

## **New seismogenic stress fields for southern Italy from a Bayesian approach**

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A new database of high-quality waveform inversion focal mechanism has been compiled for southern Italy by integrating the highest quality solutions, available from literature and catalogues, and 146 newly-computed ones. All the selected focal mechanisms are (i) coming from the Italian CMT, Regional CMT and TDMT catalogues (Pondrelli et al., PEPI 2006, PEPI 2011; <http://www.ingv.it>), or (ii) computed by using the Cut And Paste (CAP) method (Zhao & Helmberger, BSSA 1994; Zhu & Helmberger, BSSA 1996). Specific tests have been carried out in order to evaluate the robustness of the obtained solutions (e.g., by varying both seismic network configuration and Earth structure parameters) and to estimate uncertainties on the focal mechanism parameters. Only the resulting highest-quality solutions have been enclosed in the database, that has then been used for computation of posterior density distributions of stress tensor components by a Bayesian method (Arnold & Townend, GJI 2007). This algorithm furnishes the posterior density function of the principal components of stress tensor (maximum  $\sigma_1$ , intermediate  $\sigma_2$ , and minimum  $\sigma_3$  compressive stress, respectively) and the stress-magnitude ratio (R). Before stress computation, we applied the k-means clustering algorithm to subdivide the focal mechanism catalog on the basis of earthquake locations. This approach allows identifying the sectors to be investigated without any “a priori” constraint from faulting type distribution.

The large amount of data and the application of the Bayesian algorithm allowed us to provide a more accurate local-to-regional scale stress distribution that has shed new light on the kinematics and dynamics of this very complex area, where lithospheric unit configuration and geodynamic engines are still strongly debated. The new high-quality information here furnished will then represent very useful tools and constraints for future geophysical analyses and geodynamic modeling.