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Sediment property changes in response to the glacial activity on the continental slope to the eastern side of Pennell-Iselin Bank in the Ross Sea, Antarctica

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High latitude marine environments including the Antarctic continental margin have sensitively responded to the climate change, and the Ross Sea is one of these examples. Subglacial marine sedimentary changes have been studied extensively in the continental shelf areas of the Ross Sea to understand the growth and retreat of glaciers in response to the glacial-interglacial changes. However, the continental slope areas of the Ross Sea have not been investigated comparatively less. Thus, in order to comprehend the glaciomarine sedimentation change on the continental slope of the Ross Sea, 3 gravity cores (GC1, GC2, GC3) and 3 box cores (BC1, BC2, BC3) were collected from 3 sites (RS14-C1, C2, C3 by decreasing water depth), respectively, across the continental slope to the eastern side of the Pennell-Iselin Bank during XXIX PNRA (Rosslope II) cruise in 2014. A variety of sedimentological (grain size, magnetic susceptibility, XRF) and geochemical (biogenic opal, total organic carbon, $CaCO_3$, δ13C of organic matter) properties were analyzed along with AMS 14C dating of bulk sediments. All core sediments consist of mostly hemipelagic sandy clay or silty clay with scattered IRD (Ice-Rafted Debris). Sediment color of three cores changes consistently downward from brown to gray with some alternations in core GC1. Based on the basic sediment properties such as sediment color, grain size, and magnetic susceptibility, sediment lithology was decided to divide Unit A and Unit B, both of which were further divided into two subunits. Despite old carbon effect, AMS 14C dates confirm that Unit A belongs to the Holocene and Unit B covers the deglacial to last glacial period at the top of cores. Unit A is characterized by low TOC, low $CaCO_3$, low biogenic opal content and low C/N ratios, whereas Unit B is characterized by high TOC, high $CaCO_3$, moderate to high biogenic opal content and high C/N ratios. Consequently, Unit A represents the modern and interglacial sediments deposited mainly by the suspension settling of biogenic particles in the open marine condition. In contrast, because Unit B shows higher TOC, $CaCO_3$ content and C/N ratios, these sediments might be supplied by the lateral melt-water plume or distal part of debris flow originated from the front of grounding ice in the subglacial continental shelf under the ice shelf and during the glacial or post-glacial period. Thus, Unit B contains mostly reworked and eroded continental shelf sediments and IRDs. In addition, because the peaks of biogenic opal and TOC contents at Site C1 are distinctly higher than Sites C2 and C3, surface water production occurred under seasonally open marine condition at the deeper Site C1. In conclusion, the influence of subglacial continental shelf sedimentation in terms of melt-water transport and/or distal stage of debris flow was limited as far as to Site C2 during the deglacial and glacial period. However, such depositional effect was insignificant, but the seasonal open marine condition was recognized, at the deeper Site C1 in the continental slope of the Ross Sea.