extends. On the other hand, the definition limits the seaward extent of the natural prolongation by reference to the outer edge of the continental margin. The reference to natural prolongation of the land territory indicates that in such a case submarine areas of oceanic origin, which are sufficiently linked to the land territory of oceanic origin are its natural prolongation. During the early phases of Third United Nations Conference on the Law of the Sea (UNCLOS III) many delegations made reference to the concept of 'natural

prolongation'. These statements also point to the fact that the territory of a State was viewed as providing the starting point for the determination of what constitutes a natural prolongation. References to both geology and/or geomorphology were made to define natural prolongation. The International Court of Justice (ICJ) has considered the concept of natural prolongation in the context of the definition of the continental shelf provided by Article 76 (1) in the *Tunisia/Libya Continental Shelf* case and the *Libya/Malta Continental Shelf* case. In both instances, the Court indicates that natural prolongation may be defined by reference to either the geology or geomorphology of the seabed.[6]

The absence of reference to paragraph 7 to 9 of Article 76 indicates that Article 76 (2) is also operative and binding on a coastal State before it has implemented paragraph 7 to 9. Article 76 (2) does not of itself provide certainty over the exact extent of the continental shelf.[7]

Article 76 (2) is a kind of reminder to the coastal States to comply with the provisions of paragraph 4 to 6 of Article 76.

ii. Entitlement to a Claim

Entitlement to the continental shelf is based on the title of the coastal State over the land or, more precisely, on possession by the territory concerned of a coastline.[8] In the case of the continental shelf, the basis of entitlement is the distance from the coast or natural prolongation of the land territory to the outer edge of the continental

[6] *Third United Nations Conference on the Law of the Sea; Offical Records*, Vol. I, p. 35 and Vol. II, p. 95. See also: Continental shelf (Tunisia/Libya Arab Jamahiriya), Judgement of 24 February 1982 ([1982] ICJ Reports 18 at 47-58, paras. 45-68; Continental Shelf (Libyan Arab Jamahiriya/ Malta), Judegement of 3 June 1985; [1985] ICJ Reports 13 at 31- 37, paras. 29- 41.

[7] International Law Association, *Toranto Confernce* (2006) *Legal Issues of the Outer Continental Shelf*, 2nd Report, p. 3.

[8] The ICJ has observed in the *Anglo-Norwegian Fisheries* case in respect of the territorial sea "[i]t is the land which confers upon the coastal State in a right to the waters off its coasts" ([1949] *reports of judgements, Advisory Opinions and Orders; The International Court of Justice* (ICJ Reports) 116, p. 133). Specially referring to the continental shelf and 200 M, the Court has later observed that "the attribution of maritime areas to the territory of a State […] is a legal process based solely on the possession by the territory concerned of a coastline." (Maritime Delimitation in the Area between Greenland and Jan Mayen (Denmark v. Norway) [1993] ICJ reports 38, para. 470, p. 48.

margin.[9] The fact that Article 76 contains both a general definition of the continental shelf and rules to define specific outer limits, confirms that entitlement to the continental shelf is not dependent on the establishment of outer limits.[10] The absence of outer limits of the continental shelf established in accordance with Article 76 does not entitle the coastal State to exercise sovereign rights over parts of the natural prolongation of its land territory that fall beyond the potential outer limit line under Article 76. Article 76 (2) provides that the continental shelf shall not extend beyond the limits provided for in paragraphs 4 to 6 of Article 76.[11]

If the margin is narrower than 200 M, States may claim the seabed to a distance of 200 M from the baselines from which the territorial sea is measured. Such a claim is identical to the area secured when a State claims an exclusive economic zone. If the margin is wider than 200 M, then claims must be made according to precise formulas and absolute limits and must be recommended by the Commission on the Limits of the Continental Shelf. If the margin is wider than 200 M, the State is able to claim sovereignty over the seabed and subsoil of the continental margin beyond the exclusive economic zone. This means that the land-ward limits of the high seas and the Area do not coincide; the land-ward limit of the high seas lies closer to the shore than the corresponding limit for the Area. In most circumstances, the presence or absence of a rise can be decisive in determining whether continental margins are wider than 200 M. It is therefore unsurprising that most of the margins wider than 200 M are found adjacent to continental coasts in the Atlantic, Arctic and Indian Oceans, where the continental rise are well developed.[12]

[9] The Convention, Article 76(1). See also: Continental shelf (Libyan Arab Jamahiriya/Malta), Judgement of 3 June 1985; [1985] ICJ Reports 13, para. 27, p. 30 and para. 34, p. 34-35.

[10] Ted L. McDorman. "The Entry into Force of the 1982 LOS Convention and the Article 76 Outer Continental Regime." In *International Journal of Marine and Coastal Law* 1995: 10, pp. 165-188; and *Report of the Eleventh Meeting of States Parties.* DOC. SPLOS/73, June 2001, para. 75. Also see: Continental Shelf (Tunisia/Libyan Arab Jamahiriya), judgement of 24 February 1982, where the ICJ distinguishes between the definition of the continental shelf contained in paragraph 1 of Article 76 and paragraphs 2 to 9 of the Article "which deal with the details of the outer limits of the continental shelf" ([1982] ICJ Reports 18, para. 47, p. 48).

[11] As such, areas would be part of the Area, Article 137 (1) of the Convention also imposes an obligation not to exercise sovereignty or sovereign rihgts over them or their resources.

[12] Victor Prescott. "Resources of the Continental Margin and International Law." In *Continental Shelf Limits: The Scientific and Legal Interface*. Perter J. Cook and Chris M. Carlton (eds). Oxford University Press. 2000. pp. 64-66.

Estimates of the extent of the world's geomorphological rather than legal continental margins have been provided by a number of sources, a figure of 46,082 million square kilometers excluding the margin around the Antarctic and taking an arbitrary limit of 3000 meters for the edge of the margin.[13] Estimate of the margins to occupy 82,6825 million square kilometers, which represents 22.9% of the total oceanic area of 361,059 million square kilometers.[14] Estimates that the margins occupy 72 million square kilometers, which equals 20% of the total ocean area,[15] which is close to the estimate of 74 million square kilometers, which equals 20.6% of the total ocean area.[16] Therefore, approximately 59 million square kilometers of continental margin, an area 5 million square kilometers larger than the extent of Eurasia, is available for the 151 coastal States around the world. If the margin was shared by those coastal States, each would secure 390,700 square kilometers. Myanmar and Somalia are the two States that might be able to claim the average margin of 390,700 square kilometers. But of course, the regime established under the law of the sea is not based on equal shares. For example, Australia has claimed an exclusive economic zone comprising 8.6 million square kilometers, excluding claims to the margins adjacent to its Antartic territories. There are other countries, such as Argentina, Canada, Indonesia, New Zealand, Russia, and the United States of America, that might claim more than 2 million square kilometers. The potential area in the Bay of Bengal of the Indian Ocean where Myanmar likely to make a claim along with Srilanka, India, Bangladesh and Indonesia is 414,000 square miles wide. There are six main interconnected factors that will influence the area of continental margin that any State might be able to claim:

1. the lengths of the mainland coastline;
2. the configuration of the mainland coast;
3. the location of the coast on an ocean or a semi-enclosed sea;
4. the possession of islands;
5. the proximity of neighbouring States; and
6. the width of the continental margin.

[13] The Geographer. Theoretical Areal Allocations of Seabed to Coastal States. *Limits in the Sea*, 46. Bureau of Intelligence and Research, Department of State, Washington, D.C. 1972.
[14] Tchernia, P. *Descriptive Regional Oceanography* (translated by D. Densmore), Oxford. 1980.
[15] Kennett, J. *Marine Geology.* Englewood Cliffs, New Jersey. 1982.
[16] Couper, A *The Times Atlas of the Oceans.* London. 1983.

When considering the significance of the length of the coastline, it is important to distinguish between continental and archipelagic States. The influence of the configuration of the coast is apparent mainly in continental States. It is a disadvantage to have a coastline that has a concave shape. This is confirmed by the fact that the concavity of Germany's North Sea coastline was a principal factor in that State's seeking relief from the claims of the Netherlands and Denmark before the ICJ in a case decided in 1969. States that have coastlines on semi-enclosed seas are faced with competition from other States for a comparatively small area. The possession of islands, in addition to continental territory or the main islands in an archipelago, generally allows increased claims to parts of the continental margin. The first five factors apply to all margins, whether they are narrower than 200 M or wider than 200 M. The width of the continental margin is only a factor in respect of margins wider than 200 M.[17]

iii. Ridges

Myanmar shall take seriously into account of this fact in examining the ridges existed in the Bay of Bengal in its efforts to delineating the continental shelf as "natural prolongation" of its landmass or land territory and "submerged prolongation" of its continental margin. Article V of the1986 Myanmar-India maritime boundary agreement in the Andaman Sea, Coco Channel, and Bay of Bengal uniquely deals with the question of emerging ocean islands and expressly provides that:

> Each party has sovereignty over existing islands and any islands that may emerge, falling on its side of the maritime boundary. [18]

Accordingly, both sides shall abide by the provisions of the treaty oceanic islands of any kind that may emerge in the area agreed between Myanmar and India as they partain to.

[17] Victor Prescott, *op cit*, pp. 67-70.
[18] David Colson. "The Legal Regime of Maritime Boundary Agreements." In Jonathan I. Charney and Lewis M. Alexander (eds). *International Maritime Boundaries.* The American Society of International Law, Martinus Nijhoff Publishers, The Netherlands. 1996. Vol. I, p.72.

Article 76 (3) of the Convention provides that the continental margin does not include the deep ocean floor with its oceanic ridges or the subsoil thereof. Article 76 (6) of the Convention provides that on submarine ridges, the outer limit of the continental shelf shall not exceed 350 M from the baseline. But Article 76 (6) does not apply to submarine elevations that are natural components of continental margin.

Here, the Convention seeks to make a distinction between what may be termed "continental territory" and "oceanic territory", a distinction which, in many cases, is far from clear-cut. The point has been made that "there is not in fact a neat division between the two features, but there is rather a zone where it is quite difficult to say with certainty 'this' is oceanic, and 'that' is continental.[19]

The ridge issue directly affects the delineation of the outer edge of the conitnental margin under Article 76, and the margin and the ridges are subject to the same principles and provisions.[20]

Therefore, there are three types of seafloor highs that are specifically mentioned in the definition of the continental shelf:[21]

1. Oceanic ridges of the deep ocean floor;
2. Submarine ridges; and
3. Submarine elevations that are natural components of the continental margin (e.g. plateaux, rises, caps, banks and supurs).

A summary of the various types of seafloor highs and the maximum extent of continental shelf these can generate is given in Table 1 below.

[19] A. J. Kerr and M. J. Keen. "Hydrographic and Geologic Concerns of Inplementing Article 76." In *International Hydrographic Review* 1985:62. p. 139 et seq., p. 141. The CLCS itself noted that "continental crust is compositionally distinct from oceanic crust, but the boundary between these two crustal types may not be clearly defined. Simple subdivision of margins into shelf, slope and rise may not always exist owing to the variety of geological and geomorphological continental margin types resulting from different tectonic and geological settings" in CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 6.2.4., p. 45.

[20] Philip A. Symonds and Harald Brekke. "A Scientific Overview of Ridges Related to Article 76 of the UN Convention on the Law of the Sea." In *Legal and Scientific Aspects of Continental Shelf Limits*, Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). Koninklijke Brill NV, Leiden, The Netherlands. 2004. p. 170.

[21] *Ibid*., p. 143.

Table 1: Seafloor highs and the implications of Article 76

Type of seafloor high	Art. 76 province that it relates to	Max. extent of continental shelf
Oceanic ridge	Deep ocean floor	200 M (M)
Submarine ridge	Continental margin	350 M (M)
Submarine elevation	Continental margin	350 M or 2500 m isobath plus 100 M, whichever is greater

(Source: Philip A. Symonds and Harald Brekke "A Scientific Overview of Ridges Related to Article 76 of the UN Convention on the Law of the Sea" in *Legal and Scientific Aspects of Continental Shelf Limits* Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)

Physically, the continental margin "consists of the seabed and subsoil of the shelf, the slope and the rise". In this particular context the term "the shelf" must pertain to the shallow rim around the landmass; "the slope" must pertain to the slope from the shelf down to the deep water; and "the rise" (where it exists) must pertain to a low gradient area between the slope and the deep ocean floor with its abyssal plains. These are all morphological entities that my be linked to any kind of landmass in order to have paragraph 3 of Article 76 make sense in terms of the Convention. Similarly, when paragraph 4 refers to the continental slope and the foot of the continental slope, it is with reference to the continental margin in the sense of the Convention (Figure 3).[22]

[22] *Ibid.*, p. 182.

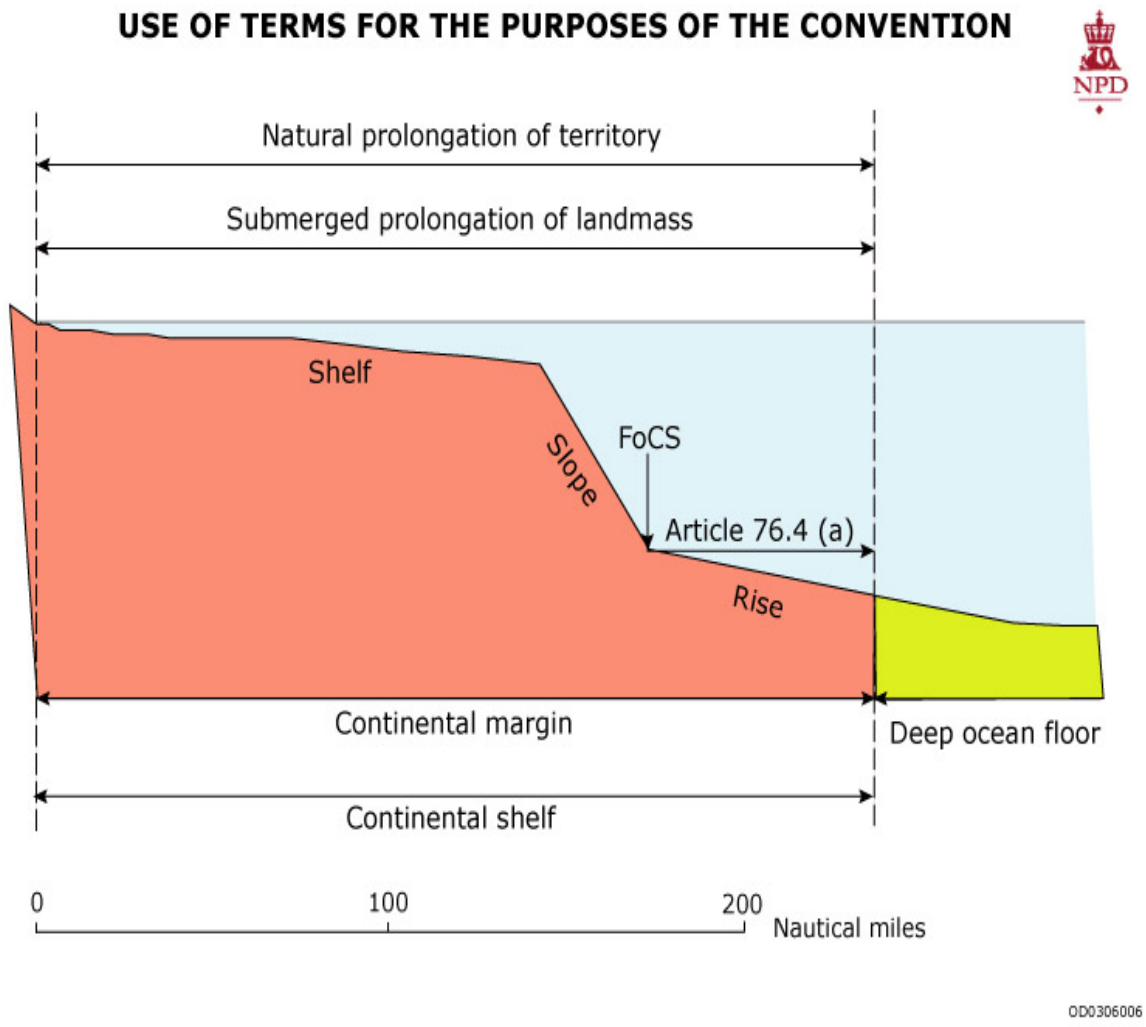


Figure (3) Continental Margin in the sense of the Convention.
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

The continental margin is defined as the"submerged prolongation" of the geologically unspecified landmass of the coastal State. The landmass in this respect must be the Earth's crust beneath the land area of the coastal State. The definition of the continental margin as being the "submerged prolongation" of the landmass of the State implies that the crust of the continental margin must remain largely the same in terms of its characteristics and/or origin extending out from the land area of the coastal State. The consequence is that any kind of landmass (irrespective of crustal type) may generate a continental margin in the sense of the Convention that can be delineated in accordance with paragraph 4 of Article 76, and which in turn forms the basis for the application of paragraph 6 concerning the maximum limits of the continental shelf. The term "oceanic" in paragraph 3 is used to designate ridges that

fundamentally and genetically, in geological terms, are linkned to the deep ocean floor by sharing geological characteristics and origin with the deep seafloor and its subsoil.[23]

There appears to be two ways in which a ridge may be classified as an oceanic ridge of the deep ocean floor. Firstly, some ridges may be regarded as fundamentally belonging to the deep ocean floor directly from the definition of the deep seafloor. Since the only definition of "the deep ocean floor" seems to be that it is the seabed and subsoil beyond the outer edge of the continental margin, an oceanic ridge of the deep ocean floor would be a ridge that belongs to the deep ocean floor by simply being situated, throughout the whole of its extent, beyond the outer edge of the continental margin of any coastal State, as defined in accordance with paragraph 4 of Article 76. However it also refers to the genetic relationship between such ridges and the deep ocean floor in terms of geology, morphology and tectonic setting. Accordingly, an underwater ridge that, along its entire length, is situated beyond the outer edge of the continental margin in the sense of the Convention, and share geological characteristics and origin with the deep sea floor, is an oceanic ridge of the deep ocean floor (Figure 4). Secondly, there are also seafloor highs that have a more subtle relationship with the outer edge of the continental margin and may be classified as oceanic ridges of the deep ocean floor. An underwater ridge that is detached from the envelope of the foot of
the continental slope but extends into the deep ocean floor from within the boundary zone between the foot of the slope and the outer edge of the continental margin, should not be regarded an integral part of the continental margin under paragraph 4. If such a ridge shares geological characteristics and origin with the deep ocean floor and its subsoil, it may be classified as an oceanic ridge.

However, only part of the ridge that lies beyond the outer edge of the continental margin as established by paragraph 4 of Article 76 is excluded from the continental margin, since this part belongs to the deep ocean floor (Figure 5).

[23] *Ibid*., p. 182-183.

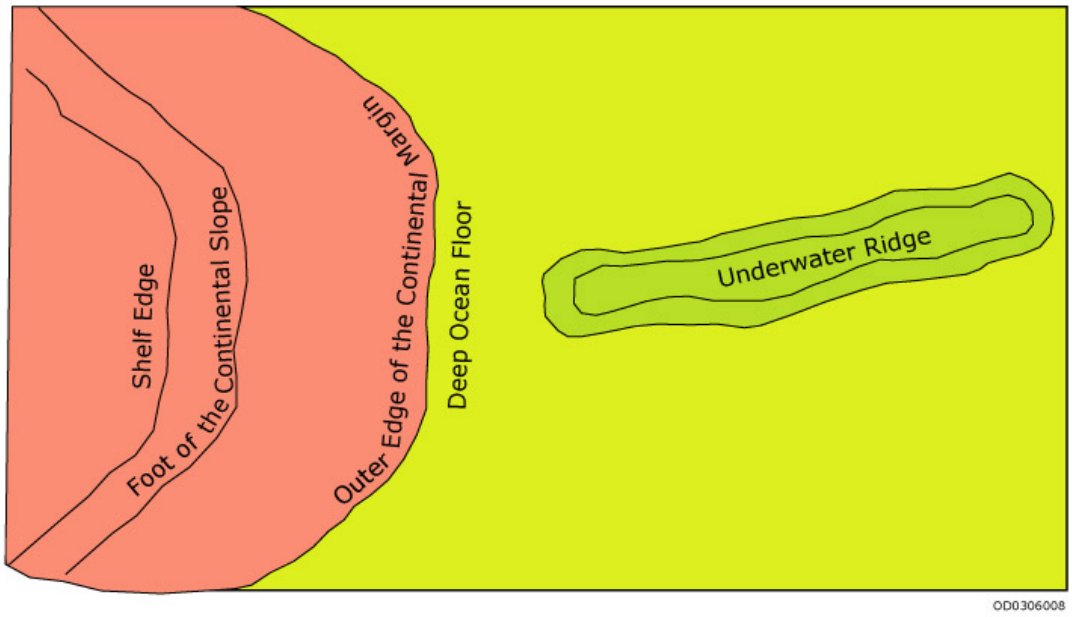


Figure (4) Oceanic ridge situated beyond the outer edge of the Continental Margin
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD –ROM

Some submarine ridges that lie entirely beyond the foot of the continental slope, and are either wholly within the deep ocean floor or straddle the outer edge of the continental margin, may have originated within the continental margin but were later separated from it by a range of geological processes. Such ridges should not be classified as oceanic ridges on a geological basis as they do not share geological characteristics and origin with the deep ocean floor. Paragraph 6 of Article 76 refers to two categories of seafloor highs that are associated with the continental margin: "submarine ridges" and "submarine elevations" that are natural components of the continental margin with regard to the maximum outer limit of the continental shelf on these features. Since both categories of seafloor highs are eligible to generate continental shelf extending beyond 200 M, it follows that both also form part of the continental margin in the sense of paragraph 3 and 4 of Article 76. That is these features are not oceanic ridges of the deep ocean floor. If the the foot of the continental slope around these sea floor highs is continuous with the foot of the

continental slope of the rest of the continental margin and these features contribute to the establishment of the outer edge of the continental margin (Figure 6).

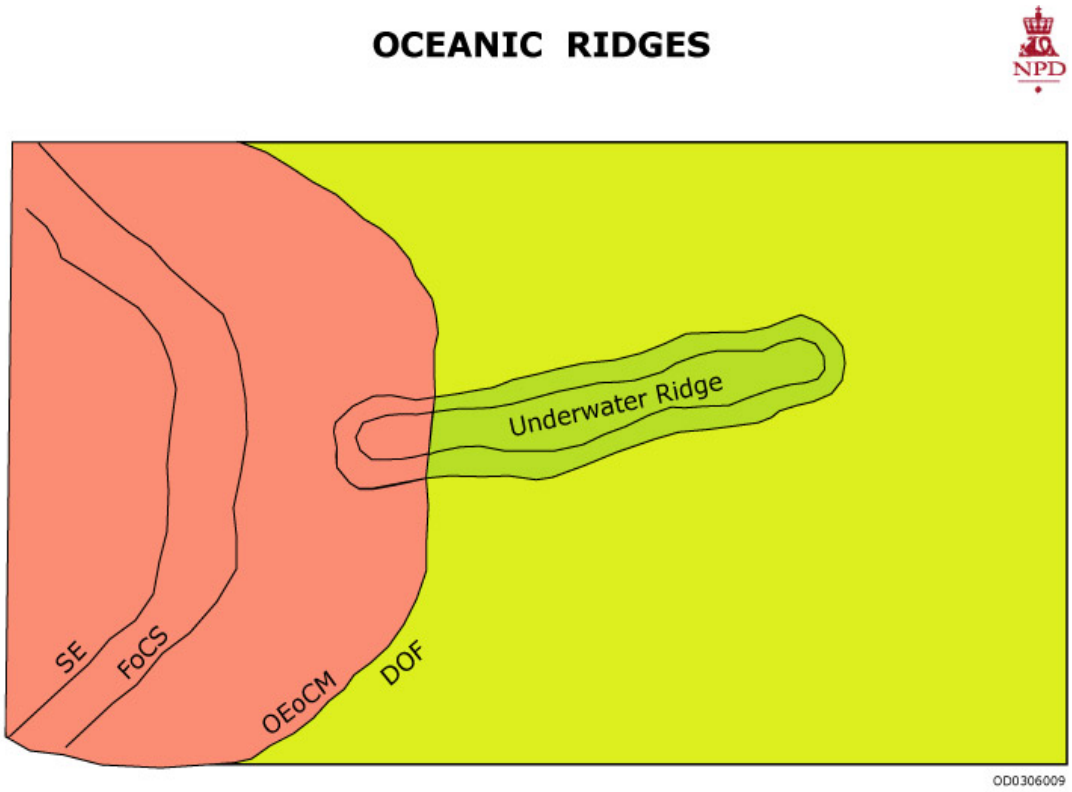


Figure (5) Oceanic ridge only part of it lies beyond the outer edge of the Continental Margin
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)Adapted from the companion CD -ROM

"Submarine ridges" in the sense of Article 76 (6) must be ridges that are not natural components of the continental margin but sill integral parts of the continental margin because they fall within the common envelope of the foot of the continental slope. At the same time, such "submarine ridges" are distinguishable from the oceanic ridges of the deep ocean floor. The maximum constraint of 350 M on such ridges was probably introduced to limit the inclusion of features with strong oceanic affinities, as well as large associated areas of deep ocean floor, within the continental shelf. Morphology alone is clearly not sufficient to distinguish such "submarine ridges" from the submarine elevations that are natural components of the continental margin because both form part of the continental margin under paragraph 4. Consequently, a "submarine ridge" is a ridge that is morphologically an integral part of the continental

margin, but along part or all of its length is different from the landmass of the coastal State from which the margin exentds, in that it also shares geological characteristics and/or origin with the deep ocean floor.

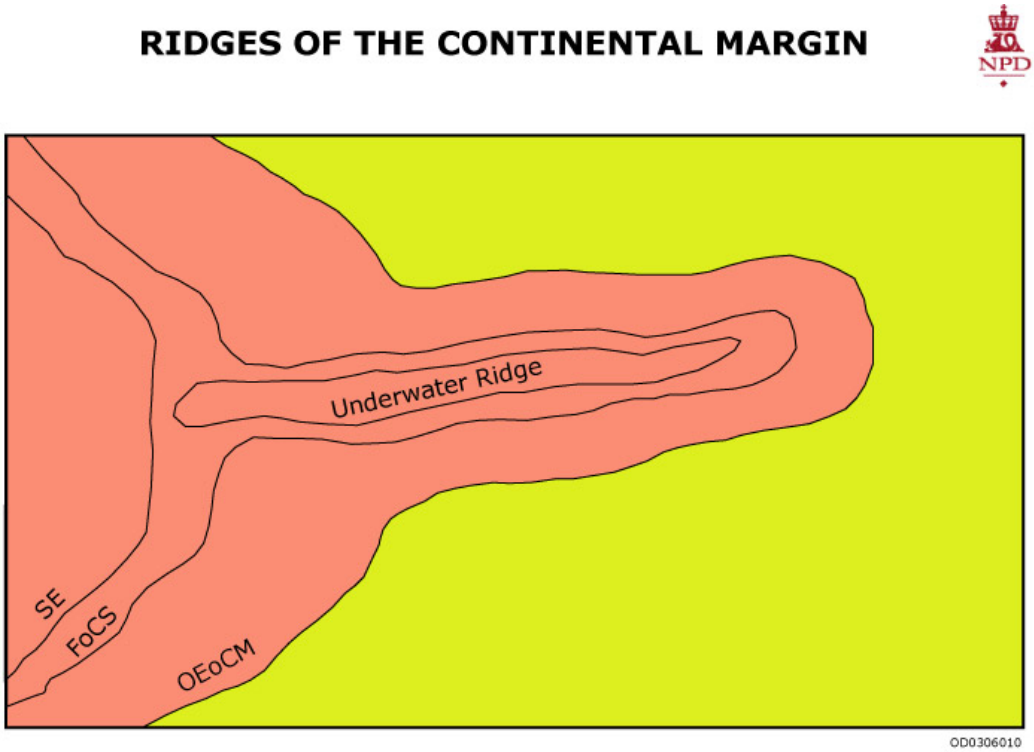


Figure (6) Natural components that contribute to the establishment of the outer edge of the Continental Margin
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD-ROM

At the same time, "submarine ridge" must, at least in its landward part, be genetically linked to the continental margin and not belong to the deep ocean floor with its oceanic ridges. One type of submarine ridge would be a feature that along its full length is transitional in character between continental and deep ocean floor characteristics. Another type would be a ridge that shares geological characteristics and origin with the surrounding deep sea floor at its seaward end, but is an integral part of the continental margin at its end (Figure 7).[24]

[24] *Ibid.*, p. 187.

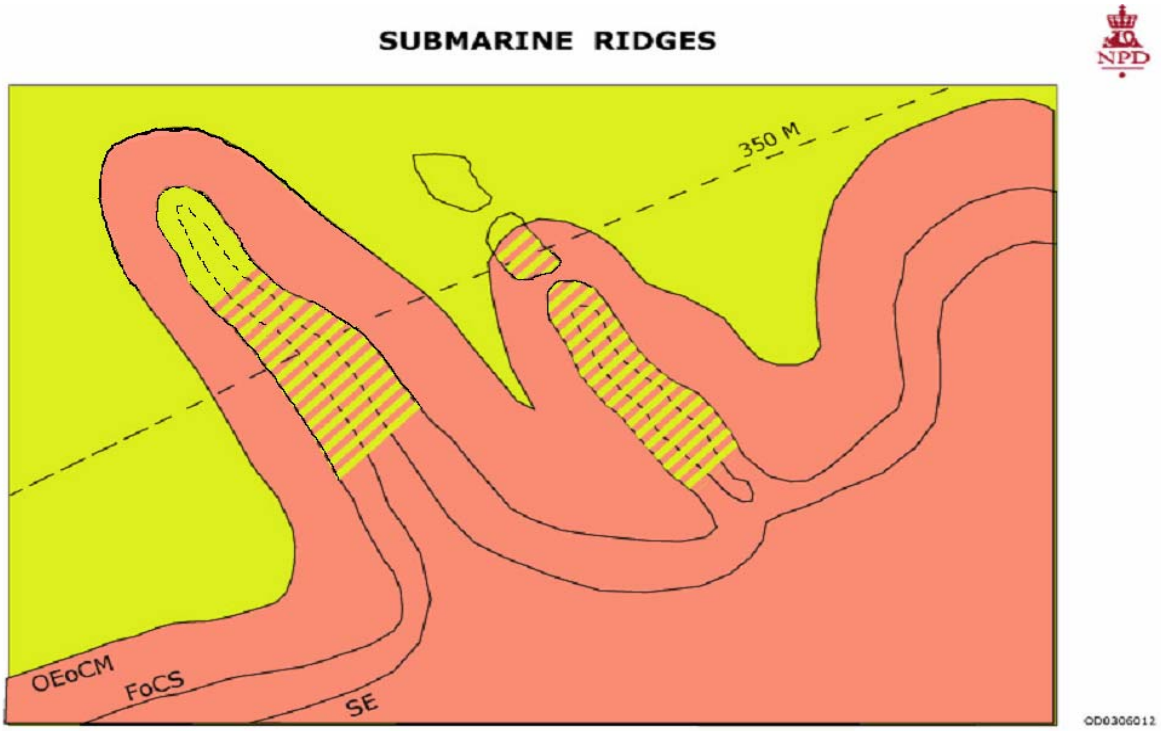


Figure (7) Submarine ridge that shares geological characteristics as integral part of Continental Margin
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD-ROM

Such changes along the strike of the ridge may reflect variations in its geological composition and/or its geological origin. Ridges with such dual nature, with one end belonging to the deep ocean floor and the other end being fully integrated with the continental margin, may form through a variety of tectonic processes. All the features listed in paragraph 6 are morphological features without reference to a spceific type of crust. However, to be consistent with paragraph 3 it seems appropriate to invoke the principle of geological continuity. That is, the morphological features must have the same general geological characteristics and/ or origin as the landmass of the coastal State from which the continental margin extends in order to classify them as *natural* components of that continental margin. Consequently, a submarine elevation that, along its entire length, shares geological characteristics and orgin with the landmass of the coastal State, and that forms an integral part of the continental margin

based on the foot of the continental slope, may be categorized as being and elevation that is a natural component of the continental margin of that State (Figure 8).[25]

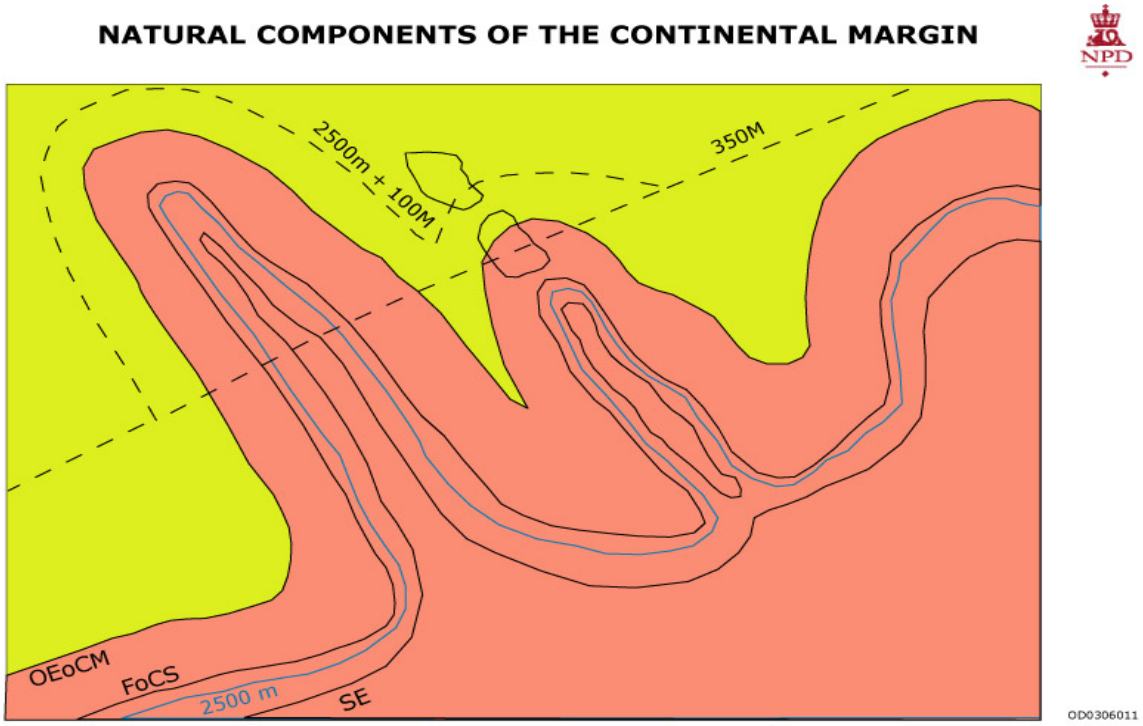


Figure (8) Submarine evlevation and origin with landmass of the coastal state and forms as an integral part and natural component of the Continental Margin
(Source: Breke and Symonds "The Ridge Provisions of Art. 76 of UNCLOS in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004). Adapted from the companion CD-ROM

According to the IHO/IOC maunual on Standardization of Undersea Feature Names,[26] both spurs and rises can be considered types of underwater ridges as follows:

1. Ridge is defined as: a long, narrow elevation with steep sides, along, narrow evelation often separating ocean basins, the major oceanic systems of global extent.
2. Rise is defined as: a broad elevation that rises gently and generally smoothly from the sea floor, a synonym for ridge in the meaning of mid-oceanic ridge.
3. Spur is defined as: a subordinate elevation, ridge, or rise projecting outward from a large structure.

[25] *Ibid*., pp. 186-187. See also: F. P. Pulvenis. "The Continental Shelf Definition and Rules Applicable to Resources." In R. J. Dupuy and D. Vignes (eds). *A Handbook on the New Law of the Sea*. 1991. p. 354.
[26] International Hydrographic Bureau. Standardization of Undersea Feature Names (2nd Edn). Monaco. 1989.

The identification of features that are "natural components of the continental margin" or "submarine ridges", their fundamental physical relationship with the continental margin in the sense of the Convention (i.e. in terms of the foot of the continental slope and their geological characteristics and origin) is more important than their classification on the basis of morphology.[27]

Several of the terms used in Article 76 (6) have been described by the International Hydrographic Organization (IHO). The IHO describes a submarine ridge as:

> [a]n elongated elevation of the sea floor, with either irregular or relatively smooth topography and steep sides which constitutes a natural prolongation of land territory.[28]

The drafting history of Article 76 (6) lends support to the interpretation that the provision on submarine ridges is intended to cover ridges of an oceanic origin. Paragraph (6) was included in Article 76 at a late stage of the Third United Nations Conference on the Law of the Sea. The Article on the continental shelf in the first revision of the Informal Composite Negotiating Text did not contain a precurser to paragraph 6, and the last part of what was to become paragraph 3 did not contain a reference to oceanic ridges. A footnote to paragraph 3 stated that general understanding had been reached to the effect that there would be additional discussion and "a mutually acceptable formulation to be included in Article 76 will be drawn up."[29]

---

[27] *Ibid*., p. 191.

[28] IHO. *Manual on Technical Aspects of the United Nations Convention on the Law of the Sea- 1982.* Special Pub. No. 51 (1990), at pp. 4, 12-13. See also: Division for Ocean Affairs and the Law of the Sea. *Baselines: An Examination of the Relevant Provisions of the United Nations Convention on the Law of the Sea*. Appendix I (Glossary of Technical Terms), pp. 47 and 53. UN Sales No. E. 88. V.5. 1989.

[29] Official Summary Record of UNCLOS III, Doc. A/CONF.62/WP.10/Rev.1 (reproduced in R.Platzöder. *Third United Nations Conference on the Law of the Sea: Documents* (18 volumes). Ocean Publications, Dobbs Ferry. Vol. I (1982-1988), para 375, p. 421.

Submarine ridges constitute a special case which is subject to the rules of entitilement given by Article 76 (4) (a) (i) and (ii), but it is also subject to the more stringent constraints provided by Article 76 (6):[30]

Article 76 (6) does not directly address the meaning of the term "sibmarine ridges"; it distinguishes between "submarine ridges" and "submarine elevations that are natural components of the continental margin." That distinction, in combination with the reference to oceanic ridges of the deep ocean floor in paragraph 3, reveals that for the purposes of the Convention, submarine ridges can be described as ridges that are part of the natural prolongation of the land territory of a coastal State but are not natural components of the continental margin.[31] Such ridges fall into two general categories:

1. ridges which, having their origin in the continental margin, project out into the area of the deep seabed; and
2. submarine ridges which are not linked to the continents, but which support chains of islands.[32]

iv. Data Requirement for Delineating Base of the Slope

For the purpose of Article 76, the Commission Guidelines direct attention to the 'base' containing the foot of the slope, where the continental slope gives way to the continental rise or to the deep seafloor. Finer scale investigations within this base region may reveal a single physiographic feature that can be termed the foot of the slope. They may also find that the transition between descending seafloor and horizontal seafloor occurs in a region of rough physiography with many possible maximum breaks in the slope. Alternatively, there simply may be a smooth transition with no identifiable surface expression. Each area will have to be examined closely by coastal States seeking to maximize the area of their continental shelf. According to

[30] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 2.1.10, p. 11.
[31] See: J.-F Pulvenis. "The Continental Shelf Definition and Rules Applicable to Resources." In R.-J Dupuy and D. Vignes (eds.). *A Handbook on the New Law of the Sea*. 1991. p. 354. Note that Mr. Pulvenis was a member of the Venezuelan delegation to UNCLOS III.
[32] J.R.V Prescott. *An analysis of the geographical terms in the United Nations Convention on the Law of the Sea*. 1987. p. 143. See also: Division for Ocean Affairs and the Law of the Sea, UN Office of Legal Affairs. *Definition of the Continental Shelf: An examination of the Relevant Provisions of the United Nations Convention on the Law of the Sea.* 1993.

paragraph 5.2.1 of the Guidelines, "bathymetric and geological data provide the evidence to be used in geomorphological analysis conducted to identify the region defined as the base of the continental slope." This could be read as meaning that *both* bathymetric *and* geological evidence must be supplied simultaneously. However, paragraph 5.4.4. is permissive and allows the possibility of not using geology:

> Many continental margins, however, depart from this ideal picture, and in such cases geological and geophysical data *may* be used to assist in identifying the region referred to here as the base of the continental slope.[33]

The initial analysis of the data focused on determining which areas had the potential for an extended claim under Article 76. This step is, in essence, an application of the "test of appurtenance" described by the Commission in which subjective decisions are made with respect to the nature of the continental margin and its "natural prolongation of the land territory." This step involves going through most of the procedures involved in establishing a claim (determining baseline, limit lines, formula lines, and cutoff lines). In most cases, claims would be based on both seismic and bathymetric data. It is possible that situations will arise where neither the bathymetry nor the sediment thickness criteria provide a clear or most advantageous indication for an extended claim and thus other geological and geophysical data will need to be examined to establish "evidence to the contrary". [34]

The Commission does require a full technical description of the bathymetric database, including a detailed description of the methodology used, as well as a description of approaches used for interpolation, approximation, and chart creation. However, no explicit statements have been made regarding required data density. This leaves the identification of "data gaps" an inherently subjective decision. Of particular concern was the ambiguity associated with establishing the foot of the slope from relatively

[33] Dave Monahan. "Determination of the Foot of the Continental Slope as the Point of Maximum Change in the Gradient at Its Base." In *Legal and Scientific Aspects of Continental Shelf Limits.* Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). Koninklijke Brill Nv, Leiden, The Netherlands. 2004. p. 100-101.

[34] L. Mayer, M. Jakobsson and A. Amstron."Evaluating U.S. Data Holdings." In Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). *Legal and Secietific Aspects of Continental Shelf Limits*. Martinus Nijhoff Publishers, Leiden/ Bonston. 2004. pp. 319-323.

sparse single beam sonar data that has relatively high positonal uncertainty associated with it (Figure 9).

Based on this reasoning, where either multi-beam sonar data or dense, modern single beam sonar data is not available. It is concluded that modern, very high-density sounding data can be used to optimize and increase substantially the area claimed by a coastal State.[35]

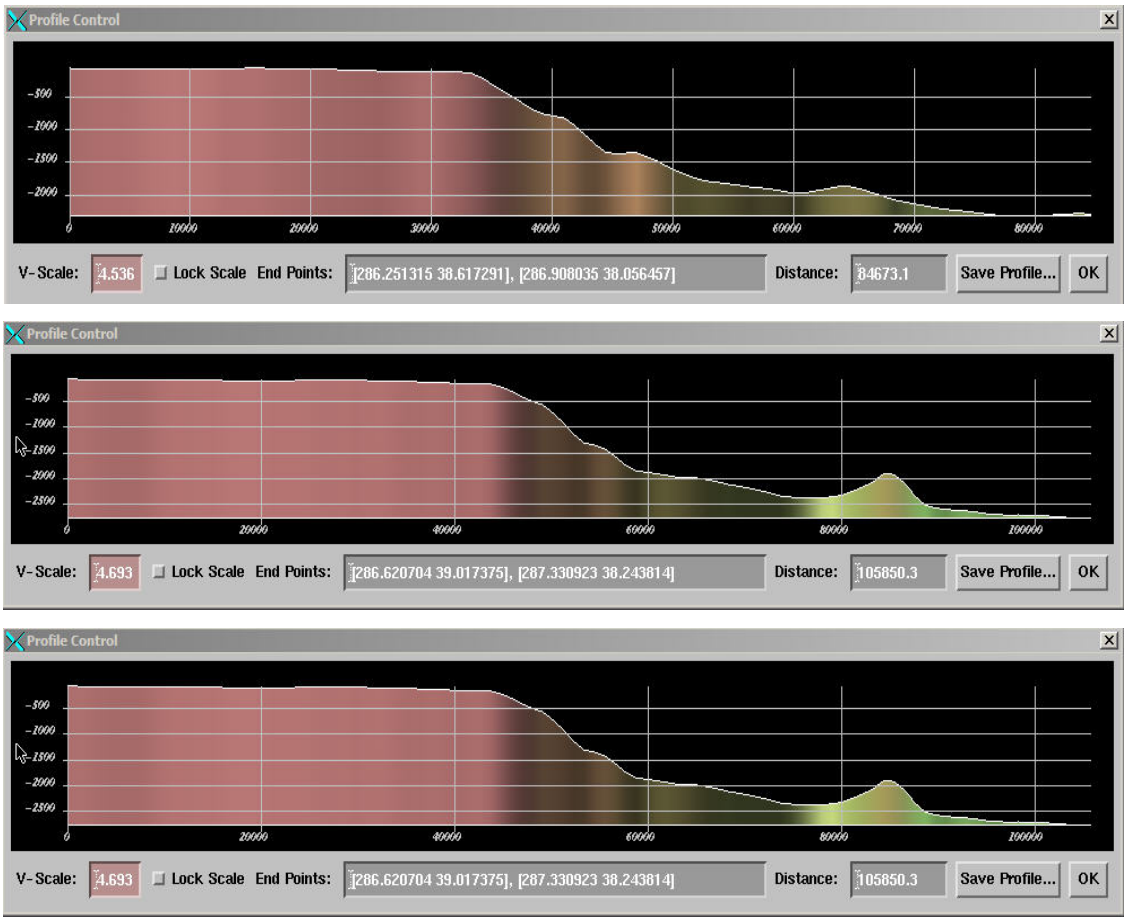


Figure (9) Ambiguity of the foot of the slope from relatively sparse single beam sonar data
(Source:L. Mayer, M. Jakobsson & A. Amstron ,"Evaluating U.S. Data Holdings" in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)

[35] *Ibid.*, p. 321.

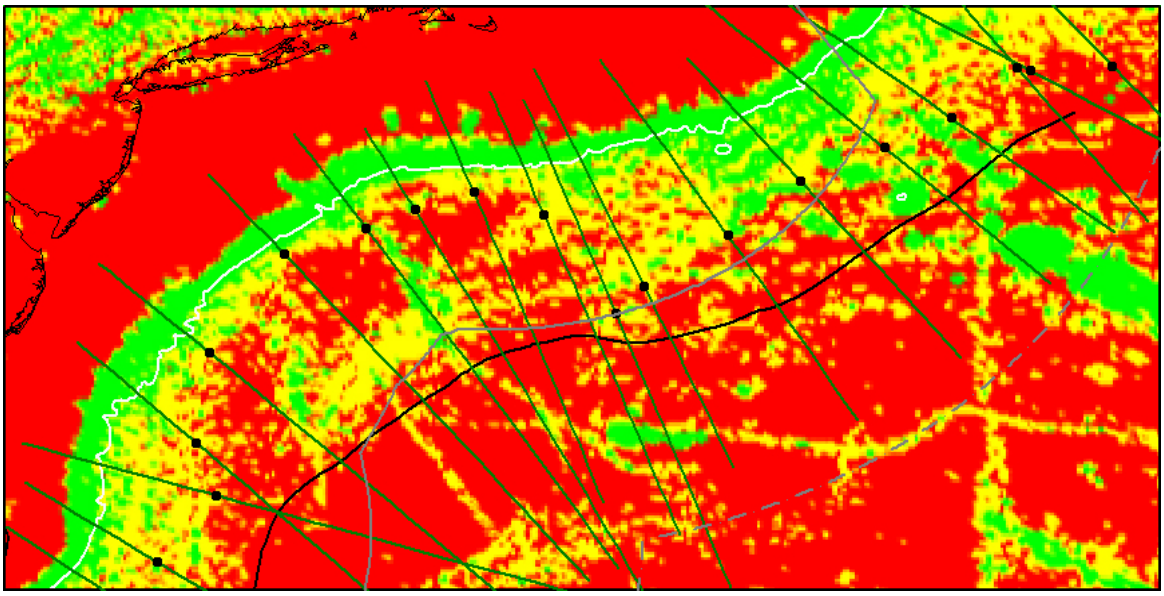


Figure (10) Maximum change of gradient at foot of the slope
(Source: L. Mayer's Presentation, The Rhodes Academy, July 2006)
Adapted from the companion CD-ROM

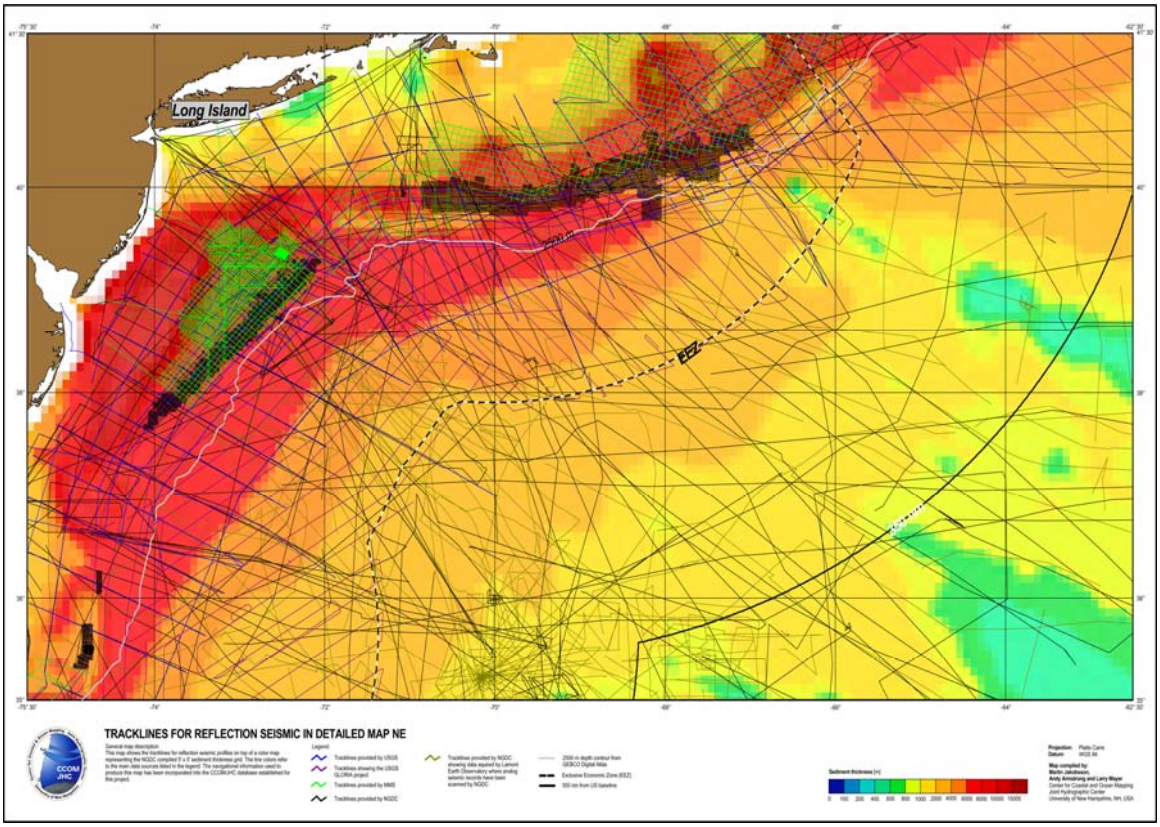


Figure (11) Seismic tacklines and sediment thickness compilation
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

v. Determination of the Foot of the Slope

A primary feature in the determination of the outer limits of the continental shelf beyond 200 M is the determination of the foot of the continental slope. Article 76 (4) (b) provides a dual regime for the delimitation of the foot of the slope. According to the Scientific and Technical Guidelines of the Commission, and as a general rule the foot of the slope shall be determined as the point of maximum change in the gradient at its base. This implies that morphological and bathymetric evidence shall be applied whenever possible.[36] See figure (10) and figure (11).

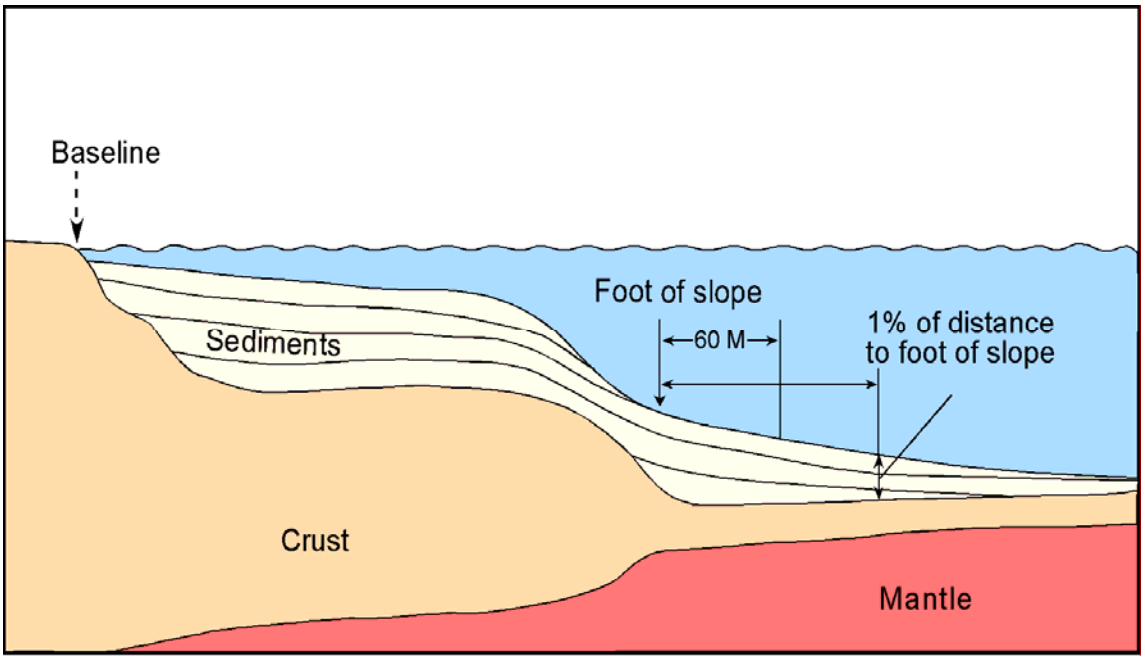


Figure (12) Sediment 1% from the foot of the slope
(Source:T. Heidar,"Legal Aspects of the Continental Shelf" in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

However, when such evidence given by the maximum change in the gradient does not, or can not, locate reliably the foot of the slope at its base, coastal States are allowed to use evidence to contrary to the general rule, which is the best geological and geophisical evidence available to them to locate the foot of the slope.[37] See figure (12).

[36] See: CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), pp. 37-42.
[37] *Ibid.*, pp. 43-49.

According to the Scientific and Technical Guidelines, the Commission invokes a principle of continuity in the application of this formula:

1. To establish fixed points a coastal State may choose the outermost location where the 1 per cent or greater sediment thickness occurs within and below the same continuous sedimentary apron; and
2. For each of the fixed points chosen the Commission expects documentation of the continuity between the sediments at these points and the sediments at the foot of the continental slope.[38]

The formula states that "in the absence of evidence to the contrary, the foot of the continental slope shall be determined as the maximum change of gradient at its base."[39] This allows considerable flexibility in the positioning of the line based on the nature of the "evidence" which could be morphological or geological in nature. "In the absence of evidence to the contrary", the definition is purely morphological and is based on geometrical concepts associated with a margin profile. The "maximum change of gradient at its base" suggests that there are several large changes of gradient, only that at the base should be chosen to determine the foot of the continental slope.[40] There are basically three types of slope:[41]

1. Slopes connecting a shallow shelf and normal deep ocean floor. These may cross terraces, ridges, canyons, etc. which give rise to rapid changes of gradient;
2. Slopes connecting a shallow shelf and extra-deep ocean floor in oceanic trenches. The region between the shelf edge and the axis of the trench may contain ridges parallel to the trench axis giving rise to several reversals of gradient in profiles; and
3. Slopes from shallow shelves to normal deep ocean floor, interrupted by areas of intermediate or shallow depth. The preliminary study indicates that examples of these types, especially of the third type, occur outside the 200-mile limit.

Furthermore, the sediment thickness criteria of the Gardiner rule for establishing the outer edge of the continental margin relative to the foot of the continental slope was introduced so that the coastal States could retain under their jurisdiction a significant

[38] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), pp. 56-67.
[39] The Convention, Article 76(4)(b).
[40] *Virginia Commentary*, Vol. II, para. 19, p. 887.
[41] *Ibid*., para. 20, p. 887.

part of the continental rise. Once again, according to this rule, the foot of the continental slope was used as the main controlling feature.[42] This means that any morphological seafloor feature around which it is possible to draw the foot of the continental slope, and which is continuous with the foot of the continental slope of the rest of the continental margin, is an integral part of that continental margin under Article 76 (4). Therefore, such seafloor features contribute to the outer edge of the continental margin since the foot of the slope is eligible to generate an outer edge of margin in accordance with Article 76 (4) (a). Consequently, it does not seem reasonable that any seabed feature that does not fall within the common evelope of the foot of the continental slope may be used as a basis for further extension of the continental margin, with the exception of the continental rise as provided by the Gardiner rule.[43] See figure (13).

vi. Determination of the Outer Limits of the Continental Shelf

Article 76 (4) of the Convention provides two options to establish fixed points which can be used to delineate the continental shelf beyond 200 M. In both cases, the starting point for establishing these points is the foot of the continental slope. Article 76 (4) provides that "the coastal State shall establish the outer edge of the continental margin wherever the margin extneds beyond 200 M". This obligation is applicable to all of the continental margin beyond 200 M. This obligation is to be implemented by applying the criteria contained in Article 76 (4) to 76 (6). Article 76 (1) establishes the right of coastal States to determine the outer limits of the continental shelf by applying either the natural prolongation criteria or the distance criteria.[44] See figure (14).

The second provison, contained in Article 76 (4) (a) (i) and (ii), subject to paragraph 5 and 6, determines the position of the outer limit of the continental margin by means

[42] Satya N. Nandan, Shabtai Rosenne and Neal R. Grandy. *United Nations Convention on the Law of the Sea- A Commentary*. Martinus Nijhoff Pubshers, The Netherlands. 1995. Vol. II, p. 878.
[43] Harald Brekke and Philip A. Symonds. "The Ridge Provisons of Article 76 of the UN Convention on the Law of the Sea." In Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). *Legal and Scientific Aspects of Continental Shelf Limits.* Martinus Nijhoff Publishers, Leiden/Bonston. 2004. pp. 184- 185.
[44] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 2.1.1, p. 9.

of a complex formula based on four rules. Two of these rules are affirmative and the remaining two are negative. The two positive rules, herein referred to as formulae, are connected through an inclusive disjuction. The inclusion of the word 'outer most' in paragraph 4 (a) (i) indicates that a coastal State is not obliged to select the point that meets the 1% criterion that is situated most landward, but may select any other point that meets the 1% criterion seaward of the most landward point.

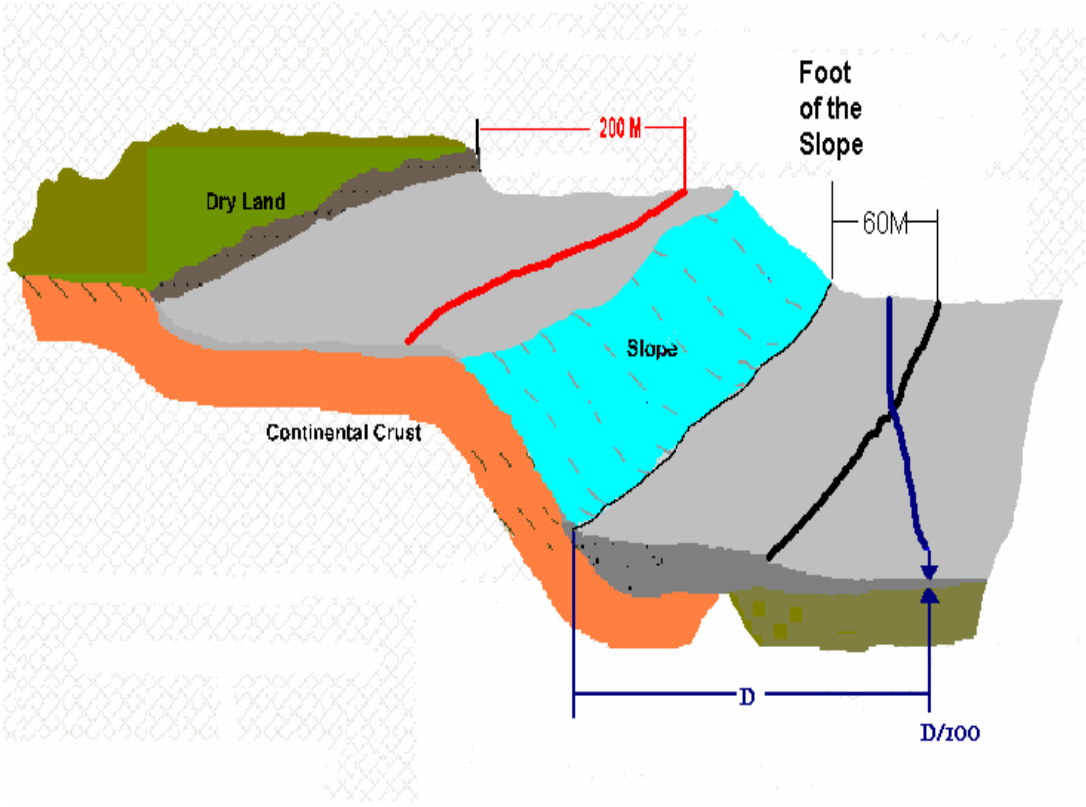


Figure (13) Foot of the Slope
(Source: D. Monahan ,"Determination of the Foot of the Continental Slope at Point of Maximum Change in the Gradient at Its Base" in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

The extent of the outer envelope formed by the lines derived from the two formulae is restricted by a line derived from the two negative rules, therein referred to as constraints, which are connected by another inclusive disjunction. According to paragraph 5, the simultaneous application of these two constraints defines the outer limit beyond which an extended claim can not be made. Thus, the outer limits of the continental shelf can extend either beyond a line delineated by reference to fixed points at a distance of 350 M from the baselines from which the breadth of the

territorial sea is measured, or beyond a line delineated by reference to the points at a distance of 100 M from the 2,500 metre isobath, but not both.[45] Myanmar shall apply the method of delineating the outer limits of its continental shelf by reference to the points at a distance of 100 M from 2500 metre isobth.

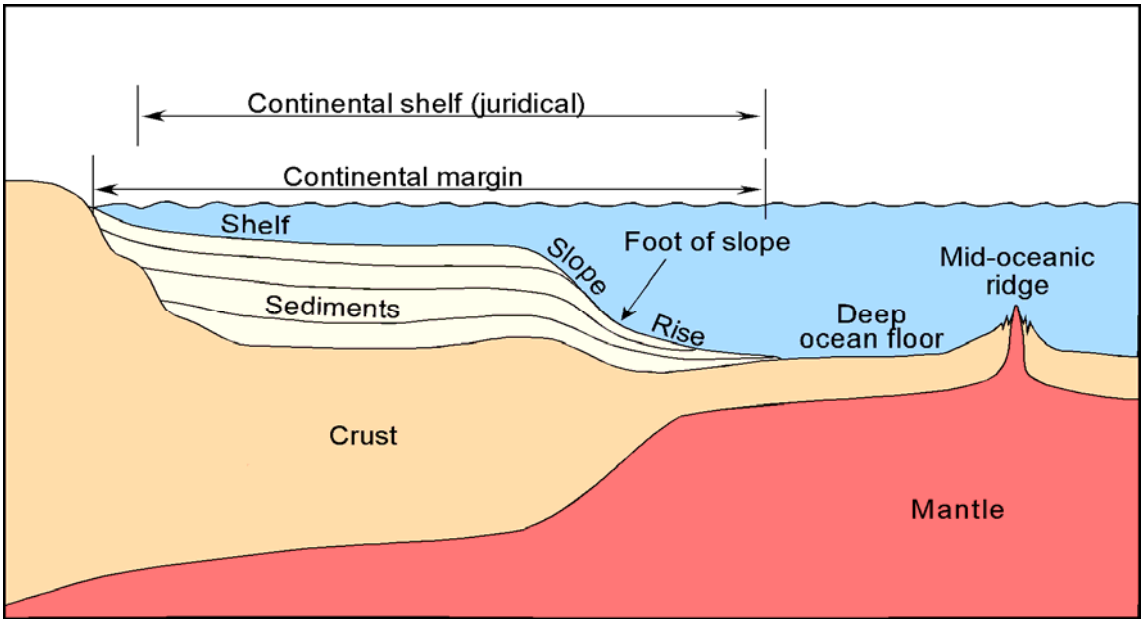


Figure (14) Determination of the Outer Edge of the Continental Margin
(Source: Tomas H. Heidar "Legal Aspects of Continental Shelf Limits" in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

Article 76 contains a complex combination of four rules, two formulae and two constraints based on concepts of geodesy, geology, geophysics and hydrography.[46] The legal limit line consists of two offshore construction lines: the 200 M line and the treaty line (both "treatied" and "hypothetical"). Projecting a geodetic line 200 M seaward from the baseline produces the 200 M legal limit line. This line is also referred to as the 200 M EEZ, which represents the mimimum seawards distance a coastal State may claim. There will be one or several neighbouring and or opposing coastal States that will involve existing "treatied" limits to be in place. It will be necessary to compute "mathematical" hypothetical treaty limit lines for those neighbouring and or coastal States where the boundaries currently remain

[45] *Ibid*., para. 2.1.4, 2.1.7, 2.1.10, pp 10- 11.
[46] *Ibid*., para 2.3.1., p.13.

unresolved.[47] The two limit lines that make up the constraint line are: the 350 M line and the 2500 m Isobath plus 100 M line. Similar to the 200 M line, projecting a geodetic line 350 M seaward from the baseline produces the 350 M line. The 2500 m Isobath plus 100 M line is produced by projecting 100 M seaward from the 2500-metre depth isobath line, which is produced using bathymetric data. The formulae line (also referred to as the "combined formula line") delineates the calculated outer limit of the continental shelf as defined by the Article 76. Like the constraint line, the formulae line is computed using a composite of two individual limit lines determined from individual independent data sources. The two limit lines that make up the formulae line are the Distance Formula Line (FOS plus 60 M line) and the Gardiner Formula Line (Sediment 1% line). [48]

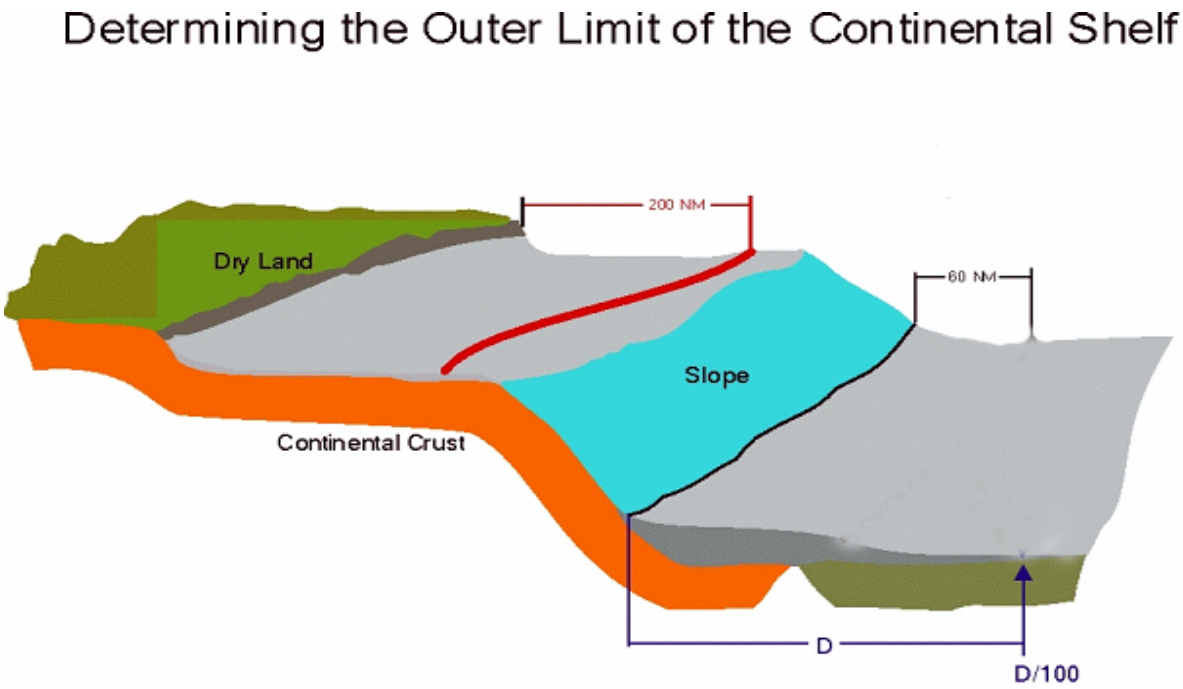


Figure. (15) Distance Formula Line and Gardiner Formula Line
(Source: L. Mayer's Presentation, The Rhodes Academy, July 2006)

The Distance Formula Line is created by first defining the "foot of the continental slope points" (FOS points). These are computed interactively by software through mathematical analysis of available bathymetric data sources. Following this, the

[47] Robert van de Poll. "The Completion of an Article 76 Deskstop Study Using Currently Available Data Sources." In *Legal and Scientific Aspects of Continenal Shelf*. Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (ed.). Koninklijke Brill NV, Leiden, The Netherlands,. 2004. p. 339.
[48] *Ibid.*, p. 340.

distance formula line is generated by connecting the results of the individual FOS points and projecting the resulting line 60 M seaward using the geodetic buffering routine available within the sofeware. This resuling “envelope of Arcs” line is the distance formula line. The Gardiner Formula Line is computed interactively within the software using available seismic sediment-thickness data sources from which 1% sediment thickness markers are computed. See figure (15). Connecting these markers together by straight line segments produces the Gardiner Line. This resulting line is a point-to-point line, and will remain so for the creation of the formulae line. Establishing the outer-limit line is an interactive procedure that involves establishing a preliminary outer-limit line, and then selecting a set of outer markers. In turn, these outer-line markers will be closely reviewed to determine whether any further improvements can be made to these preliminary results. The preliminary outer-limit line represents the most seaward components of the combined results of the produced constraint line and the formulae line, respectively. These contributing points must not be more than 60 M apart. The constraint line (also referred to as the “cut-off line”) consists of the relults of the combination of the following two limits lines, and by taking the seaward-most segments of the two individual lines. This is the maximum seaward limit that a coastal State can claim as its outer limit boundary. Its use as the outer limit will be directly determined by the results of the formulae line.[49] See figure (16).

[49] *Ibid*., pp. 340-341.

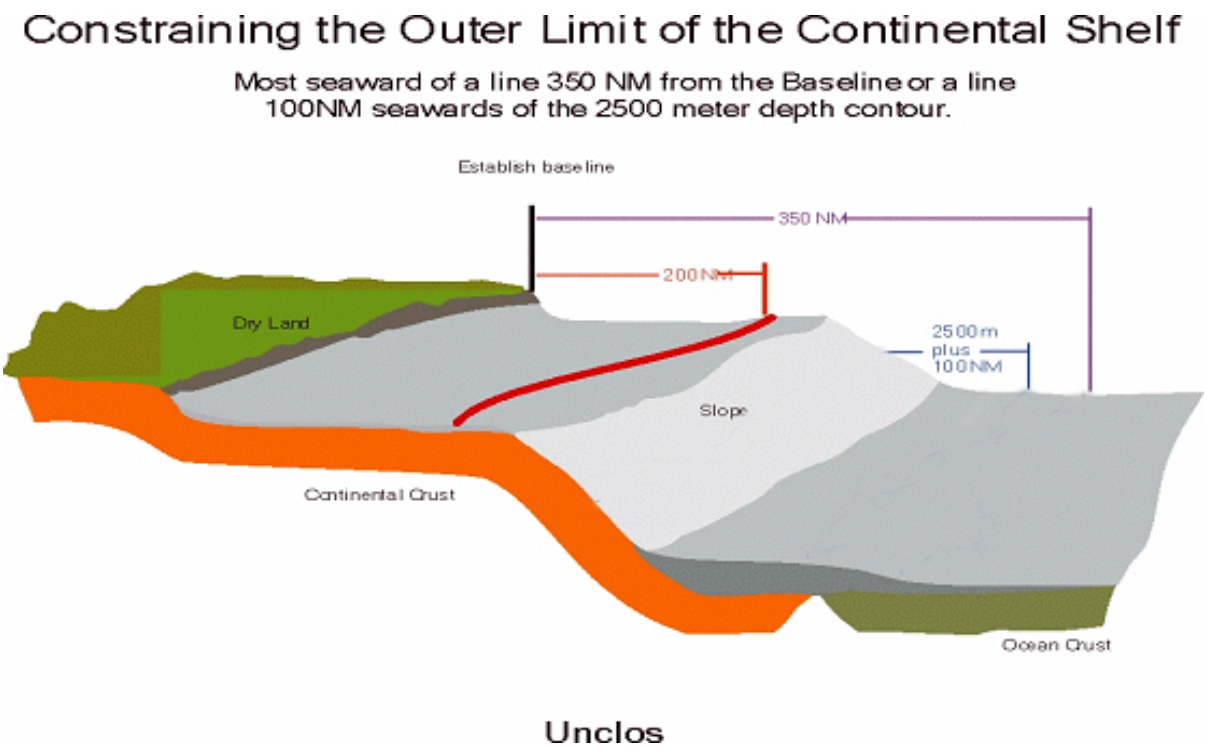


Figure. (16) Constraints Lines (Cut-off lines)
(Source: L. Mayer's Presentation, The Rhodes Academy, July 2006)

B. Commission on the Limits of the Continental Shelf and It's Mandate

i. Commission on the Limits of the Continental Shelf

1. Establishment of the Commission

The Commission on the Limits of the Continental Shelf was established in accordance with the provisins of Article 76 of the Convention and its Annex II. Annex II is compsed of Articles and it convers the Commission's functions and mandate. The Commission consists of 21 members who shall be experts in the fields of geology, geography or hydrography and elected by States Parties to the Convention from among its nationals. The members of the Commission are required to ensure equitable geographical representation and serve in their personal capacities. The term of office of the member of the Commission is five years and members are

eligible for reelection. Not less than three members shall be elected from each geographical region.[50]

2. Functions and Competence of the Commission

Article 3 of Annex II to the Convention sets forth the functions of the Commission. This provisions stipulate that these functions are concerned with the consideration of scientific and technical data and other material submitted by coastal States concerning the outer limits of the continental shelf, and to make recommendations to coastal States on matters related to the establishment of the outer limits of the continental shelf. Although the functions of the Commission are concerned with the assessment of scientific and technical data, this assessment has to be carried out "in accordance with Article 76 of the Convention".[51] In order to make recommendations to coastal States, the Commission has to make an independent evaluation of the submissions of coastal States in respect of the outer limits of their continental shelf.[52] The Commission has to be presumed to be competent to deal with issues concerning the interpretation or application of Article 76, or other relevant Articles of the Convention to the extent this is required to carry out the functions which are explicitly assigned to it.[53] This function includes an assessment of the question whether the information that has been submitted to the Commission recommends that the conditions set out in Article 76 are actually met by the coastal States for the specific outer limit lines it proposes. At times, this may involve a choice between different interpretations of specific provisions of Article 76. The Commission will have to make its own assessment of whether the interpretation a coastal State has implicitly adopted in its submission actually is in accordance with Article 76.[54] The

[50] The Convention, Annex II, article 1 and 2.
[51] The Convention, Annex II, article 3 (1) (a). The Commission, in making recommendations, shall also do this in accordance with the Statement of Understanding adopted on 29 August 1980 by UNCLOS III. In addition, the Commission is instructed that its actions shall not prejudice matters relating to the delimitation of boundaries between States. The Convention, Annex II, Article 9.
[52] See: The Continental Shelf (6 May 1975), foot note to article 1, para. 5. Reproduced in Platzöder. *Third United Nations Conference on the Law of the Sea: Documents* (18 Volumes). Ocean Publications, Dobbs Ferry. 1982-1988. Vol. XI, p. 501.
[53] See: United Nations. Reparation for Injuries Suffered in the Service of the United Nations. Advisory Opinion of 11 April 1949; and [1949] ICJ Reports 174, pp. 180-182.
[54] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999); CLCS/11/Add.1, 3 September 1999; CLCS/11/Corr.1, 24 February 2000, paras. 6.2- 6.4.

competence of the Commission does not replace the competence of States Parties to interpret the Convention.[55]

The requirement that the competence of the Commission to interpret Article 76 and other provisions of the Convention have a number of consequences. The Commission should not interpret these provisions in such a way that this place additional obligations on coastal States. On the other hand, neither should the Commission reduce the obligations resting on coastal States under the Convention. Secondly, the Commission should accept a reasonable interpretation of relevant provisions of the Convention provided by the coastal States making a submission. If the Commission considers that the interpretation of the coastal State can not reasonably be considered to be in accordance with the Convention, the Commission may make recommendations accordingly.[56]

The competence of the Commission is not to be interpreted restrictively as far as the evaluation of scientific and technical data submitted by the coastal State is concerned. The Commission has the function to make an independent assessment of the scientific and technical data submitted by a coastal State. This implies a power to establish whether the scientific and technical data submitted by a coastal State prove that the conditions which allow the specific delineation of the outer limit of the continental shelf are met.[57]

[55] In this connection, it should be noted that the assessment of scientific and technical data, which is one of the functions of the Commission, has to be distinguished from the interpretation of scientific and technical terms in connection with the interpretation of provisions of Article 76 of the Convention. A number of terms included in the Convention have been derived from the field of natural sciences. This fact does, however, not place their interpretation beyond the legal realm. The general rules on the competence of the Commission to interpret provisions of the Convention are applicabel to this case.

[56] The consideration of a submission by the Commission allows for an exchange of views with the submitting State. Such an exchange of views may contribute to identifying and addressing differences concerning the interpretarion or application of the Convention.

[57] This concerns the questions whether: a) the scientific and technical data submitted by the coastal State actually support the conclusions which are drawn from them (e.g. do submitted data indicate the existence of a specific sediment thickness); and b) these conclusions are in accordance with Article 76 (e.g. when the data indicate that the sediment thickness at a specific point is 0.5% of the shortest distance of the foot of the slope, the specific point can not be used to establish the outer limit of the continental shelf beyond 200 nautical miles.)

3. Rule of Procedure

The Rules of Procedure[58] and the Scientific and Technical Guidelines of the Commission provide an interpretation of provisions of the Convention. To assess to what extent provisions contained in the documents adopted by the Commission carry legal conquences for States Parties to the Convention a threefold distinction has to be made between rules on the internal procedure of the Commission, the consideration of scientific and technical data by the Commission and the interpretation of substantive provisions of the Convention.[59] The Commission is competent to establish the rules applicable to its own internal procedures.[60] Such rules have to be complied with by States in their dealings with the Commission. Such rules can only be objected against on the ground that the the Commission has overstepped the limits of its compentence or that these rules are invalid for other reasons.[61]

Article 76 (8) of the Convention provides that the outer limits established "on the basis of" the recommendations of the Commission shall be final and binding. The Commission is "to make recommendations in accordance with Article 76 and the Statement of Understanding adopted on 29 August 1980 by the Third United Nations Conference on the Law of the Sea".[62] Furthermore, Article 7 of Annex II states that the coastal State is to act "on the basis of" the Commission if it establishes the outer limits of the continental shelf beyond 200 M indicates that it can not establish these outer limits on the basis of information that has not been considered by the Commission.[63] The Convention does not entrust the Commission with a role in respect to the process of establishing the outer limits of the continental shelf once it has issued its recommendations and the coastal State

[58] CLCS Rules of Procedure (CLCS/40, July 2004).
[59] This section discusses this matter in general terms. In addition, in looking at the status of a specific provison, it will be necessary to look at the practice existing in its respect. A provision in itself whould not have been binding on States may become so due to their practice.
[60] See: Ramcharan. p. 57.
[61] See: R. Bernhardt. "*Ultra Vires* Activities of International Organizations." In J. Makarczyk (ed). *Theory of International Law at the Threshold of the 21st Century: Essays in Honour of Krysztof Skubiszewski*. Kluwer Law International, The Hague. 1996. pp. 599-609; and K.H. Kaikobad. *The International Court of Justice and Judicial Review*. Kluwer Law International, The Hague. 2000. p. 36.
[62] The Convention, Annex II, Article 3 (1) (a).
[63] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 15.

does not make a new or revised submission. The Commission is not competent to assess whether a coastal State has establish the outer limits of the continental shelf "on the basis of" its recommendations.[64] The coastal State is under an obligation not to change an outer limit line which has become final and binding.[65] Article 76 (9) of the Convention provides that the coastal State shall deposit charts and relevant information with the Secretary-General of the United Nations, permanently describing the outer limits of its continental shelf.[66] This deposit signifies the completion of the process of establishment of the outer limits of the continental shelf beyond 200 M by the coastal State, and these limits are from that moment final and binding on the coastal State, unless they are challenged by other States Parties to the Convention and this challenge is successful.[67] The provisions of Article 76 (10) of the Convention precludes an outer limit line becoming final and binding in an area where a continental shelf claim of another State exists.[68]

The view that the term 'outer limits' in Article 76 (9) only concerns the outer limits beyond 200 M is supported by a number of arguments. The acceptance that Article 76 (9) is applicable to all of the outer limits of the continental shelf would mean that Article 84 (1) has no known application as far as the reference to the outer limit lines of continental shelf are concerned. A consequence of permanently fixed 200 M limit of the continental shelf is that it could lead to non-coincident outer limits for water-column and seabed jurisdiction, as the outer limit of the exclusive economic zone established by the coastal State does not become permanent, but may shift if the baseline from which it is measured changes.[69]

---

[64] Ted.L. McDorman. "The Role of the Commission on the Limits of the Continental Shelf: A Technical Body in a Political World." In *International Journal of Marine and Coastal Law* 17. p. 315.

[65] This inclusion is confirmed by Article 76 (9) of the Convention, which provides that the coastal State shall deposit charts and relevant information with the Secretary-General of the United Nations *permanently* describing the outer limits of its continental shelf.

[66] The English text of Article 76 (9) refers to 'outer limits' in Articles 76 (8) and 76 (9), the French, Russian and Spanish texts refer to 'outer limits' in Article 76 (8) and 'outer limit' in Article 76 (9). The different language texts also differ in their use of the term outer limits in other instances. For instance, the Spanish text of Aricle 84 (1) also refers to outer limit in the singular and the English text of Article 84 (1) refers to 'outer limit lines of the continental shelf'.

[67] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 15.

[68] On the implication of Article 76 (10).

[69] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 17.

Once a coastal State has established the outer limits of its continental shelf in conformity with Article 76 (8) it has to deposit information on these limits with Article 76 (9). However, the possibility can not be excluded that a coastal State deposits information on outer limit lines that have not been considered by the Commission, or outer limit lines that have not been established on the basis of the Commission's recommendations. Under Article 76 (9), the Secretary-General is not authorized to review the information deposited by the coastal State.[70] On these considerations, it is submitted that the inclusion of the term 'permanently' in Article 76 (9) does not necessarily mean that the limits of the continental shelf become permanently fixed by the mere fact that the coastal State has deposited the required information. If other States do not protest outer limit lines that have not been established in conformity with Article 76 (8), such outer limit lines may eventually become permanently fixed.[71] Article 76 (9) has to be interpreted in light of Article 76 (10). The deposit of information under Article 76 (9) is without prejudice to the delineation of the continental shelf between States.[72]

Article 76 (10) of the Convention provides that the provisions of Article 76 are "without prejudice" to the question of the delimitation of the continental shelf between States with opposite or adjacent coasts. This provision confirms that Article 76 is concerned with entitlement to, and the establishment of, the outer limits of the continental shelf and not the delimitation of overlapping entitlements between neighbouring States, which is addressed in, Article 83.[73] The implications of Article 76 (10) are addressed in, of the Rule 46(1) of Procedure of the Commission provides:

> In case there is a dispute in the delimitation of the continental shelf between opposite or adjacent States or in other cases of unsolved land or maritime disputes, submissions may be made and shall be considered in accordance with Annex I to these Rules.

[70] Ted.L. McDorman. "The Role of the Commission on the Limits of the Continental Shelf: A Technical Body in a Political World." In *International Journal of Marine and Coastal Law* 17. p. 316.
[71] *Ibid*., p. 317.
[72] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 18.
[73] Myron H. Nordquist. (general ed). *United Nations Convention on the Law of the Sea 1982; A Commentary* (6 Volumes). Martinus Nijhoff Publishers, Dordrech/The Hague. 2000. Vol. II, p. 883.

Paragraph 5 of Annex I of the Convention provides that the Commission will not consider and qualify a submission in a case where a land or maritime dispute exists unless all States that are parties to the dispute have given their prior consent. The submision before the Commission and its recommendations shall not prejudice the position of States which are parties to the land or maritime dispute.[74] In order to assess the implications of paragraph 5 of Annex I, it has to be considered in light of the relevant provisions of the Convention. In acting on the provisions contained in Annex I to the Rules of Procedere, States Parties to the Convention:

> shall fulfill in good faith the obligations assumed under this Convention and shall exercise the rights, jurisdiction and freedoms recognized in this Convention in a manner which would not constitute an abuse of right.[75]

Article 8 of Annex II of the Convention provides that the coastal State, in the case of disagreement with the recommendation of the Commission, shall make a new or revised submission. The rules generally applicable to submissions are also applicable to a new or revised submission. Following "a new or revised submission", the Commission will consider it and issue its recommendations to the coastal State, which can either agree with the recommendations or remain in disagreement. In the latter case, the caostal State can again avail itself of its right to make a new or a revised submission. Although this process can, in theory, continue without end, it is to be expected that a disagreement between the coastal State and the Commission can not be resolved after the first revised or new submission.[76] The Convention does not indicate how such a difference is to be resolved. The coastal State is to fulfill the obligations assumed under Article 76 in good faith.[77] If a coastal Sate is considering making a new or revised submission, it has to consider in good faith the recommendations of the Commission. The coastal State is to decide the consequences of such a consideration for its new or revised submission. A coastal State may

[74] CLCS Rules of Procedure, Annex I, para. 5(b).
[75] The Convention, Article 300. A number of States which are not a Party to the Convention have provided observations on submissions. Although Article 300 is not directly applicable to these States, in exercising a right to comment on a submission they must be considered to bound by the same conditions for its exercise as States Parties to the Convention (see: Vienna Convention, Article 36).
[76] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 22.
[77] The Convention, Article 300.

conclude not to revise the outer limit lines or their justification contained in its original submission and set out the reason why its does not bring them in line with the recommendations of the Commission. An obligation for the coastal State to accept the recommendations of the Commission would make the recommendations binding on the coastal State, an effect that is not envisaged under the Convention. The Commission is not obliged to accept the outer limit lines contained in a new or revised submission if it considers that these are not established in accordance with Article 76. The dispute settlement procedures entailing binding decisions under Part XV of the Convention are not available to reslove such a difference. The Commission does not have standing to be a party to such procedures.[78]

ii. Data Requirements for Submission to the Commission

1. Echo-Sounding and Seismic Profiling

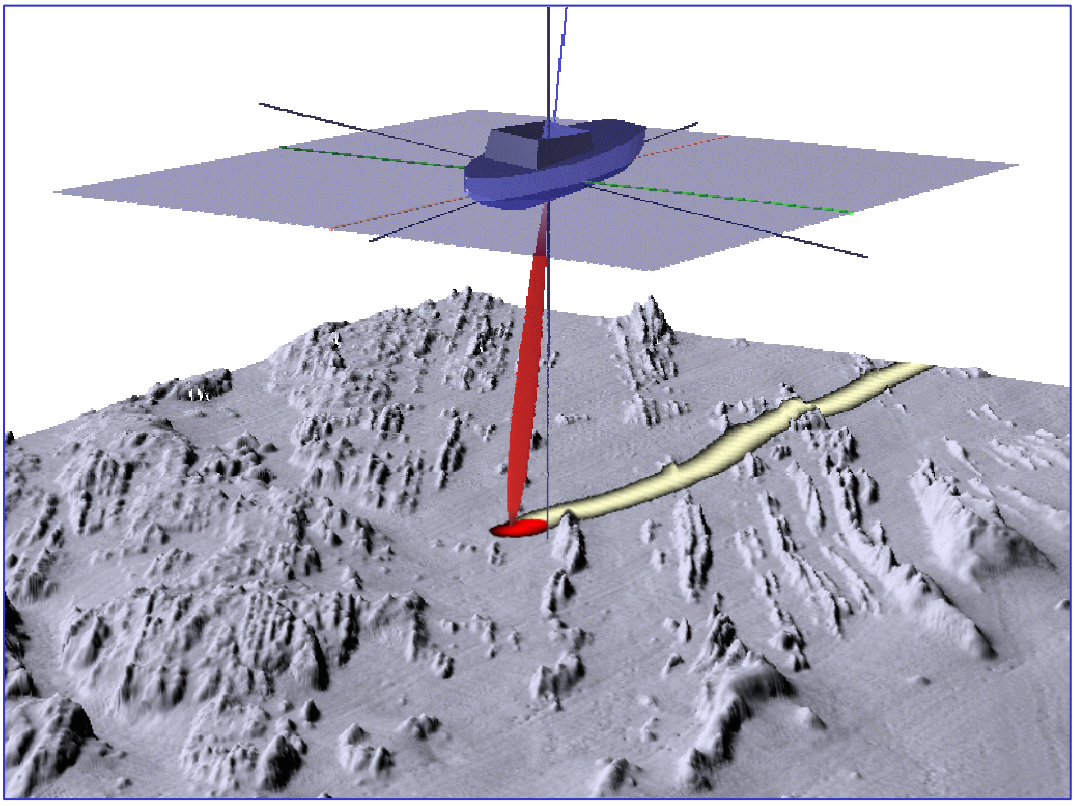
These are a cross section of the seafloor as measured by the instrument along the track, followed by the ship, and recorded digitally or in analogue form. The latter have different horizontal and vertical scales, usually with a large vertical exaggeration. Their capability to resolve individual features in deep water, like the foot of the slope, will be subject to the limits inherent in the "beam width" effect of the instrument. Beam width refers to the spreading out of sound as it travels through the water column so that it intersects the seafloor over an area, not at a point. This can limit the profile's ability to detect small features, particularly with older wide-beam echo sounders.[79] See figure (17).

In effect, the ensonified area acts like a spatial filter, smoothing out any features of that size or smaller. Since this effect will vary with the age and model of the sounder, it may make a feature detected on a narrow beam sounder difficult to trace onto adjacent profiles measured with a wide beam sounder. Profiles can be examined to

[78] The Convention, Article 279.

[79] Dave Monahan. "Determination of the Foot of the Continental Slope as the Point of Maximum Change in the Gradient at Its Base." In *Legal and Scientific Aspects of Continental Shelf Limits*. Myron H. Nordquist, Jhon Norton Moore and Tomas H. Heidar (eds). Koninklijke Brill Nv, Leiden, The Netherlands. 2004. p. 100-101.

pick changes in gradient using a number of techniques. These may be interpreted as the base or the foot of the slope and possibly correlate from one profile to the next. One record alone is unlikely to prove sufficient, but if a similar feature occurs on adjoining traces, it is more likely that the feature is continuous between them. Candidate points can be selected (and there may be more than one per echogram) and plotted to help determine continuity between the possible points. Continuity does not guarantee that the points chosen represent the foot of the slope, but strong continuity is a major contributing factor. An echo sounder profile is as original a piece of data as possible, one that the Commission may be influenced by in a submission. Echo sounder profiles have been the major data constituent of bathymetric maps in the past, but are slowly being replaced by multibeam data. See figures (18) and (19).[80]



Firgure (17) Single beam echo-sounder
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

[80] *Ibid.*, p. 102.

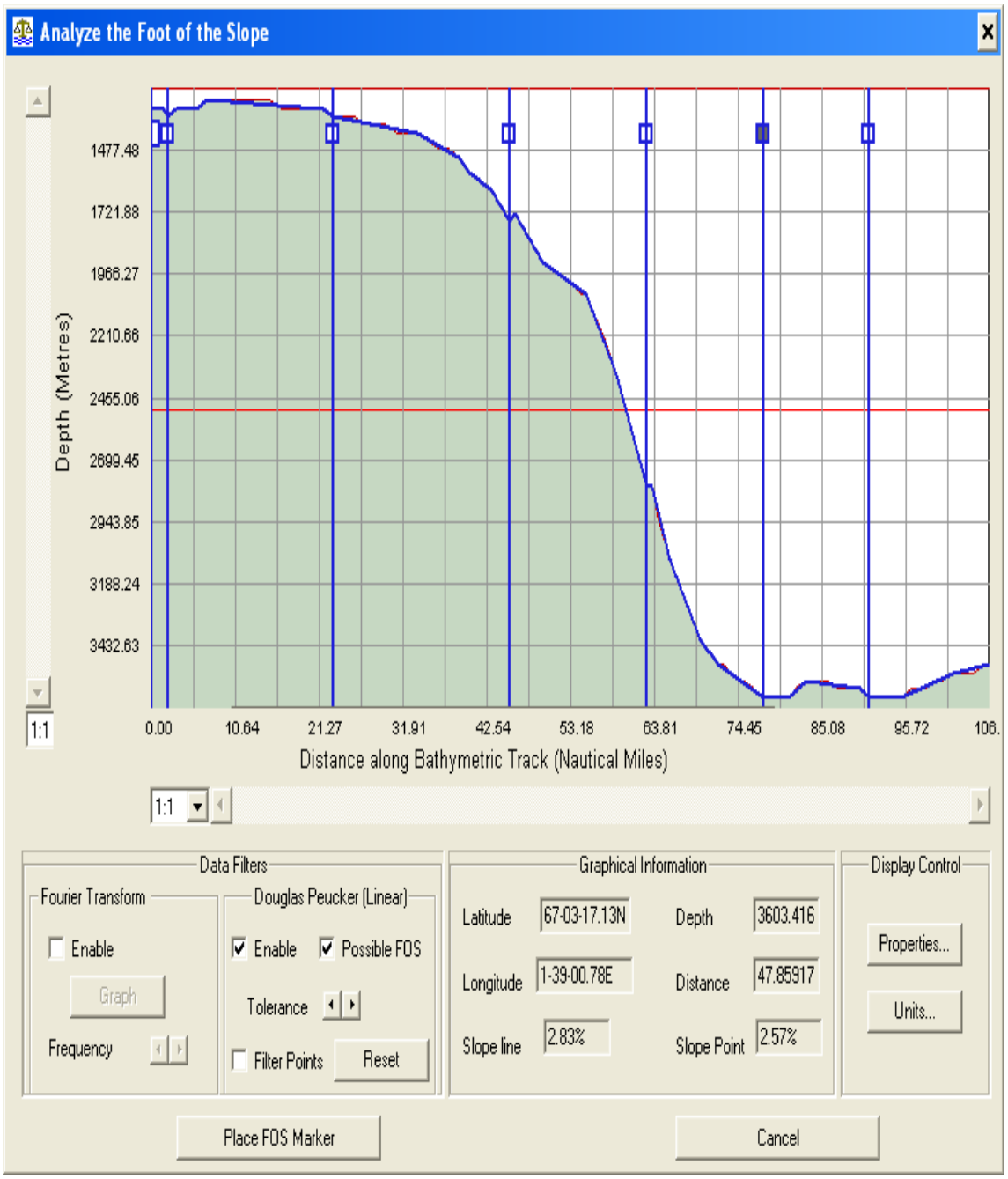
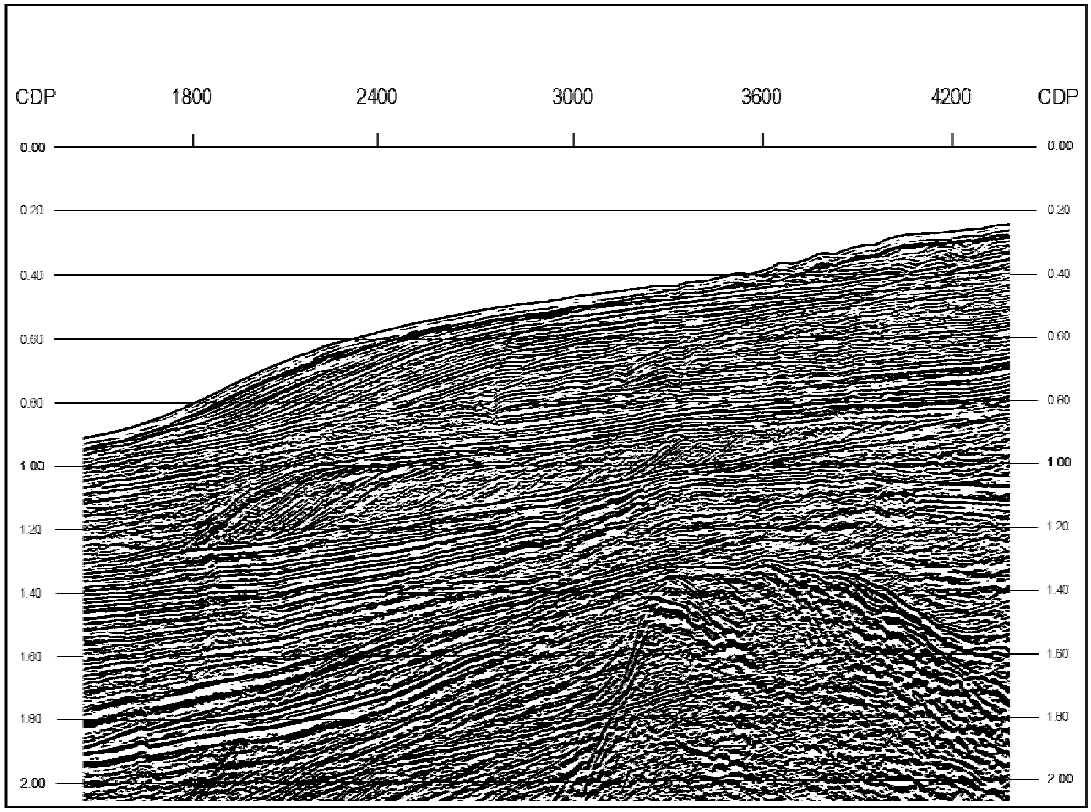


Figure (18) Seismic profiling
(Source: Harald Brekke, Member of the Commission)
Adapted from the companion CD-ROM



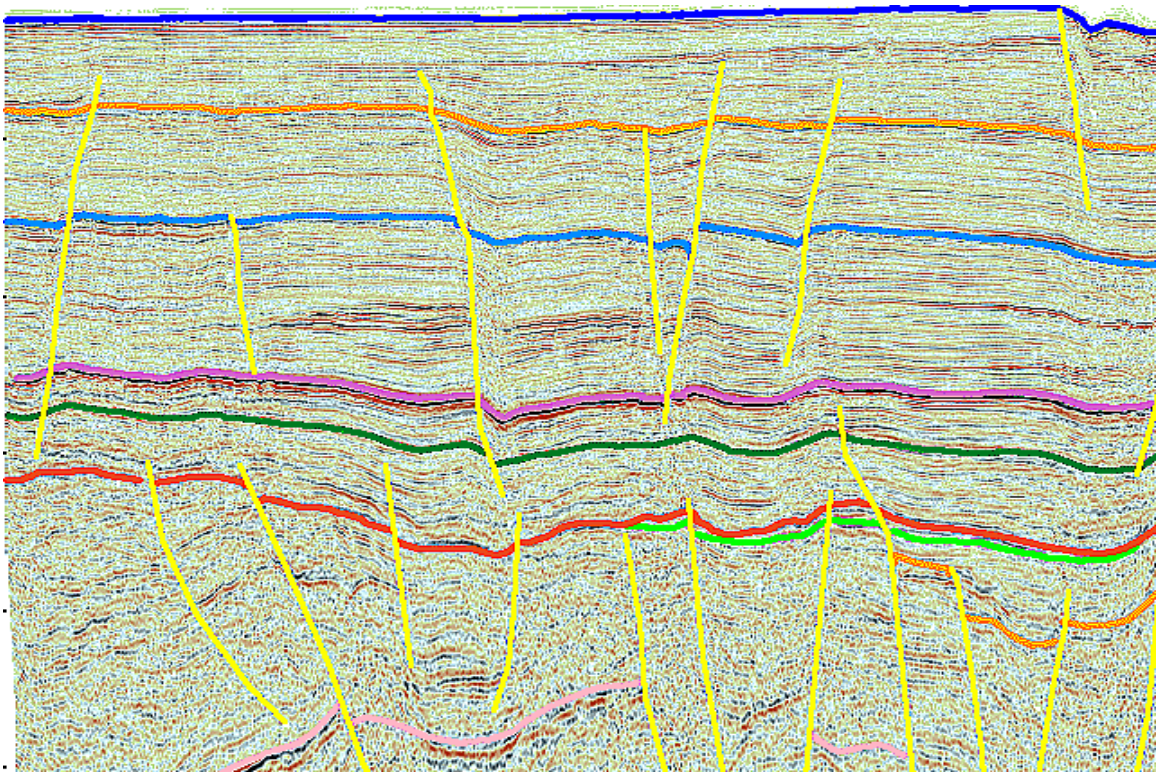


Figure (19) Seismic profiling
(Source: L. Mayer's Presentation, The Rhodes Academy, July 2006)

2. Contoured Bathymetric Maps

Most existing bathymetric maps are an excellent tool to use in a preliminary investigation. On bathymetric maps, gradients are steeper where contours are closer together, and are less steep where contours are further apart, provided that the contour interval is the same. The base of the slope zone may in theory be shown as the region where the more closely spaced contours of the slope give way to those wider apart depicting the rise or the abyssal plain. In places, the base of the slope may be identified as lying between adjacent contours. The uncertainty in the location of the foot of the slope is then half the horizontal distance between the straddling contours. However, since the horizontal scale of bathymetry maps covering the slope and rise is usually quite small, with 1: 1,000,00 being the best, and 1:10,000,000 being more usual, horizontal measurements between contour lines can not be very accurate. Nevertheless, the utility of contour maps is that they permit some horizontal continuity of the base of the slope zone to be established. Although this zone does not have to be constrained to lie everywhere between the same pair of adjacent contours, it is highly unlikely that it will make large vertical deviations over short horizontal distanes. In some areas, then, contour maps may in fact identify the base region as well as it can be defined, and as well as it needs to be defined. However they are generally too crude to *demarcate* the foot of the slope.[81] See figure (20).

[81] *Ibid*, p. 103.

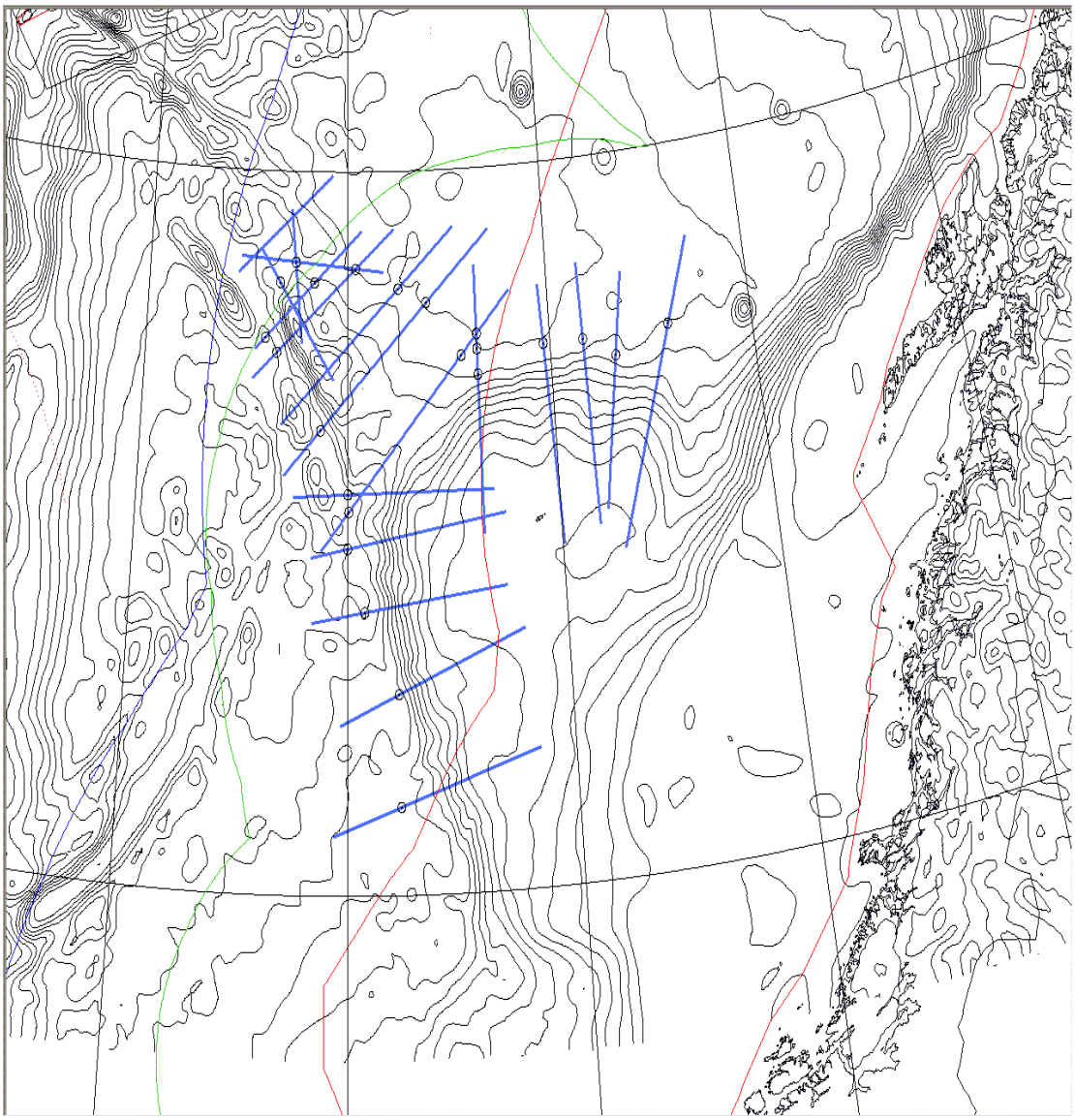


Figure (20) Continental Margin delineation bathymetric map
(Source: Harald Brekke, Member of the Commission)

3. Multi-Beam Surveys

Multibeam surveys and the maps derived from these are far more detailed than are contour maps constructed from single beam echo sounders, providing virtually complete coverage as well as a much finer resolution. Since they use a much smaller beam width than single beam echosounders, their footprint ensonifies a considerable smaller area so that smaller features can be resolved. Data density is usually homogeneous, i.e. the same in all directions. While this resolution is

clearly an advantage over single beam in delineating the 2500 m contour, in places Multi-Beam Echo Sounder data may prove to be too detailed to isolate one single feature such as the foot of the slope, out of the several changes of slope that it reveals. The other disadvantage of this type of data is that there is not yet much coverage available on a worldwide scale.[82] See figure (21).

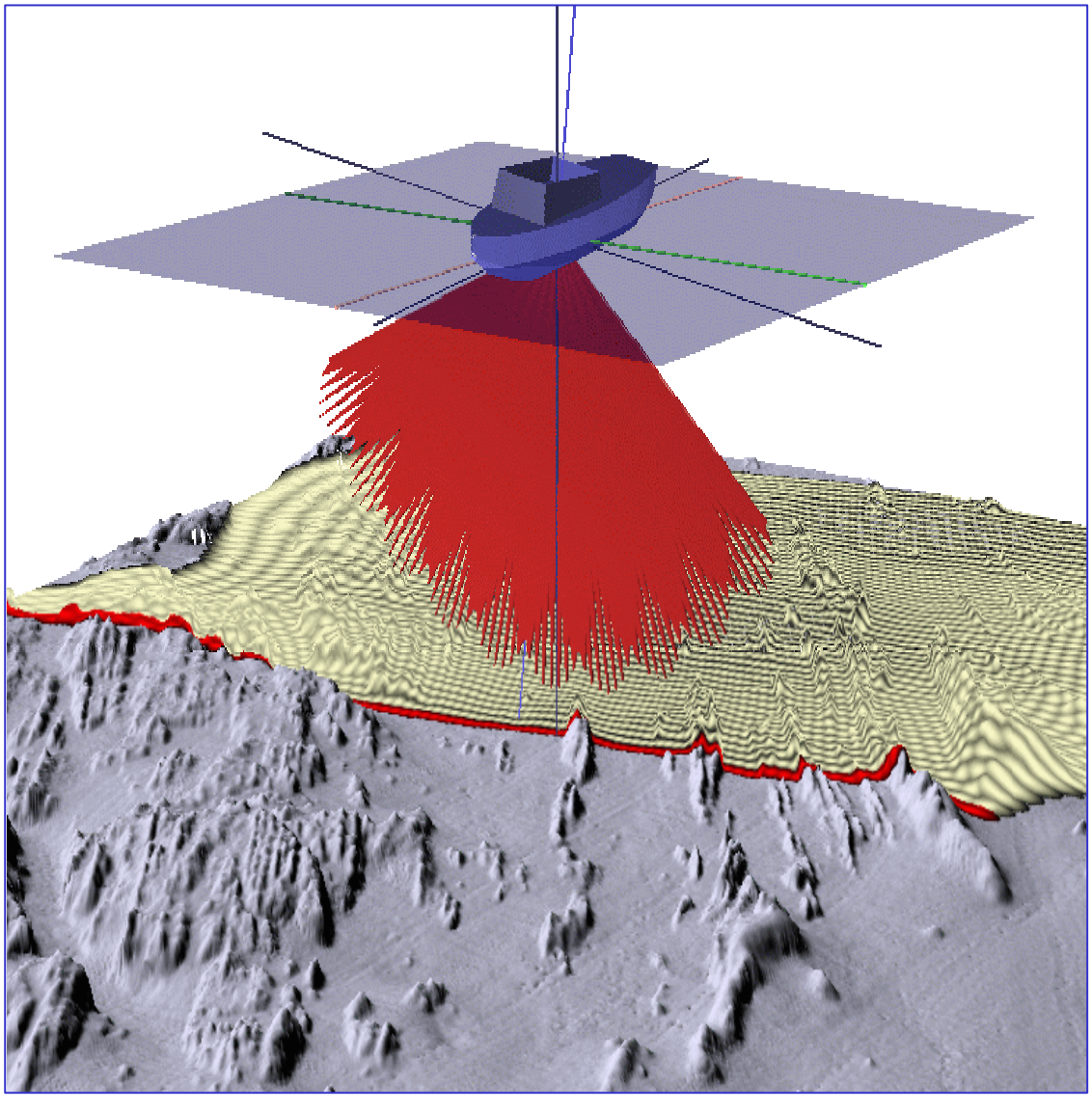


Figure (21) Multi beam echo sounder
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD-ROM

[82] *Ibid.*, p. 104.

Making a grid involves numerous calculations using the original measured data to calculate the depth at each desired grid intercept. Factors that go into the calculation of grid values include: number of real soundings to be included in each calculations; contribution of distance from grid point to real soundings; importance of islation or clustering of real soundings; and method of curve-fitting to real soundings and candidate grid point. Grids can also be constructed from contour maps, meaning they are at least one step further removed from the original data, but benefit from the interpretation that went into producing the contours.[83] In this case, the values of nearby contours, rather than soundings, contribute to the calculated grid. Grid size must be selected with care by both the constructor and the user. Size must be based on what the data will support. Although it is possible to calculate grid values at very small spatial intervals, the utility of those values will be small if they are based on data at a much greater spacing. There is also a risk of aliasing, which is the introduction of false wavelengths due to grid spacing, which must be accounted for. Users must be aware that a regular grid is not necessarily one with the same sounding spacing in both directions: a "one-minute" grid, i.e. one minute of latitude and longitude, will have constant spacing of 1.85 km north/south but an east/west spacing that diminishes with increasing latitude. These factors must be evaluated carefully when the grid is being used, as the scale at which the results of operations can be shown depends on them. Multibeam sounders avoid the additional steps of gridding since they produce a data set that under ideal conditions is a regular grid, and under poor conditions does not depart significantly from one.[84]

[83] Goodwille, A.M. "Producing Gridded Databases Directly From Contour Maps." Reports SIO References Series No. 96-17. Scripps Institution of Oceanography, La Jolla. 1996; and *User Guide to the GEBCO one minute grid*. In IOC, IHO, and BODC. 2003; and *Centenary Edition of GEBCO Digital Atlas*. British Oceanographic Data Centre, Liverpool. 2003.
[84] Note 82, p. 105

5. Satellite Altimetry

Satellite altimetry is a recent development that maps long, horizontal wavelength features of the morphology of the seafloor.[85] The Commission considers it admissible as supporting information in a submission. Existing altimetry bathymetry can be used in the early stages of developing a plan on the likely area to be included in a continental shelf submission and what data may be needed to substantiate it. During the interpretation stage of acoustic data, altimetry can be used as a quality control device to assess the accuracy of the ship sounding data and to infer morphologic trends between them. This will be particularly useful where the predicted data identifies features between existing sounding lines that have not been detected or whose most seaward extent is unclear.[86] (See Table 2)

Table. (2) Desirable characteristic of the different types of data

	Echo-Sounding - Seismic Profiling	Contoured Bathymetry Maps	Multibeam Surveys	Gridded Data Sets	Satellite Altimetry
DESIRABLE CHARACTERISTICS					
FINDS A UNIQUE FOOT OF THE SLOPE (IF ONE EXISTS)	MAYBE	MAYBE	YES	MAYBE	NO
READILY AVAILABLE	YES	YES	YES	YES	YES
UNDERSTANDABLE BY/ ACCEPTABLE TO LAY PERSONS	NO	MAYBE	YES	NO	NO
SHOWS CONTINUITY	MAYBE	YES	YES	MAYBE	YES
ADDRESSES UNCERTAINTIES	NO	YES	YES	YES	YES
NOT BIASED THOUGH INTERPRETATION.	YES	NO	YES	NO	MAYBE
IDENTIFIES LOCAL SEAWARD EXTREMES	NO	NO	YES	NO	NO
NEUTRAL	YES	YES	YES	MAYBE	YES
UNIFORM QUALITY THROUGHOUT	NO	MAYBE	MAYBE	MAYBE	YES
APPROPRIATE SPATIAL RESOLUTION	NO	MAYBE	MAYBE	MAYBE	NO

(Source: Dave Monahan, 'Determination of the Foot of the Continental Slope at the Point of Maximum Change in the Gradient at Its Base in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 20040
Adapted from the companion CD-ROM

As shown in Table (2), the setting of the location of the foot of the slope and determination of the base of the slope, the feature of the continental shelf are so uncertain by using modern echo sounding and seismic profiling, contoured maps, multibeam surveys, gridded date and satelite altimerty. The different types of data

[85] Smith, W.H.F., and Sandwell, D. T. "Global Sea Floor Topography from Satellite Altimetry and Ship Depth Soundings." *Science*. 1997:227. pp. 1956-1962.
[86] Monahan, D. and Wells, D. E. "The use of the International Hydrographic Organization's "Standards for Hydrogrpahic Surveys" as a measure of depth accuracy in Continental Shelf determinations." International Hydrographic Review, 2002:3, no.1. pp. 59-67.

resulting from the use of such sophisticated technology are indispensable for delineating the outer limits of the continental shelf. They are the starting point of the whole process.

Predicted bathymetry can delineate the 2500 m isobath, as defined by Article 76, to the accuracy specified by the Guidelines in one test area.[87]

6. Geodetic Methodology

The Commission recognizes that the Convention poses specific scientific requirements in the field of geodesy. States are requested to delineate the outer limits of the extended continental shelf based on different distance criteria. These criteria are applied from baselines from which the breadth of the territorial sea is measured, the foot of the continental slope and the 2,500 metre isobath.[88] There are only two instances in which the Commission might request geodatic information about baselines. First, it must be satisfied that the test of appurtenance has been positively met. Secondly, if the 350 M limit is employed as a constraint in a submission, the Commission might also find it useful to make recommendations in relation to the methodology employed in the delineation of this limit.[89] The Commission is aware that there are different chart dadum transfer techniques designed to provide the location of the low water line at sites along the coastline other than at tide guage sites.[90] The Convention does not specify the geodetic definition of these baselins.[91] The coastal State shall submit the following geodetic information about baselines requested by the Commission:

(a) Source of the data;
(b) Positioning survey technique;
(c) Time and date of the survey;

[87] Monahan, D. and Mayer, L. "An examination of publicly available bathymetry data sets using digital mapping tools to determine their applicability to Article 76 of UNCLOS". In *International Conference on Technical Aspects Of Maritime Boundary Delineation and Delimitation*. International Hydrographic Organization and International Association of Geodesy, Advisory Board on Technical Aspects of Law of the Sea (ABLOS). Monaco. 1999. pp. 183- 190.
[88] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 3.1, p. 24
[89] *Ibid*., para. 3.3.2, p. 28.
[90] *Ibid*., para. 3.3.6, p. 29.
[91] *Ibid*., para. 3.3.7, p. 29.

(d) Corrections applied to the data;
(e) A priori or a posteriori estimates of radom and systematic erros;
(f) Geodetic reference system; and
(g) Geometric definition of straight, archipelagic and closing lines.

Myanmar shall perform all the necessary measures in using the above stated geodetic method in its submission to the Commission.

III. Issues of Delineating Myanmar's Continental Self

A. Overview of the Potential Area of Claim

i. Geographical Location

Myanmar's continental shelf covers an area of 228,781 square kilometers and the exclusive economic zone includes 486,000 square kilometers.[92] Myanmar shares maritime boundaries with India and Bangladesh in the Bay of Bengal.[93] Myanmar's maritime boundary stretches approximately from 21˚ North to 10˚ North over a distance of over 1800 square kilometers.[94] The Rakhine coast bordering the Bay of Bengal, with a narrow shelf and few islands, extends approximately 740 kilometers from the mouth of Naaf River down to Mawdin point about 16˚ latitude North.[95]

Myanmar shall claim the outer limits of its continental margin in the Bay of Bengal, which occupies an area of approximately 879,375 square miles[96] and has a mean depth of 2586 meters.[97] The continental slope terminates at less than 3000 meters depth.[98] To the west of the Bay lie the Inidan states of West Bengal and Urissa. In the southern part of the Bay are Sri Lanka and Nicobar and Andaman Group of Islands (India) and to the east lies Myanmar. [99] To the north and east lies Bangladesh.[100] The Bay of Bengal is rich not only in fish and seaweeds but also in mineral resources.[101] See figure (22).

---

[92] http://www.livestockandfisheries.mm, accessed 5 April, 2006.
[93] Dr. Swe Thwin. *Andaman Workshop Final Report*. Yangon, 29-30 June 2000.
[94] Ma Ma Lay. *Methodological Review of Statistical Activities in Fisheries Sector of Myanmar*. Yangon, 29-30 June 2000.
[95] Swe Thwin. *Andaman Workshop Final Report*. Yangon, 29-30 June 2000.
[96] Rhodes W. Fairbridge (ed). *The Encyclopedia of Oceanography*. 1966:1. pp. 110-118.
[97] Rhodes W. Fairbridge (ed). *The Encyclopedia of Geomorphology*. 1998:3. p. 186.
[98] *Ibid*., p. 186.
[99] Francis P. Shepard. *Submarine Geology*. (3rd edn. 1973. p. 418.
[100] M. Habibur Rahman. *Delimitation of Maritime Boundaries* (Rajshahi University 1991) p. 273.
[101] *Ibid*., pp. 98- 144.

Figure (22) Map of South Asia showing theBay of Bengal
(Source: http://wwww.un.org/Depts/Cartographic/map/profile/seasia.pdf, accessed 15 November 2006)

ii. Geological Features

Topographically, the thickness of sediment in the Bay of Bengal is 16.5 kilometre, the thickest of any place in the world.[102]

The topography of the coastal sea bordering Myanmar and Bangladesh is peculier. D.G. Moore, J. R. Curry and F. J. Emmel found that:

> Reflection profiling in a region of anamalous topography and structure in the Bay of Bengal off Myanmar has revealed the presence of a large submarine slide (olistostrome) at the base of the continental slope off the Pathein (Bassein) River. The slide overlies a thick section of Bengal Deep-Sea Fan turbidites and has a complex internal structure consisting of two primary elements. The lower element is pervasively disturbed and is interpreted as a mudflow generated at the time of the slide which spread over a large area to as much as 35 kilometre beyond the topographic toe. This mudflow poured into a distributary channel on the Bengal Fan and virtually filled it for 145 kilometre long its length. The upper element comprises a series of relatively coherent blocks of stratified sediments (olistoliths) bounded by curved fault planes. The blocks have been transported as much as 55 kilometre from the original Sunda Trench Wall. Their dimensions, up to 360 meter thick and 2.8 kilometre between faults, are similar to olistoliths of the slide terrain in the Appennines. The blocks are blanketed by the younger slope strata. The total area covered by the slide, including the mudflow, is almost 4000 square kilometre, and total volume of the slide is over 90 kilometers. Material of the slide comes of Bengal Fan turbidtities offscraped above the Sunda Subduction Zone and blanketed by rapidly deposited slope sediments from a western Ayeyarwaddy River distributary the Pathein (Bassein) River during the Late Quaternary glacial low sea level. This rapid loading probably coupled with a large earthquake, triggered the slide.[103]

To the south of Myanmar, there lies the Indian occupied Andaman and Nicobar Group of Islands. These rocky and hilly islands are geologically regarded to be the

[102] Francis P. Shepard. *Submarine Geology*. 3rd edn. 1973. p. 418. Also note: Dr. L. Mayer stated that sediment thickness in the Bay of Bengal is the world's tickest and largest in the Bay of Bengal. Lecture on Ocean Mapping, The Rhodes Academy. July 2006.

[103] David G. Moore, Joseph R. Curray and Frans J. Emmel. "Large Submarine Slide (Olistostrome) Associated with Sunda Arc Subduction Zone, Northeast Indian Ocean." In *Marine Geology*. 1976:6. p. 211.

submerged continuation of the outer fold ranges of the Rakhine Yoma in Myanmar.[104] See figure (23).

Figure (23) Map of Myanmar
(Source: http://wwww.un.org/Depts/Cartographic/map/profile/myanmar.pdf, accessed 15 November 2006)

[104] F. J Monkhouse. *Principle of Physical Geography*. 4th edn., 1979. p. 342.

From this point of view, Myanmar regards the continental shelf surrounding these islands as "natural prolongation" of its territory.

The concept of natural prolongation lies at the core of the definition of the continental margin and continental shelf. Natural, submerged prolongation of land territory or landmass is precisely the property that allows a coastal State to extend entitlement over its continental shelf beyond 200 M. Natural prolongation possesses geological properties different from its geomorphic properties. This is evident from references in Artile 76 to geological concepts such as the subsoil of submarine areas, the submerged prolongation of landmass, the continental margin and the natural components of the continental margin. Such properties may include crustal type, crustal structure or crustal composition applied either to the whole crust, to crystalline basement or to the deep crust. They may also include elements of common geological history or origin, such as those caused by accretion, rejuvenation or overprinting by significant geological events. It is possible for a coastal State to have natural prolongation in terms of such geological properties. Parts of the seafloor and underlying geological formations would, according to this view, belong to the natural prolongation of a coastal State if they share a geological property with the landmass of the coastal State and are continuously coonected to the land territory in terms of this geological property.[105]

The concept of natural prolongation and continental margin are in their essence geomorphological concepts and that the former is defined in terms of the latter in a way that makes them equal in the sense that they cover exactly the same area.[106] Natural prolongation to the outer edge of the continental margin forms the basis for the juridical definition of the continental shelf. More precisely, natural submerged prolongation of land territory or landmass is the key beyond 200 M, whereas the outer edge of the continental margin serves to define its outer limit.[107]

[105] Steinar T. Gudlaugsson. "Natural Prolongation and the Concept of the Continental Margin for the Purposes of Article 76." In Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (ed.). *Legal and Scientific Aspects of Continenal Shelf.* Koninklijke Brill NV, Leiden, The Netherlands. 2004. pp. 67- 71.
[106] *Ibid*., p. 61.
[107] *Ibid*., p. 63.

In other words, to define the outer edge of the continental margin is of critical importance in the basis of natural prolongation or submerged prolongation of land territory. For continental margin palys a crucial role in determing the continental shelf.

B. Applicable Provisions of Article 76 for Myanmar's Potential Claim

i. Application of Article 76 (4)

The main tasks in establishing the edge of the continental margin according to Article 76 (4) are to map and establish the foot of the continental slope (in the sense of the Convention) and then to place the outer edge of the continental margin relative to the foot of the slope in accordance with either paragraphs 4(a) (i) or 4 (a) (ii), informally named the Gardiner or Hedberg rules, respectively. The Hedberg rule is based on the view that the foot of the continental slope is the most prominent feature separating the outer edge of the continent (the continental margin) from the deep seafloor. Furthermore, the sediment thickness criteria of the Gardiner rule for the establishing the outer edge of the continental margin relative to the foot of the continental slope was introduced so that coastal States could retain under their jurisdiction as a significant part of the continental rise.[108]

The wording of Article 76 (4) (b) indicates a different relationship between the two rules. The maximum change in gradient rule is applicable in the absence of evidence to the contrary. If the later type of evidence on location on the foot of the slope exists, the maximum change in gradient rule is not applicable.[109]

[108] Brekke and Symonds. "The Ridge Provisions of Article 76 of the UNConvention on the Law of the Sea." In *Legal and Scientific Aspects of Continental Shelf Limits*. Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). Koninklijke Brill NV, Leiden, The Netherlands. 2004. p. 184. Note 42.

[109] See: French, Spanish and Russian authentic texts of The Convention.

ii. Application of Article 76 (4) and 76 (7)

Article 76 (4) and 76 (7) contain references to conditions which fixed points that define outer limits of the continental shelf beyond 200 M have to meet. One possible interpretation of these provisions is that the requirements for fixed points contained in Article 76 (4) are only applicable to fixed points beyond 200 M from the baselines. Under this interpretation, a point at 200 M does not have to meet these requirements as it already can be used as part of the outer limit of the continental shelf on the basis of the distance criterion contained in Article 76 (1).

iii. Application of Article 76 (7)

The other interpretation of Articles 76 (4) and 76 (7) finds support in the wording of Article 76 (4) (a). Both subparagraphs of this Article require that the coastal States shall establish the outer edge of the continental margin, wherever the margin extends beyond 200 M, by a line delineated in accordance with paragraph 7 *by reference to* fixed points that meet one of the requirements of Article 76 (4) (a). This language indicates that all fixed points that are used to delineate the continental shelf under Article 76 (7) have to meet one of these requirements. Under the interpretation of Article 76 (7), where there is a need to connect an outer limit line beyond 200 M with the outer limit line at that distance, the coastal State has to select a fixed point that meets the above mentioned requirements and is either located at the 200 M limit or within that distance from the baseline. In a latter case, the outer limit line of the continental shelf beyond 200 M can be conntected to the outer limit line at 200 M at the point at which both lines intersect.[110]

Article 76 (4) (i) of the Convention provides that the outer limit of the continental shelf can be established by:

[110] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf*. 2nd Report. p. 9.

> a line delineated in accordance with paragraph 7 by reference to the outer most fixed points at each of which the thickness of sedimentary rock is at least 1 percent of the shortest distance from such point to the foot of the continental slope.

In certain cases sedimentary rocks will not be distributed evenly.[111] In such a case, there may be more than one point on a profile line that meets the 1% criterion. The inclusion of the word "outermost" in Article 76 (4) (a) (i) indicates that a coastal State is not obliged to select the point that meets the 1% criterion that is situated most landward, but may select any point that meets the 1% criterion seaward of that most landward point. There may be circumstances in which there is no continuous sedimentary rock between the foot of the slope and a point at which the thickness of sediment is 1% of the shortest distance to the foot of the slope along a straight line. This may, for instance, be the case where the sedimentary rock has been eroded locally by a transverse channel or the topography of the basement is highly irregular.[112] A point qualifies for selection under Article 76 (4) (i) if there is continuity of sedimentary rocks along another pathway. Article 76 (5) of the Convention imposes two constraints on the fixed points that result from the application of Article 76 (4). The fixed points comprising the line of the outer limits of the continental shelf shall not exceed 350 M from the baselines from which the breadth of the territorial sea is measured or shall not exceed 100 M from the 2,500 metre isobath. For any continental margin, there will only be one line at 350 M from the baselines. However, there are areas of the seabed where a number of consecutive 2,500 metre isobaths occur.[113] Article 76 (6) supports the proposition that an isolated 2,500 metre isobath can be imployed under Article 76 (5). This paragraph excluded use of the 2,500 metre isobath along submarine ridges, but alows its use if it is located along other seafloor highs.[114] The two formulae line are shown respectively in Figure (24) and Figure (25).

---

[111] See: CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 8.5.2., p. 66.
[112] L.D.M Nelson. "The Continental Shelf: Interplay of Law and Science." In N. Ando et al. (eds) *Liber Amicorum Judge Shigeru Oda.* Kluwer Law International, The Hague. 2002. pp. 1235-1244.
[113] International Law Association. *Toranto Conference (2006): Legal Issues of the Outer Continental Shelf.* 2nd Report. p. 10.
[114] B.H. Oxman. "The Third United Nations Conference on the Law of the Sea: The Ninth (1980)." In *American Journal of International Law.* 1980. pp. 221-256; and E. Miles. *Global Ocean Politics.* Martinus Nijhoff Publishers, The Hague, 1998. pp. 387-388.

The drafting history of Article 76 indicates that proposals to include a reference to water depth in the Article in general were justified by the argument that they could be used to establish the extent of the continetal shelf or the natural prolongation of the land territory.[115]

A number of publications support the interpretation that a 2,500 metre isobath can only be employed by a State if it is situated inside the natural prolongation of its land territory on features that are components of the continental margin.[116]

Given the geographical conditions in the Bay of Bengal, Myanmar will be delineating the outer edge of its continental shelf. As provided by Article 76 of the Convention of the two options, Myanmar shall be using the 1% sediment thickness formula accordingly. In its application of Articles 76 (4) and 76 (7), Myanmar will use the delineation principle of depth method of Gardiner Rule. To this end, Myanmar is to apply the *Irish formula* and the constraint line of 100 M from 2,500 metre isobath in delineating the outer edge of its continental shelf (Figure 26).

[115] Third United Nations Conference on the Law of the Sea. Official Records. Vol. II, para. 14, p. 144, para. 41, p. 146, para. 4, p. 156, para. 9, p. 161.

[116] H. D Hedberg. "National-International Jurisdictional Boundary of the Ocean Floor." Occasional Paper No. 16. Law of the Sea Institute, Unversity of Rhode Island. 1975. p. 5; and A. A. Symonds, O. Eldholm, J. Mascle and G.F. Moore. "Characteristics of Continental Margins." In P. J. Cook and C. M. Carleton (eds). *Continental Shelf Limits; The Scientific and Legal Interface.* Oxford University Press. 2000. p. 17- 24.

Delineation Principle

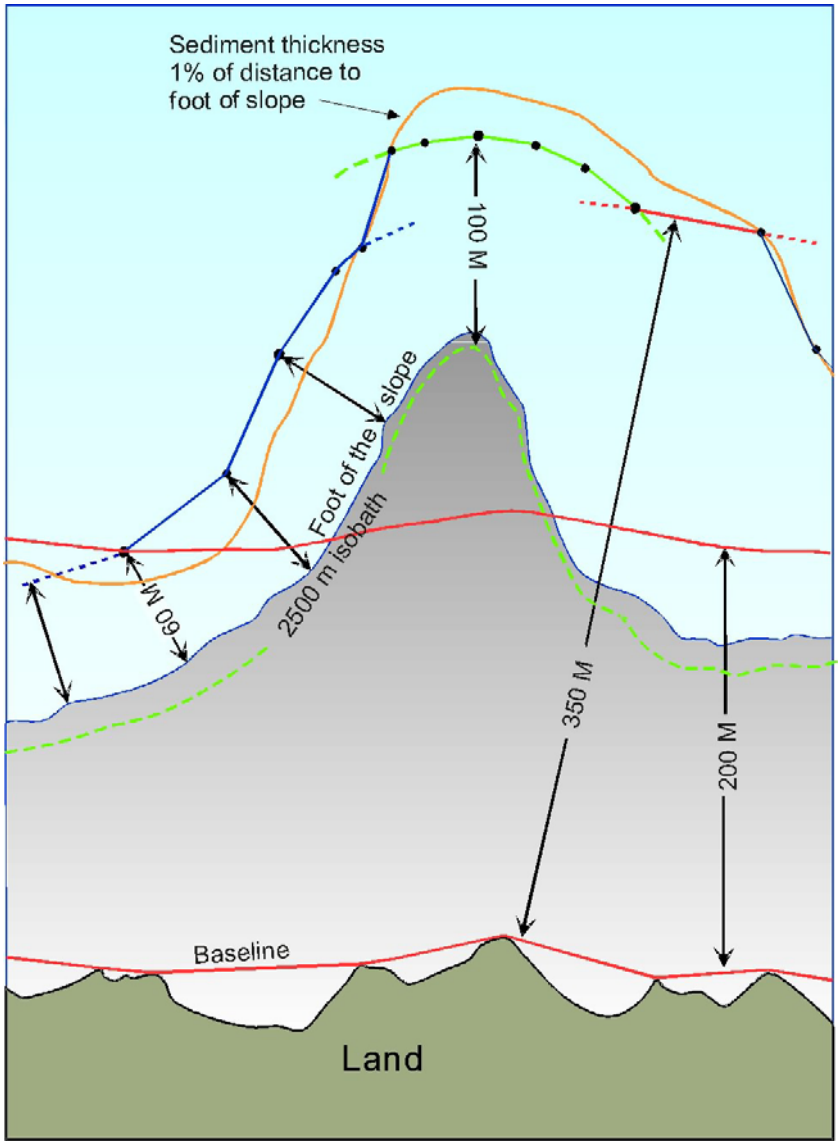


Figure (24) Hedberg and Gardiner combined formula limit lines
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)

Delineation Principle

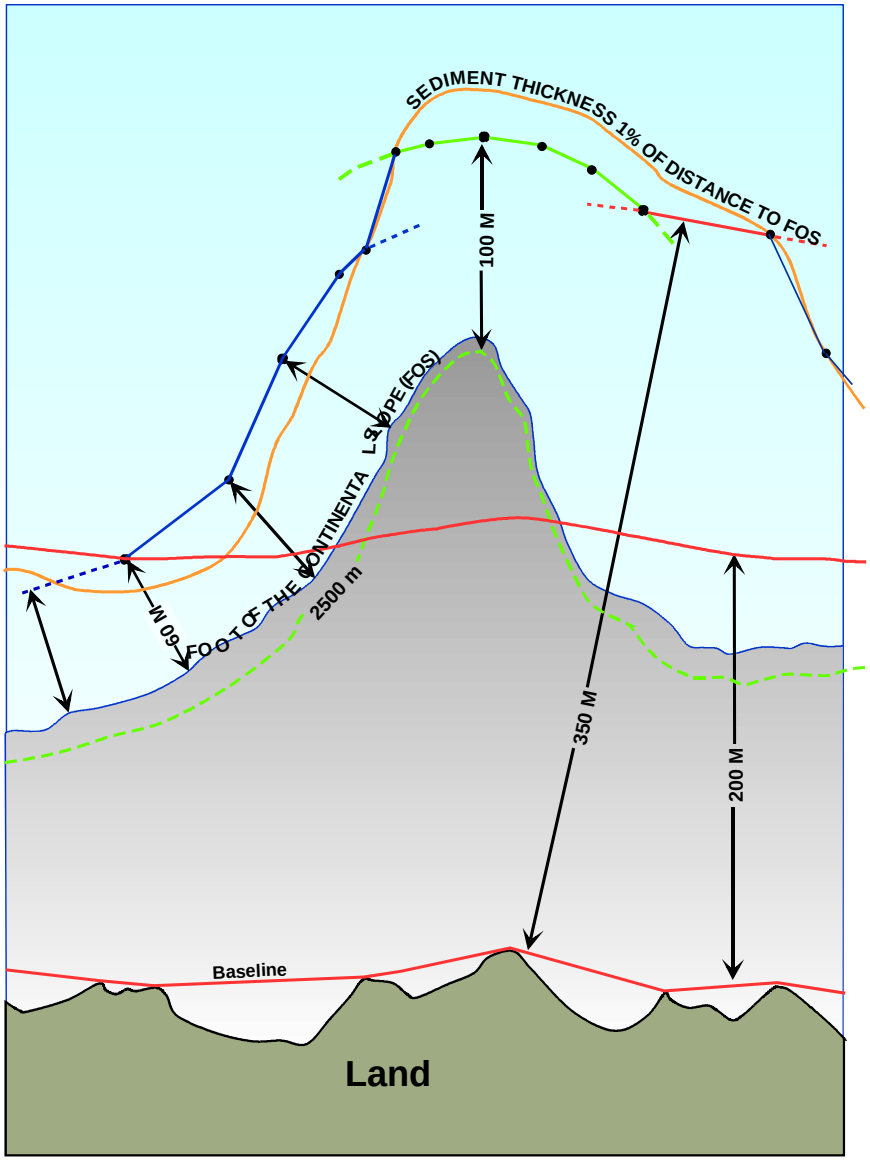


Figure (25) Hedberg and Gardiner combined formula limit lines
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)

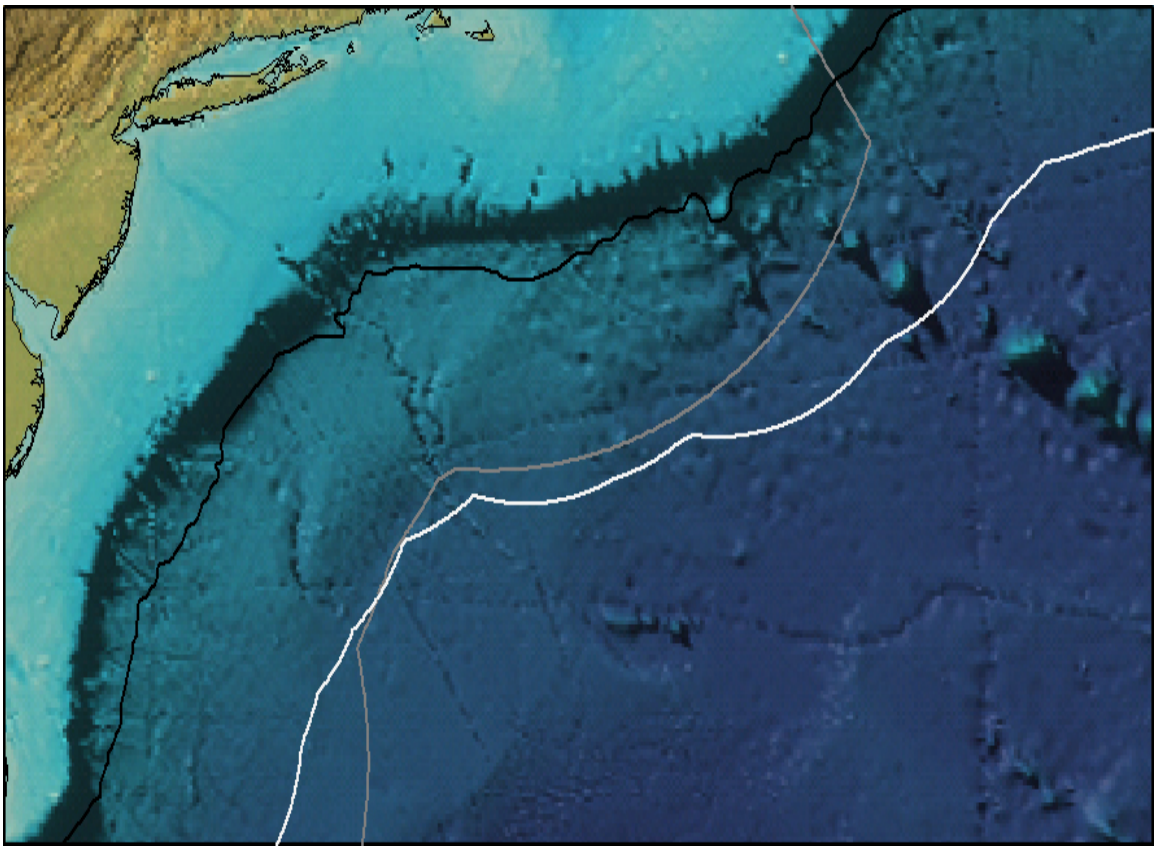


Figure (26) 2500 Meter isobaths and 100 M constraint line
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD ROM

The basic concept in producing the Gardiner line is to locate a series of sediment 1% markers which, by definition "is the location where the thickness in sediment is exactly 1% of the minimum distance to the foot of the continental slope"[117]

The Gardiner formula line (also referred to as the sediment 1% line) consists of a series of individual points (sediment 1% markers) which are based on interpreted sediment thickness data that is primarily derived from seismic surveys taken over the continental rise. Many parts of the world's continental margin include a wedge of sedimentary rocks and sediments. Where these sedimentary rocks are sufficiently thick they can potentially contain large reserves of oil and or natural gas. It is for this reason that the Convention was designed to include that part of the continental rise

[117] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), the Convention, Article 76 (4) (a) (i).

where sediment wedge at 1% or greater with respect to the distance to the foot of the slope line might be thick enough to contain substianl energy resources.[118] The thickness value is given in meters. Because most of the deeper data has been obtained from seismic interpretations, depths are interpreted to reflect depth to acoustic basement, not to actual basement (floor on which the continental rise sediments have been deposited). Acoustic basement is usually interpreted from the presence of strong reflectors in the seismic profile and may reflect actual basement. However, a strong reflector such as a sequence of basalt could also be present within the sedimentary sequence, in which case it might be misdiagnosed as basement. This is why drilling, in combination with seismic (reflections and refraction) surveys, should form the basis of an accurate sediment thickness dataset.[119]

The current methodology most widely used to compute the location of the 1% markers is the use of operator-defined 2-D profile lines. These 2- D profile lines will allow the operator to analyse the shape of the continental rise in any random direction. Through the use of specific mathematical algorithms included with the software, the location of the sediment 1% marker can be calculated. The procedure itself is similar to that used in locating the foot of the slope markers. However, as this is purely a mathematical application, the operator will not need to support the selection of this position with the aid of any additional scientific evidence. The sediment 1% marker can only be computed using seismic interpreted sediment-thickness values. The actual mathematical procedure used to produce the sediment 1% also must use existing foot of the slope markers in order to compute the distance back to the foot of the slope. The software can produce sediment 1% markers from both 2-D line evaluation and 3-D seismic interpolated sediment thickness lines. The continental rise (sediment wedge) of the sea floor bottom will yield the location of these sediment 1% markers. The locations of the sediment 1% markers will be used to construct the Gardiner formula line.[120]

[118] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 8.5.2., p. 57.
[119] *Ibid.*, para. 8.1.9.
[120] Robert van de Poll. "Completion of an Article 76 Desktop Study." In Myron H. Nordquist, John Norton Moore and Tomas H. Heidar (eds). *Legal and Scientific Aspects of Continental Shelf Limits*. Koninklijke Brill NV, Leiden, The Netherlands. pp. 365-367.

The "Combined" formula line is constructed from the individual results of segments coming from both the computed distance formula limit line and Gardiner formula limit line. The combined formula limit line is constructed by integrating the seaward-most line segments of each of these two individual limit lines.[121] For any continental margin, there will be one line at 350 M from the baselines. See figure (27).

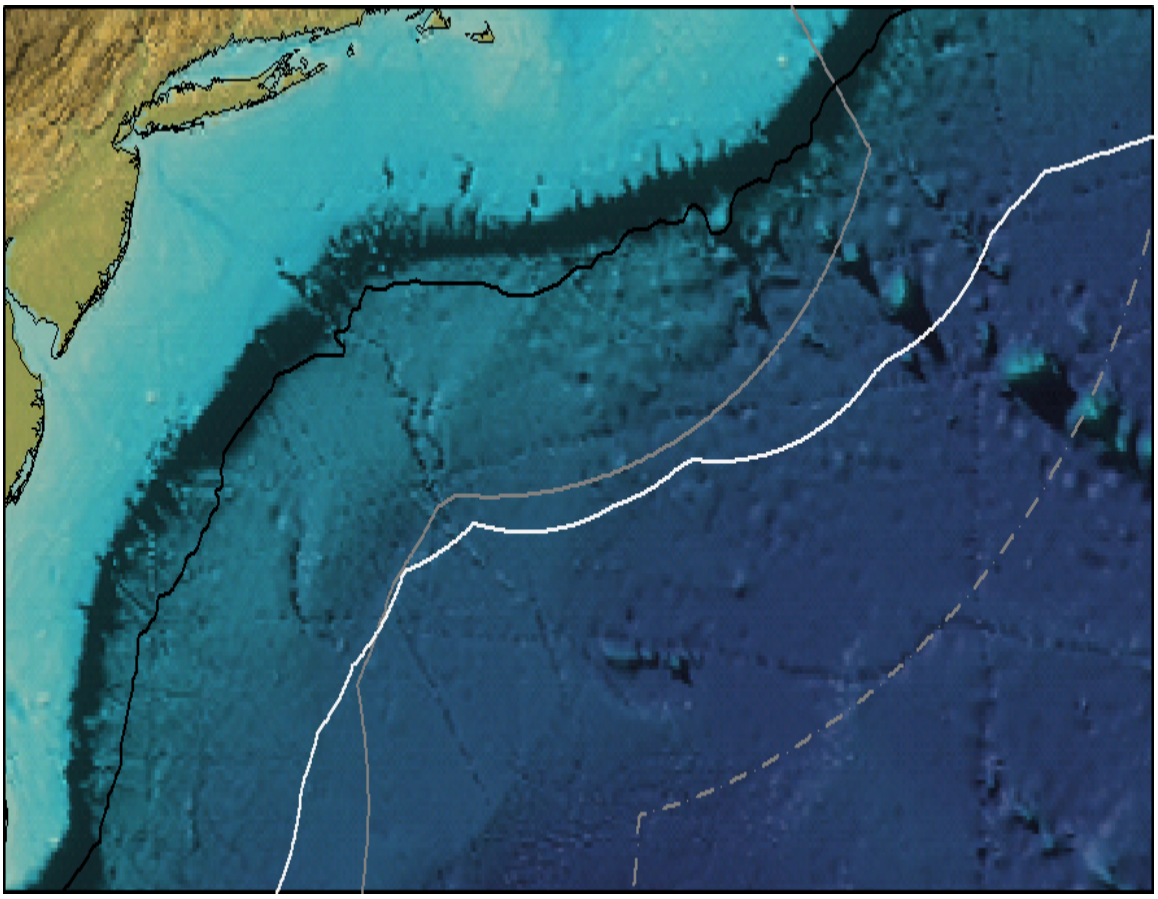


Figure (27) 350 M cut-off line
(Source: Mayer and Jakobsson, 'Evaluating U.S Data Holdings Relevant to the Definition of Continental Shelf Limits' in *Legal and Secietific Aspects of Continental Shelf Limits*, Martinus Nijhoff Publishers, Leiden/ Bonston, 2004)
Adapted from the companion CD ROM

The next procedure is to delineate the preliminary outer limit line. This initial line is referred to as being preliminary because it will need to be closely reviewed and analysed to see if any further improvements can be made on its initial location. Therefore, it is strongly recommeded that this initial resulting line should be considered as being a preliminary result. Upon closer inspection and careful review of these initial results, it is apparent improvements could be made through the selection

[121] *Ibid.*, p. 367.

of additional 2-D profile lines from one or both the formula lines (distance and Gardiner). The preliminary outer limit line is basically a composite of two composite lines. These two combined limit lines (constraint and formulae) are produced from indepentent procedures in the application. The resulting preliminary outer limit line makes use of the two individual limit lines which are the formulae limit line (seaward combined line segments originating from the distance formula line and the Gardiner formula line) and constraint line (seaward combined line segments originating from the 350 M limit line and 2500 m plus 100 M limit line).[122]

There are no applicable references in the Commission on the Limits of the Continental Shelf Technical Guidelines with respect to eveluating a preliminary outer limit line. It simply states that the final outer limit markers will come from straight-line segments, which can not exceed 60 M. As the final outer limit line will be used to select 60 M markers non straight-line segments, any area along its entire extent that could result in landward indentations could potentially take away from the State's final outer limit.[123]

Another situation that can produce "indentations" in the preliminary outer limit line is the variations in sediment thickness as expressed by the Gardiner formula line. When the operator randomly selects the 2-D sediment 1% profiles lines (in any orientation) from which the sediment 1% markers are computed, variations in sediment thickness can greatly affect the seaward or landward position of the Gardiner limit line. Sediment buildup at the base of the continental slope can vary considerably depending on the rigidity of the underlying basement. The presence of these sedimentary basins is reflected in the sediment thickness dataset. Once the evaluation procedure is complete, and the revisions to the preliminary outer limit line have been made, the final outer limit line can be formulated.[124] This stage is termed "the desktop study stage".

The deskstop study is the most important and essential step for the preparation of a submission. To accomplish the deskstop study, all the rules and procedures prescribed

[122] *Ibid*. pp. 368-369.
[123] *Ibid*., p. 370.
[124] *Ibid*., p. 371.

by the Commision must be followed during the data acquision. In this respect, Myanmar has formed a technical sub-committee for the purpose of making the deskstop study in the Bay of Bengal. The technical sub-committee compriese experts and scientists from the ministries concerned.

Once the evaluation procedure is complete and all possible modifications have been made, the last procedure in the preparation of a submission is to generate the final outer limit. This line will include all modifications that were made to the preliminary outer limit from the previous section. The Commission's Technical Guidelines simply state that the final outer limit markers which form straight-line segments, can not exceed 60 M between any two coordinates. There is no ruling on minimum distance. These markers can then be joined together, forming straight- line segments. The placement of these markers will most likely bridge gaps that form part of the final limit. The straight-line segments that cross these gaps are commonly referred to as "bridging lines". The final outer limit line will be used to delineate isolated outer limit markers that are less than, or equal to 60 M, and formed by straight-line segments along the entire extent of the coastal State's outer limit. These coordinates will then be deposited with the United Nations.[125]

[125] *Ibid*., p. 372.

IV. Implemenation of Myanmar's Submission to the Commission

A. Administrative Arrangements

i. Formation of Preparatory Committee

Myanmar became a State party to the Convention and ratified the Part XI of the Agreement of Implementation on 16 November 1994 and deposited its instrument of accession on 21 May 1996.[126] As entitled to make a claim over an extended continental shelf beyond 200 M by the Convention, Myanmar is now preparing its submission to the Commisssion.

In order to make a timely submission, Myanmar has formed the Preparatory Committee for Continental Shelf Delineation on 18 October 2000 with the approval of the Cabinet of the Ministers, comprising all relevant ministries concerned. The Committee is chaired by the Ministry of Foreign Affairs, other ministries include the Ministry of Science and Technology, the Ministry of Home Affairs, the Ministry of Transport, the Ministry of Education, the Ministry of Defence, the Ministry of Energy and the Ministry of Agriculture and Irrigation and the Ministry of Livestocks and Fisheries. To this end, the Committee meets once a month, and serves as a policy making body. The Committee has since commenced holding meetings with respect to the systematic implemenation of the process of the submission to the Commission.

The Ministry of Foreign Affairs plays both a chairperson role and a coordinating role. As teamwork is most important in achieving a rewarding outcome, Myanmar is determined to make its submission to the Commission as the result of concerted efforts of the relevant ministries.

[126] http://untreaty.un.org/ENGLISH/bible/englishinternetbible/partI/chapterXXI/treaty.7.asp, accessd 12 September 2006.

ii. Formation of Technical Sub Committee

The Committee has also formed the Technical Sub-Committee, so as to efficiently formulate the process and implement the necessary data acquision for submission in due course. The Technical Sub-Committee is composed of technicians, field experts and scientists representing the ministries concerned. The Technical Sub- Committee meets on a weekly basis to exchange information and to draw the working plan as set out in the Scientific and Technical Guidelines of the Commission. In the formation of the Technical Sub-Committee, the Preparatory Commisttee gathers geophysicists, seismiclogists and geologists from the Ministry of Energy, surveyers from the Ministry of Agriculture and Irrigation for geodesy, professors from geology department and law professor from the Ministry of Education, marine scientists from the Ministry of Livestock and Fisheries, hydrographers from the Minstry of Defence, legal experts from the Minsitry of Foreign Affairs, remote sensing and satellite techician from the Ministry of Science and Technology.

B. Desktop Study and Required Data

i. Desktop Study

The desktop study is the first important phase to be accomplished in order to make submission to the Commission. The desktop study comprises the acquisition of data such as bathymetric, seismic and geodetic data. Once all the data required are gathered to determine the right location of the foot of the slope, Myanmar will present its submission to the Commission.

In the case of Myanmar, the desktop study currently presents a barrier due to the shortage of expertise in software operation. Furthermore, data acquision for the deskstop study is not only time consuming, but also costly for Myanmar. To collect the data needed, the State needs to hire a research vessel equiped with modern technology. Without seismic ship track, accurate data of bethymetric, seismic and

geodetic data are impossible. The duration of the desktop study phase is relatively short compared to that of data collection. Thus, to complete the deskstop study, data collection by using 2 D and 3 D profile lines and the bathymetric meaurements is a must. Skilled operators are also in demand for operating the software to preocess the data for the desktop study. Once the desktop study data inserting process is over, each individual graphs are to be recorded precisely for compilation.

The barrier for Myanmar to implement a deskstop study is that Myanmar has so far no existing data. The shortage of resources is a major factor of concern for Myanmar. Data required for the coastal State like Myanmar is also not obtainable from the public domain, and resources to carry out the desktop study is scarces for Myanmar.

ii. Data Required[127]

The data requierd for Myanmar in order to produce deskstop study is listed below in accordance with the Article 76 of the Convention and the Scientifica and Technical Guideslines of the Commission:

1. Bathymetric Data

   (a) Single-beam echo soounding measurements;
   (b) Multi-beam echo sounding measurements;
   (c) Bathymetric side-scan sonar measurements;
   (d) Interferometri side-scan sonar measurements;
   (e) Seismic reflection-derived bathymetric measurements; and
   (f) Light detection and ranging (LIDAR) measurements.

2. Gravity Data

   (a) Marine, aerial and sea-bottom gravimeter measurements; and
   (b) Gravity values derived from satellite altimery and orbital anylyses.

[127] CLCS Scientific and Technical Guidelins (CLCS/11, May 1999), pp. 72-76.

3. Geodetic Data

(a) Geodatic positioning techniques and reference system;
(b) A priori or a posterior estimates of random and systematic erros; and
(c) Geometric definition of straight, archipelagic and closing baselines.

4. Seismic Data

(a) Both seismic reflectionand seismic wide-angle reflection/refraction data; and
(b) Navigation and data records.

5. Profiles and cross-sections

(a) Geological/geomorphologic profiles and cross-sections;
(b) Geodatic positions of all profiles;
(c) Geological/geomorphological features with vertical and Horizontal scales on maps; and
(d) Indication of the direction of the profiles or cross-section.

6. Maps and charts

7. Magnetic Data

(a) Marine and aerial fluxgate and proton-precession magnetometer measurements; and
(b) Magnetic values derived from satellite obervation campaigns.

8. Geological Data

(c) Lithology;
(d) Radiometric/palaeontological/palaeomagnetic age dating; and
(e) Geochemical-isotope geochemical results.

C. Process for Submission to the Commission

i. Submission

Myanmar will make a submission to the Commission as soon as it accomplishes the deskstop study and documentation. According to Article 4 of Annex II of the Convention, Myanmar must make its submission to the Commission within 10 years

of the entry into force of this Convention for Myanmar, namely it before 13 May 2009.

The objective of Myanmar's submission is (i) to demonstrate to the Commission that Myanmar's natural prolongation of the submerged land territory to the outer edge of the continental margin extends beyond 200 M and thus meets the Test of Appurtenance; (ii) to propose a delineation of the outer limits of the continental shelf to the Commission which complies with the provisions contained in Article 76 of the Convention, its Annex II, the Statement of Understanding, and the Scientific and Technical Guidelines of the Commission.

As far as the format of the submission is concerned, and according to both the Rules of Procedure[128] and the Scientific and Technical Guidelines:[129]
Myanmar must provide the following to the Commission.

1. Executive Summary

The executive summary should include the following:[130]

(a) Technical data and information (Provisions of Article 76 invoked to support the submitted outer limits); and
(b) Procedural information.[131]

2. Main Body

The main body of the submission contains a detailed description of the data set, maps, technical procedures and scientific methodologies applied in the implementation of Article 76. Each of the issues listed below should be dealt with in the main body of the submission in a detailed and precise manner:

[128] CLCS Rules of Procedure (CLCS/40, July 2004), para. 1 of Annex III.
[129] CLCS Scientific and Technical Guidelins (CLCS/11, May 1999), para. 9.1.3, para. 9.1.4, and para. 9.1.5.
[130] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 9.4.
[131] CLCS Rules of Procedure (CLCS/40, July 2004), Para. 2 of Rule 45, and Rule 46.

(a) Foot of the slope;
(b) 60 M formula line;
(c) Sediment thickness formula;
(d) 2,500 m isobath;
(e) 100 M from the 2,500 m isobath;
(f) 350 M constraint line;
(g) Outer edge of formulae line describing the outer edge of the continental margin;
(h) Constraint line;
(i) Inner envelope of formulae and constraint lines;
(j) 60 M straight line; and
(k) Estimates of certainties.

3. Supporting Scientific and Technical Data

The third part of the submission should contain a copy of all data referred to in the main body. Such data should be arranged in separate annexes, with the purpose of:

(a) To support the work and results presented in the main body;
(b) To put the Commission in a position to verify all the results; and
(c) To enable the Commission, if necessary, to make its own detailed recommendations regarding the outer limits should they differ from the ones submitted.

The supporting scientific and technical data can be provided in :

(a) Hard copy (soundings; cross-sections; maps; etc) [132]; and
(b) Digital format, in any internationally recognized format.

The Commission will consider all data submitted by Myanmar in support of its submission, and not just data recalled in the main body of the submission.

4. Language of the Submission[133]

The submission, and its annexes, attachments and other supporting material must be:

(a) Made in one of the official languages of the Commission; and
(b) Translated by the Secretariat into English, if made in an official language other than English.

[132] CLCS Scientific and Technical Guidelines (CLCS/11, May 1999), para. 9.4.
[133] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 47.

ii. Function of the Secretary-General

One of the functions of the Secretary-General of the United Nations in relation to the work of the Commission is to ensure the safe costody of the submission and the attachements and annexes at the United Nations Headquarers in New York for as long as they are required by the Commission.[134] For this reason, Myanmar must transmit all the requied copies of the submission to the Secretary-General of the United Nations through the Divison for Ocean Affairs and Law of the Sea, Office of Legal Affaris.

iii. Recording of the Submission[135]

Upon its receipt, the Secretary-General records the submission, noting:

1. Date of receipt of the submission;
2. List of attachments and annexes thereto; and
3. Date of entry into force of Convention for Myanmar which made the submission.

iv. Acknowledgement of Secretary General's Receipt[136]

The Secretary-General promptly acknowledges by letter to the submitting State the receipt of its submission and attachments and annexes thereto, specifying the date of receipt. The Secretary-General promptly notifies the Commission and all States Members of the United Nations, including Sates Parties to the Convention, of the receipt of the submission.

[134] CLCS Rules of Procedure (CLCS/40, July 2004), AnnexII, para. 1.
[135] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 48.
[136] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 49 and 50.

v. Publication of Proposed Limits

The Secretary-General makes public the executive summary of the submission of Myanmar including all charts and coordinates contained in that summary.

vi. Other States' Comments

Following the publication of the executive summary by the Secretary-General, other States may commet on its contnent. They can do so by a note-verbale addressed to the Secretary-General to the noticification of Myanmar's submission. The Secretary-General makes such notes-verbale public, if requested to do so by the commenting States.

vii. Convening of the Commission's Session

The Commission has to be in session in order to examine the submission of Myanmar. In order to ensure that all participants are aware of the dates and content of the session in which the Commission examines that submission, the Seretaray-General of the United Nations:

1. Notifies all the Commission members of the date, place and duration of the session as soon as possible, but no later than sixty days in advance of its opening date, and transimits to them the provisional agenda;[137]
2. Notifies, on behalf of the Commission, Myanmar which has made a submbssion, no later than sixty days prior to the opending date of the session, of the date and place at which Myanmar's submission will be first considered;[138] and
3. Invites Myanmar to send its representatives to participate, without the right to vote, in the proceedings that the Commission deems relevant for their participation. These include those in which the representatives:

    (a) Present their submission;
    (b) Are invited by the Commision for consultation; and

[137] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 3.
[138] CLCS Rules of Procedure (CLCS/40, July 2004), para. 3 of Rule 52.

(c) At wich the representatives of Myanmar wish to provide additional clarification to the submission on any matters relating to the submission.[139]

D. Consideration of Submission by the Commission

i. Holding of Session of the Commission

The Commission meets on the date and place indicated in the invitation sent by the Secretary-General. In addition, the Secretariat supports the work of the Commission for the effective preformace of its functions during the Session. During the session, the Commission will consider the agenda items as listed below:

1. Presentation by representative of Myanmar;
2. Consideration of any information regarding any disputes related to the submission;
3. Decisions as to whether to proceed with the consideration of the submission, or part thereof, or not; and
4. Consideration of how to proceed with the further work of the Commission, inter alia, by way of a submission.

ii. Establishment of Sub-Commission[140]

The Commission normally proceeds with the examination of each submission it receives by way of a submission. In order to establish a subcommission of the Commission to:

1. Identify any members who are ineligible:
    (a) Nationals of Myanmar making the submission; and
    (b) Members who have assisted Myanmar by providing scientific and technical advice with respect to the delineation.
2. Identify any members who may, for other reasons, be perceived to have a conflict of interest regarding the submission, e.g., members who are nationals of a State which may have a dispute or unresolved border with Myanmar;

[139] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 52, para. 15 of Annex III.
[140] The Convention, Article 5 of Annex II, and CLCS Rules of Procedure, Rule 42.

3. Through informal consultations among the members of the Commission, nominate candidates for the submission other than those ineligible taking into account:

    (a) The factors regarding the members identified in paragraph;
    (b) The specific elements of the submission; and
    (c) The need to ensure a scientific and geographical balance, to the extent possible.

4. Appoint from among the nominated candidates seven members of the sub-commission.

Rule 42 of the Rules of Procedure allows Commission members to be appointed to more than one submission.

iii. Term of the SubCommission[141]

The subcommission remains established untill Myanmar deposits the charts and relevant information, including geodetic data, regarding the outer limits for that part of the continental shelf for which the submission was originally made.

iv. Examination of the Submission

The examination of the submission carried out by the subcommission takes place in two phases:

1. First, there is an initial examination that is necessary to determine whether and how to proceed; and
2. Second, if the subcommission deems it possible to proceed (i.e. the format/ content of the submission is accepted; there are no disputes related to the submission, etc.) a more thorough scientific and technical examination is carried out.

v. Initial Examination of the Submission

Initial examination of the submission reviews the following formal, procedural, and substantive aspects of the submission:

[141] CLCS Rules of Procedure (CLCS/40, July 2004), para. 2 of Rule 42.

1. Format and completeness of the submission;
2. Test of appurtenance;
3. Construction of the outerlimits of the continental shelf;
4. Advice of specialists;
5. Cooperation with relevant international organizations;
6. Estimated time;
7. Disputes related to a submission; and
8. Clarifications.

vi. Duration of the Initial Examination

This phase of the examination of the submission must be completed within one week[142]

vii. Notification to the Commission

At the end of the initial examination, the subcommission notifies the Commission of the following needs to complete the review of the submission and prepare recommendations:

1. Estimated time; and
2. Advice of specialists, if any.[143]

viii. Main Scientific and Technical Examination

During the second phase of the examination of the submission, the main scientific and technical examination, the subcommission carries out a thorough analysis of the main body of the submission and its supporting scientific and technical data. The purpose is to verify:

1. How Article 76 has been applied in the submission; and

[142] CLCS Rules of Procedure (CLCS/40, July 2004), para. 8.1, Annex III.
[143] CLCS Rules of Procedure (CLCS/40, July 2004), para. 8.1 of Annex II.

2. The the relevance, quality and quantity of the data submitted are sufficient to justify the proposed limits[144]

In practice, the subcommission will examine all the items submitted by Myanmar.

ix. Request of Clarification

During this phase of the examination, Myanmar may be requested to provide additional data, information or clarifications, by a request transmitted by the Chairperson of the subcommission through the Secretariat. The request must be:

1. Articulated in precise technical terms;
2. In the form of written questions;
3. Translated, if necessary; and
4. Answered within a time period agreed upon between Myanmar and subcommission.

The written communication should be combined with consulations between the national experts and members of the subcommission at meetings arranged by the Secretariat if the delegation of experts from Myanmar is available at United Nations Headquaters in New York.

x. Preparation of Recommendations by Subcommission

Upon complection of the examination of a submission, including obtaining any necessary clarifications, the subcommission prepares recommendations to be submitted to the plenary of the Commission.

The Rule of Procedure guide the submission in the process of drafting of the recommendations. Paragraph 12 of Annex III to the Commission's Rules stipulate the following with respect to the preparation of the subcommission's recommendations:

[144] CLCS Secientific and Technical Guideline (CLCS/11, May 1999).

1. First Draft

The subcommision may appoint one of its members to produce, after consultation with the other members, a first draft of the recommendations. Each member must produce notes to be considered for the preparation of the draft.

2. Outline and Inter-sessional Work

The subcommission may, at an appropriate time, prepare an "outline of the recommendations prepared by the subcommission" containing the:

(a) Agreed format
(b) Contents; and
(c) Main conclusions.

3. First Reading of Combined Draft

At the next session of the subcommission, the combined draft, consolidated by an appointed member, is examined by the subcommission at a first reading. Any member who wishes to modify the draft may propose amendments in writing.

4. Adoption of the Recommendations

Since the subcommission has to make all endeavours to accomplish its work by general agreement, it must make every effort to reach agreement on recommendations by way of consensus. Therefore, voting on the recommendations is admitted only after all efforts to achieve consensus have been exhausted. The Rules of Procedure

contain provisions with respect to the framework, content and format which the recommendations of the subcommission must take.[145]

xi. Submission of Recommendations to the Commission

The recommendations prepared by the subcommission are submitted in writing to the Chairperson of the Commission through the Secretariat.[146]

xii. Preparation and Adoption of the Recommendations by the Commission

The work of the subcommission provides the ground on which the Commission makes its recommendations. The Commission considers the recommendations prepared by the subcommission ensuring that sufficient time is allowed for each case.[147] Once the Commission has considered the recommendations of the subcommission, it may either:

1. Approve the recommendations as submitted by the subcommission; or
2. Amend the recommendations submitted by the subcommission.

In both cases, the adoption of the recommendations by the Commission should be taken by consesus, unless all efforts to reach consensus are unsuccessful and voting is necessary.

xiii. Transmission of Recommendations to Myanmar and Secretary-General

Once the Commission elaborated and adopted its recommendations, the Chairperson of the Commission shall transmit to the Secretariat two copies of the recommendations, one to be submitted to Myanmar, and one to remain in the custody

[145] The Convention, Article 76; and The Convention, Anne II; and CLCS Rules of Procedure (CLCS/40, July 2004), para 11.1, Annex III; Para 11.2, Annex III; and Para 11.3, Annex III; and the CLCS Scientific and Technical Guidelines (CLCS/11, May 1999).
[146] CLCS Rules of Procedure (CLCS/40, July 2004), Rule 51, para. 14 of Annex III.
[147] CLCS Rules of Procedure (CLCS/40, July 2004), para. 1, Rule 53.

of the Secretary-General.[148] The Secretary-General shall make public the summary of the recommendations.[149]

xiv. Preparation of Revised or New Submission

Upon receipt of the Commission's recommendations, Myanmar may:

1. Disagree with the recommendations of the Commission, and prepare a revised or new submission to the Commission within a reasonable time.[150] This brings the process back to the beginning, with the only difference that a subcommission is already established.
2. Agree with the recommendations of the Commission and proceed to establish the outer limits of the continental shelf on their basis. The outer limits so established are final and binding.[151]

xv. Deposit of Myanmar

Following the establishment of the outer limits of the continental shelf, Myanamar must deposit charts and relevant information, including geodetic data permanently describing the outer limits of its continental shelf, with:

1. The Secretary-General of the United Nations; and
2. The Secretary-General of the International Seabed Authority (ISA), as the outer limits of the continental shelf, in fact, also represent the outer limits of the Area.[152]

It must be underlined that, if the continental shelf has been delineated not only as far as its outer limits are concerned, but between neighbouring States with opposite or adjacent coasts, the charts and/or coordinates describing the lines of delineation must

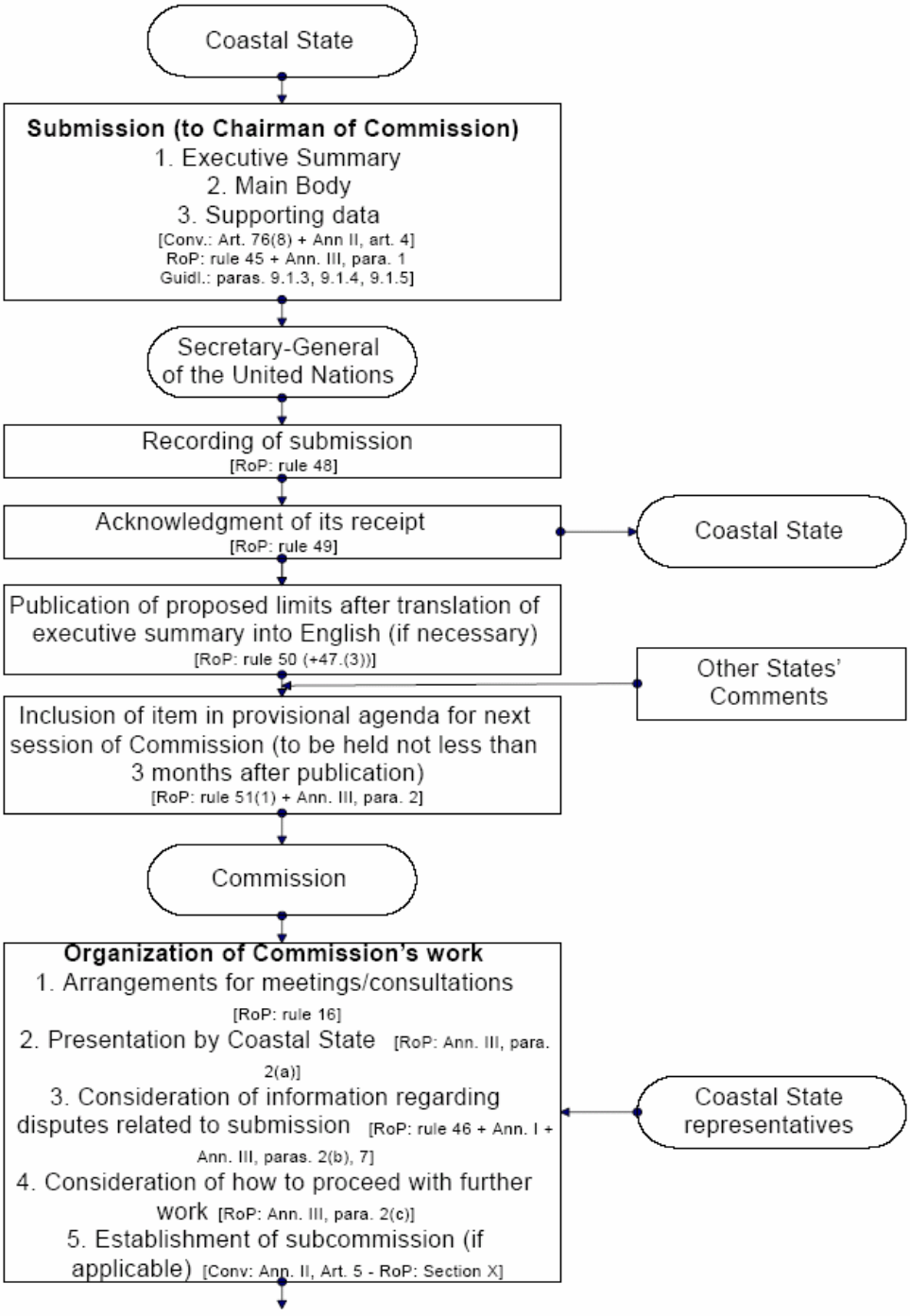
[148] The Convention, Article 6, para. 3 of Annex II; and CLCS Rules of Procedure (CLCS/40, July 2004), Rule 53, para. 3.
[149] CLCS Rules of Procedure (CLCS/40, July 2004), para. 11.3 of Annex III.
[150] The Convention, Article 8 of Annex II.
[151] The Convention, Article 76(8).
[152] The Convention, Article 76(9) and Article 84.

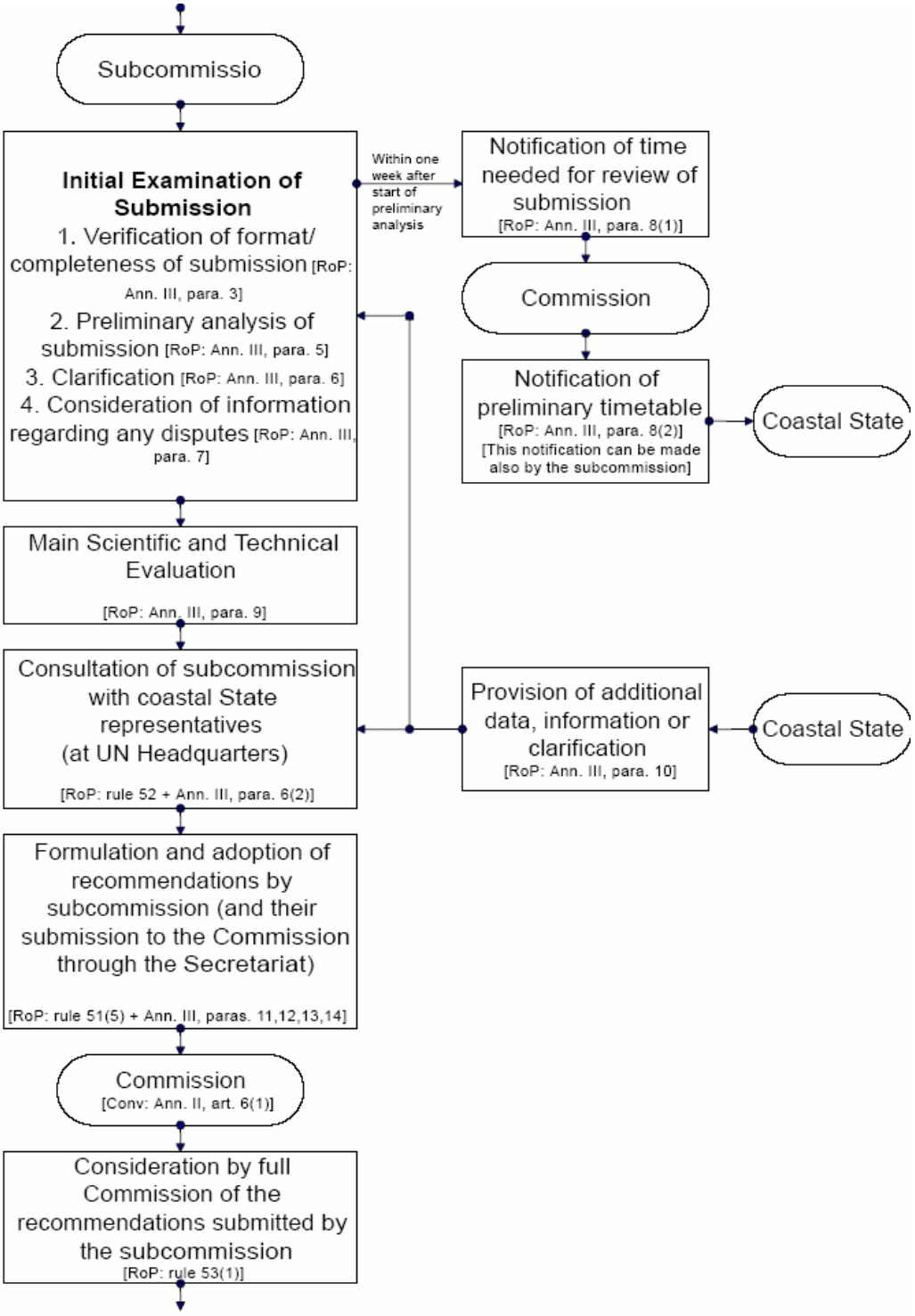
also be deposited with the Secretary-General of the United Nations,[153] and not with the Secretary-General of the ISA.[154]

xvi. Due Publicity[155]

The Secretary-General of the United Nations gives due publicity to charts and relevant information, including geodetic data, permanently describing the outer limits of the continental shelf deposited by Myanmar. Together with such material, the Secretary-General also gives due publicity to the recommendations of the Commission which in the view of the Commission are related to those limits. This way all States are informed about the exact delineation of the outer limits of the continental shelf. The summary of the process for submission to the Commission is shown in figure (28).

[153] The Convention, Article 83.
[154] The Convention, Article 84.
[155] CLCS Rules of Procedure (CLCS/40, July 2004), para. 3 of Rule 54.


Coastal State
Submission (to Chairman of Commission)
1. Executive Summary
2. Main Body
3. Supporting data
[Conv.: Art. 76(8) + Ann II, art. 4]
RoP: rule 45 + Ann. III, para. 1
Guidl.: paras. 9.1.3, 9.1.4, 9.1.5]
Secretary-General of the United Nations
Recording of submission
[RoP: rule 48]
Acknowledgment of its receipt
[RoP: rule 49]
Coastal State
Publication of proposed limits after translation of executive summary into English (if necessary)
[RoP: rule 50 (+47.(3))]
Other States' Comments
Inclusion of item in provisional agenda for next session of Commission (to be held not less than 3 months after publication)
[RoP: rule 51(1) + Ann. III, para. 2]
Commission
Organization of Commission's work
1. Arrangements for meetings/consultations
[RoP: rule 16]
2. Presentation by Coastal State [RoP: Ann. III, para. 2(a)]
3. Consideration of information regarding disputes related to submission [RoP: rule 46 + Ann. I + Ann. III, paras. 2(b), 7]
4. Consideration of how to proceed with further work [RoP: Ann. III, para. 2(c)]
5. Establishment of subcommission (if applicable) [Conv: Ann. II, Art. 5 - RoP: Section X]
Coastal State representatives


Subcommissio
Initial Examination of Submission
1. Verification of format/ completeness of submission [RoP: Ann. III, para. 3]
2. Preliminary analysis of submission [RoP: Ann. III, para. 5]
3. Clarification [RoP: Ann. III, para. 6]
4. Consideration of information regarding any disputes [RoP: Ann. III, para. 7]
Within one week after start of preliminary analysis
Notification of time needed for review of submission
[RoP: Ann. III, para. 8(1)]
Commission
Notification of preliminary timetable
[RoP: Ann. III, para. 8(2)]
[This notification can be made also by the subcommission]
Coastal State
Main Scientific and Technical Evaluation
[RoP: Ann. III, para. 9]
Consultation of subcommission with coastal State representatives (at UN Headquarters)
[RoP: rule 52 + Ann. III, para. 6(2)]
Provision of additional data, information or clarification
[RoP: Ann. III, para. 10]
Coastal State
Formulation and adoption of recommendations by subcommission (and their submission to the Commission through the Secretariat)
[RoP: rule 51(5) + Ann. III, paras. 11,12,13,14]
Commission
[Conv: Ann. II, art. 6(1)]
Consideration by full Commission of the recommendations submitted by the subcommission
[RoP: rule 53(1)]

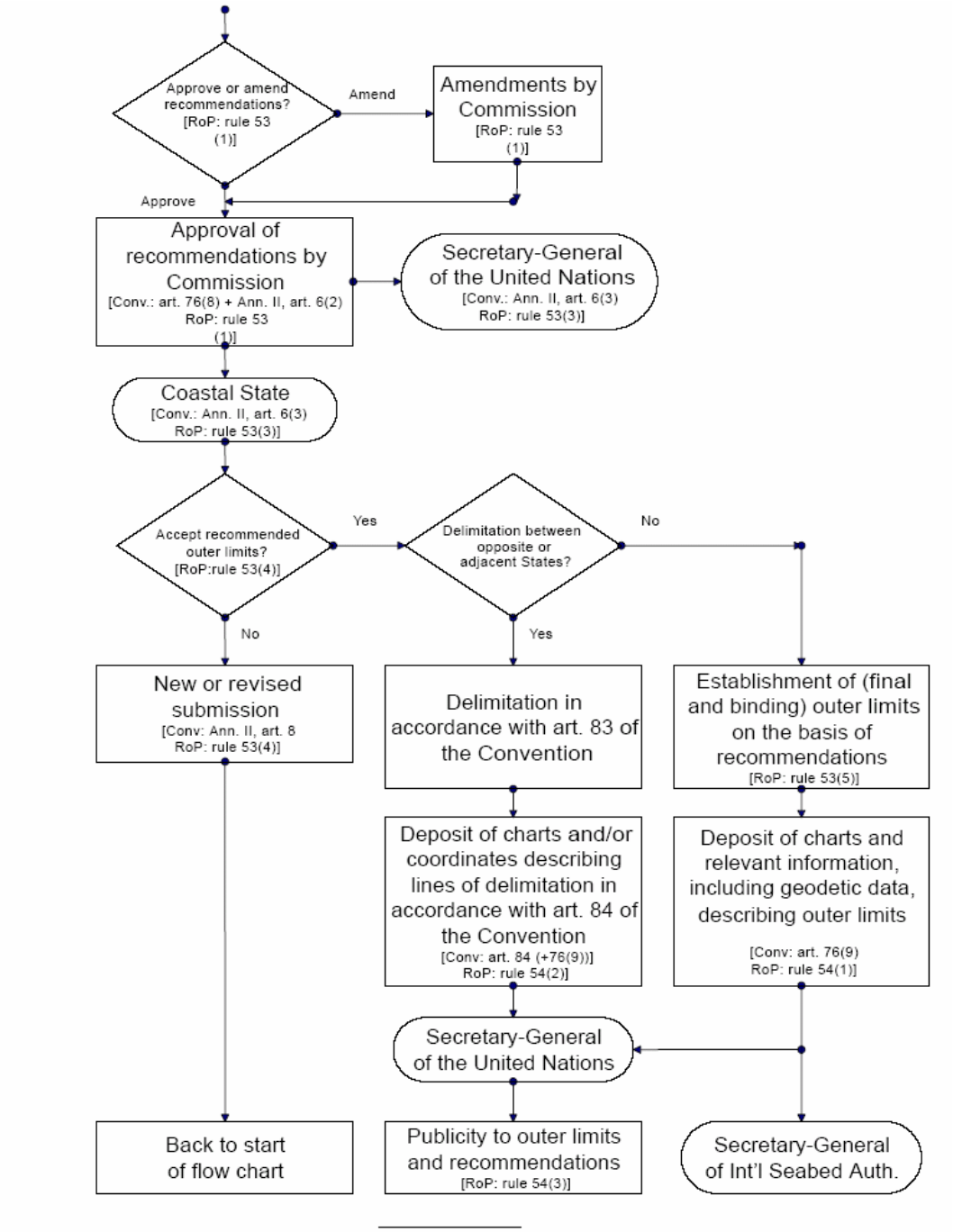


Figure (28) Steps taken by the Commission and the work of the subcommission
(Source: Commission on the Limits of the Continental Shelf, CLCS/40, 26-30 April, 2004, New York)

V. Conclusion

Myanmar, as a State Party to the Convention, its continental shelf possessing the requisite characteristics, is entitled to extend the outer limits of its continental shelf beyond 200 M, having due for submission to the Commission after ten years of its signature, shall make the claim in conformity with the Convention and giving due regard to the provisions of the scientific and technical guidelines and the Rules of Procedure of the Commission.

In its submission, Myanmar shall include all the scientific and technical data required for the Commission and the methods recommended in using data acquisition in good faith.

For the purpose of submission in accordance with the provisions of Article 76 and annex II of the Convention, Myanmar will implement the project as outlined below in compliance with *Irish formula* (the Gardiner Rule):

1. Contsruct legal limit lines of 200 M line and treatied lines (both “treatied” and “hypothetical”) by geodetic method;
2. Construct the constraint lineof 350 M line seaward from baseline by geodetic method;
3. Construct the 100 M line seaward from the 2500 m isobah by using bathymetric data sources;
4. Construct the Gardiner Formula Line (1% sediment line) by using the 1% sediment thickness marker software computing seismic sediment-thickness;
5. Construct the preliminary outer limit line resulting from the formulae limit line (seaward combined line segments origination from distance formula line and the Gardiner fromula line) and constraint line (seaward combined line segments originating from the 350 M line and 2500 m plus 100 M limit line);
6. Generate the final outer limit by modifying the preliminary outer limt;
7. Locate the foot of the slope by using seismic profiling (2-D or 3-D);
8. Compile the data collected (Maximum certainy for each data set);
9. Produce charts and maps (geodetic, digital resuled from profiling);

10. Make document for each section;
11. Conduct final preparation for submission; and
12. Make submission through proper channel.

Myanmar shall collect all the above bathymetric and seismic data by using single beam or multi-beam installed vessel in the Bay of Bengal where the potential area of claim may lie. Once the data acquision is completed, Myanmar shall compile the data for the desktop study.

Myanmar shall produce a final compilation of the submission including geodetic, bathymetric and seismic data for submission. Accordingly, Myanmar shall produce the executive summary as required by the Scientific and Technical Guidelines of the Commission which shall contain charts, name of the Commission Members and or the provision of Article 76 to support its submission.

Myanmar shall prepare its submission on the basis of the principle of natural prolongation as stated during the Third United Nations Conference on the Law of the Sea by the Myanmar delegation with the support of Part IV of the 1977 Territorial Sea and Maritime Zone Law[156], which solely deals with the issue of the continental shelf beyond 200 M.

At the Eighteenth Meeting on the Continental Shelf of the Second Committee of the Second Session, U Kyaw Min of Myanmar stated that:

> On the central issue of limits, Burma [Myanmar] delegation considered it essential that the paramountcy of the natural prolongation principle should be upheld in formulating the draft Articles on the geographical limits of a coastal State's jurisdiction over the seabed, both seawards and another State. The definition of the continental shelf as embodied in the 1958 Geneva Convention, notwithstanding the exploitability clause, had done only partial justice to the natural prolongation principle, which was expressed in the Convention in terms of the natural continental shelf, namely, the 200-metre isobath line. But in geological terms the submerged parts of continents ended not at the edge of the natural continental shelf,

[156] Myanmar enacted the Territorial Sea and Maritime Zone Law on 9 April 1977.

> but at the edge of the continental margin. The new definition of the continental shelf to be elaborated by the Conference must express "natural prolongation" in terms of the continental margin.[157]

Referring to the delimitation of the boundaries of the exclusive economic zones between States, he further expressed the view that:

> Equidistance boundaries whereby definition arbitrary and did not take account of the physical features of the seabed. In situation where the application of the equidistance rule would result in the economic zone of one State overlapping the natural prolongation of another State, the natural prolongation principle should be determinant for the purpose of delimiting the seabed boundary.[158]

[157] *1973-74 Official Records of the Third United Nations Convention on the Law of the Sea*. UN Publications, Sales No. E. 75 V4. Vol II, para. 91, p.155.
[158] *Ibid*., para.7, p. 224.

References

1. Ando, Nelson et al (eds) Liber Amicorum Judge Shigeru Oda (Kluwer Law nternational, The Hague: 2002).
2. Charney, Johnathan I and Alexander Lewis M (eds) *International Maritime Boundaries*,The American Society of International Law (Martinus Nijihoff Publishers, The Netherlands, 1993, 1996), Vol. I.
3. Cook, Peter J and Carlton, Chris M (eds) *Continental Shelf Limits: The Scientific and Legal Interface* (Oxford University Press, 2000).
4. Dupuy, R. J and Vignes D (eds) *A Handbook on the New Law of the Sea* (1991).
5. Fairbridge, Rhodes W (ed) *The Encyclopedia of* Oceanography I (1996), *Oceanography III* (1998).
6. Kaikobad, K. H *The International Court of Justice and Judicial Review* (Kluwer Law International, The Hague, 2000).
7. Lay, Ma Ma *Methodological Review of Statistical Activities in Fisheries Sector of Myanmar* (Yangon, 2000)
8. Makarczyk, J (ed) *Theory of International Law at the Threshold of the 21st Century: Essays in Honour of Krysztof Skubiszewski* (Kluwer Law International, The Hague, 1996).
9. Miles, Edwards *Global Ocean Politics* (Martinus Nijihoff Publishers, The Hague, 1998).
10. Monkhose, F. J *Principle of Physical Geography* (4th edn, 1979).
11. Nandan, Satya N., Rosenne Shabtai and Grandy Neal R, *United Nations Convention on the Law of the Sea-A Commentary* (Martinus Nijihoff Publishers, The Netherlands, 1995), Vol. II.
12. Nordquist, Myron. H., Moore J. Norton and Heider, Tomas. H (eds) *Legal and Scientific Aspects of Continental Shelf* (Martinus Nihihoff Publishers, Leiden/Boston, 2004).
13. Prescoot, V.J.R *An Analysis of the geographical terms in the United Nations Convention on the Law of the Sea* (1987).
14. Rahman, M. Habibur *Delimitaion of Maritime Boundaries* (Rajshahi University Press, 1991).
15. Sheperd, Francis P. *Submarine Geology* (3rd edn., 1973).
16. Thwin, Swe *Andaman Workshop Final Report* (Yangon, 2000).
17. Toranto Conference Report (International Law Association, 2006).
18. Training Manual for delineation of the outer limits of the continental shelf beyond 200 M and for preparation of submission to the Commission on the Limits of the Contiental Shelf (Division for Ocean Affairs and the Law of the Sea, United Nations, New York 2006).