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Direct evidence for significant deglaciation across the Weddell Sea embayment during Melt Water Pulse-1B

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During the last deglaciation (21,000 to 7,000 years ago) global sea level rise was punctuated by several abrupt meltwater spikes triggered by the retreat of ice sheets and glaciers world-wide. However, questions regarding the relative timing, geographical source and the physical mechanisms driving these rapid increases in sea level have catalysed significant debate that is critical to predicting future sea level rise.

Here we present a unique record of ice sheet elevation change derived from the Patriot Hills blue ice area (BIA), located close to the modern day grounding line of the Institute Ice Stream in the Weddell Sea Embayment (WSE). Combined analysis of ice gas volume and deuterium isotopic signatures allows us to develop a record of regional ice sheet palaeo-altitude change that can be assessed against independent regional high-resolution ice sheet modelling studies using PISM (Parallel Ice Sheet Model, University of Alaska, Fairbanks). We argue that ice in the WSE had a significant influence on both pre and post Last Glacial Maximum (LGM) sea level rise, particularly during Meltwater Pulse-1B (11.7-11.6 ka), demonstrating that this sector of the West Antarctic Ice Sheet made a significant and direct contribution to post LGM sea level rise at the very beginning of the Holocene.