

## Mapping in Support of Frontier Arbitration

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### Introduction

In my article in the previous issue of this Bulletin, I suggested that greater attention to, and understanding of, geographic matters by both the tribunals and the parties in land boundary arbitration cases can lead to a delimited boundary being produced faster and to a higher standard. The selection or, where necessary, production of maps and air photographs to be used for delimitation illustrate this contention.

### Maps for Delimitation

Ideally, tribunals of lawyers would only be responsible for stating the principles to be followed in delimiting a disputed boundary and would leave the detailed delimitation to a joint team of technical experts. However, unlike maritime boundaries, it has almost always been impossible to find a set of principles to apply since each land boundary has its own characteristics which depend on local circumstances. Since any uncertainty about the line decided by the tribunal is likely to lead to further dispute between the parties, it has proved necessary for tribunals to include a detailed delimitation in their judgement. This usually consists of a textual description supported by an annotated map. I will return to the form of the text and its relationship to the map in a later article as, for the present, I wish to concentrate on the provision of a suitable map for delimitation.

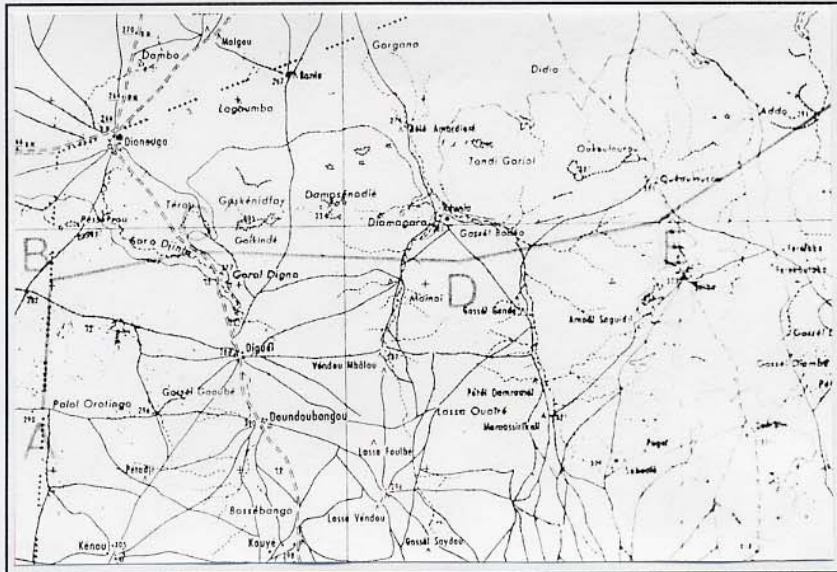
The scale of the map selected for the delimitation should be sufficiently large to show the border in the detail required by the tribunal and will depend on how developed the area is. In practice the process is often reversed with the tribunal delimiting the boundary to the accuracy possible with the best available map. This can lead to a sub-standard result. In the Burkina Faso-Mali case in 1986, the International Court delimited the boundary at 1:400,000 scale, see Figure 1, though a scale of 1:200,000 is shown incorrectly on the monochrome map used. (Although the judgement at a footnote on page 98 implies otherwise, the sealed copies as well as the published copies are at 1:400,000 scale). The actual map used was a

1:200,000 Institut Geographique National (IGN) compilation. Because of the reduction by a half, such detail as does appear on the map is almost illegible. Because of inadequacies in the map, the problem area of the In Abao pool is inadequately delimited. In addition the accuracy of the map is suspect for the purpose of delimitation. It was made by graphical air survey methods based on sparse astronomical control. There could easily be errors of a kilometre in the position of detail. This was acceptable when the map was made because more accurate methods would have taken too long and been prohibitively expensive. The map is a good general guide to an otherwise unmapped area but is not adequate for the definitive positioning of the border. Although this is a sparsely inhabited desert area, such a map is surely inadequate and unworthy of the enormous effort and expense that the parties and the International Court put into determining the boundary.

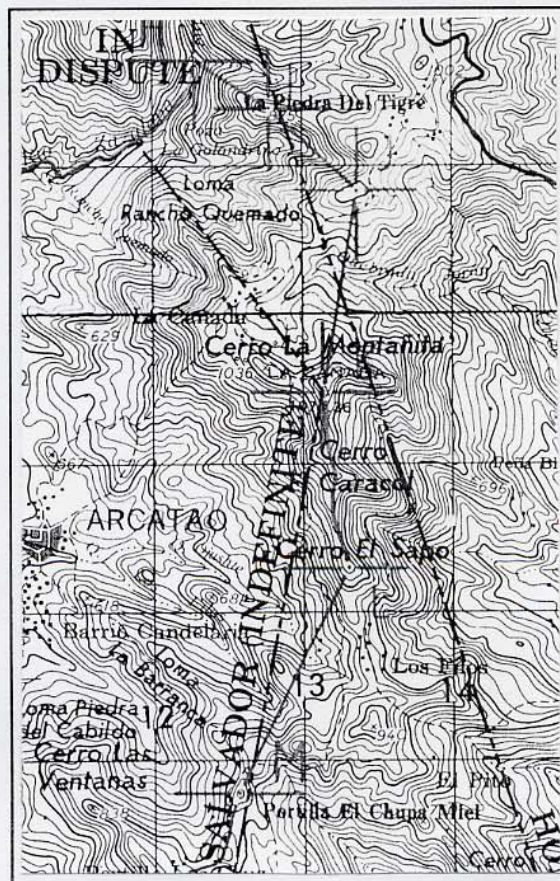
It would not have been difficult to produce a much better solution at little extra expense. The IGN air photography used to make the map undoubtedly still exists and could have been used to define the turning points accurately and unequivocally as was done in the Palena case (see below). At somewhat more expense, but still cheaply in relation to the overall cost of the case, large scale maps could have been made, from the air photographs, of the turning points and the In Abao pool. Another solution would have been to use satellite photography, either to identify key points or to prepare orthophotos for use as on the Israel-Jordan border (see below).

Another consideration is that the map used for delimitation should be acceptable to both parties. In the Burkina Faso-Mali case, because the map was made by the French Government, the former colonial power in both countries, it was considered 'neutral' but it is not always possible to find such a solution. In the El Salvador-Honduras case both parties possessed versions of the 1:50,000 maps of the area made by the Inter-American Geodetic Survey (IAGS) but they were ruled out because the titles, place names and boundary depiction were

**Figure 1:**  
**Extract from Map Referred to in the Judgment of the**  
**ICJ in the Burkina Faso/Mali Case**  
**(1:400,000)**



**Figure 2:**  
**Extract from Map III (of 6) Illustrating the Course of the Boundary between**  
**El Salvador and Honduras as defined by the Judgment of the ICJ**  
**(1:50,000)**

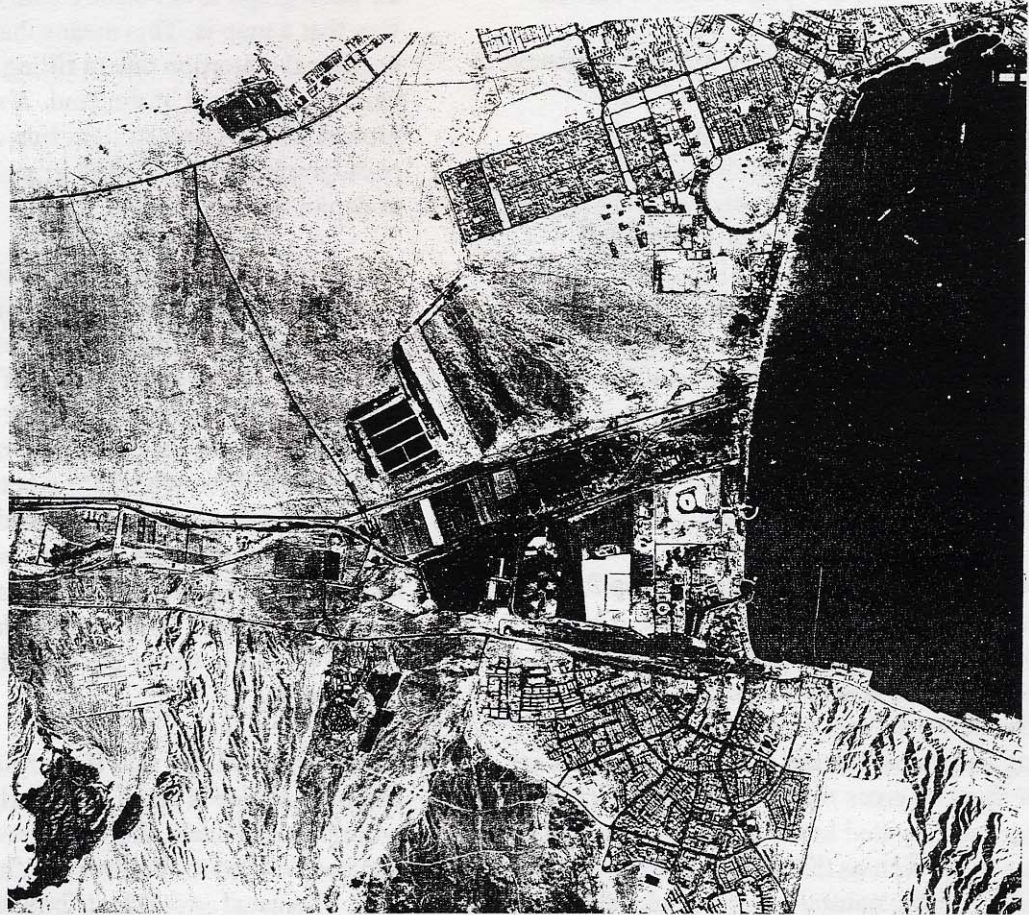




**Figure 3:**  
**Air Photograph Defining the Location of Turning Point G**  
**Incorporated in the Award in the Argentina/Chile 1966 Case**  
**(Approximately 1:25:000)**



**Figure 4:**  
**Extract from Orthophotomap of Wadi Araba/Emeq Ha'Arava**  
**Delimiting the Boundary Between Israel and Jordan**  
**as part of the Peace Treaty of 1994**  
**(1:50,000, original 1:20,000)**





one-sided. Fortunately there was also a US version of the map which was acceptable to both parties.

In the latter case the US Defense Mapping Agency version of the IAGS maps were used for the delimitation. Original coloured copies were mounted together and hand annotated with the boundary for the sealed copies and working spares for each party. Full scale monochrome printed copies, with a red overlaid boundary, were published, see Figure 2. All copies bear full marginal detail such as title, source, scale, north point, graticule values and signatures of the President and Registrar. This delimitation is more satisfactory than Burkina Faso-Mali though available air photography could have been used advantageously to enhance the result.

A very effective alternative to using a map for delimitation was used in the Palena case. The text of the delimitation designates turning points (but does not attempt to describe them) and describes the border between them as straight lines or following a physical feature. The turning points are solely defined by cross marks on air photographs which are incorporated in the award, see Figure 3. In remote areas such as this there are rarely permanent, unique, natural or man-made features that can be used to describe points textually. Even if a point is marked on a map there is often insufficient detail on the map to transfer the point to the ground accurately. However, an air photograph contains a wealth of detail of rock markings, vegetation and soil patterns that makes point identification easy and unequivocal. This technique is widely used by surveyors to identify control points and it has been shown that identification in remote areas is largely unaffected by change of seasons or the passage of years.

Unusually, in the Palena case the Court, at the request of the parties, supervised the demarcation of the boundary. The boundary that was demarcated was plotted on the map that had been prepared for the arbitration. This map and a report on the demarcation were approved by the Court and issued to the parties as Court documents. Presumably, in law, the demarcation documents now supersede the delimitation as the definitive statement of this boundary.

While the use of air photographs for delimitation in the Palena case is believed to be unique it does seem that a development of the potential of air photography is likely to become the most effective basis for delimitation in the future. The detail on an air photograph is not orthogonally projected in the

way that a map is. This means that there is positional distortion due to tilting of the camera and variation in height of the land. A straight line on the ground will not be a straight line on an air photograph so that air photographs cannot be used to depict the line of a boundary.

Orthophotomapping takes out these distortions to produce a photographic image with map properties providing an ideal medium for defining a boundary since it has the wealth of detail of a photograph married to the positional integrity of a map. The technique has not yet been used in an arbitration but has been used for delimitation between countries where surveyors have taken a leading role in the practical arrangements. A very good example is the recent rapid and effective delimitation of the boundary between Israel and Jordan in 1994, see Figure 4. This is surely the way ahead for future arbitrations.

I hope I have shown that if professional survey and mapping advice is taken at an early stage by arbitration tribunals, there are techniques available that can be used to improve the final product of any case. The usual caveat by tribunals, including the International Court, is that such solutions are beyond their finances and management resources. This may be true in terms of the tribunal's allotted budget but taking an overall outlook it is a narrow approach. Spending a little on orthophotography could save a lot of time and effort in resolving the dispute and implementing the agreed boundary. In any case it is almost certain that some such mapping will have to be paid for eventually as part of the demarcation.

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## References to Source of Figures

- Award of Her Majesty Queen Elizabeth II for the Arbitration of a Controversy between the Argentine Republic and the Republic of Chile, Foreign and Commonwealth Office, 1966.
- Case concerning the Frontier Dispute (Burkina Faso-Mali), International Court of Justice, 1986.
- Case concerning the Land, Island and Maritime Frontier Dispute (El Salvador- Honduras: Nicaragua intervening), International Court of Justice, 1992.
- Treaty of Peace between the State of Israel and the Hashemite Kingdom of Jordan, Arava Border Crossing, 1994.

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