# Retreat history of the West Antarctic Ice Sheet since the Last Glacial Maximum from deep-basin and sub-ice shelf sediment cores in the Western Ross Sea

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Three sediment gravity cores from beneath the McMurdo Ice Shelf (Fig. 2) and three piston cores from beneath seasonally-open water in the Erebus (in McMurdo Sound) and Lewis Basins (north of Ross Island) display a characteristic succession of sedimentary facies that document the retreat of the Ross Ice Sheet since the Last Glacial Maximum (LGM) to its present configuration. The succession of facies records a transition from sub-glacial to open-marine environments that comprises in ascending stratigraphic order: (1) slightly consolidated, clast-rich muddy diamict dominated by basement clasts from the Transantarctic Mountains, and interpreted as melt-out from the basal debris layer debris proximal to a retreating grounding zone; (2) sparsely-fossiliferous (reworked diatom frustules) and non-bioturbated mud lacking lonestones, interpreted as a sub-ice shelf facies; and (3) diatom mud and diatom ooze indicative of open water conditions with evidence of iceberg rafting. We present a chronology based on radiocarbon dates from post-LGM muds and diatom oozes, which indicates that lift off of the grounded Ross Ice Sheet in deep basins of the McMurdo Sound region began at ~10,000 $^{14}$C yr BP. Retreat of the grounding from the outer Dryglaski Trough to Ross Island was rapid and occurred within ~1000 yr. By ~8,900 $^{14}$C yr BP, there was open water immediately to the north of Ross Island, and since this time the calving line of the Ross Ice Shelf has remained to pinned to Ross Island, despite ice core evidence for a mid-Holocene climatic optima 1-2ºC warmer than present (Steig et al. 1998). We suggest the post-LGM retreat of the Ross Ice Sheet shifted to its contemporary ice shelf mode when the calving line became pinned by Ross Island. This revised chronology implies an earlier and more rapid retreat history than previously reported, and allows for the possibility that the retreat of the Ross Ice Sheet was associated with global eustatic sea-level pulses during the early Holocene.