Title: The source process of Greek earthquakes

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Abstract:

Investigations of moment tensor (MT) and its uncertainty are topical. This thesis is focused on isotropic component of three shallow earthquakes: Event A in Cretan Sea (M_w 5.3) and two events near Santorini island, B (M_w 4.9) and C (M_w 4.7). MT is inverted from full waveforms in an assumed 1D velocity model. The inverse problem is non-linear in centroid depth and time, and linear in six MT parameters, one is the MT-trace. Uncertainty of isotropic component is studied by a new approach (Křížová et al., 2013). The trace is systematically varied, and remaining parameters are optimized. The method reveals tradeoffs between the isotropic component, depth, time, and focal mechanism. From two existing velocity models, we prefer the one with lower condition number, in which a (positive) isotropic component is indicated for event B. To rapidly assess a likely existence of isotropic component, an empirical method is proposed (Křížová et al., 2016). It is based on comparison between depth-dependences of waveform correlation in full and deviatoric modes. Based on extensive synthetic tests, the method confirms a non-negligible isotropic component of event B; event A appears to be deviatoric. Routine application in seismological centers could reduce risk of erroneous source-depth estimates.

Keywords: earthquake, moment tensor, isotropic component, full waveform inversion