WINTER 2011/12

ICE BITS

U.S. Ice Drilling Program
Ice Drilling Program Office | Ice Drilling Design and Operations

Quarterly update of Ice Drilling Program Office (IDPO) and Ice Drilling Design and Operations (IDDO) activities

Drilling Completed of the WAIS Divide Main Ice Core

On December 31, 2011, the drilling of the Antarctic WAIS Divide ice core was successfully completed. The DISC Drill produced excellent quality core over the entire 3,405 m depth, including through the technically challenging warm ice. This significant achievement was the culmination of over a decade of work including the design and construction of the DISC Drill by IDDO and its predecessor ICDS.

The IDDO drilling team celebrate the completion of the WAIS Divide deep ice core. Pictured are (L to R) Chuck Zander, Josh Goetz, Michael Jayred, Kristina Dahnert, Elizabeth Morton, and Paul Sendelbach. Photo courtesy of Kristina Dahnert.

The ice core retrieved from the site is anticipated to yield the first high-resolution southern hemisphere record of greenhouse gases and climate comparable to the Greenland records, and will contribute significantly to improved understanding of climate variability over the last 62,000 years. Unlike the Greenland cores, however, the WAIS Divide ice core will also provide a record of carbon dioxide; and that record will have a higher time-resolution during the transition from the last glacial period to the current warm interval than any other existing ice core record.

To view an excellent, short NSF-produced video about the WAIS Divide ice core project, visit: http://waisdivide.unh.edu/about/index.shtml

Drilling Completed at Taylor Glacier, Antarctica for Study of Ancient Atmospheres

Using the Blue Ice Drill developed by IDDO, an IDDO contract driller successfully completed drilling for samples dedicated to the study of ancient atmospheric composition. Over 800 meters of high quality, large (9.5-inch diameter) ice core was recovered, bringing the drilling to a successful completion on schedule. The science experiment, led by PI Jeff Severinghaus, provides unique and important evidence of past atmospheric composition.

To view a short video showcasing the Blue Ice Drill at Taylor Glacier, visit: http://www.youtube.com/user/USIceDrillingVideos

The Blue Ice Drill is designed to collect large volumes of ice (9.5-inch diameter cores) in a short period of time. The large volumes of ice enable ultra-trace gas measurements, such as the carbon-14 of methane, that historically have been precluded by sample size limitations of ice cores. Photo courtesy of Tanner Kuhl.

Replicate Coring System

IDDO completed the bench testing of replicate coring components prior to their being shipped to WAIS Divide. In addition, IDDO designed and built a new inclinometer control board with greater accuracy for positioning the sonde in the borehole for replicate coring, developed a bumper for the broaching cutter head to protect the borehole during the lowering and raising of the drill sonde, and designed and built a downhole camera system. IDDO conducted field-testing of the replicate coring system at WAIS Divide in January 2012, and the system will be used for production drilling at WAIS Divide during the 2012-13 field season.

For more information about the Replicate Coring System, visit:
http://icedrill.org/equipment/development.shtml#replicate

Rapid Access Ice Drill

IDPO led a series of planning meetings involving community members, IDDO, industry, and logistics support representatives to come to consensus on science requirements and overall design features of a unique drill, the Rapid Access Ice Drill (RAID). This novel drill will be able to drill through 3.3 km of an ice sheet, retrieving ice core samples from selected depths and drilling up to 25 m of rock core from beneath the ice. An IDDO team led by Michael Gerasimoff evaluated the feasibility of several possible technologies on the basis of meeting science requirements, cost and logistical burden. By the end of December 2011, IDDO had substantially developed a concept for the drill that would meet the science requirements at a reasonable cost and logistical burden. IDDO will produce a report in January 2012 that includes a technical description of the drill system concept, estimates of cost, and schedule for development.

For more information about the RAID, visit:
http://icedrill.org/equipment/development.shtml#RAID

Intermediate-Depth Drill

IDDO is undertaking the design and construction of an Intermediate-Depth Drill (IDD), based on the Hans Tausen drill, in cooperation with the Centre for Ice and Climate (CIC) in Copenhagen, Denmark. Agreement on the nature of the cooperation was worked out (exchange of information) between IDPO/IDDO and CIC in fall 2011. IDDO expects to complete the detailed design by the end of calendar year 2012, with an aim to have an operational, tested drill by the end of FFY2014, in time for deployment to Antarctica for the 2014-15 field season. During the first quarter (Oct-Dec 2011), IDDO personnel made substantial progress on the design of the drill winch and tilting tower before their deployment to WAIS Divide.

For more information about the IDD, visit:
http://icedrill.org/equipment/development.shtml#IDD

Educational Outreach

Linda Morris, IDPO's Education Program Manager, completed creation of a new videoconference-based curriculum called "*Checking Out Your Team*". This middle-to-high school classroom activity targets student climate knowledge and career interest, and prepares participants for a presentation by, and Q & A with, an ice coring scientist or engineer. The opportunity was presented to teachers at two regional NSTA conferences this fall, with a very positive response.

Testing of the associated, interactive portion of the activity with videoconference between a scientist and the remote classrooms began in early January. For a list of scientists who have volunteered for outreach and/or to become involved yourself, please visit http://icedrill.org/scientists/outreach_support.shtml.

Links to teacher instructions and student "web quest" starters for this activity can be found at:
http://www.climate-expeditions.org/educators/activities.html
and
http://www.climate-expeditions.org/students/links.html#learning

Drilling Support to Science Projects

Current

- WAIS Divide Ice Core, Antarctica (Taylor and Severinghaus)
- Taylor Glacier Ice Cores, Antarctica (Severinghaus)
- Whillans Ice Stream Seismic, Antarctica (Winberry)
- Badger-Eclipse/Hand Auger Field Testing, Antarctica (Bentley)

Upcoming

- McCall Glacier Ice Cores, Alaska (Nolan)
- Isotope Hydrology at Summit, Greenland (Noone)

For information about each of these projects, visit:
http://icedrill.org/expeditions/index.shtml

Requesting Ice Drilling Support

If you are preparing a proposal that includes any kind of ice drilling or ice coring support from IDPO/IDDO, you must complete a Field Project Requirement Form (www.icedrill.org/scientists/scientists.shtml) and submit it to IDPO/IDDO via icedrill@dartmouth.edu at least six weeks before your proposal deadline.

Once IDPO/IDDO receives your Field Project Requirement Form we will provide you with a cost estimate and a letter of support that MUST be included with your proposal. If you are submitting a proposal to NSF the cost estimate and letter of support should be included as Supplemental Information in your proposal, and it is recommended that you also notify your relevant NSF Program Manager that your proposal requires support from the IDPO/IDDO.

If you are preparing a non-NSF proposal, it is recommended that you familiarize yourself with the Policy for Ice Drilling for Organizations other than NSF available at www.icedrill.org/scientists/scientists.shtml#otheragencies.

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