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Partitioning of deformation along a reactivated rifted margin: example of the northern Ligurian margin.

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The northern Ligurian margin, of Oligo-Miocene age, is currently undergoing compression related to microplate motions and/or to gravity spreading of the Alpine chain located immediately north of it. Active thrust faults and folds have previously been identified below the margin, together with a global uplift of the continental edge, since at least the Messinian. The seismicity that goes with the present-day margin contraction (e.g. Mw 6.9, 1887/02/23) extends to the axis of the adjacent oceanic basin (e.g. ML 6.0, 1963/07/19; ML 5.4, 2011/07/07). However, we do not know of any recent or active crustal contractional structure within this oceanic domain.

In this study, we use new 12-channel high-resolution seismic data (FABLES seismic cruise, 2012, R/V Tethys II) in order to image the sedimentary cover of the Ligurian oceanic basin, up to $\sim$3km below the seabed, including the Plio-Quaternary and the Messinian sediment down to the bottom of the Messinian salt layer. Because the Messinian event is well dated (5.96-5.32 Ma) and well identified in the seismic data, it forms a clear marker that we use to characterize the recent deformation related to both mobile salt motion and crustal tectonics.

About 50 km south of the margin offshore of Italy, we identify huge and complex salt walls that elongate SW-NE. Such salt walls, which cannot be explained by salt tectonics only, are interpreted as evidence of deep-seated crustal deformation. They form en echelon structures that are well expressed in the seabed morphology, and do not correspond to any significant vertical throw at the base of the salt layer. This suggests that within the deep basin, mainly strike-slip faulting accommodates long-term crustal deformation. It thus offers a contrast with the margin where deformation is mainly marked by shortening and reverse faulting, with vertical throws of several hundred meters. This discrepancy in the tectonic styles between the margin and the adjacent oceanic basin suggests some partitioning of the deformation. It may result from the difference in the topographic gradient of the main crustal interfaces between the steep margin and the adjacent oceanic domain, and/or to different mechanical behaviours of the adjacent lithospheric domains.