

Seismic hazard assessment through predictive modelling of local stress changes due to hot fractured rock (HFR) geothermal energy operations in the Cooper Basin of South Australia

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Abstract

This paper reports on a study that has been undertaken in the Cooper Basin region of South Australia where an assessment of seismic hazard has been made to determine stress changes in the region due to HFR geothermal energy operations. The work has considered the basement structural geology and slip tendency for large scale faults, previously interpreted from seismic data. The slip tendency analysis has resulted in a derived factor of safety for all faults of greater than 1. The seismic activity recorded during reservoir stimulation events, at a local geothermal field, has been analysed and incorporated in the probabilistic hazard maps for the region, little change in seismic hazard is evidenced.

The same geothermal field has also been studied using a numerical modelling approach which investigates possible static stress changes and likely interaction of this stress field change with nearby geological structures. The stress field perturbation is small and has an extent which is significantly less than the extent of the field itself. Initial work has been performed in order to investigate the influence of seismic waves on a well bore and numerical well completion models have been developed.