

EGU2020-12723

<https://doi.org/10.5194/egusphere-egu2020-12723>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



The 2016 Mw 6.1 Petermann Ranges earthquake rupture, Australia: another “one-off” stable continental region earthquake

Mark Quigley¹, **Tamarah King**¹, and Dan Clark²

¹University of Melbourne, School of Earth Sciences, Australia

²Geoscience Australia, Canberra, Australia

The 20th May 2016 moment magnitude (M_w) 6.1 Petermann earthquake was the 2nd longest single-event historic Australian surface rupture (21 km) and largest M_w on-shore earthquake in 28 years. Trench logs from two hand-dug trenches show no evidence of penultimate rupture of surface eolian sediments or underlying calcrete. Available dating of eolian dunes 140 to 500 km away from the Petermann fault indicated eolian deposition during either the last glacial maximum (approximately 20 ka) or a period of aridification at approximately 180 - 200 ka. Ten ¹⁰Be cosmogenic nuclide erosion rates of bedrock outcrops at 0 to 50 km from the surface rupture trace are within error of each other between 1.4 to 2.6 mMyr⁻¹. These samples have approximate averaging times between 208 to 419 ka. Bedrock erosion rates, trenching results and interpretation of the landscape history suggest the 2016 event is the only surface rupturing earthquake on the Petermann fault in the last 200 to 400 kyrs, and possibly the first ever on this fault. This finding is consistent with a lack of evidence for penultimate rupture for all eleven historic Australian surface rupturing events, as described by either trenching and/or landscape analysis and bedrock erosion rates. These ‘one-off’ events within Precambrian cratonic Australian crust are not consistent with trenching results and geomorphology of paleo-scarps within the Flinders Ranges and Eastern Australia which indicate multiple recurrent fault offset. Variable fault recurrence behaviour highlights that uniform seismic hazard modelling approaches are not applicable across Stable Continental Regions.