



Paleoseismic investigations of the Carboneras Fault (SE Iberia): first trenching results at Tostana site

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The Eastern Betics Shear Zone (EBSZ), in SE Iberia, is a slow deformation zone with low seismicity. Given the lack of moderate-large earthquakes in historical times along the Carboneras fault (CF), palaeoseismological analyses are needed to better assess the seismic hazard of the area. The last paleoseismic and geological onshore-offshore studies on CF showed that this 150 km long (100 km off-shore, 50 km on-shore) left-lateral strike-slip fault is seismogenic with an average slip rate of 1.3 mm/yr. On the 12 km long La Serrata Range the CF forms a contractional duplex structure.

In this work for the first time, we are studying the southeast onland section of the fault (previous studies were focusing on the northwestern boundary). We selected a late Pleistocene alluvial fan, at the base of Cerro Tostana, for a palaeoseismological 3D trenching survey. The fault crosses the fan at the apex zone, where we dug seven trenches: two perpendicular and five parallel to the fault trace. The stratigraphy consists of an alternation of planar limestone gravels and silty layers of the large-scale fan, incised by minor gravel channels: we used those latter as piercing lines to constrain offsets of different ages and reconstruct the earthquake history and fault slip rate.

The fault perpendicular trenches showed evidence for at least 4 paleo-earthquakes, where the youngest event reaches the present-day soil. The fault-parallel trenches present an evidence of at least three well defined channels and four stratigraphic units that can be correlated through the outcrops. The horizontal separation between these channels increases with their relative age (around 5 m in the last 28 ka; and 9 m in 37 ka). The radiocarbon dates yielded by 9 charcoals and 25 land snails distributed along the trenches and covering the whole stratigraphy, suggest that the CF had a continuous activity during the last 44 Ka at least, with an approximate 0.2-0.5 mm/a rate. Aminoacid racemization dating is on-going and will be compared with the calibrated Radiocarbon results. In the near future, the obtained geologic slip rates will be compared with the geodetic GNSS slip rates, obtained as part of the same project. All this data aims to improve the hazard assessment of the zone, and will be used on the Fault2SHA Betics pilot zone.