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The Odyssea contourite drift system (Ross Sea, Antarctica)

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The Hillary Canyon is one of the main conduits for dense shelf water forming in the Ross Sea, which over-flows the shelf edge and transforms into the Antarctic Bottom Water (AABW). The main changes in past ocean circulation are recorded in the adjacent ODYSSEA Contourite Depositional System that is located at 2000-3000 m depth west of the Hillary Canyon. Seven depositional units are identified in the seismic data. Unconformity UR3 marks the transition from the lower units with thickness controlled by basement depressions to the overlying units that conversely present many lateral thickness variations not clearly associated with the underlying topography or active tectonics. The sedimentary succession above UR3 is, hence, interpreted to be controlled by bottom currents and gravity flows. In particular, a series of mounds, 2 to 5 km wide and between 50 and 200 m high, are elongated in NNE direction, obliquely with respect to the continental slope. They are separated by erosional (turbiditic) channels and landslide scars and interpreted as small mixed sediment drifts. Prominent landslide scars and a giant landslide deposit over 200 m thick and covering 750 km2, are also visible. The gravity cores show sedimentary facies typical of contourites including well-developed planar laminations. Local cross bedding suggests a dynamic bottom environment. The oceanographic data show that the $\sim$200 m thick bottom layer is occupied by AABW (with potential temperature $< 0^{\circ}$ C). In that layer at the base of the slope, flow speed recorded by the Lowered Acoustic Doppler Current Profiler is larger with respect to the upper layers, and reaches about 30 - 35 cm/s. Near bottom currents are weaker further offshore. The energetic mixing between the along slope current and the down slope currents coming from the continental shelf, increases the turbidity of the bottom boundary layer. Our results will be merged with those obtained from the 2018 IODP drilling expedition 374 to develop a conceptual model of sediment deposition relating marine-based ice sheet and oceanic processes along the Ross Sea continental margin during the Neogene and Quaternary.