Geophysical Research Abstracts
Vol. 12, EGU2010-12576, 2010
EGU General Assembly 2010

Multi-scale electromagnetic imaging of the Monte Aquila Fault (Agri Valley, Southern Italy)

Alessandro Giocoli (1), Sabatino Piscitelli (1), Gerardo Romano (2), Marianna Balasco (1), Vincenzo Lapenna (1), and Agata Siniscalchi (2)

(1) IMAA-CNR, Tito, Italy (giocoli@imaa.cnr.it), (2) Dipartimento di Geologia e Geofisica, Università di Bari, Bari, Italy

The Agri Valley is a NW-SE trending intermontane basin formed during the Quaternary times along the axial zone of the Southern Apennines thrust belt chain. This basin is about 30 Km long and 12 Km wide and is filled by Quaternary continental deposits, which cover down-thrown pre-Quaternary rocks of the Apennines chain. The Agri Valley was hit by the M 7.0, 1857 Basilicata earthquake (Branno et al., 1985), whose macroseismic field covered a wide sector of the Southern Apennines chain. The latest indications of Late Quaternary faulting processes in Agri Valley were reported in Maschio et al., (2005), which documented a unknown NE-dipping normal fault thanks to the finding of small-scale morphological features of recent tectonic activity. The identified structure was termed Monte Aquila Fault (MAF) and corresponds to the southern strand of the NW-SE trending Monti della Maddalena Fault System (Maschio et al., 2005; Burrato and Valensise, 2007). The NE-dipping MAF consists of a main northern segment, about 10 Km long, and two smaller segments with cumulate length of $\sim$10 Km, thus bringing the total length to $\sim$20 Km. The three segments are arranged in a right-stepping en-echelon pattern and are characterized by subtle geomorphic features.
In order to provide more detailed and accurate information about the MAF, a strategy based on the application of complementary investigation tools was employed. In particular, multi-scale electromagnetic investigation, including Electrical Resistivity Tomography (ERT), Ground Penetrating Radar (GPR) and Magnetotelluric (MT) methods, was used to image the MAF from near-surface to several hundred metres depth. Large-scale MT investigation proved to be useful in detecting the MAF location down to several hundred meters depth, but it didn't show any shallow evidence about MAF. Conversely, ERT and GPR surveys evidenced signatures of normal-faulting activity at shallow depth (e.g., back-tilting of the bedrock, colluvial wedges, etc.). In conclusion, taking into account all the above inferences, we think that suitable multi-scale electromagnetic approach has proved to be affective for MAF detection, giving valuable data to the seismic hazard assessment of the region.

References

Branno A., E.G.I. Esposito, A. Maturano, S. Porfido and V. Rinaldis (1985): Studio, su base macrosismica, del terremoto della Basilicata del 16 dicembre 1857. Bollettino della Società dei Naturalisti di Napoli, 1985, 92, 249–338.

Maschio L., L. Ferranti and P. Burrato (2005): Active extension in Val d'Agri area, Southern Apennines, Italy: implications for the geometry of the seismogenic belt. Geophys. J. Int., 162 (2), 591–609, doi:10.1111/j.1365-246X.2005.02597.x.

Burrato P., and G. Valensise (2007): Rise and fall of a hypothesized seismic gap: source complexity in the 16 December 1857, Southern Italy earthquake (Mw 7.0). Bull. Seism. Soc. Am., 98 (1), 139–148, doi: 10.1785/0120070094.