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South Pole ice stream evolution with implications for fabric development and subglacial hydrology

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The evolution of the East Antarctic ice sheet surrounding the South Pole has been complex. Previous work using airborne radar sounding has indicated that the tributaries of major ice streams have reached the South Pole, but details of the position and timing of flow regime change have been unknown. We will present an analysis of internal layering observed in airborne radar sounding data collected over South Pole and time-registered to the local dust record that shows the position of an ice stream margin that was active from about 10,000 to at least 70,000 years ago.

The position of this margin was initially about 10 km grid north of the South Pole, and migrated to the grid south about 40 km before expiring. Significant melting occurred beneath the active portion of this ice stream, causing the ice of Eemian age to reside very near the bed to the grid south of the South Pole, relative to its depth to the grid north. Melting associated with the margin migration pattern observed is consistent with the distribution of subglacial lakes previously identified in the region. Additionally, preferred fabric orientations and associated birefringence can be expected within the former boundaries of the ice stream margin, which includes the IceCube neutrino observatory.

Summary

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