

Who Owns the Arctic?*

Ian Wright¹ and Alan J. Evans¹

Search and Discovery Article #70113 (2011)

Posted December 12, 2011

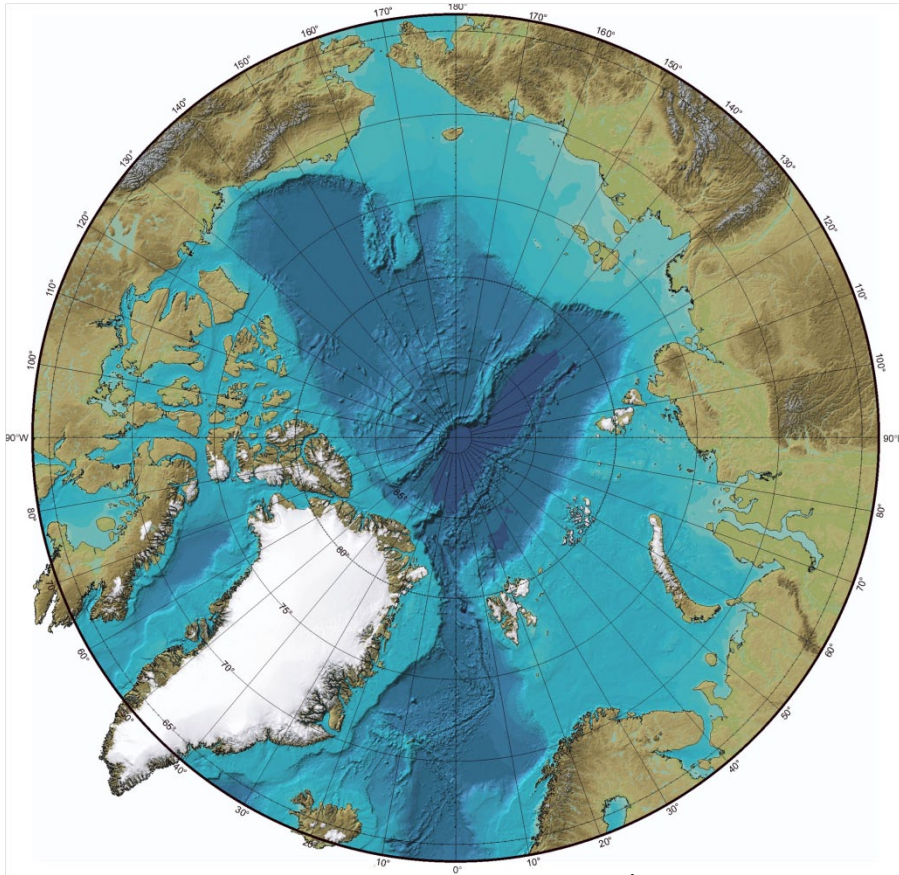
*Adapted from oral presentation at AAPG International Conference and Exhibition, Milan, Italy, October 23-26, 2011

¹National Oceanography Centre, Southampton, UK (ian.wright@noc.ac.uk; alan.evans@noc.ac.uk)

Abstract

This session is designed to raise awareness of issues rarely discussed, even though they may be part of ongoing technical meetings. One such topic is *Who Owns the Arctic?* Of particular interest is the fact that the USA has not yet ratified the 1980 convention on the Law of the Sea and therefore cannot yet claim beyond 200 nautical miles, a context which will send other claimants to parts of the Arctic.

Other than research purposes, several of the surveying techniques employed here at NOC, such as swath, seismics, and side scan, for example, are applied to non-research purposes. One of these is for the use of developing an area beyond the current 200 mile limit, or EEZ. No country at present has the right to explore/exploit the sea floor beyond the 200 nautical mile limit. However, there are ways in which countries can claim the right to explore/exploit the non-living resources of the sea floor beyond the 200 mile limit. This work is generally known as UNCLOS (United Nations Convention on the Law of the Sea) Article 76 (Definition of the continental shelf).



Who Owns the Arctic??

Overview and application of UNCLOS Article 76 to the Arctic Basin

Professor Ian Wright¹ and Alan J. Evans²

¹Deputy-Director, Directorate of Science & Technology
National Oceanography Centre
Southampton, UK
email: ian.wright@noc.ac.uk

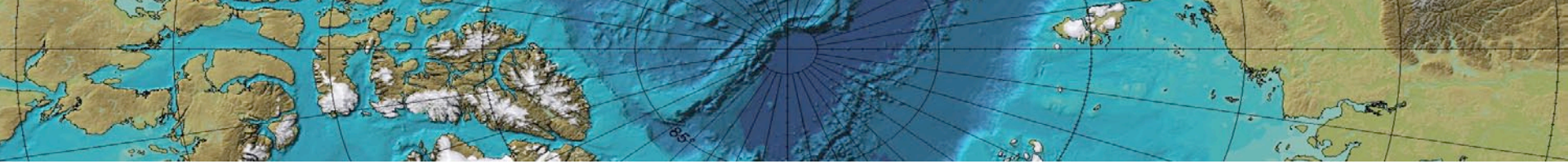
⁴National Oceanography Centre, Southampton, UK; e-mail: alan.evans@noc.ac.uk



**National
Oceanography Centre**

NATURAL ENVIRONMENT RESEARCH COUNCIL

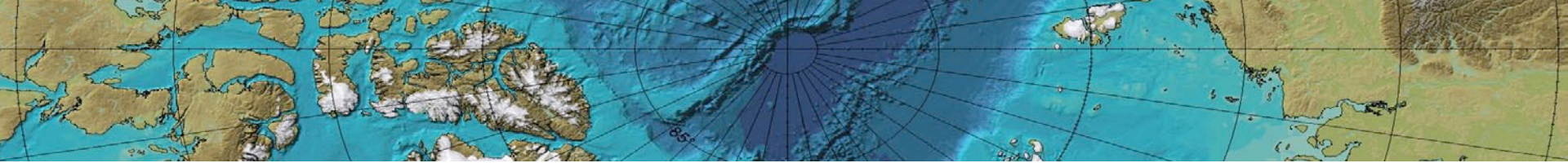
AAPG International Conference, 23 – 26 October 2011, Milan



Presentation

- United Convention Convention on Law of the Sea (UNCLOS)
- Article 76 - Theory
- Article 76 – Practice and application
- Application to Arctic Basin





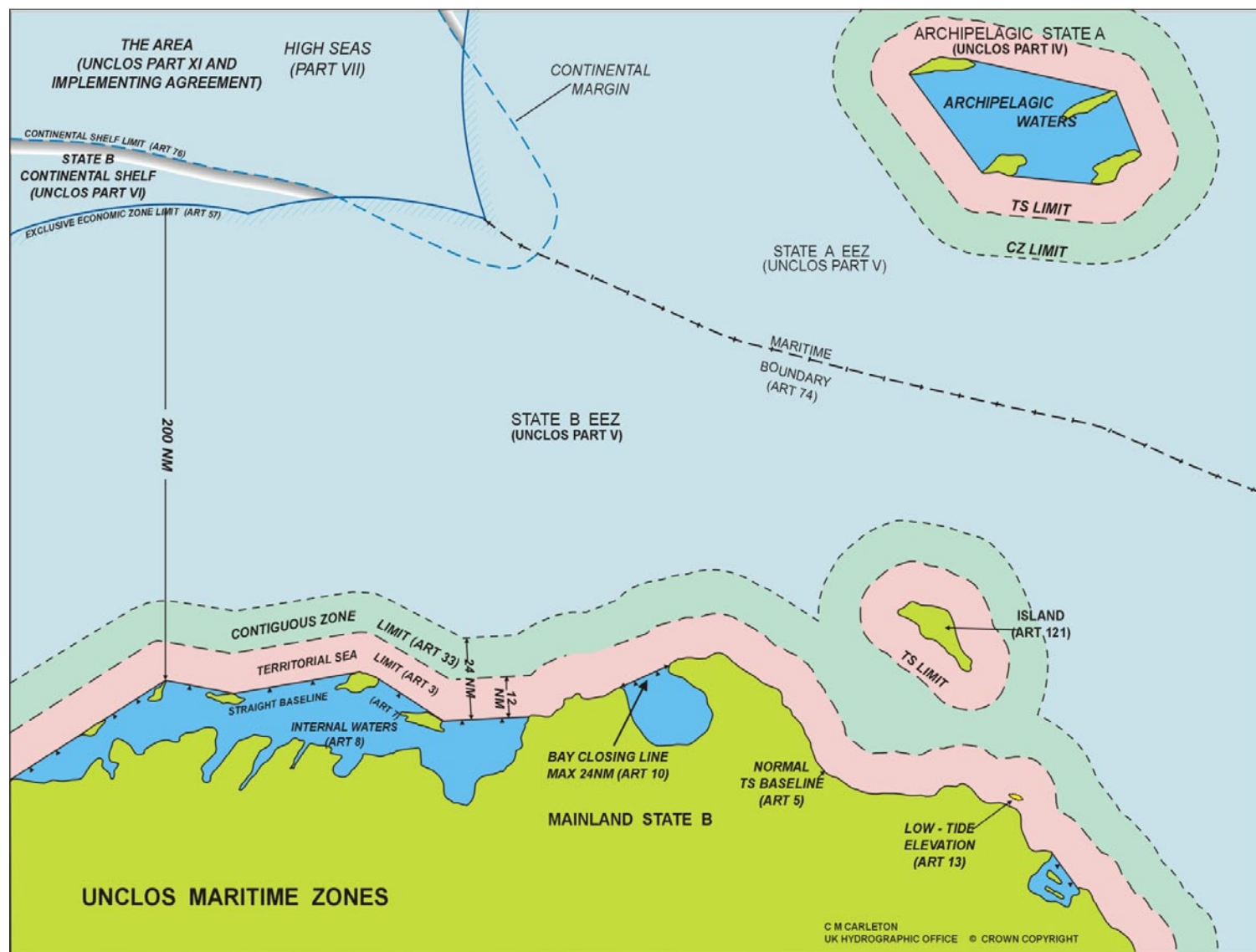
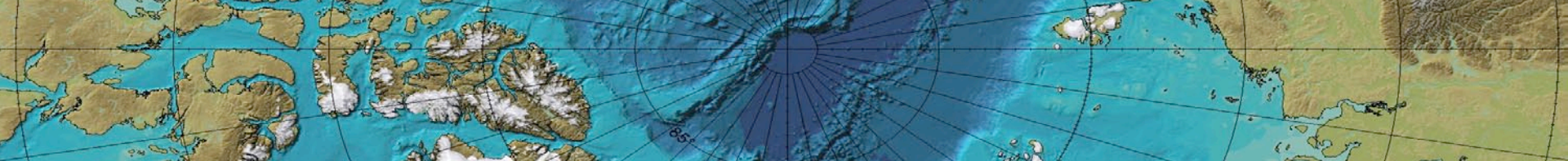
United Nations Convention on Law of the Sea (UNCLOS) – arguably very successful convention

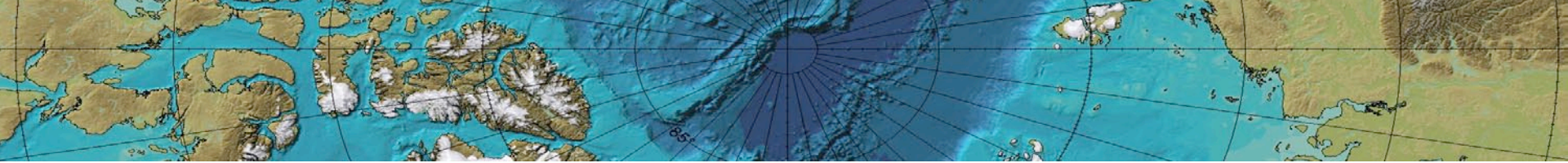
- Came into force 16 November 1994;
- 161 States have ratified.

Continental Shelf – Part VI

- **Article 76 - Definition of the continental shelf**
- *Article 77 - Rights of the coastal State over the continental shelf*
- *Article 78 - Legal status of the superjacent waters and air space and the rights and freedoms of other States*
- *Article 79 - Submarine cables and pipelines on the continental shelf*
- *Article 80 - Artificial islands, installations and structures on the continental shelf*
- *Article 81 - Drilling on the continental shelf*
- *Article 82 - Payments and contributions with respect to the exploitation of the continental shelf beyond 200 nautical miles*
- *Article 83 - Delimitation of the continental shelf between States with opposite or adjacent coasts*





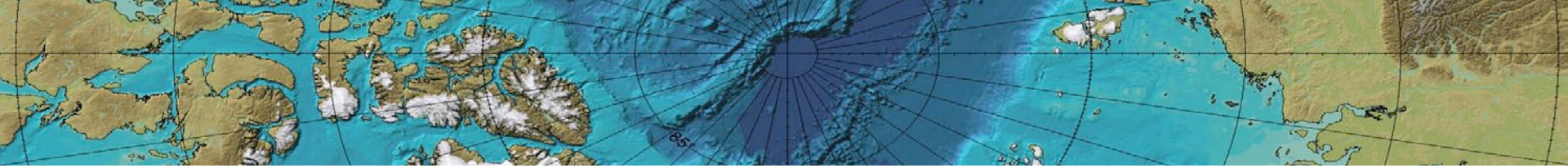


Article 76 *Definition of the Continental Shelf*

Legal continental shelf defined as;

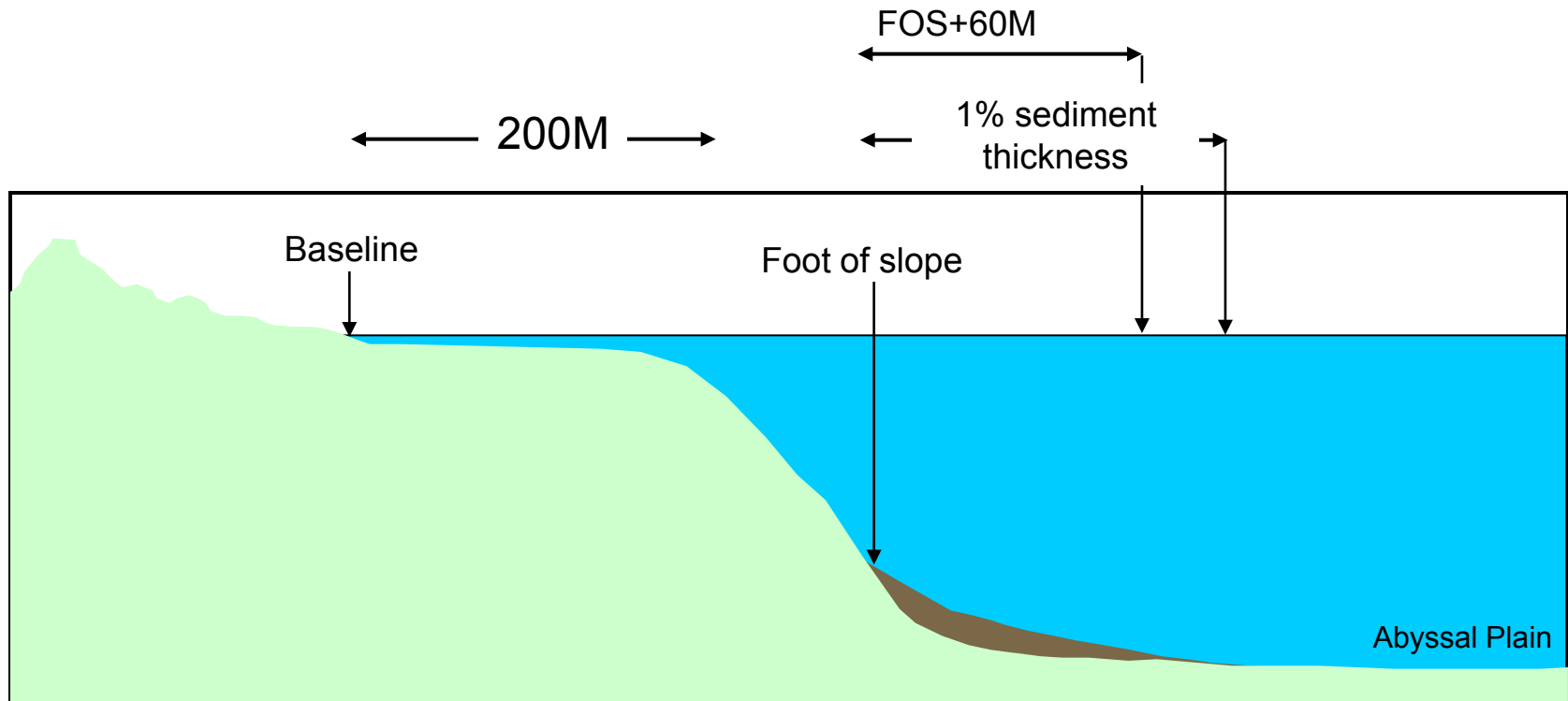
“The continental shelf of a coastal state comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200M (nautical miles) from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.”
(UNCLOS Article 76, paragraph 1)

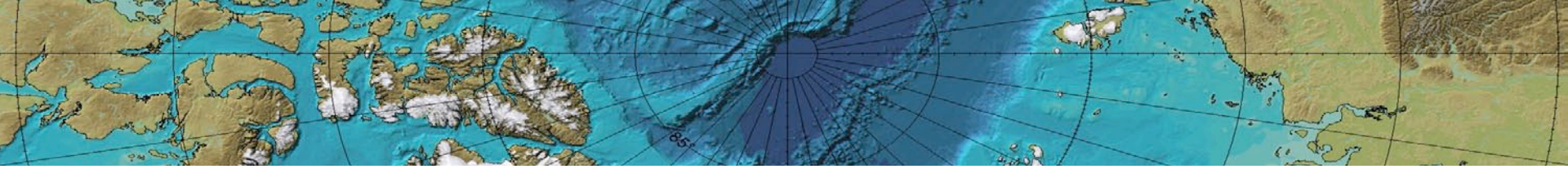




Article 76, defines two criteria which allow a nation to extend its continental shelf beyond 200M.

1. Locate the FOS (Foot Of Slope) and define a series of points where the thickness of the sedimentary rock is at least 1% of the shortest distance from such point to the FOS, or
2. Identify the FOS and geodetically measure 60M seaward from this point.



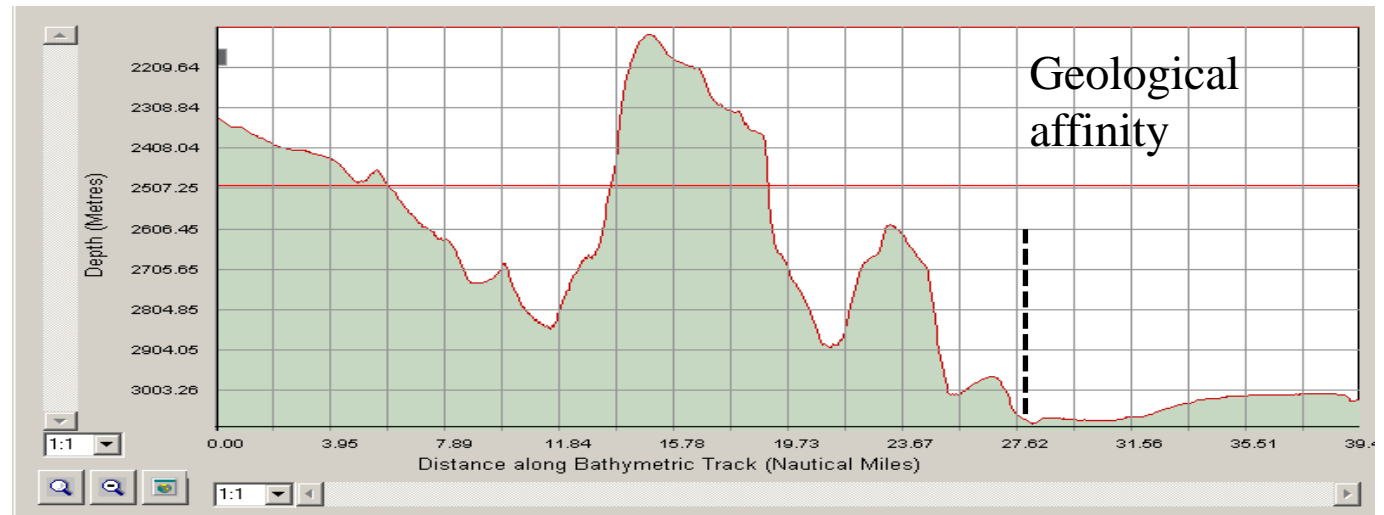
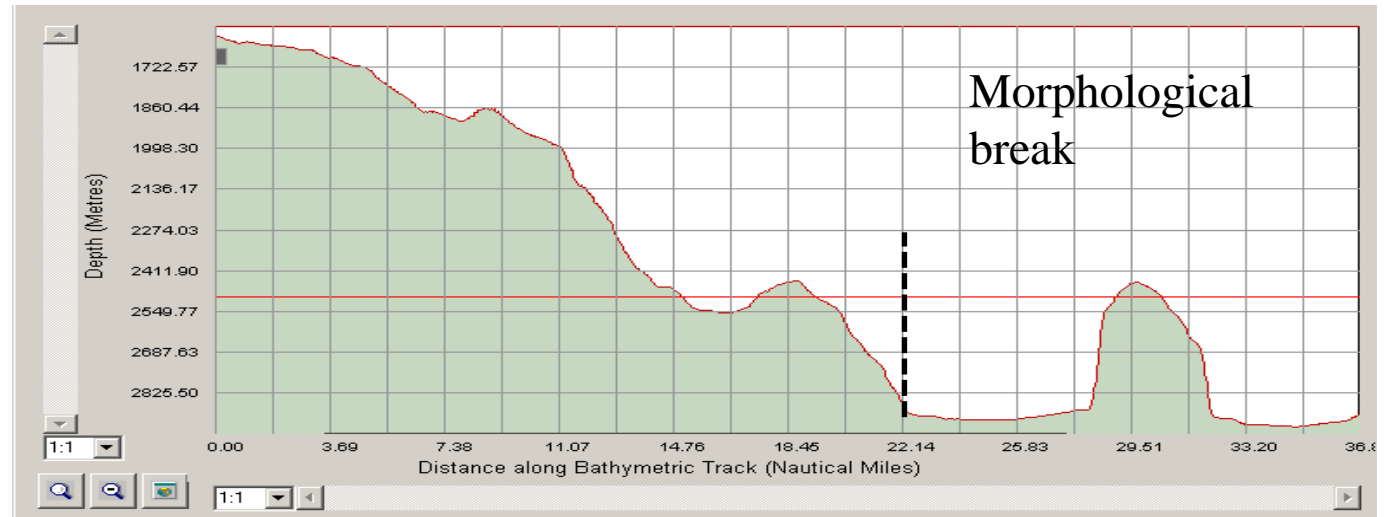
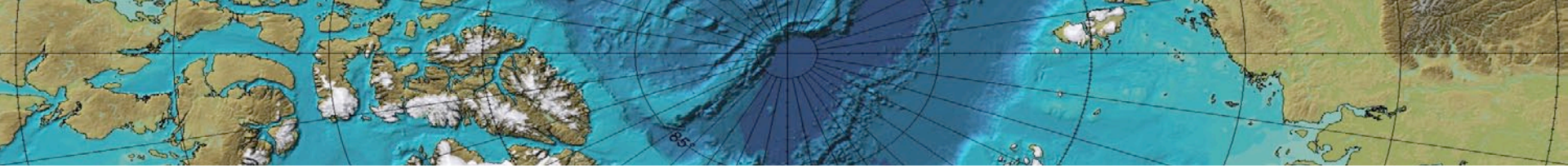


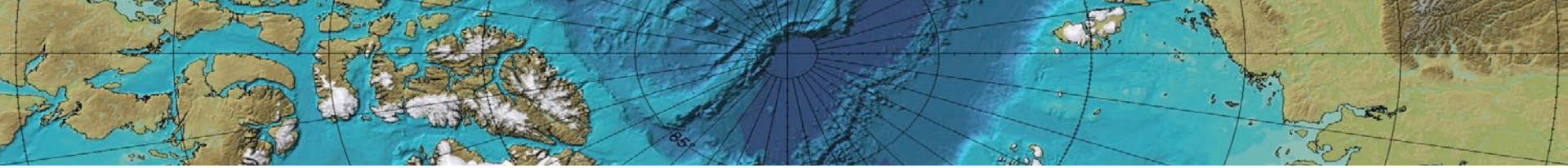
Foot of the Slope Identification

“In the absence of evidence to the contrary, the foot of the continental slope shall be determined as the point of maximum change in the gradient at its base”.

- Prolongation – Geology / Morphology
- Base of the Slope – Landward/Seaward
- Foot of the Slope – Max Change

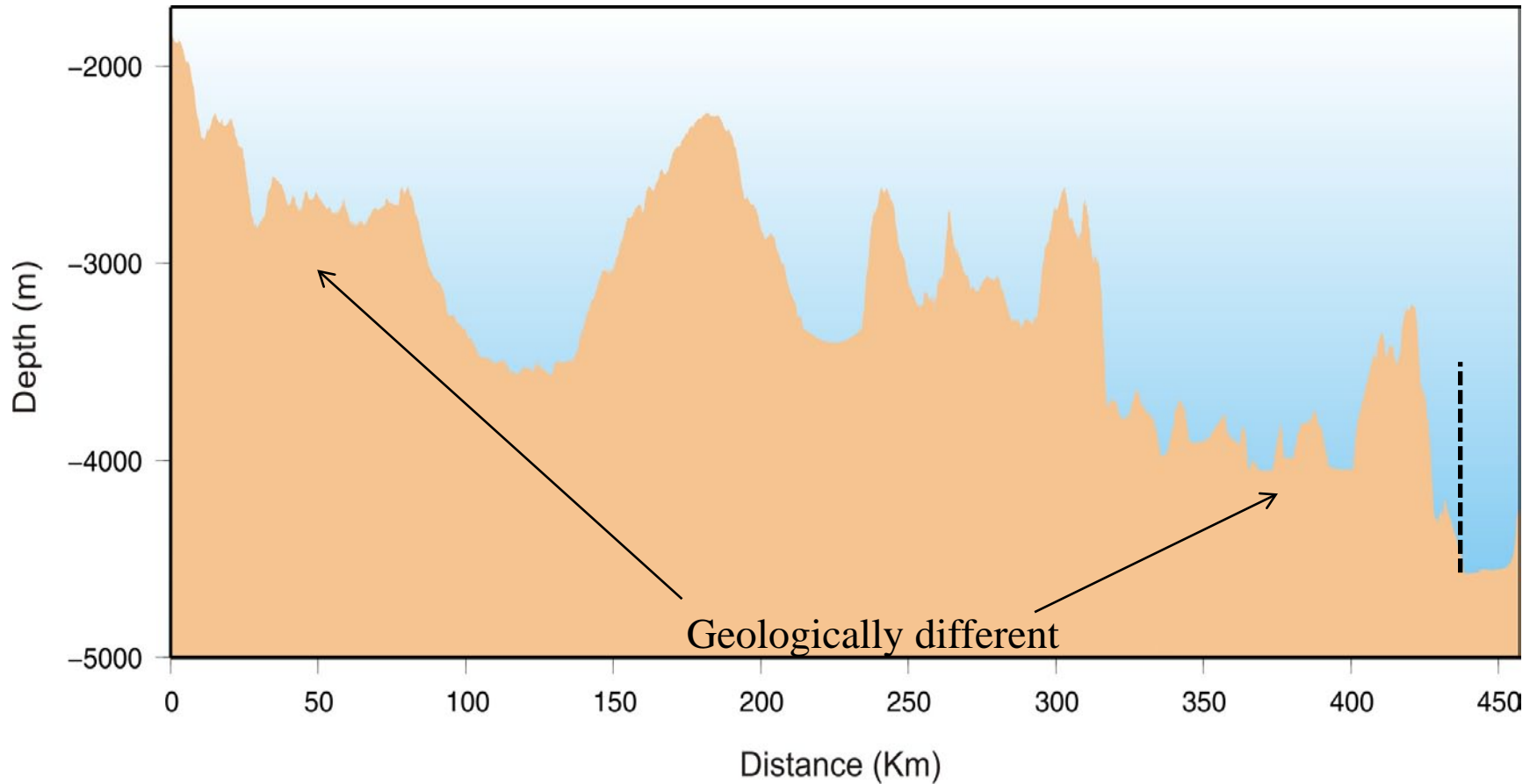


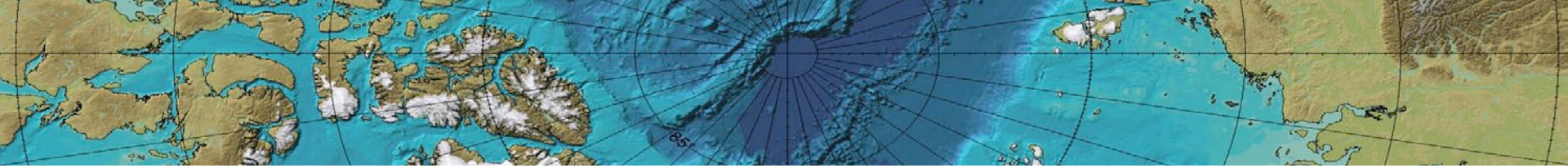




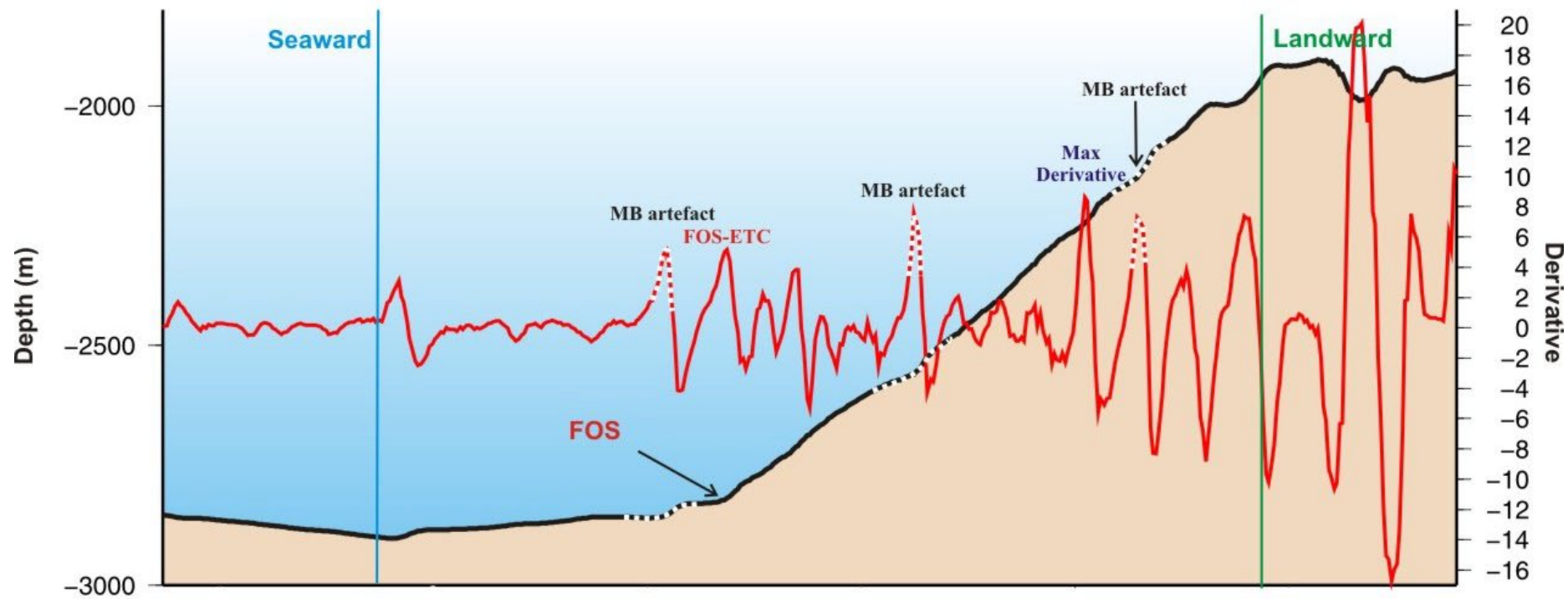
Extent of natural prolongation

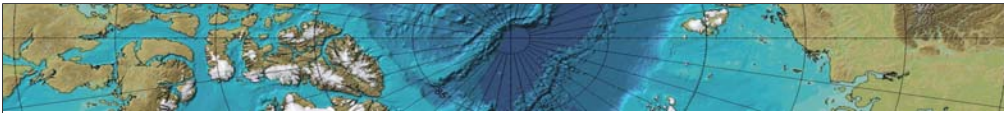
Morphological continuity





Foot of the Slope – Max Change – Slope $>1^\circ$

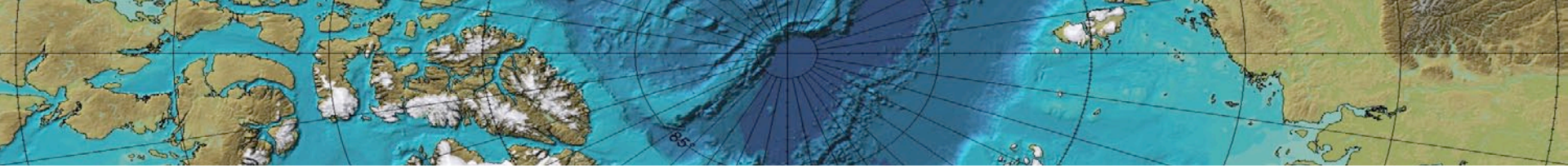




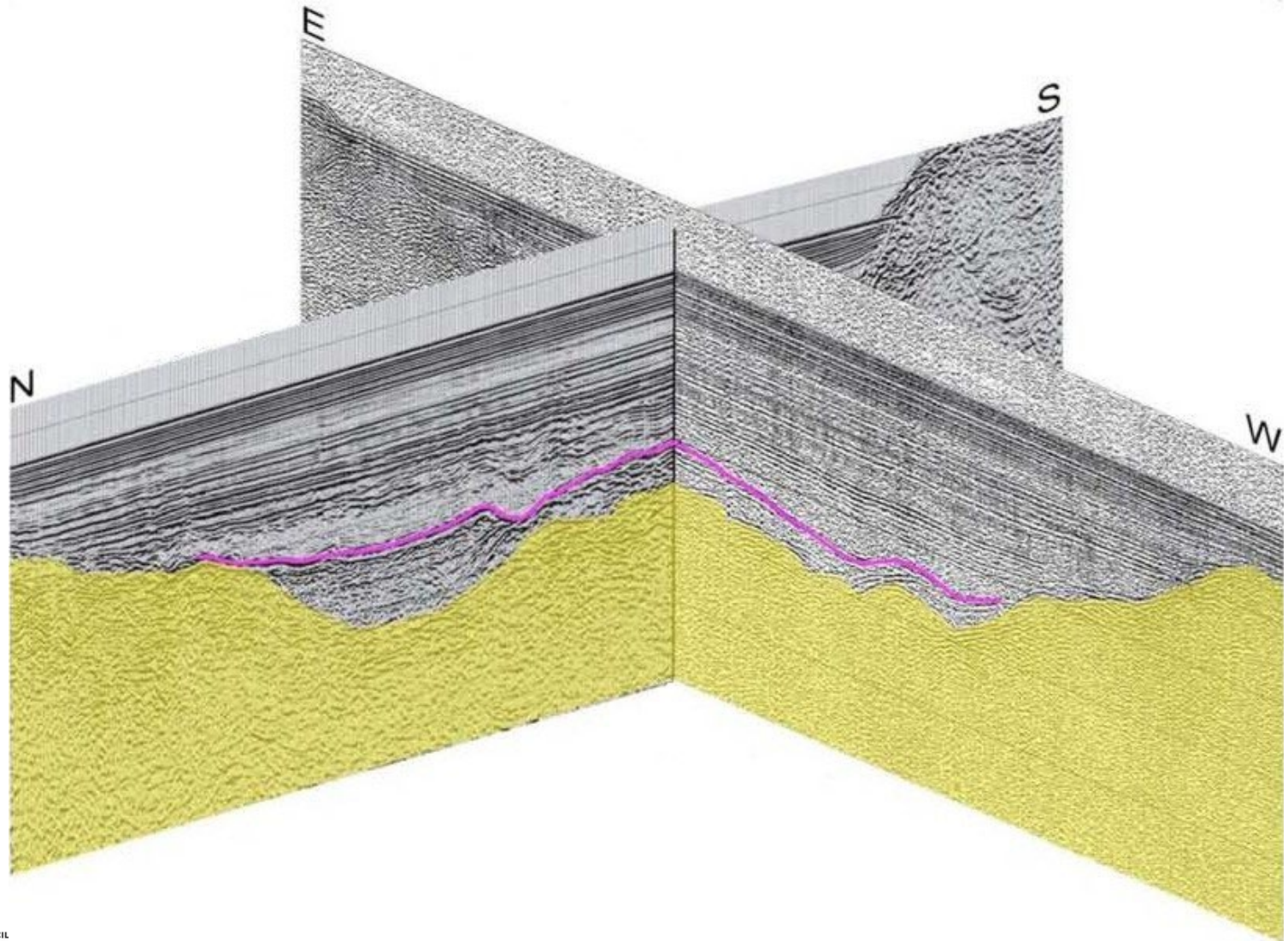
1% Sediment Thickness

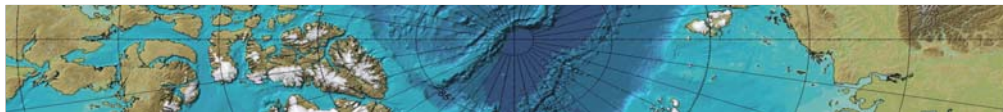
Outermost fixed points at each of which the thickness of sedimentary rocks is at least 1 per cent of the shortest distance from such point to the foot of the continental slope;

- Basement identification
- TWT to Sediment Thickness
- Sediment Continuation

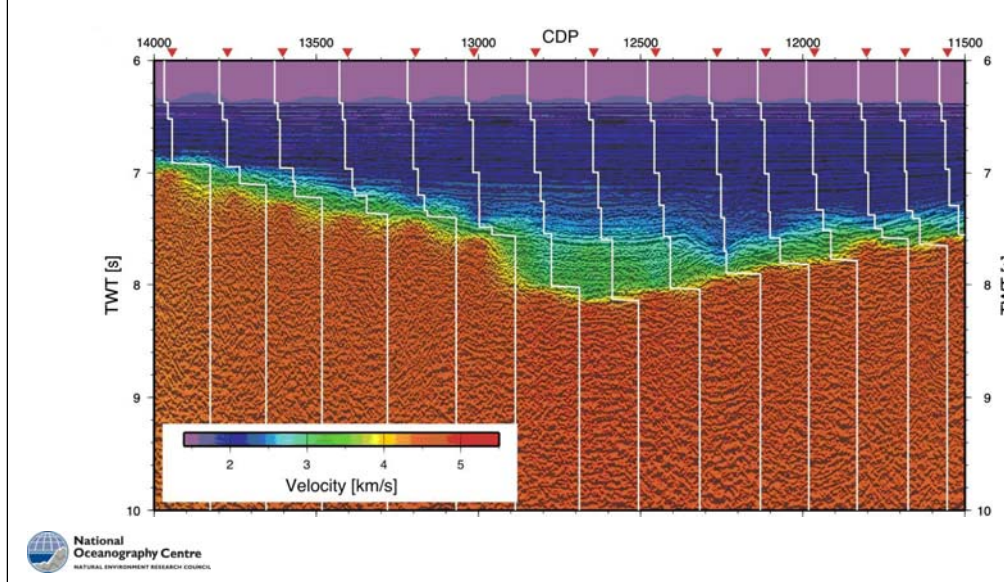


Basement Identification





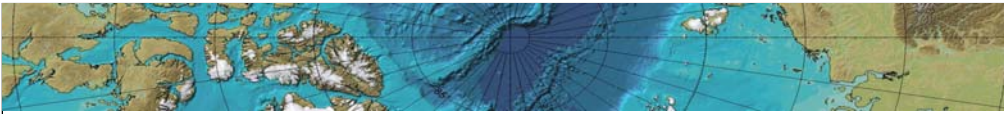
TWT to Sediment Thickness



Presenter's Notes: In this slide we show how we measure the thickness of sediment by transferring information of TWT into distance (or thickness).

The white lines are velocity analysis results at particular CDP, where the kinks are caused by changing composition/structure within the sedimentary package. These individual analyses are then applied to the whole section to produce the coloured pallet. From this picture it is the yellow horizon we see here that is critical, as this marks the true basement.

And the third requirement of using the 1% rule is to demonstrate that there is a continuation of sedimentary coverage from the 1% point back to the FOS.



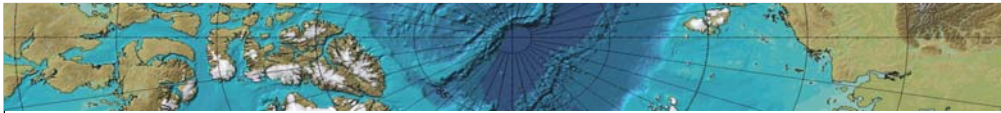
60M from Foot of the Slope

A line of fixed points not more than 60 nautical miles from the foot of the continental slope.

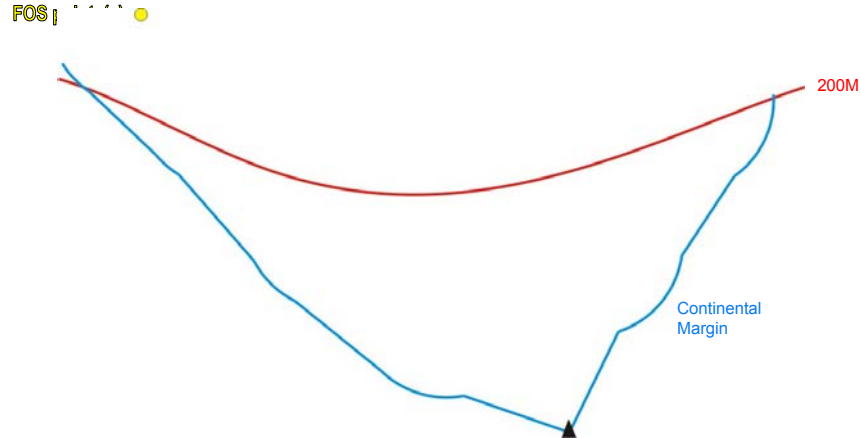
- Geodetic measurement of 60 nautical miles

Presenter's Notes: The second constructional criteria is the FOS+60M measurement, otherwise known as the Hedberg formula.

This is a far less complicated way of defining the OL, as it is a simple geodetic measurement, which several software packages can perform, or you can even use your own algorithm, etc.

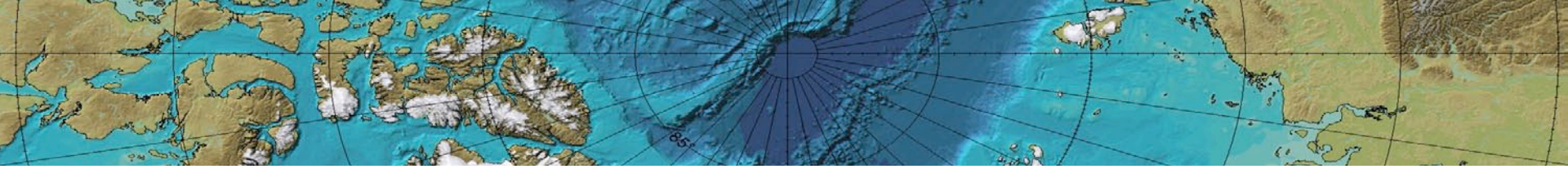


Continental Margin



Presenter's Notes: I will now demonstrate how we use the three criteria, FOS, 1% and FOS+60M to construct an area of Continental Margin (legal).

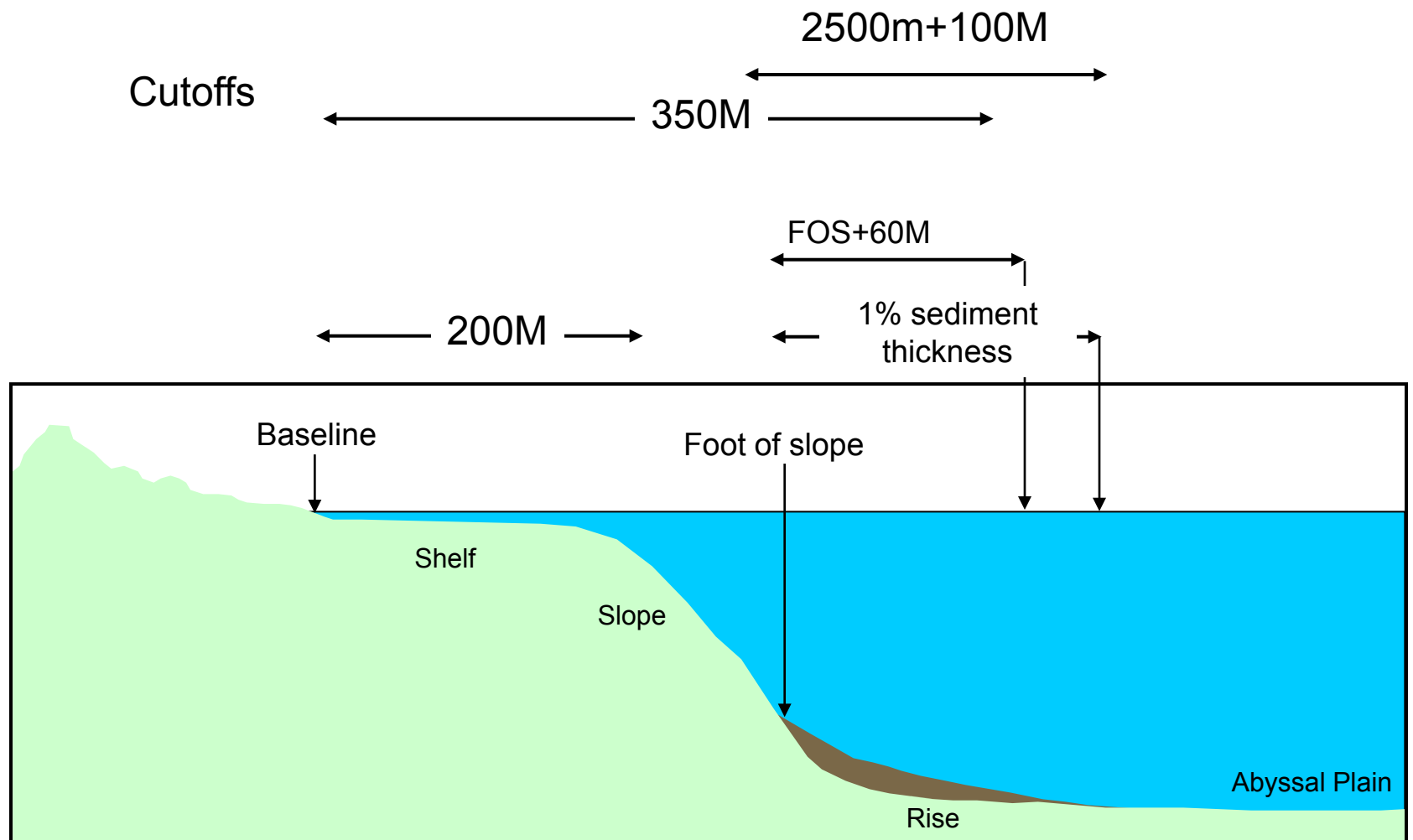
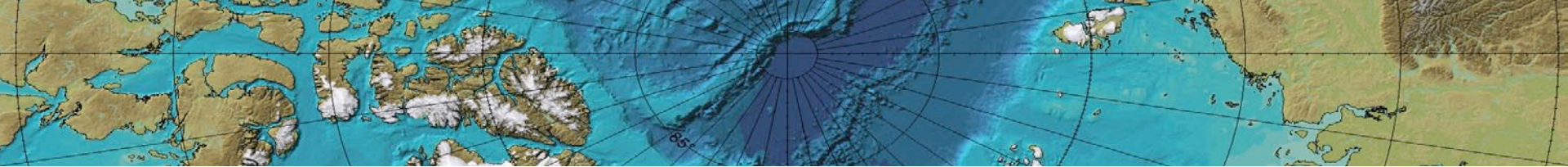
All along this is a legal Continental Margin and not a geological one.

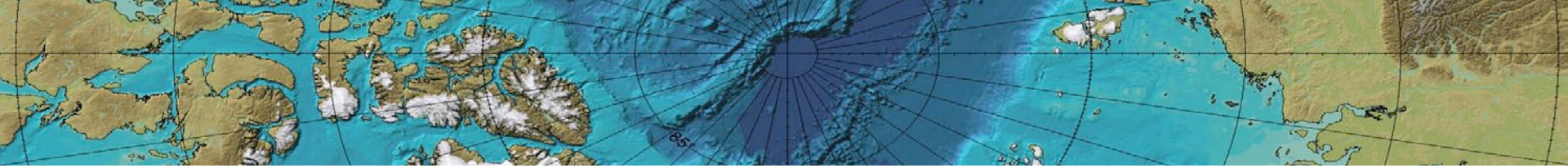


Article 76, defines two criteria which constrain the extent of a continental shelf beyond 200M.

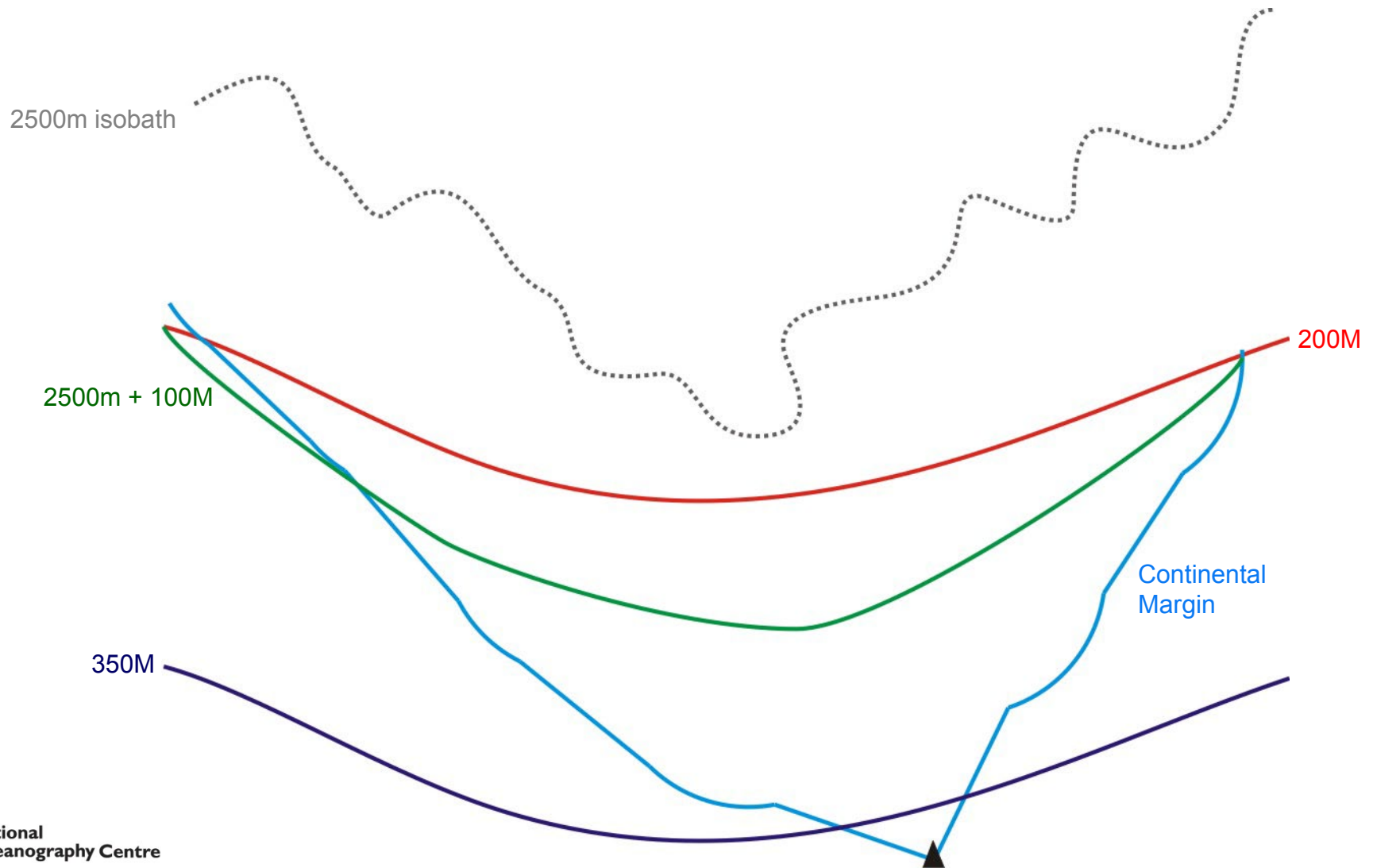
1. Either shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured, or
2. Shall not exceed 100 nautical miles from the 2,500 metre isobath, which is a line connecting the depth of 2,500 metres,
3. Notwithstanding these provisions, on submarine ridges, the outer limit of the continental shelf shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured, though does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs.

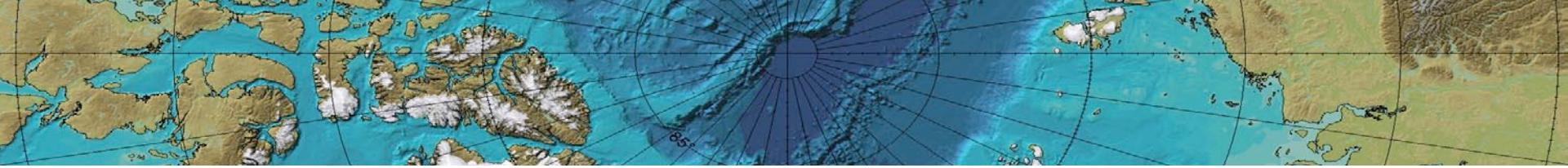




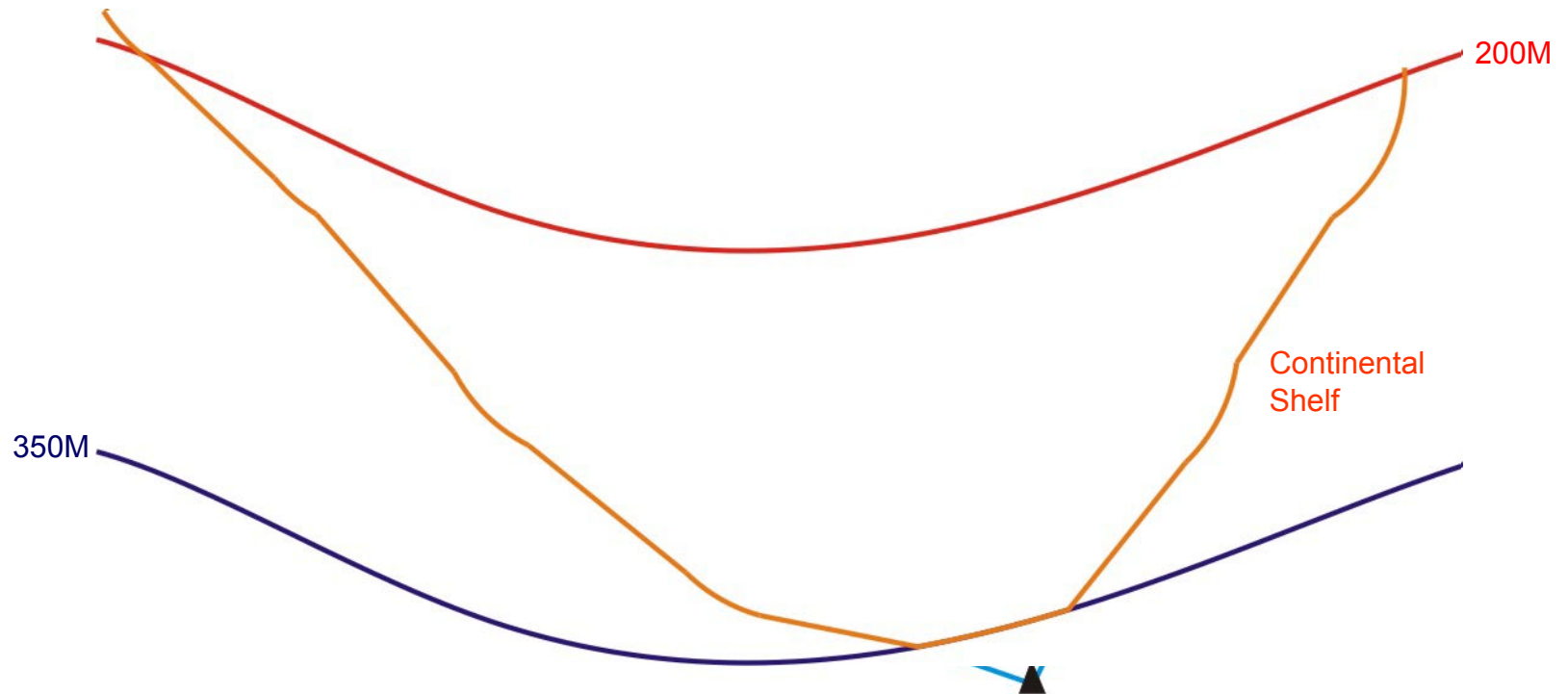


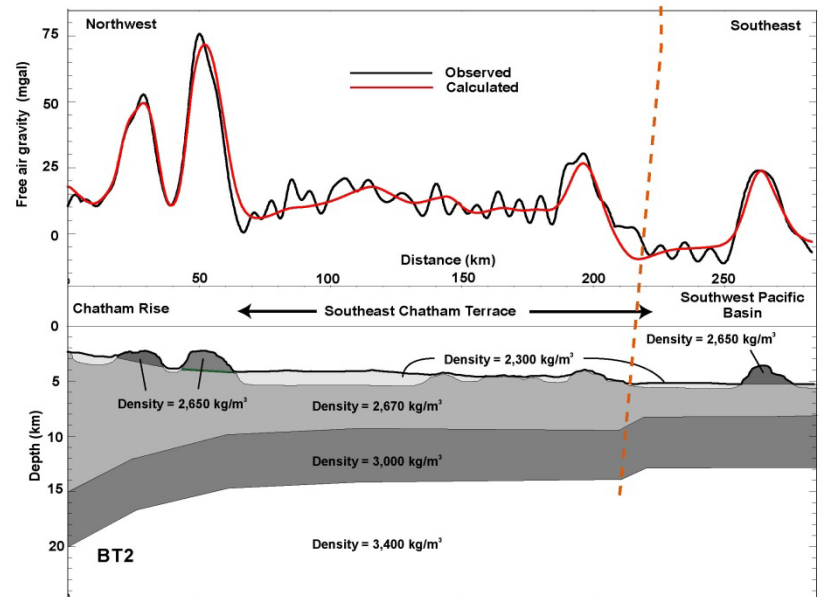
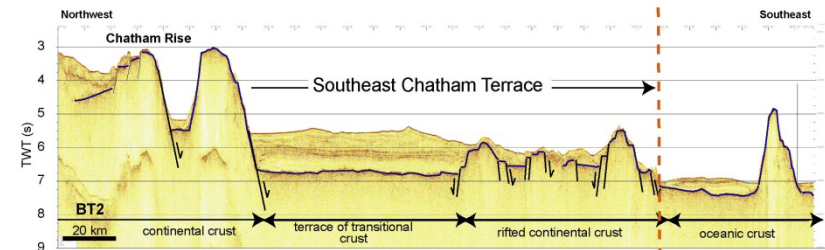
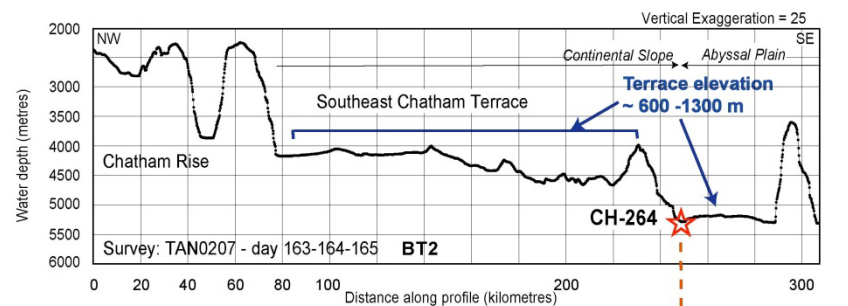
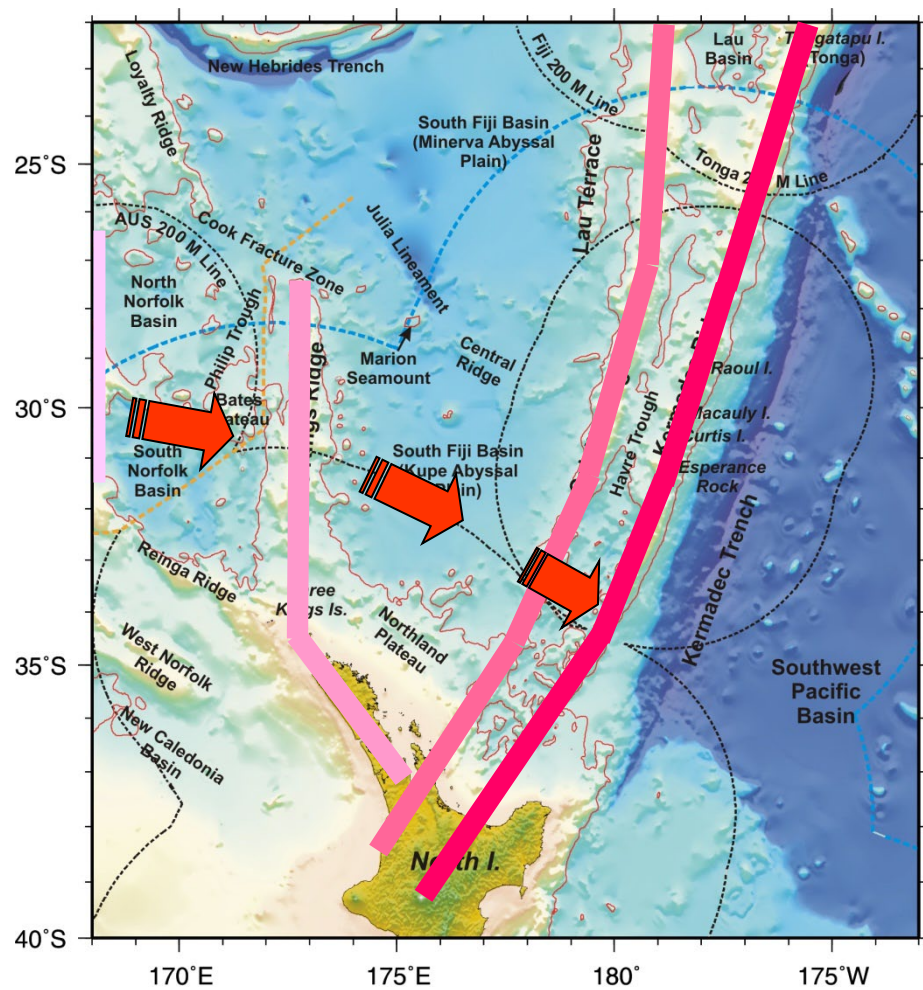
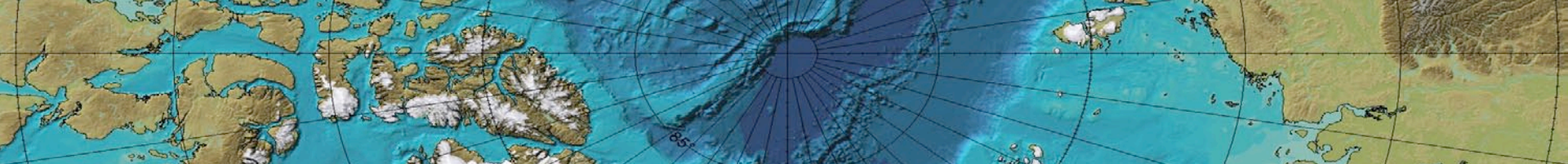
Constraints

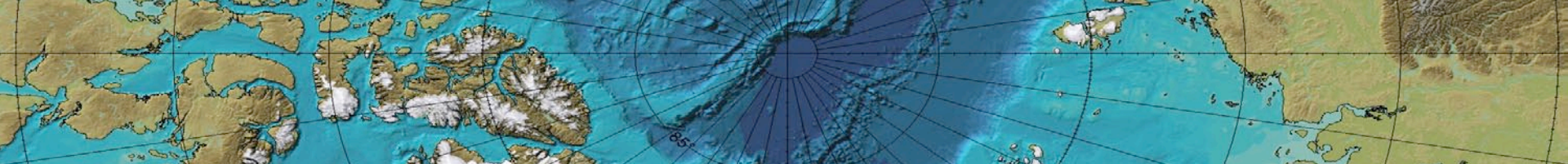




Continental Shelf

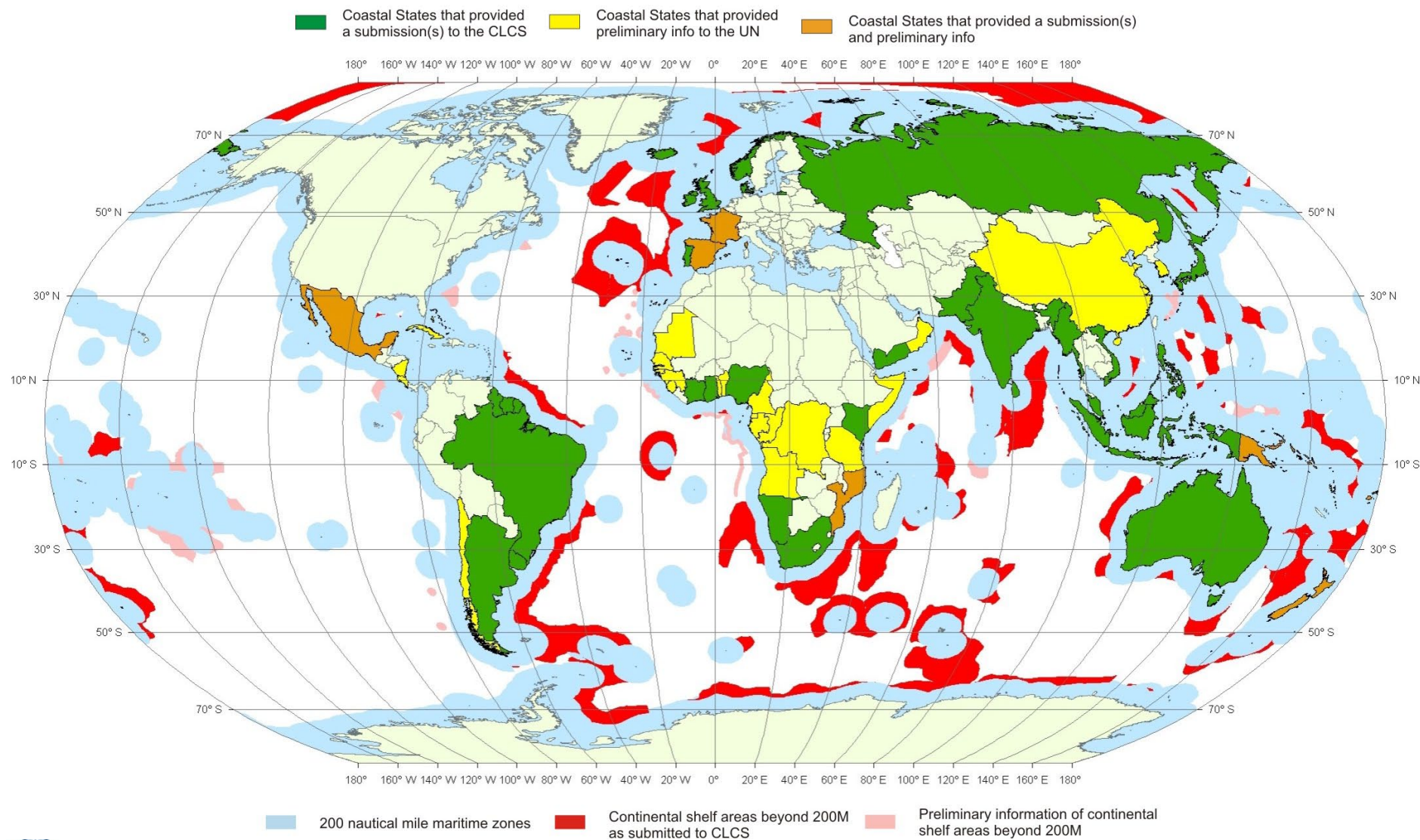
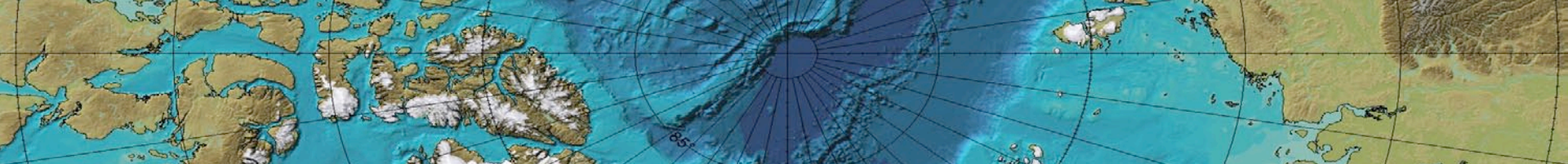


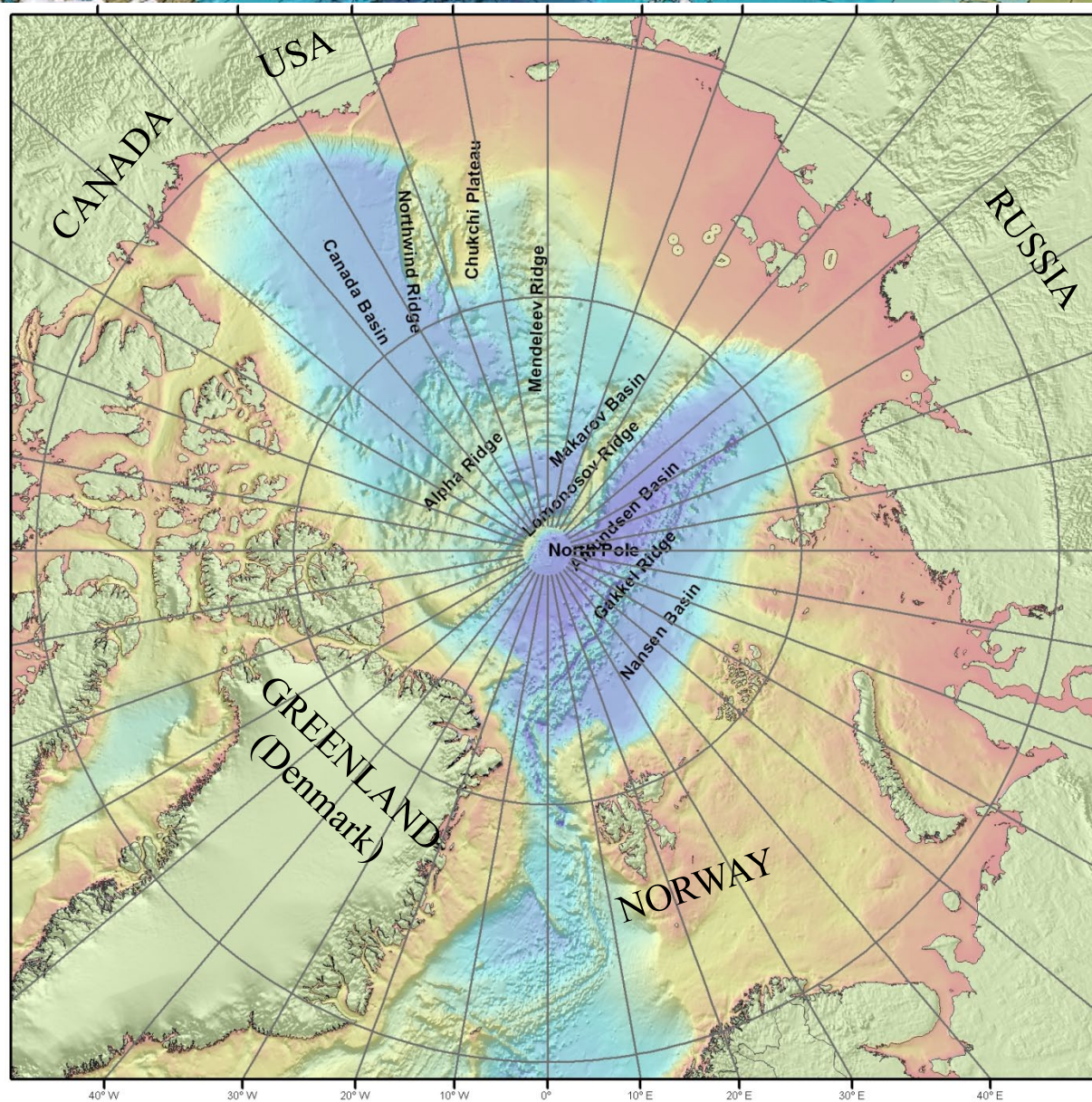
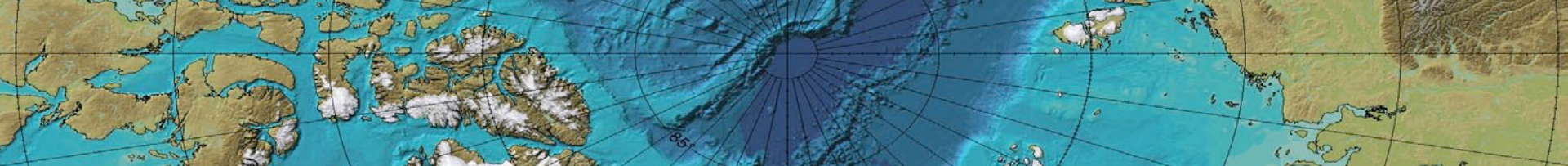


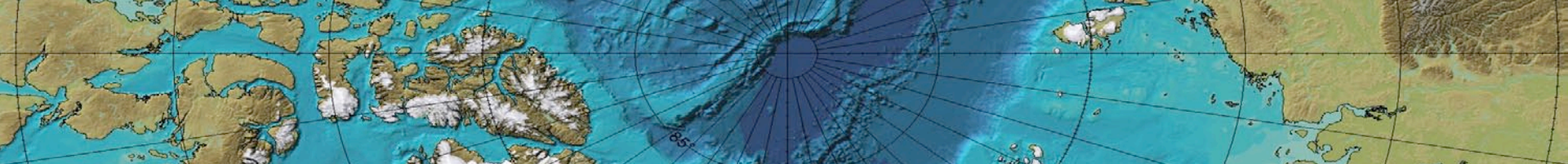


Country	Order	Country	Order	Country	Order
Russia*	1	Ireland (HRA)	20	Seychelles	39
Brazil	2	Uruguay	21	France	40
Australia	3	Philippines	22	Palau	41
Ireland	4	Cook Islands	23	CoteDivoire	42
New Zealand	5	Fiji	24	Sri Lanka	43
FISU	6	Argentina	25	Portugal	44
Norway	7	Ghana	26	UK Falklands	45
France	8	Iceland	27	Tonga	46
Mexico	9	Faroe N	28	Spain	47
Barbados*	10	Pakistan	29	India	48
UK Ascension	11	Norway	30	Trinidad & Tobago	49
Indonesia	12	South Africa	31	Namibia	50
Japan	13	FSM-PNG-Solomon	32	Cuba	51
Seychelles-Mauritius	14	Malaysia-Vietnam	33	Mozambique	52
Suriname	15	SA-France	34	Maldives	53
Myanmar	16	Kenya	35	Denmark	54
France	17	Mauritius	36	Bangladesh	55
Yemen	18	Vietnam	37	Madagascar	56
UK HRA	19	Nigeria	38	Guyana	57



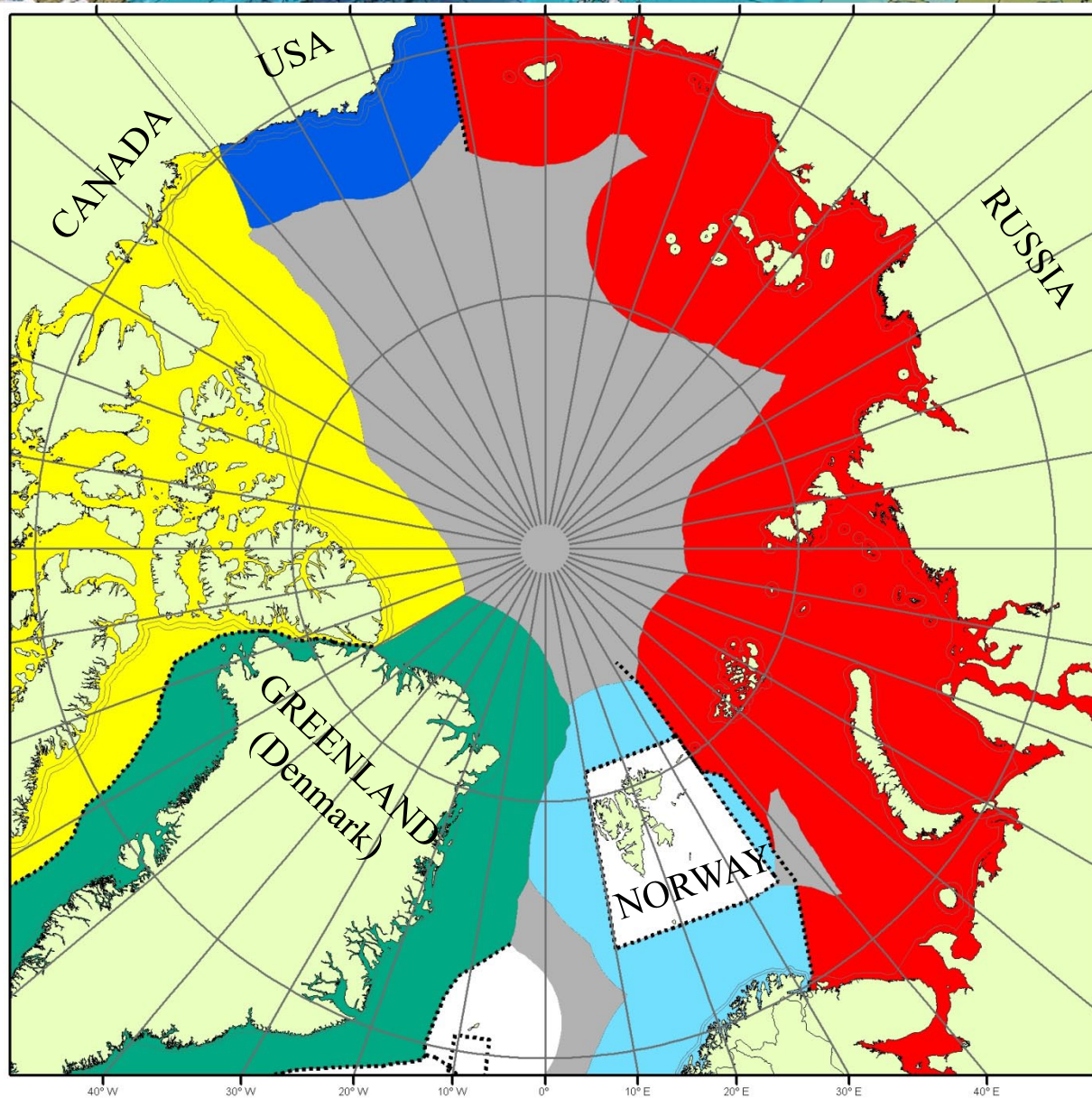


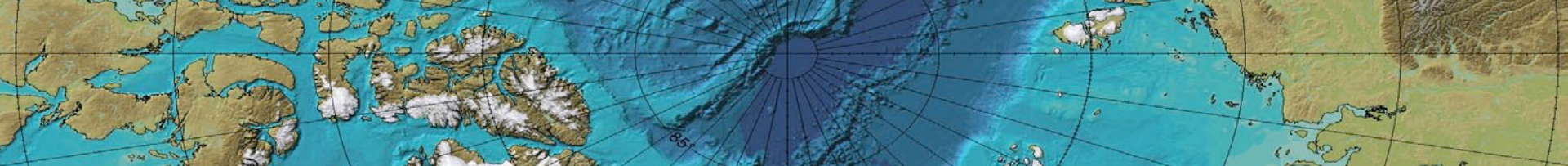




Maritime zone

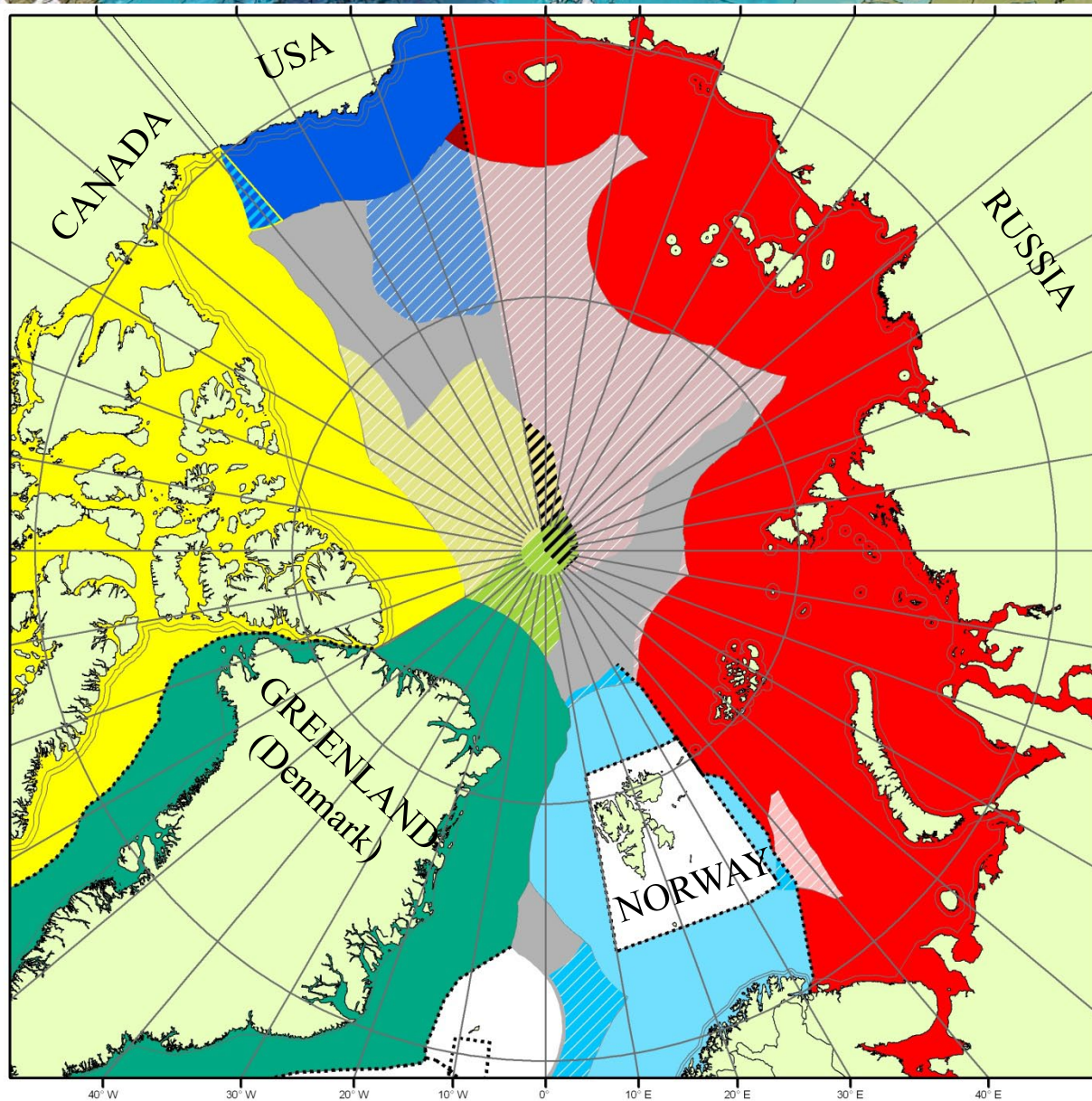
- Canada
- Greenland
- Norway
- Russia
- USA
- Canada-USA overlap
- Russia-USA special agreement
- High Seas

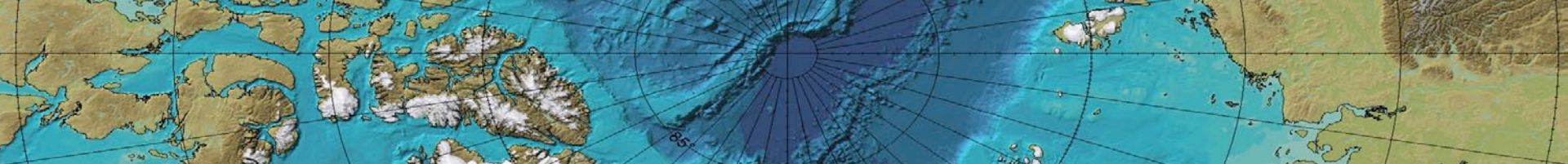




Outer Continental Shelf

- Canada OCS?
- Greenland OCS?
- Norway OCS
- Russia OCS?
- USA OCS?
- Potential overlap

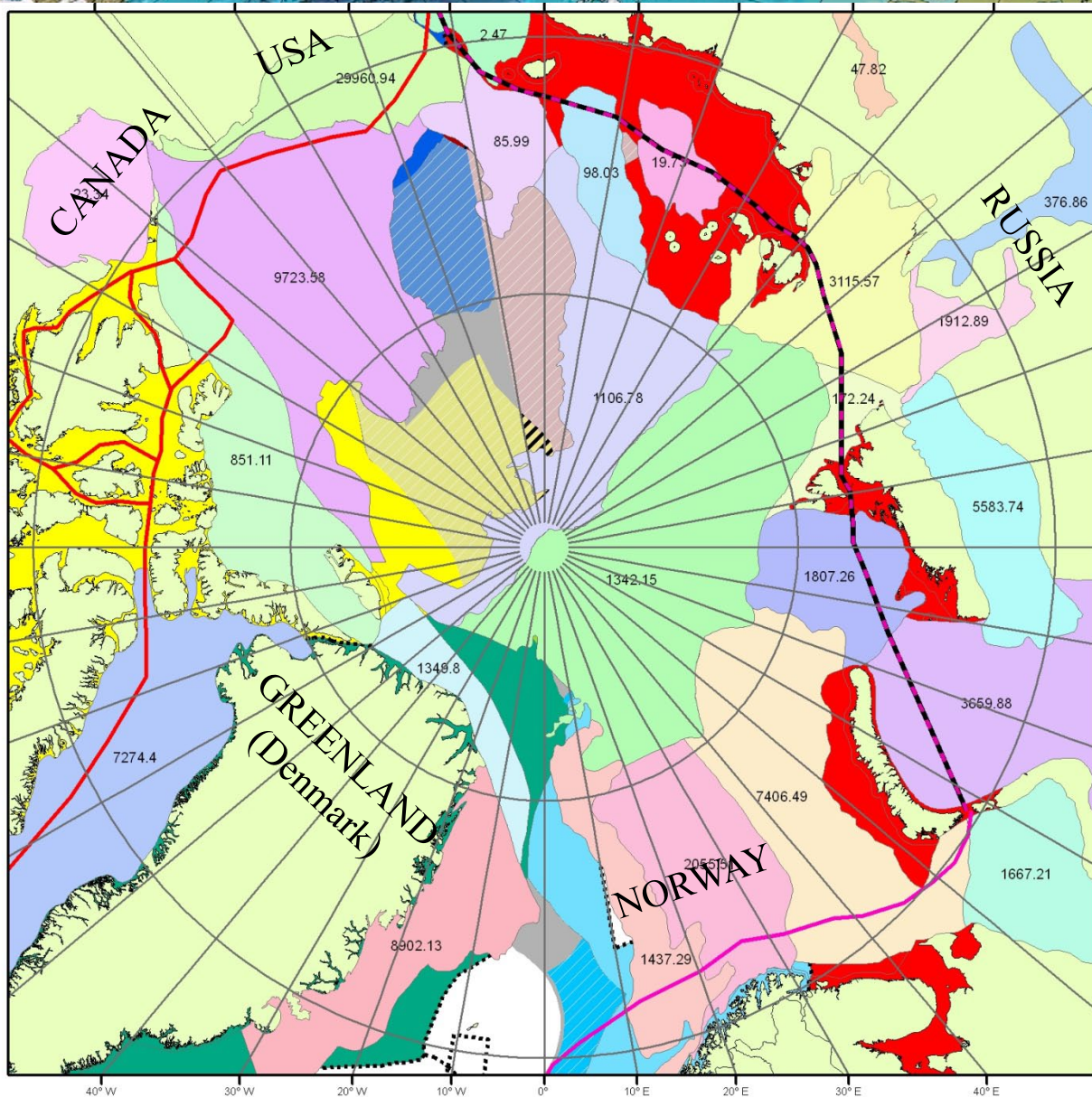


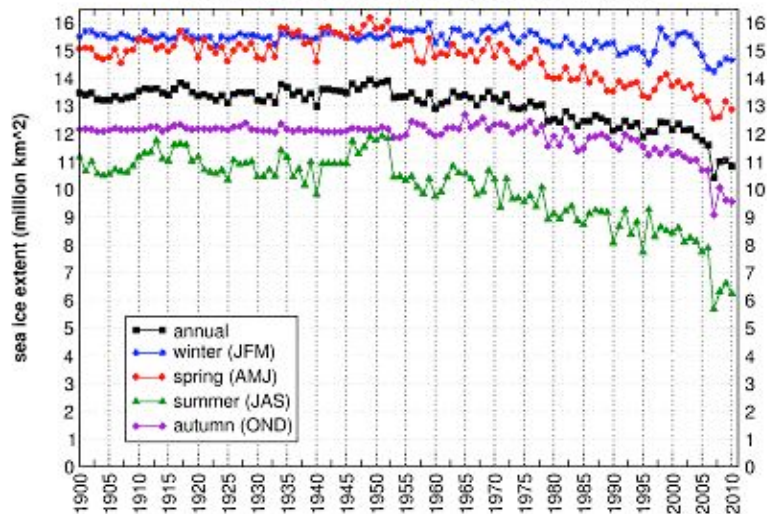
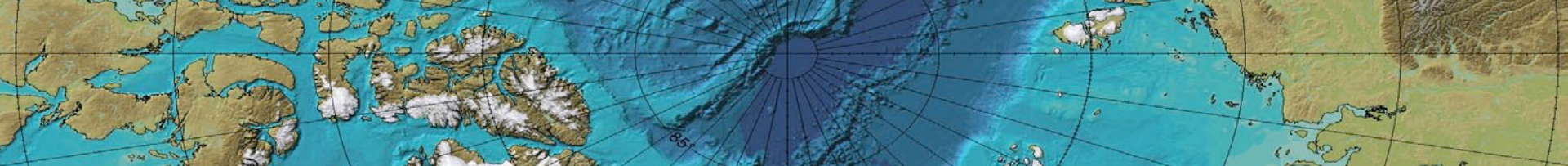


**The mean estimate of
volume of undiscovered
oil (millions of barrels)**

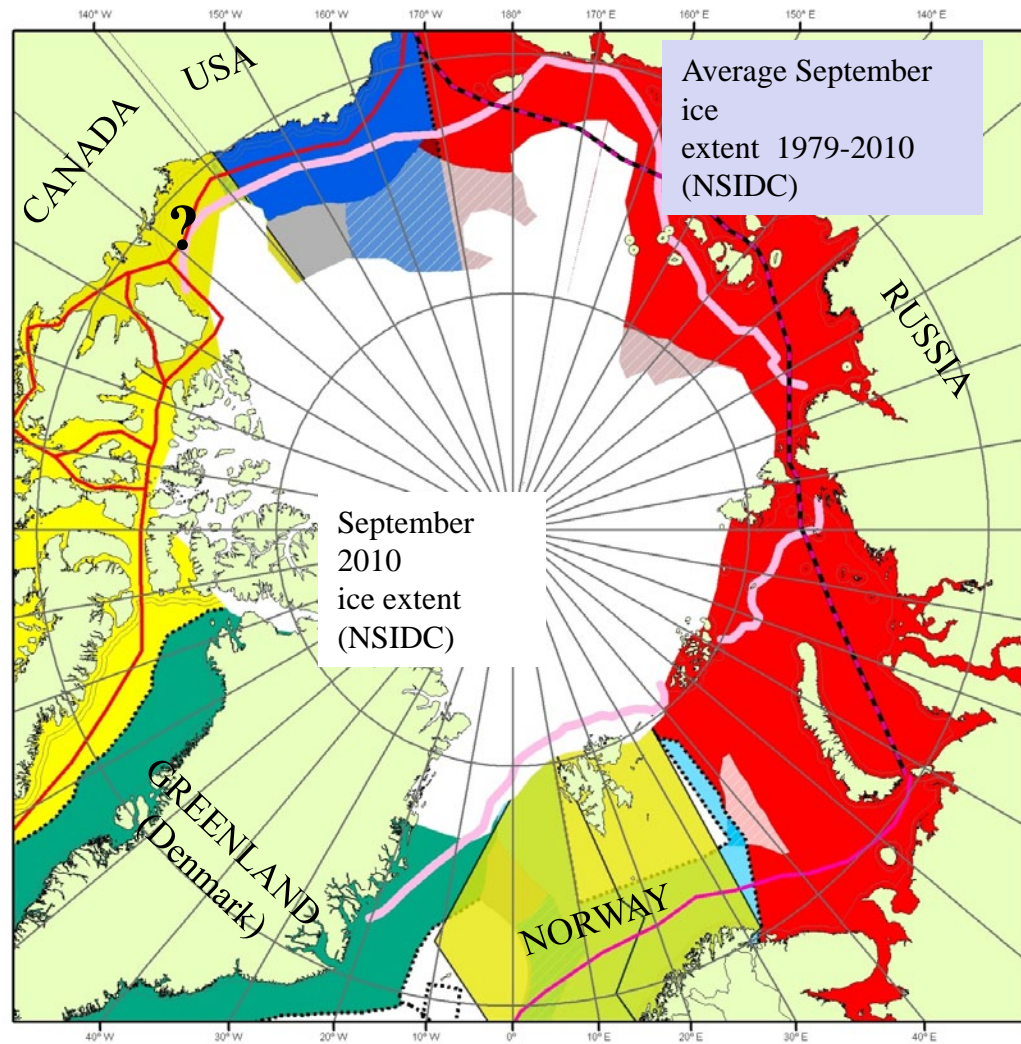
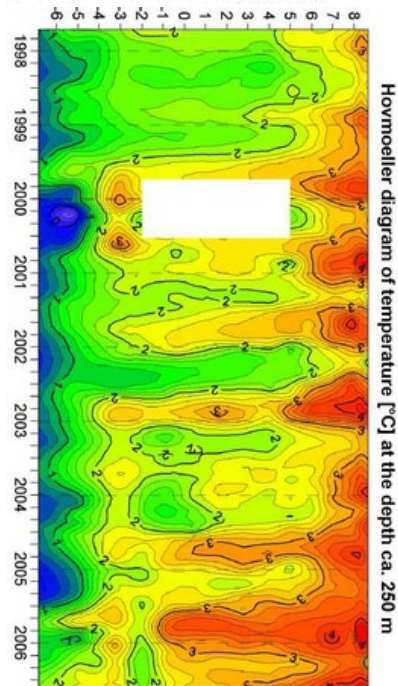


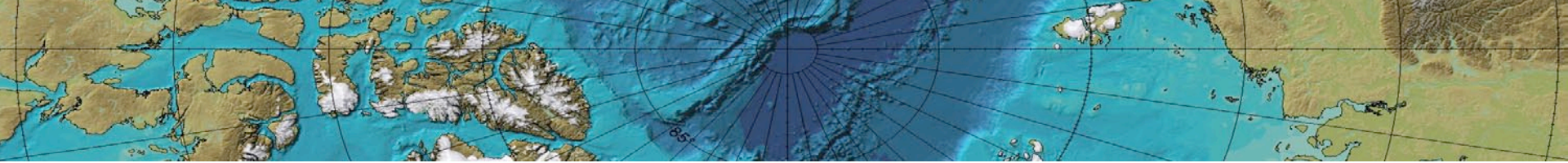
*Source
USGS*





Arctic Warming





Summary

- UNCLOS and Article 76 provides a legal framework for seafloor exploitation beyond 200 M.
- Article 76 essentially distinguishes between continental margins / natural landmass prolongation, and the deep-ocean seafloor.
- Article 76 provides “formulae” and “constraints” based on foot of slope and sediment thickness and geodetic distances for determining an outer continental margin.
- Most of the Arctic Ocean can be defined as legal continental shelf beyond the 200 M by bounding coastal states.
- Arctic Ocean is warming faster than other parts of Earth and could be sea-ice free by ~2040.

