Geophysical Research Abstracts
Vol. 19, EGU2017-1586, 2017
EGU General Assembly 2017

Radar Sounding Investigations at the Boundary of Thwaites and Pine Island Glaciers

Dustin Schroeder (1), Andrew Hilger (1), John Paden (2), Hugh Corr (3), and Donald Blankenship (4)

(1) Department of Geophysics, Stanford University, Stanford, USA (Dustin.M.Schroeder@Stanford.edu), (2) Center for the Remote Sensing of Ice Sheets, University of Kansas, Lawrence, USA, (3) British Antarctic Survey, Cambridge, United Kingdom, (4) Institute for Geophysics, University of Texas, Austin, USA

Recent observational and modeling studies have shown that the behavior and stability of both Thwaites Glacier and Pine Island Glacier in the Amundsen Sea Embayment of the West Antarctic Ice Sheet are modulated by a combination of ocean forcing, bed topography, and basal conditions. In terms of future deglaciation scenarios and their ultimate sea level contribution, the configuration, evolution, and ice-dynamical impact of basal conditions in the boundary region between Thwaites Glacier and Pine Island Glacier stand to play a particularly significant role. This region not only separates the two most rapidly changing glaciers in Antarctica, but – as a result – also has the potential to be the site of dynamic and destabilizing interactions between them as either glacier retreats. Despite this potential, little research has focused on characterizing the basal condition context for modeling current and potential interaction across this boundary.

One reason for this is the fact that (despite relatively dense airborne radar sounding coverage in the area) the data in this region was collected by three different radar systems and much of the Thwaites / Pine Island boundary lies at the boundary of these data sets. These include the 2004 survey of Thwaites Glacier by the UTIG HiCARS system, the 2004 campaign over Pine Island Glacier by the BAS PASIN system, and the 2011 – 2014 surveys of the Amundsen Sea Embayment by the CReSIS MCoRDS system. This has resulted in distinct sets of observations, collected across a range of frequencies, bandwidths, coherency, and observing geometries. To date, these data have also been processed by different institutions with software, algorithms and approaches that were specifically developed for each radar system. While each produce consistent ice thickness measurements, the character of their bed echoes have yet to be exploited.

Here, we present initial results from processing, analyzing, and synthesizing these three distinct data sets to characterize basal conditions for modeling and interpretation across boundary between Thwaites and Pine Island. These results highlight the significance of conditions beneath the Southwest Tributary of Pine Island, the Eastern Shear Margin of Thwaites, and the Bentley Subglacial Trench for the behavior, evolution, and stability of the Amundsen Sea sector.