Review on some aspects of legal and scientific understandings regarding outer continental shelf limits in the Arctic Ocean

Jongseong Ryu* and Vladimir Kaczynski

ABSTRACT

Among the most controversial criteria in the delimitation of outer continental shelf are ridge provisions in article 76 of the United Nations Convention on the Law of the Sea. In 2001, Russia claimed its sovereign rights to the continental shelf in central Arctic Ocean. Focusing on this Russian submission to the Commission on the Limits of the Continental Shelf (CLCS), this article aims to widely address the historical, legal and scientific aspects of the continental shelf that are necessary to be reviewed by coastal States seeking to claim the extended continental shelf beyond their 200 nautical miles (M) territory. Ridge provisions with the natural prolongation standard can be invoked as a useful tool in order to remove the 350 M constraints for outer limits of the continental margin. Three features should be carefully considered to classify ridges correctly: geological continuity, crustal neutrality and envelop of the foot of the continental slope. Geomorphological data ought to be carefully considered together with geological and geophysical data to prepare the submission to the CLCS. The CLCS has a full responsibility to interpret the provisions and apply the legal and scientific criteria in reviewing the submission by coastal States. Given the high possibility of getting easily rejected due to the heavy workload of the CLCS, a coastal State should expend considerable amounts of time and efforts in claiming its outer limit of continental shelf based on a ridge and natural prolongation.

Key words: Arctic, territorial claims, continental shelf, sovereign rights, Commission of the Limits of the Continental Shelf, Lomonosov and Alpha-Mendeleev Ridges.

* Corresponding Author: School of Marine Affairs, University of Washington, Seattle, WA 98105-6715, USA
E-mail: bbenthos@u.washington.edu Telephone: 1-253-303-2203 Fax: 1-206-543-1417

1. Introduction

The Arctic Ocean is rising rapidly in terms of its international, political and economic importance. Plentiful minerals will likely transform the Arctic region into a booming economic frontier in the 21st century. The Arctic Ocean basins are expected to hold large deposits of oil, natural gas, methane hydrate and large amounts of valuable minerals.[1]

With the shrinking of the polar ice cap in the Arctic due to global warming, this region also draws global attention as it offers attractive transportation possibilities as well as more viable energy exploitation. Two navigable pathways, the Northern Sea Route (NSR) and the Northwest Passage (NWP), have been historically recognized and seem to be open for navigation in the near future.[2] By August 2008, ice blockage in Laptev Sea melted enough to open NSR and NWP simultaneously for the first time in 125,000 years since the last Ice Age.[3] Both passages can significantly reduce the time and costs of the existing transportation and logistics.

With such a rapid increase of attention on the Arctic, five coastal states (Canada, Denmark, Norway, Russia and the United States)[4] have competitively made efforts to reinforce their territorial and jurisdictional claims in the region. In December 2001, Russia proposed outer limits of its continental shelf beyond the 200 nautical mile (M) of Exclusive Economic Zone (EEZ) in the Arctic, thereby becoming the first state to submit such information to the Commission on the Limits of the Continental Shelf (CLCS) in accordance with the UN Convention on the Law of the Sea (LOS[5]). A central argument of this claim was that the Lomonosov and Mendeleev Ridges were natural extensions of the Russian

1 The Arctic Council's *Arctic Oil and Gas 2007* assessment, published in May 2008, states that: More than five percent of the world's known oil reserves and over 20 percent of its known gas reserves are in the Arctic, the vast majority of both in arctic Russia. There are estimates that as much as a quarter of the world's undiscovered oil and gas lies in the Arctic. See AMAP (2007), p.32.

2 The Northern Sea Route (NSR) is the shortest link between Western Europe and East Asia along the northern coast of Russia. A contemporary ship travelling along this route, for example, from the Netherlands to Japan, will cover about 14,000 km, compared to 20,000 km (the length of the route along the Suez and across the Indian Ocean) or 24,000 km (the Atlantic, the Panama Canal and the Pacific). Large ships that cannot pass through either canal have to go around Africa covering nearly 27,000 km. The entire passage opening of the NSR historically lasted only 20~30 days per year (ACIA, 2004). The Northwest Passage (NWP) also connects Asia and Europe along the northern coast of Canada but had a much more limited navigation history with the only one significant merchant voyage by the ice-breaking tanker 'Manhattan' in 1969.

3 For example, see Lean (2008).

4 A further three states (e.g., Finland, Iceland and Sweden) are also generally considered to be Arctic states. For various optional definitions of the Arctic region, see Rayfuse (2007), p.197.

5 In this paper, we separately use two acronyms, LOS and UNCLOS, to avoid the confusion between the law and the conference itself. LOS stands for (the UN Convention on) the Law of the Sea, referring to the provisions of law itself. UNCLOS abbreviates the United Nations Conference of the Law of the Sea, meaning the conferences gathered three times under the call and sponsorship of the UN General Assembly (i.e., UNCLOS I, II and III).

continental shelf.[6] Norway also submitted to CLCS its proposal for extended outer limit of continental shelf in the Arctic in 2006. The CLCS responded on Russia's submission to conduct further research and collect more data to revise its proposal, but has yet to respond to Norway's submission.[7] Canada, Denmark and the US are also likely to define their continental shelf limits over the next few years. In August 2007, Russia embarked on a mission to the Lomonosov Ridge sending the submersible that planted a national flag on the seabed below the North Pole. In response to the Russian's maneuver, the other Arctic coastal states began their own scientific and political activities. Denmark launched a month-long Danish Continental Shelf Project with several Swedish institutes to seek the evidence that Lomonosov Ridge is attached to the northern Greenland, attempting to make the ridge a natural extension of Danish territory.[8] The US continued expansion of offshore activities in the Chukchi Sea and Norway developed resources in Barents Sea. Canada announced a range of initiatives, including eight new patrol vessels, plans for the construction of a High Arctic military base and deep sea port and a rejuvenated programme of environmental and climate research.[9]

Besides the jurisdictional claims of coastal states to the international waters around the Arctic pole, an oil exploration venture company recently argued that it had a prior claim to the 'Arctic Commons.' The argument draws on legal principles such as the Law of Discovery, Rights to Claim Territory and rights to operate in international waters for the common good of mankind.[10] Natural resources in the international waters of the Arctic should be common heritage for mankind and be explored in a sustainable manner for the justified benefit of future generations. Therefore, the argument of coastal states regarding jurisdiction of continental shelf beyond 200 M in the Arctic directly affects other nations' interests in worldwide. As many nations do, Korea also regards the Arctic development as one of the 'Blue Ocean Projects', a promising opportunity to expand and develop the national welfare. Thus, the territorial issues of the Arctic deserve international attention.

Given the confidentiality rule, there is no way to know precisely what LOS provisions Russia invoked in the 2001 submission or might invoke in the revised submission to come.[11] It is highly possible that the natural prolongation and ridge concept plays an important role in the Russian's submission. In order to better understand the Arctic territorial

6 It means that almost half of the continental shelf in the Arctic would go under Russia's jurisdiction if the submission is accepted. For claims and agreed boundaries in the Arctic Ocean, see the map from IBRU (2008).

7 As of March, 2009.

8 See Mellgren (2007).

9 See Powell (2008), p.828.

10 The Arctic Oil and Gas Corporation (an oil venture) established the 'Arctic Ocean Commons Prospect' claim, based on a submission to the UN General Assembly in May 2006 by three private companies. See *Ibid.*, p.829.

11 The confidentiality is originally aimed to protect proprietary and sensitive data of the submitting state. However, it practically masks the data from other states that may have legitimate concerns about the appropriateness of the data for delimiting the outer continental shelf. See Macnab (2004), p.12.

issues initiated by Russia, the main purpose of this paper is to provide wide information ranging from historical, legal and scientific aspects of the continental shelf, focusing on the provisions of the LOS article 76. Russian claims to the Arctic in 2001 are also addressed in terms of historical and scientific perspectives. This paper, because of its comprehensive approach and in-depth analysis, is also intended as an educational material for graduate students of law and/or earth sciences.

2. Historical perception on continental shelf

Awareness of the historical background often helps to understand the current situation. Until the 20th century the seabed was generally regarded as an international area.

No legal distinction was made between the continental shelf and the deep ocean floor and coastal States had only sovereign rights over the seabed within their 3 M territorial sea.[12] In the first decades of the 20th century, however, coastal States started declaring sovereign rights to the exploitation of sedentary species on the continental shelf, or even asserting rights of control over specific areas of the shelf. Sovereign rights lie somewhere in between sovereignty and jurisdiction.[13] With technical advances, the interest in having control over the shelf resources beyond the existing territorial sea increased and the developments were rapid.

The first clear assertion of the idea that the resources of the continental shelf belong to the coastal State is the Proclamation made by the U.S. President Truman in 1945.[14] The Truman Proclamation claimed that the continental shelf was considered as contiguous area to the continent which is covered by no more than 100 fathoms of water

12 The territorial sea concept gradually solidified in the 18th century. Its maximum breadth has long been disputed and said to be equal to the range of a land-based cannon in that century. Eventually, through decades of naval warfare, one English league (3 nautical miles) became a much-cited customary standard. Scandinavian nations claimed 4 M territorial seas, based on the length of the Scandinavian league. By the 20th century, 3 M was the maximum allowable breadth for the territorial sea under customary international law. See Kalo *et al*. (2007), p.375.

13 Legally speaking, sovereignty and jurisdiction are distinctive terms to be separately treated. Sovereignty is the power of a state to do everything necessary to govern itself, such as making, executing and applying laws; imposing and collecting taxes; making war and peace; and forming treaties or engaging in commerce with foreign nations. Jurisdiction generally describes an authority over a certain area, which is often interpreted as police power in the context of the coast guarding. See *lbid*., p.380.

14 The Truman Proclamation mentioned four reasons to justify the exercise of jurisdiction over the natural resources of the subsoil and sea bed of the continental shelf by the contiguous nation: 1) The effectiveness of measures to utilize and conserve resources, 2) The natural appurtenant to land-mass of the coastal nation, 3) The seaward extension of natural resources, 4) Monitoring activities off the coast in the context of self-protec- tion. See Continental Shelf of the United States, Proclamation No. 2667, Sept. 28, 1945, 10 Fed. Reg. 12303.

(equivalent of 600 feet or 200 metres).[15] It was followed by similar illegal claims of many other States. The South American countries Chile, Peru and Ecuador went one step further with the Santiago Declaration in 1952.[16] The international response to this 200 M claim, was opposition, especially from the maritime nations with large navies or fishing vessels, in contrast to nearly immediate favorable response to the Truman Proclamation. The 200 mile club of nations did, however, gradually begin to gather developing nations first in Latin America and then in Africa. In the midst of this unsettling trend toward extended jurisdiction in the ocean, the First United Nations Conferences on the Law of the Sea (UNCLOS I) gathered in Geneva in 1958 to consider four law-making treaties proposed by the International Law Commission.[17] These four treaties successfully built the framework of the LOS, but hardly addressed the debate on the extended national jurisdiction rather than recognized the Truman continental shelf doctrine. The delegations in Geneva were unable to agree on the maximum breadth of the territorial sea.[18] In 1960, UNCLOS II was called for by UN General Assembly to meet again in Geneva, attempting to reach to an agreement on this issue, but failed. Only ten years after UNCLOS II, a third conference was summoned in order to address this issue. The decade-long negotiations within UNCLOS III from 1973 to 1982 settled by consensus upon a definition of an allowable zone of coastal nation rights, jurisdictions and duties that could extend out to 200 miles offshore, which is known as the EEZ.

Apart from the territorial sea boundary, the legal status and limit of the continental shelf had been addressed during the three UNCLOS. Four law-making conventions during UNCLOS I provided generally accurate codifications or articulations of the customary LOS. For example, the Convention on the Continental Shelf, one of the four conventions, gave to the coastal State the exclusive right to explore the continental shelf and exploit its resources. It also made clear that the rights of the coastal State over the continental shelf did not affect the legal status of the superjacent waters as high seas or that of the air space above.[19] Importantly, this right is viewed as inherent and does not require the state

15 This claim was almost certainly illegal at the time because it asserted national authority over resources of the seabed extending far beyond the 3 M border of the US territorial sea and under the waters of the free high seas.

16 In 1947, Chile first claimed the jurisdiction to the natural resources of the 200 M in response and against to the Japanese return to the whaling ground off the South America's long coast. The same year saw Peru assert its 200 M territorial sea. In 1952, based on the Santiago Declaration of Chile, Ecuador and Peru, which proclaimed the legality and rightness of 200 M zones. Ecuador extended its territorial sea to 200 M. Those nations did not claim full sovereignty only over the seabed and subsoil but also over the superjacent waters and the air space above.

17 More than 80 nation-state delegations participated in these deliberations and, following a few weeks of negotiations, adopted the four 1958 Geneva Conventions on the Law of the Sea. Four conventions are regarding 1) the Territorial Sea and the Contiguous Zone, 2) the Continental Shelf, 3) the High Seas and 4) Fishing and Conservation of the Living Resources of the High Seas, respectively.

18 The U.S. and other maritime countries wanted to retain the 3 mile limit, while the 200 mile club of nations would like to argue 200 mile limits. A growing number of coastal nations preferred a 12 mile breadth.

to make an explicit claim to continental shelf resources.[20] However, there are some differences between the physical extent of today's legal continental shelf and that recognized in 1958. The convention chose to establish the 200 metre isobaths, a depth line that approximates the average natural limit and is also close to the 100 fathom line marked on then-nautical charts. For future technical improvement, it allowed the further extension of the legal shelf beyond the 200 metre isobath to the limit of technical exploitation of the natural resources of the seabed and subsoil.[21]

In the North Sea Continental Shelf cases in 1969, the International Court of Justice (ICJ) confirmed that these provisions of the Geneva Convention represented customary law. However, the ICJ also laid much stress on the continental shelf being the natural prolongation of the coastal State's land mass.[22] This conclusion of the ICJ was to have big influence on the development of this issue (natural prolongation) during the UNCLOS III. While there was general agreement at the UNCLOS III to draw on the provisions of the Geneva Convention with regards to the legal status of the continental shelf and its inner limit, there were divergent views on what the definition of the outer limit should be.[23] During the UNCLOS III, a compromise was reached that coastal States could extend their continental shelf jurisdiction beyond 200 M. Therefore, the continental shelf regime evolved from the traditional limit of 3 M territorial sea to the full natural prolongation beyond the 200 M EEZ.

3. Provisions of the LOS regarding the continental shelf

3.1. Legal status of the shelf and coastal State's rights

According to article 77 of the LOS, the coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources.[24] The coastal nation does not enjoy full sovereignty over the continental shelf, but functional rights and jurisdiction, as is the case in the EEZ.[25] This includes the right to construct

19 See article 2, paragraph 1 and 2 of the 1958 Convention on the Continental Shelf.

20 See article 77, paragraph 3 of the LOS, stating *The rights of the coastal State over the continental shelf do not depend on occupation, effective or notional, or on any express proclamation.*

21 This was called as the *exploitability criterion.*

22 The ICJ said the following: *More fundamental than the notion of proximity appears to be the principle of the natural prolongation or continuation of the land territory.*

23 Many countries favored toward the 200 M limit. However, a number of coastal nations with a potential for extended continental shelves supported a definition which would extend the continental shelf beyond the 200 M limit.

24 See article 77, paragraph 1 of the LOS.

25 See article 56, paragraph 1 of the LOS.

artificial islands, installations and structures[26] and to authorize and regulate drilling[27] on the continental shelf. The coastal State also has the right to regulate, authorize and conduct marine scientific research on its continental shelf[28] and can, in principle, withhold its consent to the conduct of resource oriented research on the shelf by another nation based on certain conditions.[29]

The sovereign rights of the coastal State are exclusive in the sense that if it does not explore the continental shelf or exploit its natural resources, no one may undertake these activities without the express consent of the coastal State.[30] All these rights are inherent on the grounds of its sovereignty over the land territory.

The continental shelf only includes the seabed and the subsoil. The superjacent waters and the airspace above do not fall thereunder and thus the rights of the coastal State over the continental shelf do not affect the legal status of the superjacent waters and the airspace above.[31] The exercise of the rights of the coastal State over the continental shelf must not infringe or result in any unjustifiable interference with navigation and other rights and freedoms of other States on the high seas and within the EEZ.[32] According to article 79 (1), all States are entitled to lay submarine cables and pipeline on the continental shelf.

3.2. Outer limits of the continental shelf

Two distinctive approaches can be used to understand the geographical range of the continental shelf. Continental shelf in the traditional scientific sense is the platform on which the land lies above the 200 meter isobaths. In broader and legal sense, continental shelf extends throughout the natural prolongation of the land territory to the outer edge of the so-called continental margin, or to a distance of 200 M from the baselines where the outer edge of the margin does not reach up to 200 M (Fig. 1). The continental margin consists of the seabed and subsoil of the shelf, the slope and the rise. In the rise, there are typically sediments that have washed down from the continents through the geological time scale, whose thickness is one of the important technical criteria to judge the natural prolongation of land mass. The foot of the slope also plays a very important role in delimiting the breadth of the continental shelf. As a general rule, the foot of the slope shall be determined at the point of maximum change in the gradient as the base of the slope in

26 See article 80 of the LOS.
27 See article 81 of the LOS.
28 See article 246, paragraph 1 of the LOS.
29 See article 246, paragraph 5 of the LOS.
30 See article 77, paragraph 2 of the LOS.
31 See article 78, paragraph 1 of the LOS.
32 See article 78, paragraph 2 of the LOS.

the absence of evidence to the contrary (Fig. 1).[33] Beyond the continental margin is the deep ocean floor or abyssal plain. Article 76 of the LOS provides the legal definition of the continental shelf, including the determination of the foot of the slope, outer edges of the continental margin, maximum limits of the shelf and the ridge.

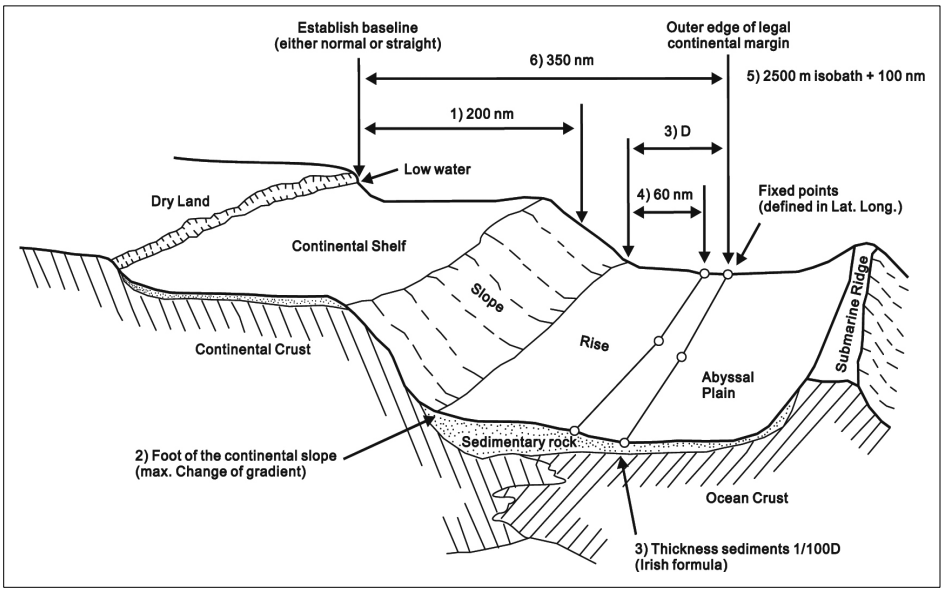

Figure 1. Generalized profiles across a continental margin showing the geomorphology and the outer limits of the continental shelf (arrows) determined by various criteria in article 76: 1) the 200 nautical mile (M) limit, 2) the foot of the continental slope, 3) the Gardiner Line (Irish formula), 4) the Hedberg Line (60 M from the foot of the shelf), 5) the 2500 m isobaths projected seaward by 100 M, 6) the 350 M limit from territorial baseline (modified from International Hydrographic Bureau, 2006).

Paragraph 1 of article 76 defines the continental shelf as the combination of the seabed and subsoil in 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, or to a distance of 200 M from the baselines. This paragraph prescribes two criteria for determination of outer limits of the shelf: either the natural prolongation or the distance of 200 M. The distance provides a minimum breadth of the continental shelf of 200 M in cases where the natural prolongation does not reach to 200 M. Natural prolongation is the key parameter in the general part of the definition of the continental shelf. Coastal States claiming for the extended continental shelf beyond the 200 M necessarily invoke this provision on the natural prolongation. By the plain meaning of the word prolongation, the required continuity must be unbroken from the shoreline to the outer edge of the continental margin.

33 See article 76, paragraph 4(b) of the LOS.

Article 76 (3) describes that the continental margin comprises the submerged prolongation of the land mass of the coastal State and consists of the seabed and subsoil of the shelf, the slope and the rise. The continental margin does not include the deep ocean floor with its oceanic ridges or the subsoil thereof.

Apparently, the definition of continental margin in article 76 shows that it draws on geomorphology and submarine landscape, not on the crustal type (i.e., continental or oceanic crust). There is no LOS provision regarding crustal type in spite of many cases representing the influence of crustal type on negotiation process. This implies that the submerged prolongation of the landmass of a coastal State, regardless of its sediment characteristics, belongs to its continental margin (legal continental shelf).

For the continental shelf of an island, there is no distinction made between the determination of the outer limits of the continental shelf of a mainland and that of an island. The continental self of an island is determined in accordance with the same provisions of the LOS applicable to other land territory.[34]

The foot of the slope is the primary feature in the delimitation of the continental shelf beyond the 200 M limit (Fig. 1). It is the reference baseline from which the breadth of limits is measured by the sediment thickness with at least 1 per cent of the shortest distance to outermost fixed points (Irish formula), or by not more than 60 M to fixed points (Hedberg formula).[35] The Irish formula employs drawing the line connecting points not more than 60 M apart, at each of which points the thickness of sediments is at least 1 per cent of the shortest distance from such point to the foot of the slope. Thus, if the formula is to apply at a distance of 100 M from the foot of the slope, 1 M thickness of sediment must be present there. The CLCS invokes a principle of continuity in the application of this formula to state that "*(a) 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 that (b) for each of the fixed points chosen, the CLCS expects documentation of the continuity between the sediments at these points and the sediments at the foot of the continental slope*."[36] The Hedberg formula includes drawing a line connecting points not more than 60 M from the foot of the slope (Fig. 1). A State may apply the two formulas alternatively, i.e., it may apply the Irish formula in certain portions of its continental shelf and the Hedberg formula in other portions, in a manner to maximize its continental shelf ranges.

Article 76 (5) confines the maximum breadth of the legal continental shelf within 350 M from the baseline of the territorial sea or within 100 M from the 2,500 metre isobaths, which is a line connecting the depth of 2,500 metres. The former criterion (350 M constraint) is based purely on a distance criterion, whereas the latter (the 100 M from the 2500 m

34 See article 121, paragraph 2 of the LOS.
35 See article 76, paragraph 4(a) (i) and (ii) of the LOS.
36 See CLCS (1999), pp.56~67.

isobaths) is based on a depth/distance criterion. Both criteria may be used alternatively and only one of them has to be respected in each portion of the continental shelf. Thus, the outer limits of the continental shelf could extend beyond the 350 M in some cases. It should be emphasized, however, that these constraints are solely limited to the fixed points comprising the line of the outer limits of the continental shelf on the seabed, drawn in accordance with the Irish and Hedberg formulas.

3.3. Ridges

According to paragraph 6 of article 76, the 100 M from the 2,500 meter isobaths constraint may not apply to submarine ridges-the maximum limit on such ridges is fixed at 350 M from the baselines. However, this paragraph does not apply to submarine elevations that are natural components of the continental margin, such as plateaux, rises, caps, banks and spurs. Three types of sea floor ridges are mentioned and differently treated in article 76 of the LOS.[37]

These so-called "ridge provisions" above incorporated into Article 76 (3) and (6) were among the last provisions to be agreed on during the UNCLOS III. The ridge issue has since been regarded as one of the most complex and contentious parts of the articles. The CLCS states in its technical guideline that None of these terms is precisely defined. It seems that the term "ridge" is used on purpose. The link between the *oceanic ridges* and the submarine ridges is unclear. Both terms are distinct from the "*submarine elevation s*"[38] Although article 76 of the LOS does not define these terms, the CLCS interprets their notions and verifies their distinction as following:

> *"The distinction between the "submarine elevations" and "submarine ridges" or "oceanic ridges" shall not be based on their geographical names used so far in the preparation of the published maps and charts and other relevant literature. Such a distinction for the purpose of article 76 shall be made on the basis of scientific evidence taking into account the appropriate provisions of these guidelines."*[39]

The main objective of article 76 (3) mentioning oceanic ridges is to exclude the deep ocean floor from the continental margin, along with its subsoil and oceanic ridges.

37 Oceanic ridges: (The continental margin) does not include the deep ocean floor with its oceanic ridges or the subsoil thereof (para.3); Submarine ridges: on submarine ridges, the outer limit of the continental shelf shall not exceed 350 M from the baselines from which the breadth of the territorial sea is measured (para.6); Submarine elevation: (Maximum limit of 350 M) does not apply to submarine elevations that are natural components of the continental margin, such as plateaux, rises, caps, banks and spurs (para.6).

38 See CLCS (1999), *supra* note 36, p.52.

39 *Ibid*., p.53.

The main point here is that the continental margin ends where the deep ocean floor begins. It should be pointed out that an oceanic ridge that is located anywhere other than within the deep ocean floor is not excluded from the continental margin. The term "oceanic" in paragraph 3 is used to refer to ridges that are fundamentally and genetically linked to the deep ocean floor by sharing geological characteristics and origin with the deep seafloor and its subsoil. There appears to be two ways in which a ridge may be classified as an oceanic ridge of the deep ocean floor.[40]

First, when an underwater ridge is located beyond the outer edge of the legal continental margin and shares geological characteristics and origin with the deep ocean floor, it is an oceanic ridge of the deep ocean floor. Second, when an underwater ridge is located within the continental margin but detached from the envelope of the foot of the continental slope and extends into the deep ocean floor, it should be regarded as an oceanic ridge.

Some submarine ridges that lie entirely beyond the foot of the continental slope and are either wholly within the deep ocean floor or around the outer edge of the continental margin, may have originated from the continental margin, but were later separated from it by geological crust movements. In geological perspective, such ridges should not be classified as oceanic ridges because they do not share geological characteristics and origin with the deep ocean floor. However, since they lie beyond the foot of the slope over their full range, such ridges cannot become parts of the outer edge of the continental margin. In this respect, such ridges should be treated as an oceanic ridge in exactly the same manner under article 76.

By virtue of article 76 (6), submarine ridges could be ridges that are not natural components of the continental margin but still comprise the continental margin because they fall within the common envelop of the foot of the slope. Concurrently, 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 strong oceanic characteristics. However, the classification of ridges should not be based solely on a distinction between different geological crust types. This point was also highlighted by the CLCS:

> *"Therefore, the Commission feels that geological crust types cannot be the sole qualifier in the classification of ridges and elevations of the sea floor into the legal categories of paragraph 6 of article 76, even in the case of island States."*[41]

The CLCS (1999) further emphasizes the need to consider a range of character-

40 For more details on the ridge issue, see Breke and Symonds (2004).
41 See CLCS (1999), *supra* note 36, p.54 (para. 7.2.9).

istics, including those already mentioned above, in the classification of ridges:

> *"Therefore, the Commission feels that in case of ridges its view shall be based on such scientific and legal considerations as natural prolongation of land territory and land mass, morphology of ridges and their relation to the continental margin as defined in paragraph 4 and continuity of ridges."*[42]

Morphology alone is clearly not sufficient to distinguish such "submarine ridges" from the "submarine elevations" that are natural components of the continental margin. Consequently, a "submarine ridge" is a ridge that is morphologically an integral part of the continental margin, but partial or entire ridge is different from the landmass of the coastal State, in that it also shares geological characteristics and/or origin with the deep ocean floor. At the same time, a "submarine ridge" must, at least in its landward part, be genetically linked with the continental margin and not belong to the deep ocean floor with its oceanic part. As it is difficult to define the details concerning various conditions, the CLCS states that it is appropriate that the ridge issue should be examined on a case-by-case basis.[43]

Article 76 (6) includes a selection of submarine elevations: "such as plateaux, rises, caps, banks and spurs." This wording is explicitly unhelpful to identify submarine elevations. A submarine elevation has not been included in any oceanographic or legal dictionary so that there is no formal definition that describes the morphological and geological characteristics of submarine elevations. The only specialized dictionary addressing submarine morphological forms was published by the International Hydrographic Bureau in 2001.[44] Although such highs are commonly associated with continental margins, they may also be found in other settings (e.g., deep sea basin). Thus, the morphological expression of these features is not a sufficient criterion to distinguish between the submarine ridges and the elevations. Since these elevations are natural components of the continental margin, it is important to consider the geological processes that form the submarine elevations within continental margins and how continents grow.

Although there is no reference to a specific type of crust in submarine elevations, it seems appropriate to invoke the principle of geological continuity. That is, these morphological features must have the same general geological characteristics and/or origin as the landmass of the coastal State from which the continental margin naturally extends in order to classify them as natural prolongations.

In conclusion, it seems that in the classification of features that are "natural compo-

42 *Ibid*., p.54 (para. 7.2.10).

43 *Ibid*., p.55 (para. 7.2.11).

44 IHO and IOC (2001). *Standardization of Undersea Feature Names*. International Hydrographic Bureau, Bathymetric Pub. No. 6, 3rd edition. Available from <http://www.iho.shom.fr/publicat/free/files/B6efEd3.pdf>

nents of that continental margin" or "submarine ridges", their fundamental and physical relationships with the continental margin in the sense of the LOS (i.e., in terms of the foot of the slope and their geological characteristics and origin) are more important than their morphological classification.

3.4. The 10-year time limit for submissions

Submission to the CLCS regarding the outer limits of the continental shelf beyond the 200 M is obligated to meet a deadline of 10 years after the entry into force of the LOS for the corresponding State.[45] Many of coastal States which already ratified the LOS in 1994 showed their major concern on the submission deadline which would have been on November 16th in 2004. Additionally, the CLCS was not established until May 1997 and the delay of deadline should be a realistic issue. At the 11th Meeting of States Parties in May 2001, the decision was made regarding the date of commencement of the ten-year period for making submissions to the CLCS set out in article 4 of Annex II to the LOS.[46] It was decided that, for a State for which the LOS entered into force before May 13th in 1999, the date of beginning of the 10-year time period for making submissions to the CLCS is May 13th in 1999.[47] By this decision, coastal States which mostly ratified the LOS before the 1999 should observe the submission deadline on May 13th in 2009. For coastal States in the Arctic Ocean, Russia was the first nation to submit a claim to the CLCS in 2001. Part of this claim relates to the Arctic Ocean beyond the 200 M from the coast.[48] Norway followed and made a submission to the CLCS regarding its extended continental shelf claim including the Arctic Ocean in November 2006.[49] Canada's deadline for submission is in 2013. It is 2014 in the case of Denmark.[50] For the USA which is a non-party to the UNCLOS, no deadline for submission to the CLCS has been decided yet.

Other opinions were voiced by some delegations during the 11th Meeting of States Parties regarding the 10-year rule. One critical opinion is highly debatable whether the deadline affects the substantive rights protected in the LOS. Article 77 (3) states that rights

45 See Article 4 of Annex II to the LOS.

46 See the CLCS document on Issues with respect to article 4 of Annex II to the Convention. Available from <http://www.un.org/Depts/los/clcs_new/issues_ten_years.htm>

47 The rationale to decide this date as the beginning is that the CLCS has adopted its Scientific and Technical Guidelines on that date and States could have a clear idea of how to prepare their submissions only after this date. See Documents of the Meeting of the State Parties to the UNCLOS, No. 72 (SPLOS/72). Available from <http://daccessdds.un.org/doc/UNDOC/GEN/N01/387/64/PDF/N0138764.pdf?OpenElement>

48 See Submission by Russian Federation to the CLCS in 2001. Available from <http://www.un.org/Depts/los/clcs_new/submissions_files/submission_rus.htm>

49 See Continental Shelf Submission of Norway: in respect of areas in the Arctic Ocean, the Barents Sea and the Norwegian Sea. Available from <http://www.un.org/Depts/los/clcs_new/submissions_files/submission_nor.htm>

50 Canada became the party to the UNCLOS in 2003. Denmark joined in the UNCLOS in 2004.

of the coastal State over its continental shelf were inherent.[51] Thus, no-compliance with the 10-year period which, in other words, means non-submission or late-submission, should not adversely affect the corresponding State's rights on the continental shelf. Another issue is of a possible further extension beyond 10 years of the time period for submission, as proposed by the Pacific Island Forum States.[52] Several delegations recognized that such an extension would accommodate the needs of developing States which lacked the reliable expertise and finance to provide the relevant scientific and technical data for their submission to the CLCS within the deadline. The delegations agreed that meanwhile further discussions were needed on the issue of the ability of States, particularly developing States, to fulfill the requirements of article 4 of Annex II to the Convention. In that regard, the Meeting suggested that the cooperation between the CLCS, regional centers of excellence and the United Nations University should be pursued to build the capacity of developing States for submission. Eventually, in the eighteenth Meeting of the State Parties in June 2008, it was decided that the 10-year time period may be satisfied by submitting preliminary information to the UN Secretary-General.[53] However, the preliminary information should be regarded as a temporary tool to delay the deadline of submitting a full submission to the CLCS. For the due consideration by the CLCS, the full submission should be made in accordance with LOS article 76, the Rules of Procedure and the Scientific and Technical Guideline of the CLCS. Based on this decision, most of the coastal States have strived for the submission within the 10-year deadline. For example, 50 cases have been submitted to the CLCS and 41 cases of preliminary information have been submitted to the Secretary-General by the deadline date of May 13th of 2009.[54] The CLCS have already performed the full examination of eight submissions. Based on the current examining speed of the CLCS, it would be expected that the full examination of 42 cases will be finished in 2091.[55]

---

51 See *supra* note 20.

52 See the Statement by Mr. Jeem Lippwe, Minister, Permanent Mission of the Federated States of Micronesia to the UN, on behalf of the members of the Pacific Islands Forum that maintain Permanent Missions to the UN in New York, Before the 11th Meeting of the State Parties to the UNCLOS, New York, 16 May 2001. Available from <http://www.fsmgov.org/fsmun/unclos01.html>.

53 Preliminary information includes the indication of the outer limits of the continental shelf beyond 200 M, the status of preparation and intended date of making a full submission. See the CLCS document, SPLOS/183. Available from <http://daccessdds.un.org/doc/UNDOC/GEN/N08/398/76/PDF/N0839876.pdf?OpenElement>

54 For updated list, see <http://www.un.org/Depts/los/clcs_new/commission_submissions.htm>. Japan already submitted to the CLCS the claim to establish the extended continental shelf beyond 200 M in seven regions located to the south and the south-east off the mainland of Japan in November 12th, 2008. China and Korea submitted the preliminary information instead of full submission on the same date of May 11th, 2009. For these countries' submissions, see the CLCS website <http://www.un.org/Depts/los/clcs_new/clcs_home.htm>

55 The CLCS holds two 6-week examining sessions (March and August) in a year and usually spends four sessions (equivalent of two years) for one case. Therefore, given 41 cases of preliminary information, the CLCS examination would be ended in 2173 (Personal communication with Dr. Park, Yong-Ahn, a member of the CLCS).

Submissions involving disputed areas are exempted from the deadline.[56] The Annex I to the Rule of Procedure of the CLCS concerns the issue on submissions in case of a dispute between States with opposite or adjacent coasts or in other cases of unresolved land or maritime disputes. Under paragraph 3 of this Annex I, a State may make a partial submission so as not to defect the delimitations of boundaries between States in any other portion of the continental shelf. If a partial submission is made, a submission for the areas not included in the initial submission may be made after the 10-year period. What coastal States in this case might consider is to submit a joint claim with adjacent claiming states, without regard to the delimitation of boundaries between States.[57] For example, five joint submissions have been turned in to the CLCS to date.[58]

4. Ridges in the Arctic Ocean (Russian submission to CLCS in 2001)

4.1. Summary of submission by Russia

Russia has recognized the multiple potential of the Arctic and is moving rapidly to assert its national interests. On December 20, 2001, Moscow has submitted documentation claiming outer limits of its continental shelf covering an area of 1,191,000 km^2 in the Arctic Ocean-the size of Germany, France and Italy combined. It became the first State to submit its application to the CLCS. The Russian claim extends its judicial continental shelf to the North Pole. As seen in (Fig. 2),[59] most of the area claimed by Russia is located beyond the Russian 200 M exclusive economic zone (EEZ) in a triangle-shaped zone. Given the confidentiality rule of the CLCS process, there is no way to directly know what provisions Russia invoked in its 2001 submission to the CLCS. However, it is also possible to draw some conclusions speculated on the grounds of documents made public for the Russian claims.[60] Previous studies represented that Russia would regard Lomonosov and

56 See Paragraph 3 of Annex 1 to the Rule of Procedure of the CLCS. Available from <http://daccessdds.un.org/doc/UNDOC/GEN/N08/309/23/PDF/N0830923.pdf?OpenElement>

57 According to the paragraph 4 of Annex I, the CLCS recommends separate submissions or a joint submission in cases involving continental shelf boundaries.

58 Joint submissions were made by 1) France, Ireland, Spain and the UK in the Celtic Sea and the Bay of Biscay (May 2006), 2) Republic of Mauritius and Rep. of Seychelles in the Mascarene Plateau (December 2008), 3) Micronesia, Papua New Guinea and Solomon Islands concerning the Ontong Java Plateau (May 2009), 4) Malaysia and Viet Nam in the South China Sea (May 2009), 5) France and South Africa in the Crozet Archipelago and the Prince Edward Islands (May 2009) in chronological order. For updated information, refer to website in supra note 51.

59 A map of the Russian claim in the Arctic Ocean is a part of the Executive Summary of Russian submission. Available from <http://www.un.org/Depts/los/clcs_new/submissions_files/submission_rus.htm>

60 The executive summary of Russian submission (2001), US reaction to Russian claim and some articles on this issue can be cited for this purpose.

Alpha-Mendeleev Ridges as submarine elevations that naturally extend from its continental margin.[61] According to the article 76 (6), submarine elevations can remove the 350 M boundary constraint for its outer fixed points as long as these points satisfy the 100 M from the 2,500 metres isobaths constraint.

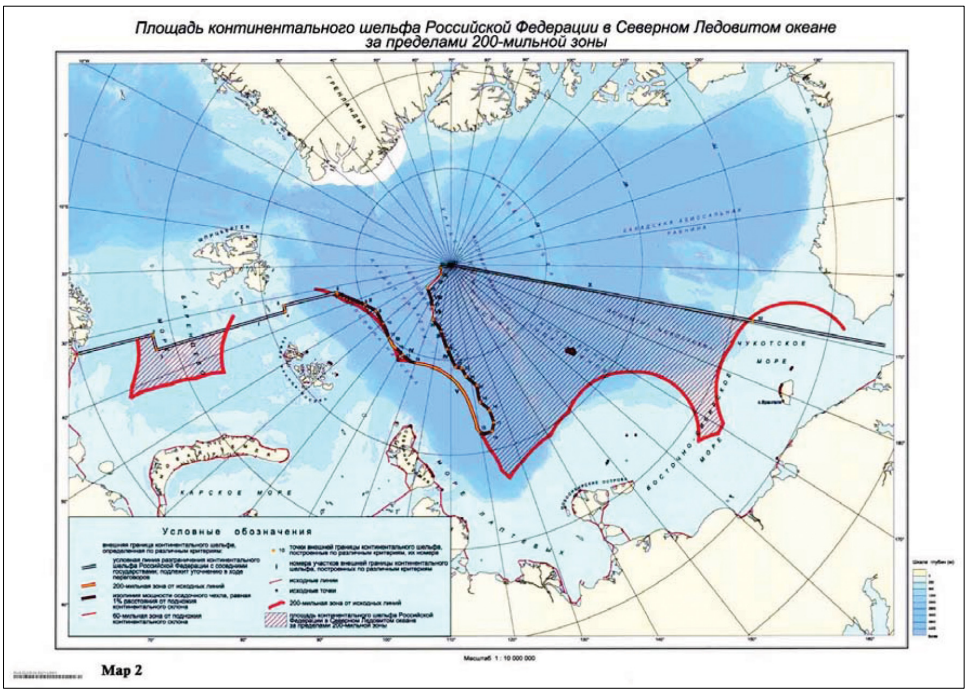

Figure 2. The outer limits of the continental shelf submitted by Russian Federation to the Commission on the Limits of the Continental Shelf (CLCS) in 2001. Slant-lined area is claimed as the extended continental shelf beyond the 200 M. Solid-curved lines indicate the Russian 200 M Economic Exclusive Zone (EEZ) from the territorial baselines (from the Executive Summary of Russian submission to the CLCS in 2001).

One question was raised by Gorski (2009): Why does the extent of the Russian claim on the Lomonosov Ridge end exactly on the North Pole?[62] If this feature is a natural component of the Russian continental margin, the ridge would be entirely included within Russia's outer limits until its physical end reaches closely to the Canada/Greenland continents. Gorski suggested two possible opinions. One is that the Russian-side continental plate exactly ends at the North Pole from which other oceanic origin exists along the ridge to the other ends. The other speculation is that Russia intentionally terminated its natural prolongation at the North Pole to avoid conflict with Denmark and Canada and to gain their support to the 2001 submission by suggesting the possibility of "sectoral division"

61 These studies are Macnab (2008), Gorski (2009) and Benitah (2007).
62 See Gorski (2009), p.57.

of the Arctic Ocean seabed. If Russian submission is accepted by the CLCS, almost half of the Arctic Ocean would be entitled to Russian Federation in terms of the sovereign rights to the continental shelf. For readers to better understand the Russian context in the Arctic sovereignty, we would like to provide what the Russians have viewed and claimed the Arctic Ocean historically.

4.2. Russia's historical perspective on the Arctic sovereignty

The Russians consider the development of the Arctic regions, the Northern Sea Route (NSR) and recent offshore oil and gas discoveries as one of the brightest pages in the Russian history. Recognizing the important contribution by foreigners (Holland, Great Britain, Norway and other countries), historical tsarist Russia, the Soviet Union and the Russian Federation as a successor have been the major discoverer of most of the Arctic islands and lands and first to achieve practical mastery of navigation along the NSR. In September of 1916 a note by the Russian Foreign Ministry was sent to all nations asserting the Russian claim to all territories explored and unexplored, discovered and undiscovered between the Russian coast on the Arctic Ocean and the North Pole, with the exception of previously recognized territories of other nations.[63] Thus, the recognition of economic and strategic value of the region was clearly demonstrated by the Russian government. The resolution of April 15, 1926 by the Presidium of the Central Executive Committee of the USSR proclaimed the establishment of the geographical boundaries of the Soviet sector of the Arctic between 32º 04'35'' E and 168º 49'30'' W. Within the boundaries of the indicated sector, the Soviet Union claimed to exercise full sovereignty of all land and islands located in the Arctic Ocean, north of the coast of the Soviet Union, as far as the North Pole.[64] The Soviet Union announced that the Arctic Ocean has special characteristic that justified their claim to nearly half of the entire ocean. Although Russia has never given a special decree since that time, it has been their policy to press for the sector principle. Interestingly, the sector principle is not based on any internationally accepted sea law whatsoever. Therefore, it does not legitimize Russia's claim and it certainly does not offer a reasonable solution in determining jurisdiction over the disputed area.

With respect to development of the Northern Region, the first ice-air reconnaissance was performed in 1924. Gradually, the aviation began regular ice-air reconnaissance and thus Polar Aviation was developed.[65] The network of Polar Stations has been growing steadily. In December, 1932, by the special resulting of the Council of People's Commissars of the USSR, the Main Directorate of the NSR, the state-owned company 'GlavSevMorPut',

63 See Krypton Constantin (1956), pp.77~78. The Northern Sea Route and the economy of the Soviet North (London: Methuen & Co., Ltd, 1956), pp.77~78.

64 Morskoy Sbornik, No. 6, 1970, pp.83~88.

65 Morskoy Flot, No. 7, 1967, pp.9~11.

was established. The Soviet mastery of the NSR was demonstrated in 1939. Prior to World War II, duration of navigation reached over 100 days in the western part of the NSR and over 70 days in its eastern part.

After the war the efforts for further mastering of the NSR continued. Systematic planned research in the Arctic was intensified during the period of 1949-51, followed by three years of passivity. After 1954, the Soviet Union has maintained at least two drifting stations on the ice. The total number of these stations in a 34-year period starting with 1937 (Papanin station) has reached 20 in 1970.[66] Polar aviation was reinforced with a greater number and better quality of aircraft. By the mid 1950s, the NSR came out to be fully operational.

Russia intends to create Arctic troops to maintain security of the Russian part of the Arctic Ocean under the conditions of the current political situation in the world. The document posted on the official website of the Russian Security Council said that the Arctic troops and the Russian Coast Guard system would be set up to maintain the military security under various conditions of the military and political situation.[67] These decisions by the Russian Security Council are aimed at enhancing security protection for the increasing traffic along the NSR. To control Arctic regions, an effective coast guard system is to be established, as well as a developed border infrastructure in Russia's Arctic zone and strong and well-equipped military contingents in those military districts. Russia's Northern and Pacific Fleets will be engaged in protecting the Arctic and sub-Arctic areas.

4.3. Other States' responses and Russia's further statements

Five States responded to the Russian submission, including the United State (US), Canada, Denmark, Japan and Norway.[68] Except for the US, other nations commented only regarding the overlapping boundary between the Russian's extended continental shelf and their EEZ. The Canadian response indicated that neither the submission itself nor its acceptance by the CLCS would prejudice the delimitation of the continental shelf between Canada and Russia.[69] Norway stated that the unresolved delimitation issue in the Barents Sea should be treated as a maritime dispute in accordance with Article 5(a) of the Annex I to the Rule of Procedure.[70] Japan responded regarding the Sea of Okhotsk that both countries have continued vigorous negotiations, in a friendly atmosphere, in terms of the territorial issue of the four southernmost Kuril islands or delimitation of the continental shelf and EEZ.[71] Denmark mentioned its irrelevant status to submit opinions, due to the lack of

66 Vodnyi Transport (December 15th, 1970).

67 See at <http://en.rian.ru/analysis/20090330/120824719.html>.

68 All five nation's notifications regarding the submission by Russia to the CLCS are available from <http://www.un.org/Depts/los/clcs_new/submissions_files/submission_rus.htm>.

69 See Notification from Canada, Ref No. CLCS.01.2001.LOS/CAN (Feb. 26, 2002).

70 See Notification from Norway, Ref No. CLCS.01.2001.LOS/NOR (April 2, 2002).

specific data and non-membership to UNCLOS.[72]

The US was the only one that referred to the scientific and technical aspects of the Russian submission which "has major flaws as it relates to the continental shelf claim in the Arctic."[73] Regarding the Lomonosov Ridge, The US claimed that "the Ridge is a freestanding feature in the deep, oceanic part of the Arctic Ocean Basin and not a natural component at the continental margins at either Russia or any other State."[74] More detailed statements were provided with respect to the Alpha-Mendeleev Ridge, saying that "The Alpha-Mendeleev Ridge System is the surface expression of a single continuous geologic feature that formed on oceanic crust of the Arctic Ocean basin by volcanism over a "hot spot The Alpha-Mendeleev hot spot is now forming from magma funneled from a hot spot to the actively spreading Mid-Atlantic Ridge. The Ridge is therefore a volcanic feature of oceanic origin... It is not part of any State's continental shelf."[75] In order to support these statements, four specific data were provided in terms of bathymetric, aeromagnetic, seismic, bedrock collection by the US response. The US conclusively recommended that the Russian submission should be considered in a deliberate manner, given its particular complexity.

In a further statement to the commission in April 2002, the Russian Federation explained the hydrographic surveys and bathymetric mapping that it had undertaken in order to establish the 2,500 meter isobaths on the continental slope and the foot of the continental slope, performed during the years 1960~1990. Furthermore, Russia detailed the methods for deep seismic sounding and seismic reflection that led it to regard the Alpha-Mendeleev Ridge System as part of its continental margin. It stated, in part: The results of the interpretations of comprehensive geological and geophysical data support the categorization of the Amerasian basin geostructures (Lomonosov and Alpha-Mendeleev Ridges) as components of the continental margin The integrated interpretation of the deep seismic sounding and seismic reflection sounding provided data on the velocity characteristics, layering and thickness of the earth's crust which are characteristic of a continental-type crust. This conclusion is consistent with generally accepted concepts.[76]

71 See Notification from Japan, Ref No. CLCS.01.2001.LOS/JPN (March 14, 2002).

72 See Notification from Denmark, Ref No. CLCS.01.2001.LOS/DNK (Feb. 26, 2002).

73 See Norification from the United States of America, Ref No. CLCS.01.2001.LOS/USA (Mar 18, 2002).

74 *Ibid*., p.3.

75 *Ibid*., p.2.

76 Statement made by the Deputy Minister for Natural Resources of the Russian Federation During Presentation of the Submission Made by the Russian Federation to the Commission on 28 march 2002, p.5, UN Doc.CLCS/31 (April 5, 2002).

4.4. Recommendation of CLCS regarding Russian submission

A subcommission of the CLCS was created to examine Russian submission. The subcommission met several times during the spring of 2002, requesting additional materials as needed from the Russian Federation and then reported its recommendation to the CLCS. In June 2002, the CLCS by consensus adopted final recommendations for transmission to Russia.[77]

As regards the Central Arctic Ocean, the CLCS recommended that the Russian Federation make a revised submission in respect of its extended continental shelf in that area based on the findings contained in the recommendations.

In the case of the Barents and Bering Seas, the CLCS recommended to Russia, upon entry into force of the maritime boundary delimitation agreements with Norway in the Barents Sea and with the USA in the Bering Sea, to transmit to the CLCS the charts and the coordinates of the delimitation lines as they would represent the outer limits of the continental shelf of Russia extending beyond 200 M in the Barents Sea and the Bering Sea respectively.

Regarding the Sea of Okhotsk, the CLCS recommended to the Russia to make a well-documented partial submission for its extended continental shelf in the northern part of that sea. The CLCS states that this partial submission shall not prejudice questions relating to the delimitation of boundaries between States in the south for which a submission might subsequently be made, notwithstanding the provisions regarding the 10-year time limit established by article 4 of Annex II to the CLCS. In order to make this partial submission, the CLCS also recommended to Russia to make its best efforts to effect an agreement with Japan in accordance with paragraph 4 of annex I to the Rules of Procedure of the CLCS.

5. Conclusions

The continental shelf of a coastal State in the sense of article of 76 of UNCLOS is the seabed and subsoil of the submarine areas beyond the territorial sea over which it has jurisdiction. Article 76 refers to this area as “the natural prolongation” of the land territory of the State. The most controversial criteria in delimitation of continental margin are how to define the natural prolongation and how to distinguish submarine elevations from submarine and oceanic ridges. To classify the ridge correctly, three features should be carefully considered: i) geological continuity, ii) crustal neutrality, iii) envelop of the

77 Fifty-seventh session, Agenda item 25 (a), Oceans and the law of the sea, Report of the Secretary-General, Addendum, A/57/57Add.1 (Oct. 8, 2002), pp.9~10.

foot of the continental slope. An extended continental shelf submission needs to include sophisticated documentation that indicates the above three characters in specific ridges and submarine elevations. The elongated morphology of the features does not make the submission consistent with the article 76 (6), nor does the nomenclature of the features as ridges. Regarding the Lomonosov and Alpha-Mendeleev Ridges, the Russia Federation needs to present geological evidence to the CLCS that both of the ridges constitute natural components of the Russian continental margin.

For coastal States seeking to the extended continental shelf beyond their 200 M EEZ, the ridge is the very attractive tool to make the submission accepted. In reality, many States have claimed the extended continental shelf beyond the 200 M limit based on the ridge provisions. The submarine elevations can even further extend the continental shelf beyond the 350 M constraint. However, since neither the expressions "submarine elevations" nor "natural components" are defined in the LOS, it is required that the CLCS should refine those characterizing features in its technical guideline. How the CLCS deals with the geological data regarding such contentious ridge provisions as the Lomonosov and Alpha-Mendeleev Ridges will have implications not only for the Arctic Ocean but also worldwide. The Arctic Ocean coastal States may follow the Russian example and take advantage of the Arctic Ocean ridges. The US has already adopted the position that the Chukchi Plateau is a natural component of the Alaskan Arctic shelf and thus allows for the determination of extended continental shelf beyond the 350 M constraint. Denmark may claim the Lomonosov Ridge to be a natural prolongation of the North American shelf and Canada may raise claims to the Alpha-Mendeleev Ridge. In other areas, a number of other nations may also raise claims to extended continental shelf beyond the 350 M, using the legal provision of submarine elevations. The CLCS's attitude toward the Russian arguments will influence the scope of future claims from "ridge coastal States".

Given the high number of submission, it is possible, solely from the authors' viewpoint, that the CLCS would find itself in a stance where it would tend to lean towards rejecting rather than accepting the submission. If a coastal state fails to include geological justifications in its submission, members of the CLCS who may not fully communicate with the submission State regarding the geological complexity of the particular case may well find rejecting reasons against a given ridge or submarine elevation as natural prolongation of a continental margin. For a successful acceptance of extended continental shelf by the CLCS, a coastal State should allocate a considerable amount of budgets and efforts in developing its outer limit of continental shelf based on a ridge or submarine elevation.

References

Arctic Monitoring and Assessment Programme (AMAP). 2007. *Arctic oil and gas* 2007. Gylling Denmark: Narayana Press.

Arctic Climate Impact Assessment (ACIA). 2004. *Impacts of a warming Arctic*. Cambridge UK: Cambridge University Press.

Benitah, M. 2007. Russia's claim in the Arctic and the vexing issue of ridges in UNCLOS. *The American Society of International Law (ASIL) Insights* 11(27), http://www.asil.org/insights071108.cfm

Breke, H. and P. A. Symonds. 2004. The ridge provisions of article 76 of the UN Convention on the Law of the Sea. In *Legal and scientific aspects of continental shelf limits*, Edited by M.H. Nordquist, J.N. Moore and T.H. Heidar, 169~199. Leiden/Boston: Martinus Nijhoff Publishers.

Commission on the Limits of the Continental Shelf (CLCS). 1999. *Scientific and technical guidelines of the commission on the limits of the continenral shelf*. United Nations Doc. CLCS/11, http://daccessdds.un.org/doc/UNDOC/GEN/N99/171/08/IMG/N9917108.pdf?OpenElement

Constantin, K. 1956. *The Northern Sea Route and the economy of the Soviet North*. London: Methuen & Co., Ltd.

Gorski, T. 2009. A note on submarine ridges and elevations with special reference to the Russian Federation and the Arctic ridges. *Ocean Development & International Law* 40:51~60.

International Boundaries Research Units (IBRU). *Maritime jurisdiction and boundaries in the Arctic region*. Durham University, http://www.dur.ac.uk/ibru/resources/arctic/

International Hydrographic Organization (IHO) and Intergovernmental Oceanographic Commission (IOC). 2001. *Standardization of undersea feature names*. International Hydrographic Bureau, Bathymetric Pub. No. 6, 3rd edition. http://www.iho.shom.fr/publicat/free/files/B6efEd3.pdf.

Kalo, J. J., R. G. Hildreth, A. Rieser and D. R. Christie. 2007. *Coastal and ocean law*: *cases and materials*. St. Paul MN: Thomson/West.

Lean, G. 2008. For the first time in human history, the North Pole can be circumnavigated. *The Independent*, August 31. http://www.independent.co.uk/environment/climate-change/for-the-first-time-in-human-history-the-north-pole-can-be-circum-navigated-913924.html

Macnab, R. 2004. The case for transparency in the delimitation of the outer continental shelf in accordance with UNCLOS article 76. *Ocean Development & International Law* 35:1~17.

_____. 2008. Submarine elevations and ridges: wild cards in the poker game of UNCLOS article 76. *Ocean Development & International Law* 39:223~234.

Mellgren, D. 2007. Denmark maps Arctic ridge in claim race. *Associated Press*, August 10.

Powell, R. C. 2008. Configuring an Arctic commons? *Political Geography* 27:827~832.

Rayfuse, R. 2007. Melting moments: The future of polar oceans governance in a warming world. *Review of European Community and International Environmental Law* 16(2):196~216.