

Interactive comment on “Faulting patterns determining groundwater flow paths in the Lower Yarmouk Gorge” by Nimrod Inbar et al.

Anonymous Referee #3

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"Faulting patterns determining groundwater flow paths in the Lower Yarmouk Gorge" by Inbar et al., presents a compilation of all available geological and geophysical data from the lower Yarmouk Gorge area. These include borehole data, geology and seismic cross-sections from south of the Sea of Galilee to the southern Golan Heights and including some data from Jordan. Results present a new faulting pattern for the area east of the Sea of Galilee. The authors suggest the presence of strike-slip faults, which form fault blocks and control hydrological parameters in the region.

While the paper presents an important reinterpretation and compilation of data within a regional context and adds information on the fault pattern along the northern section of the southern Dead Sea fault, there are some problems. The main issue I have is the lack of a proper, comprehensive discussion. Currently, the discussion is mixed in with

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the results of the study. By separating them into two individual sub-chapters, both will benefit. The Results section needs to be expanded and presented in a more precise and focused way.

The discussion must go into more critical issues that are currently lacking such as:
- Tectonic implications - Hydrological implications. In a paper titled "Faulting patterns determining groundwater flow paths in the Lower Yarmouk Gorge" – you do not discuss groundwater flow patterns - A discussion of the mechanism that formed these faults - do they fit in with what we know about the stress field in the area? It is not enough to say that since they are along the DSF, it fits. . . - Also, statements such as: "The present study shows that although there is no evidence for large vertical displacements, strike-slip faults must cross the LYG forming fault-blocks. Therefore, these faults must be taken into consideration when discussing groundwater hydrology" (lines 118-120) need to be formulated in a more rigorous way. Why "must" strike slip faults cross the LYG?

In addition, the discussion should address issues brought up in the Introduction. On lines 56-64 you mention the hypothetical fault trace of Magri et al. (2016), yet you do not refer back to this to show if your results support this trace or not. This is also true for the results of Goretzke et al (2016), which you mention in the introduction – do your results support or disprove their theories?

The GII provides a comprehensive database of historical-recent seismicity. In such a study, I would also expect you to use seismicity to prove the presence of strike-slip faults or thrusts and help rule out previous suggestions. I think this would strengthen your arguments.

Technical issues: - While the paper is well written, there are still a few grammatical mistakes. Please check the English again. - Every location, borehole, seismic line, etc. mentioned in the text needs to appear on a comprehensive location map, which is referred to in the text (e.g. Meizar 1,2 & 3 (Fig. 1)). This should be the very first figure of the manuscript (and not the third). This holds for every place name mentioned

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in the introduction and throughout the paper (GH, LYG, Golan syncline, Mt. Hermon, Sheikh Ali fault, Ajloun Dome, Hammat Gader and Mukheibeh springs, Meizar 1,2 & 3. . .) - Line 19-20: Please do not cite in the Abstract - Line 31: The more correct term is "Dead Sea fault (DSF)" in keeping with the "San Andreas fault" - Line 97-98: The DST was already defined above. There is no need to define it again. - Lines 99-100: You present the eastern fault entering the Sea of Galilee as the main branch of the DSF. Why do you rule out the western branch (Hurwitz et al., 2002)? - Line 134: "dots were connected" – please use a more scientific term. Perhaps "interpolation was carried out between data points" - Lines 140-146: From this paragraph it seems that you use the interpretation of Meiler (2011) for seismic cross section DS-3545. So when you say "reinterpretation" on line 149, what do you mean? It is not clear if you just took Meiler's interpretation or if you did something of your own. Please clarify. - Line 151-152: I do not understand the logic of the argument. Please rephrase so that it is clearer. Why is a thrust fault the more logical solution? - Line 156: Seismic data is not measured. It is collected. - Line 159: Repetition - Line 184-187: Please refer to Figure 4 - Lines 191-193: Repetition

Figures: Figure 1 should be a comprehensive location map that includes all places, boreholes, seismic lines, features, etc. mentioned in the text. Figure 2: please show uninterpreted seismic line together with the interpretation. Also on 2b – the vertical scale cannot be depth since this is a time section. Figure 3: this is in fact your location map and should come first. I cannot see the difference between Figure 4a and the bottom of Figure 3. Why do you need both if they are the same except for the location of profile A-A'?

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