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## **Origin of morphological depressions in the Guadalquivir Bank area (Gulf of Cadiz middle slope)**

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Swath bathymetry and high resolution seismic datasets evidence the widespread occurrence of morphological depressions of different scales in continental margins. Their origin is related to a number of processes, such as fluid escape, collapses or reworking of bedforms by turbidity currents. In this work we study the origin of morphological depressions, escarpments and a major channel on the Guadalquivir Bank uplifted area (Gulf of Cadiz middle slope) in relation to bottom currents. The study area is located on the depositional sector of the Gulf of Cadiz Contourite System [1]. It is characterized by mounded and elongated contourite drifts at the foot of the upper slope and extensive sheeted drifts on the middle slope that result from the activity of the Mediterranean Outflow Water (MOW). The Bartolomeu Dias and Faro Sheeted Drift (SD) occur north of the Guadalquivir Bank and are separated by the Diego Cao Channel.

The Diego Cao channel is 4-5 km wide and has a NW-SE trend. In Parasound profiles it shows truncated reflections on the NE flank and layered reflections on the SW flank. It has been previously interpreted as a Contourite Channel [1]. Amphitheatre-shaped escarpments occur along the SE limit of the Bartolomeu Dias SD plateau. They are 0.5-5.5 km in diameter, 20-80 m deep and produce a terraced-shaped profile. They are interpreted as slide scars [2]. Circular-elliptical depressions occur on the Bartolomeu Dias SD plateau at depths of 640-780 m. They are aligned parallel to the SW rim of the Diego Cao Channel along about 12 km [2]. Depressions are irregular in shape, 1-2.2 km in diameter and 15-90 m deep. Parasound profiles show wavy, irregular parallel reflections with lateral discontinuities and truncations. The correlation in the depressions area with the regional stratigraphy [3] allows identifying two main Quaternary units (QI and QII) and the boundaries corresponding to the Base of Quaternary and the Middle Pleistocene (MPD). The Pliocene to Lower Quaternary record displays mounded bodies and associated depressions that evolve from single to multiple systems. The MPD is an erosional surface underlying the depressions that displays a step-like profile. The QII has an irregular, wavy, cut-and-fill seismic character.

The morphological depressions are interpreted as the result of the interplay between oceanographic, mass-wasting and tectonic processes and occurred in four stages: 1) Weak MOW circulation produced the onset of a proto-Diego Cao contourite moat by interaction with structural features of the Guadalquivir Bank (Lower Pliocene); 2) Enhanced MOW and increased deformation created a multi-crest drift and moat system (Upper Pliocene-Early Quaternary); 3) Enhanced tectonic activity provoked widespread mass-wasting along the sheeted drifts rims, opening a gap in the bank uplift and originating the erosive surface as slide escarpments under the present-day Diego Cao channel western rim (Mid

Pleistocene); 4) Final stage (Late Quaternary). The Intermediate Branch of the MOW started flowing through the deep gateway and a separated contourite drift started depositing over the erosional surface formed by the slide scars. The interaction between the bottom current and this irregular basal surface created the depressions as the drift was being deposited. In this scheme, the Diego Cao channel would have acted as a contourite moat since the Lower Pliocene, and not as a merely erosional contourite channel as previously interpreted.

[1] Hernández-Molina FJ et al. (2006) Deep-Sea Res II 53: 1429-1463

[2] García M et al. (In Press) Marine Geology

[3] Llave E et al. Mar Geophys Res 28: 379-394

