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Messinian seismic Markers in the Western Tyrrhenian Sea: preliminary results from the "METYSS" Cruise (June 2009)

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This work has been undertaken in the framework of an integrated study of the Messinian Salinity Crisis (MSC, Hsu et al., 1973) seismic makers at the scale of the Mediterranean basin. This new approach is based on multi-site comparative studies and on a unified nomenclature for Messinian sedimentary units and surfaces (Lofi et al., accepted). The objectives are to establish the impact of the MSC event on margins and basins that are characterized by various geodynamical, structural and sedimentary settings. In this scientific context, the Tyrrhenian Sea and especially its western part, constitutes a major target because of its geodynamical evolution. This area is a Neogene back-arc basin opened by continental rifting and oceanic spreading related to the eastward migrating Apennine subduction system (Jolivet et al., 2006). Rifting of the Tyrrhenian Sea started first on the Eastern Sardinian margin during the Tortonian-Messinian times, thus including Messinian deposits potentially syn-rift in some places. For these reasons, the western part of the Tyrrhenian basin is a key-area to document relationships between Messinian deposits and tectonic activity. In addition, this geodynamical evolution rises the question of the paleogeography and paleo-connections with the East Corsica basin, that may have worked as an independent lacustrine basin during the MSC, a topic that is questioned (Thinon et al., 2004).

The dataset used in this study consists of 15 seismic high-resolution reflection profiles ($\pm$1200 km). They have been acquired during the “METYSS” cruise (June 2009) along the Eastern Sardinian and South-Eastern Corsican margins on the R/V “Téthys II” (INSU-CNRS/CIRMED) (Gaullier et al., 2009). These profiles penetrate up to 1 second TWT below the sea-floor, allowing to clearly image the Plio-Quaternary sequence, Messinian Salinity Crisis deposits and erosion surfaces, down to the basement top. Here, we describe the characteristics (seismic facies, geometry, distribution) of the MSC markers that are similar to those observed in the deep Provençal basin and can thus be interpreted in respect to the new nomenclature proposed by Lofi et al. (2010). Several erosion surfaces (MES, TES, BES) and depositional units (UU: Upper Unit; MU: Mobile Unit)are identified. Those two latter commonly form the two upper units of the Messinian trilogy observed in the deep western basin. Observations show that the spatial organization of the Messinian markers strongly varies according to their location on the different margin and basin segments. South-eastward, in the vicinity of the Cornaglia Seamount, salt tectonics appears surprisingly huge. Preliminary interpretation suggests a syn-rift character for some of the Messinian deposits.

Among other points, we expect from these data to better argue: 1) the paleogeography, paleo-depths, connections and evolution of the basin and sub-basins during the MSC; 2) The base-level dynamics and the modalities of salt precipitation during this event; 3) The interactions between crustal tectonics, salt tectonics and sedimentation in order to precise the relative vertical movements (tilting, subsidence, magmatism...) and geodynamical history of the different segments of the area since 6 Ma.

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