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Evidence for the Late Cenozoic Antarctic Ice Sheet evolution and bottom current dynamics in the central-western Ross Sea outer margin, Antarctica

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Sedimentary records in polar continental margins provide clues for understanding paleo-depositional environments, related to ice sheet evolution and bottom-water current dynamics, during times of past climate and global sea level changes. Previous seismostratigraphic studies of the Ross Sea embayment, Antarctica, illustrated its general stratigraphic framework and the distribution of glacial sedimentary features over the continental shelf, since the onset of Antarctic ice-sheets at the Eocene-Oligocene boundary (∼34.0 Ma). In contrast, there are a fewer studies for the outer continental margin, where continuous sedimentary deposits generally preserve the record of past climate cycles with minimum hiatus, comparing to the inner- and mid-continental shelf, where grounding ice streams eroded most of the sediments. Here we present a seismostratigraphic analysis of 2-D multichannel seismic reflection profiles, from the Central Basin located in the central-western Ross Sea outer margin. A glacial prograding wedge developed at the mouth of the Joides Basin since early-middle Miocene times (RSU4: ∼14.0 Ma). And the Central Basin was filled with stacked debris-flow deposits and turbidites. The sediment depocenter shifted from the Central Basin toward the slope in the Pliocene (after RSU2: ∼3.3 Ma). Pliocene foreset beds are steep and pinch out at the base of the continental slope. Bottom current controlled sediment drifts well developed since the middle Miocene, along the western slope of the central Basin and on the basement highs These areas are far from the mouth of the Joides trough, where most of the glacial sediment is deposited, and they are also more elevated than the basinal areas, where gravity flow maximum thickness accumulated. Along the western slope of the central Basin and over the basement highs, the signature in the sediments of the action of bottom current reworking and shaping the sea floor can be then clearly recognized. We present the sediment drifts type and distribution and an hypothesis of past circulation pathways based on the sediment drift characters and comparison with the present day circulation in the Central Basin.