Regional sea-level highstand triggered Holocene ice sheet thinning across coastal Dronning Maud Land, East Antarctica

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The East Antarctic Ice Sheet stores a vast amount of fresh water, which makes it the single largest potential contributor to future sea-level rise. However, the lack of well-constrained geological records of past ice sheet changes impedes model validation, hampers mass balance estimates, and inhibits examination of ice loss mechanisms. Here we identify rapid ice-sheet thinning in coastal Dronning Maud Land from Early to Middle Holocene (9,000-5,000 years ago) using a deglacial chronology based on in situ cosmogenic nuclide surface exposure dates from central Dronning Maud Land, in concert with numerical simulations of regional and continental ice-sheet evolution. Regional sea-level changes reproduced from our refined ice-load history show a highstand at 9,000-8,000 years ago. We propose that sea-level rise and a concomitant influx of warmer Circumpolar Deep Water triggered ice shelf breakup via the marine ice sheet instability mechanism, which led to rapid thinning of upstream coastal ice sheet sectors.

References

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