Novel evidence from the Pliocene-Quaternary succession of the southeastern Gela Basin (Strait of Sicily, Central Mediterranean Sea): onset and evolution of contourite deposits

Gauchery, T.[1*], Rovere, M. [1], Cattaneo, A. [2], Pellegrini, C. [1], Asioli, A. [1], Tesi, T. [1], Campiani, E. [1], Trincardi, F. [1]

[1]*CNR-ISMAR, via Gobetti 101, 40129, Bologna, Italy,*

[2]*IFREMER, Géosciences Marines, Z.I Pointe du Diable, BP70,Plouzané, France*

**e-mail : tugdual.gauchery@bo.ismar.cnr.it*

Contourite deposits are the products of persistent thermohaline currents that accumulate or significantly rework sediment along continental margins. Despite being first documented in the Atlantic Ocean decades ago, many aspects on their genesis and their relationship with downslope sediment-transport processes remain uncertain. In the Mediterranean Sea, several examples of contourite deposits have been identified on continental slopes and shelves, in deep basins and around shallower sills, where bottom-hugging currents flow along preferential pathways.

We present novel finding on the reconstruction of the Pliocene-Quaternary succession of the Gela Basin (Strait of Sicily, Mediterranean Sea), a peculiar area of water masses exchange between the eastern and western Mediterranean Sea. We investigate the onset and evolution of contourites in the Gela Basin through the integration of seismic stratigraphy from multichannel and sub-bottom profiles, morphobathymetric analysis, sedimentology, micropaleontology and geochemistry to show the role of contourites in the Gela Basin evolution and to investigate their relationships with Mass Transport Deposits (MTDs).

Starting in the Pliocene, the Gela Basin recorded a first phase of shelf-edge progradation associated with the deposition of turbidites and thin-skinned stacked MTDs in the basin. During the Pleistocene and since 800 kyr BP, sediment drifts began to migrate on the slope concurrently with the onset of large MTDs further downslope, involving the entire Pleistocene succession. In addition, within the Pleistocene, a distinct change in the sedimentary architecture of the margin was caused by the progradation of shelf-edge clinothems and by a new growth pattern of contourites with a more patchy distribution on the upper slope and outer shelf. The youngest of these contourites experienced high Sediment Accumulation Rate (SAR) of up to 0.5 cm yr^{-1} during the end of the Last Glacial Maximum and became starved soon after Heinrich Event 1 (< 0.1 cm yr^{-1}). The contourite eventually failed generating an MTD up to 50 m thick and with a volume of 0.41 km^3.

Our results suggest that the onset of contourite deposits may represent a marked shift in margin evolution favouring the instability of the stratigraphic succession in fewer but thicker MTDs, compared to sediment collapses from shelf-edge progradation. These conclusions have implications on chronostratigraphic and paleoclimatic reconstructions of the Central Mediterranean basin.