

MINUTES

Ice Drilling Program Office – Science Advisory Board Meeting
March 1 & 2, 2010
National Science Foundation - Stafford II Room 565, Arlington, VA

Attendees: Ed Brook, Gary Clow, Howard Conway, Karl Kreutz, Ross Powell, , Eric Saltzman, Julie Palais, Mary Albert, Charles Bentley, Linda Morris, Don Lebar, Alex Shturmakov, Alicea Bursey

Monday March 1

Mary Albert welcomed attendees to the meeting and reviewed the agenda.

NSF Remarks - Julie Palais from NSF gave a presentation with updates from current NSF activities, and also questions for the SAB. She encouraged the SAB members to think about the purpose and long term and short term goals of the SAB. In the title, consider whether the word Senior be replaced by Science, to indicate that younger scientists could also be members. She encouraged the group to branch out to other disciplines, become more engaged in science planning, and to think about how the SAB fits into the big picture. She introduced Cliff Jacobs, who encouraged the SAB to engage a broader community than ice coring, to become more interdisciplinary, possibly including the permafrost community.

IDPO Update - Mary Albert gave an update on IDPO. She reviewed the IDPO/IDDO Strategic Plan, outlining the vision statement, mission statement, organizational goals, and responsibilities, and the 5 Year Science Plan and its relationship to the 4 Year Drilling Technology Plan. The group then discussed the SAB and observed that the physics community and biology community need some representation. Adding the permafrost community was discussed, but the drilling required there is not currently within the expertise of IDDO; additional technical expertise and equipment would need to be located, funded, and added. This perhaps may be considered in the future, but there were questions of whether adding that much breadth would weaken depth of expertise and infrastructure for ice coring & drilling in IDPO/IDDO, at least at this time. Mary discussed with the group that the Science Plan needs to be more explicit than at present about future activities, to be more explicit about where the community is going in terms of future deep drilling sites, borehole logging, replicate coring, drilling fluid, and intermediate drills in the afternoon discussions about the Science Plan.

IDDO Update - Don Lebar gave a presentation on the status of the drilling equipment in the IDDO inventory. They currently have three types of hand augers, but the equipment is old and the parts are not interchangeable; they are considering designing a new hand auger. The Badger/Eclipse drill is the workhorse of the light drills, and there are at least one or two fielded every year. The four-inch drill is reliable and has been in use a long time, but would benefit from a lighter winch. The DISC drill is the deep coring drill used at the WAIS Divide site. Repairs to the drill include new bearings, since the airplane

bearings being used were not designed for rotation. The replicate coring system will be first implemented with the DISC drill. A number of specialty drills are in the inventory, including the Prairie Dog which was designed by Jay Kyne; it is essentially a double barrel hand auger. The Koci drill is designed for use in dirt-laden ice. The Chipmunk drill is a very small auger but has a niche in ice drilling. Non-coring drills include the RAM drill, designed for shot holes. It has been fairly successful but the depth of penetration depends on the properties of the firn. It would benefit from being made smaller and more mobile, and to better figure out air use to reduce the size of the compressors needed. The portable hot water drills are primarily used for shot holes, and are limited to about 80m depth. The Kamb hot water drill is in the IDDO inventory but is in poor repair. A wide-diameter drill, the Blue Ice drill, is being designed to gather large amounts of shallow ice; its development is proceeding but currently they are experiencing issues with breaking the core. Stimulus funding for the WISSARD project is development of a large hot water drill that requires cleanliness and filtration to minimize contamination. It will be able to produce large access holes for ROV. The group asked about IDDO personnel for the various projects, and whether there are any infrastructure issues that might cause drilling delays for example at WAIS Divide.

SAB Terms of reference and composition- Mary led a discussion about updating the Terms of Reference for the SAB. The group discussed the purpose of the SAB and roles of SAB members, and edits were made to the ToR. For SAB composition, the group identified that a member of the physics community should be brought on board. A discussion followed about redundancy with the ICWG. The IDPO is broader and oversees IDDO so has control of drill development. IDPO could have a number of working groups for the various communities; ICWG would be the IDPO working group for ice coring. The SAB members will be listed on the Icedrill.org web site so that the community can see who the members are and their areas of expertise, so they know who is their representative. The SAB voted Eric Saltzman for Chair. The TAB meeting will be April 20-21, and a SAB representative is needed to serve as a liaison. There were no volunteers but Mary will talk to people and send out emails to identify a SAB member to serve as representative at the TAB meeting.

Science community updates

IPICS – Ed Brook talked about a tentative IPICS-sponsored ice core symposium in 2012, possibly in France, India, US, or China. He discussed the various areas of IPICS endeavors. For the 2k arrays, cores are being drilled by various groups, 86-800 m in depth. For 40k year records, the cores are hoped to be accomplished each in 1-2 years of drilling. In East Antarctica the hope is to drill to 1.5 million years, not going to be shallow. The Chinese may drill at Dome A regardless of conditions. Access drills are needed to understand heat flux and conditions near the bed. A challenge is to interface IPICS thoughts with U.S. thoughts; a European IPICS has been formed.

Next deep coring site – Karl Kreutz, ICWG Chair, gave a talk on the next deep coring site. It will be in Antarctica and the questions to be addressed include: whether WAIS collapsed 130k years ago, sea level change, whether removal of the ice sheet caused

climate change, and was there a WAIS then? Two sites under consideration are South Pole and Herc Dome. There are several logistical advantages to drilling at South Pole. Questions include CO₂, greenhouse gases from a 1,000 year old core, and what caused 40k to 100k year periodicities. It is unclear whether DISC is the best tool for this. The group considered whether it would be beneficial to see the results of other countries drilling moving forward first. It would be good to drill both South Pole and Herc Dome to an intermediate depth see if one or the other shows promise for the next deep drilling site. There are site selection considerations. Clean fluids for oldest ice is a question, since nothing is available yet. The Russians are using silicone fluid at Vostok; need input from a microbiologist.

WISSARD – Ross Powell talked about the goals of WISSARD in examining subglacial environments. WISSARD is a combination of GBASE (microbiology), LISSARD, and RAGES projects. The difficulties include learning how to explore while protecting the environment and the samples. Raytheon is staging fuel for the field effort.

Updating science planning matrices in the Science Plan

The group discussed the content of the planning matrices for Climate, Ice flow history and response, and Sub-ice environment and habitat, to identify new items and adjust dates and progression. The group discussed an intermediate drill, and asked the ICWG to write a white paper on the science driving the drill. There was a discussion of South Pole and Herc Dome, and whether the DISC could be used on one and an intermediate drill on the other. Gary Clow talked about the need for a fastdrill to get heat flux measurements from the bottom of the ice sheet, plus other measurements.

Tuesday March 2

Drilling technology needs

The group discussed the need for an intermediate drill. It must be transportable so that it can be used in a range of projects. The science requirements will need to be defined, there is need for a cost assessment, and a 3rd party reality check on the requirements and costs. For logistical impacts in the field, there needs to be enforcement of a minimum level of logistical support so that logistics do not consume the budget. Currently in the US program, there is no incentive for logistics providers to save money. The intermediate drill should have logistical considerations included in the design to minimize logistical needs, and should have a life cycle analysis.

Diversity

At NSF's request, the SAB discussed efforts to increase diversity in the SAB membership. Possibilities include adding engineering interns through a college or university, perhaps working with universities that are all Native American or African American.

Board rotation

The group discussed needs in terms of board composition and diversity. For the borehole logging community, Kurt Cuffey rotated off and will be replaced by Gary Clow (who attended this meeting as a substitute for Cuffey). Ryan Bay should be invited to represent

the physics community. Jill Mikucki should be invited to represent microbiology. Sam Mocasa should be invited to represent bedrock sampling. Eric Saltzman asked Mary to make the invitations.

Education & outreach

Linda Morris gave an introduction to her efforts as the IDPO Educational Outreach program manager, and invited SAB members to tell her their wishes for outreach. There is a new NSF solicitation for educating the U.S. public about climate change, and Linda is pulling together a group for a proposal submission that will include a lot of discoveries from ice coring and ice sheet science.

Other items

Ross Powell agreed to serve as the SAB liason to the TAB meeting in April.

Funding Opportunities

Charlie Bentley identified the Tinker Foundation, Conoco Phillips, BP, and NSF, DOE, and NOAA as possible places to seek funding for new drilling technology for IDPO/IDDO. He will be identifying more specific information for each.

Action Items

- Mary will send out the ToR to SAB members asking for any further edits.
- SAB members should talk to others in the community and send Mary edits to the Science Plan in the coming two weeks; she will edit the plan and post it to the web in May for community input.
- Mary will ask Gary Clow, Jill Mikucki, Ryan Bay, and Sam Mocasa to join the SAB.
- Ross Powell will attend the TAB meeting on behalf of the SAB.