Seismotectonic analysis of the north-east sector of Calabrian Arc

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Keywords: earthquakes, faults, focal mechanisms.

The north-eastern sector of the Calabrian Arc includes the Sila Massif, Sibari plain and part of the Taranto gulf. It is a geologically complex area crossed by a system of active faults since the Middle Pleistocene that makes Calabria one of the regions with the highest seismic hazard in the Mediterranean. These faults are responsible for the morphology of the territory, characterized by high relieves and widespread landslides on a large scale, and they generated strong earthquakes in the past centuries. A first fault system is characterized by normal high-angle faults with a N-S direction which displaces the Sila batolith. Continuing towards the northern part of the area, NW-SE trending normal faults displace the Plio-Quaternary sediments. In the Corigliano-Rossano area, the Rossano Fault is the most important. It is a WNW-ESE neogenic tectonic structure characterized by a left normal-transcurrent kinematics and extending for about 12 Km with an en-èchelon arrangement. It puts the Sila Batolith in contact with Tortonian and Plio-Quaternary sediments and is responsible for the catastrophic earthquake of 1836. In this work we focused on a wide area comprised between 39.2°-39.9° N and 16.2°-17.4° E degrees, making a revision of the recent earthquakes occurred in it. We collected all focal mechanisms available in published papers and analyzing with great detail the seismicity of the last 15 years. During the last century only small to medium size earthquakes occurred in the area, both on land and offshore. The seismic catalog includes hundreds of earthquakes of magnitude $M<5$ recorded during the last few decades. This seismicity appears widespread through the area of our study, with depth in the range from 5 km to 40 km below sea level. Swarms of small events ($M<4$) are quite common in this seismogenetic area. The increased number of seismic stations available during the last decade allowed for detailed analysis of the local earthquakes. We performed a location as accurate as possible of recent earthquakes, including those occurred along the coast and offshore, and computed the focal mechanism of as many events as possible. To estimate the source kinematics of small earthquakes we applied the software FOCMEC (Snoke, 2003), based on the polarity of body waves, and the software HybridMT (Kwiatek et al., 2016), based on the area below the first P wave pulse. We obtained reliable results for more than 30 earthquakes occurred during the last 15 years ($2.5 \le M \le 4.4$). Results show a variety of solutions, with predominance of transtensive and reverse kinematics. The location and kinematics of recent earthquakes are in good agreement with the known faults, showing a significant correlation between the computed focal mechanisms and the direction of the tectonic structures. The source analysis of recent seismicity gives interesting insight about the offshore faults.