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Miocene to Present evolution of the Calabria Tyrrhenian continental margin (Southern Tyrrhenian Sea)

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The Miocene to Present evolution of the Calabria Tyrrhenian Continental Margin (CTCM, Southern Tyrrhenian Sea) are reconstructed using two ENE-WSW oriented, near-vertical seismic profiles (CROP-M27 and SISTER 11 lines). The interpreted profiles were time-to-depth converted, merged and translated in a geological section, which was also extended to the Tyrrhenian bathial plain and the Calabrian arc using wide-angle seismic data [Scarascia et al., 1994], and tested with gravity modelling.
Across the CTCM, top of KCU is laterally variable in depth forming basins filled by Oligo-Miocene clastic to terrigenous deposits up to 1500m thick. Basins are separated by major structures with contractional or transcurrent kinematics, where faults are arranged in a positive flower structure fashion, affecting the KCU as well as lower Oligocene to Miocene deposits. The Messinian evaporites display essentially a constant thickness of ≈400m with the exception of the Paola Basin where deep-water Messinian evaporites are up to 1000 m thick. Plio-Quaternary deposits display a remarkable variation in thickness from ≈4.5 km in the Paola Basin to less then 400m in the central sector of the margin. Plio-Quaternary sediments are internally sub-divisible into four sub-units separated by tectonics enhanced angular unconformities.
W-ward vergent reverse faults with limited vertical displacement offset the top of KCU as well as the Oligo-Miocene sedimentary and evaporitic units in the eastern side of the Paola basin and in the distal part of the CTCM where a number of closely spaced, W-vergent thrust faults are also observed in the Plio-Pleistocene deposits. Along the CTCM, the only significant normal fault which was identified is located around its central sector, dips to the W and has a displacement of ≈580m.
Across the margin, the Moho was inferred at ≈35 km beneath the Calabria Arc and shallows up to 24 km in correspondence with the coastline. Moho deepens again to a depth of ≈28 km in correspondence with the depocenter of the Paola Basin and then climbs gently and regularly reaching a depth of ≈15 km at the continent-ocean transition. Westward, the ≈8-9 km thick oceanic crust of the Marsili basin is recognised. The CTCM crust has undergone substantial thinning that starts becoming important in correspondence with the W coast of Calabria where thinning is up to delta=1.5 and, on the whole, shows then a fairly gradual increase from the E to the W where thinning reaches up to delta=3.2 at the continent-ocean transition. The disaggregated analysis of thinning factors for the upper (including KCU, Oligo-Miocene and Plio-Pleistocene deposits) and lower crust identify a long wavelength trend which is essentially similar to that of the entire crust thereby suggesting that regional thinning affected in equal amounts the upper and lower crust. Two important deviations are observed, underneath the Paola Basin and towards the zone of the continent-ocean transition where upper crustal thinning is much larger than the crustal one. On the basis of tectonic features recognised in the KCU, the CTCM may be partitioned into three segments characterized by different post Late-Messinian tectonic deformation and separated by localised strike-slip fault zone.

References

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