Paper Number: 3103

The Scan Basin contourite fan, southern Scotia Sea (Antarctica). High-resolution seismic stratigraphy and oceanographic implications

García, M.[1], Lobo, F.J.[1], Maldonado, A.[1], Hernández-Molina, F.J.[2], Bohoyo, F.[3], Pérez, L.F.[4]

[1]Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR), Av. Palmeras 4, 18100 Armilla (Granada), Spain
[2]Royal Holloway University of London, Department of Earth Sciences. Egham, Surrey, TW20 0EX, UK
[3]Instituto Geológico y Minero de España. Rios Rosas 23, 28003, Madrid, Spain
[4]Geological Survey of Denmark and Greenland, Øster Volgade 10, DK-1350 Copenhagen K, Denmark

---

The Scan Basin is the easternmost of the southern Scotia Sea small oceanic basins, bounded by Bruce and Discovery banks. The basin seafloor and the surrounding banks are affected by the northward flowing Weddell Sea Deep Water (WSDW) and the Antarctic Circumpolar Current (ACC) [1,2]. The Scan Basin records the complex geodynamic evolution related to the opening and later evolution of the Drake Passage and the resulting onset of the present-day global oceanographic pattern [3]. It constitutes moreover, an important gateway for the ACC, north of Bruce Passage, and allows the northward overflow of the (WSDW) from the Weddell Sea into the Scotia Sea. The basin morphosedimentary features and the late Pliocene to Quaternary sedimentary processes are described based on the analysis of high-resolution seismic profiles and swath bathymetry [4]. Two main domains have been identified: (1) the abyssal plain and (2) the banks. These domains are characterized by distinct features with different origins (erosional, depositional, gravitational, fluid-escape and volcanic) imprinted in the surficial morphology and the sub-surficial acoustic response.

The abyssal plain is characterized by erosional features (lineations, dendritic channels and furrows)in the proximal area north of Bruce Passage, depositional features (sheeted drifts and low-relief sediment waves) in the central basin and associations of erosional and depositional features (contourite moats and mounded drift systems) along the margins at the base of the banks. The main deposits in the abyssal plain of the Scan Basin compose a large contourite fan developed by the WSDW flow. The deposits distribution suggests that: the main core of the WSDW flows northward along the western part of the basin plain; the main core splits in the distal part of the Scan Basin into a main northward-flowing core that continues toward the Scotia Sea; and a weaker counter-current that flows southeast and is responsible for the formation of erosive features along the eastern part of the basin. This weaker flow could be locally intensified by interaction with the steep flanks of Discovery Bank, thus generating the contourite moats and associated drifts.

The banks represent shallower domains characterized by an irregular physiography, a relatively thinner sediment drape and an abundance of volcanic edifices and fluid-escape features (craters). Banks are connected with the abyssal plain by the slopes, where numerous slide scars are identified, with their associated deposits located either on the surface or buried at the foot of the slopes. Discovery Bank includes landforms of contourite origin consistent with the circulation pattern of the generally eastward-flowing ACC. The swath bathymetry suggests a highly dynamic interplay between fluid escape and mass-wasting processes, where submarine slide scars are interpreted as created by the reworking of craters, probably also favoured by the contouritic character of the deposits.

Variations in the abyssal plain stratigraphy are associated with events related to climate changes since the late Miocene [3], involving increased bottom-current circulation and variations in the interaction

between the WSDW and the ACC. These results provide insights on the palaeoceanographic regimes affecting Antarctic water masses and also contribute to the better understanding of contourite fans, of which few examples have been defined, specially associated to deep overflows.

[1] Lobo FJ et al. (2011) Geo-Mar Lett 31: 451-464
[2] Maldonado A et al. (2003) Palaeogr Palaeoclim Palaeoecol 198: 187-221
[3] Perez LF et al. (2014) Global Planet Change 123 : 344-358
[4] García M et al. (In Press) Marine Geology