

The United Nations Convention on the Law of the Sea and the Delimitation of Australia's Maritime Boundaries

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Abstract

The MarZone software has been developed to rigorously compute Australia's maritime zone boundaries and the geographical extent of the nation's continental shelf beyond the 200 nautical mile Exclusive Economic Zone (EEZ). The principles under which a coastal State such as Australia can delineate its maritime zone boundaries and make a claim for extended continental shelf are set out in the United Nations Convention on the Law of the Sea (UNCLOS). As a ratifying nation, Australia is bound by the provisions of UNCLOS and must lodge its claim for extended continental shelf with the United Nations Commission on the Limits of the Continental Shelf (CLCS). If this claim is successful, Australia will gain legal rights to the third largest ocean empire in the world. This paper reviews the events that culminated in the preparation and adoption of UNCLOS and discusses particular aspects of the convention that had to be considered in the development of the MarZone software.

1. The Origins of Maritime Law

The law of the sea, or maritime law, is one of the oldest areas of international jurisprudence. Although its origins date back to Roman times (Kaye, 1995), maritime law has traditionally been ill-defined and poorly documented. Historically, usage of the world's oceans operated on the unwritten principle of *freedom of the seas* which provided unrestricted access for the common activities of fishing and navigation.

In the seventeenth century, the ideology of a *closed sea* was developed. Also referred to as *ocean enclosure*, the closed sea regime proposes the creation of property rights for a particular area of ocean. Within a defined area, the so-called owner would have the right to ban usage and access by others. The closed sea approach was widely supported by countries such as Britain and Spain (Barston and Birnie, 1980) who wished to extend their empires. But the adoption of such a regime represented a real threat to trading companies who were natural supporters of *freedom of the seas*.

In 1608, the Dutch scholar Hugo Grotius, an employee of the Dutch East Indies Company, penned *Mare Liberum* (The Freedom of the Seas). Grotius' work codified the generally accepted principle of freedom of the seas, giving everyone equal and unrestricted access to the oceans and to the resources they contained.

A philosophical battle between the two opposing ideologies ensued (Barston and Birnie, 1980) with the freedom of the seas philosophy eventually becoming more widely accepted. The only restrictions to the extent of that freedom was applied to a narrow band of water adjacent to a nation's coastline within which sovereign jurisdiction by the adjoining nation was granted. The breadth of this strip of sea (referred to as the *territorial sea*) was originally undefined, but was generally regarded to be the range of a shore-based cannon (the *cannon shot rule*). In more recent times, a three nautical mile width for the territorial sea became widely accepted.

The principles of Grotius' work formed the basis of international maritime law for the following three and a half centuries. While *Mare Liberum* contained some flaws, many of its basic principles remained relevant into the twentieth century. However, the rapid technological development that then occurred created the need to comprehensively define a modern law of the sea.

2. Modern Law of the Sea (UNCLOS)

The need for an updated codification of the law of the sea became evident after the Second World War. Apart from the technological advancements that had occurred, the concept of the *continental shelf* as a region under the jurisdictional control of a coastal State was first introduced. In a proclamation by President Truman in 1945 (Friedheim, 1993), the United States made a claim to the seabed minerals of the continental shelf contiguous to the United States' coastline. Previously, the creation of such a zone was considered unreasonable. However, with a precedent set, other countries soon followed suit, although the legal validity of such claims remained questionable.

An early attempt to codify the law of the sea had been undertaken by the League of Nations in 1924 but a final agreement could not be reached. In 1950 the United Nations (UN) directed the International Law Commission (ILC) to attempt to codify the law of the sea. The work done by the ILC was discussed at the first United Nations Convention on the Law of the Sea (UNCLOS I) in 1958. UNCLOS I documented a lot of customary international law and four conventions were adopted; however, agreement could not be reached on a number of issues, including the breadth of the territorial sea. Another conference (UNCLOS II) was convened in 1960 in an attempt to reach agreement on the unresolved issues, but again consensus was not achieved. The main basis for disagreement on the issue of the breadth of the territorial sea was that less developed nations wanted a larger territorial sea to protect their resources from the developed countries who had the means to exploit them. The developed countries, on the other hand, were opposed to an increase in the width of the territorial sea as this could impact on the freedom of navigation.

During the 1960's it became evident that the long-held view that the living resources of the oceans were inexhaustible was a fallacy. Disputes over fishing rights were becoming common. Coastal States were also starting to become concerned about the environmental damage being done to the oceans around them. The exploitation of deep sea mineral deposits was not yet technically possible, but their existence was known. There was also some concern that the rush to secure claims to the ocean's non living resources might lead to a military build-up at sea.

Attempting to solve these problems through unilateral acts and regional agreements was the preferred approach, rather than at an international forum. However, in 1967, correspondence between the Soviet Union and the United States brought the major States together to discuss resolving the failures of UNCLOS I and II. At the same time, there was a feeling that the more developed nations would be able to exploit deep sea bed resources more easily than less developed ones. In an effort to prevent this, the Maltese ambassador to the UN, Arvid Pardo, proposed that the seabed beyond national jurisdictional limits be considered "the common heritage of mankind" and that it should come under the control of the UN (Friedheim, 1993). The developed countries were generally reluctant to agree to such a proposal, but as a result of the widespread feeling that the UN should play a central role, the General Assembly created a special committee to look into the use of the seabed beyond national jurisdictional limits.

The committee so formed was subsequently replaced by the General Assembly Seabed Committee which continued its work. A list of 150 subjects and issues to be discussed and hopefully resolved at the forthcoming UNCLOS III was prepared. The fact that it took over three years to agree upon the agenda was a precursor to the drawn out negotiations that were to follow. UNCLOS III would become "the largest, most complex and most difficult global negotiations ever hosted by the United Nations" (Miles, 1998).

The first session of the third convention began in 1973. The importance of developing an oceans policy with virtually unanimous international support was not underestimated. If the conventional two-thirds voting system

had been adopted, non-industrial States would have been able to tailor the Convention to their own benefit. This would have made it unlikely that the industrial States would accept it. To avoid this occurring, a consensus-based approach was used (Friedheim, 1993; Rozakis and Stephanou (1983)). It was also agreed that the convention would be a “package deal” allowing States to trade off a less acceptable outcome on particular issues in order to gain support on other issues of more importance (Miles, 1998).

The convention was developed through a “single negotiating text” (SNT). This was a document which defined the status of consensus (or near consensus) on the various issues being discussed. At the conclusion of the May 1975 session, the SNT became the first draft of the new treaty on the law of the sea (Friedheim, 1993); however, it took another seven years before the final treaty was accepted. The main contentions over those seven years were experienced by the committee developing a policy for the control of the seabed beyond national jurisdictional limits.

When the Reagan administration took office in the United States in 1981, it was decided that additional time was needed to reassess the nation’s position in relation to the newly drafted Convention. This caused much frustration for many delegates, as a successful conclusion to the negotiations was imminent. At the eleventh session in 1982, the United States tabled ten new demands, and an additional one to completely re-write the section concerning the seabed beyond national jurisdictional limits (Friedheim, 1993). Various attempts at a compromise were made, but without success. It was decided to put the current version of the Convention to the vote. A total of 130 States voted in favour, 4 against and 17 abstained. The United States was one of the four that voted against, while many of the major industrial States abstained.

The Convention was opened for signature for a period of two years, during which 158 signatures were officially recorded. However, the Convention could not enter into force until 12 months after the date of deposit of the sixtieth instrument of ratification. On 16 November 1993 the Secretary General received the sixtieth instrument of ratification (Guyana) and the Convention duly entered into force 12 months later. Since signature was subject to ratification, deposit of the instrument of ratification was the final consent by a State to be bound by the provisions of the Convention. Australia lodged the instrument of ratification with the Secretary General on 5 October 1994.

3. The Convention

The Convention is essentially a constitution for the oceans (Bernaerts, 1988). It covers the use and allocation of ocean resources in a document which consists of 320 articles divided into 17 parts and including 9 annexes. Some of the aspects covered by the Convention (United Nations, 1997) include:

- territorial jurisdiction
- navigation rights
- resource exploitation rights
- marine research rights
- marine environment protection obligations
- a dispute settlement process

Reference can also be made to the UN Law of the Sea homepage at <http://www.un.org/depts/los>. A core component of the Convention is the definition of a number of jurisdictional zones. A zone is an area of ocean in which a coastal State has specific rights relating to the seabed, the subsoil, air space and water column. The outer boundary of a zone generally falls at a specified maximum distance from the territorial sea baseline (TSB) which is usually defined by the low-water line as shown on charts officially recognised by the coastal State. In Australia, the majority of the TSB is defined by the line of lowest astronomical tide, which is the predicted lowest level under average meteorological conditions. The remainder of the baseline consists of straight lines, including:

- lines across the mouths of rivers flowing directly into the sea;
- bay closing lines that enclose certain bays not more than 24 nautical miles (M) wide at their mouths; and
- straight lines to enclose waters where the coastline is deeply indented and cut into, or where there is a fringe of islands along the coast in its immediate vicinity.

A simplified example depicting various components of the TSB is shown in Figure 1.

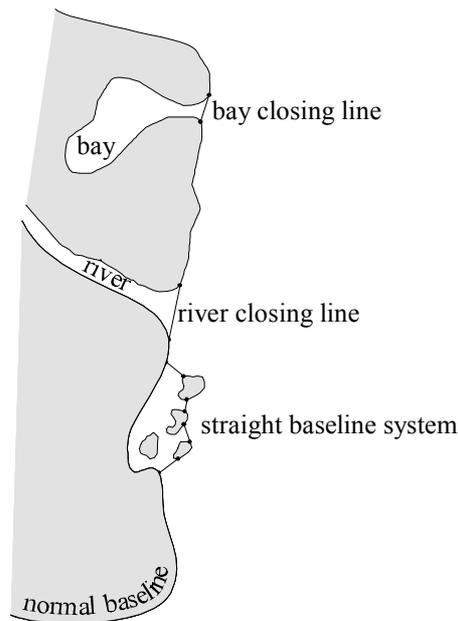


Figure 1 - Normal baseline, which includes bay and river closing lines, and straight baselines together form the territorial sea baseline from which zone boundaries are generated under UNCLOS.

4. Ocean Zones

In this section, the various jurisdictional zones prescribed under UNCLOS are described. Refer also to Figure 2 for a diagrammatic representation of these zones.

The *Territorial Sea* is the band of ocean adjacent to the coastline, the outer limit of which does not exceed 12 M from the TSB. Agreement on the maximum breadth of this zone was one of the important achievements of UNCLOS III. Within the territorial sea, a State has full sovereign rights, with the exception that it must allow foreign ships the right of innocent passage.

The *Contiguous Zone* provides an additional 12 M buffer beyond the territorial sea. Thus the outer limit of the contiguous zone does not exceed 24 M from the TSB. Within this zone a State has the right to enforce its customs, fiscal, immigration or sanitary laws and regulations.

The *Exclusive Economic Zone (EEZ)* is an area beyond and adjacent to the territorial sea which does not extend beyond 200 M measured from the TSB. Within this zone a State has rights to exploit the water column, the seabed and the subsoil.

The *High Seas* is the area of ocean that falls beyond the EEZ. Within this area all States have equal rights and, subject to certain provisions, essentially enjoy *freedom of navigation, overflight, fishing, and scientific research*. However, if certain conditions are satisfied (see section 7), a State may gain seabed and subsoil rights by claiming an extended continental shelf beyond the 200 M limit.

The *Area* is the seabed, ocean floor and subsoil thereof beyond the limits of national jurisdiction (United Nations, 1997). All States, coastal and land-locked, have equal rights in the resources of the Area, which are vested in mankind as a whole and on whose behalf the International Seabed Authority shall act.

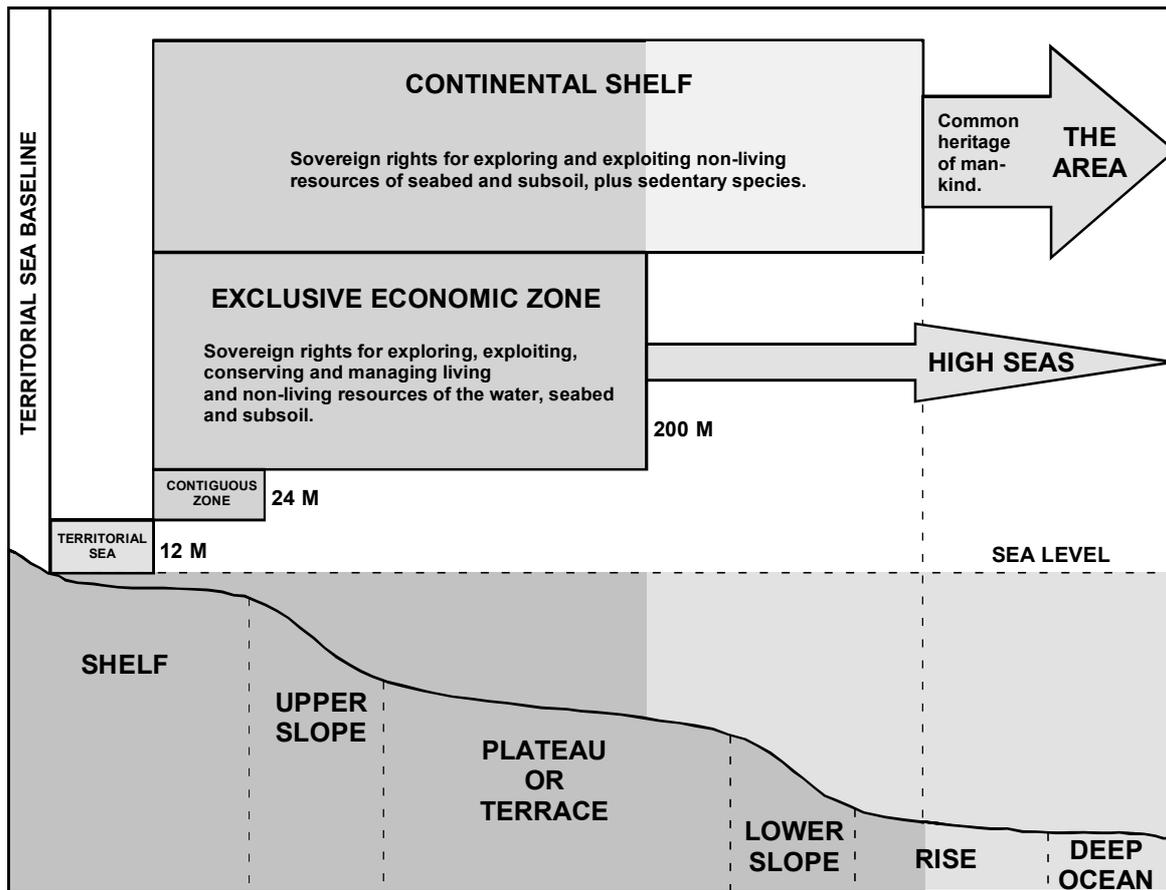


Figure 2 – Maritime zones and their relationship to subsea topography (Source: Australian Geological Survey Organisation).

Reaching consensus with regard to the definition and treatment of the continental shelf was another achievement of UNCLOS III. The Convention recognises the continental margin as a geomorphological concept and the continental shelf as a legal concept (United Nations, 1993). The continental shelf extends beyond the territorial sea throughout the natural prolongation of land territory to the outer edge of the continental margin, or to the outer limits of the 200 M EEZ where the outer edge of the continental margin does not extend up to that distance. *Article 76* defines the conditions under which a coastal State may legally extend its continental shelf beyond 200 M.

Continental shelf rights allow a State to exploit the seabed and the subsoil. If a State wishes to exercise such a right, it must submit a claim to the United Nations Commission on the Limits of the Continental Shelf (CLCS) within ten years of ratifying the Convention. In Australia's case, since it ratified the Convention before it entered into force, there is a period of 10 years from November 16, 1994 in which Australia must prepare and submit its claim for extended continental shelf. This claim is currently being prepared. The extent of Australia's claim is estimated to cover 4.6 million sq km (Kaye, 1995).

5. Implementation of UNCLOS in Australia

As the world's largest island, Australia has a coastline length of approximately 36,700 kilometres, which is amongst the longest of any coastal State. Apart from Papua New Guinea, East Timor and the Republic of Indonesia lying immediately to the north, Australia's relative isolation from other coastal States enables it to claim one of the largest maritime jurisdictions in the world, extending into the Indian, Southern and Pacific Oceans. The strategic, economic and political benefits of securing rights to such vast areas of the ocean and seabed need no elaboration, but these come with significant responsibilities in relation to delineation, administration, exploitation and conservation of the marine environment.

The Maritime Boundaries Program of the Australian Surveying and Land Information Group (AUSLIG) has the responsibility for defining and administering all of Australia's maritime zone boundaries, including the TSB (Hirst et al., 1999). In late 1990, following an earlier feasibility study, AUSLIG commenced building the

Australian Maritime Boundaries Information System (AMBIS) utilising the capabilities and sophistication of a modern geographic information system (GIS).

Initially, priority was given to the acquisition of data which would enable the compilation and validation of the TSB, as delimitation of zone boundaries could not be performed until this task was completed. AUSLIG then undertook an international search to identify existing software packages which might be capable of meeting the full range of Australia's complex maritime boundary delimitation requirements. These requirements included:

1. The ability to undertake the delimitation of all zone boundaries (12, 24, 200 M and user-defined) in strict accordance with the relevant provisions of UNCLOS, taking into account all combinations of maritime features such as:
 - normal baseline, including bay and river closing lines
 - straight baselines
 - low-tide elevations
 - islands
 - rocks
2. The ability to compute the outer limits of the extended continental shelf in strict accordance with the provisions of UNCLOS Article 76.
3. The application of geodetically rigorous methods in performing all delimitation computations.

The search failed to find any suitable software, so AUSLIG prepared technical specifications for the commercial development of such software within Australia. The tender for the development was awarded to the Department of Geomatics at the University of Melbourne. The result was *MarZone*, a stand-alone Windows software package. See <http://www.geom.unimelb.edu.au/marzone> where a description and a demonstration version of the software are available.

6. Implementation of UNCLOS by MarZone

MarZone takes full account of the provisions and requirements of UNCLOS, while at the same time employing a rigorous geodetic methodology to provide an automated solution to the maritime boundary delimitation problem. A core component of *MarZone* is its representation of the input data. UNCLOS introduces a number of different data types that need to be considered in maritime zone boundary delimitation. Each data type has corresponding conditions or restrictions that determine the nature and extent of the zone boundaries which can be generated from it. Relevant data types for the delimitation of the 12 M, 24 M and 200 M zone boundaries include:

- Normal baseline (Article 5)
- Straight baselines (Article 7)
- River closing lines (Article 9)
- Bay closing lines (Article 10)
- Low-tide elevations (Article 13)
- Islands (Article 121)
- Rocks (Article 121(3))

In relation to straight baselines and bay and river closing lines, the Convention does not state how these lines are to be represented in geodetic terms. Various alternatives exist, such as loxodromes, geodesics, normal sections, grid lines and great circles. However, in Australia, straight baselines, together with bay and river closing lines, are legally defined as geodesics (the line of shortest distance between two points on the surface of the reference ellipsoid). In the development of *MarZone*, formulae and algorithms for the geodetic manipulation of long geodesics had to be developed so that rigorous treatment of the straight baselines could be carried out (Murphy et al., 1999).

Interaction between the above data types can create complex situations of which there are many examples along the Australian coastline. Torres Strait and the Great Barrier Reef are two such areas. Both of these areas comprise an intricate system of straight baselines combined with multiple islands and low-tide elevations. An example is shown in Figure 3. *MarZone* was designed to cope with such complex cases.

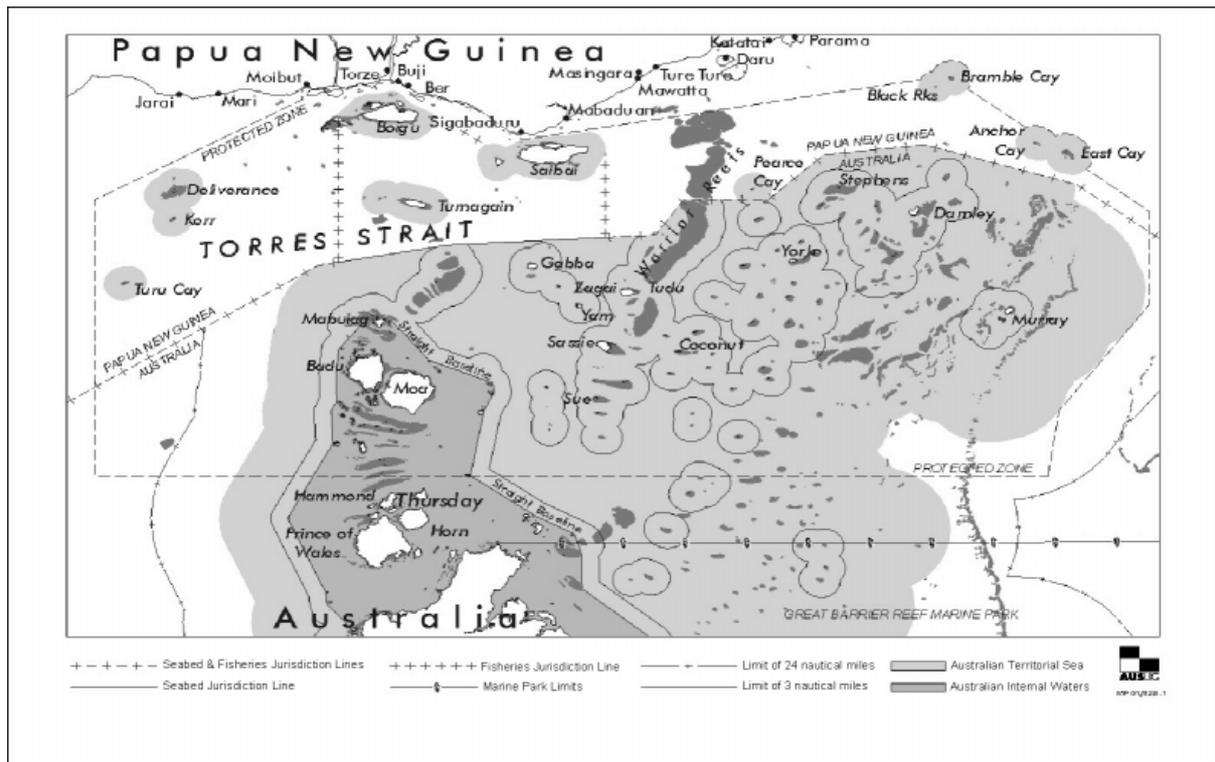


Figure 3 – Complexity of data in Torres Strait.

As part of a submission to the CLCS for a claim to extended continental shelf, Article 4 of Annex II of the Convention requires that “supporting scientific and technical data” must also be provided (United Nations, 1993). To assist in this requirement, *MarZone* is able to document full lineage between boundary delimitation points and the original input data.

Figure 4 shows two sample *MarZone* projects. The project on the left is a fixed-width boundary (12 M) computation. The input data set consists of one island and seventeen low-tide elevations. The project on the right is an extended continental shelf computation. The input data set comprises five boundary line types used in the delimitation of the extended continental shelf.

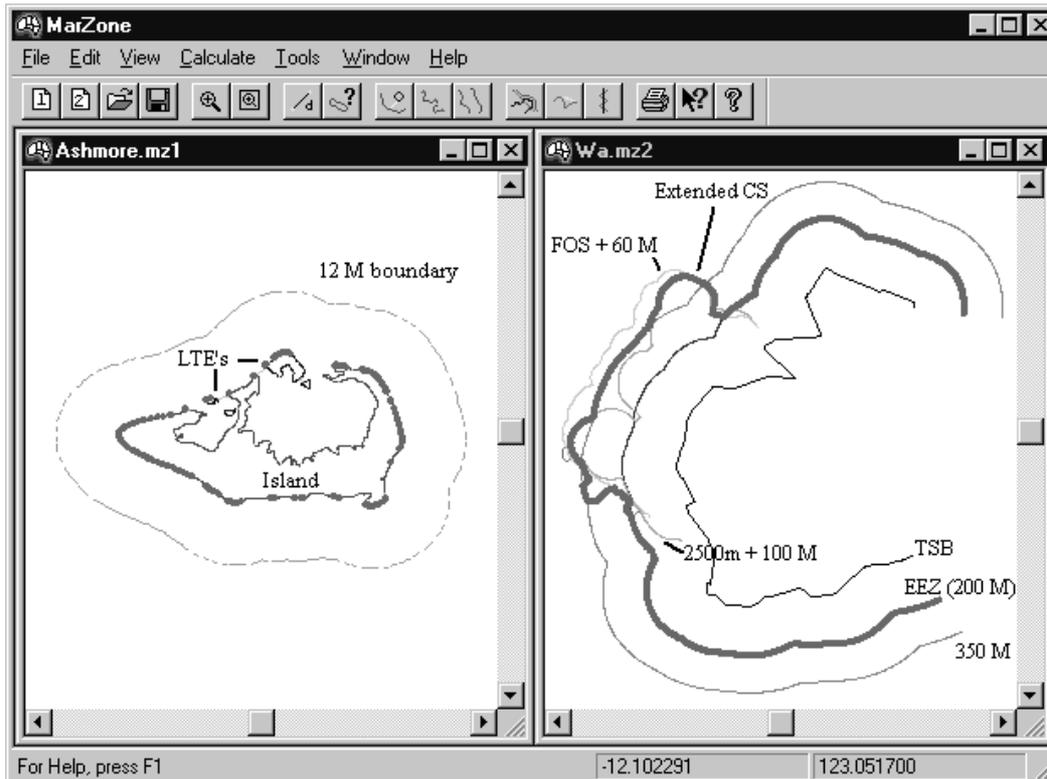


Figure 4 – MarZone application with a 12 M boundary project (left) and an extended continental shelf project (right).

7. Determining the Limits of Australia’s Continental Shelf

UNCLOS Article 76 defines the conditions under which a coastal State may claim extended continental shelf. The implementation of this component of UNCLOS was a major requirement of *MarZone*. The geographical limits of the continental shelf beyond the 200 M EEZ are computed using the TSB data supplied by AUSLIG, in conjunction with geological, hydrographic and geomorphological data supplied by the Australian Geological Survey Organisation (AGSO) – see <http://www.agso.gov.au/marine/los/>.

One of the complex issues in this process is the determination of the foot of the continental slope (FOS). Even with detailed hydrographic data, it can be difficult to definitively locate the “*point of maximum change in gradient*” at the base of the slope, as required under Article 76. Equally contentious is the issue of determining the points at 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*”. It is in the collection, analysis and interpretation of FOS and 1% sedimentary thickness data that AGSO is playing a crucial role in the preparation of Australia’s claim to the CLCS.

MarZone provides AUSLIG with the ability to delimit the extended continental shelf in strict accordance with the provisions of Article 76 UNCLOS once the basic data has been collected and provided in the appropriate format. The computational process is quite complex, but is fully defined in the *Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf* (United Nations, 1999). The specific approach used in *MarZone* is described by Collier et al. (2001).

8. Australia’s Maritime Boundaries

Proclaimed in August 1994, the Australian Exclusive Economic Zone (AEEZ) covers an area of 11.1 million km² of which 8.6 million km² lie off the Australian mainland, while a further 2.5 million km² lie off the Australian Antarctic Territory (AAT). Beyond the AEEZ, Australia is entitled to claim an extended continental shelf that covers an estimated 4.6 million km² (Kaye, 1995). The extent of the AEEZ, together with the several areas of claimable extended continental shelf, is shown in Figure 5.

Recently, *MarZone* has been used to produce the AMBIS 2001 data set, which includes the first rigorously computed definition of Australia's maritime zone boundaries using updated TSB data. This data set, which

became available in February 2001, defines zone boundaries to an unprecedented level of accuracy and completeness (see <http://www.auslig.gov.au/marbound/ambisdef.htm>).

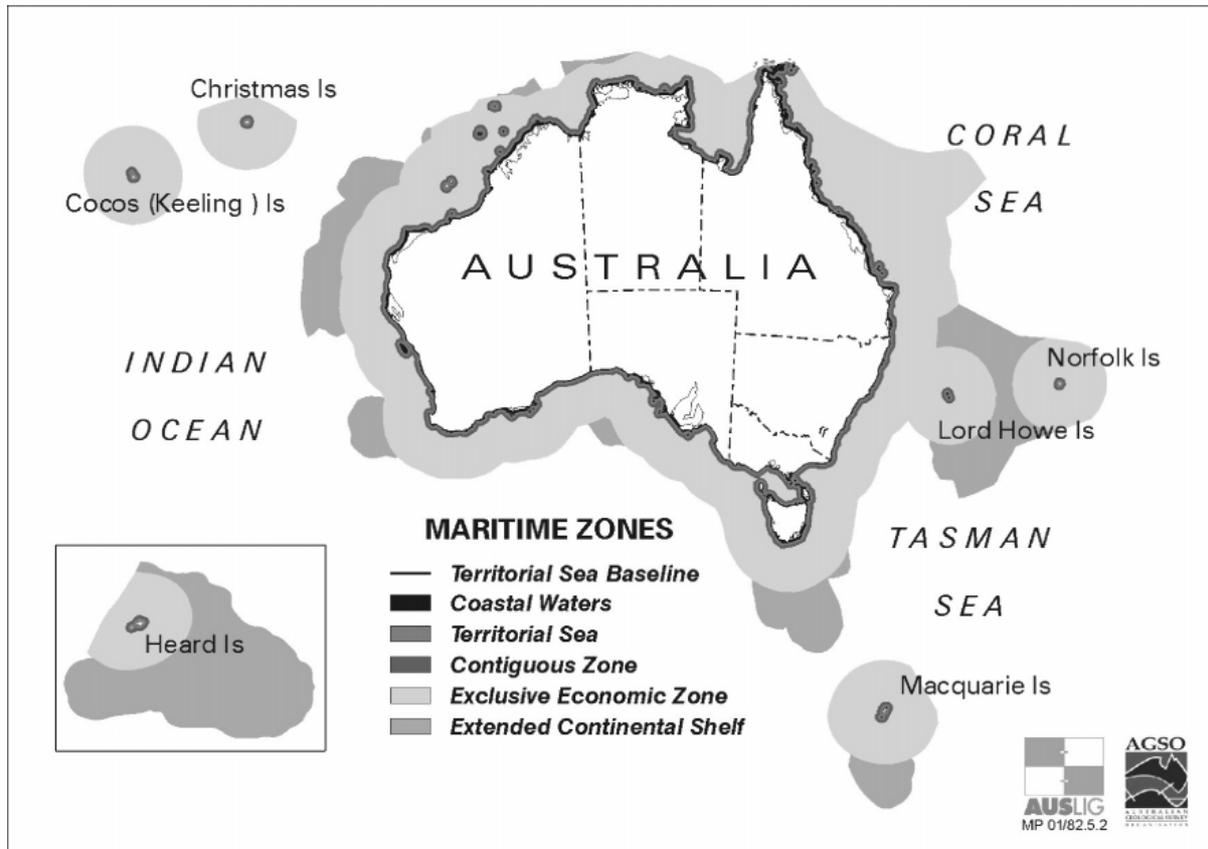


Figure 5 – Australian maritime zones

9. Conclusion

Prior to the twentieth century, the essentially unwritten law of the sea, operating on the basic principle of *freedom of the seas*, had not changed much since Roman times. However, following the Second World War, rapid technological developments and a realisation that ocean resources were not infinite highlighted the need for a modern law of the sea.

After various attempts which culminated in the most complex global negotiations ever undertaken by the United Nations, the United Nations Convention on the Law of the Sea was finalised and entered into force on November 16, 1994. The Convention gives each ratifying State the right to share and the obligation to protect the resources of the world's oceans.

As a party to the Convention, Australia will claim rights to the third largest ocean empire in the world. However, before this claim can be approved, extensive data collection and analysis, geodetic computations and documentation must be carried out. To assist in this task as well as in the delimitation of Australia's maritime zone boundaries, the *MarZone* software has been developed by researchers in the Department of Geomatics at the University of Melbourne.

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