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Seismotectonics of the active thrust front in southwestern Sicily: hints on the Belice and Selinunte seismogenic sources

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We present a seismotectonic model of the active thrust front in western Sicily, which includes the area hit by the 1968 Belice earthquake sequence. The ~40 km long *South-WEstern Sicilian Thrust* (SWEST) is formed by two aligned albeit non-parallel fault arrays, the *Granitola-Castelevetrano Thrust System* (GCTS) in the west and the *Partanna-Poggioreale Thrust System* (PPTS) in the east.

The ~NE-SW trending, NW-dipping GCTS straddles from the Pelagian coastline to Castelvetrano, is ~18 km long and composed of two segments, with the northern, ~12 km long one showing geodetic and geologic evidence of active deformation (Barreca et al., 2014). The segment is marked by a sharp gradient in Differential SAR interferometry (DinSAR and STAMPs) and GPS velocity fields. Geologic evidence include an up to 60 m high, and up to 15° steep scarp, which is the fore-limb of a broad fold involving Lower Pleistocene shore calcarenites, and cm-scale reverse displacement of an ancient road dated as early Bronze-Hellenistic age. Inversion of fault slip-lineation data from structures displacing the archaeological remains yields a ~N110°E shortening axis, consistent with the geodetic shortening direction estimated from GPS differential velocities.

The ~ENE-WSW trending PPTS stretches from Partanna to the macro-seismic area of the 1968 earthquake sequence and is composed of two ~10 km long segments limited by relay ramps. Although geologic and geodetic evidence of deformation are less clear than for the GCTS, we nonetheless observe a gradient in interferometry data for the western segment, and evidence of slow deformation (creep?) in historical to recent (last ~400 yr?) man-made structures.

Integration of geologic, geodetic and seismology data suggests the active folds and thrusts are the uppermost expression of steep (45°) crustal ramps (Monaco et al., 1996) which upthrust the Saccense platform at depth.

Based on macroseismic and seismological evidence (Monaco et al., 1996), we contend that the PPTS was partly activated during the 1968 sequence, and that rupture stopped at the junction with the GCTS. The current geodetic strain accumulation on the GCTS, on the other hand, suggests that the fault array has been significantly loaded, and that its last important co-seismic event could have been caused the 4th–5th century A.D. destruction of Selinunte (Bottari et al., 2009).

Barreca G., Bruno V., Cocorullo C., Cultrera F., Ferranti L., Guglielmino F., Guzzetta L., Mattia M., Monaco C., Pepe F., 2013. Geodetic and geological evidence of active tectonics in south-western Sicily (Italy). Journal of Geodynamics, in press

Bottari C., Stiros S.C., Teramo A., 2009. Archaeological Evidence for Destructive Earthquakes in Sicily between 400 B.C. and A.D. 600. Geoarchaeology, 24, (2), 147–175, doi:10.1002/gea.20260.

Monaco C., Mazzoli S., Tortorici L. 1996. Active thrust tectonics in western Sicily (southern Italy): the 1968 Belice earthquakes sequence. Terra Nova, 8, 372-381.