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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, made on 28 March 2002

The main purpose of this presentation is to demonstrate the methodology used in determining the outer limit of the continental shelf of the Russian Federation in the Arctic basin in the context of article 76 of the United Nations Convention on the Law of the Sea ("the Convention"). A complete package of submission materials was sent to the Commission on the Limits of the Continental Shelf on 20 December 2001 in accordance with the established procedure.

In preparing the submission, the terms "continental shelf", "continental margin" and the constraints relating to "oceanic ridges" were applied in accordance with article 76, paragraphs 1, 3 and 6 of the Convention, and the Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf.

Let us consider some of the criteria contained in the Convention for the delineation of the outer limit of the continental shelf.

Article 76 establishes two criteria (formulae) for establishing the outer edge of the submarine continental margin: the first criterion is based on the thickness of sedimentary cover (paragraph 4 (a) (i)), i.e. the thickness of sedimentary cover within the outer limit of the continental shelf must be at least 1 per cent of the distance from the foot of the continental slope (sediment thickness formula).

The second criterion, which is based on distance, is set forth in paragraph 4 (a) (ii); the outer limit of the submarine continental margin is determined as 60 nautical miles from the foot of the continental slope (distance formula).

Article 76, paragraph 5, sets restrictions on determining the position of the outer limit of the continental shelf: (a) 350 nautical miles from the baselines and (b) 100 nautical miles from the 2,500 m isobath. The coastal State has the right to use whatever combination of constraint lines and formula lines is most advantageous to extending its continental shelf.

The formal delimitation of the submarine continental margin in terms of article 76 is based on an analysis of the earth's crust under the Arctic Ocean, prepared in accordance with the findings of geological and geophysical research, which is discussed below. The diagram shows the following principal genetic types of the crust of the Arctic basin: oceanic crust formed by spreading (Eurasian basin) and continental crust in varying degrees of transformation (Amerasian basin).

The descriptive diagram of crust types confirms the validity of the plotting of the foot of the continental slope (FCS) for the main morphostructures in the Russian sector. The findings of bathymetric and seismohydrographic investigations carried out by Russian expeditions during the period 1960-1990 were used as source materials in constructing the FCS and the 2,500 m isobath.

During this period, practically the entire area of the marine basin was surveyed by high-precision systematic depth soundings with a density of measurements ranging between 5 and 15 km. A total of 21,120 depth points was measured by echo-sounder, and 17,426 depth points were measured by seismic soundings. Depth soundings from submarines covered 90,716 linear kilometres. The precision of the depth measurements remained within 0.5 per cent of the measured depths, and were corrected for sound velocity in water using the findings of observations from hydrological stations which were carried out at depth measurement points, as well as tabulated data for the correction of depth values measured by echo-sounder. Hydrological observations were made repeatedly, and over several days, where the schedule permitted. Prior to 1969, the positioning of the depth measuring stations was determined by astronomic-geodetic means with average accuracy of about 1,000 m. Subsequently satellite navigation systems were used for this purpose, and the accuracy of determining the position of the stations moved into the range of 150-400 metres.

Over large areas the bottom topography was surveyed by means of brief landings of one or more helicopters or aircraft delivering research teams and seismic equipment to small ice floes. The large-scale survey covered an area of 4.1 million sq. km, or 80 per cent of the entire area of the Arctic basin. During the same period depth soundings from submarines covered approximately 91,000 km of linear kilometres with a mean accuracy of depth point positioning within 1.0–1.5 miles; readings were taken by NEL-6 “Mologa” echo-sounders.

On the basis of the findings of the Russian hydrographic surveys, a bathymetric map of the Arctic basin was prepared with a scale of 1:5,000,000, and 200 m contour intervals. An analysis of the bathymetric data and mapping of the bottom topography was carried out using morphological constructions, allowing a detailed representation of the various features of the topography. All the positive and negative forms of the topography were mapped in detail, showing their close interrelationship within the Arctic basin.

The findings of the surveys and mapping of the topography made it possible to establish the position of the basic criteria of article 76 of the Convention — 2,500 m isobaths on the continental margin and the foot of the continental slope. Within each composite profile, isobaths were spaced at 200 m intervals on a strip 40-50 km wide, and depth values were shown at the points of their intersection with the profile. When the profile was converted [into digital format], it was split into equal 2,500 m intervals and the depth values at these fixed points were determined by linear interpolation. In order to determine the foot of the continental slope, the following process was carried out on each initial digital bathymetric profile:

- Smoothing by the arithmetic mean method, at three points with five smoothing cycles;
- Computation of the smoothing parameters was carried out on the basis of the appropriate formulae;
- Calculation of the changes in the bottom gradient at each point of the smoothed profile was made on the basis of the appropriate formula indicated in the submission.

The determination of the foot of the continental slope was carried out by a geomorphological analysis of the profile and the selection of the maximum bottom gradient on the basis of the continental slope. A geomorphological analysis was necessary to determine the point of junction between the continental slope and the continental rise, i.e., the foot of the continental slope.

In addition to specific bathymetric data, the basic seismic data obtained in the course of many years of Russian and foreign research activities in the Arctic basin were used in the preparation of this submission. Seismic investigations were carried out in two ways:

- Soundings by the seismic reflection method at discrete intervals from the drifting ice bases of the “North Pole” (NP) and the “Sever (North)” research stations, both in the form of large-scale (10 x 10 km) aircraft soundings and along drifting ice bases;
- Deep seismic soundings by the seismic refraction method on the “Sever” and “Transarctic” expeditions.

In seismic reflection observations, multi-channel receiving arrays were used: cross-shaped, angular or T-shaped with 275 x 275 m spacing (systematic surveys); or 1,150 x 1,150 m (on drifting ice stations). The energy was generated by detonations from two to five electric detonators. Recording was made in analog form. Before 1969, the accuracy of positioning had been approximately 1 km, but after the introduction of satellite navigation systems, it became at least 300 m. Velocities in the sedimentary cover were determined on the basis of the results of special observations made during the “Sever” and “Transarctic” expeditions with much longer arrays which made it possible to compute the velocity parameters of the seismic environment. In addition, all available refraction data obtained by foreign expeditions was utilized. The error in velocity assessment was about 10 per cent.

The data from seismic (systematic) and bathymetric surveys was combined to produce a system of composite bathymetric and seismic profiles spaced 60 miles apart across all the major geological structures identified in the area (in accordance with article 76, paragraph 7). The composite profiles were prepared by orthogonal projection of the initial data points on selected profile lines. The projection distance did not exceed 15.8 km. These profiles were used to determine the foot of the continental slope (FCS), the 2,500 m isobath, the thickness of the sedimentary cover and the formula lines (1 per cent and 60 nautical miles distant from the FCS).

In order to determine the position of the FCS in accordance with article 76, a special methodology was developed. In essence, after smoothing procedures were applied to each bathymetric profile, several extreme gradients in the bottom slope were identified, and the maximum gradient was taken as the position of the FCS on a given profile. A more detailed description of the methods used for the determination of the FCS is given in the submission.

Taking into account the mean accuracy of the initial bathymetric data used in the calculation (of about 600 m), the mean accuracy of the FCS points was close to that value. However, since some measurements of positioning points had errors of up to 3,000 m, the accuracy of the FCS points was in the same error range, which is indicated in the submission.

The position of the FCS is shown on the map of the Arctic ocean in accordance with the distribution of crust types in the Arctic basin described above.

The position of the FCS obtained in this way was used to delineate the outer limit of the submarine continental margin using the distance formula (60 nautical miles from the FCS) in accordance with article 76, paragraph 4 (a) (ii) of the Convention. For these calculations, forward positioning computation was used.

A system of composite seismic profiles was used to delineate the outer limit of the submarine continental margin on the basis of the sediment thickness formula. The profiles showed the position of the points of the outer limit of the submarine continental margin calculated in accordance with the sediment thickness criterion (1 per cent of the distance from the foot of the continental slope). The position of the outer limit of the submarine continental margin using the sediment thickness criterion was determined in the same way on all the other profiles.

The position of the outer limit of the submarine continental margin determined in this manner is shown on the map of the Arctic Ocean.

The combination of the positions of the outer limit of the submarine continental margin determined on the basis of the sediment thickness and distance formulae is shown on the map of the Arctic Ocean.

The constraint lines were determined using the catalogue of coordinates of the basepoints of the Russian Federation in the Arctic approved in accordance with the established procedure. The location of the exclusive economic zone of the Russian Federation (the 200-mile zone) was calculated by using specially developed software.

The position of the first constraint line, the 350-mile zone from the baselines of the Russian Federation, which was determined by forward position computation, is shown on the map of the Arctic Ocean.

The position of the 2,500 m isobath, the coordinating points of which were calculated on composite bathymetric profiles using the method of linear interpolation of seabed depths, is shown on the map of the Arctic Ocean.

The position of the 2,500 m isobath was calculated on the same profiles that were used for determining the FCS. The coordinates of the points of the 2,500 m isobaths were calculated by the method of linear interpolation of coordinates and depth values relating to adjacent points of the profile, on the basis of the formulae specified in the submission. The accuracy of the positioning of the 2,500 m isobath corresponds to that of the determination of the FCS.

The position of the second constraint line, 100 miles from the 2,500 m isobath, which was calculated by forward positioning computation, is shown on the map of the Arctic Ocean.

In accordance with article 76, paragraph 5 of the Convention, the fixed points comprising the line of the outer limits of the continental shelf shall not exceed 350 nautical miles from the baselines of the coastal State (constraint line I), or 100 nautical miles from the 2,500 m isobath (constraint line II). The outer limit of the continental shelf of the Russian Federation does not extend beyond constraint line I in the Eurasian basin and constraint line II in the Amerasian basin.

All the geological, geophysical and bathymetric data cited above made it possible to determine the position of the outer limit of the continental shelf of the Russian Federation in the Arctic Ocean in accordance with article 76 of the Convention.

Concepts concerning the structure and type of the earth’s crust underlying Lomonosov ridge, Mendeleev rise and Alpha ridge are of fundamental importance for the Russian submission. To this end, all available geological and geophysical data on the Arctic basin were analysed, and special additional field investigations were carried out.

Over recent decades, the Russian sector of the Arctic Ocean was mapped by aeromagnetic surveys on different scales whose accuracy varied from a few tenths of nTl to units of nTl. Within the framework of international projects (Exxon, United States Naval Research Laboratory, Geologic Survey of Canada (GSC) — Atlantic) this data was reprocessed and converted into 5 5 and 10 10 km Grids.

The magnetic anomaly map clearly demonstrates the distinctions between the “purely” oceanic Eurasian basin and the subcontinental Amerasian basin.

This data was also used to compare magnetic anomaly patterns over major geological structures of the Arctic basin.

A comparison of spectrum characteristics of magnetic anomaly fields was performed for the typical geological structures of various kinds: Mendeleev rise and Alpha rise, Greenland-Faroe ridge, Iceland, Anabar shield and Tunguska basin. The results show that the spectrum characteristics of magnetic anomalies over Alpha rise and Mendeleev rise are equally comparable both with those the Greenland-Faroe ridge, which is an oceanic morphostructure with prolonged hot spot volcanic activity, including modern activity, and with the Anabar shield, which is located in the nucleus of an ancient craton. A slightly more distinct, although not major difference is observed when the Alpha-Mendeleev system is compared with Tunguska basin. Consequently, the similarity or diversity of magnetic anomaly patterns cannot form the basis for determining that the formations under study belong to any particular type of tectonic structure.

Russian gravity data were obtained in the Arctic Ocean in the period between 1963 and 1992 in the course of air-supported gravity measurements and on-board marine gravimetric surveys by ships and submarines. The area most studied is the deep water part of the Arctic basin adjacent to the Russian shelf. The average distances between measurement points in the deep-water basin range from 20 to 30 km. Errors of measurements of the gravity field in the Arctic region average within ± 1-3 mGl range with maximum errors of ± 5 mGl. At a few points, however, the accuracy of gravity field measurements may be significantly lower. The initial gravity data (about 62,500 measurement points from ice and more than 200,000 sq. km of on-board marine observations) is summarized in sheets of the State Gravimetric Map of magnetic anomalies of the USSR with a scale of 1:1,000,000, and also in overview maps of the Arctic, the Arctic shelf of the USSR and individual areas on smaller scales from 1:2,500,000 to 1:6,000,000.

The map of gravitational anomalies in free air reduction clearly shows the main morphostructures of the Arctic Ocean. Essentially, data on gravitational and magnetic fields in combination with seismic data was used to determine the nature of the earth’s crust in the claimed zone of the outer continental shelf.

Gravimetric studies in the Arctic are summarized as gravity anomaly maps of free-air and Bouger anomalies. The main features of the deep structure of the earth’s crust in the Eurasian basin, the Canada basin and the Alpha and Mendeleev rises are clearly visible on overview maps of gravity anomalies.

The differences are particularly striking in the map of Bouger anomalies. The Alpha, Mendeleev and Lomonosov rises are characterized by minimal anomalies, which may be interpreted as an indication of the deep bed of the sharp density Moho boundary.

In order to determine the structure and nature of the crust of the basic morphostructures of the Amerasian basin, special field investigations were undertaken in 1989-1992 and 2000 following a regional geotraverse pattern.

Investigations were carried out using the deep seismic sounding and seismic reflection methods, and measurements of potential fields. The investigations on Mendeleev rise by the "Transarctica-2000" expedition were supplemented by geological studies (bottom sampling using gravity corer, grabs and dredges).

Ice-resistant research vessels of the "Akademik Fedorov" type with on-board aircraft (MI-8 helicopters) were used for complex field investigations.

A system of deep seismic sounding investigations of unprecedented density and depth penetration was used in the investigations. The observations were conducted by the method of differential point soundings with intervals providing for a system of oncoming and overtaking travel-time curves (up to 200 km in length) for imaging the major seismic boundaries in the lithosphere. The accuracy of positioning was at least 100 m. The sedimentary cover along the geotraverses was studied by the seismic reflection method (discrete seismic reflection soundings).

The integrated interpretation of the deep seismic sounding and seismic reflection sounding along the SLO-92 geotraverse passing across Lomonosov ridge 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.

The conclusion regarding the continental nature of the earth's crust was also made on the basis of the interpretation of seismic data (deep seismic sounding and seismic reflection sounding) obtained along the geotraverse across Mendeleev rise during the "Transarctic-2000" expedition. The earth's crust is up to 32 km thick and contains typical components of the continental crust (sedimentary layer up to 5 km thick, upper crust up to 6-8 km thick, with velocity reversal [waveguides] in the lower part, and lower crust up to 20 km thick). This data is independently confirmed by the results of density modelling.

A deep dynamic section along the NP-26 ice-drifting station over Mendeleev rise clearly shows outcrops of lower sedimentary complexes on the bottom surface in the area of the rise with a gradient of over 8 degrees, which may be sampled by dredging.

An additional argument in support of the conclusions concerning the continental nature of the crust beneath Mendeleev rise is derived from the findings of the geological investigations during the "Transarctic-2000" expedition. There are a number of signs that the erosion of bedrock played a significant role in the formation of coarse-grained material in bottom sediments. Palaeozoic terrigenous-carbonate deposits, whose lithology demonstrates their platform nature, predominate in this material.

A comprehensive interpretation of deep seismic sounding, seismic reflection and potential fields data along the SLO-89-91 geotraverse gives reason to believe that the primary continental crust of the Podvodnikov and Makarov basins underwent strong transformations during the process of intensive extension. As a result, the crust thickness in the Podvodnikov basin was 20-22 km with a thinning of the upper crust to 6 km, whereas in Makarov basin the total crust thickness does not exceed 14-15 km and the "granite" layer is almost completely reduced.

A composite section of the earth's crust along the geotraverse of Lomonosov ridge, Podvodnikov basin and Mendeleev rise provides a good illustration of the interpretation set forth above.

The map of the Moho depths was compiled using the Parker (1972) algorithm, on the basis of a digital model of the gravitational field of Bouger anomalies. As may be seen from the diagram, the Mendeleev and Alpha rises are characterized by a thick crust 20-25 km and thicker, taking into account the data of the "Cesar" and "Transarctica 2000" expeditions. The information on crust thickness was used, along with other data, to categorize the crust of the Arctic basin.

Thus, the results of the interpretation of comprehensive geological and geophysical data support the categorization of the Amerasian basin geostructures (Lomonosov ridge and Mendeleev and Alpha rises) as components of the continental margin.

The final outcome of the delineation of the outer limit of the continental shelf of the Russian Federation in the Arctic Ocean is the area of the continental shelf situated beyond the limits of the 200-mile zone over which the Russian Federation has jurisdiction.

Substantiation of the outer limit of the continental shelf of the Russian Federation in the Bering and Okhotsk seas

Bering Sea

Within the area enclosed between the 200-nautical-mile exclusive economic zone of the Russian Federation and the line delimiting the maritime spaces of the Russian Federation and the United States of America, the thickness of sedimentary cover (even within local arched uplifts of the basement) everywhere exceeds 1 per cent of the shortest distance from the FCS.

Thus, the data presented indicate that the part of the continental shelf in the Bering Sea located beyond the limits of the 200-mile zone from the baselines from which the breadth of the territorial sea of the Russian Federation is measured and extending to the line of delimitation of the maritime spaces of the Russian Federation and the United States of America (USSR/United States Agreement of 1 June 1990) may be included in the continental shelf of the Russian Federation, in full conformity with article 76, paragraph 4 (a) (i) of the Convention.

Sea of Okhotsk

The deep seismic refraction sounding data given in the submission show that the part of the Sea of Okhotsk located beyond the limits of the 200-mile exclusive economic zone of the Russian Federation is a geographical shelf with a continental-type crust 15-18 km thick, submerged to a depth of about 1 km and lying above the upper edge of the continental slope. Pursuant to article 76, paragraph 1, of the Convention, the area in question is undeniably a geographical and geological continental shelf and a prolongation of the land mass of the Russian Federation in the Sea of Okhotsk.

Thus, pursuant to the Convention, the outer limit of the continental shelf of the Russian Federation in the Pacific Ocean is delineated as a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea of the Russian Federation is measured, to the south and east of the Kuril and Aleutian Islands. In the Bering Sea, it coincides with the line of delimitation of maritime spaces between the Russian Federation and the United States of America.

In connection with the notes received by the Secretary-General of the United Nations concerning the Russian submission, I should like to add the following:

In relation to the note from Norway, the establishment of the outer limit of the continental shelf in accordance with the submission does not have any effect on the negotiations and solution of the issue of the delimitation of the maritime spaces in the Barents Sea between Norway and the Russian Federation.

The notes from Denmark and Canada do not contain any indication of the existence of disputes concerning the delimitation of maritime spaces or other territorial disputes and, consequently, are not an obstacle to the consideration of our submission.

The note from the United States of America indicates that there are no disputes concerning the delimitation of maritime spaces between the Russian Federation and the United States of America.

The note from Japan is concerned with territorial disputes relating to a number of islands of the Kuril chain; however, this problem does not affect the provisions of our submission in relation to the continental shelf in the Sea of Okhotsk beyond the limits of the 200-mile zone. The islands referred to in the note from Japan were not used as basepoints for delineating the 200-mile zone in this case. Consequently, Japan’s note cannot be an obstacle to the consideration of our submission either.