SUMMER 2023

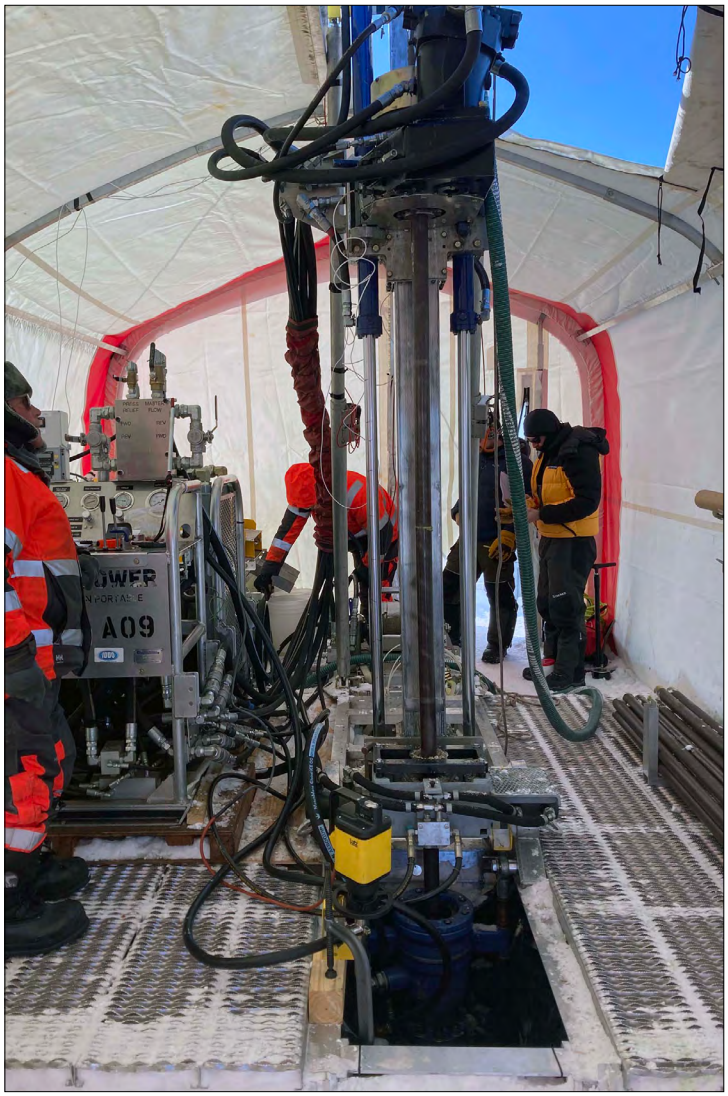
ICE BITS

Newsletter of the U.S National Science Foundation Ice Drilling Program (IDP)

Arctic Fieldwork Back in Full Swing

During the 2023 Arctic Spring/Summer field season, IDP supported ten principal investigators by providing equipment or equipment and IDP driller support. The first of two GreenDrill seasons was completed in northwest Greenland, where an IDP Winkie Drill was used to drill one 97-meter access hole and collect 201.5 cm of rocky sediment over thirteen coring attempts. In the nearby ASIG Drill camp, IDP drillers successfully recovered from a hydrofracture event and collected 7.5 meters of subglacial material, including 4.5 meters of bedrock core! At Summit Station, Greenland, a 150-meter hole was successfully drilled using the Blue Ice Drill, and beneficial testing was subsequently conducted with various cutter, shoe, and barrel configurations down to 170 meters. In June and July, a team of three IDP drillers worked up on Mount Waddington in British Columbia to drill a hole to near bedrock with the Thermal Drill. After encountering ice entrained with rocks near the bed, the team successfully deviated around a rock at 204 meters depth and completed the hole at 219 meters.

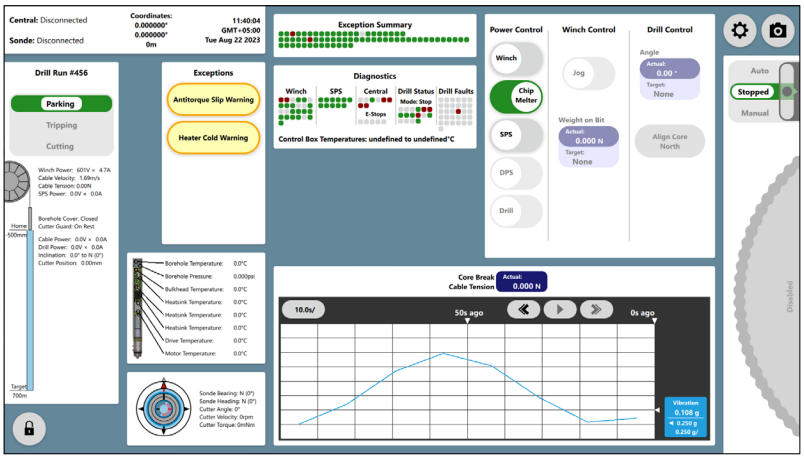
IDP Driller Rubin Harmon operates the Winkie Drill in windy conditions in northwest Greenland. Credit: Jason Briner.



(Left) IDP contract rock drill rig operator Richard Erickson operates the IDP ASIG Drill for the GreenDrill project. Credit: Tanner Kuhl. (Right, top) PI Nathan Chellman's team at Summit Station with a large-diameter ice core drilled with the IDP Blue Ice Drill. Credit: Mike Jayred. (Right, bottom) Drilling on Mt. Waddington in British Columbia, Canada, with the IDP Thermal Drill. Credit: Peter Neff.

New 700 Drill Takes Shape

Over the past ten months, IDP electrical and mechanical engineers have worked hard to bring the detailed designs for the 700 Drill to life. Equipment designs were finalized, engineering drawings completed, components ordered, and assembly begun. The winch and tower were fully assembled in Madison, and the electronics hardware and software also made excellent progress. Control system mechanical and electrical features were finalized, and work was initiated on final auxiliary systems such as core handling and chips processing equipment. IDP anticipates the drill will be ready for issue by March 2024.



The graphical user interface (GUI) being developed for the 700 Drill console. Credit: Umberto Stefanini.

The new 700 Drill winch and tower assembled at the IDP facility in Madison, WI. Credit: Jay Johnson.

IDP Welcomes New Mechanical Engineer Andrew Haala

In late July, IDP welcomed Mechanical Engineer Andrew Haala. Haala comes to IDP from the bike equipment industry and has hit the ground running. He is currently diving into the design of auxiliary systems for the 700 Drill as well as a redesign of the Sidewinder system.

New Mechanical Engineer Andrew Haala.

Climate of H.O.P.E. (How Our Planet is Evolving) Conference

IDP's education and outreach program is leading a professional development climate change science day in partnership with the DuPage County Regional Office of Education (Wheaton, Illinois), the National Center for Science Education, Downers Grove North High School, and the Fermi National Accelerator Laboratory (Fermilab) on March 1, 2024, in DuPage County, Illinois. The *Climate of HOPE Conference* will bring a combination of cutting-edge climate research and engaging classroom-ready activities to Illinois science teachers.

Tentatively, speakers include Dr. Richard Alley (Penn State) and Dr. Karen Alley (University of Manitoba), Anne Reid (Executive Director at National Center for Science Education), and Frank Niepold (Senior Climate Education Coordinator at NOAA's Climate Program Office) along with break-out sessions led by IDP educators and other partners.

400+ middle and high school science educators are expected to attend during the DuPage County-wide Inservice Day. The conference is open to educators in surrounding areas who would like to attend.

Questions? Contact IDP Director of Education & Public Outreach Louise Huffman at louise.t.huffman@dartmouth.edu.

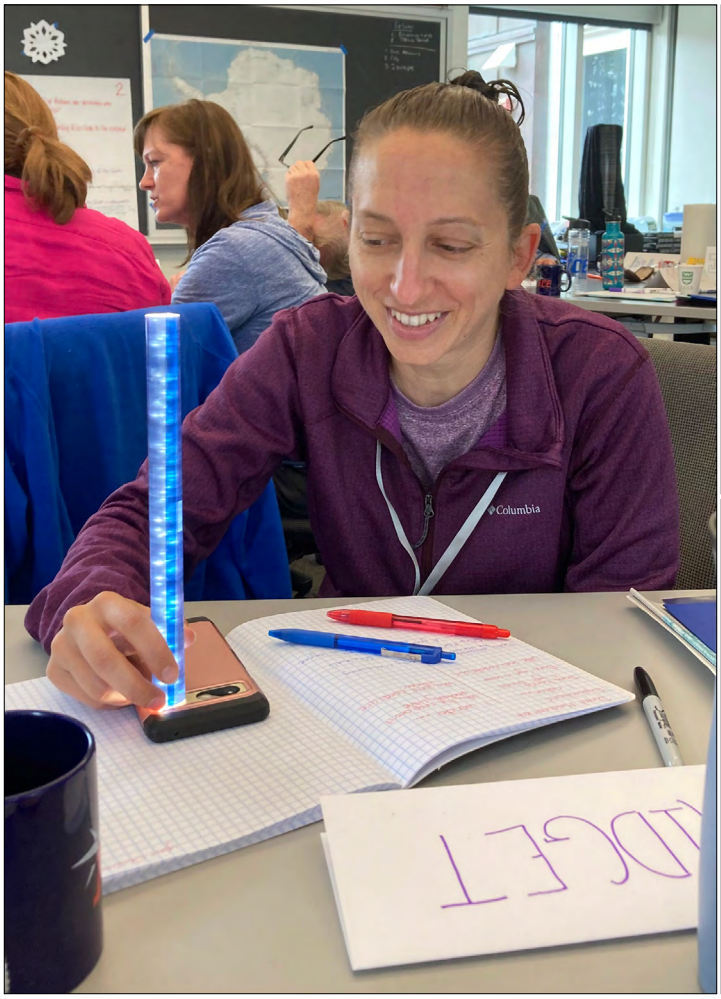
Conference website coming soon.

IDP Holds Successful School of Ice at Dartmouth

The IDP *School of Ice* took place at Dartmouth College June 18-22 with twelve participants. Evaluation responses suggest an overwhelmingly successful workshop; participants learned about ice core and climate science and intend to incorporate what they learned in their work. In the post-workshop evaluation, participants reported that many aspects of the workshop were impactful.

Group photo of the participants from the 2023 School of Ice (SOI) held at Dartmouth College. For more information about the program, visit the SOI website at https://icedrill-education.org/school-of-ice/.

While engineer Jay Johnson looks on, School of Ice participants take part in a hands-on classroom activity, successfully testing their mobile drill model.



Participants from the 2023 Dartmouth School of Ice (left) analyze conceptual models of ice cores, (right, top) learn about glacial features from Dr. Meredith Kelly, and (right, bottom) conduct a mapping activity.

IDP Train the Trainers Workshop Extends the Reach of IDP Resources

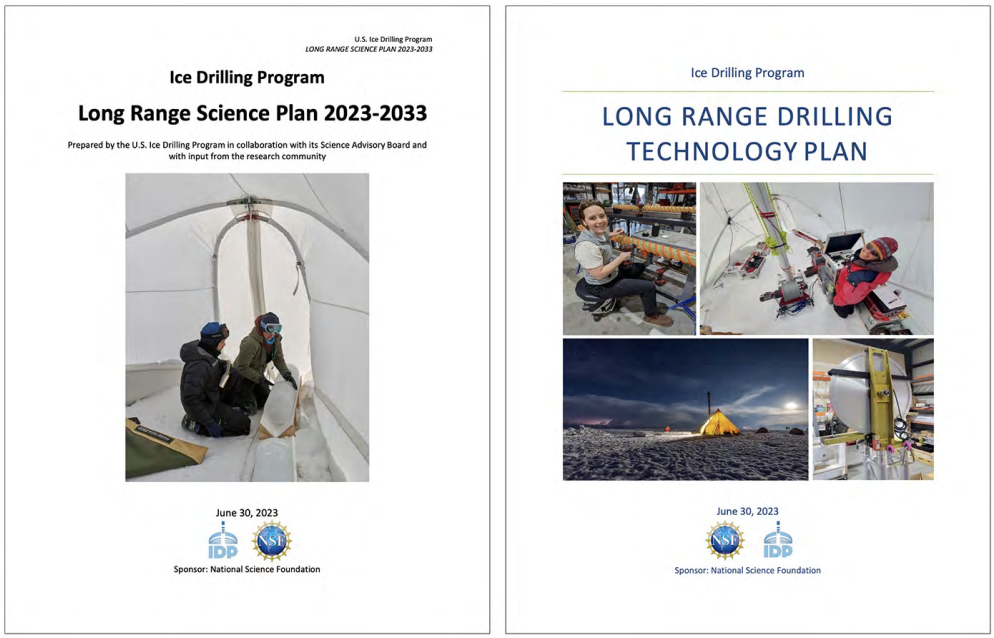
IDP piloted its Virtual Field Lab (VFL) *Train the Trainers* workshop at the National Science Foundation Ice Core Facility July 26-28 with fifteen in-person participants and one on Zoom due to COVID. Evaluation responses indicated that 100% felt they understood the VFLs and had gained a solid understanding of ice core and climate science. Three participants have already submitted an AGU abstract, while four others are tentatively planning to present at the Climate of HOPE conference next spring.

Participants of the Train the Trainers workshop participated in activities including (left) processing ice cores at the NSF-Ice Core Facility, (right, top) developing ice sheet models, and (right, bottom) conducting albedo fieldwork.

2023-2033 Long Range Science and Long Range Drilling Technology Plans Updated

The U.S. Ice Drilling Program (IDP), in collaboration with its Science Advisory Board and with input from the research community, updated the Long Range Science Plan. The purpose of this plan is to articulate goals and make recommendations for the direction of U.S. ice coring and drilling science in a wide variety of areas of scientific inquiry and to make recommendations for the development of drilling technology, infrastructure, and logistical support needed to enable the science. A companion document, the Long Range Drilling Technology Plan, provides details about drills available through IDP. Both plans are revisited and revised as appropriate each spring. The Long Range Science Plan is available at https://icedrill.org/long-range-science-plan. The Long Range Drilling Technology Plan is available at https://icedrill.org/long-range-drilling-technology-plan.

If you envision the need for ice drilling for your project in the coming decade, **please make sure that the high-level articulation of your science is captured in the Long Range Science Plan**. If it isn't, send several sentences to IceDrill@Dartmouth.edu describing the science driver and the envisioned field date and location for your project so that your plans are voiced in this planning document.



Covers of the Long Range Science Plan (left) and Long Range Drilling Technology Plan (right).

Ice Drilling Support for NSF Polar Proposals

If you are preparing a National Science Foundation (NSF) proposal that includes any kind of support from IDP, you must include a Letter of Support from IDP in the proposal. If your fieldwork requires support from the U.S. Antarctic Program (USAP), you should include a Letter of Support from IDP in the pre-proposal Concept Outline (see NSF 23-509 for more details) .

Researchers are asked to provide IDP with a detailed support request three weeks prior to the date the Letter of Support is required. **Early submissions are strongly encouraged.**

Scientists who seek to include IDP education and outreach activities associated with U.S. ice coring or drilling science projects should contact Louise Huffman at Louise.T.Huffman@Dartmouth.edu during their proposal preparation stage.

For additional information on requesting IDP support, visit our website at https://icedrill.org/requesting-field-support or contact us at IceDrill@Dartmouth.edu.

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