Bounds on marine melting of the Antarctic ice sheet - lessons learned and knowledge gaps

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Abstract

The strength and volume flux capacity of ocean currents are in many places limited and steered by the seafloor topography. This occurs in submarine channels, sills, fjords and similar topography and include hydraulic control, geostrophic transport limitation, and canyon transport capacity. The simplified physics of such systems provide us with some upper bounds and estimates for flow rates from which oceanic heat flux calculations can be obtained. Upper bounds on oceanic heat flux from the deep sea onto the Antarctic continental shelf will here be presented and discussed in the context of historical ice sheet loss and future projections, together with major knowledge gaps and observations gaps needed to be addressed in order to minimize the uncertainties in future sea level projections.

Keywords: Ocean heat flux, topographic steering, topographic control