



New insights on intraplate seismicity from a “tectonically stable” region in the southwest of Australia

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The southwest of Australia is located more than 2500 km from the nearest plate tectonic margin and is geologically dominated by an Archean Craton. As a result, this region is classified as a stable continental region. Associated with this classification is the perception of a low potential for earthquake generation. Similarly, views of the regional geomorphology emphasise the apparent long-term tectonic and landscape stability. These interpretations have emerged despite the fact that instrumental and anecdotal records show that the southwest of Australia is one of the most seismically active regions in Australia.

Our recent interpretations of high-resolution digital elevation models (DEM), drainage network analysis, gravity, magnetic and seismic data and palaeoseismological investigations have led to a revision of the traditional view of tectonic stability for this part of the Australian Plate. Analyses of high-resolution DEM allowed the discovery of various linear scarps in the southwest of southwest of Australia, which are apparently related to large surface breaking earthquakes. Examination of the drainage network associated with some of these scarps showed anomalies (i.e. drastic changes in direction, channel migration, diversion and/or interruption, etc.) that suggested tectonic deformation related to the scarps. Subsequent trenches for palaeoseismological investigations on two of these scarps confirmed not only their association with surface rupturing palaeo-earthquakes but also indicated events with likely magnitudes of $\sim M7.0$. Further analysis of the drainage in the area, on a regional scale, also suggested that physiographic features previously considered as the result of climatic and/or erosional

processes have a tectonic origin. Some of the geophysical data analysed supports this conclusion (i.e. gravity and magnetic anomalies). These new findings place important constraints on seismicity models and seismic hazard assessments for the southwest of Australia.