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Wireless sensors for measuring sub-surface processes in firn

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Subsurface processes exert controls on meltwater storage and densification within firn, which are, by their nature, challenging to measure. We present the results of proof-of-concept tests of wireless ETracer sensors with the East Greenland Ice Core Project (EGRIP) at the Northeast Greenland Ice Stream. ETracers equipped with temperature, pressure and electrical conductivity sensors were deployed in firn boreholes at the centre and the shear margins of the ice stream. Data were returned from a 60m deep test borehole, and continuously for 4 weeks from two 14m deep boreholes, to autonomous receivers at the surface. Two receivers were tested: a station using software radio and PC, and the BAS/UCL ApRES radar system. The sensors were used to track high resolution changes in temperature with depth, changes in densification rates in response to accumulation events and snow redistribution, and the presence of liquid water within the firn.