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Development and Field Deployment of the HWD700 Hot Water Drill for Subglacial Instrumentation on a Land-Terminating Glacier of the Greenland Ice Sheet

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As part of the ERC Consolidator Grant project REASSESS, we have developed and successfully deployed a new hot water drilling system, the HWD700 (Hot Water Drill, 700 m capacity). The system is specifically designed to operate on land-terminating glaciers of the Greenland Ice Sheet, where surface meltwater is available and water recirculation is not required.

The design requirements focused on rapid deployment (capable of drilling through 700 meters of ice in less than 10 hours), helicopter portability, and mobility over a 1 km radius on glacier surface without heavy machinery. These constraints led to a compact, modular system that can be efficiently operated in remote and logistically constrained environments.

In July 2025, the HWD700 was field-tested on Isunnguata Sermia, a land-terminating outlet glacier in West Greenland. During the campaign, four boreholes ranging from 600 to 675 meters deep were successfully drilled. Each borehole was equipped with a suite of subglacial instrumentation, including piezometric pressure sensors and optical fibers. These sensors enable high-resolution measurements of temperature profiles (DTS), ice deformation (DSTS), and seismic activity (DAS), contributing valuable data for understanding ice sheet dynamics.

This presentation will outline the design concept, technical specifications, and operational performance of the HWD700, as well as preliminary insights gained from the deployment.

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