



Interaction between crustal tectonics and salt deformation in the Eastern Sardinian margin, Western Tyrrhenian Sea: seismic data and analogue modelling

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The Tyrrhenian Basin opened by eastward migration of the Apennine subduction system. Rifting along the Eastern Sardinian margin started during the middle to late Miocene times and hence this timing partly overlapped the Messinian Salinity Crisis. The two “METYSS” cruises were conducted to use the deformation of the Messinian salt and its Plio-Quaternary overburden as a proxy for better delineating the tectonic history of the sub-salt basement.

Many parts of the study area contain two of the most typical Messinian series of the Western Mediterranean: the Mobile Unit (MU; salt, mainly halite), overlain by the more competent Upper Unit (UU: alternating dolomitic marls and anhydrite). The brittle Plio-Quaternary cover overlies the UU.

Usually, the presence of mobile salt is viewed as a nuisance for understanding crustal tectonics because salt's ability to act as a structural buffer between the basement and the cover. However, we illustrate, using examples from the Cornaglia Terrace, how we can use thin-skinned salt tectonics as indicators of vertical movements in the sub-salt, pre-Messinian basement. There, slip along N-S-trending crustal normal faults bounding basement troughs has been recorded by salt and overburden in two different manners:

- First, post-salt basement faulting (typically after deposition of the Upper Unit and the early Pliocene), and some crustal-scale southward tilting, triggered along-strike (southward) thin-skinned, gliding of salt and overburden recorded by upslope extension and downslope shortening.
- Second, and less obvious at first glance, there was some crustal activity along another basement trough, located East of the Barone Ridge after deposition of the Messinian salt. This trough is narrow, trends N-S and is bounded by crustal faults. The narrow width of the trough allowed for only minor across-strike (E-W) gliding. The resulting geometry would suggest that nothing happened after Messinian times, but some structural features (confirmed by analogue modelling) show that basement fault slip and tilting (Eastward or Westward) was accommodated by lateral flow of salt, which thinned upslope and inflated downslope, while the overlying sediments remained sub-horizontal.