
Characteristics and Change in Ice Flow Dynamics of Pine Island Glacier

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We compare radar interferometry data from ERS-1/2 and Radarsat-1 to detect changes in ice flow of Pine Island Glacier, West Antarctica. ERS-1/2 data span 1992 to 2000; Radarsat-1 mostly spans 2000-2002. We earlier reported a grounded line retreat of Pine Island Glacier (WAIS 96 and 97), and a flow acceleration between 1992-1996-2000. Data collected recently by Radarsat-1 permit us to determine whether the acceleration is still ongoing. A speckle tracking technique is employed to yield glacier velocities with a precision of a few meters per year, including the ice shelf. Speckle tracking with Radarsat-1 is however limited by the 24-day repeat of the satellite, so that most velocities are measured in the lower reaches of the glacier, where ice is close to the glacier surface, and the data cannot be used to retrieve the grounding line position. In this talk, we will present a detailed analysis of the spatial pattern of ice flow change. In particular, it will be shown that the flow acceleration of Pine Island Glacier is dissymmetric. Flow changes on the thinning ice shelf will be analyzed as well. We will conclude that both the ice shelf and the glacier are thinning rapidly, and thinning is mostly of dynamic origin. One important recent observation by Jacobs (in press) is that melt water production has increased in this sector, possibly associated with a warmer ocean. We will discuss how oceanic changes may be related to the ongoing thinning of ice in this important sector of West Antarctica.

This work was performed at the California Institute of Technology's Jet Propulsion Laboratory under a contract with NASA's Cryospheric Science Program.