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TITLE: Linkage between Grounding Line Dynamics and Geological Observations in the Weddell Sea Sector of Antarctica.

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ABSTRACT BODY: Surface-exposure dating is a potentially a powerful technique to constrain Antarctic ice-sheet thinning from the Last Glacial Maximum to its present state. Erratics recently collected near the grounding line of the Foundation Ice Stream in Antarctica's Weddell Sea sector detail thickness maxima and exposure rates along local nunatak elevation transects. These points in space and time constrain the local thickness and rate of thinning—however, what can they tell us about the history of the elevation profile of the interior ice stream?

The elevation profile of the interior ice is strongly controlled by the position of the grounding line, which in turn depends on sea level, accumulation, and the ice stream/shelf's physical characteristics. We use to an idealized flowline model to assess the relative importance of factors used to model ice stream thickness profiles. We divide these factors into two general categories: model physics, and environmental factors. Model physics includes choices about the ice rheology, the sliding law, and the calculated flux at the grounding line, where the ice transitions from grounded stream to floating shelf. Environmental factors include climate, basal topography, sliding parameterization, sea level, ice softness, and lateral shelf stresses. In our simplified model, we ignore the potentially important effects of isostatic rebound and the gravitational pull of the ice on ocean water.

Preliminary findings indicate that the position of the grounding line controls the elevation at the exposure sites; and that sub-glacial and sub-marine basal topography, together with the assumed form of the grounding-line flux, dominates the grounding-line sensitivity to change. This suggests that the surface elevation predominantly reflects regional-scale ice sheet behavior rather than the climate local to the ice-stream catchment.

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