



## West Antarctic Ice Sheet Divide Ice Core

Climate, Ice Sheet History, Cryobiology

### 2009/2010 Field Operations

Our main objectives for the coming field season are:

- 1) To ship ice from 680 to ~2,100 m to NICL
- 2) Recover core to a depth of 2,600 to 2,900 m

The U.S. Antarctic Program will be establishing a multi year field camp at Byrd this season to support field operations around Pine Island Bay and elsewhere in West Antarctica. The camp at Byrd will complicate our logistics because the heavy equipment that will prepare the Byrd skiway will be flown to WAIS Divide and driven to Byrd, and a camp at Byrd will make for more competition for flights. But this is a much better plan than supporting those operations out of WAIS Divide, which would have increased the WAIS Divide population to 100 people.

Other science activities at WAIS Divide this season include the following:

CReSIS ground traverse to Pine Island Bay

Flow dynamics of two Amundsen Sea glaciers: Thwaites and Pine Island. PI: Anandakrishnan

Ocean-Ice Interaction in the Amundsen Sea sector of West Antarctica. PI: Joughin

Space physics magnetometer. PI: Zesta

Antarctic Automatic Weather Station Program. PI: Weidner

Polar Experiment Network for Geospace Upper atmosphere Investigations. PI: Lessard

Artist, paintings of ice and glacial features. PI: McKee

IDDO is making several modifications to the drill that should increase the amount of core that can be recovered each time the drill is lowered into the hole, which will increase the amount of ice we can recover this season. Currently we are limited by the amount of chips we can store in the drill. The first modification is a change in the downhole pump to increase the pressure in the screen section along with a chip transfer tube, which might pack the chips tighter. Another modification is to reduce the thickness of the kerf made by the cutters, which will reduce the volume of chips that are produced.

RPSC is obtaining three shipping containers for shipping ice to NICL. The containers have redundant cooling systems and are referred to as SafeCore Containers. We will be able to ship 1,400 m of core a year to NICL with these containers.

Two of the SCO science technicians (Maria Banks and Heidi Roop) will be blogging from the field for POLAR-PALOOZA, PolarTREC, and Ice Stories: *Dispatches from Polar Scientists* at the San Francisco Exploratorium.

A major uncertainty for this coming field season is how much work will be required to mitigate differential movement of the drill and core handling shelter caused by snow loading. This may delay the start of operations by a week or more.

The anticipated field schedule is shown below. Please note that this is a tentative schedule and is subject to change. Any delays during the RPSC put-in will likely delay our arrival dates until the camp construction and put-in effort can recover and catch up to the planned schedule.

### Anticipated 2009/2010 Field Schedule

- Oct. 22** RPSC put-in crew arrives at WAIS Divide by Basler aircraft
- Oct. 29** RPSC camp construction crew arrives at WAIS Divide to set up the camp
- Nov. 13** First wave of the WAIS Divide ice core crew arrives at WAIS Divide
- 1 person from NICL to organize the packing of the brittle ice
  - 4 SCO science technicians to assist with packing the brittle ice
  - 1 person from NICL may come to start preparing the core handling equipment for the core that will be recovered during the 2009/2010 season. The SCO may have to take a greater role in logging the new core than in previous seasons.
  - Bruce Vaughn, who will be the early season SCO Representative
- Nov. 18** Second wave of the WAIS Divide ice core crew arrives at WAIS Divide
- 3 people from IDDO to inspect and start to prepare drilling equipment
- Nov. 23** Third wave of the WAIS Divide ice core crew arrives at WAIS Divide
- 5 people from IDDO
  - 2 SCO science technicians
- Dec. 10** Start production coring (24 hours a day, 6 days a week)
- We expect to have 35 days for production coring, and expect to recover between 30 and 40 meters of core per day. We expect the depth at the end of the season to be between 2,600 and 2,900 meters.
- Anais Orsi will be arriving at WAIS Divide mid-season to replace Bruce Vaughn. Ken Taylor will be arriving at WAIS Divide in late December.
- Jan. 21** Stop drilling operations, prepare for winter

### **Core Processing at NICL**

The situation at the National Ice Core Laboratory (NICL) is in flux due to changes in management and a possible change in priorities. We are fortunate to still have Geoff, Brian and Eric who are strongly committed to supporting the ice coring community. NICL is planning on upgrading tables in the exam room to reduce saw vibration and allow more flexibility in the arrangement of the processing stations. We will start processing ice in early June 2010 and expect to complete the processing of the brittle ice by the third week of August (to a depth of 1,400 m; age of ~9 ka). It is unclear if NICL can support processing of the WAIS Divide ice core after August, which would enable us to process ice to a depth of ~2,100 m (age of 13 ka). Given the recent changes at NICL it will be a few months before we can determine if it is possible to process ice at NICL in the fall of 2010, and if this is desired by the PIs.

### **Recently Funded Projects**

A complete list and information about the projects funded to work on the WAIS Divide ice core is posted at <http://www.waisdivide.unh.edu/Projects/DisplayAll>. The following is a list of projects that were recently funded to

work on the WAIS Divide ice core.

Collaborative Research: Cosmogenic Radionuclides in the Deep WAIS Divide Core: Caffee, Welten and Nishiizumi

Collaborative Research: Integrated High Resolution Chemical and Biological Measurements on the Deep WAIS Divide Core: McConnell, Edwards, Saltzman, Priscu and Foreman

Developing a Glacial-Interglacial Record of  $\delta^{13}\text{C}$  of Atmospheric  $\text{CO}_2$ : Brook and Mix

Major Ion Chemical Analysis of Brittle Ice in the WAIS Divide Ice Core: Cole-Dai

Record of the  $^{17}\text{O}$ -excess of  $\text{H}_2\text{O}$  in the WAIS Ice Core: Steig

### Annual Science Meeting

Registration is now open for the 2009 WAS Divide Science Meeting to be held at Scripps Seaside Forum in La Jolla, CA on October 1-2, 2009. Details of the meeting and the registration form are online at:

<http://www.waisdivide.unh.edu/meetings/index.html>

### Long Term Plans

The current plan is to stop coring ~50 m above the bed. This will leave the bottom most ~50 m of ice as a barrier between the borehole environment and the pristine basal environment. Depending on the age of the ice and condition of the ice at the bottom of the hole it may be desirable to pursue the permitting and drill development that would be required to drill to, and sample, the bed. However, at this time there are no plans to drill past ~50 m above the bed.

IDDO is working on a conceptual design for obtaining replicate cores from depths of special interest by drilling through the borehole wall and collecting a parallel core. Although we are planning on collecting replicate cores from depths of special interest, there is considerable uncertainty regarding the methods and funding for this effort.

The following is the anticipated schedule for the WAIS Divide Ice Core Project.

#### **2009/2010 Field Season**

It is anticipated that we will have recovered 2,600 to 2,900 m of core and have shipped the top 2,000 m of core to NICL, with the remaining core stored onsite at WAIS Divide.

#### **June 2010 to August (or later) 2010: Core processing at NICL**

Sample and distribute ice from depths of 600 m to 1,450 m (or ~ 2,100 m if we work in the fall) to the science groups.

#### **September - October 2010: Science meeting**

Host the annual science meeting at a yet to be determined location.

#### **November 2010 to January 2011: Antarctic field season**

Conduct borehole geophysics survey to more accurately determine the depth of the bed. Collect ice cores from 2,700 m to 50 m above the bed. Transport all the recovered ice cores to NICL.

#### **June 2011 to August 2011: Core processing at NICL**

Sample and distribute ice from 1,450 m to 2,600 m depth to the science groups.

**September - October 2011: Science meeting**

Host the annual science meeting at a yet to be determined location.

**November 2011 to January 2012: Antarctic field season**

Conduct borehole geophysics surveys (temperature, optical, sonic). Collect additional ice from depths of special interest using replicate coring.

**June 2012 to August 2012: Core processing at NICL**

Sample and distribute ice from 2,600 m to ~3,413 m to the appropriate science groups.

**September - October 2012: Science meeting**

Host the annual science meeting at a yet to be determined location.

**November 2012 to January 2013: Antarctic field season**

Conduct borehole geophysics surveys that need to have replicate measurements (temperature, strain). Collect additional ice from depths of special interest using replicate coring

**June 2013: Core processing at NICL**

Sample the core in response to follow up requests by science groups.

**September - October 2013: Science meeting**

Host the annual science meeting at a yet to be determined location.

**November 2013 to January 2014: Antarctic field season**

Conduct borehole geophysics surveys that need to have replicate measurements (temperature, strain). Secure WAIS Divide borehole to preserve for borehole logging or additional sampling that may occur in the future.

**June 2014: Core processing at NICL**

Sample the core in response to follow up requests by science groups.

**September - October 2014: Final Science meeting**

Host the last annual science meeting at a yet to be determined location.

**Closing Comment**

The entire project is progressing well. The economic stimulus package provided funding for infrastructure and science projects that are directly related to the WAIS Divide Ice Core Project. There would have been considerable problems getting the resources we need if the economic stimulus funded was not available.

See you in La Jolla,

Ken Taylor  
Chief Scientist, WAIS Divide Ice Core Project



**WAIS Divide Ice Core Project - Science Coordination Office (SCO)**

Dr. Ken Taylor, Chief Scientist, Desert Research Institute  
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