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UNCLOS AND ICE EDGE BASE LINE PROBLEMS

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SUMMARY

Applying the Law of the Sea to determine extent of continental shelves start from base lines bounded by the outermost land/sea margin. In many parts of the world these base lines are drawn from immovable rock to rock, but this is not always the case in the polar areas. Here the outer boundaries of "terra firma" may be glaciers or iceshelves, with fronts that can exhibit significant changes in position. This paper discusses the implications of such phenomena in the context of applying the Law of the Sea. Because ice in glaciers as well as rock are both, from a physical point of view, mediums in the same phase, the solid phase; and because ships cannot penetrate glaciers or iceshelves (which typically are 200 m thick) such ice is for this purpose considered to be the same as rock.

INTRODUCTION

The United Nations Convention on the Law of the Sea (UNCLOS) does not cover this issue. The only mention of ice covered areas is in Part XII – The Protection and Preservation of the Marine Environment. Article 234 states:

"Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance. Such laws and regulations shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific evidence."

There is nothing in Part II, Section 2 covering the territorial sea baseline issue in ice-covered areas.

DEFINITIONS AND FACTS

In accordance with information from The National Snow and Ice Data Center in Boulder, Colorado, glaciers and ice sheets cover about 10 percent of the Earth's land area.

Glaciers, large, thickened masses of ice, accumulate from snowfall over long periods of time. When these ice masses reach a critical thickness, they begin to move, or flow. A body of ice that covers a large area of land and flows outward in all directions is called an ice cap or ice sheet. Two ice sheets exist on Earth now, one in Greenland and one in Antarctica. All continents except Australia bear ice in the form of mountain glaciers, ice sheets, or ice caps. Today, glaciers and ice sheets store about 75 percent of the world's freshwater.

Sea ice typically covers 14 to 16 million square kilometers of the Arctic Ocean, and 17 to 20 million square kilometers of the Southern Ocean around Antarctica, during their respective winter seasons.

THE PROBLEM

The question of whether “ice” can be regarded as “land” in the context of determining a territorial sea baseline in ice-covered areas is the key uncertainty.

All inorganic matters can exist in three phases: gas, liquid, and solid. Ice in a glacier or an ice-shelf is the solid phase of water as rock may be the solid phase of magma. In a situation where volcanic activity alters the position of the coastline, or creates a new island, changes to the territorial sea baseline are permitted automatically. Examples such as the island of Montserrat in the Caribbean and the Icelandic islands of the Vestmannaeyjar Group and on Fuglasker are classic. If the baseline claimed is normal, then as soon as a revised coastline has been published, either by the new edition of a chart or map, or by Notice to Mariners, the legal baseline automatically changes.

In an ice-covered area, the same process could apply, provided the ice is permanently attached to land. If the coastal State took the front of the glacier or iceshelf where it met the sea (the “ice front”) as the normal baseline, and mapped or charted this limit, this would be considered acceptable. Only if it was clear that there had been a change in ice front position that was more significant than the normal winter/summer variations would a change in the baseline position be recorded.

If the ice-covered coast meets the requirements of UNCLOS Article 7, then straight baselines could be used. Again the turning points on a straight baseline system on an ice-covered coast would be fixed at the ice front position and only amended after it is clear that a marked non-seasonal change had occurred to the ice-edge. This would be a similar system that is envisaged for a highly unstable coast as provided for in Article 7.2.

The argument that modern techniques can determine the edge of land under an ice-covered coast needs to be addressed. There are at least three reasons why this would not be satisfactory:

- It would be very expensive to determine the land edge under the large areas of ice-covered coast;
- The accuracy of such measurements would not be good enough to determine a legally enforceable baseline;
- The position of the land edge under several 10s or 100s of meters of ice would alter if the ice were removed, so it would not be the true land/sea interface.

It is obvious that the position of an ice front is changing with time. But today's technology shows that even rock is moving, due to tectonic movements. These tectonic movements may be up to more than 0.1 m/year as seen on figure 1.

The Arctic and Antarctic situations differ considerably:

Arctic

Most glaciers in the Arctic terminate on land, and are outside the scope of this discussion. Those that terminate at sea usually do so at the point where the glacier starts to float, and usually with nearby land extending further out to sea. Most of these also do not change their front position significantly. Only very exceptionally are glaciers seen that float seaward for more than a few hundred meters. Examples are found locally on Ellesmere Island in northern Canada, Nordaustlandet in Svalbard and at Franz Josefs Land. But even these glaciers stay generally within base lines determined by rock extending further seawards. See figure 2, where islets can be seen to the left of the glacier.

A surging glacier is one exceptional type of glacier found in a few regions of the Arctic, e.g. Svalbard, which exhibit rapid movement after a period of stability which can last for many decades or even a century or two. Such glaciers advance their front positions by several kms over a short period of months or a few years. Surging could thus possibly extend a glacier into the sea beyond a base line that has been determined from rock, but this has so far not been observed in the Arctic.

Antarctic

It could be argued that the interpretation of the provisions contained within the Antarctic Treaty negate any legitimate claim to an extension of maritime jurisdiction within the region. This lies outside the scope of this paper.

The coasts of Antarctica are nearly all ice covered. A typical part of the Antarctica glacier is shown on figure 3.

Compared to other continents there are very few off shore islands. Approximately half the circumference of the continent is in the form of rock outcrops or glaciers that calve

off where they start to float, and which do not change their position significantly. The other half consists of ice shelves. These are large floating glaciers, of thickness ranging from 200 to 1000m, that flow seawards at annual rates between 100-1000 m. The two largest ice shelves, Filchner-Ronne and Ross, both have an area of around 500 000 km², i.e. about the size of France. Many ice shelves extend seawards more than 100 km from where they start to float, at the location of the so-called grounding line.

Large icebergs sporadically calve from these ice fronts. In most extreme cases such calving can take place at intervals of over 100 years, giving rise to recorded changes in front position of more than 50 km.

Most parts of the Antarctic circumference have been sporadically mapped from the 1950's, and with good satellite coverage from the 1970's. There is thus enough data available to make a reasonably good determination of ice shelf positions, including a prediction of likely maximum extent. It is proposed here that this should be the starting point for drawing the base lines around the Antarctic continent.

CONCLUSION

From a physical point of view rock and permanent ice are both mediums in a solid phase. In the Antarctic, the floating ice shelves require discussion of which principles to apply when drawing base lines. These affect significantly the limits of the territorial sea and continental shelves, both because the ice shelves extend seawards beyond rock, and because they may change their front position by several 10s of km in some areas. In the Arctic, the presence of glaciers does not cause significant problems with regard to the construction of base lines in the context of the Law of the Sea.

In statistics limits are often given at 5, 2.5 or 1 % probabilities. We may accept the lowest of these numbers from the statistics when the permanent ice edge is considered in an area of a base line. If the ice edge is changing so that the influence will cause a change that is greater than 1 % of the breadth of the territorial sea, then the official coordinates for the base line should be changed. That means if the ice breaks off or moves more than 0.12 nautical miles (equal to 222 m) perpendicular to the base line, new coordinates can be given to describe the base line and the territory sea. Nowadays it is easy to ascertain the position of the permanent ice using available satellite information.

It is important to attempt to gain agreement between the coastal States concerned and the international community as a whole, rather than face unilateral claims by States which differ in their technical interpretation of this issue.

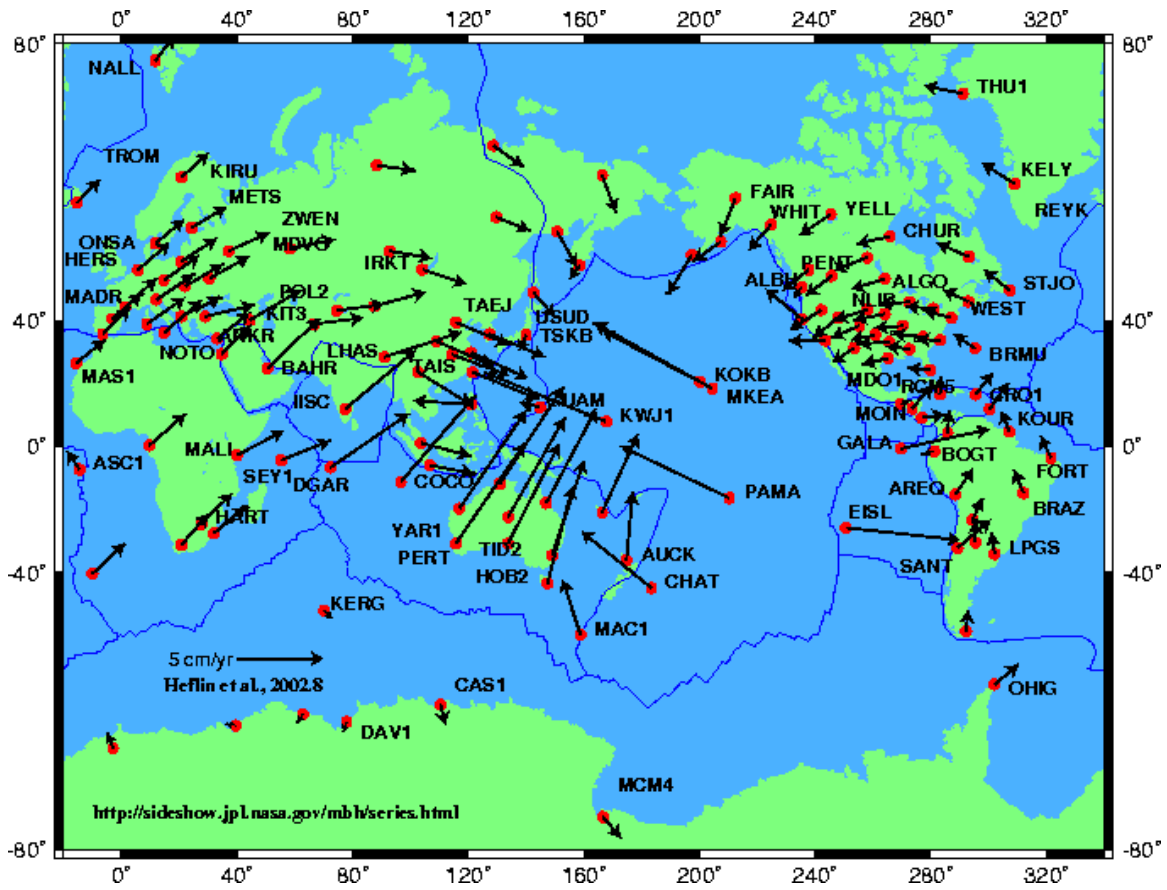


Figure 1. Tectonic movements in accordance to JPL/NASA



Figure 2. Glacier Austfonna at Svalbard. (Norwegian Polar Institute)



Figure 3. Glacier in Antarctica. (Norwegian Polar Institute)