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Sedimentation pattern of the southeastern Weddell Sea

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An improved understanding of the sedimentation processes of the southeast Weddell Sea helps in refined reconstructions of paleo-ice sheet dynamics in conjunction with paleoceanographic processes. We re-investigated a series of sedimentary features of the continental rise, such as contourite drifts, which were reworked by glacial erosional and ocean-current activity from the middle Miocene to the present. New unconformities WS-u5 (middle Miocene), WS-u6 (late Miocene), WS-u7 (Pliocene) were interpreted by correlating records of the ODP Leg 113 Site 693 and existing seismostratigraphic and chronological models. We focused on the Crary trough mouth fan and channel system as well as giant sediment drifts and analysed published and unpublished high-resolution seismic reflection, sub-bottom profiler (Parasound) and swath-bathymetry data. Four types of sediment drifts (channel related drifts, elongate drifts, contourite drifts, and levee drifts), mass wasting deposits and sediment waves were recognized from analyses of seismic characteristics. The formation of the different types of sediment drifts can be related to the upslope/downslope Antarctica Bottom Water (AABW) and Weddell Sea Bottom Water (WSBW) activity as well as interaction with the westward Weddell Gyre and Coriolis force. Mass wasting deposits and sediment waves were caused by large scale slumping and sliding from the continental slope and by contour currents, respectively. The large size of the three main channels and their infill consisting of seismically chaotic facies indicate that these channels formed by shelf slope collapses at the Dronning Maud Land margin and large volume mass wasting through the Crary trough mouth fan. Finally, we compare the sedimentation processes of the Crary fan with other submarine fans, such as Belgica fan of West Antarctica, Prydz Bay fan of East Antarctica and Scoresby fan of East Greenland.