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Antarctic Ice Sheet variability and ACC dynamics in the Drake Passage region during the last deglaciation

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The evolution of the Antarctic Ice Sheets during the last deglaciation remains controversial which implies critical intimation for our understanding of ice sheet response to modern global warming.

The time of the last deglaciation warming is relevant for the understanding of variability and sensitivity of Antarctic Ice Sheets to climate changes and the continuing build-up of atmosphere greenhouse gases concentration. Antarctic Ice Sheets play a pivotal component for the global water balance during the glacial-interglacial cycles. Freshwater fluxes from Antarctic Ice Sheets may affect the Antarctic Circumpolar Current (ACC), which is strongly impacted by the westerly wind belt in the Southern Hemisphere (SHWW) and constricted to its narrowest extent in the Drake Passage. The flow of ACC water masses through Drake Passage is, therefore, crucial for advancing our understanding of the Southern Ocean′s role in global meridional overturning circulation and global climate change.

In order to address orbital and millennial-scale variability of the Antarctic ice sheets and the ACC, we present sediment multi-proxy records from the Drake Passage. In combination with published sediment records from Cape Horn Current in the North, the Scotia Sea and the high-resolution data from Antarctic ice cores (WDC, EDML), we propose that rising insolation together with increasing the strength of SHWW and the associated rise of atmospheric carbon dioxide reached a threshold at which ongoing deglaciation became inevitable.

Keywords: Last Deglaciation, Antarctic Ice Sheet, Antarctic Circumpolar Current, Southern Westerlies.