

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

Reviewer #2

Dear Dr. Margane,

Particularly due to your long-term expertise in the area, we highly appreciated your kind words and constructive remarks on the manuscript! We hope to meet your points in the following.

C1: on the Syrian side where it should be mentioned that there are no known seismic profiles available (for this it could be referred to BREW et al., 2010 (Tectonic and Geologic Evolution of Syria, GeoArabia, Vol. 6, No. 4); which has e.g. Bussra-1 borehole, also mentioned in Meiler’s PhD). It should also be added that on the Jordanian side there are no seismic profiles in this area. The closest oilwell is NH-1.

A1: The aim of the presented study is to delineate the structural guidelines across the Yarmouk Gorge at the area of Hammat Gader – Meizar – Mukheibeh. Therefore, Syrian data are not discussed. Similarly, oil wells and remote seismic lines in Jordan and Israel are not discussed.

C2: By the way, you might also want to refer to geol. structure contour maps for Northern Jordan done by me in the mid 1990s (Margane & Hobler, 1994) and available by your team for the SMART project.

A2: Of course, we only missed that citation. Corrected.

C3: In the abstract and later in the text it should be made clear that the new fault system was not inferred from remote sensing.

A3: In that paper we have not dealt with methods such as remote sensing, gravity, magnetics, etc., and therefore those methods are not discussed.

C4: In fact that’s the disturbing part: “your” faults are not even located in the valleys/topo lows. So I am wondering how could they be inferred in areas where there is no geophysics like in NW Jordan?

A4: The faults described in the manuscript were inferred from seismic lines at the Golan Heights and their southward continuation across the gorge was inferred by geological profiles. One of the profiles was constructed as part of the current study, others were published by Sahawneh (2011). A line indicating the northernmost profile by Sahawneh was added to the map.

C5: Knowing how imprecise the fault system of Jordan was mapped by NRA in particular in the old days when satellite images where not used (until the 1990s) and when there was a lot of shifting in geological maps also due to the way mapping was conducted (we are speaking about hundreds of meters), I wouldn’t dare using these as reference.

A5: We are aware of the critical correctness of the old geological maps, available from NRA. The original maps have been made available as GIS files, which have been corrected by Julia Sahawneh and own work at the UFZ.

C6: 119-21: there is no proof for these faults.

A6: That’s correct, we reshaped the sentence.

C7: 123: relies Chapter 4: explain details of seismic data acquisition, e.g. spacing Text/graphics (Figures 2/3/4): text uses DS-3545, graphics use DS-3543; plz correct whichever is wrong.

A7: general description of seismic data collection was added with references to works with detailed description of the various parameters. DS-3545 is correct, typo was corrected.

C8: Chapter 5: Would be good to add mentioned locations, like Hamat Gader spring and Meizar 2 well in Fig. 3

A8: According to the remarks of RC1 we amended figures and new fig. 1 includes all information

C9: 219: why should faults be a constraint for GW modelling?

A9: Faults are often regarded as relative flow barriers with different hydraulic properties from the surrounding rock. Depending on the specific properties of the fault, it may either block or divert GW flow. In both cases it is constraining the model.

C10: Figure 1: you might want to add SF-Siwaqa Fault . Figure 2: plz add in Figure 3 which part of that seismic profile is shown here

A10: all maps were joined into a new Figure (Fig.1), which does not show any more Siwaqa Fault. The figure show the entire length of the seismic lines presented in Fig. 2

C11: Table 1: I have doubts Daisy is a valid reference. Can the described data be accessed by anyone (not being eligible)?

A11: We included the original reference Margane and Hobler, 1994, which is made available via DAISY. Daisy is accessible at <http://www.ufz.de/daisy> and holds data from several sources.

C12: Figure 3/4: add that the cute green lines are adopted from NRA geological maps MARGANE, A. & HOBLER, M. (1994): Groundwater Resources of Northern Jordan, Vol.3: Structural Features of the Main Hydrogeological Units in Northern Jordan. - Technical Cooperation Project 'Advisory Services to the Water Authority of Jordan', BGR & WAJ, BGR archive no. 118702:1-3, 57 p., 30 app., 38 ann.; Amman.

A12: Yes, please see answer on that comment above. Corrected also in the new Fig. 1.