

Exposure ages from mountain dipsticks indicate little change in East Antarctic Ice Sheet thickness since the Last Glacial Maximum and stability from the mid Holocene

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Past changes in East Antarctic Ice Sheet (EAIS) volume are poorly known and difficult to measure, yet are critical for predicting the response of the ice sheet to modern climate change. In particular, it is important to identify the sources of sea level rise since the Last Glacial Maximum (LGM), and ascertain the present-day stability of the world's largest ice sheet. We present altitudinal transects of ^{10}Be and ^{26}Al exposure ages across the Framnes Mountains in Mac.Robertson Land which allow the magnitude and timing of EAIS retreat to be quantified. Our data show that the coastal EAIS thinned by at most 350 m in this region during the last 13 ka. This reduction in ice sheet volume occurred over a ~5,000 yr period and the present ice sheet profile was attained at ~7 ka, in contrast to the West Antarctic Ice Sheet which continues to retreat today. Combined with regional offshore and terrestrial geologic evidence, our data suggest that the reduction in EAIS volume since the LGM was smaller than that indicated by some ice sheet models and added little meltwater to the global oceans. Stability of the ice margin since the mid Holocene provides support for the hypothesis that EAIS volume changes are controlled by growth and decay of Northern Hemisphere ice sheets and associated global sea level changes.