

The dimensions of the Greenland Ice Sheet during the warmer-than-present middle Holocene

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Abstract

Assessing the natural (pre-industrial) variability of the Greenland Ice Sheet (GrIS) provides important empirical constraints on ice-sheet behavior that can improve numerical ice-sheet models – the same models used to predict future sea-level rise. Moreover, these ice-sheet models routinely depict the western margin of the GrIS as displaying enhanced sensitivity to climate change compared to other ice-sheet sectors. Thus, in light of projected 21st century Arctic warming, elucidating the behavior of the western GrIS is directly relevant for predicting the ice sheet's contribution to 21st century sea-level rise. Here, using a novel approach, I propose to investigate the behavior of the western GrIS during the warmer-than-present middle Holocene (~8,000 to 4,000 yrs ago) at a location where numerical ice-sheet models show the greatest amount of ice-margin retreat. I hypothesize that current generation ice-sheet models are over estimating the distance of ice-margin retreat (i.e. mass loss) in response to middle Holocene warmth.