

GPS measurements from Pine Island Glacier

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Satellite measurements have demonstrated the recent acceleration and thinning of Pine Island Glacier (PIG). Annual percentage velocity increases of up to 4% have previously been published. Recent GPS work on other Antarctic ice streams, notably the Rutford and Bindshadler ice streams, has identified strong tidally driven variations in the ice stream velocities. It has been suggested that these tidal variations could reduce the accuracy of satellite derived velocity measurements.

Until recently no ground based GPS measurement data existed on PIG. The glacier is a long way from the main Antarctic bases and is therefore logistically difficult to conduct fieldwork on. The first, and possibly the only previous visit, to PIG was on the U.S. Ellsworth Highland Traverse in 1961, where seismic reflection ice thickness measurements and shallow snowpit studies were conducted. In the 2006/2007 season a team of four from the British Antarctic Survey conducted 2 months of fieldwork on the main trunk of PIG. The area was notable for its frequent katabatic winds. The wind speed was greater than 15 knots for 40% of the season and greater than 10 knots for 60% of the season. The main work consisted of seismic reflection profiling. Some passive seismic measurements and shallow cores studies were also made. Three GPS stations were placed along a flowline, approximately in the centre of the ice stream. These three GPS stations recorded data at 10 s intervals for periods!

of between 20 and 54 days. The stations were located at distances of approximately 50, 105 and 165 kilometers from the grounding line.

The data was analysed for tidal components and acceleration. It was found that the acceleration during the season was greater than has been shown in previous publications. Further GPS measurements are due to be made in the coming 2007/2008 season. There are also plans to site a GPS on the glacier over the following winter, 2008. This will help determine any seasonal changes in the motion of PIG.