

ICE CORE WORKING GROUP COMMUNITY MEETING

VIRTUAL MEETING
APRIL 2, 2020

IDP DRILL SYSTEM UPDATES

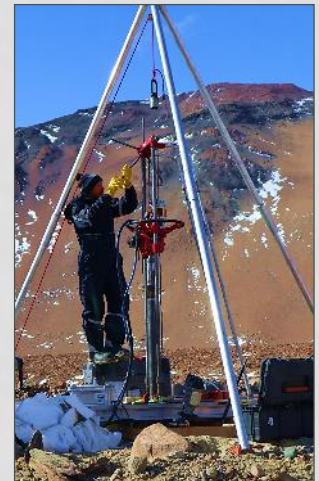
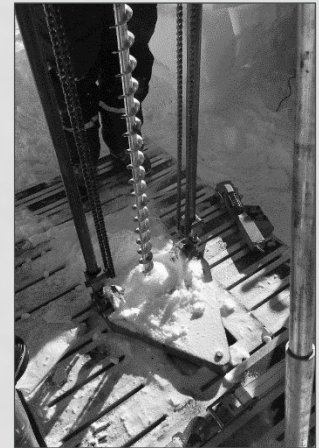
KRISTINA SLAWNY – IDP DIRECTOR OF OPERATIONS

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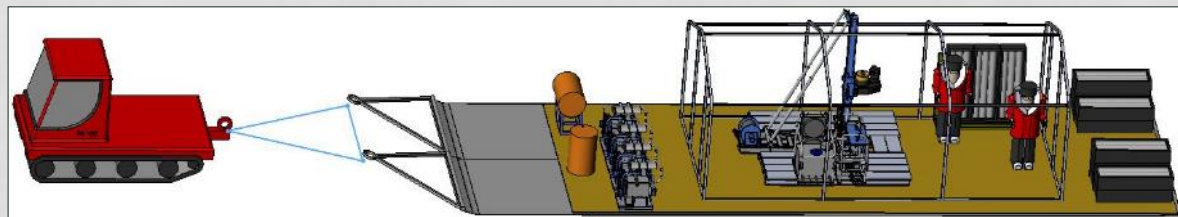
WINKIE DRILL

- Continuous flight augers provide a reliable, fast means to create clean access holes through blue ice but are less efficient in firn.
- Plan to test a new full-face ice bit to create access holes in blue ice going forward. Will require fluid circulation, but may remove the need to bring augers along.
- Geoset bit performs well for drilling any type of mixture of rock and ice.
- Eclipse Drill can be used as a pilot hole drill, offering the following advantages:
 - Packer-sized, clean borehole
 - Simultaneous operation of Eclipse and Winkie Drills
 - Density verification
 - Reliability
- Implemented casing for drilling at firn sites.
- Currently fabricating Winkie 2, as two systems are funded for use during the 2020-2021 Antarctic season.

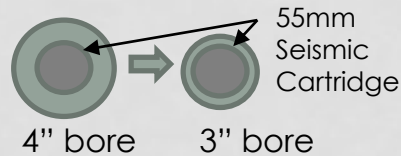


AGILE SUB-ICE GEOLOGICAL (ASIG) DRILL

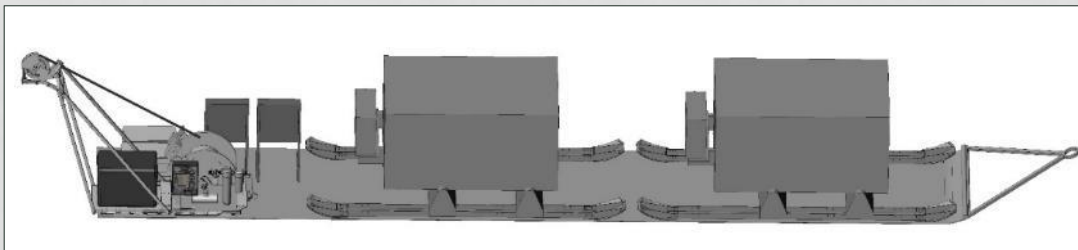
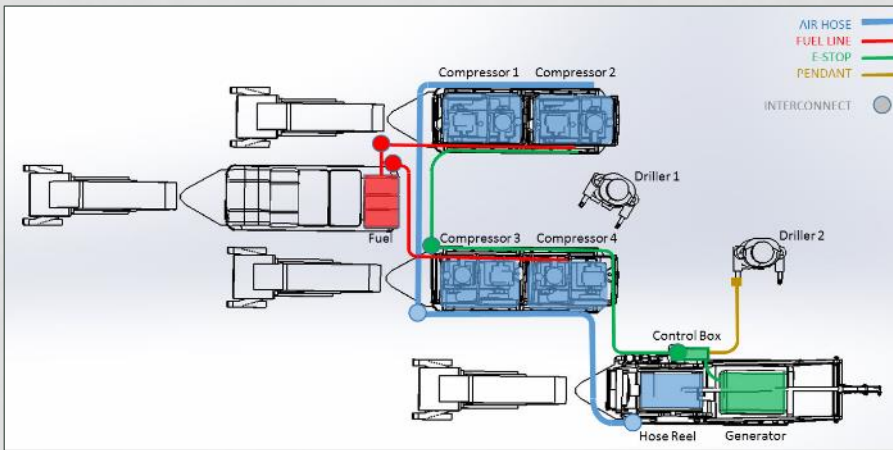
- Drill System Upgrades In-Process:
 - Improved drilling fluid control
 - Fluid recovery upgrades
 - Driller safety
 - Pilot hole firm sampling
 - Wireline chips bailer for pilot hole
 - Upgraded foot clamp
 - Reduced assembly/disassembly time
 - Drill fluid containment
 - Sled-mounted drill system for efficient completion of multiple holes on flat terrain.
- Potential Future Modifications:
 - Improved borehole pressure modeling to prevent hydro-fracture.
 - Modifications to operate in wet or fractured bed sites.
 - Rig modules designed for helicopter fly-in.



RAPID AIR MOVEMENT (RAM) DRILL

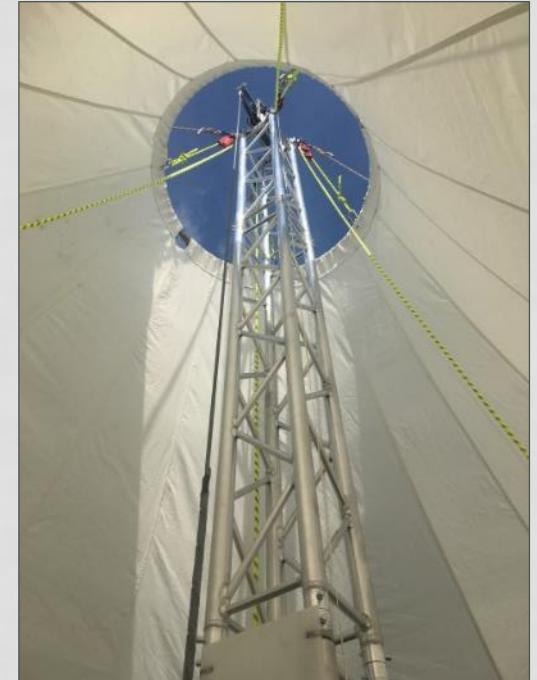
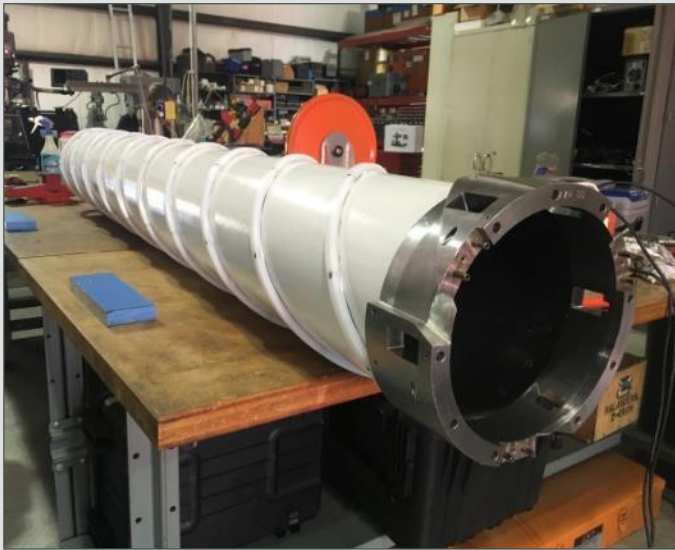


- Upgrades:
 - Reduced system weight from 23,000 lbs. to 8,000 lbs.
 - New 3-inch Sonde
 - Reduced Diameter = Reduced Air Flow
 - New 1500 lb. hose reel sled; no heavy equipment required for assembly
 - Continue to evaluate casing options
 - Continue to evaluate higher-power, modular engines
 - Tested RAM 2 components with the original RAM Drill compressors at WAIS Divide during the 2019-2020 season



BLUE ICE DRILL (BID)

- Designed and fabricated a new tower for safe, durable operation with the new drill tent.
- Design and fabrication of a new type of drill tent represents a major improvement in field operations efficiency for multiple systems due to the speed of set-up and ability to operate in very poor weather.
- Fabricated a new carbon fiber core barrel to try to improve core quality at depth.

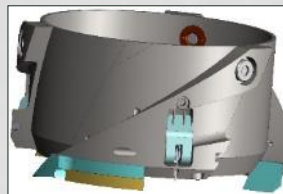


FORO 400 DRILL

- Weight savings of ~40% as compared to the 4-Inch Drill.
- First deployed to Allan Hills during the recent 2019-2020 field season.
 - New control box functioned well
 - 1 hole drilled to 135 m depth
 - Chip transport issues encountered
 - Currently fabricating an aluminum outer barrel
 - Fabricating scoop cutters
- Drill tent design is identical to that of the BID.



FORO 3000 DRILL



- Fabrication, assembly and testing in process.
- Design continues for electronics.
- Design Drivers:
 - Extend the depth capacity of the Foro 1650 (IDD) system rather than design a completely new drill system
 - Reuse as much of the existing design as possible
 - Increase the core length recovered per run from 2m to 3m
 - Make it feasible to drill a 3,000 m borehole in 3 drilling seasons
 - Fit the longer drill and core processing system within the existing tent footprint
- Re-designed cutter head in an attempt to recover multiple 1 m long cores during a single drill run in the brittle ice zone; improved chip flow near the core dog window area
- Implementing a chip melter for recovering as much fluid as possible
- Estimated shipping weight: 43,000 lbs.
- Estimated shipping volume: 2,900 cu. ft.
 - By comparison, the DISC Drill was 136,000 lbs. and 8,600 cu. ft.

OTHER SYSTEMS

Thermal Drill

- Tested the system in Alaska in summer 2019 in conjunction with the Juneau Icefield Research Program (JIRP).
 - Implemented a new 300-meter water-shedding cable.
 - Completed a borehole to a depth of 294 meters.
 - Successfully used the Safir Tentipi tent as a drilling structure.
 - Ethanol delivery system successfully used three times.
 - Tested the new magnetic core removal tool and documented suggested modifications.



Sidewinders

- Modifications made in 2018/2019 to mitigate a potential safety hazard with the metal cleats, but ultimately did not perform well in the field.
- System Upgrades in Progress:
 - Purchase and evaluate a Kovacs Sidewinder kit.
 - Reduce electric drill weight – Determine torque and speed requirements, review latest technology drills and mixers and evaluate if a battery powered drill is adequate for the task.
- Potential Future Improvements:
 - Platform improvement – Explore replacing wood platform with more robust, non-slip, collapsible base (e.g. plasma-coated aluminum panels).
 - Simplify core break – Perhaps a foot activated lever could grab the extensions with cams and lift enough to break the core.



4-Inch Drill

- Chips bailer equipment fabricated and used successfully during the RAID AFT3.



OTHER IDP UPDATES

STAFFING CHANGES

- Josh Jetson departed IDP-WI in January 2020 to pursue another local opportunity.
- Elliot Moravec hired to fill the vacancy left by Jetson. Moravec was previously an undergraduate student employee and a Research Intern with IDP.
- Field Support Manager, Anna de Vitry, will depart IDP-WI on June 1, 2020 to pursue personal travel.
- Anna Zajicek hired as the new Field Support Manager; start date TBD pending COVID-19 developments. Zajicek has 10+ years Arctic/Antarctic experience and was most recently the Allan Hills Camp Manager during the 2019-2020 season.

8th INTERNATIONAL ICE DRILL SYMPOSIUM

- Meeting held in Copenhagen, Denmark, September 30 – October 3, 2019.
- Six people from IDP-WI attended, gave talks and presented posters.
- Currently writing articles for the Annals of Glaciology.

ICEDRILL.ORG

- View equipment inventory, availability, comparisons and development information.