



## **The Subglacial Access and Fast Ice Research Experiment (SAFIRE): 2. Preliminary outcomes from hot-water drilling and borehole instrumentation on Store Glacier, West Greenland**

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As part of the SAFIRE research programme, pressurised hot water was used to drill four 603-616 m-long boreholes to the bed of the Greenland Ice Sheet at a site located 30 km from the calving front of marine-terminating Store Glacier (70° N, ~1000 m elevation). Despite the boreholes freezing within hours, 4 wired sensor strings were successfully deployed in three of the boreholes. These included a thermistor string to obtain the englacial temperature profile installed in the same borehole as a string of tilt sensors to measure borehole deformation, and two sets of water pressure, electrical conductivity and turbidity sensors installed just above the bed in separate, adjacent boreholes. The boreholes made a strong hydrological connection to the bed during drilling, draining rapidly to ~80 m below the ice surface. The connection of subsequent boreholes was observed as a perturbation in water pressure and temperature recorded in neighbouring boreholes, indicating an effective hydrological sub- or en-glacial connection between them. The short (week long) records obtained from these sensors in summer 2014 tentatively reveal (i) water pressure varying diurnally close to overburden albeit of a small magnitude (~0.3 m H<sub>2</sub>O), (ii) a minimum extrapolated englacial temperature of -21° C, (iii) and thermistors in the lowest 10 m of the borehole recorded temperatures above the pressure melting point indicating the presence of water. Data loggers were left running and longer records should become available in the near future. Differential drilling and instrument installation depths together with observations of discrete, diurnal turbidity events provisionally suggest the presence of sediment at the bed. These preliminary borehole observations will be complemented by GPS measurements of ice motion, meteorological data, and seismic and radar surveys to be undertaken over the next two years.