Recent flow history of Pine Island Glacier

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During the austral summer seasons of 2006/2007 and 2007/2008 the British Antarctic Survey undertook extensive fieldwork on Pine Island Glacier (PIG) spending more than 150 days in total on the ground. This was the first major ground based study of this ice stream. We previously showed GPS measurements that revealed the extent of the current acceleration as greater than 170 km inland from the grounding line. Now we have extensive radar measurements using 500 MHz and 25 MHz GPR along with those from the BAS deep look radar system (DELORES) at around 1 MHz. In particular we have radar measurements along the central flowline of PIG, which reveal aspects of flow that have not been previously demonstrated by airborne radar systems.

Flow changes significantly as PIG emerges from the deeper trough around 140 km upstream from the grounding line. Upstream of this point it is possible to identify features in the radar layers that have been consistently present for at least 200 years B.P. An accumulation high just downstream of this point cannot be tracked for the same length of time by using simple velocity models. This could be linked to a change in the flow of the ice stream.

With further modelling it may be possible to put upper and lower limits on the average velocity of the ice stream over the last two centuries. This will help to put into context the current changes being observed and enable us to make better estimates of the future behaviour of PIG.