



## Seismic signals associated with basal processes of the Greenland Ice Sheet

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Understanding ice sheet and glacier dynamics is crucial for modeling of ice mass balance and resulting sea level changes. Ice dynamics is strongly influenced by surface melt water accumulating at the glacier base and its effect on basal sliding. The relationship between surface melt and ice flow depends on hydraulic processes in the subglacial drainage system. However, both subglacial and englacial drainage systems are inherently difficult to investigate due to their remoteness, and basal processes to date remain poorly understood.

Borrowing concepts from volcano studies, recent glacier studies are employing passive seismology as a supplement to traditional glaciological techniques. When monitoring the seismic activity of a glacier or an ice sheet, several different types of so-called 'icequakes' and some times even 'tremor' may be detected in the seismic records that is dominated by the large number of surficial icequakes. Deep icequakes may provide information about englacial water flow and basal motion in response to hydraulic events over a region whose size is only limited by seismic background noise and the aperture of the monitoring network.

Here, we present results from a passive seismic deployment on western Greenland's ablation zone during summer 2011. The high-density seismometer network consisted of 17 three-component stations installed at the ice surface or in boreholes. We recorded a large variety of seismic signals, including thousands of near-surface crevasse events as well as dislocation events deep within the ice sheet and near its bed. We discuss these 'deep icequakes' in view of hydraulic processes and basal motion. Furthermore, the seismic deployment was part of larger field campaign including a deep drilling project and glaciological surface observations. This provides the unique opportunity to interpret the seismic monitoring results within the variety of observations including subglacial water pressures and other borehole measurements.