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Structure and potential seismogenic and tsunamigenic sources of the offshore Bajo Segura fault zone, SE Iberian Peninsula (Mediterranean Sea): Preliminary results

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The present-day crustal deformation of the SE Iberian margin is driven mainly by the NW-SE convergence (4-5 mm/yr) between the African and Eurasian plates. This convergence is accommodated over a wide deformation zone with significant seismic activity south of the Iberian Peninsula. The Neogene and Quaternary faulting activity in the SE Iberian Margin is dominated by a large left-lateral strike-slip system of sigmoid geometry referred to as the Eastern Betic Shear Zone (EBSZ), stretching over more than 450 km from Alacant to Almería. The northern terminal splays of the EBSZ correspond to the Bajo Segura fault zone (BSFZ) that extends further into the Mediterranean Sea. This fault zone shows an important instrumental seismic activity characterized by small to moderate earthquakes. Even though, moderate to large historical earthquakes have affected the zone, being the Torrevieja earthquake (1829; IMSK=X) the largest. The onshore area of the BSFZ has been extensively studied and it is characterized by active structures (faults and folds) displaying a transpressive behavior since the Plio-Pleistocene and resulting in positive relieves and subsiding zones. However, the offshore area shows an almost complete lack of information from the tectonic point of view. Recently, the marine geophysical cruise EVENT-SHELF was carried out in September 2008 onboard the Spanish RV Garcia del Cid. The main goal was to map the seafloor ruptures and the sub-seafloor structures of the offshore area of BSFZ using swath bathymetry and high-resolution seismics (Spaker GeoSpark 6kJ). A total of 10 regional profiles were acquired along and across the fault zone. The preliminary results from the analysis of the acoustic and seismic data show that the main structures observed onshore have their continuation offshore, and that some of the faults and folds related to the BSFZ are active. The carefully study and processing of these data will allow us to localize the present active structures, determine its fault parameters and seismogenic behavior and, since they are located offshore, their potential to generate tsunamis. All this information would contribute to a better understanding of the EBSZ kinematics and to improve the seismic hazard studies in the area.