Does Ascension Island have an outer continental shelf?

by

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Introduction

This presentation has been prepared by members of the technical team that prepared the technical aspects of the UK's submission with respect to Ascension Island. This paper is prepared largely from published statements of the Commission and the United Kingdom, but the arguments and conclusions are the authors own.

Continental shelf beyond 200M associated with oceanic ridges has been a difficult subject during the negotiation of the UN Convention on the Law of the Sea and now for States Parties and the CLCS alike during case preparation, submission and examination. The difficulty is exacerbated by the legal concepts enshrined in article 76 of the Convention that differ from recognised scientific terms, or where the scientific terms do not have a standard and accepted definition. For the case of Ascension Island this applies in particular to the terms continental margin and shelf, oceanic ridge, submarine ridge, deep ocean floor and natural prolongation.

The UK's submission for Ascension Island is one of several for outer continental shelf areas associated with oceanic islands situated on or near mid-ocean ridges, and the first to be considered by the CLCS. None of these oceanic islands has a conventional continental shelf, slope and rise in the sense of the Convention.

Article 76 paragraph 6 makes special provision for submarine ridges by providing a coastal state which bases its case on such a ridge with a single constraint of 350 nautical miles from the baselines from which the territorial sea is measured. It is clear from the record of proceedings within Negotiating Group 6 in 1980 (the working group of State Parties established at the Third Conference on the Law of the Sea which drafted the text which would become article 76 of the Convention) that it was envisaged that ridges like the Reykjanes Ridge (part of the Mid Atlantic Ridge south of Iceland – an actively spreading ridge, in scientific parlance) would be subject to this single constraint (see Nandan and Rosenne (1993) at section 76.13). It is curious then, that the Commission's Scientific and Technical Guidelines (CLCS/11) are not specific in their definition of the term submarine ridge, and the relevant section (paragraph 7.2.11) simply concludes that the issue of ridges will be "dealt with on a case-by case basis". This of course does not assist in establishing the general principles that ought to be applied. Furthermore, little clarity is provided by the more recent attempts by scientific experts to clarify the definitions of legal terms used in the Convention (Symonds and Brekke and Brekke and Symonds, both 2003)

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[1] While this paper is based on published statements from the UK and the CLCS any views expressed are those of the authors and are not necessarily those of the UK Government.

The issues that need to be addressed regarding the proper implementation of article 76 with respect to islands on mid-ocean ridges are:

1. The meaning of "deep ocean floor" and "oceanic ridges" as expressed in article 76.3 "The continental margin [. .] does not include the deep ocean floor with its oceanic ridges or the subsoil thereof."

2. The implication (from article 76.6) that submarine ridges are somehow legally different from oceanic ridges: "[. .] on submarine ridges the outer limit of the continental shelf shall not exceed 350M [. .]".

3. The notion that "elevations that are natural components of the continental margin" also warrant different treatment. Art 76.6 again: "This paragraph does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs."

4. The meaning and definition of "natural prolongation" in article 76.1 and the use of geoscientific as well as morphological data for its definition.

The general situation

Ascension Island is located in the central south Atlantic, around 800 miles from the coast of Africa and about 500 miles south of the Equator. It has an area of approximately 90 km^2.

It is a dependency of the British Overseas Territory of Saint Helena and dependencies, some 750 nautical miles to the southeast. Executive authority is vested in the Queen, who is represented on Ascension Island by the Governor of Saint Helena and dependencies or in his absence, the Administrator of Ascension Island.

Whilst it has no settled permanent population, since it was garrisoned by British troops around 1815, Ascension Island has had a long and continuous history of individuals working and living on the island. Approximately 1000 people currently work and live on Ascension Island. It undoubtedly qualifies as an island capable of sustaining human habitation or economic life (Art 121 of the Convention). It is therefore entitled to establish an Exclusive Economic Zone and a Continental Shelf.

Other island groups of UK overseas territories, including St Helena, Tristan da Cunha and Gough, lie further south-east., None of these off-axis islands could be described as proximal to, or part of, the Mid-Atlantic Ridge and they have not been assessed as having any separate basis for establishing a continental shelf beyond 200M.

Origin of Ascension Island

Ascension Island is located on the western flank of the Mid-Atlantic Ridge (MAR) on the South American Plate and forms an integral part of the submarine MAR system. It lies on the ridge segment between the Ascension and Bode Verde Fracture Zones. The island is the sub aerial expression of a large volcano rising to over 800m above sea-level. The whole volcanic structure is 4km high with a basal diameter of 60km, covering an area of approximately 2000 km^2 surrounded by seafloor at about 3000m water depth.

The island is composed of lava flows, with pyroclastic deposits, air-fall pumice, and volcanic breccias. This material is reworked as alluvial deposits and beach sands. The oldest exposed rocks on the island are about 1 million years old (Ma), the most recent being approximately 700 years. Although there are several vents and about 40 identified craters on the island, there are no historical records of volcanic activity but the volcano is nevertheless thought to be dormant rather than extinct. The volcano sits on oceanic crust with an age of about 5–6M and the volcano probably started to form on the axis of the MAR at about that time (Nielson & Sibbett, 1996). The limited deep coring on the island reveals an age of 3.4 Ma at the base of a 1996 borehole at 3000m depth, with evidence that the transition from submarine to subaerial rock types occurred at approximately 2.5 Ma at a horizon now 710m below present sea level (Minshull et al, 2003).

It is the only subaerial expression of a group of similar seamounts in the region of the ridge at this point. There are a number of other volcanic features in the immediate area also developed in relation to the MAR.

East of Ascension Island, a volcanic edifice, now approximately 15% of the volume of Ascension Island, is actively growing along the west wall of the axial zone. This proto-Ascension currently has a height of 1.4 km above the surrounding ocean floor of 2800m and has developed over 1Ma. As smaller seamounts have steeper sides than larger volcanic islands, continued growth at current extrusion rates would result in the young seamount emerging as an island within the next 2–3 million years and reaching the present volume of Ascension Island in 6 Ma. The development of this feature suggests that Ascension Island formed in a similar way on the axis of the MAR (Klingelhofer et al, 2001)..

West of Ascension, on the American Plate on a trend parallel to the Ascension FZ, are two more seamounts, A and B. Little is known about these but they are presumed to have a similar origin to Ascension Island (Nielson and Sibbett, 1996). To the east of the MAR, on the African Plate, is the Circe seamount (crest approx 1500m subsea), and to the southeast is the Gratton seamount (approx 500m subsea).

Scientific opinion is divided on the origin of these features. Ascension Island and the related seamounts and volcanoes are generally thought to be due to a regional mantle anomaly – either a low-intensity thermal feature (analogous to the much stronger hotspot under Iceland) or a localised area of anomalously enriched mantle that has a lower melting point. The balance of evidence seems now marginally to suggest the latter explanation though the effects on both seafloor topography and composition are similar (Klingelhofer et al, 2001).

Arguments in Favour of Extended Continental Shelf

In developing the submission, we had to apply a regime in the Convention that was developed for a conventional "passive" continental margin to a situation where there was no continental shelf, slope or rise in the geological sense, and therefore no conventional foot of the slope from which to measure the outer limit and thus to satisfy the Commission's "test of appurtenance".

The first premise that the technical team needed to consider was whether Ascension Island had a connection to the Mid-Atlantic Ridge (MAR) that would enable it to

establish that its natural prolongation extended to, and along the MAR. If the UK could meet this test, a section of the MAR would be, in effect, a part of the continental margin of the island. If so, applying the criteria of Article 76 this section of the MAR may be a "submarine ridge" or a "submarine elevation" in the sense of Article 76. By definition, this continental margin could not be "deep ocean floor" in the sense intended by the Convention.

It is clear that Ascension as an island cannot itself be deep ocean floor, likewise any extended continental margin, or associated parts of the MAR meeting the test of appurtenance provided in the Convention, could not be deep ocean floor. This much is clear from Article 76. This is also affirmed in the Technical and Scientific Guidelines, para 7.2.8: "Some ridges (including active spreading ridges) may have islands on them. In such cases it would be difficult to consider that these parts of the ridge belong to the deep ocean floor." The crest of the MAR is at a water depth of about 2000 metres (mss); Ascension Island is situated on the shoulder of the ridge, with the sea floor deepening to about 3000m between Ascension Island and the ridge axis. This contrasts with a depth of 4000-5000 m for the deep ocean floor.

Mid-ocean ridges by their very nature do not have breaks of slope or a foot of slope. They typically have a very rugged morphology due to extensive rifting and faulting as the oceanic crust is created at the spreading axis; this becomes blanketed with sediment as the crust ages and moves away from the ridge axis. Despite this ruggedness the shape of the mid-ocean ridge and the slope of its flanks can be modelled as a simple asymptotic function of the age of the crust – as the crust cools and moves away from the ridge axis it subsides such that its depth is proportional to the square root of its age. This depth-age relationship has been demonstrated for a wide variety of settings.

Superimposed on this regular relationship however are a series of anomalous mantle areas, commonly referred to as hotspots, that have caused local areas of anomalous elevation – often associated with islands. Iceland is the premier example. In the Ascension Island area the elevation is subtle, indicative of a less pronounced thermal anomaly.

For Ascension Island, we took the view that the island was both situated on the MAR, and that it was part of the MAR. As a consequence, the continuation to the north and south of Ascension Island of the MAR provides, prime facie, the morphological and geological basis for supporting the prolongation of the continental margin in these directions. During discussions with the Subcommission, it was recognised that additional analysis of the seafloor water depths around Ascension Island revealed a discrete positive seafloor depth anomaly, extending to approximately 1000km radius, and centred on the location of the island. This was used by us to support their arguments that Ascension was the subaerial expression of an anomalously elevated section of seafloor, through which the MAR passed.

Faced with the difficulties of interpreting the convention (paragraph 76.4b) and implementing the Commissions guidelines (Section 5)with respect to both choice of Foot of Slope and Base of Slope zones in the context of an island land mass, rather than a continent, we made best efforts to identify foot of slope positions in relation to the continental margin of Ascension. Using these FOS positions Hedberg lines were drawn

60M to seaward but the final outer limit is constrained to the north, south and west by the 350M cutoff.

To summarise, our view is that Ascension Island is located on the flank of the MAR and the natural prolongation of its land territory and hence its continental margin extends from the island itself as far as the axis of the MAR.

The Commission's View[2]

The Commission noted that "traditionally, the Atlantic Ocean floor has been subdivided into three main zones: continental margin, ocean basin floor with its abyssal plains and abyssal hills, and the mid-ocean ridges (MOR). It is generally recognised that the true oceanic features of the seafloor occur seaward of the continental margin and include both the ocean basin floor and MOR zones. This categorisation is reflected in Article 76, paragraph 3, of the Convention, which states that the continental margin "…does not include the deep ocean floor with its oceanic ridges…". From this it follows that central valley of the MAR with its rift shoulders, its flanks and the deepest parts of the adjacent ocean basin belong to the deep ocean floor of the Atlantic Ocean."

It went on to conclude that "this normal deep ocean floor has a generally rugged topography with amplitudes of at least several hundred metres. In the central Atlantic Ocean, a range of anomalous morphological features occur that are imposed on this "average" rugged seafloor topography. One such group of features are steep and isolated seamounts, Ascension being a special case that is surmounted by an island."

And furthermore they stated that "Ascension Island has a very restricted volcanic pedestal that rises directly from the normal deep ocean floor around it. It is not connected to any other discrete morphological feature that rises above the general "ruggedness" of the surrounding seafloor. According to this view, and given the particular circumstances of this case, the application of paragraph 5.4.5 of the Guidelines would place the base of the insular slope of Ascension Island at the bottom of the volcanic pedestal, and not within the central valley or the fracture zones of the MAR, or where the gently westward-dipping seafloor merges with other provinces of the deep ocean floor or the adjacent continental margin."

In the view of the Commission, "the base of the continental slope zones identified by the United Kingdom occur on, and enclose, conventional deep ocean floor, which by definition, both scientifically and under Article 76, cannot be considered part of any continental margin."

"The Commission is of the view that there is no geomorphological or geological basis, or any support within Article 76 of the Convention, that justifies the determination of the base of slope zones and associated FOS points at the locations given in the Submission for the Ascension Island region."

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[2] Dealings with the Commission were through a Sub-Commission during the evaluation of the submission. References to the Commission include both material produced by the Sub-Commission and the full recommendations endorsed by the Commission itself.

Further, the Commission considers "that in the particular case of Ascension Island and its location with respect to the MAR, Ascension Island's edifice sits directly on deep ocean floor and that the only credible location for the base of slope zone is at the base of the insular slope and not in the locations selected by the UK. On this basis Ascension Island has no continental shelf beyond 200M."

Discussion

It emerged that there were three main areas of difference of opinion between the UK and the Commission relating to interpretation of the Convention. The UK maintained that interpretation of the Convention remains a matter for States Parties to the Convention. It is not for the Commission to proceed on the basis of its own reading of Article 76; that is not a matter for, nor within the competence of, the Commission, but a matter for State Parties to the Convention, and ultimately their lawyers, to advise on the intent and meaning of the words in the Convention.

1. The definition of deep ocean floor.

The Commission has maintained that MOR, and the MAR in particular, is "deep ocean floor" within the meaning of Article 76(3) which states that the "[continental margin] does not include the deep ocean floor with its oceanic ridges". They concluded that Ascension Island, by virtue of sitting on the MAR, is on deep ocean floor, and thus can have no continental margin beyond 200M.

If the Commission's approach were to be extended to all mid-ocean ridge spreading systems, this would have implications for any coastal State seeking to establish outer continental shelf beyond 200M.

There is no definition in the Convention of the key terms in Art 76 para 3, i.e. "deep ocean floor" and "oceanic ridges". The Commission's approach whereby they define the deep ocean floor first, and define the continental margin by exception is contrary.

It is a well-known maxim that the "land dominates the sea" and the sovereign rights of coastal states with respect to continental shelf result from their sovereignty over the land territory. This is also supported by the Commission's own Guidelines which state "Some ridges (including active spreading ridges) may have islands on them. In such cases it would be difficult to consider that those parts of the ridge belong to the deep ocean floor. (7.2.8)" It follows from this that where a continental margin extends to the flanks of a MOR, such as MAR, those parts of the ridge cannot be deep ocean floor.

The term "oceanic ridges" in Art 76(3) does not encompass all undersea ridges because para 6 of Art 76 specifically refers to another category, ie "submarine ridges", and expressly recognises that continental margin may be established by reference to such ridges. Therefore, some ridges, or parts of ridges, belong to the deep ocean floor; some ridges or parts of ridges do not. Ridges may also change their juridical status under Art 76 from margin to deep ocean floor as they move away from a land mass.

In putting our submission forward on Ascension Island, we accepted that parts of MORs must be part of the deep ocean floor in both the scientific and legal sense. However, the Commission appears to have assumed that all MORs are deep ocean floor. In our view,

if a submerged prolongation of the landmass can be established, this constitutes part of the coastal state's continental margin and by definition cannot be part of the deep ocean floor for the purposes of Article 76. It was and is our view that the assessment of the Commission that deep ocean floor surrounds the island of Ascension up to its insular slope, fundamentally prejudices any attempt to apply the criteria laid out in Art 76 which establish prolongation from the landmass to the Ridge.

This view is supported by the International Law Association's Committee on the Outer Continental Shelf which states in its 2006 report:[3]

> "The reference [in Article 76(3)] to the deep ocean floor and its oceanic ridges cannot lead to the exclusion of areas which form part of that natural prolongation of the land territory and meet the other criteria of article 76 which define the continental shelf. Ridges of an oceanic origin that are *not* a part of the natural prolongation of the land territory cannot be used to extend the continental shelf beyond 200 nautical miles." [emphasis added]

The corollary to this is if ridges *are* part of the natural prolongation of land territory then they can be used as the basis of a claim for extended continental shelf. If the assumption that the area around Ascension is deep ocean floor is removed, then the test of appurtenance is satisfied.

2. Natural Prolongation of the Land Territory

The second issue is the determination of the natural prolongation of the land territory of the coastal state.

The Commission has proceeded on the basis that the outer edge of the continental margin in the sense of Article 76(3), is established by applying the provisions and formulæ of Article 76(4) through measurements from the foot of continental slope. By jumping immediately to these formulæ in para 4 the Commission overlooks the requirement in Art 76(1) to first determine the extent of natural prolongation of the land territory. This is also recognised in paragraph 3 which refers to the continental margin comprising the submerged prolongation of the land mass.

We did not consider that natural prolongation, [an inherent property of any landmass] can be defined by applying the formulae in Article 76(4).

This view is supported by the Virginia Commentary which notes that State Parties to the Convention were concerned to come up with a formula for identifying outer continental shelf which did not compromise the sovereign rights of coastal states as a matter of customary international law.

Whether there is any natural prolongation of the submerged component of a land territory can only be established by an assessment of all of the available geoscientific data as a whole. While this might seem a more complex and challenging task to

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[3] http://www.ila-hq.org/en/committees/index.cfm/cid/33 (Conference Report Toronto 2006)

undertake, when it may be easy to jump to applying the formula in paragraph 76.4., consideration of natural prolongation is an essential first step. Otherwise, the Commission risks taking an approach that would compromise the sovereign rights of states; a point which is naturally a sensitive one for all State Parties to the Convention. In addition, such an approach would overstep the mandate of the Commission which is limited to reviewing the technical data submitted by the coastal state and making recommendations.

3. Use of morphology over geology

Throughout its examination of the UK's submission, the Commission showed a strong preference for relying on morphological over geological criteria. On a number of occasions morphological arguments have been used by the Subcommission and then the Commission as the only criteria to implement the Convention, to the exclusion of geology. We found no basis in the Convention for weighting one type of data over another. Indeed, there are instances in which the Convention recognises that data other than morphology should be used. Paragraph 4 (b) states "in the absence of evidence to the contrary, the foot of the continental slope shall be determined as the point of maximum change in its gradient at its base." Thus the Convention specifically calls for the use of a range of data, not just morphology. This is also reflected in the fact that the Commissioners themselves are drawn from a wide range of disciplines; reflecting the wish of the framers of the Convention that all these data sets be considered.

Natural prolongation of the landmass, and continental margin can be defined by a combination of criteria – such as geology, geophysics and geochemistry – in addition to morphology.

The Commission has approached the Ascension Island submission on the basis that Article 76(3) requires establishment of "shelf, slope and rise". Whilst this represents a conventional understanding of a passive continental margin, the Convention needs also to deal with situations that are not so typical. This is recognised in the DOALOS handbook on the Definition of the Continental Shelf which provides that "This simple categorisation of margin morphology into shelf, slope and rise is rarely found in practice owing to the variety of geomorphological forms of the continental margin resulting from different tectonic settings". Furthermore, it is noted that "many volcanic islands have no shelf, but rather a slope that plunges into the deep seabed. The common definitions of shelf, slope and rise do not apply in such settings". This supports our view that the provisions of the Convention are intended to encompass all manifestations of continental shelf.

Where to now?

Returning to the question posed by the title of this paper, "does Ascension Island have an outer continental shelf?" it becomes a question of if it doesn't, how will any of the other examples of islands on mid-ocean ridge systems be able to argue their cases for prolongation (or not).

The Commission have referred to "particular circumstances" in their conclusion that in this case the base of slope is at the foot of the insular slope. have never been appraised of these circumstances, especially as they may or may not apply to the other ridge states.

The use of the terms “particular circumstances” in the Ascension Recommendations and “case by case basis” in the Guidelines does not enable the Commission to avoid approaching their task in a technically rigorous and legally consistent manner.

The Commission’s conclusion that the bathymetric seafloor anomaly on which Ascension Island sits is insufficiently elevated to constitute the ‘significance’ deemed by them to warrant a wider continental margin than one based on an insular slope delivers a somewhat opaque message to the UK and the island-ridge community as a whole. What magnitude or dimensions of elevation would be ‘significant enough’? How many of the five other island-ridge states facing the Commissions’ examination (in submission order, South Africa (with respect to Prince Edward and Marion Islands), France (with respect to St Paul and Amsterdam Islands); Norway (with respect to Bouvet Island); Iceland (with respect to Reykjanes Ridge); Portugal (with respect to the Azores) will be characterised by ‘sufficiently significant’ elevations?

We will await with interest the outcomes of these submissions which raise similar issues of legal interpretation of the Convention before considering its next steps.

Some of this discussion and the fundamental three principles discussed above are contained in a note verbale from the UK to the Secretary General (NV 164/10 of 29 June 2010) for promulgation through the DOALOS website.

References

The Ascension Island Executive Summary, the Summary of the Recommendations, and other related materials can be found on the DOALOS web-site: http://www.un.org/Depts/los/clcs_new/submissions_files/submission_gbr.htm

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