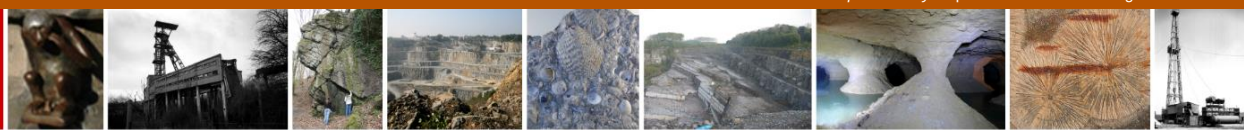

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Palaeoceanographic implications of current-controlled sedimentation in the Alboran Sea after the opening of the Strait of Gibraltar

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Abstract

This study focuses on the Alboran Sea area (Westernmost Mediterranean), where a seismic analysis of the Pliocene and Quaternary stratigraphy was conducted in the Alboran Sea (Westernmost Mediterranean) using ~2000 profiles consisting of single and multi-channel seismic records. The seismic facies and architectural analysis of the deposits evidence the presence of bottom-current deposits (plastered, sheeted, elongated-separated and confined monticular drifts) and associated erosive features (terraces, scarps, moats and channels). Many of these deposits were previously considered to be open slope turbidite deposits which have now been reinterpreted as contourites.The contourite features have developed under the continuous influence of Mediterranean water masses, after the opening of the Strait of Gibraltar (roughly divided into light and dense Mediterranean waters), with plastered drifts dominating on the Spanish and Moroccan continental slopes, and sheeted drifts infilling the subbasins. The location and growth of contourite features have been mainly controlled by two main factors: i) tectonics, which has governed the relocation of the main pathways of the water masses; and ii) climate, which has influenced both water mass conditions and the depth of interfaces, as well as hinterland sediment sources, conditioning the morphoseismic characteristics of the drifts (facies and geometry) and terrace formation (dimensions). The mapping of the contourite facies through time has allowed defining three main scenarios for deep water circulation since the opening of the Strait of Gibraltar, which are: i) Atlantic Zanclean flooding; ii) the Pliocene sea, with two different stages caused by the progressive relocation of flow pathways; and iii) the Quaternary sea, with well defined characteristics and mostly stable flow pathways for the AW, and light and dense Mediterranean waters.This work lead us to consider the geologic framework characterizing the Alboran Sea may have played an important role in the interaction of the Mediterranean Waters before entering the Strait of Gibraltar, and thus in forming the MOW. Additionally, the results of this work may help in understanding the sedimentation in other Mediterranean margins affected by the same water masses and other partly land-locked basins with exchanges of waters over a confining sill.