A recent volcanic eruption in West Antarctica

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There has long been speculation that volcanism may influence the ice-flow in West Antarctica, but ice obscures most of the crust in this area, and has generally limited mapping of volcanoes to those protrude through the ice sheet. Radar sounding and ice cores do show a wealth of internal horizons originating volcanic eruptions but these arise as chemical signatures usually from far distant sources and say little about local conditions. To date, there is no clear evidence for Holocene volcanic activity beneath the West Antarctic ice sheet. Here we analyze radar data from the Hudson Mountains, West Antarctica, which show an extraordinarily strong reflecting horizon, that is not the result of a chemical signature, but is a tephra layer from a recent eruption within the ice sheet. This tephra layer exists only within a radius of 80 km of an identifiable subglacial topographic high, which we call Hudson Mountains Subglacial Volcano (HMSV). The layer was previously misidentified as the ice-sheet bed; now, its depth in the ice column dates the eruption at 207 ± 240 years BC. This age matches previously un-attributed strong conductivity signals in several Antarctic ice cores. Today, there is no exposed rock around the eruptive centre, suggesting the eruption was from a volcanic centre beneath the ice. We estimate the volume of tephra in the layer to be >0.025 km^3, which implies a Volcanic Eruption Index of 3, the same as the largest identified Holocene Antarctic eruption. HMSV lies on the margin of the glaciological and subglacial-hydrological catchment for Pine Island Glacier. It's very unlikely that water from HMSV could enter the subglacial hydrological system of neighbouring ice streams, and it cannot be responsible for the regional ice-sheet thinning that has occurred across this part of West Antarctica in recent decades. However, similar VEI-3 eruptions in Iceland produced vast quantities of melt water, and so at the time of the HMSV eruption, the flow of Pine Island Glacier could have been substantially altered. We can only speculate on the influence it has on present day ice-flow.