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Programmable deployed borehole measurement system for hot water drilled ice holes

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Abstract:

A programmable borehole measurement system was deployed in hot water drilled ice holes during the BEAMISH project to drill to the bed of the Rutford Ice Stream in Antarctica. Capable of operating remotely, this system reached depths of 2150 meters and measured hole diameter, depth and angle. Additionally this system was fitted with three cameras (two side and one downward facing) to monitor sediment and glacier bed conditions. There were several project constraints. The first was constructing an instrumentation system small enough to fit the ice hole diameter, allowing only 17.5 cm width for the instruments. The second was ensuring the system could operate for the full period of deployment without surface intervention. The measurement system needed to operate autonomously after leaving the surface as there was no live data feed available from the drill line. To do this the instruments were coded to only operate during preconfigured times or depths via a central master unit. The system was successful but needed some refinement to the software and battery systems. There is also the possibility of including additional sensors to expand the measurement capabilities. Some of the results are presented and reviewed.

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