



## **10-years of self-potential observations in Southern Italy: a critical review.**

**G. Colangelo** (1,2), V. Lapenna (2) and L. Telesca (2)

(1) Dipartimento Infrastrutture e Mobilità, Regione Basilicata, Potenza, Italy, (2) Istituto di Metodologie per l'Analisi Ambientale, CNR, Tito Scalo (PZ), Italy (colangelo@imaa.cnr.it / Phone: +39-0971-427206)

In this paper a critical review of more than 10-years of systematic observations of self-potential signals is presented and discussed. We have focussed our attention to the analysis of a large data-base of self-potential time series recorded by means of a geoelectrical monitoring network installed since 1991 in seismic active areas of Lucanian Apennine chain (Southern Italy). The remote stations have been localised along the main seismogenetic structures and are equipped with sensors able to detect the time fluctuations of horizontal electrical field along the N-S and E-W directions. At Tito station the unpolarizable electrodes have been installed at different depths in a borehole for measuring the vertical electrical field.

To-date an impressive data-base of self-potential time series recorded for long time and in different zones of Lucanian Apennine chain is available: more than  $10^8$  samples values have been processed and analysed with robust statistical techniques. A wide range of different geophysical conditions have been considered: electrical observations during seismic quiescent periods; jointly appearances of electrical signals at different sites; anomalous electrical patterns detected before and during the occurrence of local earthquakes etc..

Our findings allow us to well define the dynamical nature of the self-potential signals, to discriminate all the possible influences of meteo-climatic and man-made noises and to identify a sequence of significant anomalous signals. The analysis of correlations between these electrical extreme events and the changes in seismic cycles open the way for new and intriguing considerations about the origin of electrical signals in seismic areas and their applicability for short-term precursors. A list of unsolved

questions have been approached. Is the spatial pattern of self-potential anomalies influenced by fault geometry? Are observed anomalous electrical signals in absence of local seismic activity? The source of the detected anomalies is local or not? Is it related to fluid migration in focal region or is it related to local electrokinetic effects?