

## **From onshore to offshore, from outcrop to subsurface: an innovative multi-scale approach to the geological mapping of the Sheet 628 Sciacca (southwestern Sicily)**

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The Sheet 628 “Sciacca” is located in an onshore-offshore sector of SW Sicily where the external segment of the Sicilian Fold and thrust belt- develops. This Sheet is composed by 1:50.000 geological and subsurface maps and a 3D geological model, obtained by field survey in the onshore sector and seismoacoustic investigation in the offshore sector.

The data collected during the marine and field survey, integrated with the subsurface data coming from the interpretation of wells and multi-channel seismic profiles made available by ENI S.p.a, have made it possible to reconstruct the 3D geological model up to the depth of 4 km by correlating the emerged with the submerged sector, as well as the kinematics and chronology of the main deformation events that affected this region.

The Lower Jurassic-Pleistocene successions were studied with stratigraphic, sedimentological and palaeontological methods: the latter allowed for an accurate dating of the lithostratigraphic units, which for the late Quaternary deposits was integrated by absolute dating with OSL methodology.

In the western outcropping-sector and south-western offshore areas, a Meso-Cenozoic shallow to deep water carbonate succession (locally named Saccense) crops-out and it is covered by Neogene-Quaternary syntectonic deposits. In the north-eastern sector, a Meso-Cenozoic deep water carbonate succession (known as Sicanian) crops-out. In the eastern and south-eastern sectors deformed Neogene syntectonic deposits (Gela Thrust Wedge) are covered by Upper Pliocene - Lower Pleistocene syntectonic terrigenous deposits.

The tectono-sedimentary analysis highlighted a multi-stage tectonic evolution, characterized by: a):- a Meso-Cenozoic extensional tectonics responsible for the formation of thick slope deposits, cropping-out along the southern slope of the main carbonate reliefs; b)- a Messinian compressional event during which the Eocene-Oligocene portion of the Saccense succession was shortened and detached from its Mesozoic carbonate substrate; c)

- a Late Pliocene-Early Pleistocene compressional event, during which low- and high-angle thrusts were responsible for the exhumation of the main carbonate reliefs and for the building of the Gela Thrust Wedge; d)

- a post-Early Pleistocene compressional-transpressional event, responsible for the activation of the two most important tectonic lineaments recognized in the Sheet: (i) the NNE-SSW-oriented, left-lateral transpressive fault that develops across the Sheet, displaying a southward continuity in the offshore; (ii) the northern dipping thrust, bounding the carbonate reliefs in the northern sector of the Sheet.

Both tectonic structures allowed for the overthrust of the Meso-cenozoic carbonate tectonic units (Sicanian and Saccense) on the Gela Thrust Wedge.