

Center of valley versus Thalweg: Revisiting the Israel – Jordan Aravah Boundary Dispute

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Key words: Israel – Jordan Boundary Dispute, Aravah Valley, Boundary Definition, Boundary Delimitation, Valley Centerline, Thalweg, GIS

SUMMARY

The Aravah Valley boundary dispute concerned interpretations of the term ‘Center of Wadi Aravah’ which was agreed as a starting point to the boundary negotiations between Jordan and Israel. The first interpretation which was adopted by the Jordanian side regarded the line as the line connecting the lowest points (Thalweg). Their interpretation was supported by several Official British maps drawn during the British Mandate over Palestine. However, there were other official British maps and documents and even Jordanian maps which regarded Wadi Aravah as a wide Valley. In this paper we present our boundary delimitation utilizing the valley centerline interpretation, following the development of a methodology for defining the valley extents. We then show the lines obtained from two different official British maps together with our new line. A special attention to the differences between the different delimitations in the Aravah Divide area is given. Our Analysis to the Aravah divide area shows that with both interpretations the line on one of the official British maps present a distinctive bias towards the west, in favor of the Jordanian interests.

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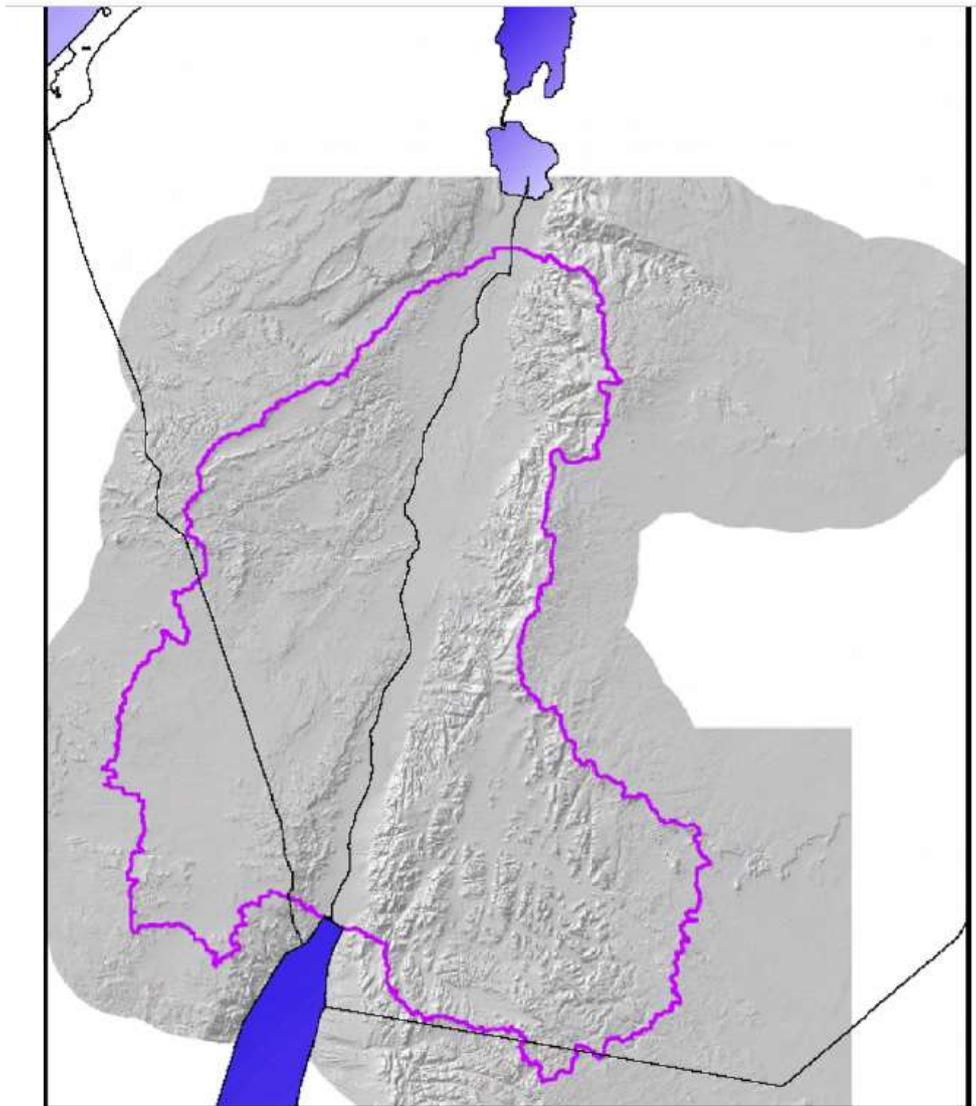
1. INTRODUCTION

The Common Agenda agreed during Washington negotiations (September, 1994) between Israel and Jordan concerning their common boundary states: “Settlement of Territorial matters and agreed definitive delimitation and demarcation of the international boundary between Israel and Jordan with reference to the boundary definition under the Mandate...”. The boundary definition concerning an administrative boundary between Palestine and the Hashemite Kingdom was published by the British High Commissioner in 1st September 1922, is stating that : "The Palestine Order in Council 1922 shall not apply to the territory lying east of a line drawn from a point two miles west of the town of Akabah in the Gulf of Akabah up the centre of the Wadi Aravah, the Dead Sea and the Jordan River". Between 1922 and Israel – Jordan negotiations in 1994, a significant number of interpretations of this definition were presented in different maps (Srebro, 2013a&b; Srebro and Shoshany, 2009). Questions concerning legitimate interpretations and their expression in maps, and in the field, were raised during the negotiations. A dispute emerged between Jordan and Israel regarding the appropriate interpretation of the definition: “ ... centre of the Wadi Aravah”. The dispute is between the thalweg of the wadi as representing a stream and the center of the wadi as the centerline of a valley. There were two preliminary problems which needed attention. The first was that the British administration had limited familiarity with the Aravah area, its topographic, lithologic and geological structure, and with the terminology: in some documents the area was termed ‘Wadi’ and in others ‘valley’. The second problem was fundamental scientific: the delineation of “valleys” and “wadis” is not well defined and agreed in the literature. During our presentation we will discuss innovative ways for determining the extents of desert valleys, apply them to the Aravah valley and show their centerline versus a line presented in one of the official British maps. Then, we will discuss the implementation of the thalweg approach on the area of the Aravah divide: the area separating the north and south basins.

2. ARAVAH VALLEY: EXTENTS AND CENTERLINE

The fundamental way of delineating valley extents would be based on crest lines: lines separating drainage basins. Map 1 shows the delineation of the Aravah drainage basin. This basin extends widely eastwards and westwards beyond the area relevant for the Aravah valley

boundary. Furthermore, there are numerous small basins which dissect the crestlines close to the main Arava drainage line.



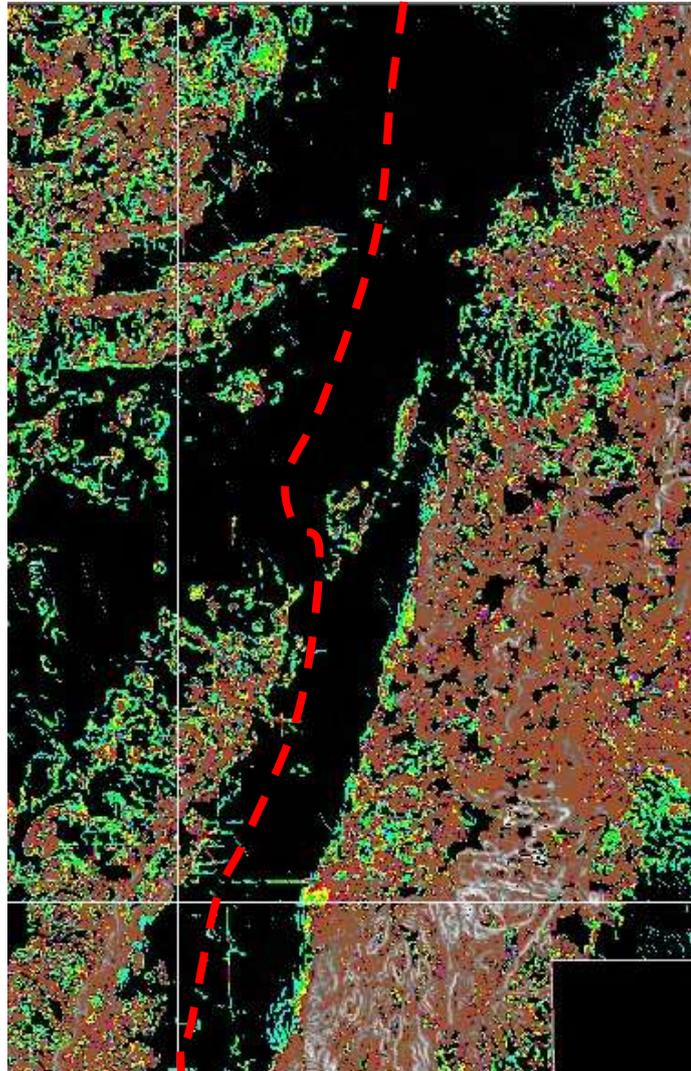
Map1: Drainage Basin : Arava Valley . Red Sea-Dead Sea Conduit Geo-Environmental Study Along the Arava Valley. Report of the Geological Survey of Israel GSI/29/2006

Our approach (Shoshany et al, 2009) in delineating the Valley extents is based on the separation between depositional and erosional surfaces. This can be achieved in two ways:

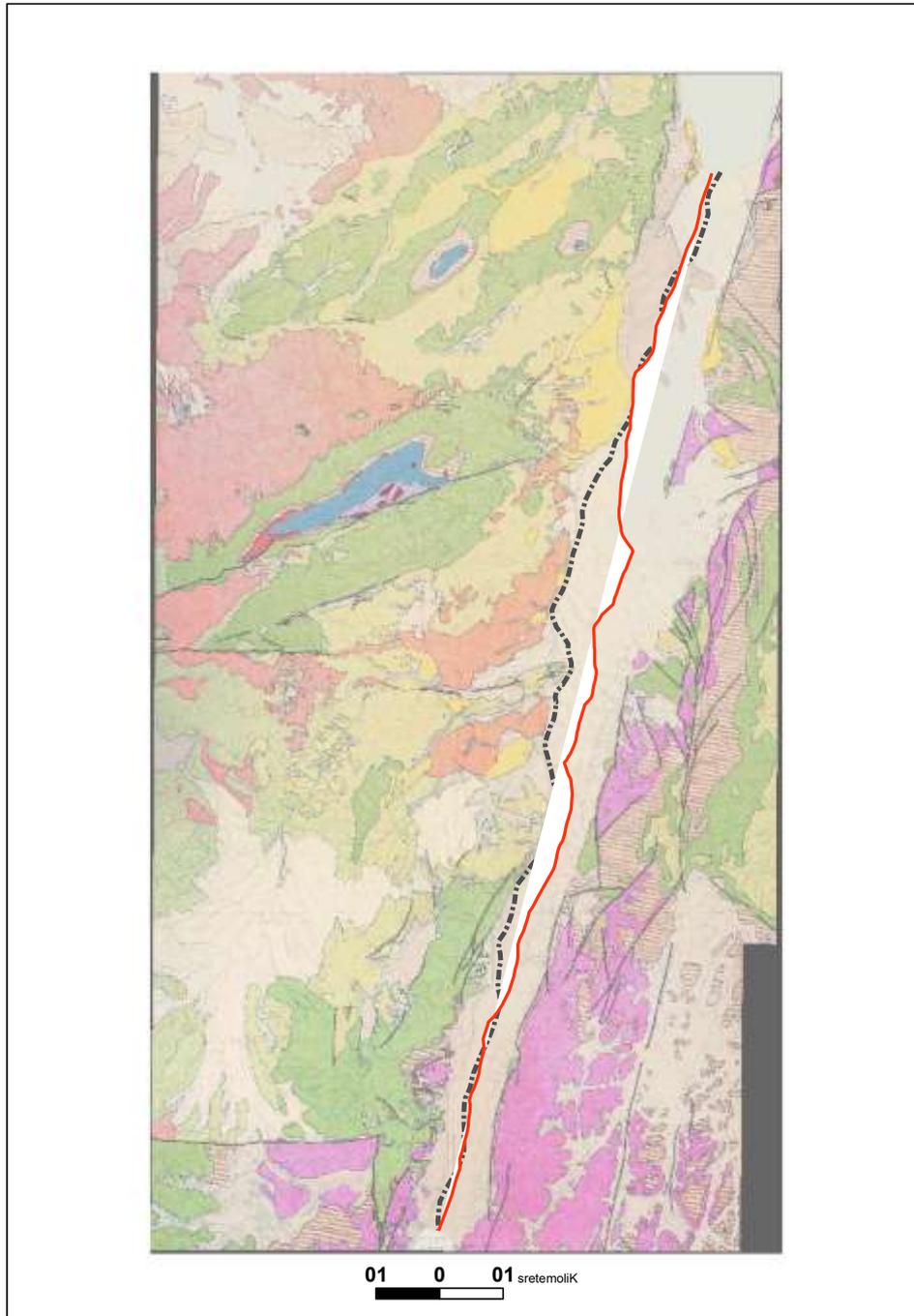
- a. Based on geological / geomorphological maps representing the mapping of lithological, rock and soil units.
- b. Based on topographic slope analysis in two ways:
 - i. The line representing the shift from convex to concave slope profile, where the convex part is representative of the erosional processes and the concave part representative of depositional processes.

- ii. The line separating the hilly/ mountainous topography and the flat depositional areas at the bottom of the valley. In deserts, alluvial fans with relatively gentle or moderate slopes frequently cover the valley bottom.

Map 2 presents the centerline marked (red dotted line) according to the valley extents determined following the mapping of the valley extents based on the separation of the mountainous and the alluvial fans' slopes. Map 3 integrates the red dotted line from the slope extents with a line derived from a British map on top of a geological map. A most distinctive shift eastwards in the central parts of the valley is obtained through application of the new technique.



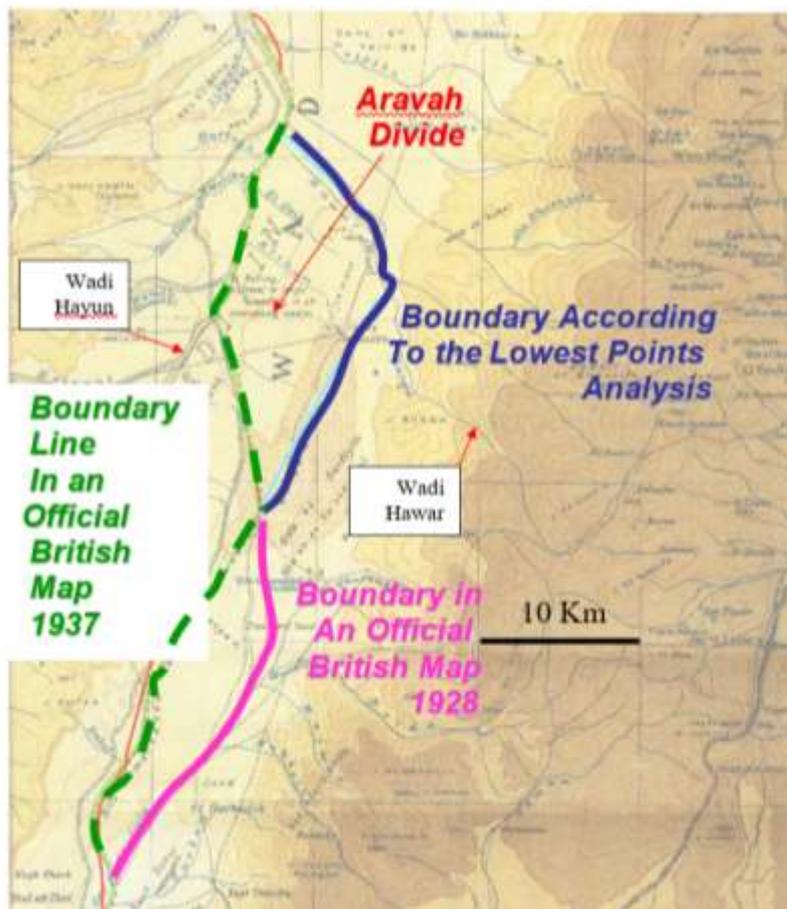
Map 2 : Mapping the Aravah Valley extents : Slope analysis (COPY RIGHT: Maxim Shoshany)



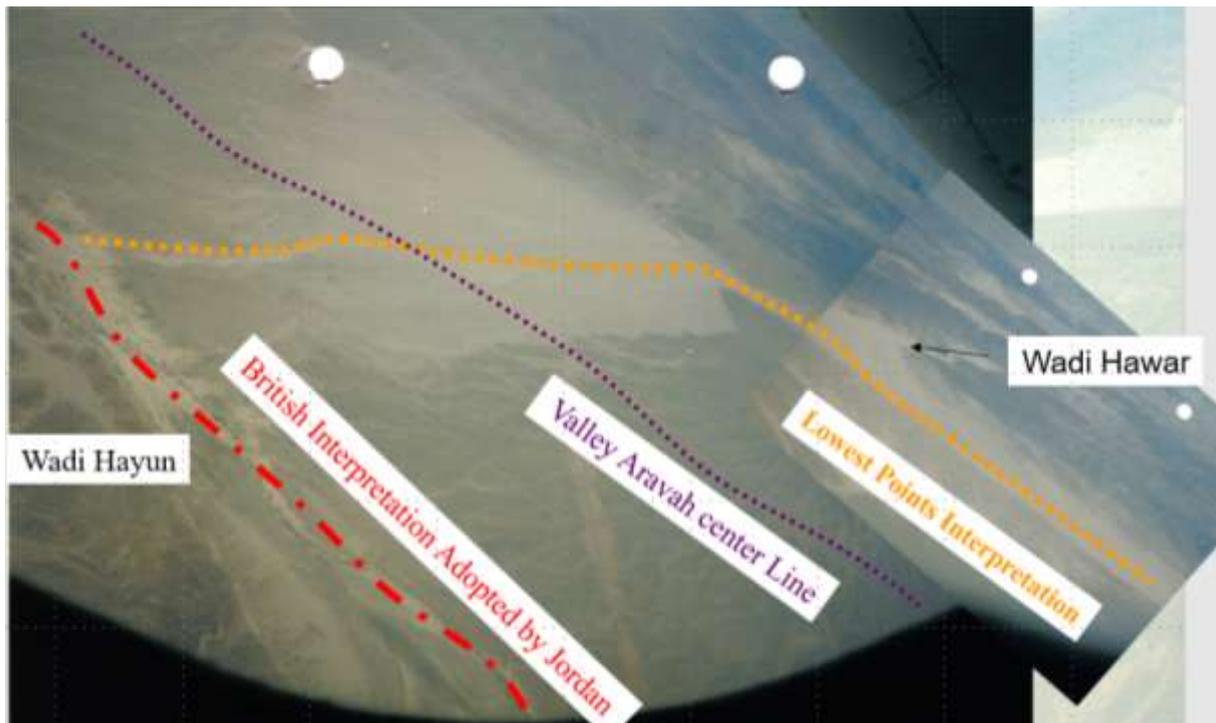
Map 3: Geological Map of the Arava region with a boundary line from a British Mandate Map and the Valley Centerline. COPYRIGHT Maxim Shoshany

3. ARAVAH DIVIDE: IMPLEMENTATION OF THE DIFFERENT INTERPRETATIONS

Two wadis supply the majority of the high water flows in this area: Wadi Hayun from the west and Wadi Hawar from the east. These two Wadis enter the Arava valley almost opposite to each other. The sediments deposited between them and a tectonic structure create a topographic barrier between the north and the south basin of the Arava valley. Map 4 presents a 3-D perspective from south to north towards the Arava divide showing the north-east route of the line connecting the lowest points. Map 5 presents the line of lowest points delineated by us and two lines from two official British maps showing that the west-east differences between the different versions are most distinctive, indicating that the British map of 1937 represents a western shift: decreasing the area included in the British mandate territory at that time.



Map 4: Boundary lines superimposed on a topographic map in the Arava Divide.
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Map 5: Boundary lines as superimposed on a pictured acquired during a flight over the Aravah Divide. COPYRIGHT : Maxim Shoshany.

4. SUMMARY AND CONCLUSIONS

The different lines obtained by implementing the Valley center versus the Thalweg (line of lowest points) were presented to the Jordanians during the Peace negotiations. It is not possible to prove that our scientific analysis made an impact on the Jordanian position during these negotiations. There were many other considerations which could influence His Majesty King Hussain and Prime Minister Itzhak Rabin in their final decision regarding the agreed boundary allocation which was then translated by experts from both sides into the current demarcation. The boundary line agreed finally represents a compromise between the Jordanian territorial claims and the Israeli interests in terms of settlements and agricultural areas.

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BIOGRAPHICAL NOTES

Prof. Maxim SHOSHANY is a Full Professor of Mapping and Geo-Information Science at the Technion, Israel Institute of Technology (IIT). He Received his PhD in Remote Sensing in 1990 from the University of Tasmania, Australia. Between the years 1997 and 2001 he was the Chairman of the Geography Department, Bar-Ilan University (Israel). In 2001 and 2002 he was on Sabbatical in the Department of Geography, Kings college, London, UK. Since 2003 he is the Head of the Remote Sensing Laboratory in the Faculty of Civil and Environmental Engineering at the Technion, IIT. His research concern mapping natural and political boundaries across desert fringe regions. He published more than 80 Journal articles in the field of remote sensing of ecosystems change along semi-arid to arid climatic gradients. In parallel, he was involved in developing GIS methodologies for boundary negotiations between Israel and its neighboring countries. During the Jordan – Israel negotiations he participated in the preparation and presentation of the Israeli professional documents including his analysis of the Aravah valley boundary delimitation. During the demarcation of the boundary in the field he was the head of the Israeli demarcation team for a section of 80 kilometers in the center of the Aravah valley including Zofar basin.

Dr. Haim SREBRO received his BSc and MSc degrees from the Technion, Haifa, in Civil Engineering and Geodetic Engineering and his PhD from Bar-Ilan University. He taught at the Technion and at Tel-Aviv University. He served as the Director General of the Survey of Israel and as Chair of the Inter Ministerial Committee for GIS 2003-2012. He is a Co-Chairman of the Israeli-Jordanian Joint Team of Experts since 1994, responsible for the delimitation, demarcation, documentation and maintenance of the International Boundary within the Joint Boundary Commission. Since 1974 he is a leading figure in all the boundary

negotiations and demarcations between Israel and its neighbors and signed the land and maritime boundary delimitations regarding the 1994 Peace Treaty between Israel and Jordan. In 2010 he signed the Agreement on the Delimitation of the EEZ between Israel and Cyprus.

He has been a member of ASPRS since 1978 and a member of ACSM and is a member of the Israeli Society of Photogrammetry and Remote Sensing and of the Israeli association of Cartography and GIS and of the Israeli Chambre of Licensed Surveyors. Dr. Srebro was the Conference Director of FIG Working Week 2009 at Eilat. He chairs the WG on International Boundaries of FIG Commissions 1 and 7. He is the editor in chief of The New Atlas of Israel in Hebrew (2008) and English (2011) and of the Atlases of the Israeli coast lines in the Mediterranean Sea (2005) and in the Red Sea and in the Kinneret (2011), and author of the books The Boundaries of Israel Today (2012) (in Hebrew and in English). Dr. Srebro is a researcher and a lecturer regarding international boundaries over the world. He published many articles on this topic.

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