The Pollino seismic sequence/swarm.

MARGHERITI L. (1), DE GORI P. (1), GOVONI A. (1), LUCENTE F.P. (1), MORETTI M. (1), PASTORI M. (1), MARCHETTI A. (1), DI GIOVAMBATTISTA R. (1), ANSELMI M. (1), DE LUCA P. (2), NARDI A. (1), PIANA AGOSTINETTI N. (3), LATORRE D. (1), PICCININI D. (1), PASSARELLI L. (4), CHIARABBA C. (1)
(1) *Istituto Nazionale di Geofisica e Vulcanologia, Roma*
(2) *Centre for Hydrological and Ecosystem Science, Department of Geography - Loughborough University Leicestershire, UK*
(3) *Dublin Institute for Advanced Studies Geophysics Section 5, Dublin, Ireland*
(4) *Section "Physics of earthquakes and volcanoes", GFZ- German Research Centre for Geoscience, Potsdam, Germany*

In the years between 2010 and 2015 in the Apennines-Calabrian arc boundary, in the Pollino massif, a long seismic sequence took place. The area is subject to Northeast- Southwest extension, which results in a complex system of normal faults striking Northwest-Southeast, nearly parallel to the Apenninic mountain range. The seismic sequence includes more than 6000 earthquakes in the Pollino region, the maximum magnitude recorded is Ml=5.0 and it happened in October 25th 2012 after about two years of ongoing activity; the peculiar temporal evolution of the seismic sequence allows us to catalogue it as a swarm. Here we describe the main seismological characteristics of this seismic sequence and characterise the fracture field of the region. We analyse thousands of seismograms, deriving accurate locations crust velocity model and anisotropic parameters in the crust. These parameters yield clues and insights that may help understanding the physical mechanisms behind the seismic swarm. Since the late 60s-early 70s era seismologists started developing theories that included variations of the elastic properties of the Earth crust and the state of stress and its evolution prior to the occurrence of a large earthquake. Among the others the theory of the dilatancy: when a rock is subject to stress, the rock grains are shifted generating microcracks, thus the rock itself increases its volume. Inside the fractured rock, fluid saturation and pore pressure play an important role in earthquake nucleation, by modulating the effective stress. Thus, measuring the variations of wave speed and of anisotropic parameter in time can be highly informative on how the stress leading to a major fault failure builds up. We systematically look at seismic-wave propagation properties to possibly reveal short-term variations in the elastic properties of the Earth crust. In active fault areas, tectonic stress variation influences fracture field orientation and fluid migration processes, whose evolution over time can be monitored through the measurement of the anisotropic parameters. We analysed waveforms recorded at permanent and temporary stations hold by the Istituto Nazionale di Geofisica e Vulcanologia.