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A large channel system in the western the Riiser Larsen Sea, East Antarctica: Paleoceanographic and sedimentary aspects

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We investigated seafloor morphology and sedimentary processes at the continental margin in the western Riiser Larsen Sea, Antarctica, to reconstruct processes of channel/levee development, and to evaluate the influence of climate through the past 5 marine isotope stages on these processes. Shallow seismic (parametric subbottom profiler) investigations reveal that channels and associated levees form the principal morphological structures in the western Riiser Larsen Sea. The channels are up to several kilometers wide and hundreds of meters deep. They stretch from the upper continental slope towards the Enderby Abyssal Plain. Sediment cores (taken from levee tops) reveal increased amounts of sand and coarser silt during warmer climate phases (MIS 1, 3, 5). The sand is mainly composed of planktic foraminifers and IRD, both suggesting seasonally open waters (interglacials). The carbonate-free sortable silt mean grain size suggests increased bottom current speed during the warmer climate phases. We postulate, that the occurrence of coastal polynyas and strong sea-ice formation through katabatic winds promote the formation of cold waters and brines. These are channeled on the continental slope and intensify turbidity currents that occur on the steep slopes. Alternatively, the newly formed dense waters can be taken up by westward flowing contour currents and thus support the formation of turbidity currents. It is suggested that either process supports downslope sediment transport and levee growth during warm climate phases. Under cold climates a permanent ice cover is suggested at least for the positions of the sediment cores (seasonally open waters today). These reveal significantly IRD and carbonate-depleted sediments during the cold climate phases.
Hence, polynyas may have formed further to the north over deeper waters. The volume of the cooled-down waters and brines was likely smaller and probably not able to reach the sea floor due to mixing with upwelling warmer waters. As a result downslope processes and levee growth were weaker during cold climate phases.