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High resolution bed topography beneath the trunk and tributaries of Pine Island Glacier from ice-penetrating radar

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Pine Island Glacier (PIG)in West Antarctica is currently losing ice at a rate equivalent to $\sim$7% of current sea-level rise, and predicting its future is therefore an important scientific goal. Though the glacier has now been the focus of several modelling studies, the different models disagree on the likely future pace of loss and its spread inland. Significantly, all models depend critically on the form of the subglacial conditions used, and though the general form of the bed has been mapped from surveys over the last decade, the resolution of bed required for modelling to be improved, i.e. at the sub-km scale, has hitherto been unavailable. Addressing this dearth of detailed bed information was therefore a key objective for the 2013/14 UK iSTAR (Ice-Sheet Stability and Response) traverse across PIG.

We deployed the British Antarctic Survey's DEep-LOoking Radio Echo Sounder (DELORES) to sound 10 x 15 km patches of the bed in six locations across PIG. Each patch was surveyed in 22 parallel transects lying 500 m apart and which were each 15 km long.Along each radar transect, the bed was sounded approximately every 5 m. The patches sample the main trunk of the ice stream, the beds of four of the main tributaries, and as a control site, an inter-tributary ridge. We show that the nature of the bed varies significantly between sites.