Paleoclimatology and the pressing question: how much Antarctic sea-level rise, how fast?

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Observations continue to confirm that Antarctic ice loss is centered largely on the Amundsen Sea Embayment (ASE) and wider Pacific-facing portions of Antarctica. The rate of loss is accelerating and ~3 m of equivalent sea-level rise are at play, clearly bringing this process to the forefront of Antarctic science. Paleoclimatology has a critical role to play in understanding the sensitivity of WAIS to global climate variability. Modern observations alone are too short to determine whether recent rates of change are exceptional, or are typical of decadal variability even in the absence of external forcing.

Ice and sediment core data suggest that initiation of ice-shelf retreat and ice loss in the ASE may have been in response to atmosphere-ocean forcing from the strong 1939-42 El Niño. These and other data highlight Antarctica's interaction with global climate, which is particularly strong in regions facing the Pacific ocean-atmosphere system. While sediment cores and geological exposure constraints respectively yield critical constraints on ocean processes and ice dynamics, ice cores remain the most highly-resolved, best-dated, most temporally-complete, and spatially-unrestricted paleoclimate archives in Antarctica, and ice-core proxy records inform atmospheric, oceanic, and ice dynamic processes.

A deep ice core at Hercules Dome, near where East Antarctica meets West in the Transantarctic Mountains, would provide critical boundary conditions for the magnitude and rate of ice-sheet collapse during the last interglacial period (120-130 kyr). An array of shallow ice cores on ice rises ringing coastal WAIS would provide the first baseline constraints at the critical "triple-point" of WAIS ice-ocean-atmosphere interaction, clarifying the impact of the 1940s El Niño while also extending the existing spatial array of inland WAIS ice cores into the 21st century.