

LGM Ice Surface Elevations along the Transantarctic Mountains Front

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During the Last Glacial Maximum (LGM), the West Antarctic Ice Sheet (WAIS) expanded into the Ross Sea Embayment. The WAIS was joined along the western margin of the Ross Sea by ice from East Antarctic outlet glaciers. These outlet glaciers thickened substantially at their mouths in response to the damming effect of the WAIS. In contrast, the heads of the East Antarctic outlet glaciers thinned or remained constant, probably due to a precipitation deficit.

Glacial geologic data from the Transantarctic Mountains (TAMS) front, as well as in Marie Byrd Land and on nunataks exposed within the WAIS, provide important constraints on LGM ice-surface elevations. In general, these data suggest ice levels significantly higher than present in the Ross Sea Embayment (although perhaps not in the interior), with ice reaching ~350 m a.s.l. at Terra Nova Bay, 720 m a.s.l. on eastern Ross Island, and well over 1000 m a.s.l. at the mouths of the southern TAMS outlet glaciers. These data are broadly consistent with those showing thicker ice in Marie Byrd Land, but contrast with new evidence from Siple Dome suggesting only minor thickening at the LGM. Here, we review the glacial geologic data in hopes of stimulating discussion on the nature of the ice sheet required to accommodate both sets of data. An accurate reconstruction of LGM ice is necessary not only for properly interpreting data on deglaciation, but also for understanding Antarctica's role (if any) in causing global meltwater pulses during the late-glacial period.