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Solid Earth Discussions

Interactive comment on "The 2018 Lake Muir earthquake sequence, southwest Western Australia: rethinking Australian stable continental region earthquakes" *by* Dan J. Clark et al.

Anonymous Referee #1

Received and published: 23 October 2019

Dear Editor, the purpose of the submitted paper by Clark et al. "The 2018 Lake Muir earthquake sequence, southwest Western Australia: rethinking Australian stable continental region earthquakes" matches the aim of the SOLID EARTH magazine.

General Overview I think the Authors made a very good work analyzing the two earthquake sequences using, at the same time, satellite SAR interferograms, seismic locations and field mapping. In addition, very interesting appear the comparison among the behavior of the Lake Muir sequence and the previous others sequences, and the analysis of the other earthquakes that produce surface rupture in SW Australia. These facts make this paper enough innovative for its multidisciplinary approach to the analysis of

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Discussion paper

the earthquakes location areas and their related structures.

Conversely, the paper carries a lot of different discussions and results, passing from the multidisciplinary approach (SAR Interferometry, field observations and seismicity) of the two seismic sequences and their relationship with the surface ruptures and deformation rates, up to the discussion of the need to introduce new relationships between moment magnitude and surface rupture length for the SCR craton area. In my opinion this latter argument deserves a separate paper. The paper should be more focused to the expected results introduced by the title. Following this choice, the paper, after some focused minor revisions, might be acceptable for publication.

In the following points, I carried over any observations about the discussion on the text:

âĂć Paragraph “Rapid deployment aftershock kits” and Figure 2: Regarding the seismic station deployment, the closest station has been located at least at 24 km far from the epicentral area of both earthquakes. Although the magnitude of two main shocks are greater than 5 and their location uncertainties could be low, however large uncertainties might afflict the location of small magnitude earthquakes occurred during the swarms. These uncertainties have implications about the matching with the surface ruptures found by the field activities and with the INSAR interferometry computation. These critical points are responsibly highlighted by the Authors, anyway they represent “low-resolution” results.

âĂć Lines 445-448: The Authors describe the fact the November event is located in the positive Coulomb stress change induced by the September earthquake and show the location of the aftershocks swarms in relation to the faults and surface ruptures. The don’t clearly explain if they consider the November earthquake induced by a dynamic triggering of the September event, but they only describe the matching with the INSAR interferograms and the rotation of local stress after the September earthquake, in order to facilitate the strike-slip failure of the November earthquake. I think the clarification of this point could be an important statement for future and more addressed studies, for

instance the fault ruptures interaction or the dynamic triggering between two or more seismic sources.

âĂć In figure 6 the Authors show both the wrapped and unwrapped interferograms. This choice allows the reader to better appreciate the measures observed by an interferogram. However, in Figure 6a there is an east-west oriented fringe interruption at latitude/longitude 6190000/4790000? How the Authors interpret it?? âĂć Finally, the text contains a lot of place names. For a “not Australian” reader is a bit hard to follow the text with the lack of a clear tectonic map containing the bright place names tags.

In particular: Line 508: ÂăFlinders Ranges is missing in the figures. Line 540: Burakin earthquake area is missing in the figures.

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