Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
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Comment on nhess-2021-62

Anonymous Referee #2

Referee comment on "Identifying plausible historical scenarios for coupled lake level and seismicity rate changes: The case for the Dead Sea during the last two millennia" by Mariana Belferman et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-62-RC2, 2021

This paper by Belferman et al. analyzes the correlation between the historical record of lake levels at the Dead Sea and regional seismicity through a numerical simulation of earthquake catalogs. The numerical simulations are based on relating the seismic stress release to characteristic water level curves derived from known control points, or dates of confirmed water levels (with associated uncertainties). The authors find a high correlation between the water level changes and historical earthquake recurrence interval. Overall, the paper is well written and lays out the appropriate motivation for this study. A couple comments are presented below.

As I understand, the assumption is that all stress release occurs along a single purely strike-slip fault plane. The authors acknowledge this assumption in the Discussion, and perhaps this paper is the groundwork for future modeling, but this is quite important. The distribution of smaller magnitude historical events will never be known, however using reasonable expected aftershock decay curves, one could include this additional accumulated stress release from the aftershocks in the modeling, or at least provide as a back-of-the-envelope calculation to determine its significance.

Secondly, the purely strike slip fault motion is likely an oversimplification of the stress release. As these events result from over-pressurized fault zones the slip distribution likely has non-double-couple components. While the total stress released is governed by the seismic moment, the length and orientation of the principle stress vectors relative to the expected shear stress can be significant for a range of plausible fault plane solutions. The modeling for this is not within scope, however my suggestion is to include some more comments regarding the strike-slip assumption.

line 75: define RI (=return interval?)

line 97: trend(s) ... are

line 112: should be Figure 1B

figure 1: Caption for C,D: what are the blue and black dots
Simulated RI and Literature RI y-axis scales should be the same extent

line 147: ifa -> if a