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**Technical Aspects of Maritime  
Boundary Delimitation**

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## **Technical Aspects of Maritime Boundary Delimitation**

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N.B. The opinions and comments contained herein are those of the author and are not to be construed as those of IBRU.

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# Technical Aspects Of Maritime Boundary Delimitation

P. B. Beazley

## 1. Introduction

In 1942 the governments of the United Kingdom and Venezuela signed a treaty dividing the "*submarine areas of the Gulf of Paria*", which lies between Trinidad and Venezuela. This was a relatively simple boundary concerning an enclosed area, but the nature of the agreement in referring to what was further defined as "*the sea-bed and sub-soil outside of the territorial waters ... of the parties*" presaged great changes in the scope of maritime boundary agreements.

Until then such agreements had been almost entirely confined to boundaries through the territorial waters of coastal states; boundaries which in many cases extended to no more than 3 nautical miles, and almost never more than 12, from the shore. The determination of such boundaries required little technical input other than a mariner's knowledge of charts and chartwork. Often a chart was prepared as the definitive document defining the agreed boundary.

Since the general acceptance in 1958 of a coastal state's sovereign rights over the continental shelf (i.e. the seabed and subsoil) which was "*the natural prolongation of its land territory*" at least out to a depth of 200 metres<sup>1</sup>, the technical aspects of maritime boundary delimitation have become both more complex and more important.

Although this paper refers to the technical aspects of delimitation, it is in practice difficult to separate the purely technical from the legal, and it is not possible to consider the technical aspects without some appreciation of the legal framework within which delimitation must take place. There are several areas of technical expertise which may affect maritime boundary delimitation: geography, geodesy, hydrography, cartography, geology, fisheries, navigation, defence and so on. In general, though, it is the first four of these which are of overall importance, and it is they which have to be addressed in any maritime delimitation regardless of the zones of jurisdiction being delimited or of the particular economic interests of the parties. They are the theme of this paper, which will outline some of the factors that affect delimitation. There is not space, though, to elaborate on each item sufficiently to provide a technical manual; there are other publications which should be consulted for that. A short bibliography is appended.

The principal authorities to be consulted on maritime delimitation are the 1958 Geneva Conventions on the Territorial Sea and Contiguous Zone<sup>2</sup> and on the Continental Shelf<sup>3</sup>, the

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<sup>1</sup> Although these words do not appear in the 1958 Geneva Convention on the Continental Shelf they reflect wording in the memorandum accompanying the 1945 Truman Proclamation and were used by the Court in the *North Sea* cases judgement at paragraph 43. They are used in Article 76 of the 1982 Convention

<sup>2</sup> Articles 3 to 13

<sup>3</sup> Article 6

1982 United Nations Convention on the Law of the Sea<sup>4</sup>, and a number of judgements starting with that of the International Court of Justice (ICJ) in the North Sea Cases (1969). The 1982 Convention will not enter into force until November 1994, and has not been signed by, amongst others, USA, UK or Japan. It will not be binding on states that are not parties to it, but those Articles which deal with baselines are largely unaltered from the 1958 Convention and may be considered as having been accepted as customary international law. The Articles on delimitation of the continental shelf differ from those of the 1958 Convention but may, so far as actual delimitation is concerned, also be considered as expressing customary international law. The concept of the 200 mile Exclusive Economic Zone (EEZ)<sup>5</sup> has been generally accepted although not all states have actually claimed one, whilst some states have claimed only extended zones of fisheries jurisdiction out to as far as 200 miles<sup>6</sup>. Similarly the concept of the Archipelagic state has been generally accepted.

In addition to the various United Nations Conventions and judicial decisions concerning maritime delimitation, there are over 100 bilateral agreements between states which have negotiated maritime boundaries of various types since 1942<sup>7</sup>. These illustrate possible solutions to particular technical - and political - problems peculiar to the parties which may be applicable in similar circumstances elsewhere. It is beyond the scope of this work to undertake a study of them.

Throughout this paper a reference to 'miles' means 'nautical miles' of 1,852 metres. A nautical mile is approximately 1.15 statute miles.

## 2. Zones of Jurisdiction

There are several of maritime zones over which a coastal state may exercise jurisdiction. They are:

**Territorial sea:** extending to not more than 12 miles from the territorial sea baselines (see below).

**Contiguous zone:** (contiguous to the territorial sea) extending to not more than 24 miles from the baselines. Within this zone the coastal state may exercise certain controls concerning customs, fiscal, immigration or sanitary laws. It also forms part of the exclusive economic zone. It is not claimed by all states.

**Exclusive economic zone:** is beyond and adjacent to the territorial sea and may extend to not more than 200 miles from the baselines. In particular the coastal state has "*sovereign*

<sup>4</sup> Territorial sea: baselines Articles 5 to 14, 47 and 121; delimitation Articles 15 and 16. EEZ: Articles 74 and 75. Continental Shelf: Articles 83 and 84

<sup>5</sup> Chiefly Articles 56 and 57

<sup>6</sup> 19 States including Australia, Canada, Denmark, Germany, Japan, Netherlands, South Africa and UK all of which claim to 200 miles

<sup>7</sup> Details of all published agreements may be found in Charney, J. I. and Alexander, L. M. (1993) *International Maritime Boundaries* (IMB), American Society of International Law, Dordrecht: Martinus Nijhoff



*rights for the purpose of exploring and exploiting, conserving and managing the natural resources ... of the waters superjacent to the sea-bed and of the sea-bed and its subsoil".<sup>8</sup>*

**Fishery zone:** within which the coastal state exercises jurisdiction over fisheries. Claimed by some countries instead of an EEZ. Usually extends up to 200 miles from the baselines.

**Continental shelf:** *"comprises the sea-bed and subsoil of the submarine areas that extend beyond its territorial sea ... to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines ... where the outer edge of the ... margin does not extend up to that distance." The coastal state "exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources."<sup>9</sup>*

### 3. Charts, Basepoints and Baselines

Many maritime boundaries are based on the principle of equidistance from the nearest points on the baselines from which to measure the territorial sea, generally shortened to 'territorial sea baselines' or just 'baselines'. Even where the delimitation line has not been based on that principle its course will be governed either by the configuration of the respective coastlines (which the baselines reflect) or, in some cases chiefly concerning the territorial sea, on the sea- (or river-) bed topography.

The baselines may consist either of the low-water line along the mainland and island coasts (the 'normal baseline'), or of straight baselines (including river and bay 'closing lines'). The circumstances governing the use of the different sorts of baselines are not pertinent to this discussion, but the use of straight baselines, which join points situated along the low-water line of the mainland or islands of the coastal state, is governed by specific articles of the 1982 Convention.

The low-water line to be used for determining baselines, whether normal or straight, is that which is *"marked on large scale charts officially recognized by the coastal state"*<sup>10</sup>. It may be assumed that such charts are also to be taken as the authority for the general configuration of the coasts, or, say, of the seabed features in cases where the baselines do not specifically form the basis for determining the boundary. Where a 'general direction' is at issue it may be appropriate to use smaller scale charts than those required for determining baselines.

The word 'chart' refers to nautical charts used by mariners. Although the world's coasts are all charted to some extent the reliability of the charts is extremely variable. In many areas of the world the only chart coverage may be on a very small scale and may depend on very

<sup>8</sup> 1982 UN Convention art. 56

<sup>9</sup> *Ibid* arts. 76 and 77

<sup>10</sup> *Ibid* art. 5. UN Document A/CONF. 62/L. 75 of 3.8.81 at 7(d)(ii) states: *"Since the scale of a chart is an expression of the relationship between a distance measured on the earth's surface and the length that represents it on the chart, a scale of 1/50,000 is of larger scale than a chart of scale 1/100,000."* (emphasis added). The document discusses what constitutes "large scale" in the context and concludes that *"Where circumstances permit, the range may lie between 1/50,000 and 1/200,000."*

old surveys with dubious positional accuracy. The date of the surveys on which a chart is based may be found from the title block or, on modern charts, from the reliability diagram on the chart. The date of publication of a chart is no guide to the date of the surveys on which it is based.

The important points for baseline, and therefore boundary, determination are that positional accuracy should be as high as possible, and that the low-water line should be depicted as accurately as possible. That includes both the existence of and the low-water line of 'low-tide elevations', which are features such as drying rocks, reefs and sand banks "*surrounded by and above water at low tide but submerged at high tide*". In certain circumstances they may be treated as islands and so their low-water lines become baselines. In many areas the best authority for the existence and location of the low-water line relative to the coast is likely to be the nautical chart, even if it is based on very old surveys. In the case of old surveys, however, it may be necessary to refer to more up-to-date land maps for positional accuracy.

#### 4. Map and Chart Projections

Most nautical charts are constructed on the Mercator projection because its properties are well suited for navigation in coastal waters. It is not always suitable, however, for the construction of boundaries because the scale of the chart increases with latitude. In particular a given distance will be represented by a different length of line depending on where on the chart it is to be measured or plotted.

Large and medium scale land maps are usually constructed on projections (such as the Transverse Mercator or Lambert Conformal) on which the scale remains (for practical delimitation purposes) the same anywhere on the map. Unlike the Mercator projection, though, on which the meridians and parallels are all depicted as straight lines intersecting at right angles, the meridians on land maps converge towards the direction of the pole (North Pole in the northern hemisphere and South Pole in the southern), and the parallels are curved. This characteristic makes accurate plotting or determining of positions by geographical co-ordinates (i.e. co-ordinates of latitude and longitude) more difficult than on the Mercator projection.

These differing characteristics have particular relevance to the nature of a line described as 'straight'. A 'straight line' between two objects on the earth's surface is the line that would lie vertically under the line of sight between them. The mapped or charted equivalent of this line is one that represents the shortest distance between two points on the surface of the reference ellipsoid (see below). This line, which is called a **geodesic**, is not represented in the same way on Mercator as on the other projections mentioned (see Figure 1).

On the Mercator projection the only geodesics which appear as straight lines are the meridians and the Equator; all other geodesics appear as curved lines. Except in the two former cases a straight line on a Mercator chart is a **loxodrome**, or **rhumb line**. Such a line represents a line of constant compass direction (or 'bearing').

On the other two projections geodesics are practically or actually straight lines, but except in the case of meridians their compass direction changes constantly along the line.

## 5. Geodetic Datums

Articles 16, 75 and 84 of the 1982 Convention, concerning the promulgation of details of the territorial sea, economic zone and continental shelf boundaries respectively, require that where the boundaries are defined by geographical co-ordinates the geodetic datum should be specified.

When a topographical survey is undertaken, all heights are reduced to a level known as the geoid, which may be described as *"the mean sea level surface of an ocean which was admitted across all the continents through wide, deep and frictionless channels"*<sup>11</sup>. The geoid is not, however, a regular geometrical shape and it is difficult to make mathematical calculations on it. For practical mapping and surveying computations a regular geometrical shape approximating to the shape of the geoid is used. The shape used is the ellipsoid, or spheroid.

Since the advent of satellite navigation it has become possible to construct a geocentric ellipsoid which fits the geoid so that the difference between the two surfaces is never more than 100 metres. Previously that was not possible, and national or regional mapping was conducted on local datums using a 'reference ellipsoid' that best suited the purely local conditions. These ellipsoids are of differing shapes and sizes, with different centres and orientation.

A geodetic datum specifies the reference ellipsoid to be used, the point of origin from which co-ordinates are derived, and other parameters. Different mapping authorities used different geodetic datums, and geographical co-ordinates derived from one system would not agree with those derived from another. Even adjacent continental states may have significant differences amounting to several hundred metres. Island states the geodetic positioning of which depend on local astronomical observations may have very large differences.

The significance of this in boundary delimitation is that the maritime boundary between two states must be defined by reference to a datum that can be related to the geodetic system of both states. It is necessary, therefore, to know the relationship between the geodetic datums of the two states. A boundary derived from the co-ordinates of basepoints of two states using differing geodetic datums will not be on either of the datums or on any other definable datum.

On modern large scale charts and maps the geodetic datum is specified, but that may not be so on many older charts. In such cases advice must be sought from the publishing authority. The differences in co-ordinates resulting from differences in datums are unlikely to be discernible on scales as small as 1:500, 000 and the datum is unlikely to be specified.

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<sup>11</sup> *Admiralty manual of Hydrographic Surveying* vol. 1, p. 6. Hydrographer of the Navy, 1965. p.6

With the advent of global systems it is not a particularly lengthy or difficult task to have the necessary global positioning system observations made that will relate the national datums to an appropriate global reference system within acceptable limits of accuracy.

## 6. Vertical (Tidal) Datums

The depth measurements shown on a nautical chart are reduced to a common horizontal height known as Chart Datum which is generally a level at or near to the level of the lowest tides. There is, however, no agreed tidal level to which all chart datums conform, although by international agreement the datum should be "*at a plane so low that the tide will not frequently fall below it*"<sup>12</sup>. States wishing to negotiate a maritime boundary may, therefore, have different levels of chart datum.

In theory such differences could produce difficulties in negotiation. For instance a state with a gently shelving shoreline and a low level for chart datum might claim a low-water line significantly further seaward than if it used a higher level. Greater difficulties might arise if one datum resulted in more areas of low-tide elevation being shown than did another. In practice, however, the differences are almost always too small to cause concern. The only instance of the matter being crucial concerned France and Belgium. Here the existence of a low-tide elevation about 2½ miles off the French coast was disputed. Agreement was reached to give it half-effect in the construction of the territorial sea boundary.<sup>13</sup>

## 7. Methods of Boundary Determination

There is in theory no limit to the methods that may be employed to determine a maritime boundary providing only that either the parties agree to it or it is deemed by a Court or Tribunal to be equitable. In the case of the EEZ and Continental Shelf states are required to negotiate on the basis of international law in order to achieve an equitable solution<sup>14</sup>. In the case of the territorial sea, however, failing agreement between them neither party may extend beyond the equidistant line unless it is necessary by reason of historic title or other special circumstances to delimit differently.

The difference in the emphasis between the rules governing the territorial sea boundary and those governing the other two reflects the greater sensitivity of the territorial sea boundary by reason of its proximity to the coast. Where both interested states claim an EEZ the boundary dividing it will also divide the continental shelf out to the outer limit of the EEZ. Even where one or both states claims something other than an EEZ (e.g. fishery jurisdiction only) it is now usual to agree to a single maritime boundary through the zones, including the territorial sea if a territorial sea boundary is not in place.

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<sup>12</sup> *Repertory of Technical Resolutions* (International Hydrographic organization) Res. A 2.5

<sup>13</sup> *IMB* p. 1894

<sup>14</sup> 1982 Convention Article 15

It is not possible to consider all the ways in which maritime boundaries have been determined. In fact where a boundary has been negotiated there is generally no published matter to indicate the factors that may have been taken into account or the weight that they were given. Where the resulting boundary is not clearly based on a concept such as equidistance it is often only possible to speculate on the principles employed in its construction, and, although the principles may be clearly set out, the final disposition of the line may not be of a nature that can be analysed to derive criteria applicable in similar situations.

There are, though, two basic geometrical methods of boundary determination which form the basis of most maritime boundaries.

## **7.1 Equidistant lines**

Historically one of the favoured methods of delimitation, particularly where the coasts are opposite to each other, has been some form of mid-line or series of mid-lines. The equidistant line as defined in the 1958 and 1982 Conventions is a geometrically exact expression of that concept.

There is some confusion of terminology over equidistant lines. Following from the wording of the Conventions the term 'median line' is widely used to refer to strict equidistant lines between opposite coasts and adjacent coasts respectively, although some commentators consider that it should apply only in the case of opposite coasts. It is also frequently and loosely used to refer to almost any boundary line between states whether or not it is an equidistant line. For that reason the term 'equidistant line' is used throughout in this paper.

A strict equidistant line is defined in the 1958 and 1982 Conventions as a line *"every point of which is equidistant from the nearest points on the [territorial sea] baselines"* of each of the two states concerned. 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 and without ambiguity.

The construction of an equidistant line using plane geometry is easily understood. Given two basepoints located on coasts opposite to each other, a line every point of which is equidistant from them will be the perpendicular bisector of the line joining them. Turning to Figure 2, imagine a vessel at point 'a' on the perpendicular bisector of the line joining basepoints A and B. It can be seen that there are no other parts of the coastlines of either state closer to it than those two basepoints: it is situated on the equidistant line. If the vessel is to navigate along the equidistant line between the two coasts it will soon arrive at point 'b', which is equidistant from basepoints A, B and C, at which point it must alter course on to the perpendicular bisector of a line joining A and C if it is to continue to be equidistant from the nearest points on the baselines. These will now be basepoints A and C until point 'c' is reached. Between points 'b' and 'c' there are no other points along either coast that are closer than basepoints A and C. At point 'c' the nearest basepoints are A, C and D, and the equidistant line continues as the bisector of a line joining basepoints C and D. And so the

equidistant line continues through points 'd', 'e' and 'f'. Points 'a' to 'f' are known as 'turning points'.

The straightforward strict equidistant line described consists of a series of turning points, at each of which these basepoints are equidistant. The turning points are joined by a series of equidistant lines which for practical purposes may be considered as geodesics. The line is defined by the geographical co-ordinates of the turning points, and the lines joining them are usually defined as geodesics.<sup>15</sup>

The same principle applies in the case of adjacent coasts. In Figure 3 a small boat approaching the coast along the equidistant line between states A and B is located at point 'a' on the perpendicular bisector of the line joining basepoints A and B. It proceeds inshore along this line until it reaches point 'b' which is equidistant from basepoints A, B and C, where it alters course to steer along the perpendicular bisector of a line joining B and C. The boat continues inshore in this manner until it reaches point 'e' where the nearest basepoints are E and C. E is the seaward terminal point of the land boundary between states A and B, so at 'e' it is the nearest basepoint for state B *and* one of the two nearest basepoints for state A. To satisfy equidistance the line from 'e' to E must be perpendicular to the direction of the coast at E. In the case of adjacent coasts it is not so easy to see the construction of the equidistant line as is the case with opposite coasts, but it is the same.

Similar principles apply where straight baselines are employed. In that case, though, an equidistant line between a single basepoint and a straight baseline will be a parabola. Where both coasts are represented by straight baselines, the *basepoint* at which a straight baseline of one state alters direction along a convex coast will, for a short distance, act as a single basepoint. The equidistant line will, therefore, be a parabola for a short distance before it is once again an equidistant line between two segments of straight baseline.

Consideration of the principle of equidistance shows that an equidistant line will be traced by the centre of a circle which, as it moves, expands or contracts so that it always touches the respective baselines at their nearest points. Figure 4 shows the same coasts and equidistant line as Figure 2. A series of circles has been drawn, each one centred at a point on the equidistant line and having a radius such that the circumference passes through the nearest basepoints. It can be seen that no basepoints lie inside the circumference of any circle, and every circle passes through the nearest basepoints on each coast. This simple geometric fact governs the technique generally used to construct an equidistant line graphically as well as by some computer programs which, given the co-ordinates of all probable pertinent basepoints, will determine both the basepoints which are relevant and the co-ordinates of the turning points of the equidistant line.<sup>16</sup>

Graphical methods may be used to select the pertinent basepoints. Mercator charts are seldom suitable for this purpose, however, unless the area is close to the Equator or is

<sup>15</sup> In some treaties (e.g. the 1966 *Netherlands/UK Continental Shelf Agreement*) the lines are described as "*arcs of Great Circles*". The arc of a great circle describes the shortest distance between two points on a sphere, and is widely used in marine navigation where high orders of accuracy are not required. It is unsuitable as a definition for modern boundary delimitation

<sup>16</sup> The International Hydrographic Bureau, Monaco, Special Publication No. 51 *A Manual on Technical Aspects of the United Nations Convention on the Law of the Sea* - 1982 lists a variety of computer programs held by different national hydrographic offices

confined to near-shore waters (less than 20 miles, say). In other circumstances it will be advisable to construct a simple conic chart on which to plot the positions of all the likely basepoints. The determination of the line itself should always be made by calculation using appropriate geodetic methods, except that where the line passes through a narrow winding channel between two coasts it may be impractical to compute a line or to simplify it. In such a case it may be necessary to construct and define the line on a chart of a suitably large scale.

## 7.2 Simplified equidistant lines

Although a strict equidistant line may be used as the final agreed boundary, it will generally be found that such a line consists of an undesirably large number of turning points which would be cumbersome to list and to show on a chart. In most cases, therefore, some form of simplification is agreed. The most common method is to reduce the number of turning points as desired, and to select or position the remainder in such a way that the resulting exchange of areas is the same for both parties (an area compensated line).<sup>17</sup>

Sometimes, particularly where fishing interests are paramount, a loxodrome is preferred to a geodesic for the final agreed boundary. In such cases it is usual to adjust the turning points to compensate also for the areas between the geodesics and the loxodromes.

An alternative, but less precise method, of simplification is to select only certain salient basepoints from which to compute the line<sup>18</sup>. An application of this method proposed for adjacent states, in order to eliminate some of the problems of inequity discussed below, is to choose as basepoints a series of positions along the coasts of both states spaced at equal intervals from the land boundary terminus<sup>19</sup>. Other more arbitrary methods may also be employed, but the resulting boundaries between opposite states tend then to have the character more of a simple mid-line rather than an equidistant line.<sup>20</sup>

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<sup>17</sup> e.g. *Norway/UK Continental Shelf* 1965 and 1972

<sup>18</sup> e.g. positions along the boundary between France and UK in the English Channel (A to D and E to L) in the award of the tribunal (1977). The decision of the Court of Arbitration is given in HMSO Miscellaneous No. 15 (1978), Cmnd. 7438

<sup>19</sup> Mentioned in Kennedy, (1958) *Brief Remarks on Median Lines and Lines of Equidistance and on the Methods Used in their Construction*

<sup>20</sup> An example is the original 'median line' adopted by the Chamber in the 1984 *Gulf of Maine* Case. It was equidistant between two straight lines representing the coasts of Massachusetts and Nova Scotia respectively. The segment B to C of the Chamber's award is the same line moved about 14 miles towards Nova Scotia

### 7.3 Partial effect

A strict equidistant line between opposite coasts will almost always, at least in the absence of islands, produce an equitable division of the intervening area<sup>21</sup>. Where an island belonging to one of the states causes the line to diverge markedly towards the opposite coast, however, inequity may result. In the case of adjacent coasts quite small coastal promontories close to the land terminal, as well as the presence of islands, may cause marked diversions of the equidistant line. Moreover, whereas in the case of opposite coasts the line will be affected only in the vicinity of the island, in adjacent coast cases the divergence may continue for the full width of the economic zone and continental shelf. Figure 5 shows a low-water line along the shores of adjacent states A and B, with their common land boundary ending at point O. The equidistant line is the line OPQ perpendicular to this shore line. In the absence of other considerations this is an equitable line of delimitation. Supposing, however, that close to the land boundary terminal there is a promontory, X, on the coast of state B. The equidistant line would now be OPR. It would diverge from the perpendicular at P, and would continue to do so, although at a diminishing rate, for as far as the line might go. In this case the promontory can be seen to have a distorting effect and to produce an inequitable result if equidistance is used. A similar situation may result from islands off shore.

One solution to the general problem is to give the feature causing the inequity only partial effect. Most often this is half-effect which is generally achieved by taking a line half way between the two equidistant lines resulting from in one case giving the feature full effect and in the other giving it no effect.<sup>22</sup>

In some cases - so far involving small islands opposite long mainland coasts<sup>23</sup> - the coastal lengths of the two states has been deemed to be so disparate that, although an equidistant line has been determined as a basis for delimitation, it has then been displaced *in toto* towards the state with the shorter coast by an arbitrary amount in order to correct the inequity.

In other cases the equidistant line in any recognisable form may not be adopted as the agreed boundary<sup>24</sup>. Nevertheless, the equidistant line, with its unambiguous construction and its general tendency towards equity, is often, if not always, a necessary starting point in any negotiation as an indicator of where inequities may lie.<sup>25</sup>

<sup>21</sup> In the 1969 *North Sea* cases the Court observed (paragraph 57) with reference to a median line between opposite States that "*ignoring the presence of islets, rocks and minor coastal projections, the disproportionately distorting effect of which can be eliminated by other means, such a line must effect an equal division of the particular area involved.*" In fact it will seldom effect mathematically equal division, but the point being made by the Court is clear

<sup>22</sup> The 1968 *Iran/Saudi Arabia* agreement and the 1978 *UK/France* award provide examples of assigning partial effect to islands

<sup>23</sup> *Malta/Libya* (1985) and *Greenland/Jan Mayen* (1993)

<sup>24</sup> For example the major part of the award in the 1992 *Canada/France* case concerning St. Pierre and Miquelon was based on a projection of the coastal front, not an equidistant line. See Fig. 7

<sup>25</sup> In the *Malta/Libya* case the Court referred to the judgement in the *North Sea* cases (see note 21 above), and stated "*it is ... a delimitation exclusively between opposite States that the Court is ... asked to deal with. It is clear that, in these circumstances, the tracing of a median line between those coasts, by way of a provisional step in a process to be continued by other operations, is the most judicious manner of proceeding with a view to the eventual achievement of an equitable result.*" (paragraph 62). Later at paragraph 77 the Court warned that this "*should not be*



## 7.4 Enclaving

In cases, generally where they are situated near to the equidistant line between mainlands, or have been situated on the 'wrong side' of the line, islands have been ignored in constructing an equidistant line and have been either partially or totally enclaved. In those cases the islands have been assigned a restricted area - generally the breadth of the territorial sea.<sup>26</sup>

## 7.5 Line of Bearing

The simplest form of maritime boundary is a single line of compass direction (or bearing) from a specified point or feature (e.g. a lighthouse). Such a boundary is likely to be found in cases where the states are adjacent to each other on a more or less smooth coast, and the direction chosen is likely to be a perpendicular to the general direction of the coast. Both the direction of the coast and the direction of the boundary line are usually determined from nautical charts and the boundary is then a loxodrome.<sup>27</sup>

Although a loxodrome does not represent a straight line on the earth's surface, near the equator the difference between it and a geodesic will be quite small. At higher latitudes the two lines separate quite rapidly with distance from their origin and with orientation away from the meridian. If the intention of using a perpendicular to a general direction is to produce an equitable division it is likely to be frustrated if a loxodrome is used over a long distance such as the breadth of the 200 mile economic zone, because it will in fact - although it will not be apparent from the chart - curve so as to give more and more advantage to the state furthest from the Pole.

It is possible to select a line representing the direction of the coast using a geodesic joining two chosen points along the coastline. This will not be a line of constant bearing. The direction of a perpendicular to it will depend upon the direction of the line at the particular point where the perpendicular starts. That will determine the initial *azimuth* or direction of the perpendicular which will also be a geodesic giving a more equitable result than a loxodrome.<sup>28</sup>

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*understood as implying that an equidistance line will be an appropriate beginning in all cases, or even in all cases of delimitation between opposite States."* In the *Greenland/Jan Mayen* case the Court (paragraph 51) found that at least as regards the continental shelf "*it is in accord with precedents to begin with the median line as a provisional line ...*". Accordingly the Court started with the equidistant line (paragraph 65)

<sup>26</sup> The 1968 *Iran/Saudi Arabia* agreement and the 1971 *Italy/Tunisia* agreement provide examples of partial enclaving. The 1978 *UK/France* award provides an example of total enclaving (of the Channel Islands)

<sup>27</sup> e.g. the 1972 *Brazil/Uruguay* Maritime Delimitation Agreement

<sup>28</sup> e.g. the seaward segment (C to D) in the *Gulf of Maine* decision. This was a geodesic, perpendicular to a straight closing line (also a geodesic) drawn across the mouth of the Gulf, starting from the point where the middle segment intersected the closing line. The details are given in the Technical Report which accompanied the judgement

The line of bearing solution is particularly apt in geographical circumstances where a number of adjacent states each has a coastline length which is short compared with the seaward extent of any maritime boundaries between them. Such a situation might well produce a series of equidistant 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. Similarly it avoids some of the difficulties resulting from uncertainty as to the exact direction in which the boundary should depart from the coastal terminal point.<sup>29</sup>

## 8. Matters Arising from Judicial Decisions

It has already been pointed out that states are only constrained by the requirement for agreement and an equitable result when negotiating maritime boundaries. In those negotiations states will seek to advance their case by drawing on judicial decisions. This section briefly examines further matters of a technical nature arising from such decisions of which there are eight of importance. Those cases heard by the International Court of Justice (ICJ) are identified; the others were heard by *ad hoc* tribunals appointed by the parties:

North Sea Continental Shelf Cases - (ICJ), 1969  
UK/France Continental Shelf - 1977  
Tunisia/Libya Continental Shelf Case - ICJ, 1985  
Maritime Boundary in Gulf of Maine Area (Canada/France) -  
Chamber of the ICJ, 1984  
Guinea/Guinea Bissau Maritime Frontier - 1985  
Libya/Malta Continental Shelf Case - ICJ, 1985  
Canada/France Delimitation of Maritime Areas - 1992  
Maritime Delimitation in the Area between Greenland and  
Jan Mayen (Denmark/Norway) - ICJ, 1993

<sup>29</sup>

A problem arose in the cases of the 1968 *Abu Dhabi/Dubai* offshore boundary and the 1964 *Sharjah/Umm al Qaywayn* seabed boundary. In these it was "... the locations of the land boundary terminals [that were in doubt] at the time the maritime boundary lines were proposed. A change in position along the coastline could have profoundly affected the course of an equidistant line. Lines based on general direction of the coasts were proposed as being more equitable than equidistant lines constructed on the basis of the supposed land terminus locations.... the Abu Dhabi-Dubai agreement of 1968 ... moved the land boundary terminus to a position 10 kilometres from where it was thought to lie in 1965." From no. 23 in the chapter *Technical Considerations in Maritime Delimitations* in *IMB* p. 260

## 8.1 Relevant Area and Proportionality

The judgement of the ICJ in the **North Sea** Cases (between West Germany, Denmark and the Netherlands) was the first judicial examination of the factors to be taken into account when delimiting a continental shelf. These factors have come to be regarded as being applicable also to boundaries through the EEZ or other zones beyond the territorial sea. One of the factors that were to be taken into account was

*"... the element of a reasonable degree of proportionality ... between the extent of the continental shelf areas appertaining to the states concerned and the length of their respective coastlines, - these being measured according to their general direction in order to establish the necessary balance between states with straight, and those with markedly concave or convex coasts, or to reduce very irregular coastlines to their truer proportions ... One method discussed in the course of the proceedings under the name of the principle of the coastal front, consists in drawing a straight baseline between the extreme ends of the coast concerned, or in some cases a series of such lines."*<sup>30</sup>

The Court did not refer to a "*relevant area*", but in an earlier passage the Court wrote:

*"But in the present case there are three states whose North Sea coastlines are in fact comparable in length and which, therefore, have been given broadly equal treatment by nature ..."*<sup>31</sup>

except for the concavity of the German coast. This passage clearly indicates that the coastlines being considered were those facing on to the North Sea, and not only those parts which would directly affect a delimitation with West Germany. The judgement also indicates that in applying proportionality it is not the actual lengths of the coasts with all their indentations and promontories that are to be considered, but the direct frontage on to the area in question.

The Court of Arbitration in the **UK-France** Continental Shelf Case considered proportionality and concluded that the criteria in the North Sea judgement were not applicable in all cases. Instead "*it is disproportion rather than the general principle of proportionality which is the relevant criterion or factor*"<sup>32</sup>. Proportionality was only of importance in the Atlantic region west of a line joining Ushant and the Scilly Isles, where the Tribunal decided that the Scilly Isles caused a greater projection of the English coast than did that of France on to the Atlantic continental shelf<sup>33</sup>. This greater projection was held to produce a distorting effect to be abated, but not by

*"any nice calculations of proportionality in regard to the total areas of continental shelf accruing to the parties in the Atlantic region" because proportionality came "into account only in appreciating whether the Scilly Isles are to be considered a 'special circumstance' having distorting effects on the equidistance boundary". The*

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30 *op cit* paragraph 98

31 *ibid* paragraph 91

32 *op cit* paragraph 101

33 *ibid* paragraph 235

*question was "simply whether the geographical situation of the Scilly Isles in relation to the French coast has a distorting effect and is a cause of inequity ..."*<sup>34</sup>

In the **Tunisia/Libya** Continental Shelf Case the geographical situation differed in one important respect from either the North Sea or the Anglo/French cases. There were no third parties in such a position of adjacency to either state that the delimitation could affect their rights. Only Malta and Italy, both standing in a relation of oppositeness to Tunisia and Libya, could be affected, but they would not be prejudiced by the *direction* of any boundary awarded. Moreover, Malta and the Italian island of Lampedusa effectively limited the northern extent of the area which the Court had found to be "*relevant to the delimitation*". The Court had little difficulty, then, in defining the area as being limited by the coasts of Libya and Tunisia on the south and east, by the parallel of latitude through Ras Kaboudia on the north, and by the meridian through Ras Tanura on the east (see Fig. 6). The choice of these last two limits specifically depended on the view that the principle of natural prolongation excluded from consideration by the Court

*"the submarine extension of any part of the coast of one Party which, because of its geographic situation cannot overlap with the extension of the coast of the other"*<sup>35</sup>.

This contradicts the position taken by the Court in the North Sea cases, although it is inconceivable that equity would have been achieved by taking into account all the coast of Libya as far as the Egyptian border.

Given such a well-defined relevant area the application of a proportionality rule as envisaged in the 1969 Judgement was relatively easy. The issues to be decided were the way in which to measure the coastline lengths and whether to take into account the areas of internal waters. The Court considered two measurements of coastline length: one omitting small inlets, creeks and lagoons, the other using straight lines (coastal fronts); one in the case of Libya and two for Tunisia. Regarding the inland waters and territorial sea the Court decided that

*"although parts of the areas in question are not part of the continental shelf in the legal sense, the sea-bed of the region of internal waters within the Tunisian baselines and of the territorial sea is the natural prolongation of the land territory in the physical sense",*

and the Court used them accordingly. The ratios were approximately:

Coastlines	Libya:Tunisia	1:2.2
Coastal fronts	Libya:Tunisia	1:1.9
Seabed areas	Libya:Tunisia	1:1.5 <sup>36</sup>

The line recommended by the Court was not an equidistant line, so it is interesting to note that had the Court adopted such a line taking full account of the Kerkennah Islands the ratio

<sup>34</sup> *ibid* paragraph 250

<sup>35</sup> *op cit* paragraph 75

<sup>36</sup> *ibid* paragraph 131. The judgement expresses the ratios as *percentages*.

of seabed areas would have been approximately 1:1.9. These figures suggest that courts do not seek close correlation between ratio of coastal length and ratio of seabed areas.

The **Canada/France** Case is the only other of the eight in which the Court identified a relevant area and applied an arithmetical proportionality test. The dispute concerned the extent to which France could claim maritime areas off the south coast of Newfoundland on behalf of the small islands of Saint Pierre and Miquelon (Figure 7). The relevant area was identified as being bounded: on the north by the south coast of Newfoundland; on the west by a line from Cape Ray (Newfoundland) to the north-eastern point of Cape Breton Island and thence the eastern coasts of Cape Breton Island as far as Cape Canso; on the south by a line from Cape Canso to the intersection of the 200 mile arcs from Cape Breton Island and the French islands, thence to the intersection of the 200 mile arcs from Newfoundland and the French islands, and then along the Newfoundland 200 mile limit to the meridian of Cape Race (Newfoundland); on the east by that same meridian. The Canadian coasts were represented by lines of coastal front including a diversion into Placentia Bay but excluding a portion of the coast opposite the French islands. The net effect was to include the territorial seas of Canada within the area measurement but to exclude the very large bodies of internal waters in the numerous bays and inlets along the coasts. The French coasts were represented by two lines of coastal front on the islands; one representing the west facing coast and the other the south. The Court took no account at all of Sable Island, taking the view that it lies outside the Gulf [of St. Lawrence] Approaches.<sup>37</sup>

The choice of relevant area in this case was dictated by the view of the Court that St. Pierre and Miquelon have a coastal opening towards the south *"unobstructed by any opposite or laterally aligned Canadian coast"*, and awarding them a *"frontal seaward projection towards the south until it reaches the outer limit of 200 nautical miles"*<sup>38</sup>. In comparing areas it was necessary to take into account

*"the Canadian area resulting from an identical projection extending the relevant areas eastwards along the Newfoundland 200 miles arc ... and so embracing the whole economic zone generated to the South by the south coast of Newfoundland"*<sup>39</sup>.

In this respect the Court's view was in accord with that expressed in the North Sea Cases (see above). In this case the ratios were:

Coastal front	Canada:France	15.3:1
Seabed areas	Canada:France	16.4:1 <sup>40</sup>

Whereas in the **Tunisia/Libya** case it was possible to identify a relevant area that was quite tightly circumscribed by the geography, in the **Canada/France** Case there is clearly room for argument as to what should constitute the relevant area. The same difficulty was very apparent in the **Gulf of Maine** Case, in which both the parties put forward suggested limits for a relevant area seaward of the Gulf to embrace an area out to a 200 mile limit. They were unable to agree the essential governing factors: the extent of Atlantic-facing open

<sup>37</sup> *op cit* paragraphs 26 - 32  
<sup>38</sup> *ibid* paragraph 70  
<sup>39</sup> *ibid* paragraph 93  
<sup>40</sup> *ibid* paragraphs 33 and 93

coasts of either Party that should be included, and the orientation of any lines to determine the southern and northern limits of the area. In the event the Chamber did not attempt to justify this segment of the award by reference to proportionality.

In the **Guinea/Guinea Bissau** judgement the Tribunal pointing out that "*la règle de la proportionnalité n'est pas une règle mécanique reposant sur les seuls chiffres traduisant la longueur des côtes*"<sup>41</sup>, declined to undertake a numerical comparison, but concluded that in the matter of proportionality neither Party could claim any additional advantage.<sup>42</sup>

In the **Malta/Libya** and **Greenland/Jan Mayen** Cases the Court accepted that there was a marked disparity between the length of coastal fronts of the islands and the vastly greater length of the relevant mainland coasts opposite to them.

In the **Malta/Libya** Case the Court took account of that part of the Libyan coast claimed by Libya as relevant, namely from the border with Tunisia eastward as far as Ras Zarruq, which, measured in its general direction, was found to be 192 miles. The relevant coast of Malta was found to be 24 miles in length. The Court was unable, however, to identify a satisfactory relevant area because - amongst other factors - the "*geographical context is such that ... virtually any variant could be chosen, leading to widely differing results*"<sup>43</sup>. In fact almost any mathematical exercise of proportionality based on the disparity of coastal lengths would have required the boundary to be positioned inequitably close to Malta. The Court found that the considerable disparity "*should be reflected in the drawing of the delimitation line*", that it was "*so great as to justify the adjustment of the median line*", but that "*the degree of such adjustment does not depend upon a mathematical operation*"<sup>44</sup>. The adjustment made was to transpose the "*median line*" (an equidistant line) 18 nautical miles to the north. The distance was partly dictated by the consideration that a shift of 24 miles would bring the line to a position occupied by an equidistant line between Sicily and Libya, and that to place a boundary between Malta and Libya at such a position would be in one sense to ignore the fact of Malta's existence<sup>45</sup>. Beyond that the Court did not offer any tangible reasons for the degree of displacement adopted.

In the **Greenland/Jan Mayen** Case the Court accepted a disparity in the lengths of the respective relevant coastal fronts in a ratio of approximately 1:9, but declined to consider any sort of mathematical proportionality test<sup>46</sup>. If the relevant area put forward by Denmark (Greenland) had been accepted as the basis for a mathematical test it would only have been satisfied if Norway (Jan Mayen) had been limited to an area east of the Greenland 200 mile fishery limit. The Court decided that the boundary should be positioned approximately half-way between the equidistant line claimed by Norway and the 200 mile limit claimed by Denmark.<sup>47</sup>

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41 *"The law of proportionality is not a mechanical law resting solely on figures describing the length of coasts"*

42 *op cit* paragraph 120

43 *op cit* paragraph 74

44 *ibid* paragraph 68

45 *ibid* paragraph 72

46 *op cit* paragraph 61 and 69

47 *ibid* paragraph 91 and 92

Thus in only two of the eight cases has proportionality been used as a mathematical test of equity. In the **Tunisia/Libya** Case it was relatively easy to determine both a relevant area and relevant coasts, but even so it is doubtful if the test showed anything other than that, on the basis of proportionality alone, an equidistant line might have been even more equitable. In the **Canada/France** Case there is enough room for argument about the correct relevant factors as to make the proportionality test of little real value. Doubtless there will be further occasions when such a test will be used, but bearing in mind that *it is only a test of the equity of a result already determined, and not a means of arriving at that result*, its usefulness must be seen as strictly limited. In general the verdict of the Courts has been that the test should not be a mathematical exercise, but one of jurisprudence.

Another form of proportionality was used in the **Gulf of Maine** Case. It differs from the *test* of proportionality discussed above, and was used as a method of positioning a part of the line of delimitation, and so constitutes another method of boundary determination. Part of the area to be delimited was the Gulf of Maine itself, within which area the Chamber found two different relationships of coast: adjacent coasts at the commencement of the line, and then opposite coasts where the line lay between the coasts of Massachusetts and Nova Scotia. In the latter case the Court used the ratio of coastal front lengths in the Gulf - including a part of the Bay of Fundy - as a determinant of the amount to displace the equidistant line towards Nova Scotia.<sup>48</sup>

## 8.2 Coastal Front

Although the mathematical test of proportionality is of little use in practice, there will yet be a need, as has been shown in the **Malta/Libya** and **Greenland/Jan Mayen** Cases, to compare lengths of coastal fronts to obtain a measure of the disproportion to be considered. This is distinct from the means that may be used to correct it.

The front to be measured is that which faces on to the area in dispute, but the extent of that area is not easy to determine. If equidistance were the accepted principle for all delimitation it might be that the relevant fronts should consist of that part of the coastline which contained all the basepoints affecting the equidistant line. The coastal fronts accepted or put forward for the **Tunisia/Libya**, **Malta/Libya** and the **Greenland/Jan Mayen** Cases were all so limited. That would not have served, however, for the **Canada/France** Case because it would have resulted in the elimination of some coastline which clearly fronted on the area although it contained no equidistant basepoints. The answer is probably to consider the above requirement as the minimum extent of the coastal front, which should be extended as necessary to include any further length which might physically face on to the area within which any delimitation line might be located.

Since the length of the coastal front represents the façade of the land mass which generates a state's entitlement to its offshore zones of jurisdiction, it follows that it must be measured in its general direction, rather than around all its promontories and inlets. The extent to which the 'general direction' should represent the whole of a length of coastline, or a

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<sup>48</sup> *op cit* paragraph 221

number of smaller lengths, is a matter of judgement. In general it may be stated that where the various local changes of direction do not affect the overall façade or its relationship with the coasts of the other Party, then a single straight line is to be preferred.

### 8.3 General Direction

The determination of the general direction of a length of coast is of particular importance in boundary delimitation where it is to be used as the basis for determining the direction of the whole or a part of the line of delimitation. Two matters must be resolved: which part of the coast is relevant, and how is the direction to be determined? The first depends on several factors and no useful guidance can be given except to point out that, as in the **Guinea/Guinea Bissau** Case, it may extend beyond the borders of both parties. In that instance the parties had quite short coastal fronts and each had another state adjacent to it which had to be considered. The tribunal took a macro-geographical approach, using the configuration of the coast in the whole region, and accepted the general direction of a line joining Pointe des Almadies in Senegal to Cape Shilling in Sierra Leone (Figure 8)<sup>49</sup>. The seaward length of delimitation line is perpendicular to this general direction.

A number of methods have been put forward for determining the general direction of a particular length of coastline, but in effect the general direction of the coast between two specified points is the line of direction of the straight line joining those two points. An acceptable alternative is to divide the coast into short stretches of equal length and to mean the resulting set of directions. This requires care in application to ensure that the directions are expressed in a way that can be averaged (use of the whole circle notation can produce strange results). It is a rather tedious way of producing almost exactly the same result as the single line between the two points.

A general direction is usually expressed as a loxodrome i.e. as a single line of compass bearing. As stated earlier, it is possible to use a geodesic, but as that is a line of constantly changing bearing it must be expressed differently. It may be defined as the geodesic between two specified points, or it may be defined as a geodesic with a specified azimuth at a particular point.

### 8.4 Opposite and Adjacent Coasts

The 1958 Territorial Sea, the 1958 Continental Shelf and the 1982 Conventions, in the Articles dealing with delimitation between states, distinguish between the cases of states that are opposite and those that are adjacent to each other. The judgement in the North Sea Cases noted that a given equidistant line might "*partake in varying degree of the nature both of a median line and of a lateral line*"<sup>50</sup>; in other words the coasts of the two states might at one point be 'opposite' and at another 'adjacent'. Significance was attached to the

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<sup>49</sup> *op cit* paragraph 110

<sup>50</sup> *op cit* paragraph 6



distinction particularly because the Court also concluded that in the case of opposite coasts an equidistant line would in general produce an equitable result, which would not necessarily be the case with adjacent coasts.<sup>51</sup>

In the **UK/France** Case France argued that the Atlantic region of the area of dispute produced neither an opposite nor an adjacent states situation, but the Tribunal affirmed that in principle all situations fall into one or the other category<sup>52</sup>. It later stated that

*"the equitable character of the delimitation results not from the legal designation of the situation as one of 'opposite' states but from its actual geographical character as such ... in the case of 'adjacent' states it is the lateral geographical relationship of the two coasts, when combined with a large extension of the continental shelf seaward from those coasts, which makes individual geographical features on either coast more prone to render the geographical effects of applying the equidistance principle inequitable than in the case of 'opposite' states. The greater risk in these cases that the equidistance method may produce an inequitable delimitation thus also results not from the legal designation of the situation as one of 'adjacent' states but from its actual geographical character as one involving laterally related coasts."*<sup>53</sup>(Emphasis added)

In the **Tunisia/Libya** Case the Court elaborated on that by identifying a situation where the coastal configuration could go a long way to transforming the relationship from adjacency to oppositeness without going the whole way, and so making equidistance a factor to be given more weight than would otherwise be the case.<sup>54</sup>

The question then of whether coasts are adjacent or opposite is of less importance than the actual effects of their particular relationship. The most marked difference between the effects of 'oppositeness' or 'adjacency' is whether or not a succession of features affect the construction of the line of delimitation so that no one feature (or pair of features) controls the course of the line for too great a distance. The greater the distance over which the line is determined by a single feature (or pair of features) the more the situation is likely to approach to one of 'adjacency'.

## 8.5 Relationship of EEZ and Continental Shelf

The Court in the **Malta/Libya** Case judged that

*"the institution of the exclusive economic zone, with its rule of entitlement by reason of distance, is shown by the practice of states to have become a part of customary law ..."*

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51 See footnote 21 above

52 *op cit* paragraph 94

53 *ibid* paragraph 239

54 *op cit* paragraph 126

*"Although there can be a continental shelf where there is no economic zone, there cannot be an exclusive economic zone without a corresponding continental shelf... for juridical and practical reasons, the distance criterion must now apply to the continental shelf as well as to the exclusive economic zone ...".*

*"This is not to suggest that the idea of natural prolongation is now superseded by that of distance. What it does mean is that where the continental margin does not extend as far as 200 miles from the shore, natural prolongation ... is in part defined by distance from the shore, irrespective of the physical nature of the intervening seabed and subsoil"<sup>55</sup>.*

This does not cover cases where one or both parties, as in the **Gulf of Maine** and the **Greenland/Jan Mayen** Cases, claim an extended fisheries zone rather than an EEZ. In the first of these cases both parties asked the Chamber to determine a single maritime boundary. The Chamber decided that a delimitation which was to apply to both the shelf and the water column could

*"only be carried out by the application of a criterion, or combination of criteria, which does not give preferential treatment to one of these two objects, and at the same time is to be equally suitable to the division of either of them."<sup>56</sup>*

The Chamber turned towards

*"an application to the present case of criteria more especially derived from geography ... mainly the geography of coasts which has primarily a physical aspect ... "<sup>57</sup>.*

In the second of the cases Norway pleaded for separate fisheries and continental shelf boundaries, whilst accepting that they might be coincidental. Both states were parties to the 1958 Continental Shelf Convention and accepted that Article 6 of that Convention applied, and neither objected to the fisheries boundary being governed by the rules applicable to the boundary of the EEZ, i.e. customary law. The Court found that, at least for opposite coasts, there is no essential difference between the effects of that and of Article 6 of the Geneva Convention.<sup>58</sup>

## 8.6 Geology and Geomorphology

In the North Sea judgement the Court wrote that it can be useful to consider the geology of the shelf

*"in order to find out whether the direction taken by certain configurational features should influence delimitation because, in certain localities, they point up the whole*

<sup>55</sup> *op cit* paragraph 34

<sup>56</sup> *op cit* paragraph 194

<sup>57</sup> *ibid* paragraph 195

<sup>58</sup> *op cit* paragraph 46

*notion of appurtenance of the continental shelf to the state whose territory it does in fact prolong".*

Later it listed the physical and geological structure of the shelf as one of the factors to be taken into account in a delimitation.<sup>59</sup>

From subsequent cases, however, it has become clear that, for a submarine feature to be of sufficient importance to be regarded as constituting a discontinuity such as to form a natural frontier or boundary which should be taken into account, it must be of major geomorphological or geological significance. Even such major features as tectonic plate boundaries are likely to be disregarded unless they produce marked or even dramatic changes in sea-bed topography the causes of which are not disputed by the mainstream of geological understanding.

Professor Keith Highet has analysed state practice in this respect, and has found that in only two agreements, both between Australia and Indonesia, were the controlling factors geophysical (geological or geomorphological), and they both concern the area between Timor and Australia. In only nine agreements was a partial control exercised by geophysical factors, and seven of them were negotiated before the continental shelf cases of the 1980s were handed down. Of the other two Highet does not consider that one, between Denmark and the German Democratic Republic, can be seen

*"as expressing or confirming any theory of the 'naturalness' of prolongation of land territory. Rather it appears to be a hybrid recognition of bathymetry and of economic functions suggested by the exploitability of shallow depths"<sup>60</sup>.*

## 8.7 Economics

The judgement in the **North Sea** Cases took no account of economic considerations *per se*. In the **Tunisia/Libya** Case both parties pleaded economic factors, but the Court took the view that they were variables which unpredictable factors might at any time cause to change.<sup>61</sup>

The Chamber in the **Gulf of Maine** Case, dealing with a single maritime boundary stated the case, in response to claims by the parties of the importance of the fisheries to port activity, ship building and the economy of the areas generally:

*"It should be emphasised that these fishing aspects, and others relating to activities in the fields of oil exploration, scientific research, or common defence arrangements, may require an examination of valid considerations of a political and economic character. The Chamber is, however, bound by its Statute, and required by the parties, not to take a decision ex aequo et bono, but to try to achieve a result on the basis of law. [It] is convinced that for the purposes of such a delimitation operation*

<sup>59</sup> *op cit* paragraph 95 and 101

<sup>60</sup> *IMB* pp. 188 and 189

<sup>61</sup> *op cit* paragraph 107

*as is here required, international law ... does no more than lay down in general that equitable criteria are to be applied, criteria ... which are essentially to be determined in relation to what may be properly called the geographical features of the area. It will only be when the Chamber as, on the basis of these criteria, envisaged the drawing of a delimitation line, that it may and should ... bring in other criteria which may also be taken into account in order to be sure of reaching an equitable result."*<sup>62</sup>

One of the matters both the Chamber in that case and the Court in the **Canada/France** Case took into account was that the solution should not be radically inequitable to the extent of being *"likely to entail catastrophic repercussions for the livelihood and economic well-being of the population of the parties concerned."*<sup>63</sup>

The judgements in the **Malta/Libya** and **Guinea/Guinea Bissau** Cases discounted economic factors. There is, however, one instance of economic factors being taken directly into account. The **Iceland/Norway** Conciliation Commission dealing with the boundary between Iceland and Jan Mayen Island was authorized to take into account *"Iceland's strong economic interest in these areas"*<sup>64</sup>. Whether such attention would have been paid to economics if the matter had gone to court is another matter.

## 8.8 Other Factors

The relative size of the land masses has been put forward as a factor to be taken into account, but the legal position was well stated by the Court in the **Malta/Libya** case:

*"Landmass has never been regarded as a basis of entitlement to continental shelf rights ... The juridical link between the state's territorial sovereignty and its rights to certain adjacent maritime expanses is established by means of its coast."*<sup>65</sup>

Navigation and defence considerations have also been put forward. The response of the Chamber in the **Gulf of Maine** case has already been discussed. In the **UK/France** continental shelf case the issue arose in relation to whether or not the Channel Islands should be enclaved. The Court of Arbitration decided that

*"the weight of such considerations in this region is ... somewhat diminished by the very particular character of the English Channel as a major route of international maritime navigation, serving ports outside the territories of either of the parties. Consequently they cannot be regarded by the Court as exercising a decisive influence on the delimitation ... in the present case. They may support and strengthen, but they cannot negative, any conclusions that are already indicated by the geographical, political and legal circumstances of the region which the Court has identified."*<sup>66</sup>

<sup>62</sup> *op cit* paragraph 59

<sup>63</sup> *ibid* paragraph 237 and *op cit* paragraph 84

<sup>64</sup> *IMB* p. 1757

<sup>65</sup> *op cit* paragraph 49

<sup>66</sup> *op cit* paragraph 188

Professor Barbara Kwiatkowska mentions a number of negotiated agreements, however, where navigation routes have been taken into consideration.<sup>67</sup>

## 9. Conclusion

The technical input to maritime boundary delimitation may cover a number of different considerations such as an understanding of charts and projections, appreciation of the importance of geodetic datums, judgement as to the appropriate factors of coastal front and direction to be considered, as well as others not the least of which is the possible methods that might be employed to achieve the desired result, and the manner in which they can be put into practice so that a clear and unambiguous definition can be given.

Although the Courts have consistently eliminated socio-economic considerations as factors to be taken into account in determining the course of a boundary, they have accepted that they are matters to be considered in judging the equity of the delimitation. State practice may have taken these factors into account more directly, particularly in regard to known oil fields and existing navigation routes<sup>68</sup>. On other issues there is seldom any clear evidence from the course of the boundary that such considerations have directly affected it.

Perhaps of all the conclusions to be drawn from the practice of maritime boundary delimitation one stands out: despite all the arguments about resources, economics, and so on that can be put forward, it is the two dimensional geography of the area - the relationship of mainlands and islands as shown on charts - that is the most important factor.

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<sup>67</sup> *IMB* pp. 96-100

<sup>68</sup> *ibid* p. 92

Figure 1

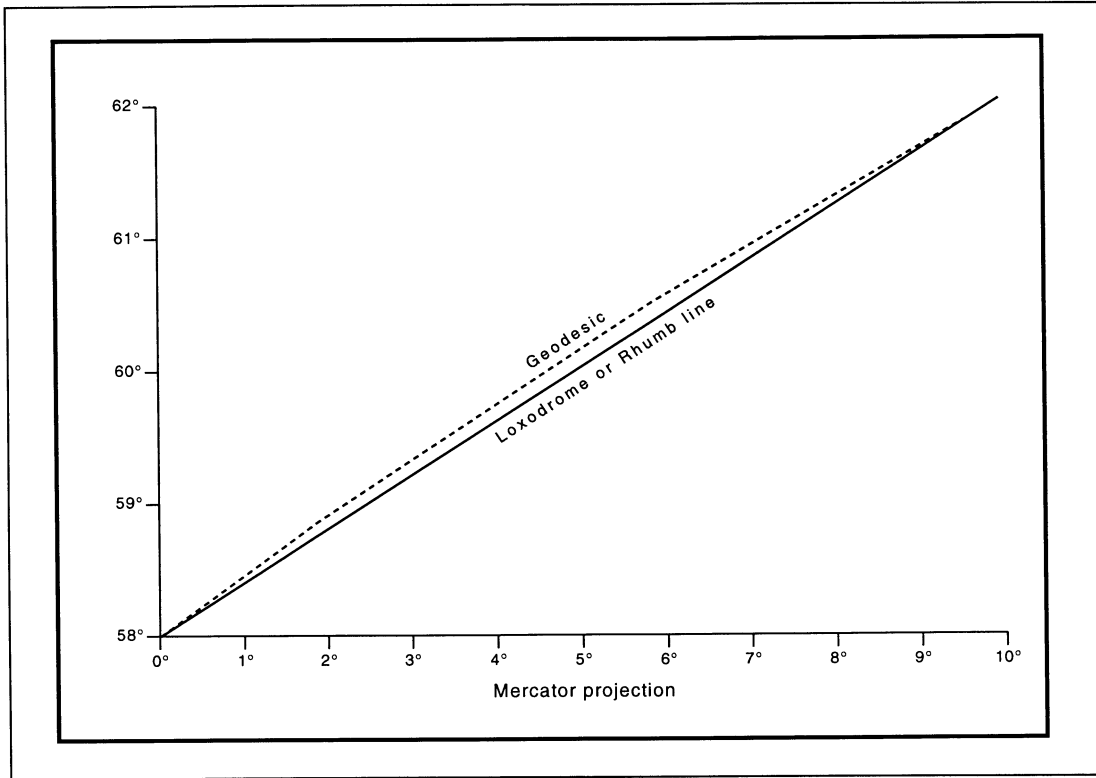


Figure 2

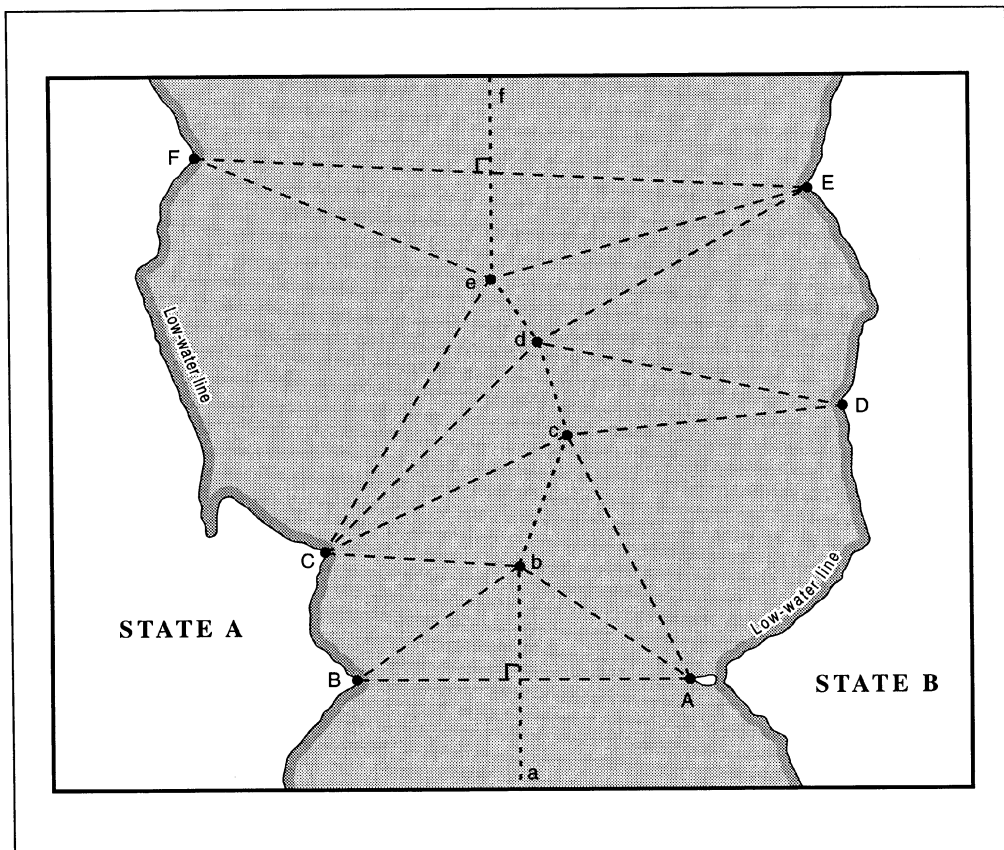


Figure 3

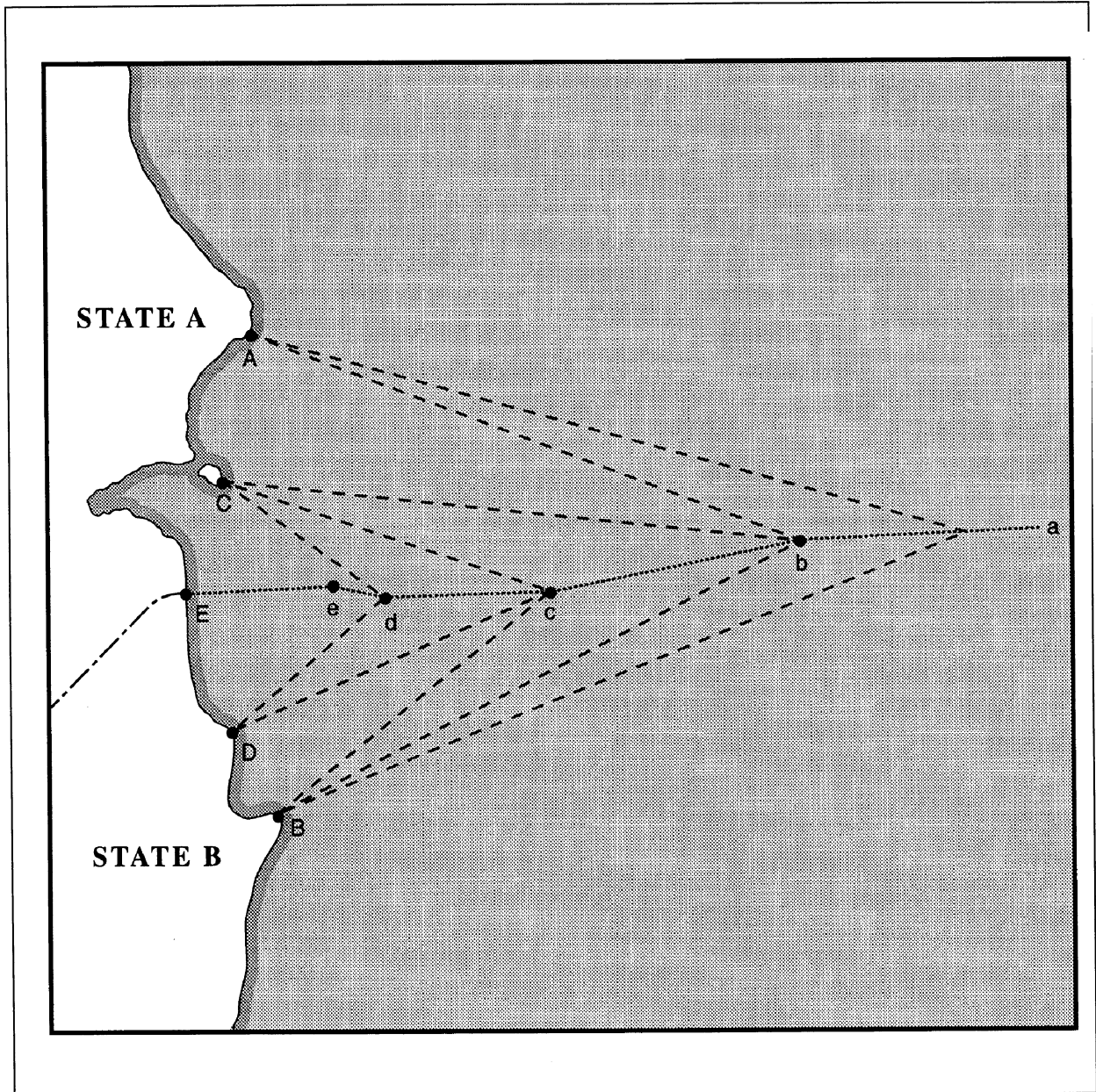


Figure 4

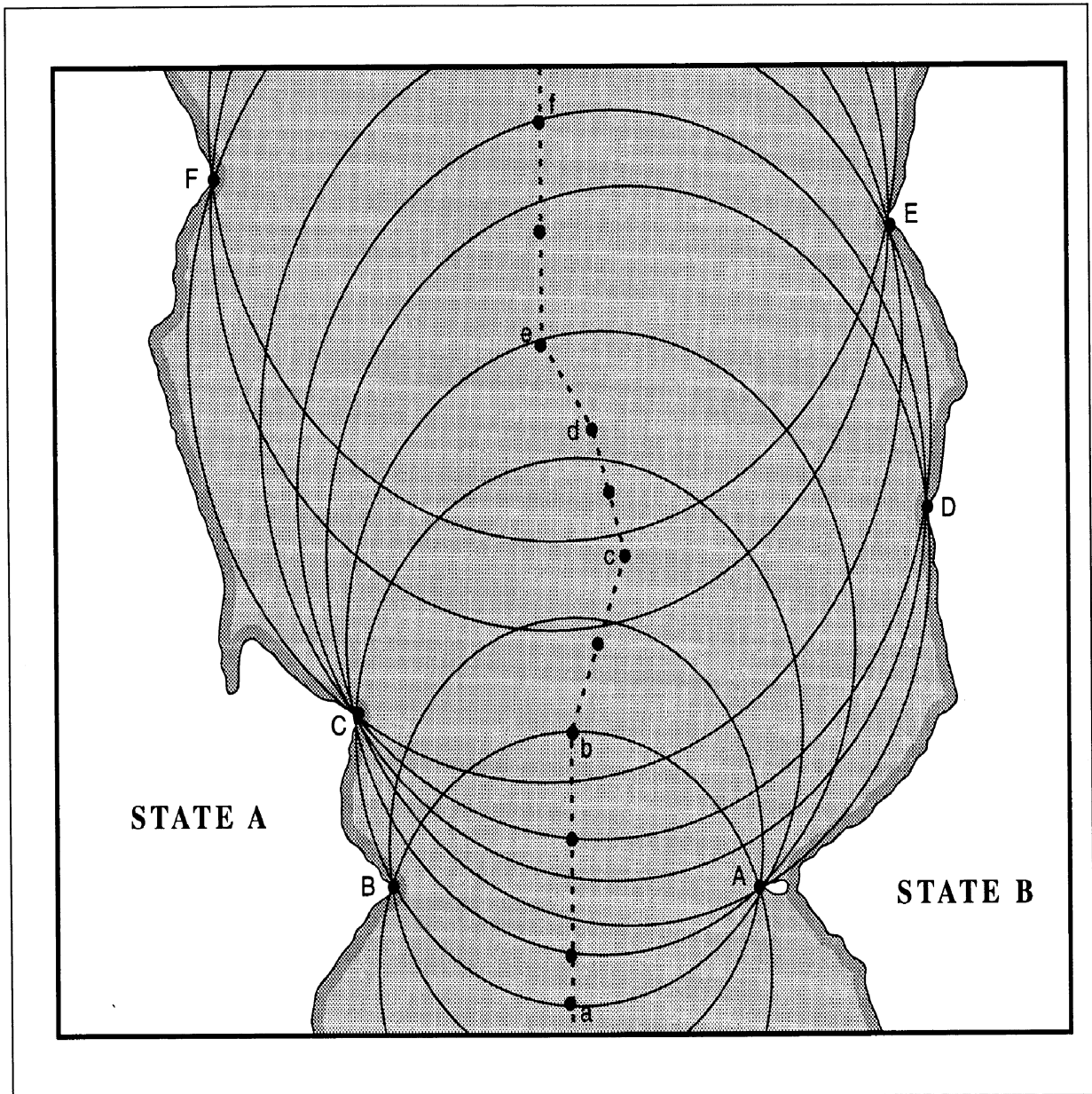




Figure 5

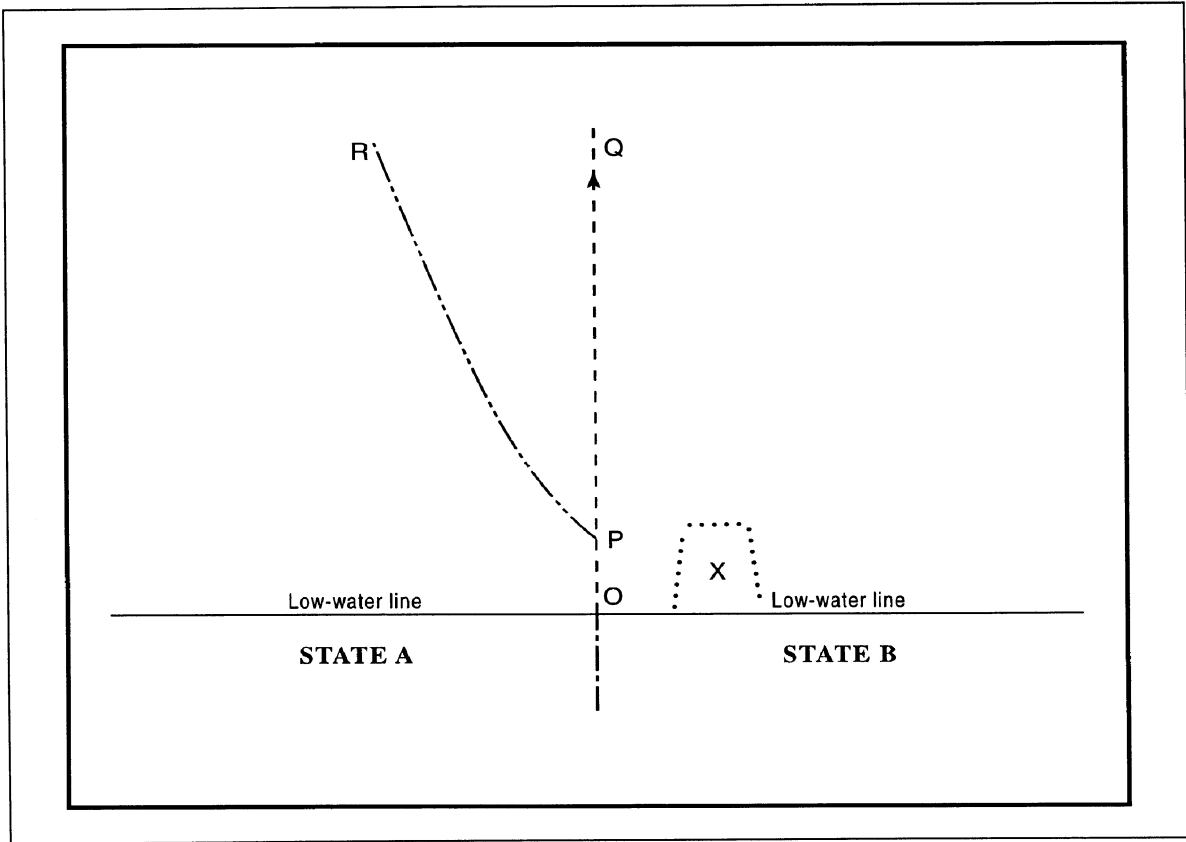


Figure 6

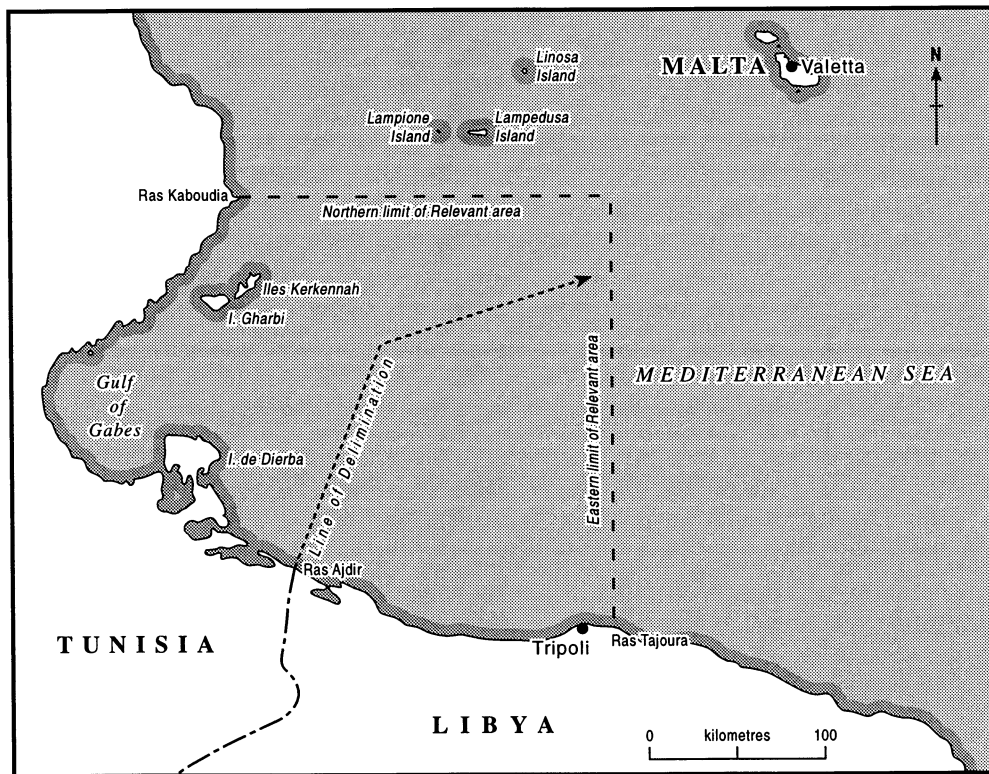


Figure 7

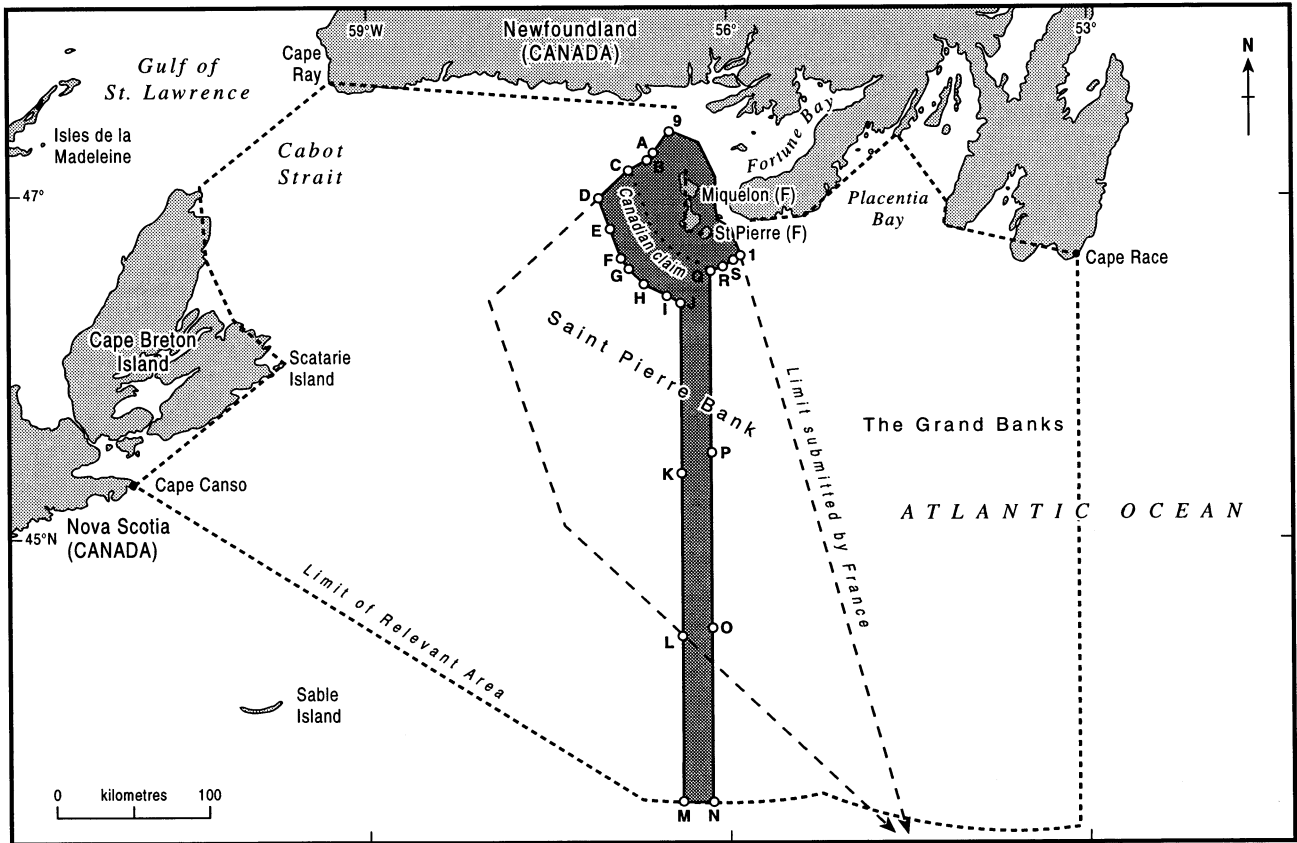
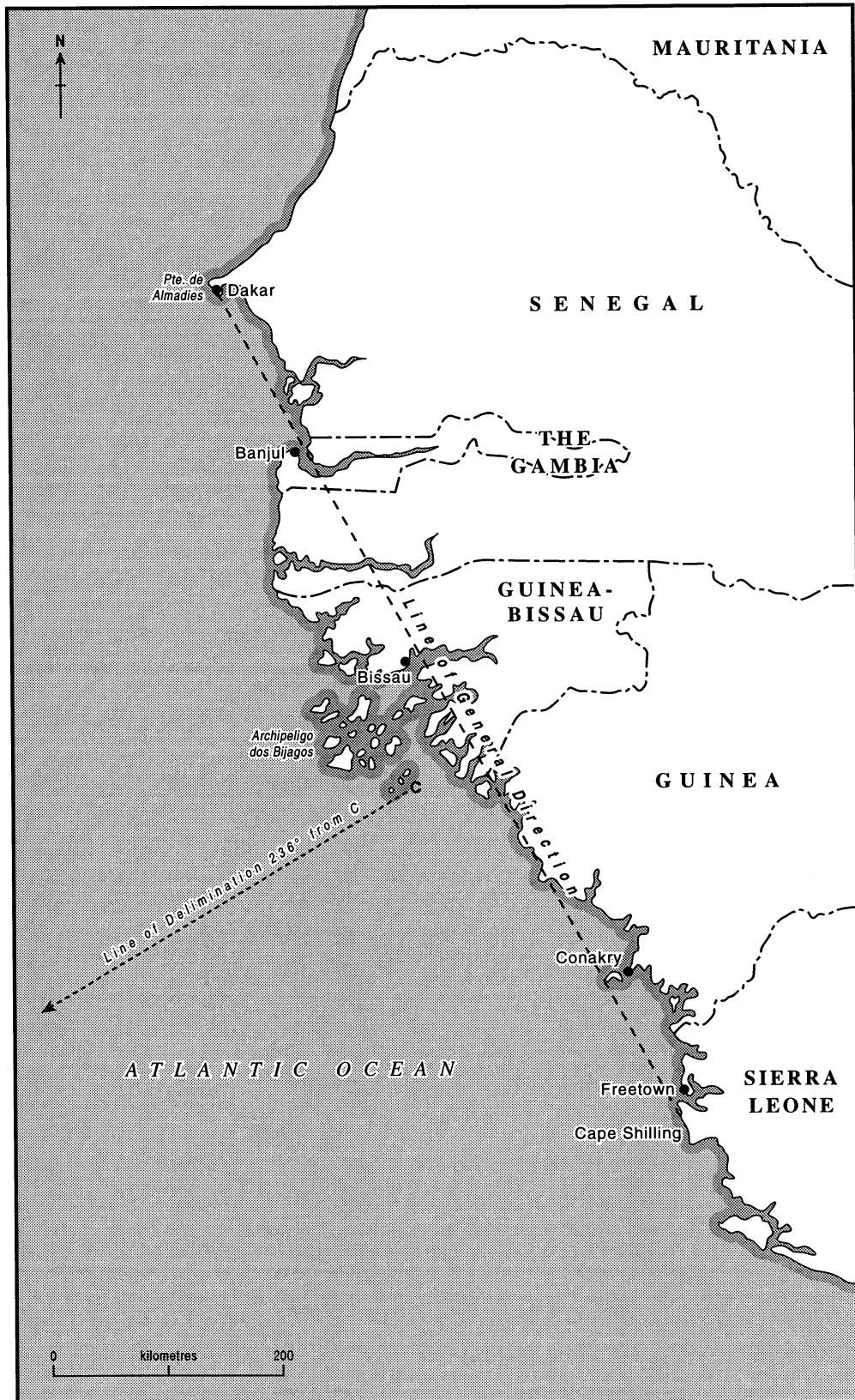


Figure 8



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<sup>69</sup> This work gives the text of every published maritime boundary agreement or award from 1942 to 1991, together with maps and commentaries on various aspects of the agreements/judgements. There are also regional commentaries and a number of articles by experts on different aspects of maritime boundary delimitation

<sup>70</sup> This work includes a glossary of technical terms used in the 1982 Convention; six sections on technical matters involved in practical applications of the Convention, including charts, geodetic factors and bilateral boundaries; five appendices including a list of computer programs

Prescott, J. R. V. (1985) *The Maritime Boundaries of the World*, London: Methuen.

Shalowitz, A. L. (1962) 'Shore and Sea Boundaries', US Department of Commerce Publication 10-1, Washington US Government Printing Office.

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US Department of State, *Limits in the Seas*.<sup>71</sup>

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<sup>71</sup> A series of which gives details and analysis of either individual national baseline claims or bilateral boundary agreements. As of January 1994 there were 63 of the latter each giving details of the relevant agreement and a technical analysis of the line of delimitation