

Recent Changes in Ice Mass Balance of the Amundsen Sea Sector

Tyler C Sutterley [1], Isabella Velicogna [1,2], Eric Rignot [1,2], Jeremie Mouginot [1], Thomas Flament [3], Michiel van den Broeke [4], Jan van Wessem [4], Carleen Reijmer [4]

[1] University of California, Irvine

[2] Jet Propulsion Laboratory

[3] University of Leeds, UK

[4] University of Utrecht, Netherlands

The glaciers flowing into the Amundsen Sea of West Antarctica were identified in the Ice Sheet Mass Balance Inter-comparison Exercise (IMBIE) as the dominant contributor to current Antarctic mass loss, and were recently determined by multiple investigators to be undergoing a possible marine ice sheet instability. Here, we investigate the regional ice sheet mass balance using a series of satellite and airborne data combined with model outputs from the Regional Atmospheric and Climate Model (RACMO). Our datasets include laser altimetry data from the ICESat-1 satellite mission and Operation IceBridge aerial campaigns, satellite radar altimetry data from the Envisat mission, time-variable gravity data from the GRACE mission, surface mass balance outputs from RACMO-2, ice velocity from a combination of international synthetic aperture radar satellites and ice thickness from Operation IceBridge airborne radio echo sounding. We present a record of ice mass balance for the Amundsen Sea Sector, which is in agreement in magnitude and temporal oscillations between the analyzed techniques. We find that the mass balance of the region has shifted into a state of much higher annual loss over our entire 1992-2013 observation period, with marked shifts over the last decade. We find that over 1992-2013, the ASE has contributed 4.5 mm in total to global sea level rise. Overall, our results demonstrate the synergy of multiple analysis techniques for examining Antarctic Ice Sheet mass balance at the regional scale.

Changes in WAIS from observations (*The Times They are a-Changin'*)