



Ice Drilling Program Office

Dartmouth – University of New Hampshire – Colorado School of Mines

DOCUMENT IDENTIFICATION	
Title:	SCIENCE REQUIREMENTS: PORTABLE FIRN CORING DRILL
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DOCUMENT APPROVAL	
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Science Requirements: Portable Firn Coring Drill

Background:

The IDPO Long Range Science Plan 2015 identified science goals for ice drilling that spanned a wide range of science targets. For field projects with very limited logistical support across a range of science, from obtaining evidence about chemical and physical changes in recent climate and environment, to gathering evidence for ground-truth of satellite imagery, a very lightweight, scientist-operated, highly portable mechanical firn coring drill is needed to collect firn cores from the top 20-100 m of firn. From discussions organized by IDPO with iterative discussions between IDPO, scientists, and IDDO staff, the following are the science requirements for the Portable Firn Coring Drill:

Scientific Requirements

- 1. Electromechanical drill to produce firn cores 2” – 2.25” nominal core diameter.**
- 2. The core barrel should be 1.5 - 2 m long; retrieved core length should be 75 - 100 cm per run.**
- 3. The drill should have two depth configurations, one setup includes a winch and cable for 50 m depth and another has a winch and cable for 100 m depth.**
- 4. The drill should be very field portable. Individual pieces, including packaging, should not exceed approximately 60 lbs, as the 50 m drill may be transported up a mountain solely by a human on foot or skis.**
- 5. The drill should be operable in ambient temperatures down to -25 C.**
- 6. One trained person should be able to set up and operate the drill in the field, with a second person logging the core. IDDO drillers should not be needed in the field.**
- 7. Operators should have the option of powering the electromechanical drill and winch by batteries to be charged with lightweight flexible solar panels (or by generator in some cases). The solar panel power option should not require use of a generator.**
- 8. Electronic controls should be simplified for use by a non-IDDO operator. Feedback should include drilling depth and does not have to be digital.**
- 9. The drill setup procedure can be considered in two steps: an initial unpacking and setup after shipment from Madison, WI to the field region (perhaps a base camp), and a final setup at the drilling site. The final setup time for the drill should be within two hours at the drilling site, excluding any tent setup.**
- 10. The drill should be transportable with the longest piece less than 108”. The entire drill system should fit inside one helicopter or twin otter packed in cases or bags that can be lifted by one person. The weight and dimensions of each case should comply with airline baggage requirements, so that the drill can be transported as checked baggage or easily shipped with a domestic/international carrier. (Each case should be less than 125” in length, and weigh less than 60 lb.)**
- 11. The drill system should not require digging of a trench or pit.**



- 12. The drill should be easily maintainable in the field by non-IDDO operators.**
- 13. IDDO shall provide a back-packable tent with the system, in which the drill can operate.**
- 14. Core packaging materials (tubes, boxes, straps) and transportation materials (pallets, blankets) shall be provided by the logistics provider.**

Notes:

1. IDDO will make every attempt to make the total weight of the packed drill less than 200 lbs for the 50 m version, and less than 300 lbs for the 100 m version.
2. The winch may have backup capability to be hand-powered.
3. The vision for this drill is somewhat of a cross between the Stampfli 2" backpack drill (but that is limited to 15 m) and the Stampfli 3" drill (goes to 200 m).
4. System weights described above include the power source (e.g. solar/batteries), but do not include a tent or backup generator power.
5. The solar panel should be flexible, not rigid.
6. Further discussion between the scientists, IDPO, and IDDO about the tent should occur before a tent is purchased.