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The interplay of contourite and mass-wasting recent sedimentary processes at the Guadalquivir Bank Margin uplift, Gulf of Cadiz: morphological high-resolution approach

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The Gulf of Cadiz records the interplay of a variety of sedimentary processes related to the flow of the Mediterranean Outflow Water (MOW) exiting the Mediterranean Sea, with downslope sedimentary processes and the topography of the region. This work presents detailed morphological features of the Guadalquivir Ridge area, based on high resolution bathymetry and very-high resolution seismic profiles (TOPAS) acquired during the MONTERA cruise.

The Guadalquivir Ridge is a SW-NE-oriented relief located on the middle slope of the Gulf of Cadiz (8º-7º10' W). It reaches minimum depths at two highs, one at the Guadalquivir Bank, at the western extreme of the ridge (275 m), and a second one close to the eastern extreme (350 m). The ridge is cut by a gap where the Diego Cao contourite moat is incised forming a narrow, 4-5 km wide, SE-NW oriented channel. It delimits two contourite sheeted drifts (SD) at the northern side of the ridge: the Faro SD at the east (∼ 600 m water depth) and the Bartolomeo Dias SD, at the west (∼750 m water depth). The SD are relatively flat and become shallower progressively in a SE direction towards the Guadalquivir Ridge. At the SE side of the Guadalquivir Ridge depth increases dramatically where the Huelva and Cadiz contourite channels occur. They are originated by the direct erosion of the Lower Core of the MOW, running at depths of around 1200 m. The Diego Cao channel is related to the Upper Core, which runs at depths of around 800 m (Ambar and Serra, 2007).

High resolution data reveal the existence of a variety of features. Semi-circular scarps, up to 10s km long, occur at the SE side of the Guadalquivir Ridge and at the SW side of the Bartolomeo Dias SD, at the rim of the Diego Cao contourite channel. Scarps occur at depths of 550 to 750 m and form steep steps of tens to hundreds of meters and in some cases occur overlapped one on each other at different depths. The second type of feature is a series of circular to ellipse-shaped depressions identified at the NE side of the Faro SD. Depressions are a few km in diameters and up to 100 m deep, and are aligned parallel to the edge of the SD, close to the rim of the Diego Cao. Finally, a valley-shaped depression has been identified at the N side of the Guadalquivir Bank. It is about 30 km long, with incision depths of up to 200 m and it runs parallel to the shape of the bank main relief. This work evaluates the relationship of the Lower and Upper cores of the MOW with the existing topography of the Guadalquivir ridge, as the origin for the identified morphologies, as the result of the interplay of mass-wasting and contouritic processes.

Bibliography: Ambar, I., Serra, N., 2007. Intermediate depth circulation: The importance of MW. Workshop on Circum-Iberia Paleoceanography and Paleoclimate, Peniche, Portugal.