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Passive Replicate Coring Concept for Ice Coring Drills

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Replicate coring systems (RCS) provide a means for additional core samples with high scientific value to be collected from an existing borehole. Considerable conservation of resources can be realized by the implementation and deployment of core replicating technology which is integrated into an established drilling/coring system. A long range (>3km) core replicating system has been designed and successfully deployed with the Deep Ice-Sheet Coring (DISC) Drill system to retrieve cores at five separate deviation points. The DISC Drill produced 122mm diameter core and the RCS produced 108mm diameter core. This particular RCS provided operators with complete autonomous control of position and inclination for initiating a deviated path including on the uphill side of the parent borehole. Adapting this technology to the Hans Tausen (HT) type drill design with 98mm diameter core, specifically the U.S. Ice Drilling Programs'(IDP) Intermediate Depth Drill (IDD) and the in-development Foro 3000 Drill, is not feasible without completely redesigning the drill systems due to the electronic and mechanical complexity of the technology. Design for a new RCS can realize a relative simplification by allowing deviations at any azimuth. By permitting deviations to be made on the downhill side of a parent borehole, steering capabilities may be excluded.

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