



## **Trend of melt under Pine Island Glacier ice shelf modulated by high variability in ocean temperature**

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Pine Island Glacier and neighbouring outlet glaciers of West Antarctica have thinned and accelerated over the last 2 decades, significantly contributing to global sea level rise. Increased ocean heat transport beneath Pine Island Glacier ice shelf and unpinning from a seabed ridge are thought to be the primary drivers of such changes. However, the acceleration of the glacier paused since 2009, renewing questions about the main processes presently affecting the ice/ocean system, the future behaviour of the glacier and the associated impacts. Here, we present ocean observations taken in austral Spring 2012 to show a 200 m lowering of the thermocline at the glacier calving front and a 50% decrease of meltwater production from 2009. High-resolution simulations of the ocean circulation in the cavity beneath the floating tongue of the glacier demonstrate that for the present ice geometry, the seabed ridge blocks the warmest deep waters from reaching the ice and strongly ties meltwater production to thermocline depth above the ridge, hereby making it susceptible to relatively high variability in time, from intraseasonal to interannual. These results highlight the role of climatic variability in glacial ice loss and the fundamental importance of local ice shelf and seabed geometry for determining ice-ocean dynamics.