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Interactions between salt tectonics and crustal tectonics on the Eastern Sardinian Margin (Western Tyrrhenian Sea)

Virginie Gaullier¹, Gaël Lymer², Bruno Vendeville¹, and Frank Chanier¹

¹Univ. Lille, CNRS, Univ. Littoral Côte d'Opale, UMR 8187, LOG, Laboratoire d'Océanologie et de Géosciences, F59000 Lille, France

²UCD.UCD School of Earth Sciences, University College Dublin, Ireland

The METYSS project (Messinian Event in the Tyrrhenian from Seismic Study) is based on high-resolution seismic data acquired along the Eastern Sardinian margin. The main aim is to study the Messinian Salinity Crisis (MSC) in the Western Tyrrhenian Basin, but we also investigated the thinning processes of the continental crust and the timing of crustal vertical movements across this backarc domain. Our first results shown that rifting ended before the MSC, but that crustal activity persisted long after the end of the rifting. This has been particularly observed on the proximal margin, the East-Sardinia Basin, where the Mobile Unit (MU, mobile Messinian salt) is thin or absent. In this study, we examined the distal margin, the Cornaglia Terrace, where the MU accumulated during the MSC and acted as a décollement, thus potentially decoupling the basement from the sedimentary cover. Our observations provide evidence for lateral flow and gravity gliding of the salt and its brittle sedimentary overburden along local basement slopes generated by the post-MSC tilting of some basement blocks formerly generated during the rifting. We also investigated an intriguing wedge-shaped body of MU located in a narrow N-S half graben bounded to the west by a major, east-dipping, crustal normal fault. Classically, one could think that this salt wedge is related to the syn-tectonics deposition of the MU, but we propose an original scenario, in which the post-rift vertical motion of the major fault has been cushioned by lateral flow of an initially tabular salt layer, leaving the supra-salt series apparently unaffected by the crustal motions of the basement. We tested this scenario by comparing natural data and physical (analogue) modelling data. Our results reveal that salt tectonics provides a powerful tool to understand the deep crustal tectonics of the margin and to constrain the timing of vertical motions in the Western Tyrrhenian Basin, results that can be applied to rifted salt-bearing margins worldwide.