Geophysical Research Abstracts
Vol. 21, EGU2019-2608, 2019
EGU General Assembly 2019

Seismic scattering and absorption mapping of fluid-filled connected fault networks at Pollino range, Italy

Ferdinando Napolitano (1), Luca De Siena (2,3), Anna Gervasi (4,5), Ignazio Guerra (4), Roberto Scarpa (1), and Mario La Rocca (4)

(1) Università degli Studi di Salerno, Via Giovanni Paolo II, 84084, Fisciano (SA), Italy (fnapolitano@unisa.it), (2) University of Aberdeen, School of Geosciences, Geology and Petroleum Geology, Meston Building, King's College, Aberdeen AB24 3UE Scotland, UK, (3) Institute of Geosciences, Johannes Gütenberg University, J.-J.-Becher-Weg 21 D-55128 Mainz, Germany, (4) Dipartimento di Biologia, Ecologia e Scienze della Terra, Università della Calabria, Ponte P. Bucci, 87036, Arcavacata di Rende (CS), Italy, (5) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Rende (CS), Ponte P. Bucci, 87036, Arcavacata di Rende (CS), Italy

We applied S-wave peak-delay and late-time coda-wave attenuation analyses to seismic recordings from the 2010 - 2014 Pollino swarm to separate and map seismic scattering and absorption at different frequencies .
While high-scattering and high-absorption patterns change with increasing frequency, they propagate from SE to NW between 1.5 and 6 Hz. The anomalies are interpreted as representative of fluid-filled fracture networks extending along the Pollino range. Moreover, as frequency increases and considering the limited accuracy of historical locations, the patterns approximately follow the temporal evolution of epicenters nucleated on faults from the sixteenth century until 1998 (Mercure basin earthquake). Our interpretation is that fracture-network propagation towards NW ends where carbonates of the Lucanian Apennines (extending from the Mt. Sirino to the Lake Pertusillo) begin. This area is marked by high-scattering and low-absorption highlighting its role as a high-compression barrier isolated by clay formations. At the highest frequency (12 Hz) the anomalies widen SW, consistently marking the faults active during the recent Pollino swarm. Our results suggest that fracture healing has closed small-scale fractures across the SE faults. On the contrary, a system of small fluid-filled connected fractures opens across the recently-active NW faults after each earthquake, leaving a high-scattering and high-absorption footprint. Our results confirm the previously-postulated change in earthquake migration as due to fluid propagation in connected fracture networks. Once blocked in the NW direction, these fractures opened across the SW faults, thus favoring the nucleation of the Pollino swarm.