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# Large bedforms on contourite terraces: conceptual consequences

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Over the last decade, numerous large-scale depositional, erosional and mixed features have been recognized in deep-water settings within the world's oceans, which provide diagnostic evidence for both modern and ancient bottom water circulation patterns and sedimentary processes [1]. Whilst most of these features are mud-rich, extensive sand-rich deposits have been determined, predominantly in high-velocity bottom currents settings [2]. The use of high resolution 3D seismic data along with modern seismic attribute analysis has allowed the distribution and geometry of these sand-rich deposits to be more easily recognised [2, 3]. Deep-water sands have come a long way. Usually, deep-water sand deposits are interpreted as a product of submarine gravity flows, whose facies model is derived primarily from the ancient record. Deep-water sandy deposits generated or reworked by bottom currents are still poorly studied, but adopting new perspectives should be explored and evaluated, since these deposits are of great scientific and potentially economic significance.

Buried contourite terraces associated with large plastered drifts from the Paleocene to Miocene in the Uruguayan continental slope have been recognised [4, 5]. Large erosional (*channels*, *scours* and *furrows*) and depositional (*sand ribbons*, *2D sedimentary waves* and *barchans dunes*) bedforms along these terraces have been identified with 3D seismic, and compared with similar bedforms identified, at different depth and ages, on the Brazilian, Gulf of Mexico, Canadian and Northern European margins.
The observations from Uruguay suggest that the bottom-currents are associated with two water masse: one vigorous deep current flowing toward the NE along the lower slope and a weaker intermediate water mass flowing toward the SW along the middle and upper slope. The interface between these two water masses is related to contourite terraces in the middle slope, and its vertical shits conditioned the formation and distribution of bedforms through time. Downslope processes were reworked and distributed by these bottom currents along the terraces generating sandy deposits concentrated in certain places in three distinct depositional settings: a) high bottom current velocities (> 0.4 m/s); b) weak bottom current velocities (< 0.4 m/s); and c) mixed systems where down-slope processes dominate developing channel-levees, but shifted alongslope due to the bottom current influence. Our evidence demonstrates that most of these bedforms are common but still unknown features in deep-water environments. Some of these features, pose questions about our fundamental understanding of margin morphologies and bedform development in the deep marine environment. They are essential as palaeoceanographic markers and might represent potential hydrocarbon reservoirs, thereby being of potential interest to petroleum explorers.

*References:*

[1] Rebesco, M. et al. (2014), Marine Geology, v. 352, p. 111-154.
[2] Viana, A.R., et al. (2007) in: Economic and Palaeoceanographic Significance of Contourite Deposits. Geological Society, London, Special Publication 276, pp. 1–23.
[3] Campbell, C., and Mosher, D.C. (2015). Marine Geology. http://dx.doi.org/10.1016/j.margeo.2015.10.005
[4] Thompson, P. et al. (2015) IAS 31st Meeting of Sedimentology, Kraków, 22nd-25th June 2015. Abstract vol-
[5] Hernández-Molina, F.J., et al. (2015). Marine Geology, doi:10.1016/j.margeo.2015.10.008