NEW EVIDENCES OF THE INTERPLAY BETWEEN A TURBIDITE CANYON (GUADIARO CANYON, NW ALBORAN SEA) AND CURRENT-DRIVEN ALONGSLOPE PROCESSES

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The NW Alboran Sea contains geological evidences of the intricate interplay of downslope and alongslope features on one hand, and of the interaction of the Atlantic Waters flowing out and the intermediate Mediterranean Waters (MWs) flowing into the Strait of Gibraltar on the other hand.Both of these interactions are of high scientific relevance and have been studied separately before, but must also be considered together since both phenomena occur simultaneously. The work is based on data acquired during the FAUCES surveys, comprising high-resolution bathymetry and seismic profiles, in combination with a database comprising seismic profiles acquired since the 70s.

The interaction between downslope and alongslope processes occurs on both margins of the Alboran Sea, but this interaction is especially complex in the Spanish margin, where the turbidite canyons cut the continuity of terraced plastered drifts. The interaction may vary between the dominance of downslope processes over the alongslope processes (i.e., Almeria turbidite system), the alternation between downslope and alongslope deposits (which is the case of the most recent lobe of the Guadiaro fan) and the influence of alongslope processes over downslope processes. The Guadiaro canyon provides an example of the last case: After a first phase in which the canyon was incised, during a second phase (Pliocene) downslope processes were dominant, as indicated by the chaotic facies infilling the canyon incision. A last phase (Quaternary) characterized by stratified discontinuous facies indicate a greater influence of contourite alongslope deposits. During the stage two and mostly during stage three, the lateral accretion of packages (LAPs) of stratified facies with NE progradation trend have been recognized on its SW side (right margin), progressively invading of the Guadiaro Palaeocanyon and affecting its current location and shape (Fig. 1). These findings have been confirmed by isochore maps, in which a depocentre of Quaternary age runs parallel to the canyon on its SW side.

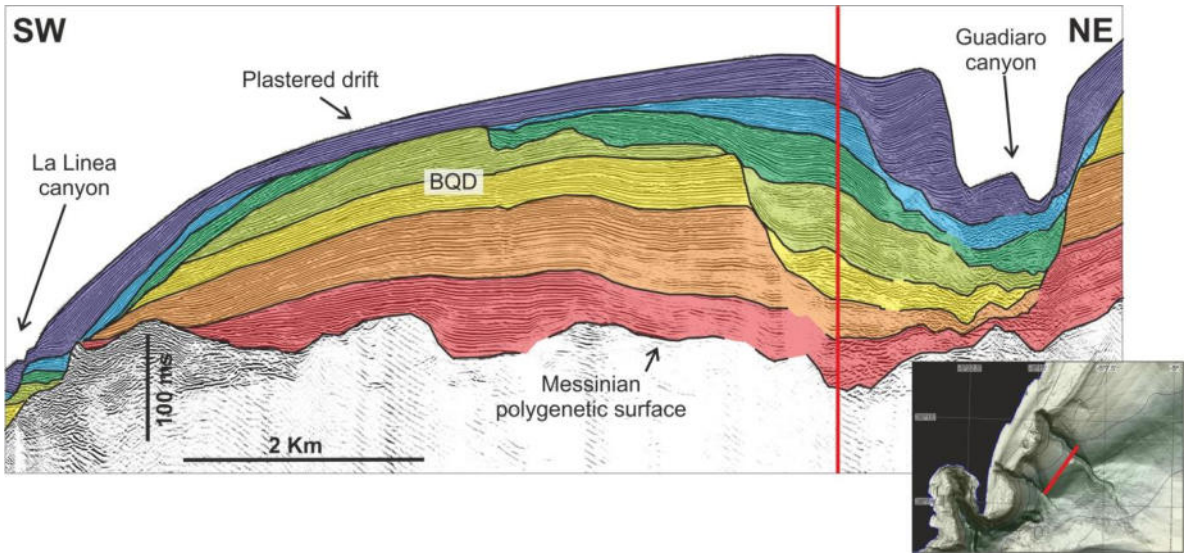

Figure 1 - Infill of the Guadiaro Canyon since the Messinian, showing the LAPs invading the Guadiaro Palaeocanyon. The LAPs are mostly of contourite origin after the Base of Quaternary Deposits (BQD)

The oceanography of the study area is marked by the closeness to the Strait of Gibraltar, located to the west. The Mediterranean intermediate waters, comprising Western Intermediate Waters (WIW), Levantine Intermediate Waters (LIW) and the upper portion of Tyrrhenian Dense Waters (TDWi), flow along the Spanish margin towards the Strait. On the opposite, the Atlantic Waters enter forming a strong jet into the Mediterranean. These two groups of water masses are separated by a pycnocline, along which internal waves formed in the Camarinal Sill travel eastwards. The NE progradation of the LAPs affecting the Guadiaro canyon points to the much stronger effect of the Atlantic Jet and the eastward-travelling internal waves over the intermediate MWs directed towards the Strait of Gibraltar.

Ultimately, these findings may shed light on one of the reasons behind the sudden abandonment and obliteration of the Estepona Palaeocanyon after the BQD, possibly located where the Atlantic Jet and the internal waves cease their sediment transport towards the NE and where the weaker SW transport by the intermediate Mediterranean Waters become the only alongslope transport mechanism.

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