

EGU2020-6334

<https://doi.org/10.5194/egusphere-egu2020-6334>

EGU General Assembly 2020

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Seismic hazard due to fluid injections

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Earthquakes can be induced by natural and anthropogenic processes involving the injection or migration of fluids within rock formations. A variety of field observations has led to the formulation of three different and apparently contradicting paradigms in the estimation of the seismic hazard associated with fluid injections. Based on a unified conceptual model accounting for the non-homogeneous pore-pressure stimulation caused by fluid injection in a prestressed region, we show here that all three paradigms naturally coexist. The loading history and heterogeneity of the host medium determine which of the three paradigms prevails. This can be understood as a consequence of a superposition of two populations of events triggered at different pore-pressure levels with different Gutenberg-Richter b-values.