SECOND EUROPEAN CONFERENCE ON EARTHQUAKE ENGINEERING
AND SEISMOLOGY, ISTANBUL AUG. 25-29, 2014

A SWARM-LIKE SEQUENCE STRIKING IN A SEISMIC GAP REGION: THE POLLINO RANGE, SOUTHERN APENNINES SEISMIC SEQUENCE

Luigi Passarelli[1], Dirk Röβler[1], Sebastian Hainzl[1], Simone Cesca[1,2], Francesco Maccaferri[1], Marco Mucciarelli[3], Aladino Govoni[3,4], Milena Moretti[4], Eleonora Rivalta[1], Lucia Margheriti[4], Heiko Woith[1], Thomas Braun[5], Torsten Dahm[1]

The Pollino Range is located at the conjuction of the Southern Apennines and the northernmost part of the Calabrian Arc. Two principal normal fault systems are known in the Pollino area: the Mercure Basin fault and the Pollino/Castrovillari fault system. The area represent a seismic gap in the Italian peninsula with no M>6 earthquakes during the last centuries, but paleoseismological investigation show evidence of several large events with M>6 for the Pollino/Castrovillari fault. Since 2010 an intense seismic swarm with more than 5000 events, recorded by INGV – largest event with Mw=5.2 occurred 25th of October 2012 – has been striking in a relatively small volume (about 15x15x10 km) in the southern end of the Mercure Basin fault and the easternmost tip of the Pollino fault. At present, the rheology and the seismic potential of these faults are unclear as well as the driving mechanisms behind the evolution of this swarm-like sequence. After the occurrence of the Mw=5.2 event a collaborative experiment started between GFZ, Germany and INGV, Italy in order to monitor the ongoing seismic swarm by using a small-aperture seismic array, integrated in a temporary seismic network. Using the array, we detect about ten times more earthquakes than currently included in automatic local catalogs based on seismic networks. The seismicity shows an unusual spatio-temporal pattern in response to the activation of two fault system at different times. We investigate quantitatively all the phases of the seismic sequence starting from 1st of January 2010. Precise relocation of events along with moment tensor inversion helped us to constrain spatially the structure activated by the swarm and the migration pattern of seismicity. We study the evolution of the frequency-size distribution of the events and the seismicity rate changes by means of statistical methods in order to investigate the aseismic transient which generates the seismicity sequence. We find evidences for a major role of fluids in triggering the seismicity but we cannot exclude aseismic fault creeping as driving mechanisms for the sequence or co-existing with it. We also revise the historical seismicity of the Pollino range finding that several other swarm-like sequences occurred in the area and no event larger than M>5.5 has struck the region in historical times.

[1]GFZ- German Reserch Center for Geosciences, Potsdam, Germany
[2]Institute of Earth and Environmental Science, University of Potsdam, Germany
[3](4) Centro di Ricerche Sismologiche-Istituto, Nazionale di Oceanografia e Geofisica Sperimentale (OGS), Udine, Italy
[4]Istituto Nazionale di Geofisica e Vulcanologia (INGV), Rome, Italy
[5]Istituto Nazionale di Geofisica e Vulcanologia (INGV), Sezione Roma 1, Arezzo, Italy