EGU21-2434
https://doi.org/10.5194/egusphere-egu21-2434
EGU General Assembly 2021

Seismogenic fault system of the Mw 6.4 November 2019 Albania earthquake: new insights into the structural architecture and active tectonic setting of the outer Albanides

Simone Teloni[1], Chiara Invernizzi[1], Stefano Mazzoli[1], Pietro Paolo Pierantoni[1], and Vincenzo Spina[2]
[1]University of Camerino, Sciences and Technology, Geology Division, Italy (simone.teloni@unicam.it)
[2]Total Upstream Denmark A/S, Amerika Plads, Copenhagen, Denmark

Fault geometries are usually reconstructed through seismic data, which can provide a very good image of the subsurface. However, the recognition of deep structures is often difficult for the shallow depth of these data and their low resolution in depth. On the contrary, recent earthquakes and their parameters (e.g. hypocentre, focal mechanism, magnitude, etc.) may have an important role in better understanding deep features, outlining the active crustal structures.

November 26th 2019 a 6.4 M_w Durres earthquake struck the Albanian coastal area, claiming 51 victims and hundreds of injured people. This seismic sequence sheds new light into the structural architecture and active tectonic setting of the northern outer Albanides. Stress field analysis performed through local mechanisms of the main seismic events of the sequence and those recorded since 1997 by the Istituto Nazionale di Geofisica e Vulcanologia (INGV) confirm that the area is dominated by ENE trending, horizontal maximum compression, with a ENE dipping thrust faults roughly parallel to the coastline. Further analysis to investigate the structural architecture of this area was conducted plotting hypocentre distribution which show that shallower hypocentres tend to cluster around the deeper portion of projected fault segment proposed by the DISS 'composite seismogenic source' labelled ALCS002, whereas most of the seismic events including the Mw = 6.4 main shock are nucleated within the crystalline basement. This result unravels for the first time the fundamental role of deeply rooted, crustal ramp-dominated thrusting in seismogenesis, implying a profound reconsideration of the seismotectonic setting of the region.

The outcomes of this study show here that the recent earthquakes are pivotal in outlining the active crustal frontal structure of the thrust belt, providing new fundamental constraints, not only on the active tectonic setting of the region, but also on the crustal architecture of the outer Albanides. In this regard, the identification of such deep seismogenic sources and the definition of their dimensional parameters may have major implications on the correct assessment of the seismic hazard, especially for this large and densely populated area of Albania. Furthermore, the evidence provided in this study for a deep seismogenic thrust system in a foreland basin setting may be of general interest in similar tectonic contexts worldwide, where deep structures are possibly unidentified, and may represent a weakness in seismic hazard assessment.