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# Source inversion of seismic events recorded in the Larderello geothermal area

T. Braun (1), S. Cesca (2), D. Piccinini (1), E. Spinelli (3), A. Fiordelisi (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Arezzo, Italy, (2) BGR, Erlangen, Germany
(3) ENEL/GEM-Produzione Geotermica, Pisa, Italy (braun@ingv.it / Fax: +39 0575 403148)

The Larderello geothermal field is a wide thermal anomaly located in the western part of Tuscany (Italy). Geophysical investigations in this area suggest a crustal thinning and intrusion of hot mantle material into the crust. The local seismicity, monitored since 1978 by a network of 26 short period almost vertical seismic stations, is characterized by a several hundred of $M \leq 1.5$ events per year, never exceeding M=3.2 in the past 25 years. At December 2004 ENEL and INGV started a scientific collaboration, which includes also exchange of selected datasets. One of the main tasks is to perform source inversion of low magnitude seismic events recorded in the Larderello geothermal area. This is of particular interest, because such earthquakes could show similarities with seismic events recorded on active volcanoes. In order to record also seismic events below magnitude M = 1 the gain of the ENEL-seismic network is set rather sensitive. This implicates that seismograms of events with magnitudes $M > 2.0$ are recorded by the entire network, but at low epicentral distances the traces are often saturated, making a waveform inversion impossible. On the other hand, smaller events are not strong enough to be recorded also at the more external stations of the network. In both cases this trade-off results in a limited number of vertical component recordings available for the inversion. A further difficulty by performing source inversion of small seismic events is to fit the high frequencies. Therefore we applied the moment tensor (MT) inversion both in the time domain as well as in the frequency domain and compared the results. Source inversion was performed both for the full MT as well as by introducing constraints for doubles couple e/o CLVD. The source inversions of events occurred in the Travale area show a high double couple percentage and show no indications for an isotropic source. This seems to indicate a source mechanism which is typical for tectonic events.