



AGU FALL MEETING

New Orleans 11-15 Dec. 2017 What will *you* discover?

C23B-1218: Simple model of melange and its influence on rapid ice retreat in a large-scale Antarctic ice sheet model.

Tuesday, 12 December 2017

13:40 - 18:00

 *New Orleans Ernest N. Morial Convention Center - Poster Hall D-F*

Theory, modeling and observations point to the prospect of runaway grounding-line retreat and marine ice loss from West Antarctica and major East Antarctic basins, in response to climate warming. These rapid retreats are associated with geologic evidence of past high sea-level stands, and pose a threat of drastic sea-level rise in the future.

Rapid calving of ice from deep grounding lines generates substantial downstream melange (floating ice debris). It is unknown whether this melange has a significant effect on ice dynamics during major Antarctic retreats, through clogging of seaways and back pressure at the grounding line. Observations in Greenland fjords suggest that melange can have a significant buttressing effect, but the lateral scales of Antarctic basins are an order of magnitude larger (100's km compared to 10's km), with presumably much less influence of confining margins.

Here we attempt to include melange as a prognostic variable in a 3-D Antarctic ice sheet-shelf model. Continuum mechanics is used as a heuristic representation of discrete particle physics. Melange is created by ice calving and cliff failure. Its dynamics are treated similarly to ice flow, but with little or no resistance to divergence. Melange provides back pressure where adjacent to grounded tidewater ice faces or ice-shelf edges. We examine the influence of the new melange component during rapid Antarctic retreat in warm-Pliocene and future warming scenarios.

Authors

David Pollard *

Pennsylvania State University Main Campus

Robert M Deconto

Univ Massachusetts

[Find Similar](#)

View Related Events

Day: Tuesday, 12 December 2017