

Post-LGM evolution of Reedy Glacier, Antarctica, as an indicator of current ice sheet stability

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Reedy Glacier (86°S) is a major outlet glacier of the East Antarctic Ice Sheet which, like many other outlet glaciers flowing into the Ross Sea Embayment, has been shown to respond to volume changes in the West Antarctic Ice Sheet. The advance of grounded ice through the Ross Sea at the Last Glacial Maximum blocked the mouths of the outlet glaciers causing a significant change in surface profile and elevation. Subsequent recession of the Ross Sea grounding line and removal of this damming effect during the Holocene caused lowering and steepening of glacier profiles and the isolation of drift sheets, moraines, and erratics on adjacent mountainsides. In contrast to the older glacial deposits at Reedy Glacier, these LGM-age landforms typically consist of unweathered grey drift and moraines, with widespread buried ice where sediment thickness is sufficient. Because Reedy Glacier currently emerges from the Transantarctic Mountains ~100 km behind the grounding line its surface profile and thickness are still partially controlled by the size and thickness of the West Antarctic Ice Sheet. Mapping of landforms deposited alongside Reedy Glacier at the LGM has revealed changes in surface elevation and profile that are contemporaneous with the Holocene retreat of the Ross Sea grounding line. For example, postglacial thinning has been asynchronous – 40 m at Hatcher Bluffs (head of Reedy Glacier), 140 m at Polygon Spur, 250 m in the Quartz Hills, and at least 110 m at Cohen Nunatak (glacier mouth) – and reflects Holocene thinning of the WAIS. Additionally, simple extrapolation of the LGM surface profile suggests that the nearby West Antarctic Ice Sheet may have been as much as 750 m thicker at the LGM than at present. Ultimately, a fully constrained record of the deglaciation of Reedy Glacier is crucial to ascertaining the current stability of the WAIS and will indicate whether deglaciation of the Ross Sea has ended or is ongoing. The exposure-age chronology of this record will be discussed by Todd *et al.* in the following presentation.