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HALF-EFFECT APPLIED TO EQUIDISTANCE LINES

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ABSTRACT

Two continental shelf delimitations have specified that an island or islands should be given only half-effect, but the concept has been applied in different ways. This paper examines some ways in which, assuming the case to be appropriate, half-effect may be applied, and demonstrates the need to consider carefully what modification to the equidistance line is intended before deciding on the method to use. The views expressed in this article are those of the author, and do not necessarily reflect those of the British Government.

INTRODUCTION

The possibility that small islands or other topographical features may have a distorting effect on maritime boundaries has frequently been the subject of discussion in connection with the principles to be employed in boundary determination. The effect of such features becomes particularly apparent when, as in the majority of cases, the boundary is to be based on equidistance. In those cases in which the distortion caused by topographical features is disproportionate it has been suggested that the appropriate modification to the equidistance line might be achieved either by ignoring the features in question or by giving them only partial effect. Nowhere, however, has the author found any examination of the application of partial effect. It need hardly be added that the following discussion assumes that the case is one in which partial effect for the features in question would be appropriate.

Two cases are known where half-effect has been specifically used. The 1965 Agreement between Iran and Saudi-Arabia (superseded in 1968) specified a line that divided equally the area between a line giving full effect to the island of Khark and one giving no effect to it [1]. The award of the Court of Arbitration on the Delimitation of the Continental Shelf between U.K. and France [2] gave half-effect to the Scilly Isles by : first choosing a single feature on the southern side of the islands, a single feature

at the south-west tip of Cornwall, and a single feature off the north coast of the French island of Ushant ; the bearings from the last-named feature to each of the other two were then determined ; from these a mean bearing was calculated and swung through 90° to give the bearing of the half-effect equidistance line. The first of these cases was one of a line between coasts lying opposite each other, and the second the Court held to be equivalent to that of a line between adjacent coasts. Applied to similar cases the two methods would have different results.

In the discussion which follows all the examples are illustrated in terms of plane geometry, but in practice proper allowance must of course be made for any chart projection distortions if the boundary is being determined by graphical means. For simplicity the islands in the first illustrations are assumed to be single points (shown within a position circle for clarity) but in practice they may be of considerable size and contain a number of individual basepoints. This does not affect the argument, but the treatment of an island consisting of more than one basepoint is considered later. Furthermore, although the discussion is limited to the half-effect of islands the principles are just as applicable to any other proportionate effect, whether to islands or to coastal configurations giving rise to distorting effects.

OPPOSITE STATES

Figure 1 is a formalised representation of two states — Northland and Southland — the coasts of which are opposite each other, and of an island

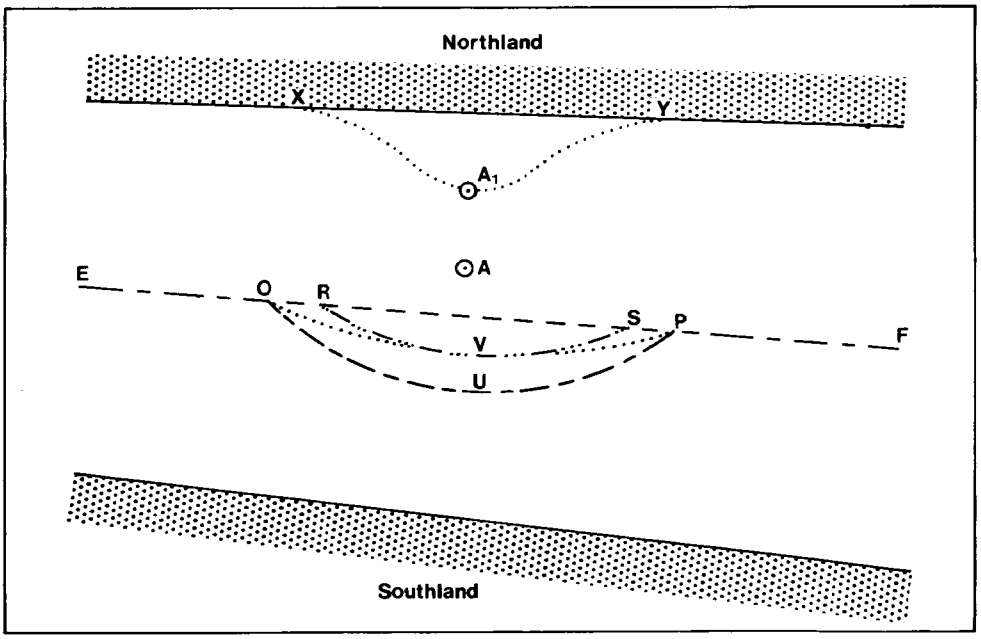

FIG. 1. — Opposite states.

'A' belonging to Northland. The equidistance line giving full effect to A (*the full-effect line*) EOUPF is shown by alternate short and long dashes. If A were to be given no effect the resulting equidistance line (*the no-effect line*) would be the straight line EORSPF. If a *notional position* A_1, half way between A and the mainland, were to be used as a basepoint the resulting version of a half-effect line would be ERVS. I shall call this line the *half-distance line,* and A_1 the half-distance notional point. This half-distance line neither bisects the area between the full-effect and no-effect lines nor, of course, is it equidistant from those two lines.

The dotted line OVP represents a line equidistant from the full-effect and no-effect lines ; I shall call it the *bisector line.* What notional basepoint would generate such a line ? Rather suprisingly it would be a series of basepoints lying along the dotted line X A_1 Y. In fact the island A which gave rise to the full-effect line OUP is transformed for this form of half-effect to a notional baseline of considerably greater extent and in the form of a promontory of the mainland instead of an island.

It should be noted that none of the three curved lines lying between O and P is the arc of a circle (except in the unlikely event of both shores being absolutely straight and parallel), and that the bisector line OVP does not divide the area between the full and no-effect lines equally. It would be wrong to conclude, though, that in practice the bisector line can never divide the area equally or that the half-distance line must always divide the area so that the greater part lies on the side of the full-effect line ; in any case there are many ways in which an area may be equally apportioned. Nevertheless the resulting line if considered in relation to a notional basepoint is likely to produce a line similar to X A_1 Y if the coastlines are relatively straight or if the general form of the mainland coast of the island-owning state is concave in that area.

ADJACENT STATES

Figure 2 is a formalised representation of a more or less straight coastline from which springs at E the maritime boundary between Eastland and Westland : there is a Westland island at A. EOF is the full-effect line, EOP the no-effect line and EOQ the bisector line which in this sort of case is likely also to divide the sector into equal areas. The half-distance line is RS based on the notional basepoint A_1. By contrast the notional basepoint for the bisector line is at M which lies half-way between A and E on the arc of a circle centred at O. Furthermore if the off-shore island had been at B the bisector notional point would be at M_1 — having a very different effect from a half-distance line based on B_1.

Figure 3 shows a less formalised but nonetheless imaginary concave coastline with an offshore island of Northland's at A. In this case the equidistance lines are controlled by discrete points on the mainlands as well as on the island, and the controlling basepoint on Northland for the no-effect line moves from J to K. In this case the notional basepoint for the bisector line OQ starts as M_1 and then moves to M_2. These points lie half-way along

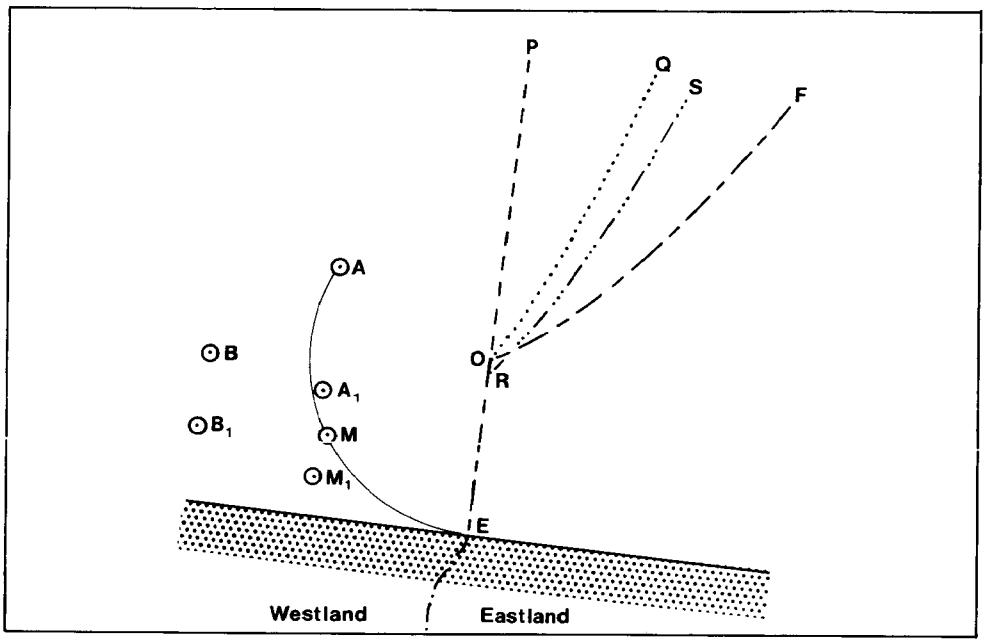

FIG. 2. — Adjacent states ; straight coastline

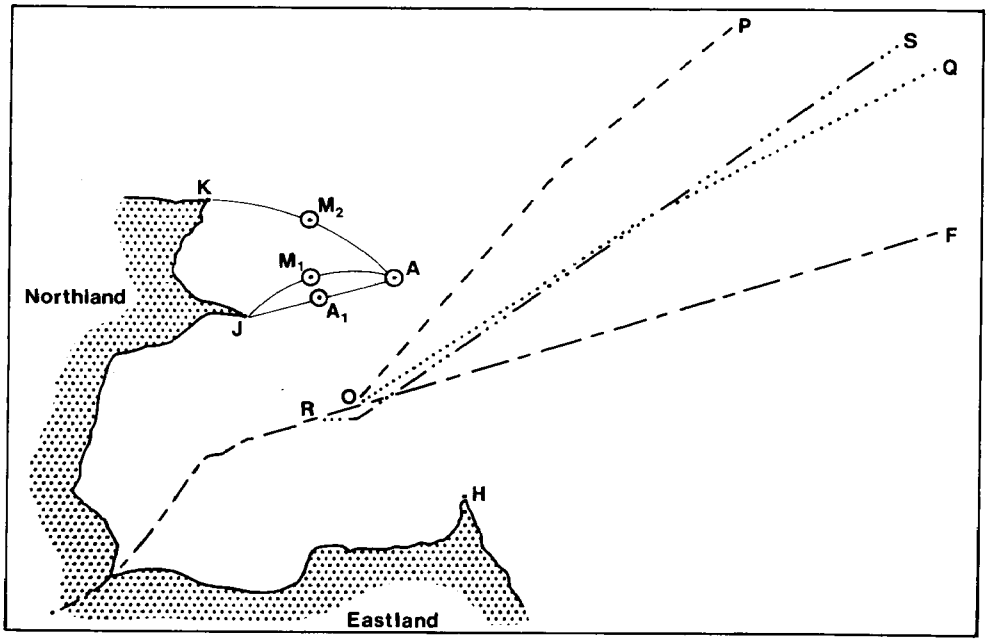

FIG. 3. — Adjacent states ; concave coastline.

the arcs AJ and AK respectively centred at the equidistance tripoints formed by : HA and J for M_1 ; and HA and K for M_2.

The half-distance line based on the notional point A_1 is shown by the line RS, and it might be thought that there was no great difference on

balance between that and the bisector line OQ. It must be remembered, however, that the divergence will increase as the two lines are extended further seaward, and in the case of a 200 mile limit or a continental margin beyond that the difference may be very large.

It should be noted, too, that in this case — and in many other actual conditions — it is not necessarily obvious where A_1 should be located to achieve the desired intent. Should it be half-way to the nearest point of the mainland, or to a mid-point on a line joining J and K, or to a perpendicular to JK, or to K itself ?

THE HALF-ANGLE

Figure 4 represents three basepoints W, X and Y of which Y is an island associated with the mainland basepoint W. X is the basepoint of the neighbouring state. C is the point equidistant from all three (the tripoint). A no-effect line will be the perpendicular bisector (*) of the line WX and

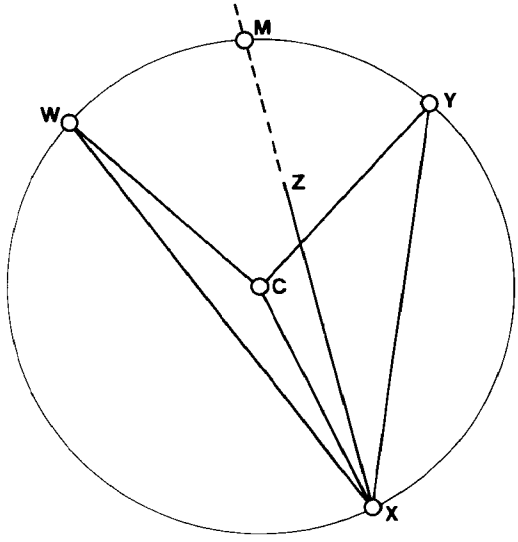

FIG. 4. — Effect of halving the angle.

(*) As already mentioned, this illustration is made in terms of plane geometry. It must be immediately apparent, though, that a straight line on a mercator projection for instance can only represent an equidistance line on the earth's surface in certain limited conditions which are unlikely to occur in practice ; similarly only in very limited conditions will a point geometrically half-way along a straight line on a mercator chart lie at the geographical mid-point. By using a suitable conical projection it is possible to obtain a graphical solution by plane geometry to an accuracy commensurate with the scale of the chart or map, but in practice these days the actual determination of a line at any distance from the coast or dividing a potentially rich area is better achieved from computing by reference directly to the appropriate spheroid, without the need to consider the mathematics of any particular map projection [3]. In fact the 'bearing' is best represented by a 'geodetic azimuth' defining the direction of a geodesic line. This will be almost identical (within mm on the earth's surface) to the equivalent equidistance line.

will pass through C. The full-effect line will be the perpendicular bisector of YX and would also pass through C if produced in that direction. A line lying half-way between them (i.e. the bisector line) will be perpendicular to a line bisecting the angle WXY, and will pass through C. Because any given angle at X must subtend the same distance anywhere on the circumference of the circle WXY, the half-angle line XZ which bisects the angle WXY must meet the circumference of the circle at a point M at the midpoint of the arc WY. But the bisector line must also pass through C. In other words the bisector line must be the perpendicular bisector of the line XM ; the notional basepoint for the bisector line must lie on the circumference of the circle, and must be M. Thus from any given basepoints the bisector line and the *half-angle line* (used in the U.K.-French Award) must be the same so long as the half-angle line is made to pass through the half-effect tripoint, and in that case the notional half-effect basepoint will also be the same as the bisector notional point. If on the other hand the half-angle line is off-set from the tripoint, the notional half-effect basepoint will move twice as far from M along the line XZ as the *half-angle line* is offset from the tripoint.

SIZE OF A NOTIONAL ISLAND

So far islands have been considered as single basepoints, but that will seldom be the case in practice. Figure 5 illustrates an island, with a straight coast efg, lying off a mainland basepoint J, with a neighbouring state's basepoint at H. The seaward end of a full-effect line will be the perpendic-

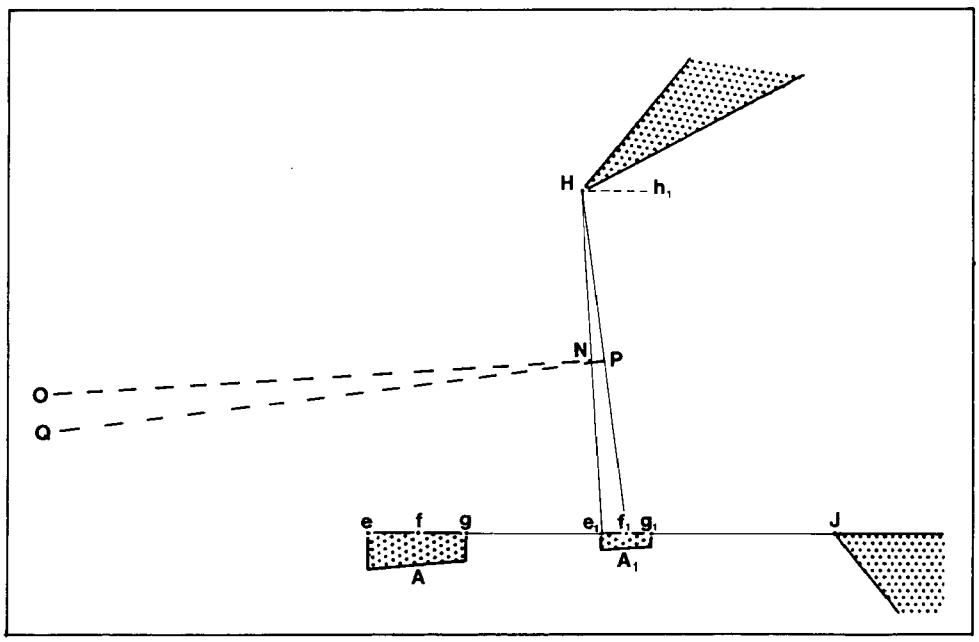

FIG. 5. — Use of a representative point.

ular bisector of a line eH. If e is translated to a half-distance notional point it will lie at e_1, the mid-point between e and J. Similarly a small part of the full effect line will be governed by g, the notional half-effect equivalent of which lies mid-way towards J at g_1. Thus it is clear that when dealing with a notional half-effect island of measurable size, that size must be diminished in the same proportion as the distance to the ' mainland ' is diminished, and this will apply also in the case illustrated in figure 1. This last condition may be contrasted with the *increase* in notional size resulting from use of the *bisector* line in such a case.

THE REPRESENTATIVE POINT

In the U.K.-French Award described earlier in the paper the Scilly Islands and Ushant were both reduced to single basepoints for the purpose of obtaining the bearings from which the half-angle line was to be calculated. I call such single basepoints *representative* basepoints, and their use may greatly facilitate the determination of a suitable line, particularly bearing in mind that eventually for practical reasons any true equidistance line derived from a multitude of basepoints will need to be simplified in some way before it can be described adequately for treaty purposes.

Referring again to figure 5, let us suppose that a representative point for the island A is chosen at f. Its notional half-effect position (again assuming the use of the half-distance method) will be at f_1. Now as already discussed, a half-effect line for the whole island would eventually be the perpendicular bisector of He_1 (i.e. the line NO), but using f_1 it would be PQ which diverges significantly from NO and would produce a very different result at a large distance offshore. To redress the balance H must also be moved to a notional position along a line towards h_1 parallel to and for the same distance as e_1 f_1.

CONCLUSION

Care has been taken throughout this article to avoid prejudicial terms like ' the true half-effect line ', for it is not possible to describe one of the lines illustrated as being more correct than another. Everything depends upon what is intended to be achieved. To take two examples : it may be desired merely to modify the lines which are the result of a particular topography, in which case the bisector line might be appropriate ; alternatively it may be that the geographical relationships themselves are to be corrected, in which case a half-distance line might be appropriate. What is important for the expert is to remember that the methods illustrated here may produce very different results. The particular geographical situation must be carefully examined and the results of different methods assessed against the intent before a particular solution can be either recommended or adopted.

REFERENCES

[1] Limits in the Seas, No. 24. — International Boundary Study Series A. — U.S. State Department Bureau of Intelligence and Research.

[2] Decision of 30 June 1977.

[3] See also HODGSON and COOPER. — The Technical Delimitation of a Modern Equidistant Boundary. — *Ocean Development and International Law Journal*, vol. 3, No. 4.