

On the possible time variability of the focal mechanisms in Southern California: an analysis trough a minimal physics-based earthquake simulator

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The stationarity of tectonic behavior of a region is a fundamental assumption for the models of the

spatio-temporal distribution of earthquakes, so that the seismicity over past decades or centuries is considered representative of what can happen in the future. However, there is empirical evidence that seems to suggest that the focal mechanism (and maybe also the seismicity rate) of the seismicity in Southern California may have experienced significant changes in time in the last century. In particular, after the sixties there is a relative decrease of strike-slip earthquake activity with respect to the number of earthquakes with different focal mechanisms.

Here we investigate on this variation of focal mechanism by questioning on the possible causes of such variation. In particular we analyze and compare the real California catalog with a set of synthetic catalogs obtained by a minimal physics-based earthquake simulator called 'CFF-Land'. Such simulator, which is based on Coulomb Failure Function (CFF) for modeling fault interactions,

is able to reproduce real features of seismic catalogs such as short-term clustering. The comparison of real and synthetic catalogs allows us to explore the physical plausibility of the time variability of the average focal mechanisms as well as any other possible variability in the real seismic catalog.