Ice Drilling Program Office

Dartmouth – University of New Hampshire

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Title:	**SCIENCE REQUIREMENTS: INTERMEDIATE ICE CORING DRILL**	
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DOCUMENT APPROVAL	
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Science Requirements: Intermediate Ice Coring Drill

Approved by IDPO January 10, 2011

Background:
The IDPO Science Advisory Board identified in the IDPO Long Range Science Plan a priority need to acquire an intermediate-depth drill for the U.S. ice coring program that is sufficiently portable that it can be used for coring at a wide variety of sites with production drilling in two field seasons or less, and be able to retrieve core from depths of interest for a variety of science goals. From discussions with the research community and discussions with IDDO staff, the following are the science requirements for the Intermediate Depth Ice Coring Drill:

Requirements

Target depths: from the surface down to 1,500 m
Ice core diameter: 98 +/- 3 mm
Core length: 2 m
Minimum 10-m temperature at the site: -55°C
Air transport type: Bell 212 or similar helicopter and/or Twin Otter
Replicate coring capability: no
Drilling fluid: drill should be compatible with existing fluids, e.g. Isopar-K or butyl acetate
Maximum field project duration: 2 field seasons
Core quality requirements:

a. **Complete core recovery over entire borehole, as close as possible, including brittle ice**
b. **Ice pieces to fit together snugly without any gaps**
c. **In non-brittle ice, the packed core should have no more than 12 pieces of ice per 10-meter section of core**
d. **In brittle ice there may be a lot of pieces in a single ~ 1m core segment, but the pieces must fit together retaining stratigraphic order; more than 80% of the ice volume must be in pieces that each have a volume > 2 liters**

Absolute borehole depth measurement accuracy: 0.2% of depth
Sonde inclination will not exceed 5°
Field set-up time: the minimum that is realistically possible with a three-person effort at a small remote camp
System complete with receiving area for core from core barrel and ability to cut into 1-meter sections
A deep-field shelter for the drill should be identified

Discussion:
This drill would be a modified version of the Hans Tausen (H-T) drill, with upgrades including a 2-m core length. The core quality requirements are those of the DISC drill. The requirements above can be achieved without use of a fiber optic cable; the drill could be built with a cable similar to the cable typically used by the H-T drill.