# Application of ice-sheet data assimilation methods to Pine Island and Thwaites glaciers.

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Data-assimilation methods, similar to those used by centres of numerical weather forecasting, show some potential for predicting how ice-sheets will contribute to sea level over the coming century. We investigate their potential for predicting changes in the Amundsen Sea sector of West Antarctica. In particular we consider whether ice sheet models are advanced enough to provide good predictions for this region. Two uses for algorithms based on data-assimilation are investigated: 1) for establishing whether any particular ice-sheet model is consistent with all of the available observations. 2) for extrapolating the present state of the ice sheet into the future for the purposes of forecasting sea level. We consider the application of these techniques to the Pine Island and Thwaites glaciers in West Antarctica, using observations of thickness change from radar altimetry, flow velocities derived from radar interferometry, basal topography from a recent airborne survey of the region, and a new map of snow accumulation derived from passive-microwave observations. In particular, we investigate whether a simple linearised model of ice flow, derived using the shallow-ice approximation, is up to the task of predicting changes in this sector, or whether further development of the ice sheet model will be needed.