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Permanent Mission of the Kingdom of Morocco to the United Nations

New York

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The Permanent Mission of the Kingdom of Morocco to the United Nations presents its compliments to the Secretary-General and further to its notes verbales N/NV/198/09 of 16 May 2009, N/NV/194/09 of 26 May 2009 and NV/ATL/N/114/2015 of 10 March 2015, has the honour to transmit, herewith, a “Briefing paper on the Atlantic continental shelf of the Kingdom of Morocco beyond 200 nautical miles”.

This briefing paper, also referred to as “partial preliminary information” on the outer limits of the continental shelf of the Kingdom of Morocco off its Atlantic coasts, is being submitted pursuant to article 76, paragraph 8, of the United Nations Convention on the Law of the Sea and in accordance with article 4 of Annex II of the Convention.

This preliminary document is being provided without prejudice to a comprehensive submission on the outer limits of its Atlantic continental shelf, which the Kingdom of Morocco reserves the right to deposit at a later date with the Commission on the Limits of the Continental Shelf.

United Nations Secretariat

Division for Ocean Affairs and the Law of the Sea

New York

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The Kingdom of Morocco wishes to inform the Secretary-General that certain plans for extending the continental shelf submitted by neighbouring States with adjacent or opposite coasts (Spain, Portugal, Mauritania and Cabo Verde) include maritime and submarine areas situated in the Atlantic, in particular, the continental shelf, on which no maritime boundary delimitation agreements have as yet been drawn up between the Kingdom of Morocco and the aforementioned neighbouring States.

In this briefing paper and in studies it is currently carrying out, Morocco has noted that, in both the northern and southern sections of its Atlantic margin, areas attached to its extended continental shelf overlap with areas of the continental shelf claimed by one or more neighbouring States in submissions to the Commission on the Limits of the Continental Shelf for its consideration, in particular, Spain, Portugal, Mauritania and Cabo Verde.

In view of the foregoing, the Kingdom of Morocco has reservations with regard to those areas of the continental shelf on which no maritime boundary delimitation agreement has as yet been drawn up between the Kingdom of Morocco and the aforementioned neighbouring States with adjacent or opposite coasts.

The Permanent Mission of the Kingdom of Morocco to the United Nations requests the Secretary-General to invite the Commission on the Limits of the Continental Shelf to take this situation duly into account in considering the submissions for extension of the continental shelves of Spain, Portugal, Mauritania and Cabo Verde with a view to preserving all the rights of the Kingdom of Morocco over its extended continental shelf.

The Permanent Mission of the Kingdom of Morocco to the United Nations requests the Secretary-General to register this note verbale and annexed briefing paper, and to transmit them to the Commission on the Limits of the Continental Shelf.

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The Permanent Mission of the Kingdom of Morocco to the United Nations takes this opportunity to convey to the Secretary-General the renewed assurances of its highest consideration.

New York, 29 July 2015

**Kingdom of Morocco**

**Briefing paper on the Atlantic continental shelf  
of the Kingdom of Morocco beyond 200 nautical miles (200 M)**

**Prepared by the Moroccan scientific team in charge of the project**

**July 2015**

This briefing paper provides a summary of the analyses and results of the work undertaken to date by the Kingdom of Morocco concerning the delimitation of the outer limit of its Atlantic continental shelf beyond 200 nautical miles (200M) from the baselines from which its territorial sea is measured.

Analysis of the geological, geomorphological and geophysical data on the Moroccan continental margin along the Atlantic seaboard, pursuant to article 76 of the United Nations Convention on the Law of the Sea and the Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf, unequivocally shows that Morocco has a continental shelf that could extend beyond 200 nautical miles from the baselines from which the breadth of its territorial sea is measured. Two distinct areas of Morocco's Atlantic continental margin where the continental shelf extends beyond 200 nautical miles were identified. Where these areas are situated at the limit of the 200 M constraint line of a neighbouring coastal State, Morocco, in establishing the outer limit of its continental shelf, attempted to avoid creating overlaps in the region.

The Kingdom of Morocco is preparing a comprehensive report, pursuant to article 76 of the Convention, containing a summary, a body and supporting documents, and an appropriate number of copies will be transmitted to the Secretary-General before 31 May 2017, the 10th anniversary of Morocco's ratification of the United Nations Convention on the Law of the Sea, in accordance with article 4 of annex II of the Convention.

The preliminary analysis carried out thus far follows the standard procedure for preparing a request for submission, set out in article 76. It starts out by describing and discussing the geology and setting of Morocco's continental margin, including a summary of relevant components of the natural prolongation of the margin from the Moroccan continental mass on and in the seabed. It goes on to provide information on the types, parameters and technical specifications of all the data utilized in this project and analyse the data collected thus far. Morocco then identifies the foot of the continental slope, pursuant to article 76, paragraph 4(b) and section 5.4 of the Commission's Guidelines.

To the north of the Moroccan Atlantic margin, a clear area at the base of the slope can be identified on the northern flank of the submarine elevations south of the Horseshoe abyssal plain (Ampère seamount). Within the base of the slope, the location of the foot of the slope can be identified precisely at the point of maximum change in the gradient at its base.

To the south, given the very narrow slope angle characterizing the Mauritanian northern continental margin, methods other than a determination based solely on maximum gradient variation are required, as well as geological and geophysical data highlighting relevant sedimentary processes which must also be considered. Morocco has therefore adopted the same procedure that the Commission followed in considering requests from Norway and French Guyana, using geophysical data to determine the base of the slope, and then identifying the foot of the slope according to the general rule.

Morocco recognizes that in both the north and south section of the Atlantic margin, areas attached to its extended continental shelf overlap with areas of the continental shelf claimed by one or more neighbouring States.

Morocco utilized the two methods set out in paragraph 4(a) of article 76 (the Hedberg (or bathymetric) formula and the sediment thickness formula (or Gardiner) formula) to define the outer edge of its continental margin. Sediment thickness was calculated on the basis of seismic and “stacking” velocities derived by processing recently acquired multi-trace seismic data. The two constraint criteria defined in paragraph 5 of article 76 were then evaluated with respect to both areas. In the southern area, only the 350M constraint line was used, while in the northern area, the 350M constraint line and the 2500m + 100M isobath were needed to verify the extension of the continental margin which can be legally considered to be the Moroccan continental shelf.

As for the geological setting, Morocco’s continental margin is a typical passive margin. This divergent margin was formed by the opening of the central Atlantic Ocean in the Mesozoic era.

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North America and Africa began to separate in the Middle to Late Triassic, evolving into seafloor spreading at 180-170 Ma. Magnetic anomalies associated with the seafloor spreading phase and fracture zone traces were utilized to document the history of the opening of the central Atlantic Ocean. In addition, the seismic characteristics of the upper crust, the location of salt domes (or diapirs), and magnetic lineations were all used to map the transition from continental to oceanic crust along the Moroccan Atlantic margin.

To the north of the Moroccan Atlantic continental margin, the Horseshoe abyssal plain is situated at 35-37° N, immediately south of the Eurasian- African plate boundary. This plain is surrounded by a seamount chain: the Gorringer ridge and the Hirondele seamount to the north, the Madeira-Tore ridge and the Josephine seamount to the west, and the Ampère and Coral Patch seamounts to the south. Wide-angle seismic modelling and dredging results suggest that the Gorringer ridge is uplifted oceanic crust resulting from the convergence of the African and Eurasian plates along the boundary. Seismic reflection profiles and modelling of acoustic buoy data reveal a sedimentary series up to 2 km thick within the Horseshoe abyssal plain.

Geophysical and geological data compiled from various sources was utilized in the preparation of this briefing paper and in a provisional technical and legal analysis of the configuration of the continental margin/continental shelf. Data sources include the Geophysical Data System (GEODAS)<sup>1</sup> of the National Geophysical Data Center in Boulder, Colorado, as well as leading United States universities and European research centres. This data was uploaded and used in the Geocap<sup>2</sup> software. The information examined for the purposes of this preliminary document includes (single- and multi-beam) bathymetry, single- and multi-channel seismic lines, refraction seismic data (from seismographs and acoustic buoys), very high-resolution (pinger) seismic profiles as well as analyses and geological models extracted from published literature. Bathymetric data is taken from free-access databases as well as academic publications. Seismic data includes lines acquired in offshore oil and gas explorations of the Office National des Hydrocarbures et des Mines (ONHYM), as well as all the available academic data. Results and analyses contained in the 2014 ONHYM report on the continental shelf were also integrated into this preliminary document.

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<sup>1</sup> <http://www.ngdc.noaa.gov/mgg/mggd.html>

<sup>2</sup> <http://www.geocap.no>

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All the available seismic data was compiled and analysed. This data comes from three main sources: (1) industrial data provided by ONHYM; (2) academic single-channel seismic data; and (3) the most recent academic data, most often including wide-angle seismic data.

From the evaluation and compilation of available seismic velocity data, sediment thickness could be provisionally calculated by using two average velocities - 2,400 metres per second (m/s) and 3,100 m/s - to generate two sediment thickness maps of the southern region representing a maximum and minimum thickness. As expected, both maps show a general thinning out of the sediments from east to west. Localized increases in sediment thickness can be identified in depressions of rough oceanic crust, perhaps corresponding to fracture zones. In view of the low or conservative seismic velocities - for example, the existence of several areas concentrated in the west where sediment thickness exceeds 2 km - a point corresponding to the foot of a slope situated at less than 200 km from these thick-sediment areas might meet the requirements of the sediment thickness formula (or Gardiner) formula.

In the northern section of the continental shelf beyond 200 nautical miles, the Horseshoe seamount is connected via the Coral Patch ridge and the Gulf of Cadiz accretionary prism to form a continuous natural submerged prolongation, extending due west from the Moroccan continental mass. From there, Morocco established its continental shelf beyond 200 M, between the 200 M constraint lines of continental Portugal and the Madeira island group.

The positions of the feet of the slope in this northern section of the margin are situated along the northern flank of the southernmost area of the Horseshoe and Ampère seamounts and the Coral Patch ridge; based on the interpretation of multi-channel seismic profiles, the continental margin attached to them extends beyond the western area of the Horseshoe abyssal plain towards the lower slopes southwest of the Gorringer ridge and southeast of the Josephine ridge.

To the south, the continental margin extends to a breadth of more than 300 nautical miles between the 200M constraint lines at the Canary Islands and Cabo Verde, respectively. In most of the region, the slope of the seabed is less than 0.30, with an average water depth of 4,000 m at the 200M constraint line, and more than 4,800 m at the 350M constraint line. The breadth and expanse of the



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deep-water margin vary with the continuous accumulations of turbidity currents and debris flows from seabed erosion on the shallow platform adjacent to the coast. These sedimentary processes are well documented in geological and geophysical studies and interpretations, including drilling, carried out in the region. The team in charge of the project mapped the distribution of these active and passive sedimentary processes (slides, gravitational collapse, channel and levee formation, channel erosion...) along the margin. These events were, in turn, interpreted to establish the limits of the area at the foot of the slope, where a number of feet of the slope were precisely identified using the general rule applied by the Commission. It was then possible to compare the results of applying each of the two formulas for establishing the outer edge of the continental margin in accordance with paragraph 4(a) of article 76. In general, the most optimal points are situated beyond the 350M constraint line defined in article 76, paragraph 5, and consequently, the fixed points which define the outer limit of Morocco's continental shelf are situated along this constraint line.

Subject to the acquisition and compilation of fresh data, and additional analyses and interpretations, Morocco is firmly convinced - and has evidence to prove it - that in both areas of its Atlantic margin, the outer limits of its continental shelf extend beyond 200 nautical miles from the baselines from which the breadth of its territorial sea is measured.

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