Insights into seismic activity of Central Adriatic offshore (Italy) evidenced by the 2013-2014, Conero seismic sequence

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The Adriatic region has always attracted the interests of researchers involved in the study of the tectonic processes that controlled the evolution of the Alpine-Mediterranean area. It has been considered as an undeformed area, an aseismic, rigid block located between two active orogenic belts, the Apennines and External Dinarides thrust belts. Nevertheless, new scientific evidences reveal a complex structural framework in which active faults are capable to produce seismic activity not only along the borders of Adriatic Sea, but also in the offshore areas. In fact, the outer thrusts of Apennines and Dinarides orogenic belts propagated from the coasts to the offshore areas originating active, NW-SE trending anticlines and thrust faults that affects the Plio-Quaternary sequences.

Defining the seismotectonics of Adriatic domain and studying the active tectonics of the area with its seismogenic potential represent a challenge because the sea prevents direct observation of main geological and structural lineaments and the deployment of standard seismic networks for a more accurate analysis of seismicity. Despite the existence of new evidences, derived from seismic profiles and borehole data, by hydrocarbon exploration, correct seismic hazard estimates of Adriatic Sea require original and accurate data on the seismic activity that can allow to depict the number, size and geometry of seismogenic sources.

In this work, we focused our attention on the seismic sequence, consisting of about 230 events, which occurred along the Central Adriatic coast, in the Conero offshore, during the 2013-2104, with a M₄.9 mainshock located at 20 km far away from city of Ancona, the main city of Marche region. After a careful and innovative selection of the data recorded from the Italian National Seismic Network, operated by the Istituto Nazionale di Geofisica e Vulcanologia, the earthquakes were relocated according to a probabilistic approach. By the inversion of the polarity of the P-wave first arrivals, the focal mechanisms were estimated and finally the local magnitudes were recalculated. Moreover, in order verify if there has been a migration of seismicity with the activation of different faults during the seismic sequence, the analysis of spatio-temporal evolution of the seismic sequence was performed. Preliminary results show that the seismic sequence was originated mainly at small depths (< 10 km) along NW-SE trending thrust fault structures as evidenced by fault plane solutions, consistent with NE-SW horizontal, maximum compression of the outer front of Apennines thrust belt, still active in the Central Adriatic offshore.