EGU22-11083
https://doi.org/10.5194/egusphere-egu22-11083
EGU General Assembly 2022

Identification and 3D modeling of active faults in the Dubrovnik (Croatia) offshore area – preliminary results

Marin Sečanj[1], Bruno Tomljenović[2], Josip Stipčević[1], Helena Latečki[1], and Iva Dasović[1]
[1]University of Zagreb, Faculty of Science, Department of Geophysics, Zagreb, Croatia
[2]University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Department of Geology and Geological Engineering, Zagreb, Croatia

The wider region around the city of Dubrovnik, encompassing coastal and offshore area of southern Croatia, is characterized by the relatively high seismicity rate with intermittent occurrence of strong events indicating the ongoing tectonic activity. Historical, instrumental and paleoseismological records show that this area was hit by at least dozen strong earthquakes in the last 500 years. Among these the most significant is the Great Dubrovnik earthquake from 1667 which devastated the region. This and other strong events of this area are related to several individual to composite seismogenic sources that generally extends in NW-SE direction from Albania to the central part of External Dinarides fold-thrust-belt in Croatia, still however, not yet sufficiently known in great details. Here, we aim to present preliminary results of identification and 3-D modeling of distribution and geometry of active faults in the offshore Dubrovnik area, based on analyses of reflection seismic profiles associated with deep borehole and surface geology data provided by the Croatian Hydrocarbon Agency.

Identification and classification of recently active faults in this area were performed by matching at least one of the following criteria: (1) offsets of the Pliocene - Quaternary deposits along faults that could be correlated between neighboring seismic lines, (2) deformation of Pliocene - Quaternary deposits above fault tips and (3) correlation of fault geometry and kinematics with distribution of the earthquake hypocenters and available fault plane solutions. In addition, a long-term neotectonic activity of identified faults has been studied by deformation and truncation of Miocene and Pliocene stratigraphic horizons that are frequently found affected by faults closely related with a long-term salt tectonics activity.

Location and geometry of the identified recently active faults are in good correlation with distribution of instrumentally recorded earthquake locations, where certain events are clustered within narrow zones of delineated fault planes. These preliminary results will be used for 3D geological and structural modelling of active earthquake generating fault systems between the city of Dubrovnik and the town of Ston, cross-section balancing and slip-rate calculation along active faults. In turn, these would provide input data for seismic shaking simulation and future seismic hazard assessment in this area.