

**International Boundaries Research Unit**

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**Developments in the Technical Determination  
of Maritime Space: Delimitation, Dispute  
Resolution, Geographical Information Systems  
and the Role of the Technical Expert**

*Chris Carleton and Clive Schofield*



# Maritime Briefing

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**Developments in the Technical  
Determination of Maritime Space:  
Delimitation, Dispute Resolution, Geographical Information Systems and  
the Role of the Technical Expert**

by

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The opinions contained herein are those of the authors and are not to be construed as those of IBRU, the United Kingdom Hydrographic Office, Ministry of Defence or any other Government Department.

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<sup>i</sup> After Pratt and Schofield, 2001: 21.

<sup>ii</sup> Reproduced by kind permission of the United Kingdom Hydrographic Office.

<sup>iii</sup> Beazley, 1994: 24.

<sup>iv</sup> *Ibid.*: 25.

<sup>v</sup> *Ibid.*: 27

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vi Images from [www3.ocn.ne.jp](http://www3.ocn.ne.jp) newspaper pages.

vii Courtesy of CARIS, Fredericton, New Brunswick, Canada.

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xi *Ibid.*

# Developments in the Technical Determination of Maritime Space: Delimitation, Dispute Resolution, Geographical Information Systems and the Role of the Technical Expert

*Chris Carleton and Clive Schofield*

## 1. Introduction

This *Briefing* represents the concluding part of a two-part overview of the technical considerations that have to be addressed in the determination of maritime space. As was outlined in the first part of the series,<sup>1</sup> the international law of the sea has been progressively clarified and codified particularly through the four Geneva Conventions of 1958<sup>2</sup> and their successor, the United Nations Convention on the Law of the Sea (UNCLOS). These legal instruments provide the framework for national claims to jurisdiction over maritime space, the delimitation of maritime boundaries and the management of the seas and will therefore be referred to extensively throughout this study.

Despite the considerable progress that has been made in the development of the law of the sea, it is nevertheless true that the Conventions mentioned do only provide a framework for maritime claims, jurisdiction and boundaries. Thus, ample scope remains for differing interpretations of certain provisions of the law of the sea and, therefore, dispute among coastal states. Furthermore, many questions of a technical nature are raised in this context.

In practice, however, it is difficult to disentangle the purely technical from the legal. An appreciation of the legal framework is therefore essential to an understanding of the technical challenges and legal issues will also be considered here, albeit from a technical perspective.<sup>3</sup>

The first *Briefing* in the series examined issues relating to charts, datums, 'straight' lines, baselines, the generation of maritime zones and their outer limits. This *Briefing*, building on these fundamental considerations, deals with the delimitation of maritime boundaries, with particular reference to the vexing question of the regime of islands. An introduction to the use of GIS (Geographical Information Systems) applications, an important new development in the calculation and depiction of maritime space, is also provided. This is followed by an overview of methods of achieving a maritime boundary delimitation and resolving maritime boundary disputes.

The concluding part of the *Briefing* deals with the role of the technical expert in maritime boundary negotiations. Many of the issues outlined earlier in the discussion are highlighted through an appraisal of the role of the technical expert in delimitation.

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<sup>1</sup> Carleton and Schofield, 2001.

<sup>2</sup> The Convention on the Territorial Sea and Contiguous Zone, the Convention on the Continental Shelf, the Convention on the High Seas and, the Convention on Fishing and Conservation of the Living Resources of the High Seas.

<sup>3</sup> Beazley, 1994: 1.

## 2. The Delimitation of Maritime Boundaries

Wherever a coastal state's maritime space abuts either an opposite coastal state's maritime area or an adjacent coastal state's maritime area, a potential maritime boundary situation will exist. Historically maritime boundaries only began to be significant in the middle of the 20th Century. Prior to that time state jurisdiction rarely extended more than 3 nautical miles (nm) offshore.<sup>4</sup> As a result, the delimitation of maritime boundaries between states, confined in scope to such a relatively narrow band of inshore waters, was infrequently a controversial process. Indeed, the majority of the significant boundary agreements were extensions of the land boundaries down rivers and estuaries. Two notable exceptions were the Sweden/Norway boundary of 1909, which delimited the full extent of the claimed territorial sea, and the US/Russian boundary through the Bearing Strait delimited in a Convention of 1867.

The tremendous increase in the maritime space coming under the jurisdiction of coastal states in the post-World War II period, coupled with similarly significant changes in the diversity and intensity of offshore activities, has, however, radically transformed the nature of maritime boundary requirements, enhancing both their complexity and importance.

The need for maritime boundaries has generally been resource induced. Initially fishery resources represented the main source of potential conflict leading to maritime boundary agreements being instigated. An exception was the first sea-bed agreement in 1942 between the United Kingdom and Venezuela in the Gulf of Paria. The Truman Proclamation of 1945 then sowed the seeds of extended maritime jurisdiction covering the living and non-living resources of the continental shelf, which led to the UN Continental Shelf Convention of 1958, extended fisheries zones of the 1970s and the exclusive economic zone of the 1982 UN Convention. Clearly, the extension of coastal states' sovereignty seawards has generated the potential for a great number of 'new' maritime boundaries and, inevitably, a host of overlapping jurisdictional claims and offshore boundary disputes. This latter point is amply illustrated by the incomplete nature of the maritime political map of the world. Of an estimated 427-434 potential maritime boundaries,<sup>5</sup> only about 178 have been formally agreed. This has increased the areas where boundaries are required several fold. Figure 1 illustrates the amount of sea area claimed by coastal states.<sup>6</sup>

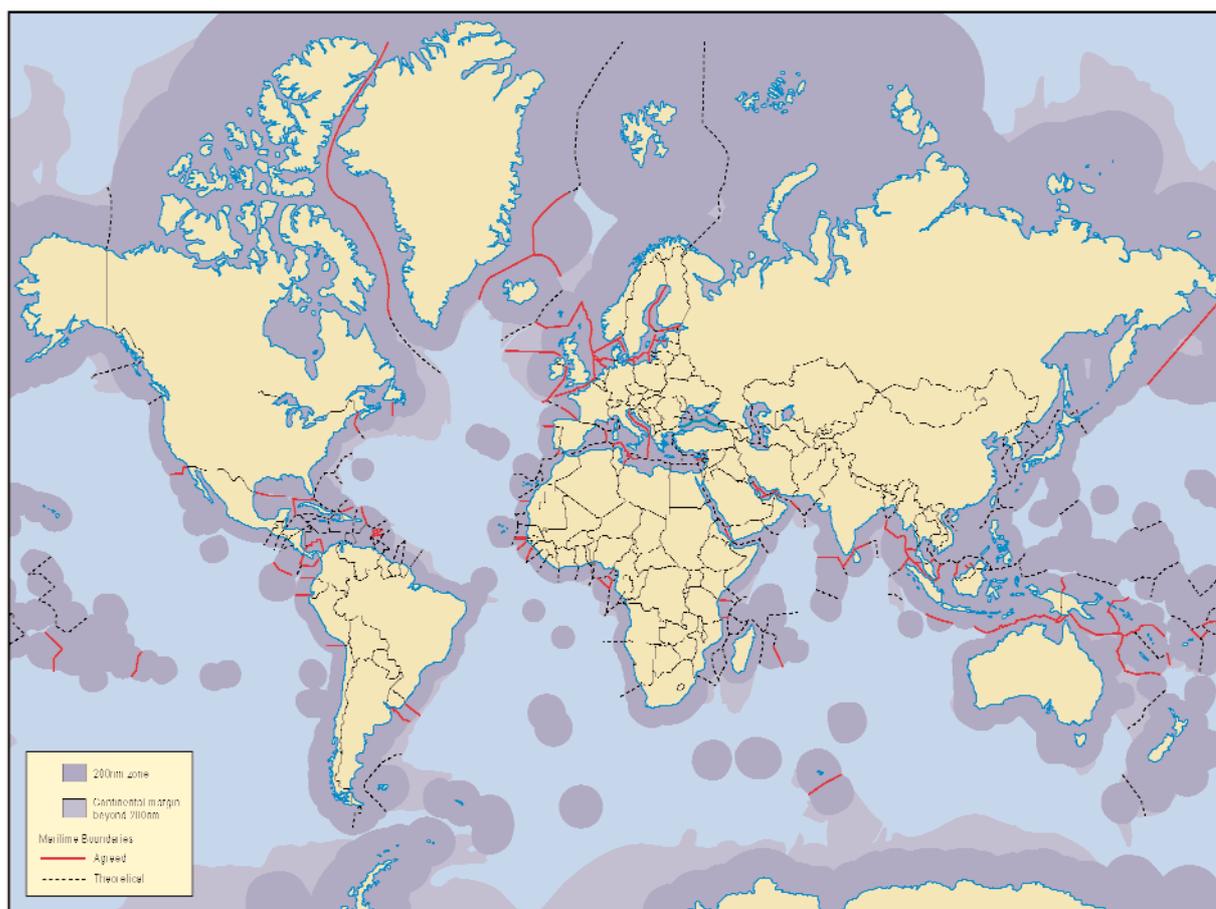
The delimitation of maritime areas between two or more states is governed by the principles and rules of public international law. In this context it is clear that geographical factors, and in particular coastal geography, are fundamental to international law as it pertains to maritime boundary delimitation. This is true, whether a boundary dispute is resolved by negotiation between the parties or whether it is submitted to third party settlement. Nevertheless, there is a significant distinction in character between these types of dispute settlement.

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<sup>4</sup> Some experts maintain that the correct abbreviation for a nautical mile is 'M' and that 'nm' should only be used for nanometres. However, 'nm' is widely used by many authorities (for example the US Department of State, the UN Office of Ocean Affairs and the Law of the Sea, and the UK Hydrographic Office) and appears to cause less confusion than 'M', which is often assumed to be an abbreviation for metres.

<sup>5</sup> Based on US Department of State (1988) figures updated by the authors. On the basis of this analysis there are 427 potential maritime boundaries around the world or 434 if the 7 potential boundaries of the Caspian Sea are considered to be maritime boundaries. This does not include the potential 'boundaries' between coastal states and the International Sea Bed Authority concerning the outer limit of the continental shelf.

<sup>6</sup> Updated to 2001.

**Figure 1: 200nm Limits and Maritime Boundaries around the World**

In a resolution by negotiation, states are free to agree to any boundary they want provided that the rights and interests of third states, or of the international community, are not prejudiced. Nevertheless, international law generally provides the context within which negotiations take place.

Where agreement cannot be reached, customary international law – now largely reflected in the United Nations Convention on the Law of the Sea (UNCLOS)<sup>7</sup> – will apply. While this does not mean that states are obliged to settle their maritime differences or to submit such differences to adjudication or other means of third party settlement, international law does provide the relevant framework for analysing the respective merits of each side's position.

## 2.1 Delimitation of the Territorial Sea

The delimitation of the territorial sea between states with opposite or adjacent coasts is governed by Article 15 of the UN Convention which repeats, almost verbatim, the text of the 1958 Convention on the Territorial Sea and Contiguous Zone. Article 15 provides that, unless the states agree otherwise or there exists an *"historic title or other special circumstances"* in the area to be delimited, neither state is entitled to extend its territorial sea beyond the median line, *"every point of which is equidistant from the nearest points on the baselines from which the breadth of the territorial seas of each of the two States is measured."*

<sup>7</sup>

United Nations, 1983.

It is apparent from this provision that there is a clear presumption in favour of equidistance for the delimitation of the territorial sea, although this presumption does not apply where historic title or “*special circumstances*” exist. While the latter terms are not defined in the Law of the Sea Convention, the burden is clearly on the state asserting such circumstances to demonstrate that an exception exists – in other words, that it has historically exercised a sufficient administration and control over the area in question, to the exclusion of others, to warrant a departure from equidistance.

## 2.2 Delimitation of the Continental Shelf and Exclusive Economic Zone

The 1958 Convention on the Continental Shelf provides, in Article 6 that:

1. *Where the same continental shelf is adjacent to the territories of two or more States whose coasts are opposite each other, the boundary of the continental shelf appertaining to such States shall be determined by agreement between them. In the absence of agreement, and unless another boundary line is justified by special circumstances, **the boundary is the median line**, every point of which is equidistant from the nearest points of the baselines from which the breadth of the territorial sea of each state is measured.*
2. *Where the same continental shelf is adjacent to the territories of two adjacent States, the boundary of the continental shelf shall be determined by agreement between them. In the absence of agreement, and unless another boundary line is justified by special circumstances, **the boundary shall be determined by application of the principle of equidistance** from the nearest points of the baselines from which the breadth of the territorial sea of each State is measured (emphasis added).*

Under the Law of the Sea Convention, however, the provisions dealing with the delimitation of the continental shelf and the exclusive economic zones are identical. Thus, both Article 74(1) dealing with the EEZ, and Article 83(1) dealing with the continental shelf, state:

*The delimitation of the continental shelf [or exclusive economic zone] between States with opposite or adjacent coasts shall be effected by agreement on the basis of international law, as referred to in Article 38 of the Statute of the International Court of Justice, in order to achieve an equitable solution.*

Significantly, unlike Article 15 dealing with the delimitation of the territorial sea, these provisions do not refer to any particular method of delimitation such as equidistance. The emphasis is clearly on achieving an equitable result.

This stance is echoed in recent cases decided by the International Court of Justice and by arbitral tribunals. In the *Libya-Malta* case, for example, the Court held:

*Delimitation is to be effected in accordance with equitable principles and taking account of all the relevant circumstances so as to arrive at an equitable result.*<sup>8</sup>

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<sup>8</sup> *Libya/Malta* Case, para.29. Republished in Research Centre for International Law, Vol.II, 1992: 1,547.

This has enabled boundary makers to use any number of possible circumstances that could conceivably have an effect on the position of the boundary. A median line solution relies exclusively on coastal geography considerations and is controlled by the relevant (i.e. nearest) points on the territorial sea baseline. In contrast, an 'equitable' solution could be influenced by any or all of the following: political, strategic and historical considerations; legal regime considerations; economic and environmental considerations; other geographic considerations; the use of islands, rocks, reefs and low-tide elevations; baseline considerations; geological and geomorphological considerations; proportionality of the area to be delimited including coastal front considerations; and different technical methods that could be employed.

Although all these areas are available to the delimitation team, jurisprudence during the last 30 years has tended to continue to treat the geographic parameters as being paramount, when dealing with a maritime boundary out to the 200nm limit. Indeed in the ICJ Malta/Libya judgement of 1985, the Court made it quite clear that geological and geomorphological arguments had no part to play within the 200nm zone. Geology and geomorphology will, however, have an important role in the delimitation of continental shelf boundaries beyond 200nm. No court has been required to make a judgment on this type of boundary to date, but the very nature of Article 76 on the limits of the continental shelf will dictate this type of argument.

Overall, however, there has been no systematic definition of the criteria which should be used to determine an equitable delimitation. As a result, equitability remains a rather vague and imprecise concept. As the Chamber of the ICJ noted in the 1984 Gulf of Maine case between the USA and Canada:

*There has been no systematic definition of the equitable criteria that may be taken into consideration for an international maritime delimitation, and this would in any event be difficult a priori, because of their highly variable adaptability to different concrete situations. Codification efforts have left this field untouched.*<sup>9</sup>

Similarly:

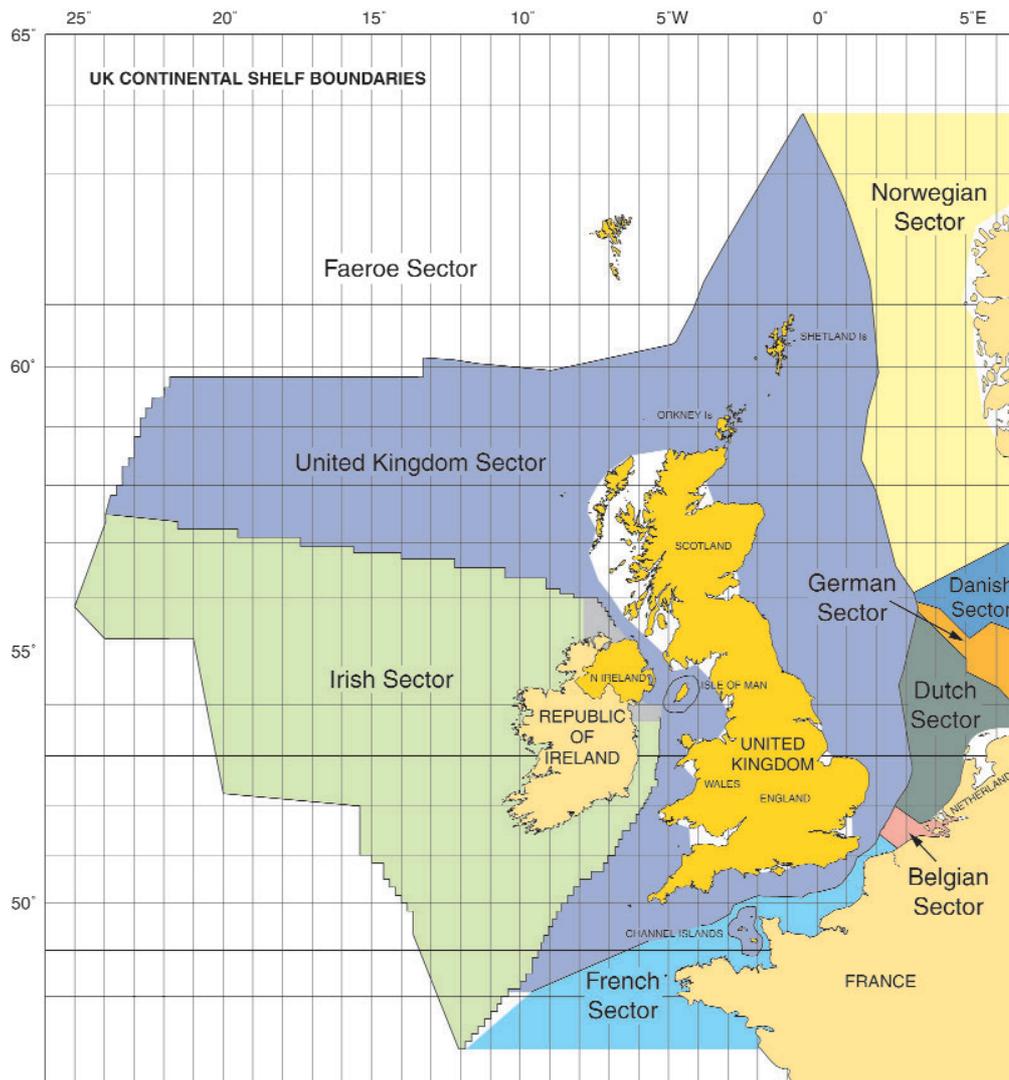
*International law does not require that maritime boundaries be delimited in accordance with any particular method; rather it requires that they be delimited in accordance with equitable principles, taking into account all of the relevant circumstances of the case so as to produce an equitable result. The equitable principles are indeterminate and the relative circumstances are theoretically unlimited.*<sup>10</sup>

Thus there is ample scope for differing interpretations as to which factors are applicable to a particular case and therefore potential for dispute and deadlock in delimitation negotiations. In a similar fashion, there is much potential conflict in the stances of states as to the emphases to be afforded to the principles or rules that might be applicable to a particular delimitation.

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<sup>9</sup> *Gulf of Maine case*, para.157. Republished in Research Centre for International Law, Vol.II, 1992: 800.

<sup>10</sup> Charney, 1987: 507.

**Figure 2: The United Kingdom's Continental Shelf Boundaries**

As a snap shot of the way maritime boundary delimitation has developed over the last 30 years, Figure 2 illustrates the United Kingdom boundaries delimited between 1965 and 2000. The first North Sea boundaries were delimited in the 1960s and were median lines derived graphically. The trend for median lines continued into the 1970s when further North Sea boundaries were delimited, but by this time were calculated with the aid of computers. Delimitations in the 1980s and early 1990s have been variations of the median line, beginning with the UK/France Arbitration of 1978, when the Scilly Isles were only awarded half weight. The remainder of this boundary through the western Channel is a simplified median line (with enclaving for the Channel Islands, see below). The boundary agreement with the Republic of Ireland, agreed in 1988, has been described as a model for compromise in maritime delimitation.<sup>11</sup> A similar description could be levelled at the much shorter boundary with Belgium. This was a pragmatic solution discounting or significantly reducing the effect of several low-tide elevations.

The technical parameters that must be addressed in maritime delimitation once decisions have been agreed on the use of the various geographic and other parameters, including baselines, the

<sup>11</sup> Symmons, 1989: 387.

effect of islands, rocks, reefs and low-tide elevations, coastal front lengths, proportionality and so forth include the following:

- the determination of relevant basepoints;
- the vertical datum used to define the low-water line;
- the geodetic datum defining geographical positions;
- the mathematical methods for calculating the various geodetic parameters;
- the type of line joining the boundary turning points; and,
- the acceptable accuracy of the delimited boundary.

### 3. Methods of Maritime Boundary Delimitation

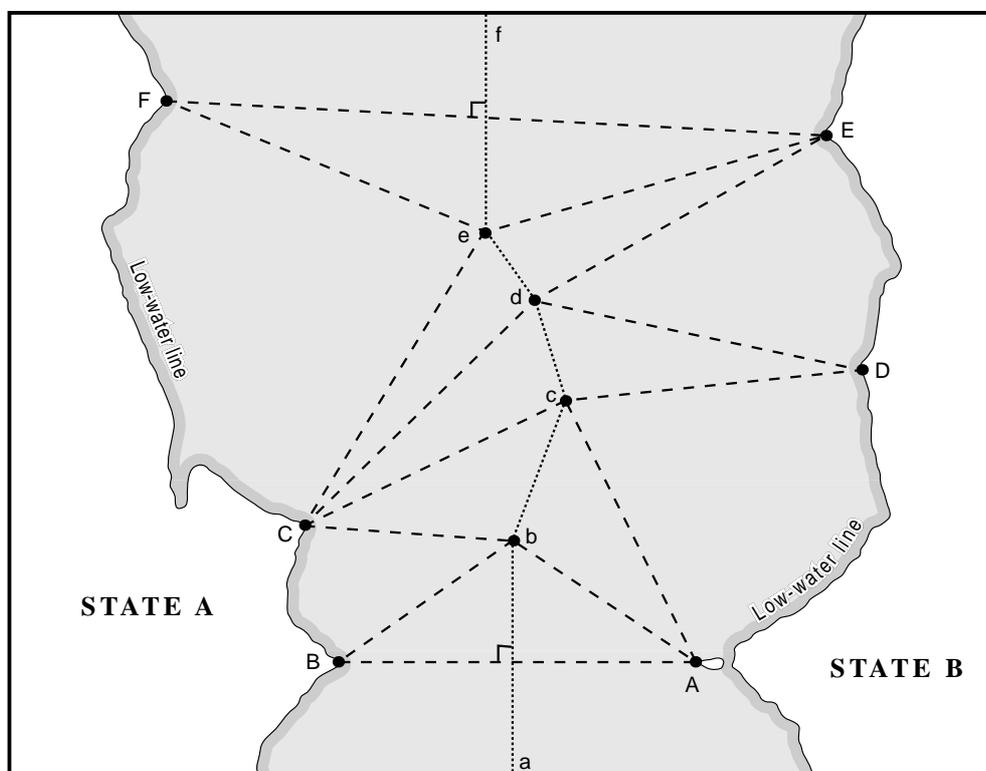
#### 3.1 Equidistance Lines

##### *Strict Equidistance*

A strict equidistance line, defined by the 1958 and 1982 Conventions as a line “every point of which is equidistant from the nearest basepoints on the [territorial sea] baselines” of the states concerned is a geometrically exact expression of the midline concept and is best illustrated graphically.<sup>12</sup>

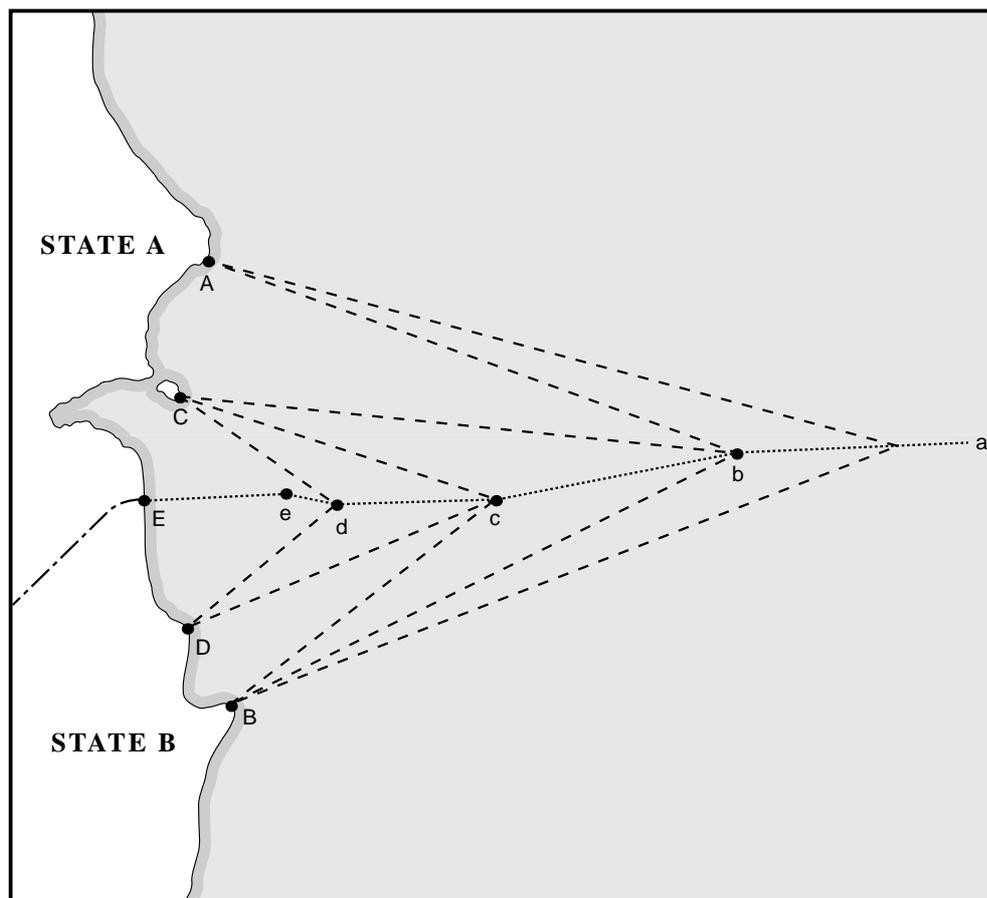
Figure 3 depicts a straightforward equidistance line between opposite coastlines. Sector a-b represents the perpendicular bisector of the line joining basepoints A and B respectively. Any

**Figure 3: Equidistance between Opposite Coasts**



<sup>12</sup> See also, for example, Boggs, 1937 and Hodgson and Cooper, 1976.



**Figure 5: Equidistance between Adjacent Coasts**

the states concerned.<sup>14</sup> A good example of this is the boundary agreement between the Netherlands and the United Kingdom (see Figure 4).

Thus, Point b represents a tripoint equidistant from basepoints A, B and C. Basepoints A and C now become the control points for the equidistance line. Point b is therefore a turning point on the strict equidistance line with sector b-c being the perpendicular bisector of the line joining A and C, and so on. The same principles can also be applied to adjacent coasts as illustrated in Figure 5. This method is often applied where relevant coastlines are of similar length and there are no exceptional features, such as islands, that might distort the line inequitably.

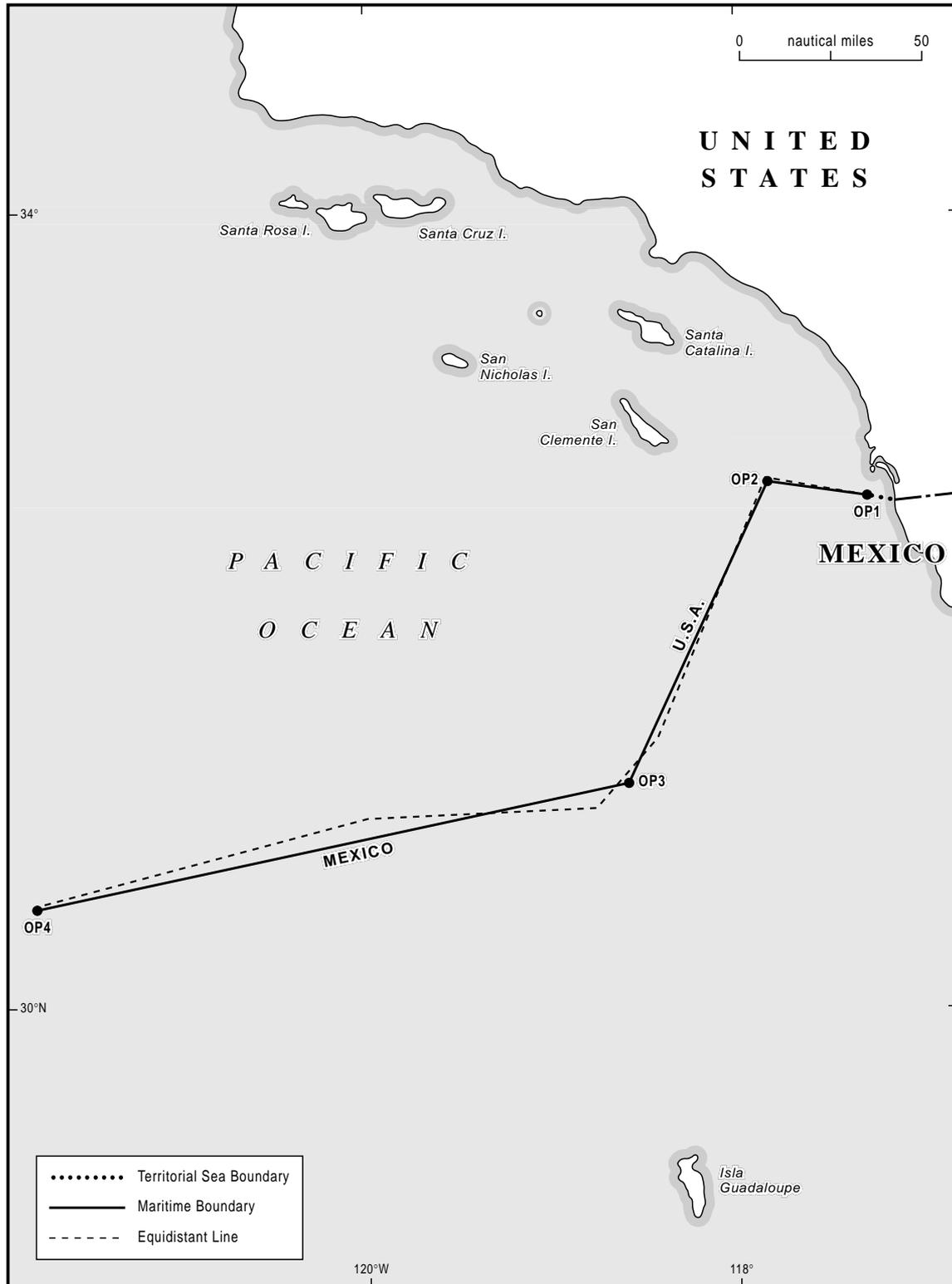
### ***Simplified Equidistance***

Where the parties' coastlines are complex and there are consequently numerous basepoints on either side, the application of strict equidistance can frequently result in a rather convoluted line involving a large number of turning points and a corresponding plethora of short straight-line equidistance line segments. This scenario raises practical problems for maritime management, particularly in relation to navigation and the development of living and non-living offshore resources. In addition, strict equidistance often makes the illustration of the line on a chart problematic and results in an overly long list of coordinates to describe the line.<sup>15</sup>

<sup>14</sup> *Ibid.*: 7-9.

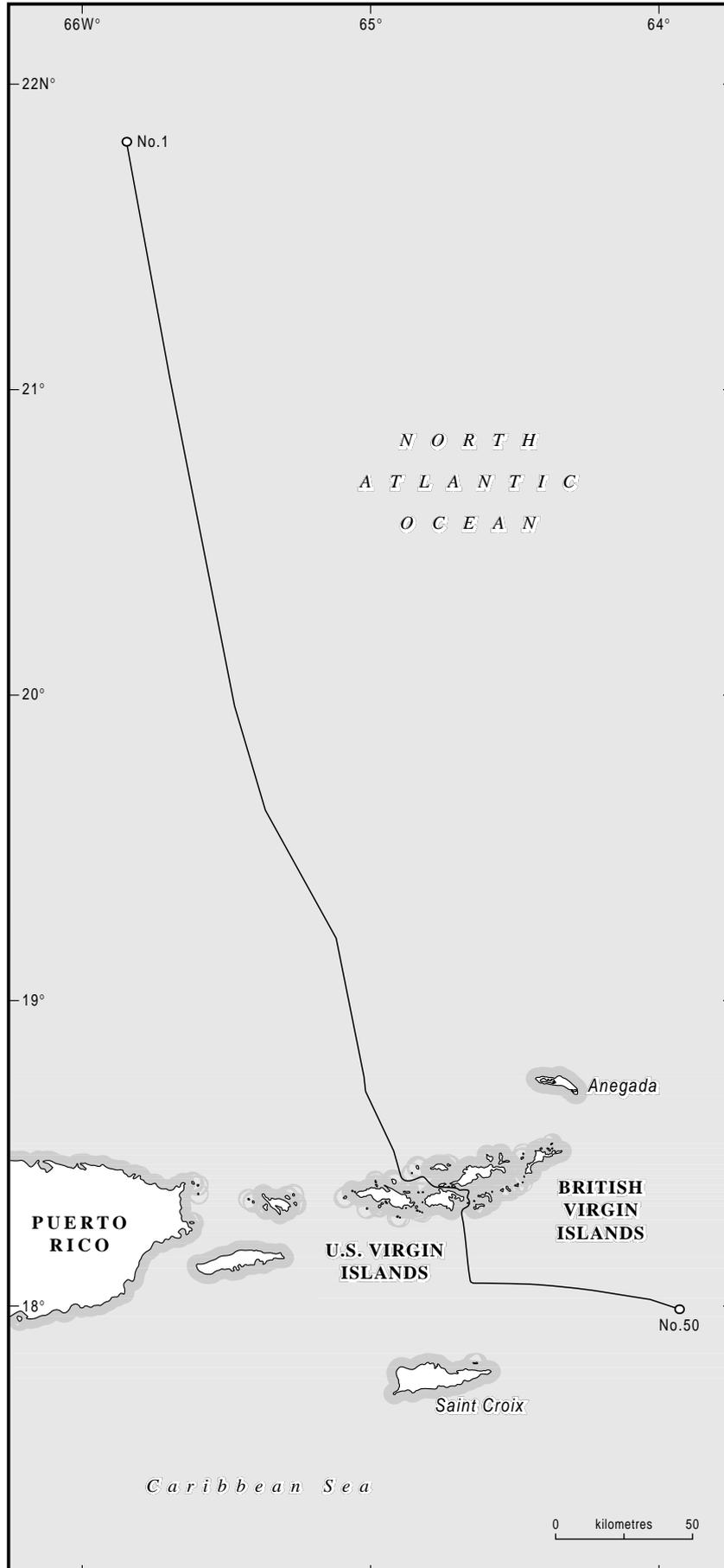
<sup>15</sup> *Ibid.*: 9

Figure 6: Mexico – United States in the Pacific

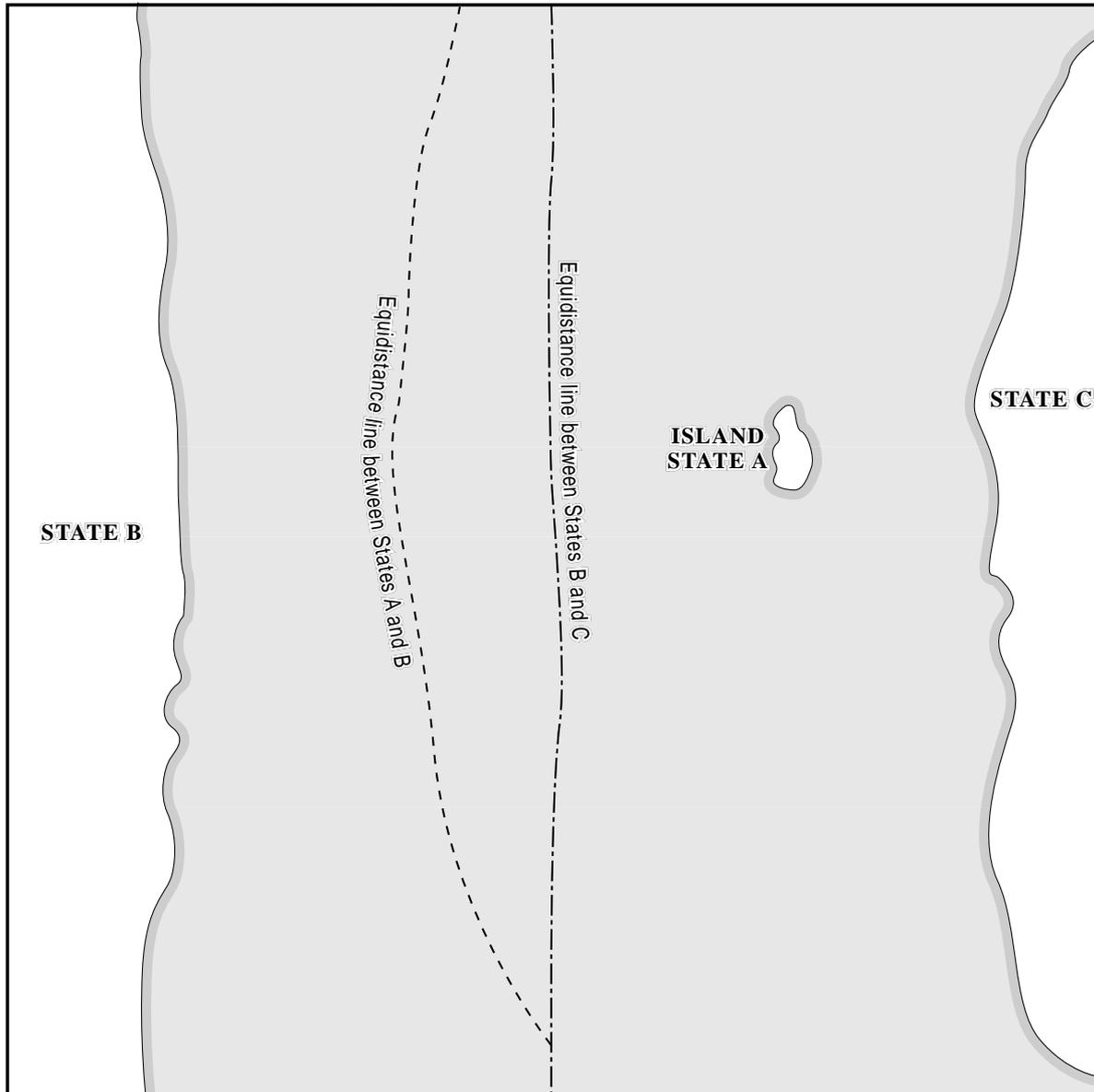


This 'problem' or inconvenience is often resolved by adapting a strict equidistance line in order to 'straighten' sections of it – resulting in a simplified equidistance line. This method involves reducing the number of turning points to a manageable level, thus reducing the number and increasing the length of the intervening straight-line segments. The remaining

**Figure 7: United Kingdom – United States  
(British Virgin Islands – US Virgin Islands)**



**Figure 8: The Impact of Islands in Delimitation between Opposite Coasts**



basepoints are often selected such that an equal exchange of area between the two sides results – a method resulting in what is frequently termed an area compensated line.<sup>16</sup>

A good example of the application of this method of maritime boundary delimitation is that provided by the Mexico-United States boundary, where the number of turning points in the Gulf of Mexico delimitation and Pacific coast delimitation were reduced from eight to five and sixteen to four respectively. In both cases this simplification resulted in only a very slight exchange in maritime space between the parties (see Figure 6).<sup>17</sup>

Other examples of the application of this type of method include the delimitation between France and the United Kingdom in the eastern Channel (see Figure 4) and that between the United Kingdom and United States relating to the British and American Virgin Islands (see Figure 7).

<sup>16</sup> *Ibid.*: 9; Legault and Hankey, 1993: 207.

<sup>17</sup> Charney and Alexander, 1993: 427-446.

Other, less accurate, methods of simplification include the selection of only certain key basepoints therefore eliminating the complexities to the resulting dividing line caused by the intervening basepoints.

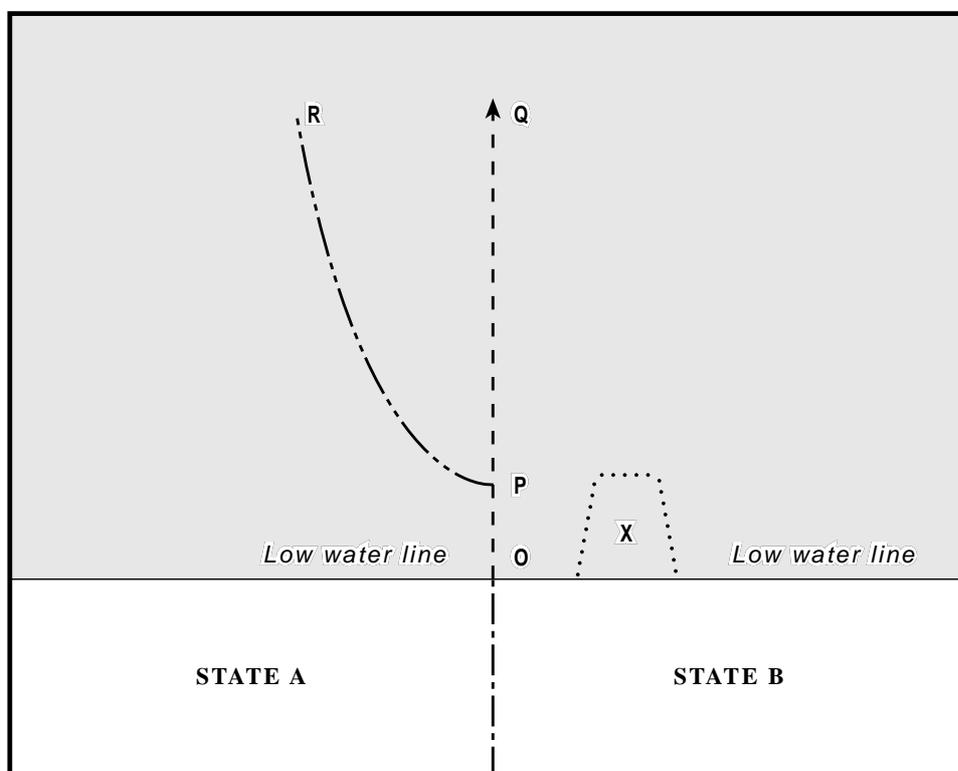
### ***Modified Equidistance***

In the absence of outstanding geographical features, strict equidistance will result in an equal division of maritime space and thus an equitable delimitation. In the case of delimitations between opposite coasts such outstanding geographical features capable of considerably influencing an equidistance line, and thus the equitability of the resulting division, are commonly offshore islands (see Figure 8). In the case of delimitation between adjacent coasts such features commonly include promontories in the vicinity of the coastal terminus of the land boundary of the two states on the coast (see Figure 9).

Where such features do occur, a frequently applied solution has been to apply equidistance principles but to modify the resulting equidistance line by either discounting certain basepoints or by according to them a reduced effect. This method commonly results in a significantly greater alteration to strict equidistance than that in the case of a simplified equidistance line. Furthermore, unlike simplified equidistance lines, modifications of an equidistance line in this manner usually result in an unequal distribution of maritime space between the parties as compared with a division on the basis of strict equidistance.<sup>18</sup>

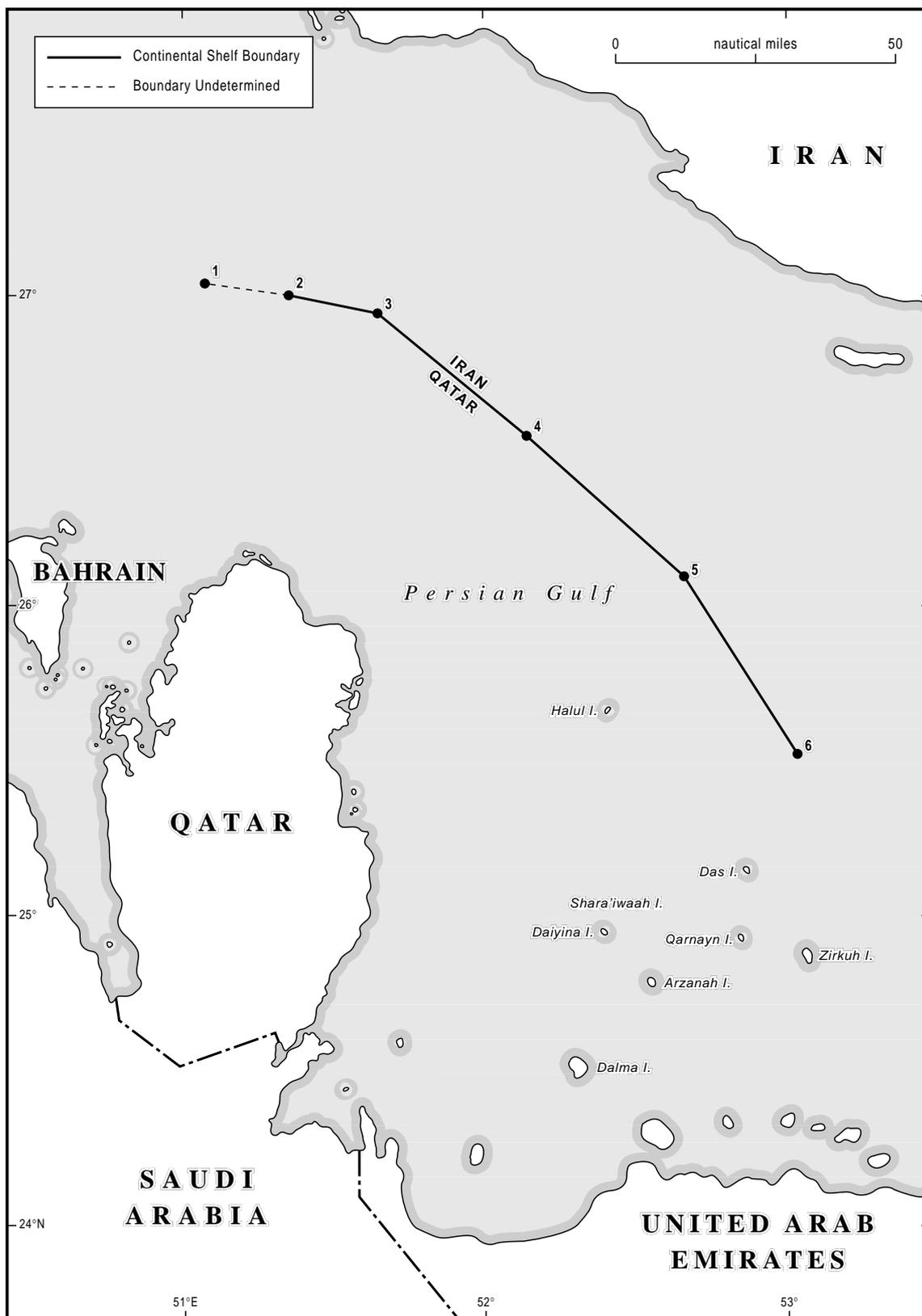
One popular way to modify a strict equidistance line is to adopt some flexibility in terms of the selection of appropriate basepoints. Under this method the parties to a dispute may agree to

**Figure 9: The Impact of Geographical Features on Delimitation between Adjacent States**

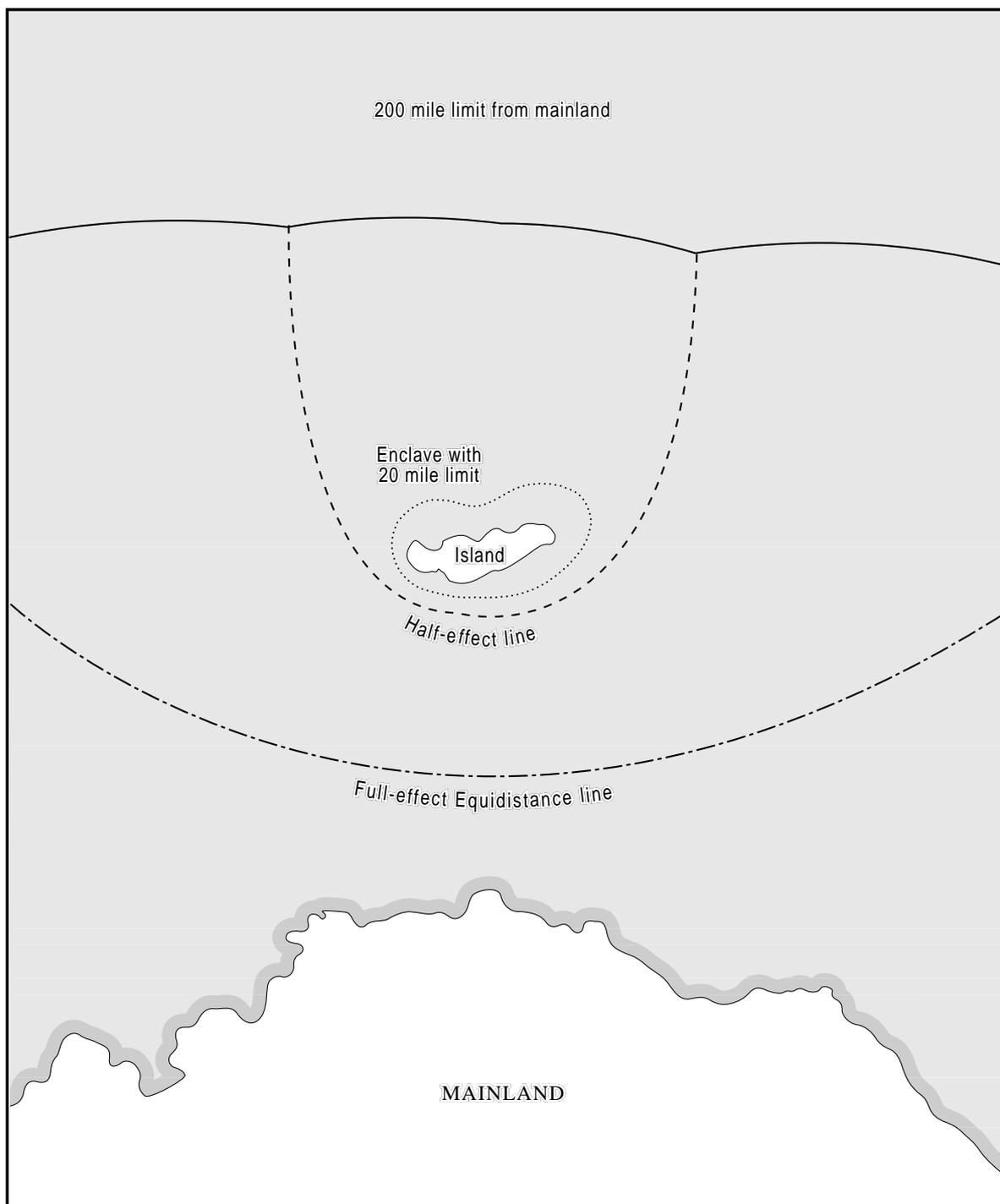


<sup>18</sup> Legault and Hankey, 1993: 208.

Figure 10: Iran – Qatar



discount particular basepoints when constructing a boundary line which is otherwise based on equidistance. This method has been widely used, a good example being the Iran-Qatar continental shelf agreement of 1969 (see Figure 10). In this case, the parties agreed to delimit

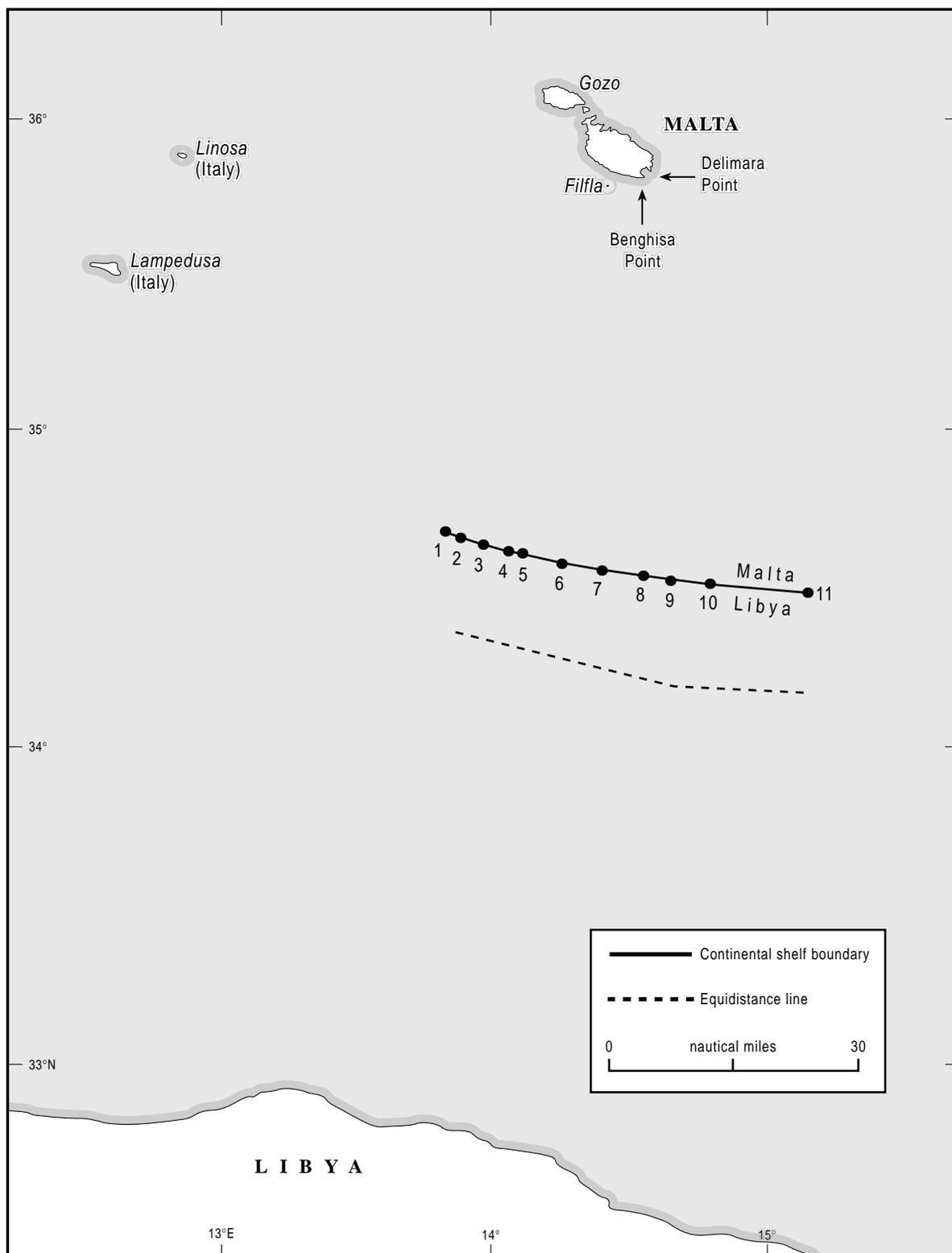
**Figure 11: Islands and Partial Effect**

their common boundary on the basis of equidistance but to ignore all islands, rocks, reefs and low-tide elevations as basepoints. The resulting boundary is therefore equidistant from the nearest points on Iran and Qatar's mainland coastlines.<sup>19</sup>

An alternative solution to the problem of the disproportionate effect of particular geographical features when the equidistance method of maritime boundary delimitation is applied is to accord the island or other feature concerned only partial effect (see Figure 11). This was the

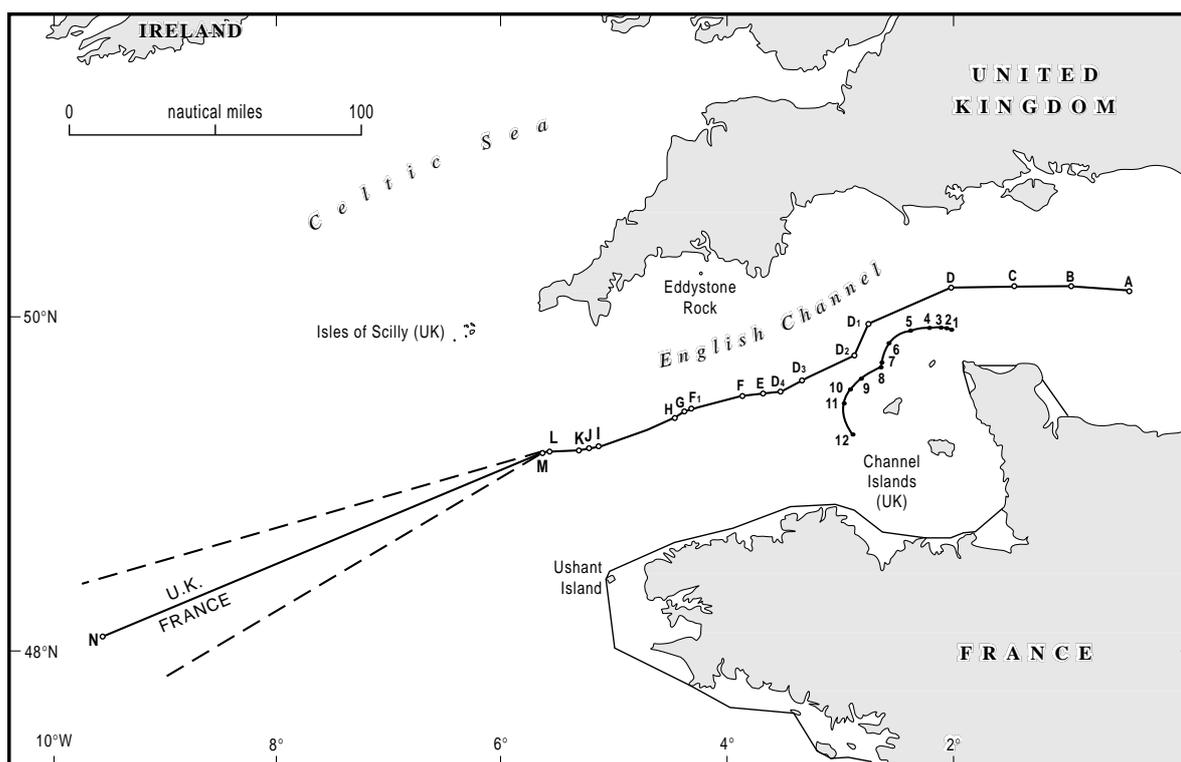
<sup>19</sup> Charney and Alexander, 1993: 1,511-1,518.

Figure 12: Libya – Malta



case in the delimitation between Malta and Libya whereby the equidistance line was shifted 18 minutes of latitude northwards (i.e. to Libya's advantage) giving the Maltese islands less than full effect on the final delimitation line (Figure 12).<sup>20</sup>

<sup>20</sup> *Ibid.*: 1,649-1,662.

**Figure 13: The United Kingdom – France Channel Arbitration**

In many cases half-effect has been applied, for example in relation to the Scilly Isles in the UK-France Arbitration<sup>21</sup> (Figure 13), but there is certainly no obligation or hard and fast rule on this issue as illustrated by the Sweden-USSR delimitation where a 75:25 ratio was applied<sup>22</sup> (Figure 14) and in the Libya-Malta case mentioned above, where no actual ratio was disclosed in the Judgement.

Half-effect can be applied by means of a 'bisector' method whereby the feature or features to be accorded a reduced effect are reduced to a single representative point.<sup>23</sup> An equidistance line can then be drawn using this point and an agreed point on the coast of the state with whom the boundary is being delimited. Another equidistance line can be constructed using the latter point, but ignoring the point representing the features being given reduced effect, and a half effect line drawn by bisecting the angle between the two equidistance lines. This method was followed in relation to the Scilly Isles in the Anglo-French arbitration case (Figure 13).<sup>24</sup>

Alternatively, two equidistance lines can be constructed, one giving the features concerned full effect and the other ignoring them. A third line, equidistant from the other two, can then be drawn in order to accord the features a half effect. This method was applied in the Sweden-USSR case, although a 75:25 ratio between the two lines using and ignoring the Swedish islands of Gotland and Gotska Sandon was agreed upon (to Sweden's advantage) rather than a 50:50 half effect one (Figure 14).<sup>25</sup>

<sup>21</sup> *Ibid.*: 1,735-1,754.

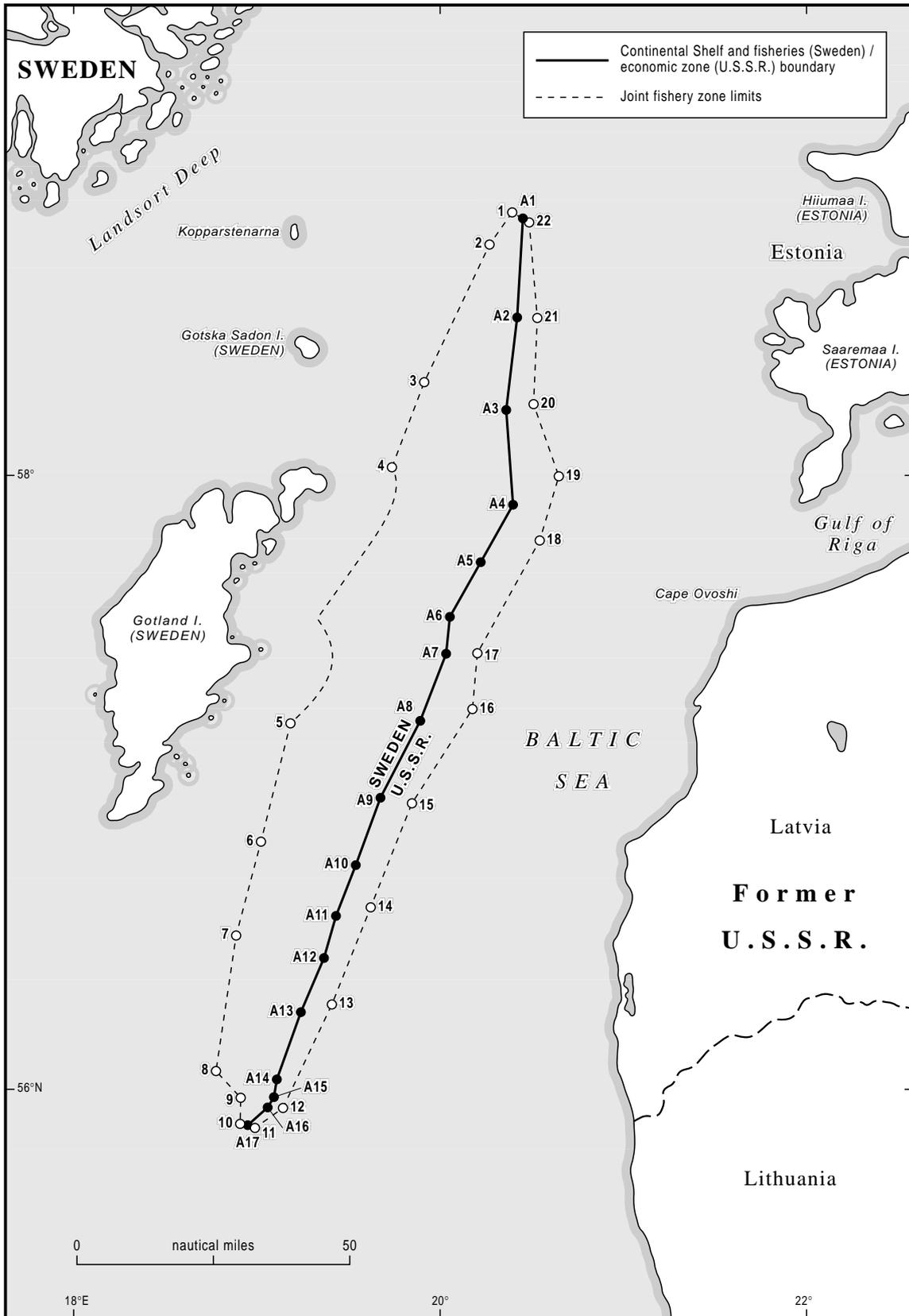
<sup>22</sup> *Ibid.*: 2,057-2,076.

<sup>23</sup> For a detailed analysis of half-effect applied to equidistance lines see Beazley, 1979.

<sup>24</sup> Charney and Alexander, 1993: 1,735-1,754.

<sup>25</sup> *Ibid.*: 2,057-2,076.

Figure 14: Sweden – USSR



### **Enclaving**

Where islands belonging to one state are nearer to the mainland coast of the opposing state than to their own state's mainland coast, that is, they fall on the 'wrong' side of an equidistance line between mainland coasts, the states concerned may opt to ignore the islands altogether for the purposes of constructing an overall division between their mainland coastlines (see Figure 11).

In such circumstances, the islands concerned may be wholly or partially enclaved, usually being accorded no more than a restricted belt of jurisdiction, often no more than that over territorial sea.<sup>26</sup> The fundamental intent and effect of such a method, which is often applied in conjunction with some form of equidistance, is to eliminate inequalities and reduce the maritime area falling to the state whose islands are enclaved relative to the application of strict equidistance.<sup>27</sup>

A fine example of the application of the full enclaving method was that which was applied in the France-United Kingdom delimitation in the English Channel (see Figure 13). The Court of Arbitration, which had been asked to render a decision on the delimitation question, found that between the opposite mainland coasts of the two states, irregularities in the coastlines of the parties generally cancelled one another out such that a median line would result in a generally equitable delimitation. Indeed, if the Channel Islands did not exist, the Court found that a median line "*is precisely how the delimitation of the boundary of the continental shelf in the English Channel would present itself.*"<sup>28</sup> Having admitted that the Channel Islands do in fact exist, albeit located not only on the French side of a median line drawn between mainland coasts but "*practically within the arms of a gulf on the French coast*",<sup>29</sup> the Court concluded that: "*...the Channel Islands are not only 'on the wrong side' of the mid-Channel median line but wholly detached geographically from the United Kingdom.*"<sup>30</sup>

The Court therefore specified that the Channel Islands be enclosed in an enclave formed by 12nm arcs from their baselines to the north and west and by a boundary between them and the nearby French coasts to their east, south and southwest to be negotiated by the two states.<sup>31</sup>

Where small islands exist in close proximity to a potential median line a further method of accommodating them is to partially enclave them. This method was applied in the continental shelf boundary agreement between Italy and Tunisia in 1971. Four Italian islands – Pantelleria, Linosa, Lampedusa and Lampedusa – located centrally in the Channel of Sicily, were accorded a reduced effect. Pantelleria, Lampedusa and Linosa were each accorded 13nm breadth

<sup>26</sup> Common practice is for such islands to be awarded a 12nm territorial sea. Occasionally, however, as in the case of Italy-Tunisia, enclaved islands may be granted a 13nm belt – 12nm of territorial sea plus a symbolic 1nm of continental shelf or exclusive economic zone jurisdiction in order to demonstrate that the feature concerned is fully-fledged island and not a mere rock (Section 3.2.1).

<sup>27</sup> Legault and Hankey, 1993: 212.

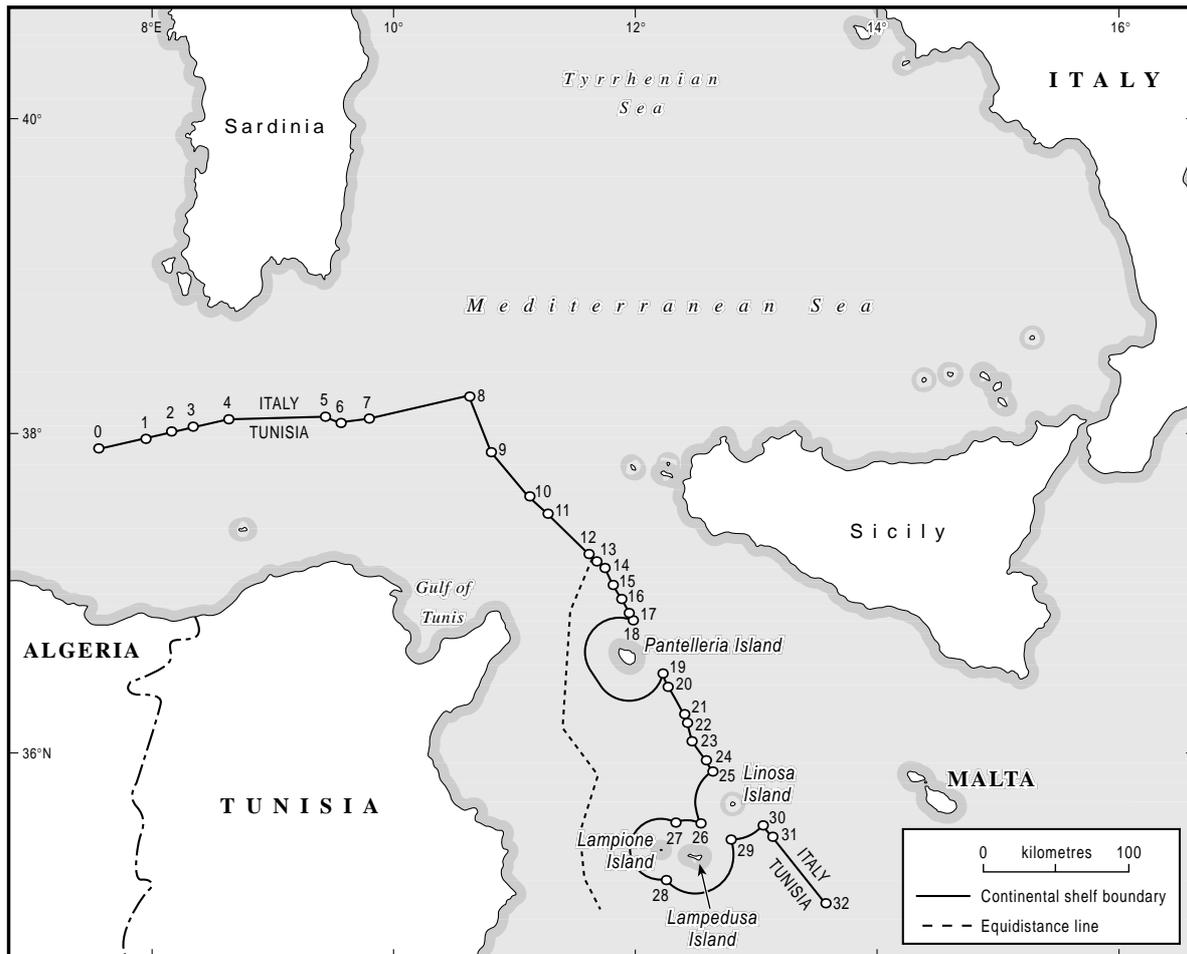
<sup>28</sup> *Anglo-French Arbitration*, para 182. Republished in Research Centre for International Law, Vol.I, 1992.

<sup>29</sup> *Ibid.*, para 183.

<sup>30</sup> *Ibid.*, para 199.

<sup>31</sup> The exact course of the boundary between the Channel Islands and the French mainland coast was beyond the scope of the Court's jurisdiction and was not therefore specified (Charney and Alexander, 1993: 1,741). This was partially resolved through an agreement between France and the UK on behalf of Guernsey of 10 July 1992 which defined two equidistance-based fishery boundaries (Charney and Alexander, 1998: 2,471), and a territorial sea agreement between the two states concerning Jersey of 4 July 2000 (*Agreement between the United Kingdom of Great Britain and Northern Ireland and the French Republic concerning the Establishment of a Maritime Boundary between France and Jersey*, France No.3 (2000), Cm5024, London: HMSO).

Figure 15: Italy – Tunisia



envelopes of jurisdiction while Lampione, which is uninhabited, was provided with a 12nm breadth semi-enclave (see Figure 15).

### 3.2 Lines of Bearing

The other main geometric method of constructing an equidistance line evident from state practice and case law is that of a line of bearing, that is, a line of constant compass bearing.<sup>32</sup>

#### *Perpendiculars*

Where this method of delimitation is employed, frequently the line of bearing taken in such circumstances is one perpendicular to the general direction of the coast in order to take into account the macro-geography of the region. In effect, this represents a much simplified form of equidistance.

Thus, where states are adjacent to one another and boast relatively uncomplex coastlines, a line of bearing perpendicular to the general direction of the coast may represent an easy and equitable option. In addition, Beazley<sup>33</sup> has observed that where a number of adjacent states

<sup>32</sup> Beazley, 1994: 11.

<sup>33</sup> *Ibid.*: 12.

have a short coastal length as compared with the possible seaward extent of their maritime boundaries:

*Such a situation might well produce a series of equidistance lines which would cut off one state from its full reach whilst affording another a disproportionate offshore area of jurisdiction. By employing a general direction, or general directions, of the coast and a series of perpendiculars to form the maritime boundaries, many of the anomalies which might result from using strict or modified equidistance will be avoided.*

It is rare, however, that a particular coastline is so regular as to be unambiguously summarised by a single straight line – a step fundamental to the construction of a perpendicular line. The disadvantage of the method therefore lies in the fact that there is almost inevitably disagreement in the precise angle of the general direction of the coast – a problem induced by the apparent simplicity and therefore the arbitrary nature of such a simplified form of equidistance.<sup>34</sup>

Nevertheless, a good example of this method's application is the maritime boundary which was eventually concluded between the West African states of Guinea and Guinea-Bissau. The parties, having failed to reach agreement in relation to their maritime boundaries as a consequence of their maintaining incompatible claims to equidistance on one hand as opposed to a system of parallel of latitude on the other, submitted their dispute to an international Arbitral Tribunal. The Tribunal found that in order to fulfil its aim of delivering an equitable delimitation guaranteeing each state jurisdiction over those maritime areas in front of their coasts, and avoiding any enclavement or 'cut-off' effects, the configuration of the parties' relevant coastlines had to be taken into account.

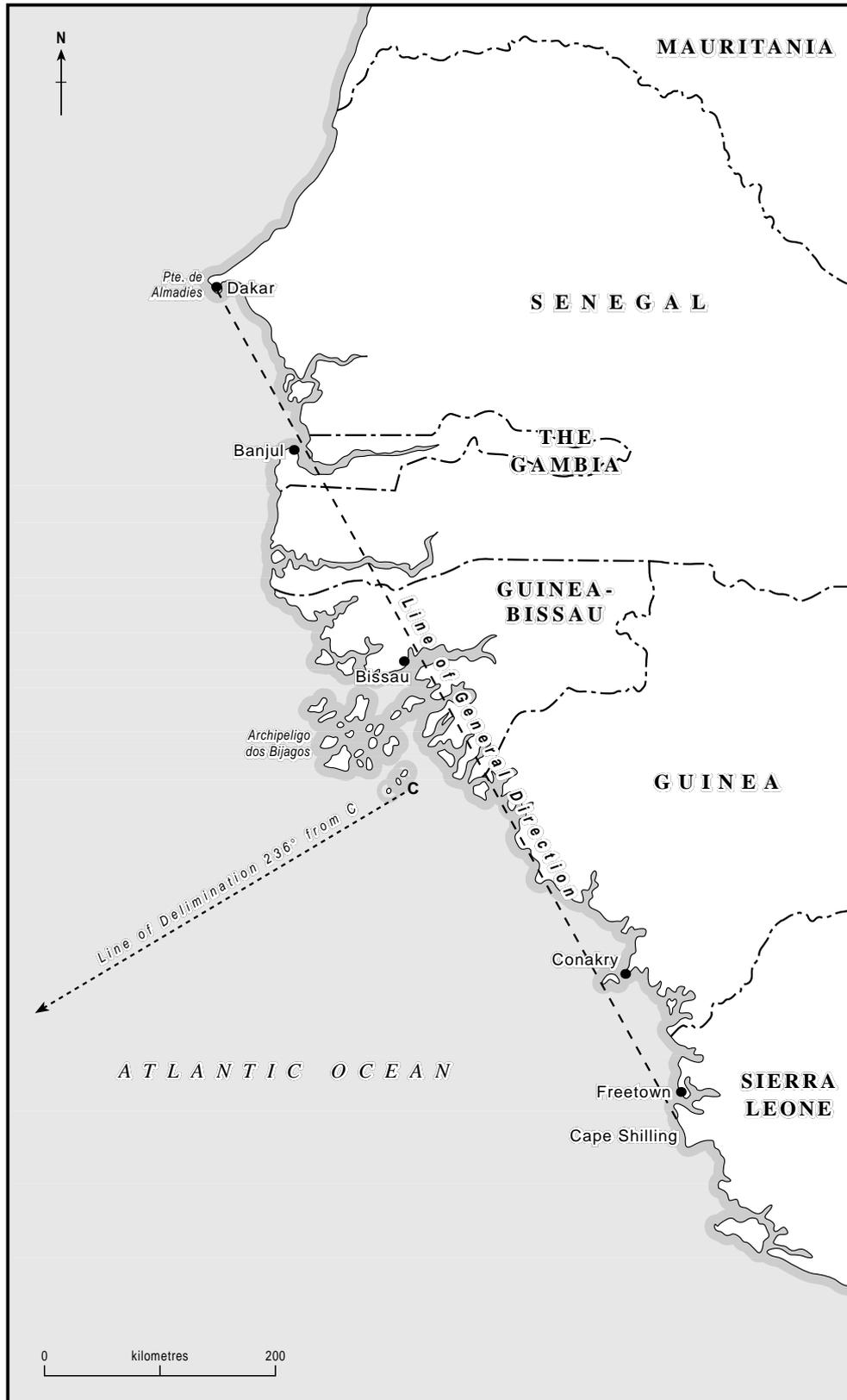
The facts that the coastlines of the two states were partially adjacent and partially opposite, and that combined they displayed a concave shape in the context of the convex coastline of West Africa as a whole, were therefore taken into consideration. In addition, the Tribunal members were keen to provide a delimitation which would be in character with the region as a whole and would not disrupt the conclusion of other maritime boundary agreements in West Africa. As a result the Tribunal found that, seaward of the parties' offshore islands, the boundary should constitute a straight line along a bearing of 236° to the outer limit of the maritime zones claimed by the two states and recognised under international law (Figure 16). The bearing of 236° was arrived at by taking into consideration the general direction of coastline of West Africa and represents a straight line perpendicular to the general direction of the coast as shown by a line connecting Almadies Point and Cape Shilling.

A slightly different approach, which has been used on occasions, is that of constructing lines representing the general direction of the relevant coastlines of each of the parties and then taking the bisector of these two lines as the boundary. This method was applied to the inner part of the Gulf of Maine by the International Court of Justice in 1984 because of the profusion of rocks and islands in the innermost part of the bay and as a result of the Canadian and the United States' conflicting claims to certain islands.

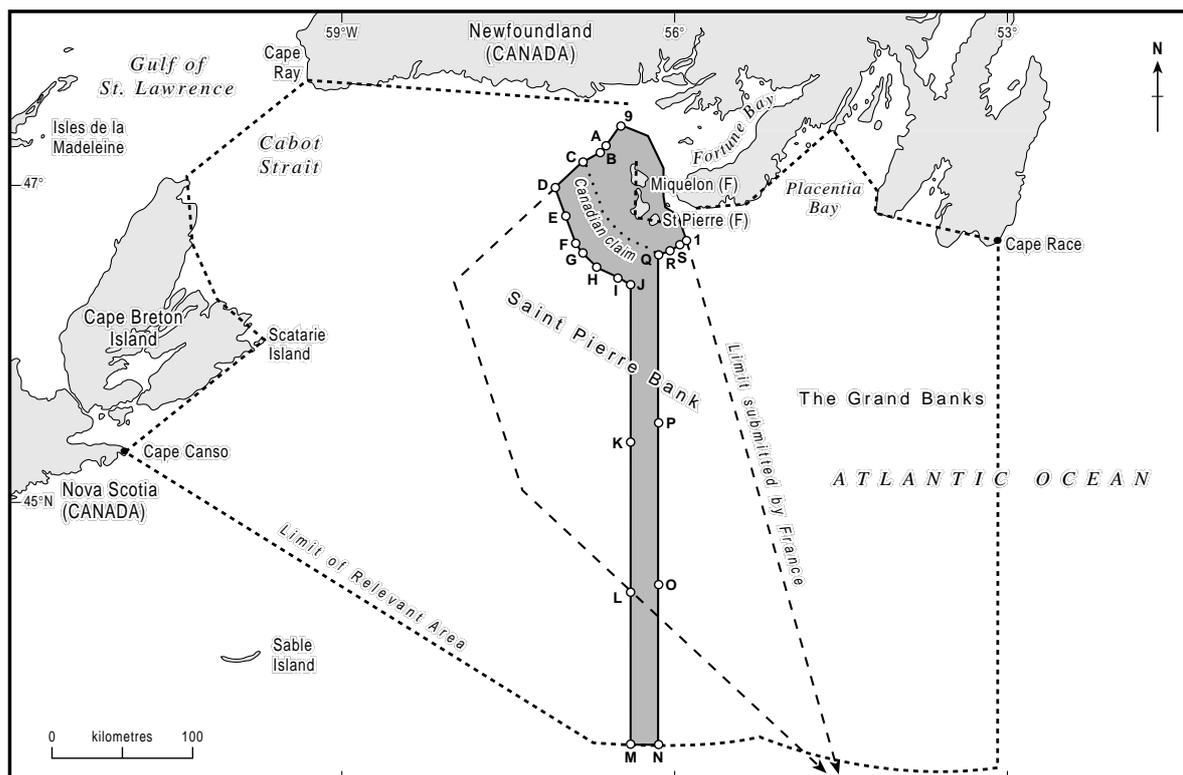
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<sup>34</sup> When the Committee of Experts appointed by the United Nations International Law Commission considered this method of delimitation in the drafting of the articles which became the 1958 Geneva Conventions on the Law of the Sea, it found the method "too vague." This was because establishing the general direction of the coast was "often impracticable" because it depended on scale and how much coast was taken into consideration (United Nations, 1956: 272).

Figure 16: Guinea – Guinea-Bissau



One further variation on this theme, which also holds the advantage of preventing ‘cut-off’ caused by converging equidistance lines, is the construction of a pair of parallel straight lines. This technique has been used on two occasions by France for the delimitations between

**Figure 17: Canada – France (St. Pierre and Miquelon)**

Dominica, and Monaco and was employed by the ICJ in the St. Pierre et Miquelon case between Canada and France (see Figure 17).

### *Parallels and Meridians*

In a similar vein, some states have concluded agreements simply based on parallels of latitude or meridians of longitude. Such arrangements between adjacent states often involve the use a parallel or meridian constructed from the terminus of the states' land boundary on the coast. The agreement between Chile and Peru is an excellent example of this relatively rarely adopted method of maritime boundary delimitation (Figure 18).<sup>35</sup>

In appropriate circumstances, the advantages of parallels and meridians are similar to those associated with perpendiculars. That is, where there are adjacent states with concave or convex coastlines, or there are numerous islands and rocks, the use of a parallel or meridian can circumvent the possibility of 'cut-off' which might occur if equidistance were applied.

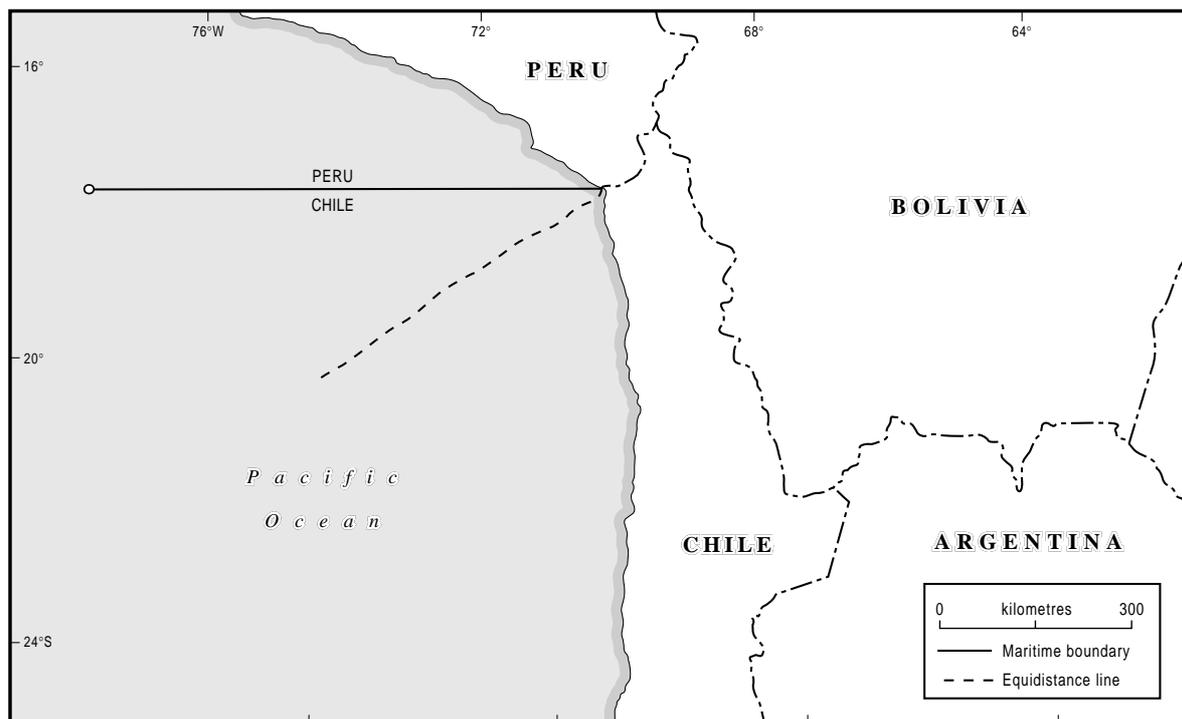
### **3.3 Other Geometric Methods of Delimitation**

Two alternative methods of maritime boundary delimitation were identified by a Committee of Experts appointed by the United Nations International Law Commission when it was asked to draft the articles which in due course became the basis for the 1958 Geneva Conventions on the Law of the Sea.

<sup>35</sup>

It is worth noting, however, that in January 2001 the Peruvian government announced that it did not recognise the parallel of latitude of 18°21'00"S as its maritime boundary with Chile – no doubt because a delimitation along this parallel is highly disadvantageous to Peru in comparison, for example, to a delimitation on the basis of equidistance.

Figure 18: Chile – Peru



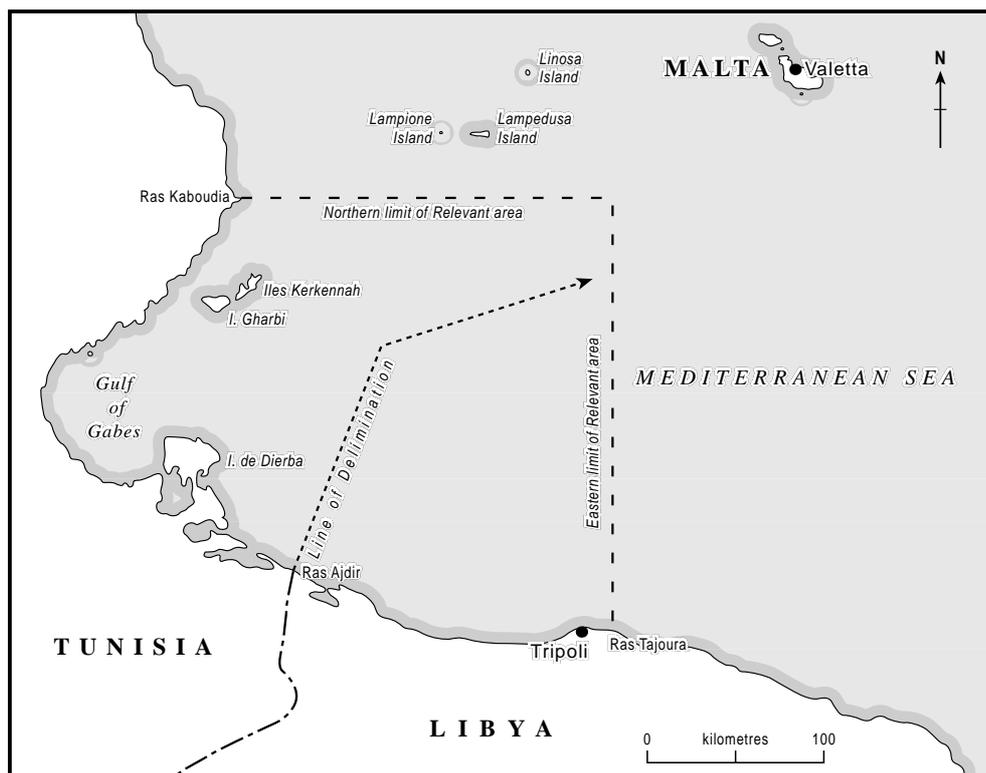
As well as considering the merits and drawbacks of equidistance lines and lines perpendicular to the general direction of the coast, the Committee also evaluated the possibility of delimiting maritime boundaries based on a continuation of the direction of the land frontier offshore or by drawing a line perpendicular to the coast at the point of its intersection with the land frontier. Both of these alternative delimitation techniques were found to have serious drawbacks by the Commission which recommended equidistance as the preferred method of delimitation.<sup>36</sup>

Nevertheless, there are instances of states seeking to employ such alternative methodologies where geographical circumstances mean that they provide that state with a particular advantage. For instance, in the continental shelf delimitation case between Libya and Tunisia before the International Court of Justice (1988), the Court found that the convention establishing the land frontier constituted a relevant circumstance since it determined the starting point of the maritime boundary on the coast and was accepted by both parties. The Court could not, however, accept the Libyan contention that the maritime boundary should reflect the north-south alignment of the land boundary – a division of maritime space which would have been highly advantageous to Libya at Tunisia's expense (see Figure 19).

Clearly, land boundaries have not generally been delimited with maritime jurisdiction in mind and attention has therefore, unsurprisingly, not been paid to the angle at which a particular land boundary intersects with the coast. As a consequence, in many circumstances, a seaward continuation of the land frontier would result in an inequitable distribution of maritime space.

<sup>36</sup> With regard to extending the land boundary offshore it was observed that where the angle of the land boundary meeting the coast was acute *"the result is impracticable."* Use of a line at right angles to the coast where the land boundary intersects with the coast was also criticised on the grounds that where the coastline in question is curved such a line *"may meet the coast again at another point."* The International Law Commission concurred with the Committee of Experts preference for equidistance, albeit *"very flexibly applied"* (United Nations, 1956: 272).

Figure 19: Libya – Tunisia



The drawing of a line perpendicular to the coast at the point of its intersection with the land frontier really represents a simplified and therefore more arbitrary version of a perpendicular to the general direction of the coast. The fact that the general direction of the coast is not taken into consideration necessarily provides greater scope for an inequitable division of maritime space based on this method.

Alternatively, a pragmatic combination of several methods may be applied as was the case in the ‘stepped’ continental shelf delimitation between Ireland and the United Kingdom of 1988 (see Figure 2). As one of the Authors stated in a paper presented at an IBRU conference in 1989 “...it is fair to say that at some stage, during these long and complex negotiations, every method or device that has been used in delimitations and some that have not, were discussed and studied at length.”<sup>37</sup> Even by the end of the 1980s it was clear that bilateral negotiations concerning maritime boundaries often produced an equitable result that can only be described as pragmatic. Experience suggests that frequently during bilateral negotiations there comes a time when both sides have narrowed the gap between them sufficiently to enable “horse trading” to take place to achieve a final result that is equitable to both parties. The final line resulting from these exchanges can rarely be explained in any robust technical way but can be explained as equitable and in accordance with international law.

### 3.4 ‘Natural’ Boundaries

Over time, certain states have advanced the argument that their maritime boundaries can be determined according to ‘natural’ physical boundaries akin to what are perceived as natural divisions on land such as mountain ranges and rivers.

<sup>37</sup> Carleton, 1990: 111.

In relation to territorial sea or continental shelf boundaries, the concept of the thalweg, or line of deepest soundings, commonly used in relation to river boundaries, has been transplanted to the offshore arena and applied to submarine trenches and channels. Similarly, the geomorphology, that is the shape and form, of the seabed and its geological make up have been raised as factors favouring certain maritime divisions. In relation to the water column above the seabed, ecological factors have also been presented as a justification for a particular delimitation.

Nevertheless, the tendency to claim the physical nature of the seabed as a factor in the determination of maritime boundaries has diminished over time. This is principally due to the fact that such natural features generally produce zones of transition rather than precise boundary lines.<sup>38</sup> The exception almost certainly will be the delimitation of those continental shelf boundaries beyond 200nm. The fact that claims beyond 200nm made in accordance with Article 76 are based solely on geological and geophysical parameters will probably mean that these will play an important part in any delimitation in these areas. However, there has been no jurisprudence concerning this type of boundary to date and it is certainly possible that should the geology be the same between the claiming states beyond the 200nm limit geography will probably still play the dominating role.<sup>39</sup>

### 3.5 Evaluation

The law of the sea does not specify that maritime boundaries should be delimited according to a particular method. Even in the case of the territorial sea, under Article 15 of the UN Convention, states are merely abjured from extending their claims beyond a median line “*failing agreement between them to the contrary.*” In effect, though, so long as third party rights are not infringed upon, states are free to agree upon any maritime boundary delimitation they choose.

It follows therefore, that there is similarly no limit to the methods of delimitation that may be employed, so long as the parties agree or the court or other legal tribunal charged with resolving a dispute deems it to be equitable. A court or arbitration tribunal will, however, be guided by the rules and principles of international law. This is not always the case for delimitations achieved through negotiations. It is therefore impossible to consider all the options and methodologies of maritime boundary delimitation available to states as these are, at least theoretically, unlimited.

Nevertheless, it is clear that in practice one method in particular has proved significantly more popular as the basis for international maritime boundary agreements over time – the equidistance method.

#### *The advantages of equidistance lines*

The principle advantage of equidistance line based delimitations is the fact that, in the absence of outstanding geographical irregularities in the parties’ coastlines, the principle of equidistance produces an equal division of maritime space. While an equal division is not necessarily an equitable division, this is in fact often the case. Another key attraction of equidistance lines as maritime boundaries is that they are based on proximity. That is, the

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<sup>38</sup> Evans, 1989: 118.

<sup>39</sup> Cook and Carleton, 2000: 313.

foundation of equidistance provides for the allocation to a particular state of those maritime areas closest to its coastline – a factor of particular concern to states, primarily for security reasons (i.e. the territorial sea).

Equidistance lines also provide an objective method of dividing maritime space. As Beazley<sup>40</sup> has noted:

*Provided that both parties are agreed on the legitimacy of the respective territorial sea baselines and basepoints, there is only one equidistant line which will satisfy those conditions, and its course can be determined on strict geometric principles without ambiguity.*

Equidistance lines can therefore be constructed in an unambiguous manner according to mathematical principles, result in the capture of those areas in closest proximity to a particular states coast, and, in the absence of outstanding geographical features, have a general tendency towards providing an equitable division of maritime space.

As a result of these characteristics, the equidistance line concept, accorded a degree of flexibility by the proviso that “*special circumstances*” might justify an alternative delimitation, was adopted in the 1958 Geneva Conventions on the Territorial Sea and Contiguous Zone and on the Continental Shelf at Articles 12 and 6 respectively. In effect, though, the inclusion of reference to median lines in the 1958 Conventions represented the high-tide for the general acceptance of equidistance as the preferred or privileged method of delimitation.

### ***The retreat from equidistance***

Despite the fact that in the 1969 North Sea Continental Shelf Cases the ICJ noted that a median line between opposite states usually resulted in an equal division of the maritime space involved, the Court concluded that the provisions relating to equidistance in the 1958 Conventions had not become customary international law and that boundaries could diverge from that rule.<sup>41</sup> Similarly, the Anglo-French Court of Arbitration’s judgement, while adhering to equidistance for much of the boundary, gave no particular preference to equidistance as a principle overall.<sup>42</sup> The progressive retreat from equidistance as a preferred method of delimitation in case law continued through the 1980s to the present day with the Libya-Tunisia case of 1982, the Canada-United States Gulf of Maine case of 1984, the Guinea-Guinea-Bissau and Libya-Malta cases, both of 1985,<sup>43</sup> the Canada-France (St. Pierre and Miquelon) case of 1992, the Denmark (Greenland)-Norway (Jan Mayen) case of 1995,<sup>44</sup> the Eritrea-Yemen arbitration of 1999<sup>45</sup> and the Bahrain-Qatar case of 2001<sup>46</sup>

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<sup>40</sup> Beazley, 1994: 7.

<sup>41</sup> Charney, 1987: 509. Legault and Hankey (1993: 204) term this the “*first blow*” struck against the privileged status of the equidistance-special circumstances rule.

<sup>42</sup> Instead the Court adopted a unified equidistance/special circumstances rule (Charney, 1987: 509; Legault and Hankey, 1993: 204).

<sup>43</sup> Legault and Hankey, 1993: 204. See also, Birnie, 1987: 15-37.

<sup>44</sup> Charney and Alexander, 1998: 2141, 2507.

<sup>45</sup> Permanent Court of Arbitration, 1999: In the Matter of An Arbitration Pursuant to an Agreement to Arbitrate dated 3 October 1996 between the Government of the State of Eritrea and the Government of the Republic of Yemen, Award of the Arbitral Tribunal in the Second Stage of the Proceedings (Maritime Delimitation), London.

<sup>46</sup> International Court of Justice, 2001, Case Concerning Maritime Delimitation and Territorial Questions between Qatar and Bahrain, Judgement 16 March 2001: ICJ, The Hague.

This shift away from equidistance over time is particularly well demonstrated by a comparison of the texts of Article 6 of the 1958 Convention on the Continental Shelf and Article 74 of the UN Convention of 1982. In the former, in the absence of agreement, “*the boundary is the median line.*” In contrast, the UN Convention merely provides that the boundary should be effected by agreement “*in order to achieve an equitable solution*” and no mention of equidistance or median lines is made. This change in emphasis strongly indicates that the equidistance principle is by no means obligatory in international law and was the result of strong pressure from states at the Third Law of the Sea Conference against the concept of the mandatory application of equidistance for ocean boundaries.

Equidistance has therefore, at least in theory, been gradually relegated to a status and importance equivalent to any other method of maritime boundary delimitation. As a result of equidistance being knocked from its pedestal as the preferred method of delimitation, the law of the sea as codified by the UN Convention and supported by judicial decisions has been stripped down to the process of taking into account all relevant circumstances in accordance with equitable principles in order to achieve an equitable result.<sup>47</sup>

Nevertheless, there are two geographical situations where the equidistance principle appears to have maintained a stronger position in international maritime boundary law – with regard to the territorial sea and in delimitations between opposite states.

#### ***Where equidistance retains a particular role***

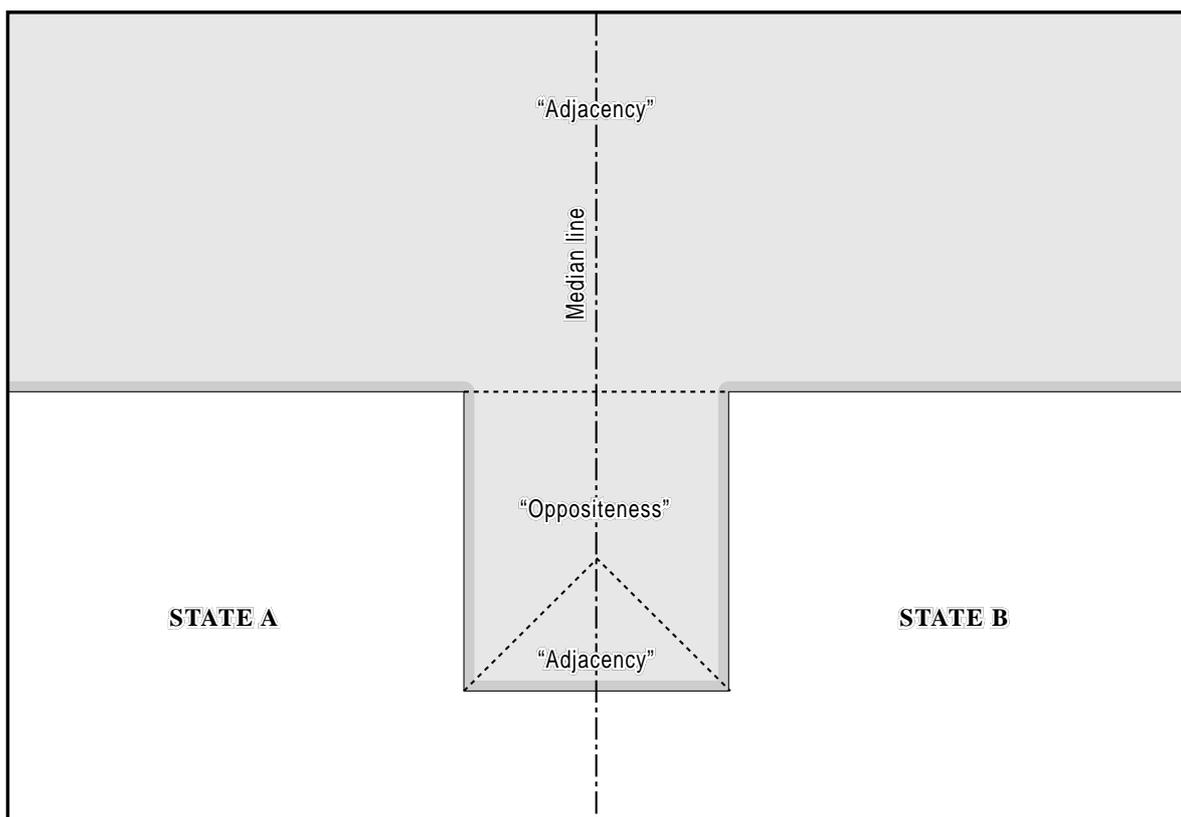
The provisions relating to delimitation of the territorial sea in the 1982 UN Convention, contained in Article 15, are virtually identical to those laid down by the 1958 Convention on the Territorial Sea and Contiguous Zone. Both of these documents call on states, in the absence of agreement to the contrary, not to extend their territorial sea “*beyond the median line every point of which is equidistant from the nearest points on the baselines from which the territorial sea is measured.*”

This preference for equidistance in the case of the territorial sea reflects concerns by states to control those maritime areas closest to their land territory, for economic and particularly security reasons. The application of equidistance answers these concerns admirably, as the foundation of the concept is the provision of a division on the basis of proximity. In addition, the fact that the territorial sea is a relatively narrow maritime zone, generally up to 12nm in breadth as compared to 200nm in the case of the EEZ, means that there is a correspondingly limited risk of major distortions caused by coastal irregularities, resulting in large areas inequitably falling under the jurisdiction of a neighbouring state. This distinction in the provisions regarding the territorial sea, as opposed to the continental shelf or EEZ, therefore reflects the greater importance attached to the maritime space in close proximity to the mainland coast.

One aspect of coastal geography which is of great significance to the application of the equidistance method concerns the relationship of the coasts of the parties to each other, that is, whether they are adjacent or opposite (see Figure 20). This is important because, even though the UN Convention does not make any distinction between opposite or adjacent delimitations, they appear to be treated differently.

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<sup>47</sup> Legault and Hankey, 1993: 204-205.

**Figure 20: Opposite and Adjacent Coasts**

In general, for opposite coasts, lines of equidistance are broadly thought to produce an equitable division. In the case of adjacent coasts, however, the presence of even a small coastal irregularity such as a headland or an offshore island can cause an equidistance line to shift significantly towards one state, thereby undermining the principle of equitability.<sup>48</sup>

This trend is evident in case law and is strongly reinforced by state practice. Indeed, taking the agreements analysed in Charney and Alexander's *International Maritime Boundaries* (1993) as a benchmark, if both third-party awards and negotiated maritime boundaries between opposite states are considered, fully 89% were based on some form of equidistance.<sup>49</sup> However, the picture is very different when adjacent state delimitations are considered. Of the 32 maritime boundary agreements (including territorial waters delimitations) concluded up to 1993 between states with adjacent coastal configurations, only 12 (38%) employed equidistance.

In addition, even if a strict equidistance line does not become the final line of division, such a line frequently provides the starting point for negotiations, if only as a way of detecting where inequities might occur.

It is also worth noting that the introduction of the EEZ and the 'distance principle' it entails in UNCLOS with regard to areas within 200nm of a state's baselines has effectively eliminated geophysical factors from the delimitation equation in these areas. It has been observed that this

<sup>48</sup> *Ibid.*: 216.

<sup>49</sup> *Ibid.*: 214.

development, ironically, amounts to little more than a “disguised throwback to equidistance.”<sup>50</sup>

Despite the recession in the importance of equidistance as a favoured, even binding, method from the legal perspective, in practice the equidistance method has proved more popular than any alternative method by far and most agreed maritime boundaries are based on some form of equidistance.<sup>51</sup>

### ***Equidistance and maritime boundary agreements***

The ICJ itself noted in the 1969 North Sea Continental Shelf cases that maritime boundary agreements at the time were predominantly based on the equidistance principle. Indeed, of the 157 maritime boundary agreements concluded by the year 2000, 124 of them (79%) were based on some form of equidistance, whether strict, simplified or modified, for at least part of their length.

This trend is understandable in relation to pre-1969 delimitations as, prior to the North Sea cases of that year, many boundary makers assumed, largely based on the provisions of the 1958 Geneva Convention on the Continental Shelf, that a clear presumption existed favouring the equidistance method. What is clear, however, is that the equidistance method of maritime boundary delimitation has retained its popularity among states in the post-1969 period.

This, on the face of it, rather surprising turn of events, has chiefly occurred because the advantages related to the equidistance method, briefly outlined above, have not themselves diminished. Application of the equidistance principle therefore often results in an equitable and politically mutually acceptable delimitation and is therefore frequently resorted to in state practice.

In addition, it has also been observed that the adoption of the equidistance method is highly unlikely in the case of judicial awards for the simple reason that were a boundary delimitation question easily resolved through the construction of an equidistance line or a variant of one, the parties would have resolved the dispute between them without reference to any third party conflict resolution procedure. The cases that are brought before bodies such as the International Court of Justice are necessarily those which the parties have failed to resolve through negotiations and can therefore be considered to be the most complex, controversial and, critically, least likely to be suited to the application of a boundary delimitation method based on equidistance.<sup>52</sup>

Despite the enduring popularity of the method illustrated by the weight of state practice in its favour it is clear that no norm in international maritime boundary law has emerged requiring the use of equidistance as the basis for a delimitation – in fact, if anything, there has been a retreat from that position. Instead of there being any preferred method under the law of the sea, the principle of achieving an equitable result through an examination of all circumstances relevant to a particular delimitation problem is fundamental to the delimitation of maritime boundaries.

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<sup>50</sup> Highet, 1993: 183.

<sup>51</sup> Legault and Hankey, 1993: 205.

<sup>52</sup> *Ibid.*: 205.

### Summary

It seems clear, therefore, that there exist a multitude of methods of maritime boundary delimitation and that the choice of method rests with the states concerned. However, the equidistance method, even if not obligatory, has proved far and away the most popular delimitation method. The reasons for this relate to its mathematical precision, lack of ambiguity and its accordance with equity where the parties' coastlines are broadly comparable. Where the coastlines in question are not comparable and a strict equidistance line would result in an inequitable delimitation, the equidistance method has frequently been used as a starting point and then modified. Equidistance has therefore proved an adaptable and flexible method of delimitation, particularly in opposite coast situations. Nevertheless, as Legault and Hankey have observed:

*The choice of means or methods for translating the relevant geographical and other circumstances into a precise line is, as ever, the most difficult issue in the law of maritime boundaries.*<sup>53</sup>

## 4. The Regime of Islands

The question of the treatment of islands in maritime boundary delimitation is a complex and crucially important one. It therefore seems appropriate to devote a separate section to this vexed issue.

It is important to distinguish between the two main types of island disputes – those relating to sovereignty over islands themselves and those concerned with the role of particular insular features in the delimitation of maritime boundaries. It is also worth observing in this context, of course, that the potential role of islands in delimitation may itself be a factor influencing any dispute over ownership.

Escalating concerns over, frequently small, islands and their capacity to generate claims to maritime jurisdiction reflects increasing interest in offshore resources, the exhaustion of nearshore and onshore resources, growing populations and therefore resource demands, allied to technological developments allowing for the exploitation of marine resources in deeper waters further and further offshore. As a single point of land, if considered an island, could theoretically generate a claim to 125,664nm<sup>2</sup> (431,014km<sup>2</sup>) if no maritime neighbours were within 400nm of the feature, the potential importance of such features is difficult to underestimate. Indeed there are several dependent islands with this situation, but none to date are independent states.<sup>54</sup>

This section will deal with the frequently contentious questions of what constitutes an island or related feature (e.g. rock or low-tide elevation) and what role islands play in generating maritime zones and their use as basepoints in the delimitation of maritime boundaries. Article 121 of UNCLOS, dealing with the Régime of islands provides the basis for this analysis. In full Article 121 states that:

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<sup>53</sup> *Ibid.*: 206.

<sup>54</sup> Such an eventuality is, however, extremely unlikely. Indeed, Prescott (1988: 33) has pointed out that were Hawaii to gain independence from the USA it would be the only coastal country in the world without overlapping maritime claims with a neighbouring state.

1. *An island is a naturally formed area of land, surrounded by water, which is above water at high tide.*
2. *Except as provided for in paragraph 3, the territorial sea, the contiguous zone, the exclusive economic zone and the continental shelf of an island are determined in accordance with the provisions of this Convention applicable to other land territory.*
3. *Rocks which cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf.*

#### 4.1 What Constitutes an Island?

Paragraph 1 of Article 121 of UNCLOS represents a direct repetition of Article 10, paragraph 1 of the 1958 Convention on the Territorial Sea and Contiguous Zone. Four requirements are identified by these Articles which a feature must fulfil if it is to legally qualify as an island. These insular criteria are that an island must be “*naturally formed*”, be an “*area of land*”, be “*surrounded by water*” and, critically, must be “*above water at high tide*.”

##### *Naturally formed*

The first requirement, that an island be “*naturally formed*” clearly serves to disqualify artificial ‘islands’ such as platforms constructed for example on submerged shoals, low-tide elevations or reefs. Such artificial islands are not considered to be legal islands in the international law of the sea as is made explicit by Article 60, paragraph 8 of UNCLOS:

Artificial islands, installations and structures do not possess the status of islands. They have no territorial sea of their own, and their presence does not affect the delimitation of the territorial sea, the exclusive economic zone or the continental shelf.<sup>55</sup>

Island-building activities on the part of states, keen to thereby enhance their claims to maritime space by creating new islands, is therefore at variance with the UN Convention and the customary international law of the sea. Nevertheless, several states have sought to protect certain insular features which, although naturally formed, are unstable and susceptible to erosion such that they are in danger of losing their status as islands through falling below the “*above water at high tide*” criterion.

Perhaps the most striking example of such efforts to preserve the insular character of vulnerable formations is Japan’s efforts to maintain its southernmost islet of Okinotorishima above the high tide level. This feature generates approximately 163,000 square miles of claimed exclusive economic zone for Japan despite consisting merely of two small peaks, neither of which is reportedly “*bigger at high tide than a king-size bed*”, sitting atop an otherwise submerged reef (see Figure 21).<sup>56</sup> One of these peaks is no more than three feet above the high-tide level. The Japanese authorities have therefore taken the rather unorthodox and somewhat dramatic step of building artificial sea defences entirely surrounding the islet. Although these artificial structures are in fact higher than the naturally formed above high tide formations themselves, it is the latter which are vital in terms of generating an extended maritime zone, although it could certainly be argued that this diminutive island feature falls under the provisions of Article 121(3).<sup>57</sup>

<sup>55</sup> States may, however, declare “*reasonable*” safety zones around artificial structures (UNCLOS, Article 60, 4).

<sup>56</sup> Silverstein, 1990: 409.

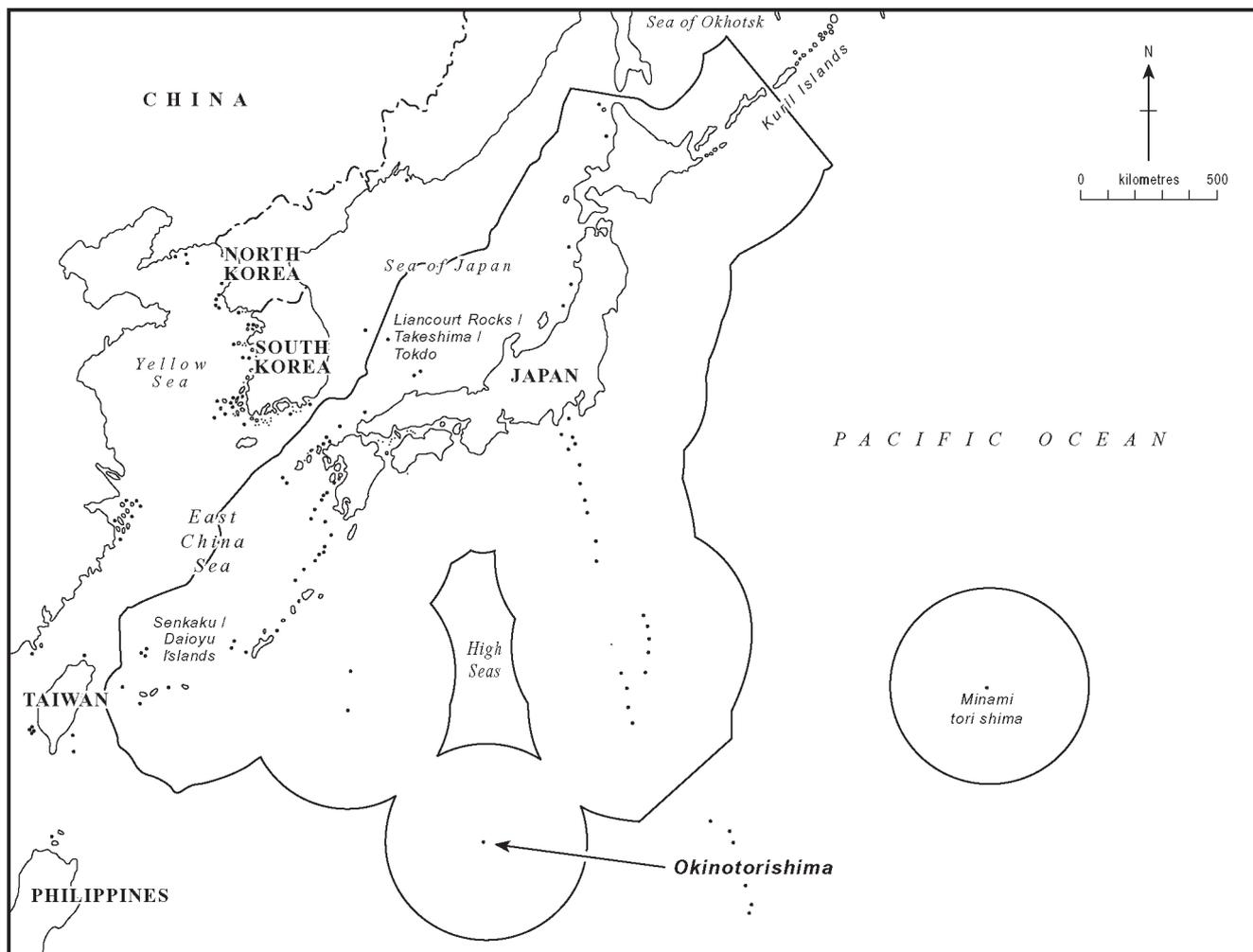
<sup>57</sup> *Ibid.*: 409-431; Symmons, 1995: 3.

**Figure 21: Okinotorishima**

**Aerial Views Showing Sea Defences**



**Location**



### *Area of land*

The provision that an island be composed of “*an area of land*” would seem, at first glance, to be a fairly self-evident requirement. However, in certain circumstances this aspect of insular definition can be problematic and open to dispute. A fine example of this is that of Dinkum Sands, a formation lying off the Alaskan arctic coast. Composed of alternating layers of sea ice and gravel, the dispute over the feature between the Alaskan state authorities and the US Federal government turned on whether that part of the formation’s vertical height made up of ice could be counted when testing the feature against the “*above water at high-tide*” provision.<sup>58</sup>

### *Surrounded by water*

The “*surrounded by water*” requirement may be regarded as a largely uncontroversial rule. This is so because if a feature is indeed linked to the mainland coast by, for example, a sandbar, to such an extent that it may be considered an integral part of the mainland coast, then it follows that that feature takes on the characteristics of the mainland coast. As such the feature would have a baseline and thus be capable of generating claims to the full suite of maritime zones, just as it would do as a full -fledged island.

### *Above water at high-tide*

The question of an island being “*above water at high-tide*” is fundamental – as the preceding sections relating to the other requirements of Article 121(1) demonstrate. A particular feature’s relationship to the tidal level is vital in distinguishing between islands (above high-tide), low-tide elevations (above low-tide but submerged at high-tide) and non-insular features (submerged at low-tide).<sup>59</sup> This concern is, however, intimately linked to the choice of vertical tidal datum used to determine what represents the high and low tidal levels. No universally accepted vertical tidal datum is in use.<sup>60</sup>

### *Alternative Definitions*

The question of the definition of islands has provoked fierce debate over the years. Perhaps the most significant issues of contention is related to island size and habitability. Many commentators, and indeed states, have proposed that there should be some size limit coupled with the definition of what constitutes an island, such as to prevent each “*mere pin-prick of rock*”, even if permanently above water, from generating maritime claims.<sup>61</sup>

<sup>58</sup> Briscoe, 1988: 17-18; Symmons, 1995: 3-4. It is conceivable that similar difficulties may arise in relation to coral cays. Islands in coral-inhabited areas are frequently described as ‘cays’ although this is not a term of art in Law of the Sea terminology. The International Hydrographic Organization (1990: 37) describes a cay (or kay or key) as “*A low flat island of sand, coral etc. awash or drying at low water, a term originally applied to the coral islets around the coast and islands of Caribbean Sea.*” This definition indicates that cays might submerge at some stages of the tidal cycle. For a detailed analysis of the Dinkum Sands case see Symmons, 1999.

Other commentators, for example Nunn (1994), have characterised cays as being impermanent accumulations of sand and shingle which, with the accumulation of beach rock, may develop into more stable features termed *motu*. This gives the impression that cays may be subject to evolution and decay over time. It is, however, reasonable to assume that on those cays which are occupied measures have been taken by the occupants to prevent the feature’s erosion and there may even have been attempts to promote island-building. As a result such features may well qualify as ‘rocks’ or even ‘islands’ (see Hancox and Prescott, 1995)

<sup>59</sup> Briscoe, 1988: 18-19; Symmons, 1995: 4.

<sup>60</sup> See Carleton and Schofield, 2001: 21-25.

<sup>61</sup> Johnson (1951) ‘Artificial Islands’, *International Law Quarterly*, 4. Quoted in Symmons, 1979: 37.

Arguments of this type were certainly evident in the run up to and during the drafting of Article 10 of the Convention on the Territorial Sea and Contiguous Zone concluded in Geneva in 1958.<sup>62</sup> In the end, however, no size criterion was included.

An important attempt to tackle the problem of defining islands by size was, however, subsequently undertaken by Robert Hodgson, The Geographer at the United States Department of State. His 1973 Research Study *Islands: Normal and Special Circumstances* included a categorisation of islands as follows:

1. *rocks*, less than .001 square mile in area;
2. *islets*, between .001 and 1 square mile;
3. *isles*, greater than 1 square mile but not more than 1,000 square miles; and,
4. *islands*, larger than 1,000 square miles.

Similar proposals were advanced before and during UNCLOS III. Malta presented draft articles defining an island as a “naturally formed area of land, more than one square kilometre in area” and an “islet” a similar area of land of less than one square kilometre in area. African states and Romania also made notable proposals, concerning both size and habitability, broadly aimed at denying or restricting small insular features which the maritime zones accorded to ‘true’ islands.<sup>63</sup>

This trend to link island definition with size and habitability were, however, counteracted by several delegations at UNCLOS keen to preserve the status quo. As the UK delegate pointed out:

*...there was an immense diversity of island situations, ranging from large and populous islands of even larger continental states to small islands with self-sufficient populations, and that, inter alia, the attempt by some delegations to categorise islands in terms of size would not result in any generally applicable rules which would be equitable in all cases; and there was grave danger of discounting many islands of both absolute and relative importance.*<sup>64</sup>

Ultimately, the forces for status quo prevailed – Article 121 of UNCLOS lacks any size criteria for defining islands and the 1958 definition remained intact. However, concerns over size and habitability were included in the 1982 Convention in the form of paragraph 3 of Article 121 which introduces into the international law of the sea a disadvantaged sub-category of island, the “rock”.

## 4.2 Rocks

A further conundrum relates to the distinction made in Article 121 between islands and rocks. Article 121(3) states that:

*Rocks which cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf.*

<sup>62</sup> See Bowett, 1979 and Symmons, 1979 for details of this debate.

<sup>63</sup> *Ibid.*

<sup>64</sup> Symmons, 1979: 40.

Rocks, therefore represent a disadvantaged sub-category of island whose zone-generative capacity, and thus value to a potential claimant is significantly reduced.

This provision presents a twofold interpretational problem. The UN Convention provides no definition as when a feature “cannot sustain human habitation” or what constitutes the “economic life” of a particular feature.

All subsequent attempts to define rocks and islands on the basis of criteria such as size or the presence of vegetation have come to nothing, primarily because the terms used in Article 121 in relation to rocks are not only vague but are also essentially concerned with the functions of technology, economics and culture.<sup>65</sup> For example, at the extreme end of the debate, if a space-station can be made ‘habitable’ and economic functions be performed there, under the terms of Article 121, there is nothing to stop any rock, however small, from being interpreted as a fully-fledged island.<sup>66</sup>

It could also be argued that provided the feature has either actually been inhabited, even in the distant past, or has the means of survival by the provision of naturally occurring potable water, or has been used for some form of economic activity, even to the small extent of occasional summer grazing, then the island may be considered to be either inhabitable or have an economic life and thus fall under the provisions of Article 121(2).

There is therefore no objective way to distinguish between an island and a rock under the terms of the UN Convention. Unless one or more of the parties to a dispute over the insular status of a particular feature possesses the political will to compromise in the course of negotiations, deadlock will inevitably occur. Given the potential of even extremely small insular features giving rise to extensive maritime claims, most states have been extremely reluctant to admit that any of their insular features are in fact (at least in legal terms) rocks, which only generate a relatively small area of territorial sea. Indeed, to date the UK is the only country in the world that has formally acknowledged such a situation, rescinding its claim to an extended fishery zone around the remote North Atlantic outcrop of Rockall when it acceded to UNCLOS in 1997. This led to a significant ‘roll-back’ in the UK’s fishery zone claims (see Figure 22).

It should be remembered, however, that in order to qualify as a rock, the other requirements for insular status laid down in Article 121(1) must first be met.

### 4.3 Reefs

Under the Law of the Sea Convention (fringing) reefs do not qualify as insular formations except in certain circumstances in confined geographical situations in which they act as an extension of another feature, for example in the case of “islands situated on atolls or islands having fringing reefs” (Article 6). Drying reefs may, however, qualify as low-tide elevations.<sup>67</sup>

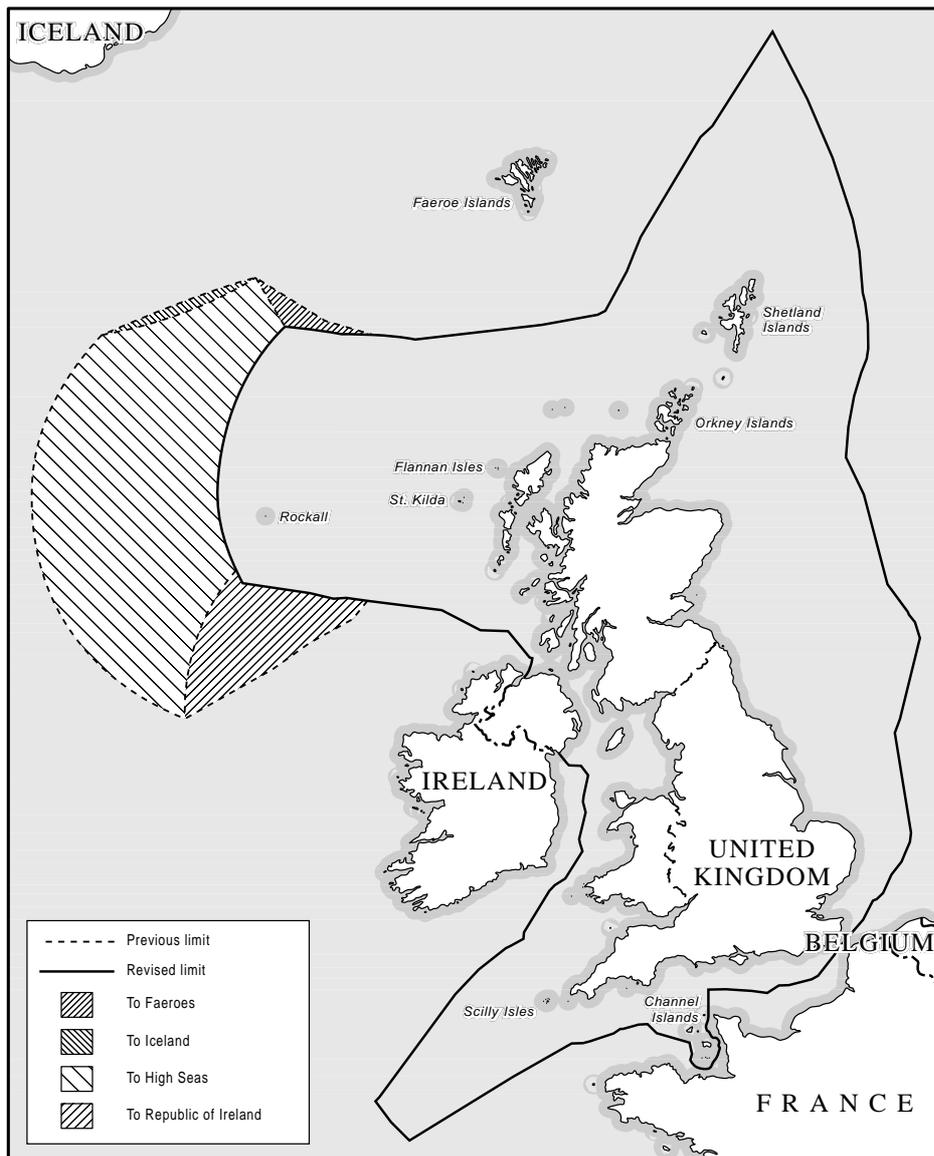
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<sup>65</sup> Attempts at objective analysis with a view to codification have, however, been made. For example, writers such as Kwiatkowska and Soons (1990) have argued that Article 121(3) applies to barren, uninhabited islands.

<sup>66</sup> Dzurek, contribution to discussion on int-boundaries e-mail list, 18/3/97.

<sup>67</sup> See Carleton and Schofield, 2001: 25-26.

Figure 22: Rockall



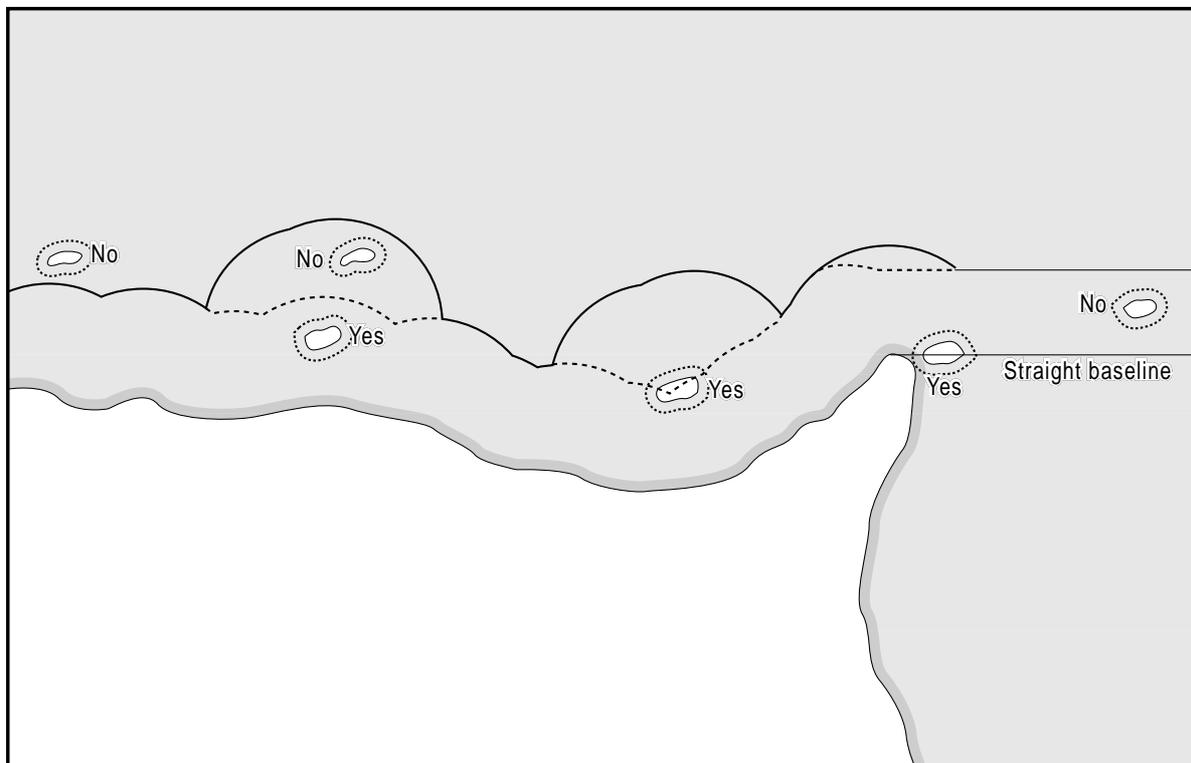
#### 4.4 Low-Tide Elevations

A low-tide elevation is defined in Article 13 of the Law of the Sea Convention, which repeats the terminology used in Article 11 of the Geneva Convention on the Territorial Sea and Contiguous Zone, as a “*naturally-formed area of land which is surrounded by water at low-tide but submerged at high-tide.*” Such a feature may be used as a territorial sea basepoint, but only if it falls wholly or partially within the breadth of the territorial sea measured from the normal baseline of a state’s mainland or island coasts. A low-tide elevation’s value for maritime jurisdictional claims is therefore geographically restricted to coastal locations. Such features have therefore been termed “*parasitic basepoints*” as their zone-generative capacity is reliant on their proximity to a mainland or island baseline (see Figure 23).<sup>68</sup>

It is worth noting that although low-tide elevations which fall partially within the territorial sea measured from a mainland or island coast qualify and may generate a territorial sea of their own, those falling partially or wholly within a territorial sea measured from a straight baseline do not. Additionally, low-tide elevations which fall wholly or partially within the territorial sea of another low-tide elevation (itself wholly or partially within the territorial sea of a mainland or island coast), do not qualify so that there can be no ‘stepping stone’ effect offshore of low-tide elevations linked by territorial seas.

It follows that low-tide elevations located beyond the territorial sea may not be used as basepoints for generating maritime zones and therefore represents “*no more than a navigation hazard.*”<sup>69</sup>

**Figure 23: Low-Tide Elevations and Maritime Claims**



<sup>68</sup> Symmons, 1995: 7.

<sup>69</sup> *Ibid.*: 7.

The exception to this rule is provided by Article 7(4) of the Convention whereby low-tide elevations may be used as appropriate basepoints for straight baselines if lighthouses or similar structures have been constructed on them or where general international recognition of the drawing of baselines from such features exists.<sup>70</sup>

#### **4.5 Submerged Banks and Shoals**

Such entirely submerged features have no zone generative capacity even if a structure has been built on them which is itself permanently above sea level. Many such structures have been constructed among the disputed Spratly Islands in the South China Sea.<sup>71</sup>

#### **4.6 The Role of Islands**

The question of how outstanding geographical features, such as islands significantly far offshore, are treated is one of the most contentious issues in maritime boundary delimitation. If a formation fulfils the requirements of this definition, it may generate the full suite of maritime zones known to the international law of the sea – territorial sea, contiguous zone, 200nm EEZ and continental shelf. As a result, islands may be of vital importance for the fixing of maritime zones and thus critical to a state's claims to maritime jurisdiction.

Even if a feature can be categorised as a fully-fledged island under law of the sea rules, it must be borne in mind that islands are not always accorded 'full effect' in maritime boundary delimitations – achieved either through negotiations or with third-party assistance. Indeed, there are numerous examples of state practice and case precedents where islands have received a substantially reduced, frequently half, effect, been partially or wholly enclaved or completely ignored (see Section 3.1 and Figures 8 and 11).<sup>72</sup>

### **5. GIS Support for Maritime Boundary and Zone Delimitation**

#### **5.1 Introduction**

The development of geographic information systems (GIS) began during the 1970s and '80s as land based geospatial information databases that could be displayed in various forms as visual images. Georeferenced data is stored in layers that can be turned off or on at will by the user depending upon the requirement of the displayed image.

Most GIS systems that are presently available are land based systems that do not require the geodetically robust calculations of position, distance and area on the spheroid that are required in the maritime domain. These calculations were first computed in the early 1970s for the determination of boundary turning points. They were conducted on large mainframe computers of that era and were by no means user friendly. This situation did not materially improve until the innovative design and application of a suite of programs to geodetically

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<sup>70</sup> See Carleton and Schofield, 2001: 36-38.

<sup>71</sup> Hancox and Prescott, 1995.

<sup>72</sup> For example see Bowett, 1979; Jayewardene, 1990; Symmons, 1979 and 1995.

calculate many of the positional and spatial requirements of the technical expert in maritime delimitation was developed by the geodesist Galo Carrera of Geometrix and funded by the Canadian Government in the mid-1980s. This program called DELMAR enabled the technical expert to compute maritime areas, determine offshore limits and compute equidistant/median lines. Even though much innovative work has been carried out on GIS systems such as ARC-View and ARC-Info the requirement of geodetic calculations still had to be carried out in separate programs and imported into the GIS. This has now been addressed by Universal Systems Ltd.

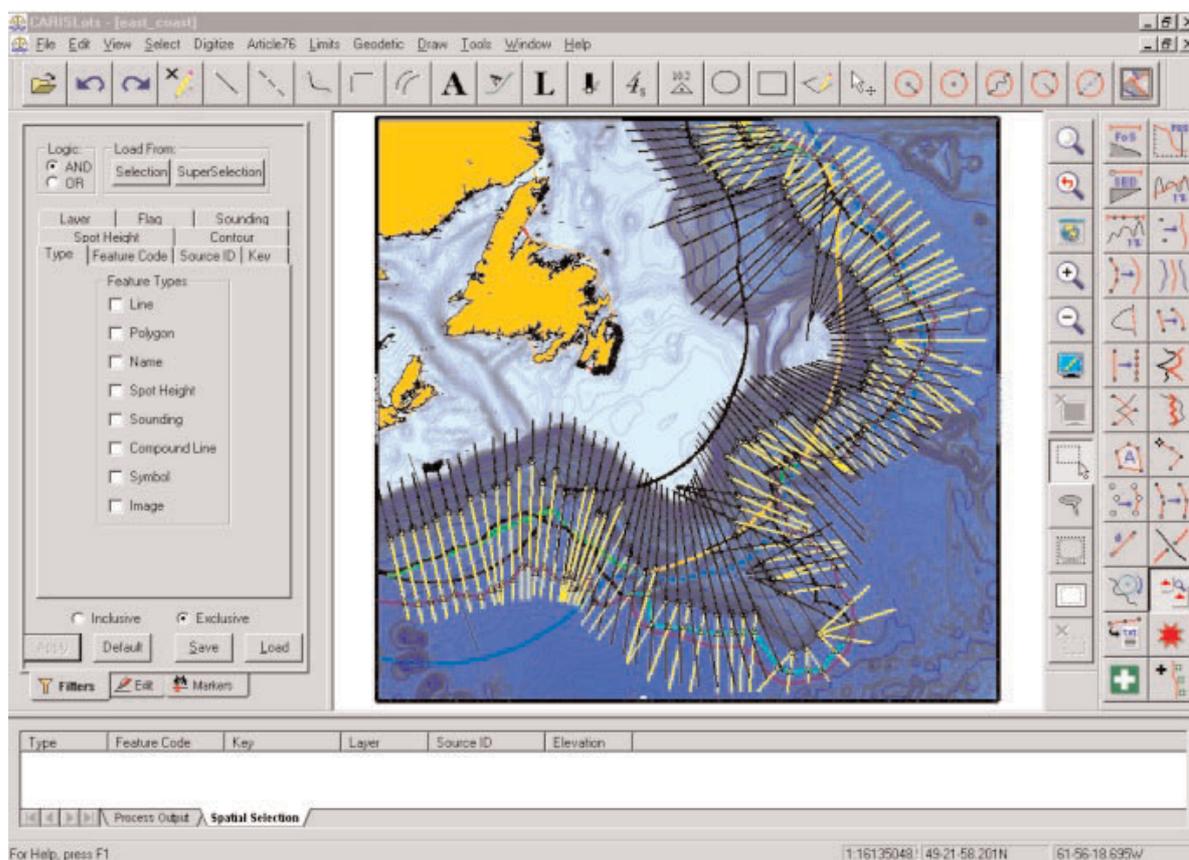
## **5.2 CARIS LOTS**

A new development by Universal Systems Ltd in the CARIS suite of programmes, LOTS (Law of the Sea) is a tailored GIS application designed primarily to visualise interpretation of UNCLOS Article 76 for definition of the outer limit of the continental shelf. The application has in the background, many of the tools available in the more general charting application CARIS ++ and also incorporates algorithms developed by Galo Carrera for the derivation of maritime limits and median line solutions (these functions are transferred from the programme DELMAR). In addition, USL have developed further algorithms for both these functions working in association with Professor Petr Vanicek of the University of New Brunswick.

The application allows import of a wide range of data to build detailed models of bathymetry and sediment thickness which can be analysed with cross sections chosen by the user to derive a series of positions for the foot of the slope and the associated 1% Sediment Thickness Line (Gardiner Line). The bathymetric processing facility also allows generation of the 2500m isobath and buffering functions allow generation of the 350nm limit, the 2500m + 100nm limit and the foot of slope + 60nm limit (Hedberg Line). From this data, outer limits and the associated cut-off lines are generated and combined to form the claimed outer limit. At all stages, images of relevant profiles of bathymetry or sediment data can be captured for subsequent reporting and there are excellent facilities for importing data from a number of sources to build a multi-faceted and detailed model of the continental shelf margin. The application is provided with a large database of coarse data (WVS, ETOPO5, GTOPO30 and a global sediment thickness model). This makes it easy to develop a coarse theoretical model of a claim and aids development of a focussed report on any requirement to gather additional data to support a claim.

With a sound background in the development of hydrographic applications CARIS LOTS uses proven methods for importing and processing raw data from bathymetric or seismic surveys. All computations to derive limits or equidistance lines are referred to the ellipsoid and results are sound. With many of the facilities used in other applications also being available, the extent to which a composite model can be manipulated to illustrate a claim is impressive and detailed maps or charts are relatively easily produced.

Figure 24: CARIS LOTS



The tools available to process and develop a continental shelf limit claim are also of more general use in the development of all maritime limits and median line solutions for whatever purpose. Functions also exist to calculate distance, azimuth and area. Loxodrome or geodesic lines can be handled graphically and in calculations.

There is full functionality to draw, symbolise and print charts. RASTER images can be imported to form a backdrop to any illustration; this includes Hydrographic Chart Raster Format (HCRF) v2 images provided by the United Kingdom Hydrographic Office in the worldwide Admiralty Raster Chart Service. The package is developed on a Windows NT platform and many of the more complex functions of calculation and topology building are automated.

With respect to the development and presentation of a claim for continental shelf extension, the tool is comprehensive and easy to use. The clever design of the application allows all tools to be used easily in a more general context and there are few tasks a LOS practitioner will address that are not made easier, far quicker and more rigorous by this application.

The application begs provision of accurate worldwide vector data for published charts. At present, the most time consuming task arises from the need to build and maintain an accurate vector model of a national baseline upon which so many of the calculations are based.

## 6. Dispute Resolution: How are Maritime Boundaries Delimited?

UNCLOS gives some guidance to coastal states in the delimitation of maritime boundaries. As has been discussed previously the territorial sea should be delimited in accordance with Article 15, the EEZ in accordance with Article 74 and the continental shelf in accordance with Article 83. The question that a coastal state must answer is how to go about it?

### 6.1 UNCLOS – Settlement of Disputes

Coastal states, in common with other members of the international community, are bound to settle disputes through peaceful means. Article 2, paragraph 3 of the United Nations Charter requires that:

*All members shall settle their international disputes by peaceful means in such a manner that international peace and security, and justice, are not endangered.*

In the event of a dispute arising, coastal states who are party to UNCLOS, are required to apply Part XV – Settlement of Disputes which itself refers back to the United Nations Charter. Article 279 of UNCLOS states:

*States Parties shall settle any dispute between them concerning the interpretation or application of this Convention by peaceful means in accordance with article 2, paragraph 3, of the Charter of the United Nations and to this end, shall seek a solution by the means indicated in article 33, paragraph 1, of the Charter.*

The traditional means of dispute resolution between states are outlined in Chapter VI of the United Nations Charter specifically dealing with the peaceful settlement of disputes, Article 33(1) of which states that:

*The parties to any dispute, the continuance of which is likely to endanger the maintenance of international peace and security, shall, first of all, seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice.<sup>73</sup>*

It should be noted that the list of means of dispute resolution open to states contained in Article 33(1) of the UN Charter is not intended to be comprehensive – states retain a free choice as to the method of dispute resolution to be applied. Similarly, the methods of dispute settlement are not listed in any order of priority – states are not bound to pursue these methods in series. Nevertheless, the means of international dispute settlement included in Article 33(1) are without doubt the most frequently used methods.

<sup>73</sup>

United Nations, 1992: 3. This legal framework has been subsequently reaffirmed and expanded upon by means of several declarations and resolutions of the UN General Assembly. These documents reinforce the key principles of the peaceful settlement of disputes; the non-use of force in international relations; non-intervention in the internal or external affairs of states; equal rights and the self-determination of peoples; the sovereign equality of states; the sovereignty, independence and territorial integrity of states; and the duty of states to act in good faith (United Nations, 1992: 3-7).

## 6.2 Bilateral Negotiations

Article 283 paragraph 1 of UNCLOS states:

*When a dispute arises between States Parties concerning the interpretation or application of this Convention, the parties to the dispute shall proceed expeditiously to an exchange of views regarding its settlement by **negotiation** or other peaceful means (emphasis added).*

By far the preferred method of handling disputes among states, including those related to maritime boundaries, is through bilateral negotiations. In contrast to other methods, negotiations may be regarded as a universally accepted means of dispute settlement<sup>74</sup> and are an essential prerequisite to the application of any other form of peaceful dispute resolution. In the *North Sea Continental Shelf* cases, for example, the ICJ held that:

*The Parties are under an obligation to enter into negotiations with a view to arriving at an agreement, and not merely to go through a formal process of negotiation as a sort of prior condition for the automatic application of a certain method of delimitation in the absence of agreement; they are under an obligation so to conduct themselves that the negotiations are meaningful, which will not be the case when either of them insists upon its own position without contemplating any modification of it.*<sup>75</sup>

Additionally, the recently published *Handbook on Maritime Delimitation*, published by the UN strongly recommends this way to proceed if at all possible.<sup>76</sup> Indeed, even if there were no duty for states to negotiate, the nature of international relations means that they almost inevitably would do so. Additionally, exploratory negotiations, often termed ‘consultations’, can be employed in order to pre-empt disputes and prevent them arising.<sup>77</sup>

It should also be noted that use of existing diplomatic contacts to conduct negotiations is likely to be cost effective, particularly when compared to other dispute settlement mechanisms (see below). The negotiating machinery is already in place and the participants often have experience of dealing with their counterparts, aiding the negotiation process. The principle advantage afforded by negotiations as a means of international dispute resolution lies in the *flexibility* of the method. Negotiations can be applied to any type of dispute and, significantly, the states concerned retain full control over dispute resolution process, enabling them to pursue any option to achieve an equitable result without having to give publicity to either the progress of the negotiations or how the end result was achieved.<sup>78</sup> This is inevitably of particular importance where sensitive issues of national interest such as boundaries and sovereignty are involved.

Negotiations may also be regarded as by far the most effective means of dispute settlement. In the period between 1940 and 1992 Charney and Alexander state that over 130 bilateral maritime boundary settlements were achieved.<sup>79</sup> Since then bilateral agreements have continued apace and approximately a further 48 maritime boundary agreements have been reached.

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<sup>74</sup> Eyffinger, 1996: 21.

<sup>75</sup> *North Sea Continental Shelf* cases, para.85, quoted in United Nations, 1992: 18.

<sup>76</sup> United Nations, 2001.

<sup>77</sup> Merrills, 1991: 3.

<sup>78</sup> Merrills, 1991: 1-26.

<sup>79</sup> Charney and Alexander, 1993: xxvii.

### 6.3 Non-Binding Procedures

Where negotiations between the parties to an international dispute fail to yield a settlement, the intervention of a third party may have the effect of preventing a further deterioration in relations, breaking the deadlock and providing a way forward towards the peaceful resolution of the dispute. Such involvement by a third party – be it an individual, another state or an organisation – may be termed an offer of its ‘good offices’ or mediation.<sup>80</sup> This is common practice in long-standing and at times violent disputes that occur throughout the world. This process has also been used on occasion in disputes concerning maritime boundaries. France carried out mediation in the dispute between Eritrea and Yemen to facilitate an agreement on an arbitration procedure and the Holy See carried out a mediation exercise between Chile and Argentina, when the latter rejected the Beagle Channel arbitral award.<sup>81</sup>

Article 284 and Annex V of UNCLOS also enables the Parties to a dispute to submit their disagreement to conciliation. Conciliation may be viewed as a more formal type of mediation and has been defined as involving the setting up of a commission by the two parties (either permanent or *ad hoc*) to examine the evidence and to define terms for a settlement.<sup>82</sup> In certain circumstances the states concerned can initiate compulsory conciliation if the dispute concerns maritime boundaries. However, no known cases of this type have been undertaken to date. In contrast, non-binding conciliation has been used, even if only very occasionally. Iceland and Norway appointed a Conciliation Commission in August 1980 to make unanimous recommendations on the question of the continental shelf boundary between Iceland and the Norwegian island of Jan Mayen. The parties accepted the unanimous recommendations of the Commission and entered into an agreement on the boundary, which served to establish a maritime joint development zone, in 1981.<sup>83</sup> However, if either Party had not agreed with the recommendations, they were not binding on either state.

### 6.4 Binding Procedures

Once a State Party to UNCLOS has considered that all possibilities to settle a dispute through either bilateral negotiation or non-binding procedures have been exhausted, then settlement by binding third party procedures are the only option remaining to the state.

Section 2 of Part XV of UNCLOS lays down the rules and regulations applying to these procedures. The state can, in accordance with Article 287, choose the type of binding settlement it prefers by a written declaration, either at the time of ratifying or acceding to the Convention or at any time thereafter. Four choices are available to the state: the International Tribunal for the Law of the Sea, the International Court of Justice, an arbitral tribunal, or a special arbitral tribunal. However, the special arbitral tribunal can only arbitrate in disputes covering fisheries, protection and preservation of the marine environment, marine scientific research or navigation, including pollution from vessels and dumping.

Once the decision has been reached that third party settlement is the only option remaining to the state for the settlement of the dispute a much larger team of experts will be required than that

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<sup>80</sup> The UN Secretary-General has referred to good offices, the offering of which is a fundamental part of his role, as being “*a flexible term as it may mean very little or very much*” (United Nations, 1992: 35).

<sup>81</sup> *Ibid.*: 719-755.

<sup>82</sup> Merrills, 1991: 59.

<sup>83</sup> *Ibid.*: 1755-1765; Miyoshi, 1999: 34-35.

used for bilateral negotiations. The team will consist of a large legal element comprising both government lawyers, and in most cases international lawyers expert in maritime delimitation disputes, together with academic and technical experts covering historical research, geography, geology, geophysics, hydrography, cartography, fisheries and so on depending upon the relevance placed upon these disciplines in the written and oral proceedings. The expertise in the administration of this team will also be required in many cases. The effective management of the case is of the utmost importance, both for the successful presentation of the arguments to the court and the efficient control of the resources and costs that will be involved.

### ***Arbitration***

For a dispute concerning sovereignty, maritime boundaries or maritime zones only an arbitral tribunal may be appointed to settle these types of disagreement if the Parties to the dispute choose to go to arbitration.

The rules and procedures for an arbitral tribunal are laid down in UNCLOS Annex VII. Article 1 of this Annex states:

*Subject to the provisions of Part XV, any party to a dispute may submit the dispute to the arbitral procedure provided for in this Annex by written notification addressed to the other party or parties to the dispute. The notification shall be accompanied by a statement of the claim and the grounds on which it is based.*

The United Nations Secretary General maintains a list of arbitrators that have been nominated by State Parties. Each State Party may nominate up to four arbitrators in accordance with Article 2(1) of Annex VII. The states agreeing to arbitration may, unless they agree otherwise, each appoint one member from this list, including their own national providing they have been included in the notification. The other three members of the five arbitrators required shall be appointed by agreement, one of which shall be nominated as President, or failing agreement shall be nominated by the President of the International Tribunal for the Law of the Sea, unless the Parties nominate some other person or state for this purpose.

Article 5 of Annex VII states:

*Unless the parties to the dispute otherwise agree, the arbitral tribunal shall determine its own procedure, assuring to each party a full opportunity to be heard and to present its case.*

In effect, most arbitrations follow a similar procedure to other third party settlements requiring written memorials, counter memorials and oral evidence.

The main advantages of arbitration for a state can be considered as the partial control of the make up of the court, the control of the venue of the proceedings, the speed with which the Parties can require the completion of proceedings and the judgement, and the total control on the publication or not of both the written and oral proceedings of the case.

There is only one major disadvantage and that is the costs involved. The Parties are required to pay for all the expenses of the arbitral tribunal, including the costs of the venue and administration of the court as well as the remuneration of the judges themselves.

### ***The International Court of Justice (ICJ)***

The ICJ is the principal judicial organ of the United Nations and sits at the International Peace Palace in the Hague. The court is made up of 15 judges representing all the major judicial systems of the world community. If one or either Party to the case has one of its own nationals as a member of the Court, one or both Parties may appoint a judge ad hoc, or if neither Party has a national on the Court, both may appoint judges ad hoc, thus making up a panel of 17 judges plus the Registrar. A formidable array of judiciary.

Cases may be brought to the Court by agreement between the Parties, or unilaterally, provided the other Party has accepted the jurisdiction of the Court. The procedures of the Court are laid down within its Rules and consist of written and oral proceedings to be provided at set time limits ordered by the Court after consultation with the Agents for the Parties.

The ICJ has much to recommend it, with perhaps its experience in dealing with sovereignty and maritime delimitation questions at the fore. The Court or a Chamber of the Court have completed 13 cases to date (May 2001) with three further cases before the Court at present (Nigeria-Cameroon, Indonesia-Malaysia and Honduras-Nicaragua). Although there has been some debate as to the ability of the ICJ to judge cases that have a strong political dimension, litigation may be seen as a method of depoliticising a dispute by submitting it to an impartial third-party decision – something that has been described as a means to get governments “*off the hook*.”<sup>84</sup>

A further advantage over an arbitral tribunal is the fact that the Court, its administration and the judges are paid for by the United Nations, so the Parties only have to budget for their own legal teams and technical experts. The other fundamental advantage of submitting a dispute to the ICJ is that the judgment is final and binding to the Parties and if either fails in its obligation to the judgment, it is answerable to the Security Council of the United Nations.

The key disadvantages of submitting a dispute to judicial settlement lie in the costs incurred, time taken to go through the process and the possibility that the state concerned will come away with nothing – the latter point being something that the state concerned may find hard to swallow. As far as the costs of a case before the ICJ are concerned, Bowett has estimated as follows: “*By and large, one can expect the total cost for a full case, from application to judgment, to be anything between [US]\$3 and \$10 million.*”<sup>85</sup>

Depending upon the complexities of the case, the time scale required to complete these procedures can be considerable. With the number of cases before the Court at any one time running into double figures, 22 in mid-2001, a figure of 8 years could be contemplated before a judgment is handed down. The latest sovereignty and maritime delimitation case between Bahrain and Qatar took some 9 years to complete.

### ***The International Tribunal for the Law of the Sea (ITLOS)***

Article 287 of UNCLOS allows a State Party to choose ITLOS as its preferred option for dispute settlement. ITLOS was set up under Annex VI of the Convention as an international court, sitting in Hamburg, and made up of 21 independent judges elected by the States Parties to represent all the principal legal systems of the world and to represent equitable geographical distribution as established by the General Assembly of the United Nations.

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<sup>84</sup> Rosenne, 1998: 59.

<sup>85</sup> Bowett, 1997: 7.

The members of the Court are elected to varying terms from three years to nine years and are all recognised experts in the law of the sea.

The Court is empowered to hear cases on all aspects of disputes concerning the Convention but does not have authority to deal with sovereignty issues. This may be one of the reasons that states have not taken a maritime delimitation case to this Court to date. Delimitation issues often relate to questions concerning sovereignty in the first instance. States also tend to be conservative when choosing third party settlement and until ITLOS has some delimitation jurisprudence of its own it may be some time before it deals with this type of case.

Its rules and procedures were determined by 28 October 1997<sup>86</sup> and its proceedings are modelled on those of the ICJ. In a statement made on the publication of its rules the Court stated:

*The Tribunal decided at the very outset that the Rules should ensure the efficient, cost-effective, and user friendly administration of justice...*<sup>87</sup>

This does appear to be the case. Cases brought before the Court to date have been dealt with very quickly and efficiently. This is perhaps one of the most attractive elements of this Court. However there have only been eight cases brought before the Court to date and none of them have involved delimitation issues.

The Court is well provided for with modern new premises and modern technology to assist both the Registrar and his staff and the judges. The innovative rules that are in place include the appointment of technical experts in consultation with the Parties and an obligation for the Tribunal to meet in private for an initial discussion of the case before the start of the oral proceedings.

## 6.5 Alternative Means of Dispute Resolution – Joint Development Zones

In addition to the conventional means of dispute resolution outlined in the previous sections, alternatives have also emerged including what are termed confidence building measures (CBMs) such as ‘track-two’ diplomatic initiatives<sup>88</sup> and other, frequently functionalist oriented, measures designed to defuse or at least partially ameliorate contentious disputes. In relation to maritime jurisdictional disputes the most significant innovative form of dispute resolution, or at least deferral, that has developed over recent years relates to the use of maritime joint development zones.

Joint development arrangements are encouraged under UNCLOS as both Articles 74(3) and 83(3) dealing with the delimitation of the exclusive economic zone and continental shelf respectively state that:

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<sup>86</sup> International Tribunal for the Law of the Sea, Rules of the Tribunal, ITLOS/8.

<sup>87</sup> Press Release ITLOS/Press 7 dated 3 November 1997.

<sup>88</sup> An excellent example of this process is the *Managing Potential Conflicts in the South China Sea* project which, through a series of non-governmental gatherings attended by government officials, has sought ways to engender cooperation among the South China Sea states. Rather than addressing the contentious issues of jurisdiction and boundaries, the project has instead attempted, with a qualified success, to build consensus on issues of mutual concern such as the environment, ecology and marine research; shipping navigation and communications and living resources management (see the South China Sea Informal Working Group’s web-site at: <http://www.law.ubc.ca.centres/scsweb>). See also, Evans, 1993.

*Pending agreement as provided for in paragraph 1, the States concerned, in a spirit of understanding and cooperation, shall make every effort to enter into provisional arrangements of a practical nature and, during this transitional period, not to jeopardize or hamper the reaching of the final agreement. Such arrangements shall be without prejudice to the final delimitation.*

Joint development zones have been heralded as a means of overcoming seemingly intractable maritime boundary disputes where the parties concerned inflexibly cling to overlapping claims. In this situation, where there appears to be no prospect of agreement on a boundary line in the foreseeable future, it has been argued that joint development agreements seem to offer an ideal way forward. As Richardson noted in his influential article, if the parties agree to such an arrangement:

*...the focus would be placed where it belonged: on a fair division of the resources at stake, rather than on the determination of an artificial line, thus, ...eliminating competition over the ownership of resources...especially where the resources are unknown.<sup>89</sup>*

The rationale behind this contention is that such cooperative arrangements are entirely logical – allowing states to retain their claims unaltered in principle and proceed with desired offshore development, for example of oil and gas resources, or fisheries management. Joint development zones have also been welcomed as evidence of the emergence of a more broad-based, functionalist and comprehensive approach to ocean management as opposed to more traditional legalistic and thus confrontational approaches focusing on the definition of a particular dividing line.<sup>90</sup>

Additionally, the drawing of a definitive boundary line can be regarded as a ‘once and for all’ process and can represent something of a lottery with regard to undiscovered resources. With a joint zone, lack of knowledge as to the precise location of resources assumes less importance and no longer acts as a deterrent to resolution. Instead, both sides can be confident that a fair and equitable sharing has been achieved – no ‘winners’ and ‘losers’ should therefore emerge from such arrangements.

Conversely, it seems inappropriate to promote joint development arrangements simply because the parties to a dispute have proved unable to resolve their differences over overlapping maritime claims. Furthermore, the practical task of establishing and maintaining such potentially dauntingly complex arrangements should not be underestimated as this requires considerable political commitment from all parties. Joint development zones cannot, therefore, be divorced from the overall political context between the states involved. As Stormont and Townsend-Gault maintain, joint development should not be suggested lightly as:

*The conclusion of any joint development arrangement, in the absence of the appropriate level of consent between the parties, is merely redrafting the problem and possibly complicating it further.<sup>91</sup>*

Similarly, Jagota has noted that:

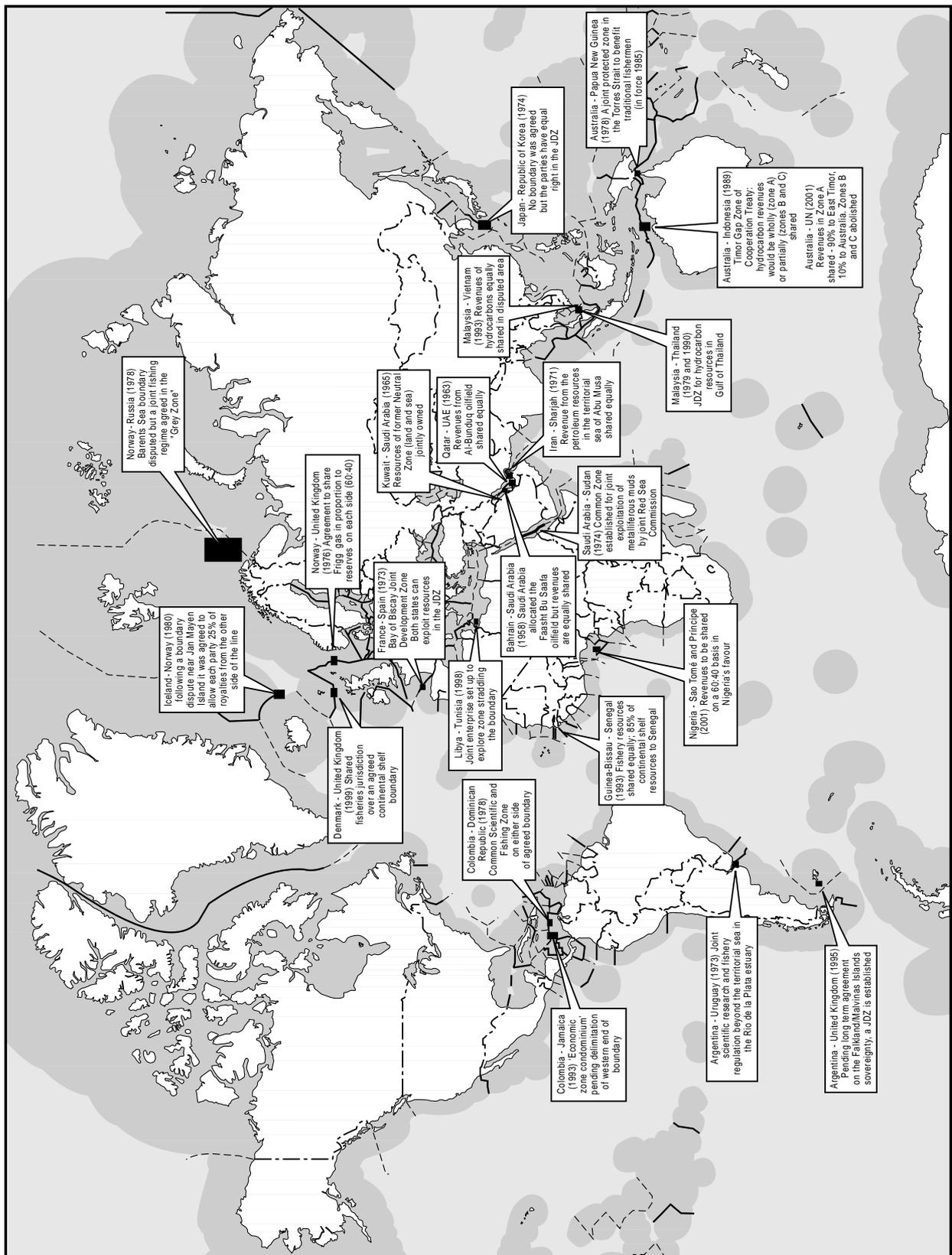
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<sup>89</sup> Richardson, 1988: 451-452.

<sup>90</sup> Ong, 1995: 91; Jagota, 1993: 114.

<sup>91</sup> Stormont and Townsend-Gault, 1995: 52.

Figure 25: Maritime Joint Development Zones around the World



*...sensitive security conditions in the area, incompatible political relations between the disputants, vertical or dependent economic relations, reluctance to transfer technology or to codevelop technology, and other similar inconsistencies may generate resistance to joint development zones, with or without a maritime boundary.*<sup>92</sup>

Nevertheless, it is clear that emerging state practice appears to favour joint development arrangements and that this accords with the evolving general duty of states to facilitate optimum ocean management. As such, joint development arrangements do offer a functional, flexible and equitable way forward for states with seemingly intractable disputes over overlapping maritime claims with their neighbours.

Such a practical, problem-solving approach with the emphasis firmly placed on promoting inter-state cooperation and effective ocean resource development and management must be considered welcome and is likely to prove of increasing significance in the future. There are at least 22 such zones in existence around the world and they are not confined to a particular geographical region (see Figure 25).

## **7. The Role of the Technical Expert in Maritime Boundary Negotiations**

### **7.1 Before Negotiations**

The considerations and procedures that are required of the technical expert in the negotiation of international boundaries are very similar for both land and maritime domains. The only fundamental difference is the fact that one can physically visit the area of a land boundary and, on the successful conclusion of negotiations, actually demarcate the boundary on the ground. In the maritime situation, one part of the ocean looks very like any other part of the ocean and the boundary is seldom demarcated. Once a boundary has been delimited its physical existence is only contained in a treaty document defined by a list of geographical coordinates joined by a specified series of lines. Life would be much simpler if the sea could be physically ‘marked’ (Figure 26).

#### ***Getting to Know the Team***

It is vital that the technical expert forms an integral part of the negotiating team. The basic building blocks of the team are made up of political, legal and technical components the bare bones of which may be only three people. Indeed, there is much advantage in using a numerically small team. It enables the team members to get know each other well and to fully respect their expertise in the three disciplines. The three basic components of the team should be considered equal with no one element working and making decisions without the full knowledge of the other two. There may be occasions when the technical expert is not needed at a particular round of the negotiations, because no technical matters are being discussed. This is fine, but he should be given a set of full minutes or attend a post-session briefing to ensure that he/she is kept fully in the picture regarding the progress of the negotiations.

#### ***Relevant Area***

The term “*relevant area*” has only been used in boundary delimitation discussions during the last 15 years or so. It is therefore a new concept in both legal and technical terms. It is required for

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<sup>92</sup> Jagota, 1993: 117.

**Figure 26: “Marking the Sea”**

both the identification of the area in which delimitation is to be carried out and the *ex post facto* test of proportionality.

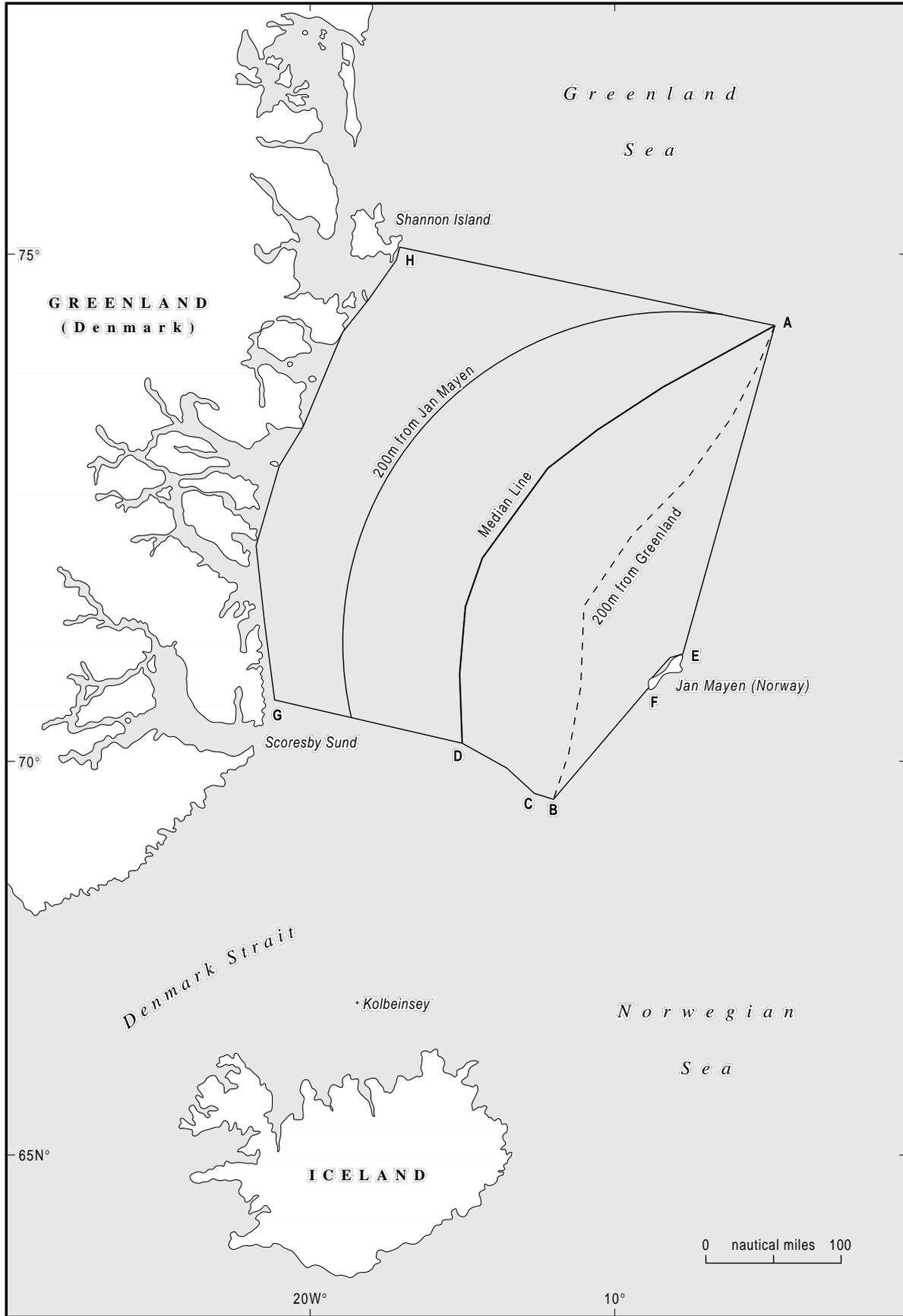
Where a possible boundary dispute exists it is important for the technical expert to have an appreciation of the general relevant area concerned. This will require a study of a general map or chart of the whole area where a possible boundary might eventually be delimited. It is important to discuss this issue with the negotiating team so that all relevant considerations can be addressed. If a small scale chart or map of the area is laid before the team it enables the whole team to gain a general overall impression of the nature of the geography of the whole area. The presence of neighbouring states, together with previously agreed boundaries will become apparent and any effect they may have on the delimitation process and the determination of the relevant area can be assessed.

A good example of the determination of the relevant area can be found in the case concerning the maritime delimitation in the area between Greenland and Jan Mayen (Figure 27). In the Court's judgment<sup>93</sup> it described the relevant area as:

*The maritime area which is the subject of the present proceedings before the Court is that part of the Atlantic Ocean lying between the east coast of Greenland and the island of Jan Mayen, north of Iceland and the Denmark Strait between Greenland and Iceland, as indicated on sketch-map No. 1 on page 45 of the present Judgment. The distance between Jan Mayen and the east coast of Greenland is some 250 nautical miles (463 kilometres). The depth of the sea in the area between them is for the most part rather less than 2,000 metres; it varies however between 3,000 metres in the north of the area and 1,000 metres in the south, and there are a few sea-bed elevations, west of the southernmost part of Jan Mayen, where the depth is no more than 500 metres. A number of geographical, economic or other facts have been presented to the Court by the*

<sup>93</sup> Maritime Delimitation in the Area between Greenland and Jan Mayen, Judgement, para 11, *International Court of Justice Reports*, 1993: 38.

Figure 27: Greenland – Jan Mayen



*Parties as pertaining to the region with which the Court is to deal; it will be for the Court in due course to decide whether any of these in law affect the delimitation, as "special" circumstances or "relevant" circumstances.*

For a detailed account of the Danish presentation of the General Geographical Context, see *The Disputed Area and the Relevant Area*, delivered to the Court by Mr Milan Thamsborg, the Danish technical expert, during the oral hearings of February 1993 (ICJ Public Sitting 11 February 1993). Although this is oral evidence to an international court, the general principles on the type of studies that are required in the development of arguments for the determination of relevant areas and the general areas under dispute, are the same for bilateral boundary negotiations.

In studying the regional geography of the area in which the delimitation is to take place, such studies as the seabed topography, the adjacent waters and adjacent landmass will have to be considered. As the area concerned is refined to the actual area under dispute, a clearer picture could emerge giving an indication of the relevant area. This area need not be one homogeneous entity. In complex geographical situations more than one area may be identified.

There are no rules or formula for the unambiguous and objective determination of a relevant area. Jurisprudence does not help, so each case must be considered on its own merit. To reach a relevant area, which can be accepted by both parties in a boundary delimitation dispute, a detailed and meticulous study of the geographical characteristics must be carried out. Detailed examinations of the length of the relevant coasts within the area will be required. The general premise that land dominates generated sea space enables a calculation to be made on the proportionality of coastal lengths approximately equating to the amount of sea area apportioned by a boundary within the relevant area. This will satisfy a proportionality test. The amount of sea space generated by territorial sea basepoints along the relevant coasts will also have to be calculated and may assist in the determination of the relevant area. Finally the existence of agreed boundaries in the neighbouring area will also have to be taken into account and may well dictate part of the boundary of the relevant area.

### ***Getting to Know the Ground***

Once a state has decided to begin the process of delimiting a boundary, whether land or sea, and the negotiating team has been put in place, one of the first requirements of the technical expert is to get to know the area through which the boundary will be delimited. In the land situation this should be relatively straight forward. The area can be 'walked' provided access is not denied. This will enable the technical expert to note relevant features on the ground, conduct survey observations and take measurements as required. Maps and other graphic representations, such as aerial photography and satellite imagery, can be studied and compared with actual observations.

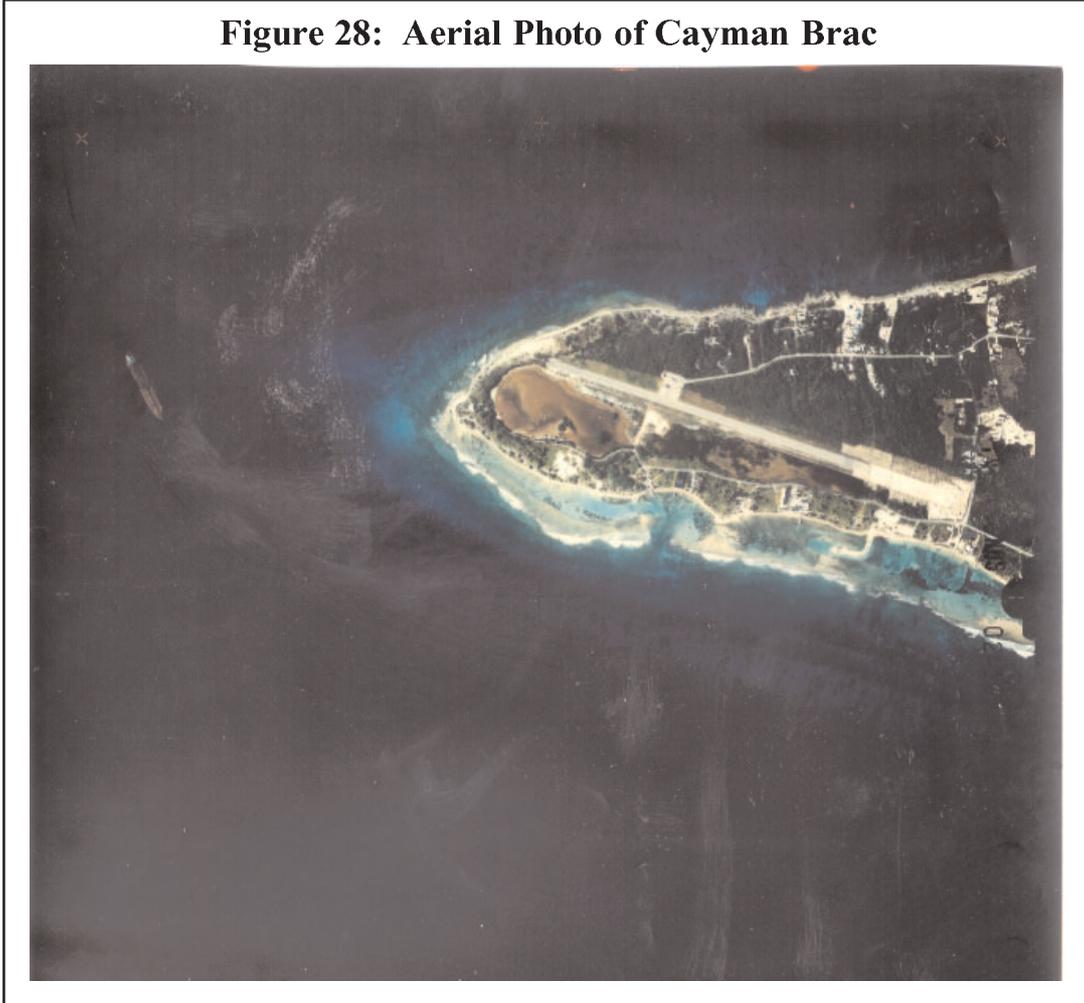
In the maritime domain it is not necessary to cross the area by boat or overfly the sea area concerned. The important requirement is to become familiar with the geographical features on and off the coast that will dominate the boundary delimitation process. This can be achieved by studying charts and maps of the area, but in many cases a visit to the area will give a clearer indication of the area concerned, particularly for those members of the team who are not familiar in the interpretation of features from a map or chart to the actual feature on the ground.

If the area cannot actually be visited, it may be possible to overfly the area. This can be particularly enlightening in areas of coral reef, where the water is clear and a reef edge or other relevant features, can be very clearly seen from the air. Another type of feature that may be

visible from the air, but very difficult to detect from the ground, are low-tide elevations, which may have a pivotal role in a maritime delimitation.

Figure 28 is an aerial photograph of the western end of Cayman Brac in the Caribbean and clearly shows the reef edge and indeed a water depth of up to 30 metres. Figure 29 is that portion of the Admiralty chart of the Cayman Islands that depicts the area covered by the photograph. This clearly shows the difference between the imagery on the published document and an actual picture of the ground.

**Figure 28: Aerial Photo of Cayman Brac**



### ***Median/Equidistance Line***

Once the relevant area has been established, or at least the area in which a delimitation has to take place, the technical expert will be required to calculate a median or equidistance line. The term is synonymous and is defined as:

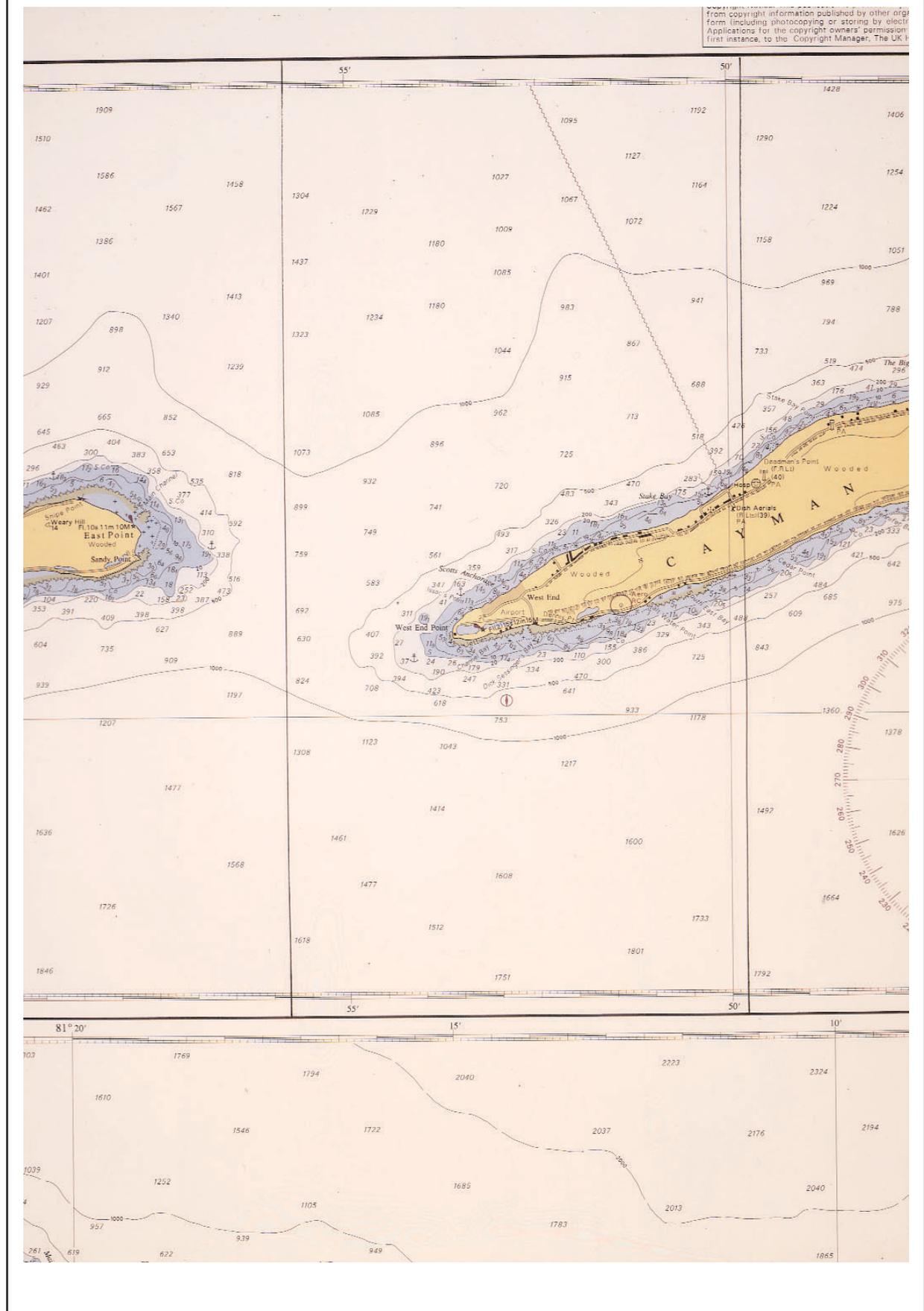
*...a line every point of which is equidistant from the nearest points on the baselines of two or more States between which it lies.*<sup>94</sup>

The reason for the calculation of this type of line is that it is the only line that is mathematically true to the geography of the two coasts with no adjustment of any kind. In an equal and opposite

<sup>94</sup>

IHO, 1990: 135.

Figure 29: Portion of Admiralty Chart 462 of Cayman Brac



coast situation it will divide the area of sea between the coasts in equal proportions. Similarly in the adjacent coast situation, provided the coast is straight either side of the boundary, the resulting median line will again divide the relevant area of sea equally. It is of course most unlikely that both coasts are straight with no off-lying features. It must also be remembered that the initial calculation of a median line does not create a 'boundary', simply a mathematically robust line.

Clearly in order to be able to calculate a median line knowledge will be required of the territorial sea baseline. This will pose no problem for your own state's details, but the relevant territorial sea basepoints for the opposite or adjacent coast will, in all probability, have to be derived from large scale charts or maps, that are available to you, either produced by your own state or acquired from the coastal state concerned, provided they publish their own charts or maps.

A careful study of both horizontal and vertical datums will have to be carried out. It is essential that both these datums are known and that they are the same as those used in your own country. If there is a difference, transformations of the datums will be required to ensure the calculated median line is referred to the same plane. In some cases the base documents, from which the basepoints are derived, may be old and the datums unknown. In this situation only an approximate median line can be calculated. A more precise calculation will have to await the negotiations stage. It is recommended that a World Geodetic Datum, such as WGS 1984, be used for boundary calculations. This datum is based on a world wide geoid and is being continuously refined by the system of satellites known as the Global Positioning System (GPS). If there is a difference in vertical datum, the position of the low-water line, as depicted on the charts or maps being used, will differ. This will effect the actual geographic position of the basepoints and may effect the presence or otherwise of low-tide elevations, which in turn may effect the delimitation of the median line.

Once the median line has been successfully calculated, the next task is to study whether this line produces an equitable division of the sea area to be delimited within the relevant area. This will require the whole negotiating team. Such questions as the proportion of sea area falling either side of the line within the relevant area, when compared to the relevant coastal lengths, will have to be discussed. This will require the technical expert to calculate areas on the spheroid.

If it is considered that a median line produces an equitable result, it is probable that the negotiations on the delimitation of the boundary will be relatively straight forward. However, it is more often the case that a feature of the coastline or a disparity in coastal lengths, or some other circumstance, will either distort the line, or the median line will not produce an equitable result.

### ***Opening Position***

Prior to the opening of negotiations, the negotiating team must have a clear idea of its opening position. This will have been discussed at the working level by officials, including the technical expert, who will have been tasked to calculate and illustrate various ideas that will produce an equitable result within the constraints of international law.

If the median line is considered equitable, the task is very easy, however this is not often the case. The median line may have to be transposed towards the shorter coast for instance, thus producing an equitable split of the water space within the relevant area. If it is perceived that this still does not produce the desired result, other more imaginative ideas may have to be considered. Such methods as perpendiculars from coastal fronts, semi-enclaves around island features or less than full weight to distorting geographical features will have to be tried. The object is to produce a suggested boundary line that will satisfy the most optimistic aspiration of the state whilst

remaining within the rules of international law. The opening position will have had to satisfy political masters as well as being creditable to the negotiating team who will have to 'sell' it to their opponents at the negotiating table.

Before negotiations start it is probable that the negotiating team's mandate will be relatively constricting. However, some ideas on possible fall back positions are always useful. The technical expert should have considered the various options, even if they have not been fully worked up prior to the first round of negotiations.

## **7.2 During Negotiations**

### ***Presence***

It is important for the continuity of the negotiating team that all the three main elements of the team, namely legal, political and technical, are present at each round of the negotiations. The technical expert will be required to make instant technical appraisals of any proposal laid before the negotiating team. It is also important for all members of the team to 'feel' the atmosphere present at each round.

A build-up of confidence between the two negotiating teams is very important and can lead to an amicably agreed settlement. The technical experts on each side should get to know each other and discuss the technical challenges facing them. This can often be most productive and is frequently conducted in the margins of the negotiations.

### ***Datums***

One of the initial decisions that will have to be made by the two technical experts is the geodetic datum to which the turning points of the boundary will be referred. Once this decision has been made and the recommendation approved by both sides, the technical experts will be able to discuss the transformation parameters that will be used if the local datums, used to define both sides territorial sea basepoints, are different. Once these transformation parameters have been agreed, both the technical experts will be able to transform the geographical coordinates, defining the two territorial sea baselines, into a common geodetic datum.

### ***Basepoints***

The next important task that should be carried out by the technical experts is to exchange lists of territorial sea basepoints relevant to the boundary delimitation. The basepoints should be defined by geographical coordinates and name with a specified geodetic datum. The chart or map, from which these points have been derived, should also be stated. If a datum transformation has been carried out, to transform the basepoint coordinates into a common agreed datum, the parameters used should also be stated and the transformed coordinates listed.

This will enable the technical experts to accurately calculate a median line. If the boundary is to be based on this type of line, both experts should independently calculate this line and compare results. Any small discrepancies can then be discussed and resolved at the technical level.

An agreed list of relevant basepoints will also enable the technical experts to calculate adjustments to the median line, confident that both sides are using common points for their calculations. For instance if one side suggests less than full weight for a particular feature and produces figures adjusting the line, the other side will both be able to check this adjustment and be confident that the basepoint coordinates used are the same.

***Presenting the Case***

The head of the negotiating team will often require the technical expert to present the case for his side's suggested boundary during the negotiations. There will come an opportune time when a suggested line should be revealed to the opposite side.

***Graphics***

A picture is worth a thousand words and this was never more true than in the description of a boundary. The technical expert should have prepared a graphic or a series of graphics clearly depicting the suggested boundary line. This can take the form of a chart, overhead view-graphs or computer graphics. Precision is not what is required at this stage. The important factor is to illustrate the proposed boundary clearly and unambiguously to the opposing team.

The production of these graphics will have required the necessary calculations to produce a mathematically robust solution. However, when illustrating the line, presentation is more important than precision. It is important to remember that you are 'selling' the line, probably to a reluctant audience. Although they will inevitably be eager to hear what you have to say in the initial stages, disappointment may well set in if they do not like the suggested solution to the boundary problem.

When presenting your case for the suggested boundary to both teams, it is particularly important that the opposing team have a clear view of the graphical display. Your own team will already have an intimate knowledge of what you are saying. It is often helpful if small scale copies of the graphics are produced and handed over to both teams prior to the presentation. They will then be able to follow your arguments without necessarily having to study the screen or look at a published map/chart or other graphic.

***Written Technical Solution***

It is also important for the technical expert to have prepared a written technical solution for both teams. This document will already be with your own side and can usually be handed over to your opponents following the verbal presentation. The written technical solution should contain both a textual account of the arguments for the suggested boundary and all the technical components that back up the case. It should include the coordinates of the turning points of the suggested line referred to a specific geodetic datum, the type of line joining the turning points and all the technical details describing and giving figures for any adjustment that has been made.

Technical calculations that have been made that endorse arguments that have been put forward to explain why the proposed line has been delimited in a certain way, should also be included. Such calculations as coastal front lengths, ratios and areas should all be included if relevant.

***Fall Back Positions***

It is most unusual for a proposed boundary to be accepted by both sides without argument. It is far more likely that once one side has proposed a line, a counter proposal will be suggested by your opponents. This counter proposal will have to be studied by the technical expert, hopefully with a full explanation provided by the other side. A fall back position will then have to be considered by your own side in an attempt to close the 'gap' between the two opening bid lines from each side. This modified line will have to be calculated in the same robust manner as the first line with graphic representation and a written technical solution. It must remain within the negotiating mandate and be approved by both the full negotiating team and the Government.

At an early stage in the negotiation process, and perhaps even before the negotiations start, your Government's 'bottom line' for the least advantageous, but nevertheless acceptable, boundary solution will have had to have been both discussed and calculated. This will enable the negotiating team to compare their opponent's position with your own bottom line.

The aim of suggesting a series of adjusted lines during a series of negotiation rounds, is to attempt to narrow the gap between the two sides to such an extent that one side or the other will accept the solution that is on the table at the time. If this process fails, either a radical re-think by both sides, on the way the boundary may be delimited, will be required or recourse to third party settlement will have to be considered.

If the negotiating team finds itself in this type of situation, it is often expected of the technical expert to re-think the technical methods that could be used in a radically different approach to the problem in order to break the deadlock. The technical expert must be prepared to be flexible together with the rest of the team, provided the negotiating mandate allows them this freedom. The expert must not be tied into a rigorous mathematical solution if an acceptable solution can be achieved by 'horse trading' so that a pragmatic solution is achieved in the final analysis. Provided the end result is equitable to both sides and can be accepted by both Governments the negotiating teams will have succeeded in their task.

One of the great advantages of a successful bilateral negotiation is that neither Government has to describe the way in which a boundary delimitation has been reached. The technical experts on both sides can be as flexible and adventurous as they like, provided both negotiating teams and Governments are content with the end result.

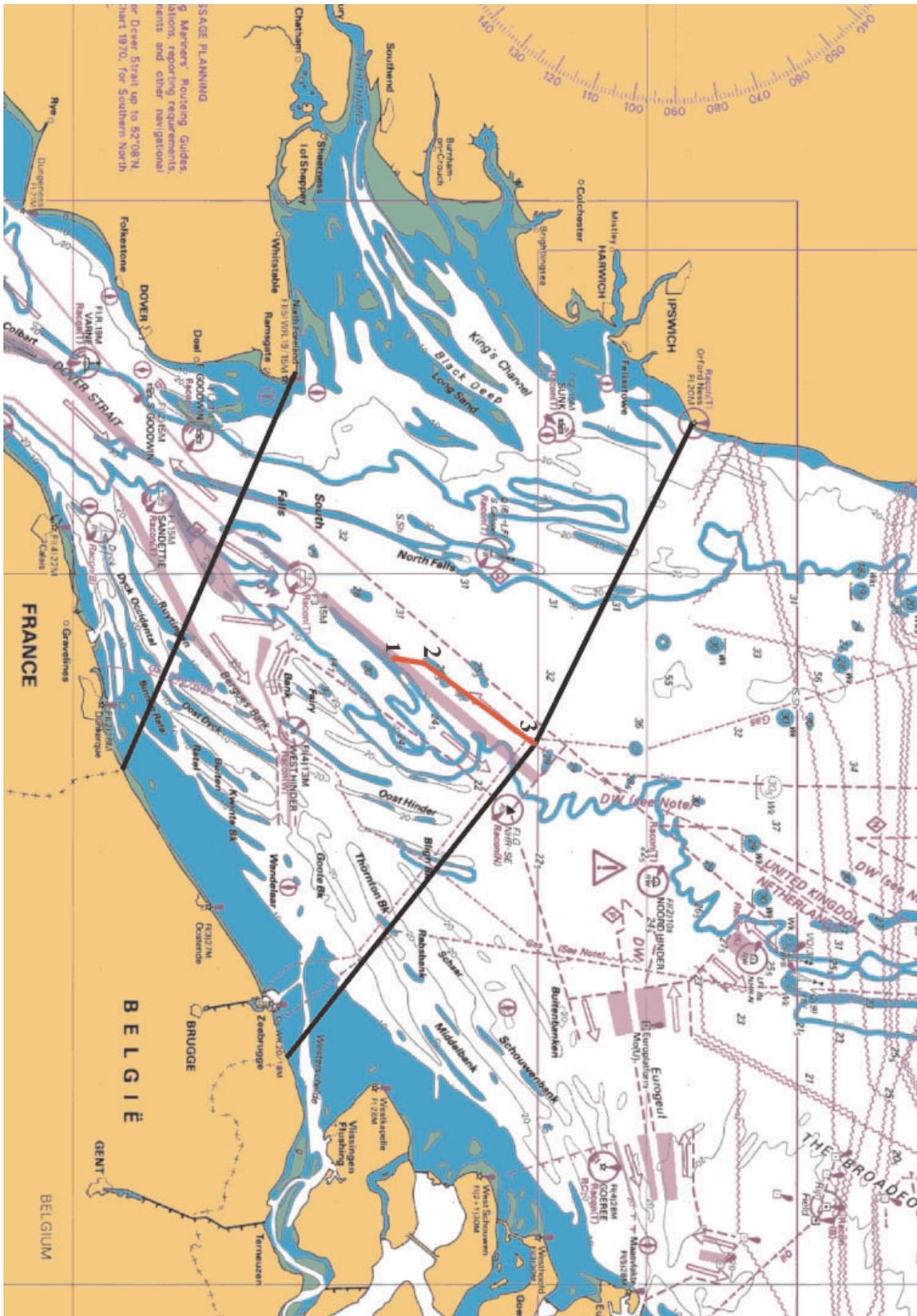
### **7.3 Case Study: Belgium – UK**

An example of this process of bilateral negotiation is the Belgian/UK continental shelf boundary agreed in 1991. The first rounds of negotiation between the UK and Belgium were carried out in the mid-sixties. At that time both sides claimed a 3nm territorial sea limit measured from normal baselines, that is, the low-water line as depicted on the latest edition of the largest scale charts of the two states. It was agreed during these discussions that a median line solution would be acceptable to both sides. These negotiations continued sporadically until 1972. However, for reasons that are not altogether clear an agreement was not reached at that time.

A further round of negotiations was initiated in January 1990. The relevant area can be described as a line from the UK coast at Orford Ness to the southern point of the agreed UK/Netherlands boundary to the Belgian coast at the Belgium/Netherlands land boundary, thence along the Belgian coast to the Belgium/France land boundary, thence northeastward to North Foreland on the UK coast, finally closing the polygon by going along the UK coast northward to Orford Ness. This is illustrated on the enclosed chart cutting of Admiralty chart 2182A (Figure 30).

The two coasts are opposite and were considered broadly in balance by the UK team. The major change that had occurred in both states, since the last round of talks in the 1970s, was the introduction of 12nm territorial sea limits. This extension of territorial sea limits did not materially alter the Belgian territorial sea basepoints, as all their relevant points were either on low-tide elevations within 3nm of the mainland low-water line, or actually on the mainland low-water line. However, on the UK side several low-tide elevations were brought into play in the approaches to the Thames Estuary, all of which were more than 3nm but less than 12nm from the

Figure 30: Belgium – United Kingdom (Admiralty Chart 2182A)



mainland low-water line. The low-tide elevations relevant to this delimitation were Long Sand Head, made up of a main bank and several small off-lying banks to the east, and the Shipwash, a drying bank off Harwich. The use of these new territorial sea basepoints in the calculation of the median line between the UK and Belgium resulted in a line some 4nm to the south of the median line calculated in 1972.

Initial discussions centred on the relevant basepoints, the geodetic datum to be used for the boundary and the size of the overlapping area between the two claim lines. The Belgian position was to use the median line calculated in 1972, whereas the UK position was to recommend the median line using territorial sea basepoints based on the 12nm territorial sea limits. The two overlapping claim lines were joined in the north by a line to the southern limit of the UK/Netherlands continental shelf boundary and in the south by a line to the recently agreed UK/Belgian/France tripoint. Both these end points were median line points, the former agreed in 1965 and based on 3nm territorial sea limits and not therefore using any low-tide elevations, and the latter giving full weight to the UK low-tide elevation at Long Sand Head, which was only agreed in 1990.

The UK accepted the relevant Belgian territorial sea basepoints, including new points in the region of Zeebrugge, where new harbour works had been completed since 1972. Another harbour extension, that was in the building stage at Zeebrugge, was not counted. The Belgians were not satisfied with the use of a small off-lying sand bank some 0.5nm to the east of Long Sand Head. It was eventually agreed that a point on the main Long Sand Head sandbank would be used as the relevant UK basepoint in this area. The use of the low-tide elevation basepoint on the Shipwash was abandoned by the UK by the middle of 1990 as it had been found, during a hydrographic survey, that the drying elevation had been eroded to such an extent that it no longer dried and as such could no longer be used as a UK basepoint. Both sides having agreed on the relevant basepoints the area of overlapping claims could be accurately calculated and resulted in a 'coffin' shaped area of some 214.64km<sup>2</sup> (Figure 31).

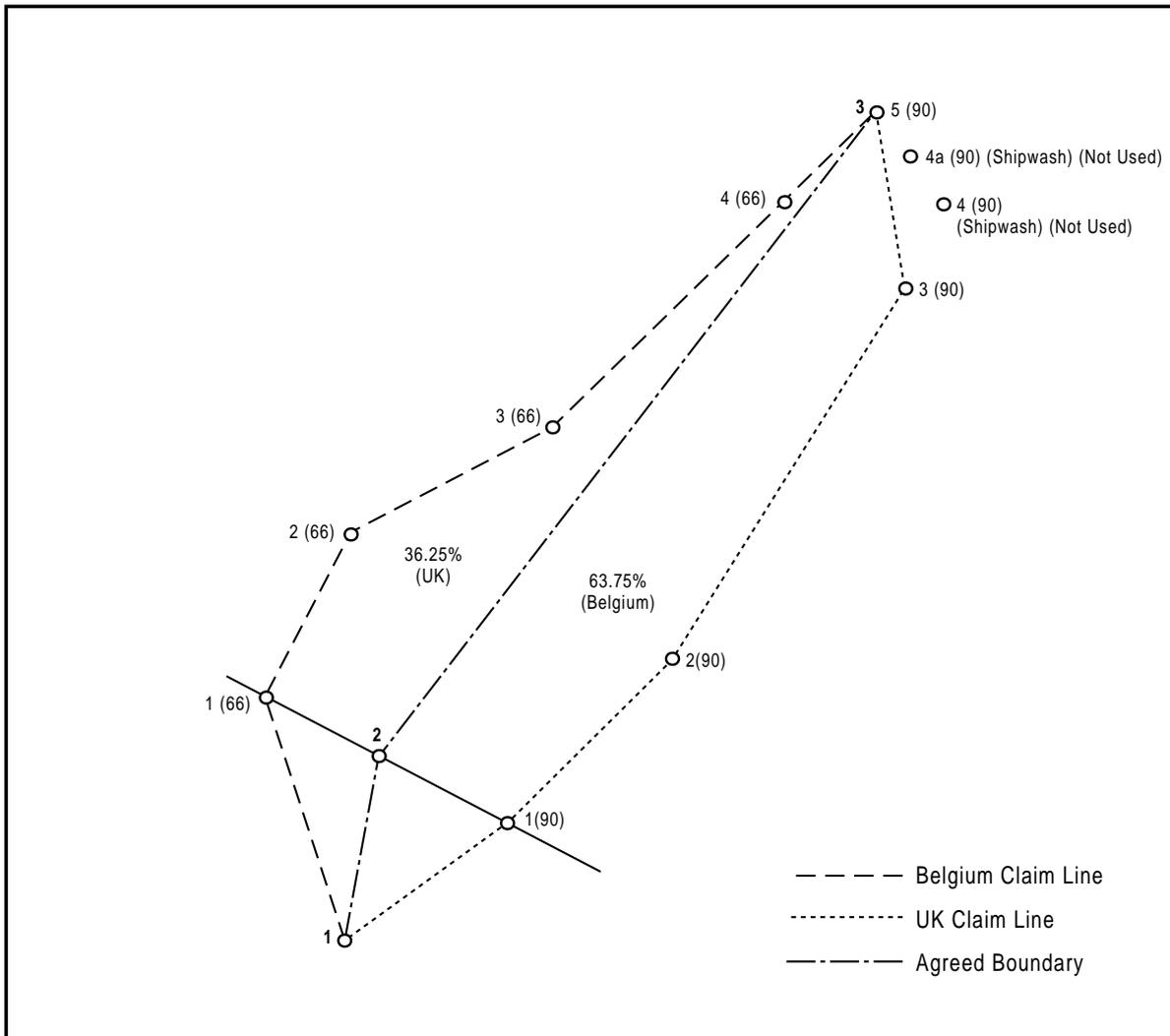
A straight line drawn between the tripoints would have divided this area approximately 50/50. This would have given approximately half weight to Long Sand Head. However, in order to achieve an equitable result, both sides agreed after several rounds of negotiations, to split the 'coffin' in the ratio of approximately one-third UK to two-thirds Belgium with one turning point towards the southern end of the 'coffin'. This agreement was based on the fact that with the demise of the basepoint on the Shipwash, the entire line was based on the Long Sand Head low-tide elevation, some 11.7nm off the mainland on the UK side, against one low-tide elevation, Trapegeer, 1.3nm off the mainland coast, and three further mainland basepoints, on the Belgian side. The resulting agreed line (Figure 30) gives full weight to Long Sand Head at Point 1, and nil weight at point No.3, with an overall one-third weight over the whole line. A result that was equitable to both sides, and a good example of a pragmatic solution.

## 7.4 After Negotiations

### *Technical Content of the Treaty Document*

When negotiations have come to a successful conclusion it is normal for both sides to exchange formal documents, usually in the form of a Treaty. Part of this document will be the technical content of the agreed boundary in the form of geographical coordinates defining the turning points of the agreed line. The coordinates in latitude and longitude should be given to an agreed precision. This is normally to one second of arc or at best a tenth of a second of arc. Although a

**Figure 31: The Belgium – United Kingdom “Coffin”**



delimited boundary could be theoretically calculated to greater precision, it is unlikely that the coordinates defining the territorial sea basepoints will be any more accurate. As they will have probably formed the basis for the agreed boundary any greater precision in the final boundary turning points would be deceptive.

The coordinates must be referred to a geodetic datum to fix them onto a reference frame, namely a spheroid, to enable their position to be determined on the Earth's surface, or as close to the true Earth surface as possible. The type of line joining the turning points must also be specified. A 'straight line' is not good enough. As discussed in the first of this two-part set of *Briefings*, a 'straight line' can mean many things.

Once again the UK/Belgium Continental Shelf Boundary Agreement<sup>95</sup> can be used to illustrate these points. Article 1 of the Treaty contains the technical specifications of the agreed boundary line. The geographical coordinates are referred to European Datum (First Adjustment 1950) and the turning points are joined by loxodromes. A slightly more complex agreement is that between the UK on behalf of the British Virgin Islands and the USA on behalf of Puerto Rico and the US

<sup>95</sup> *Agreement between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the Kingdom of Belgium relating to the Delimitation of the Continental Shelf between the Two Countries*, Treaty Series No. 20 (1994), Cm 2499, London: HMSO.

Virgin Islands.<sup>96</sup> In this case the technical specifications are contained within an Annex to the Treaty. The geographical coordinates of the turning points are referred to North American Datum (1983) and the turning points are joined by geodesics. It is notable that both these boundary Treaties only define the boundary turning points to the nearest second of arc.

### ***Graphic Depiction***

It is also important to depict the agreed boundary graphically so that members of the Government and the general public can see what the boundary looks like. This can be achieved by either appending a published chart to the Agreement with the agreed boundary plotted or annexing a special chart, produced for the purpose. The advantage of a special chart is that it need only show the relevant coastlines and the agreed boundary, whereas a navigational chart will show a great deal of detail that is not relevant to the Agreement. It will also be much larger and will not be able to be produced in copies of the Treaty. UK practice is to produce special charts, examples of which are to be found in the above-mentioned Treaties.

### ***Publicity***

All boundary agreements should be published in accordance with the UN Convention on the Law of the Sea (UNCLOS) Articles 16, 74 and 84. This can be achieved by placing a copy of the Treaty with the Secretary General, provided the Treaty contains a list of geographical coordinates, referred to a specified geodetic datum and/or a chart depicting the boundary on a suitable scale. Internally it is normal for Treaties to be published in an official gazette, which can be purchased by the general public.

## **8. Conclusions**

Of the 137 states that have ratified or acceded to UNCLOS, 122 are coastal.<sup>97</sup> Of these a considerable number have little knowledge of their maritime zones and boundaries and it is certainly the case that the majority of potential maritime boundaries around the world remain undelimited. There is therefore a great deal of work required to bring this situation to a satisfactory conclusion.

The technical expertise that is required to determine and to delimit a coastal state's maritime space is both varied in scope and innovative in its development. There is still a requirement to understand the use that can be made from nautical charts, whether they be paper, raster or vector products. Knowledge is also required of the use of alternative means of studying the coastline such as aerial photography and satellite imagery. The development of GIS technology and the introduction of digital databases are areas that will continue to expand and the technical expert will be expected to utilise these developments to the advantage of the coastal state.

The relevance of geodesy in the determination of maritime space, particularly a thorough understanding of geodetic datums, both horizontal and vertical, is perhaps even more important today than it was 35 years ago. The use of accurate navigational positioning systems

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<sup>96</sup> *Treaty between the Government of the United Kingdom of Great Britain and Northern Ireland and the Government of the United States of America on the Delimitation in the Caribbean of a Maritime Boundary Relating to Puerto Rico/US Virgin Islands and the British Virgin Islands*, Treaty Series No. 77 (1995), Cm 2978, London: HMSO.

<sup>97</sup> As at 12 November 2001 ([www.un.org/Depts/los](http://www.un.org/Depts/los)).

such as the Global Positioning System (GPS) allows practitioners to determine their positions on the Earth's surface to within a few metres. It is therefore incumbent upon the technical expert to attempt to match or even better this accuracy when determining the limit of a coastal state's maritime space. Without a sound understanding and appreciation of geodesy, he/she will be unable to achieve this goal.

It is important that the technical expert realises that he/she has a part to play in the drafting of maritime zone legislation. Many states have not updated their legislation to bring it into line with UNCLOS or have not amended legislation defining the territorial sea baseline, including straight baseline systems, to reflect changes in the coastline.

The correct determination of the territorial sea baseline is perhaps the most important fundamental task that the technical expert is required to carry out. It is not easy, requiring an in depth knowledge of the coastline, bay closing lines and straight baseline systems. If relevant an interim knowledge of Part IV of UNCLOS covering the provisions for archipelagic states will also be required. It is very much the responsibility of the technical expert to advise the legal and political elements in the government administration on the correct technical interpretation of the provision for bay closing lines and more especially straight baselines to attempt to reduce the misuse of Article 7 of the Convention.

Once the territorial sea baseline has been determined in accordance with the Convention, the generation of the various maritime zones using modern computer technology is a relatively straight-forward task. The one maritime zone that is continuing to tax the brightest technical and legal experts is the determination of the outer limit of the continental shelf beyond 200nm in accordance with Article 76 even with the assistance of the Technical Guidelines of the Commission on the Limits of the Continental Shelf.

Once the various maritime zones have been determined the need for maritime delimitation, if not already carried out, will become apparent. The technical expert has a major role to play in any maritime boundary negotiation team being one of the legs of the core triumvirate of 'legal, political and technical' disciplines that should make up the team.

The fact that the expert now has at his/her disposal an impressive array of software tools, that will enable a geodetically robust technical solution to be calculated very quickly and depicted in any way the customer requires, merely enables more possibilities to be presented to the team. The requirement for an equitable solution, agreed by both parties, in accordance with the provisions of UNCLOS remains.

The challenges facing the technical expert in the determination of maritime space, whether they be zones or boundaries are considerable. As the client, whether government or private, realises the potential wealth that can still be exploited in the maritime domain, the technical expertise and innovation of the technical expert will be tested to the limit for decades to come so long as mankind still favours the concept of the territorial sovereignty of the nation state.

## Bibliography

- Antunes, N.S.M. (2000) *The Importance of Tidal Datum in the Definition of Limits and Boundaries*, *Maritime Briefing*, 2, 7, Durham: International Boundaries Research Unit.
- Beazley, P.B. (1979) 'Half-Effect Applied to Equidistance Lines', *International Hydrographic Review*, LVI, 1 (January): 153-160.
- (1994) 'Technical Aspects of Maritime Boundary Delimitation', *Maritime Briefing*, 1, 2, Durham: International Boundaries Research Unit.
- Birnie, P. (1987) 'Delimitation of maritime boundaries: emergent legal principles and problems', pp.15-37 in Blake, G.H. (ed.) *Maritime Boundaries and Ocean Resources*, London: Croom Helm.
- Boggs, S.W. (1937) 'Problems of Water-Boundary Definition: Median Lines and International Boundaries through Territorial Waters', *The Geographical Review*, XXVII, 3 (July): 445-456.
- Bowett, D.W. et al. (1997) *The International Court of Justice: Process, Practice and Procedure*, London: The British Institute of International and Comparative Law.
- Briscoe, J. (1988) 'Islands in Maritime Boundary Delimitation', *Ocean Yearbook* 7, Chicago: University of Chicago Press: 14-41.
- Carleton, C.M. (1990) 'The Role of the Territorial Waters Officer and the Problems Associated with the Delimitation of the UK Continental Shelf', pp.91-118 in Grundy-Warr, C.E.R. (ed.) *International Boundaries and boundary Conflict Resolution*, Proceedings of the IBRU Conference, 14-17 September 1989, Durham: International Boundaries Research Unit.
- (1997) 'Islands as Basepoints', unpublished presentation at workshop on The Role of Islands in Maritime Delimitation, Durham: International Boundaries Research Unit, 9-10 July.
- Carleton, C.M. and Schofield, C.H. (2001) *Developments in the Technical Determination of Maritime Space: Charts, Datums, Baselines, Maritime Zones and Limits*, *Maritime Briefing*, 3, 3, Durham: International Boundaries Research Unit.
- Charney, J.I. (1987) 'The Delimitation of Ocean Boundaries', *Ocean Development and International Law*, 18, 5: 497-531.
- Charney, J.I. and Alexander, L.M. (1993) (eds) *International Maritime Boundaries*, Vols.I and II, Dordrecht: Martinus Nijhoff.
- (1998) *International Maritime Boundaries*, Vols.III, Dordrecht: Martinus Nijhoff
- (2001) *International Maritime Boundaries*, Vols. IV, Dordrecht: Martinus Nijhoff (forthcoming)

- Churchill, R.R. and Lowe, A.V. (1983) *The Law of the Sea*, Manchester: Manchester University Press.
- Cook, P.J. and Carleton, C.M. (2000) (eds) *Continental Shelf Limits, the Scientific and Legal Interface*, New York: Oxford University Press.
- Evans, M.D. (1989) *Relevant Circumstances and Maritime Delimitation*, Oxford: Clarendon Press.
- Eyffinger, A. (1996) *The International Court of Justice, 1946-1996*, The Hague: Kluwer Law International.
- Francalanci, G. (1998) 'The UN Convention on the Law of the Sea: Amendments or "Interpretation"', *International Hydrographic Review*, LXXV, 2 (September): 107-115.
- Francalanci, G. and Scovazzi, T. (1994) (eds) *Lines in the Sea*, Dordrecht: Martinus Nijhoff.
- Hancox, D. and Prescott, J.R.V. (1995) *A Geographical Description of the Spratly Islands and an Account of Hydrographic Surveys Amongst Those Islands*, Maritime Briefing, 1, 6, Durham: International Boundaries Research Unit.
- Highet, K. (1993) 'The Use of Geophysical Factors in the Delimitation of Maritime Boundaries', pp.163-202 in Charney, J.I. and Alexander, L.M. (eds) *International Maritime Boundaries*, Vol.I, Dordrecht: Martinus Nijhoff
- Hodgson, R.D. and Alexander, L.M. (1972) *Towards an Objective Analysis of Special Circumstances*, Occasional Paper No.13, University of Rhode Island: Law of the Sea Institute (April).
- Hodgson, R.D. and Cooper, E.J. (1976) 'The Technical Delimitation of a Modern Equidistant Boundary', *Ocean Development and International Law*, 3, 4: 361-388.
- International Court of Justice (1993) *Denmark v. Norway, Public Sitting 11 February 1993*, The Hague.
- International Hydrographic Organization (IHO) (1990) *Hydrographic Dictionary*, Special Publication No. 32, Monaco: IHO.
- (1993) *A Manual on Technical Aspects of the United Nations Convention on the Law of the Sea, 1982*, 3rd edition, Monaco: IHO.
- Jayewardene, H.W. (1990) *The Regime of Islands in International Law*, Dordrecht: Martinus Nijhoff: 3-12.
- Kapoor, D.C. and Kerr, A.J. (1986) *A Guide to Maritime Boundary Delimitation*, Toronto: Carswell.

- Kwiatkowska, B. and Soons, A.H.A. (1990) 'Entitlement to Maritime Areas of Rocks which Cannot Sustain Human Habitation or Economic Life of their Own', *Netherlands Yearbook of International Law*, 11: 139-181.
- Legault, L. and Hankey, B. (1993) 'Method, Oppositeness and Adjacency, and Proportionality in Maritime Boundary Delimitation', pp.203-242 in Charney, J.I. and Alexander, L.M. (eds) *International Maritime Boundaries*, Vols.I, Dordrecht: Martinus Nijhoff.
- Merrills, J.G. (1991) *International Dispute Settlement*, 2<sup>nd</sup> edition, Cambridge: Grotius.
- Miyoshi, M. (1999) *Joint Development of Offshore Oil and Gas in Relation to Maritime Boundary Delimitation*, Maritime Briefing, 2, 5, Durham: International Boundaries Research Unit.
- Nixon, D.W. (1981) 'A Comparative Analysis of Historic Bay Claims', Annex II-3 in *Technical Annexes to the Reply submitted to the Socialist People's Libyan Arab Jamahiriya, Continental Shelf (Tunisia/Libyan Arab Jamahiriya)*.
- Nunn, P.D. (1994) *Oceanic Islands*, Oxford: Blackwell.
- O'Connell, D.P. (1982) *The International Law of the Sea*, Oxford: Clarendon Press.
- Pratt, M.A. and Schofield, C.H. (2001) *Jane's Exclusive Economic Zones 2000-2001*, 3<sup>rd</sup> edition, Coulsdon: Jane's Information Group.
- Prescott, J.R.V. (1985) *The Maritime Political Boundaries of the World*, London: Methuen.
- (1987) 'Straight Baselines: Theory and Practice', pp.288-318 in Brown, E.D. and Churchill, R.R. (eds) *The UN Convention on the Law of the Sea: Impact and Implementation*, Honolulu: Law of the Sea Institute.
- (1988) 'On the Resolution of Marine Boundary Conflicts', pp.33-40 in Craven, J.P., Schneider, J. and Stimson, C. (eds) *The International Implications of Extended Maritime Jurisdiction in the Pacific*, Honolulu: Law of the Sea Institute.
- Reisman, W.M. and Westerman, G.S. (1992) *Straight Baselines in International Maritime Boundary Delimitation*, London: Macmillan.
- Research Centre for International Law (1992) *International Boundary Cases: The Continental Shelf*, Vols.I and II, Cambridge: Grotius.
- Roach, J.A. and Smith, R.W. (1996) *United States Responses to Excessive Maritime Claims*, The Hague: Martinus Nijhoff Publishers.
- Schofield, C.H. (1999) *Maritime Boundary Delimitation in the Gulf of Thailand*, unpublished Ph.D. thesis, International Boundaries Research Unit, University of Durham.
- Scovazzi, T., Francalanci, G., Romanò and Mongardini, S. (1986) *Atlas of Straight Baselines*, 1st edition, Milan: Dott. A. Giuffrè Editore.

- Shalowitz, A.L. (1962) *Shore and Sea Boundaries*, 2 Vols, Washington: US Government Printing Office.
- Silverstein, A.L. (1990) 'Okinotorishima: Artificial Preservation of a Speck of Sovereignty', *Brooklyn Journal of International Law*, Vol. XVI, 2: 409-431.
- Symmons, C.R. (1979) *The Maritime Zones of Islands in International Law*, The Hague: Martinus Nijhoff.
- (1989) 'The UK/Ireland Continental Shelf Agreement 1988: A Model for Compromise in Maritime Delimitation', *International Boundaries and Boundary Conflict Resolution 1989 Conference Proceedings*, Durham: International Boundaries Research Unit.
- (1995) 'Some Problems Relating to the Definition of 'Insular Formations' in International Law: Islands and Low-Tide Elevations', *Maritime Briefing*, 1, 5, Durham: International Boundaries Research Unit.
- (1999) *When is an 'Island' Not an 'Island' in International Law? The Riddle of Dinkum Sands in the Case of US v. Alaska*, *Maritime Briefing*, 2, 6, Durham: International Boundaries Research Unit.
- United Nations (1956) 'Report of the International Law Commission to the General Assembly', *Yearbook of the International Law Commission*, Volume II.
- (1983) *The Law of the Sea*, New York: United Nations.
- (1989) *Baselines: An Examination of the Relevant Provisions of the United Nations Convention on the Law of the Sea*, New York: Office for Ocean Affairs and the Law of the Sea, United Nations.
- (1992) *Handbook on the Peaceful Settlement of Disputes*, New York: United Nations.
- (2001) *Handbook on Maritime Delimitation*, The Division for Ocean Affairs and the Law of the Sea, New York: United Nations.
- United States Department of State (1987) *Developing Standard Guidelines for Evaluating Straight Baselines*, Limits in the Seas, No.106, Washington D.C.: Bureau of Oceans and International Environmental and Scientific Affairs (31 August).
- (1988) *Maritime Boundaries of the World*, Limits in the Seas, No. 108, Washington D.C.: Bureau of Oceans and International Environmental and Scientific Affairs (20 July).
- Westerman, G. (1987) *The Juridical Bay*, Oxford: Clarendon Press.