Polyphase deformations along the regional transect Squillace Basin-Crotone swell-Taranto basin-Apulian foreland: a Recent active collisional system in the northeastern Ionian Sea

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The Calabrian Arc (CA) is part of the most active seismic belt in Italy, and the Ionian Sea has been described as the last remaining segment of oceanic crust subduction in the central Mediterranean. The thick sedimentary section of the African and Ionian plate has been scraped off from the descending plate, and piled up along thrust faults resulting in the emplacement of a thick (up to 10 km) and about 200–300 km wide arcuate accretionary complex. In the study area, the accretionary wedge interfers with the Apulian foreland. Here, the continental crust of the Apulian foreland is colliding with the suture zone of the Cretaceous-Paleogene Ligure-Piemontese ocean in Northern Calabria-Southern Apennines. This implies that, at least since late Miocene to Recent, in the northeastern sector of the CA, a foreland basin system was generating, while to the SW , where the Ionian oceanic plate was subducting, thick forearc basins are present. The present work is aimed to analyze the geometry and tectono-stratigraphic evolution of this late Neogene foreland basin system along the transect Squillace Basin- Crotone swell-Taranto Basin-Apulian foreland based on the pre-stack depth migrated multichannel seismic line CROP M5, about 2000 Km of multichannel seismic reflection profiles collected in the past in the coastal region and 20 well logs available from: http://unmig.sviluppoeconomico.gov.it/videpi/. In this sector of the CA, the polyphase deformations are given by alternating phases of extension and compression. NW-SE trending trascurrent fault zones affect the Late Miocene-Recent deposition and form along inherited and pre-Late Miocene deformation zones. All these deformations produce variable and cross-cutting structural trends and many inversion structures active till very recently. Four structural domains will be described; from SW to NE, they are: 1) the Squillace basin; 2) the Crotone swell; 3) the Taranto Gulf; 4) the Apulian foreland. It is remarkable that polyphase deformation (i.e. alternating extension and compression phases and the inversion structures) is common in all of the four domains, from the inner orogenic arc/wedge-top basin (Squillace basin and Crotone swell), to the foredeep basins (Taranto basin) and the foreland area (Apulian foreland). This suggests that the northeastern sector of the CA is colliding and is starting to "accrete" the subducting Apulian plate about 100km east of the presumed continental-oceanic transition.

Geodetic and geological evidences of active tectonics in western Sicily (Italy): insights on the seismogenic source of the 1968 Belice earthquake sequence

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The night between the January 14th and 15th 1968, a wide area of western Sicily (Italy) was shaken by a strong earthquake, the main shock of a seismic crisis that hit the region until the January 25th. The disastrous event, that is the strongest seismic event recorded in Western Sicily in historical times, caused about 370 deaths and the destruction of many villages facing the Belice river valley, which was the epicentral area for this unexpected natural disaster. The seismic sequence consisted of a main shock with M=5.9 and a series of pre-shock and aftershocks that were clustered along a NE-SW alignment. Focal planes solutions provided by many authors in the last decades show controversial interpretations about the possible geometrical and kinematic pattern of the seismogenetic source. Computed focal solutions provide in fact different hypothesis on trend and kinematics of possible faulting mechanism that range from pure thrusting on NW-SE steeply dipping planes to right-lateral slip of NNW striking sub-vertical plane. This ambiguity remains at present-day still unresolved due to the fact that the 1968 earthquake sequence did not produced a typical seismic landscape and that, as result of low magnitude of events, coseismic fault ruptures were never observed until now. However, the lacking of any morphological expression and fault breaks at surface makes the 1968 Belice earthquakes sequence a geologically unconstrained event. Starting from the analysis of SAR interferometry (DInSAR) for western Sicily, which displays a differential ground motion near the Castelvetrano and Campobello di Mazara villages, new field surveys have been performed along the Belice Valley with the aim to verify possible correspondence between geodetic data and geological-morphological ones. In this respect, available geological maps have been upgraded by original field surveys, that were supported by the morphometric analysis of a 2x2m grid resolution DEM and by the interpretation of 1:10,000 scale aerial photographs. The re- measurement of a 20 years old GPS network has allowed to constrain the current deformation pattern of the area. Moreover, in correspondence of the offshore extension of the lineament marked by the interferometric data, a shaded relief representation of sea-floor bathymetry has been elaborated and available seismic lines have been analyzed and interpreted. Finally, the discovery of dislocated archaeological and recent marker near the epicentral area of the 1968 seismic sequence enabled us to provide, for the first time, the likely evidence of surface expression for coseismic faulting.