

Draft Minutes
Ice Drilling Program Office Science Advisory Board 2015 Meeting
Arlington Hilton Hotel
Matisse/DaVinci Meeting Rooms
April 16 & 17, 2015

Thursday, April 16, 2016

Attendees:

IDPO-SAB: Ed Brook (Chair, Oregon State), Sridhar Anandakrishnan (Penn State), Ryan Bay (UC Berkley), Howard Conway (UW), Dorte Dahl Jensen (U Copenhagen), Jill Mikucki (U Tenn), Jim White (U Colorado), Ross Powell (NIU)

IDPO: Mary Albert (Dartmouth), Blaise Stephanus (Dartmouth), Linda Morris (Dartmouth), Mark Twickler (UNH), Joe Souney (UNH), Alicea Bursley (Dartmouth)

IDDO (U. Wisconsin): Krissy Slawny, Mark Mulligan

NSF: Lisa Clough, Renee Crain, Paul Cutler, Carol Frost, Mark Kurz,, Eric Saltzman, Lisa Romm

- **Welcome & Review Agenda**

- Welcome and agenda review by Ed Brook (Chair, SAB)
- Introductions
- Timeline dates - Mary Albert
 - Need updated draft of 10-year plan (LRSP) from last year on ICE DRILL site by early May.
 - Comment/input from community until May 15; *later changed to May 26.*
 - SAB review & approval of content by May 27; *later changed to June 2.*
 - Final formatted plan due on Fastlane by June 30

- **NSF Update (Paul Cutler and others)**

- Scott Borg and Julie Palais unable to attend
 - Scott Borg “There is a good chance that the budget won’t go down in the next couple of years”
 - Brief overview of balance of budget items
 - Dr. Mike Jackson coming on board for Antarctic logistic integration position (4/20)
 - Julie Palais will return to GEO-PLR end of June 2015
- Eric Saltzman
 - Goals for coming to NSF – improve Greenland/Antarctic communication process
 - Goal: Solicit input and how to solicit input from community on assessing investments in Greenland
 - Investment in NICL and management structure of ice coring will need attention/investment
- Renee Crain:
 - Considering large-budget investments in Greenland
 - Overview of setbacks and adaptations from start of the season
- Lisa Clough:
 - LC130 for Antarctic black out periods, how will we get everything on LC130? Budget is being monitored. Working on new airfield with AIMS and may have supportability for C17, no discussion on purchasing of LC 130s to date.

- South Pole Ice Core: Housing/resources will be a challenge for the next few years (max 150 ppl)
 - Mark Kurz:
 - Will be rotating off his current position at the end of summer; encouraged others to consider being an NSF rotator
 - Discuss with Scott Borg or Eric Saltzman if you are interested in the rotator position
 - Sridhar:
 - Antarctic Infrastructure panel to rebuild McMurdo – be aware they may be soliciting input.
- **IDPO Update (Mary Albert)**
 - Thanking NSF for support of all activities
 - Overview of vision & mission
 - Overview of old NSF cooperative agreement & new agreement with sub-awards
 - Review of new org chart
 - Potential new subaward to U. Nebraska-Lincoln with Frank Rack as PI
 - Overview of what LRSP is and does (10 year plan, drives IDPO-IDDO actions and investment in drill maintenance/upgrade/development)
 - Overview of community involvement
 - IDPO community workshop on subglacial access likely this fall
 - Special volume of Annals of Glaciology was published
 - Overview of science requirements for new drills
 - Upcoming drills, completed drills, drills in prep
 - Overview of how IDPO-IDDO Annual Program Plan is developed
 - Overview of communications
 - Website, Ice Bits Newsletter
 - Overview of education & outreach (**Linda Morris**)
 - Leading goals and best practices
 - Impact and teach understanding (science and engineering content)
 - Expansion and new directions
 - Overview of potential film project with Jim Balog
 - IDPO “School of Ice” proposal has been funded by Lockheed-Martin, will result in a class for professors from minority-serving institutions, goal of increasing diversity

ACTION ITEM: Renee Crain suggests that Linda work on an article in “Witness the Arctic” with ARCUS on how to get involved and get the word out about IDPO Educational Outreach, beyond the ice coring & drilling community. Renee will ask ARCUS to do a feature article on Linda and her program.

- **IDDO Update (Krissy Slawny)**
 - Discussion on staffing changes within IDDO over the last year
 - Development projects
 - ASIG (entry into rock coring), IDD
 - Maintenance and upgrade of drills
 - SHWD, 4” (new “Foro” design, upgrade to submersible system), BID-DEEP, Badger-Eclipse, Koci (Koci not in LRSP as a priority)

- Interactions with LAC-Core Group and the Winkie Drill to drill rock core (5-30meters)
 - Small hot water drill needs a user-friendly pickling system (conference call with users in March 2015)
- Field projects
 - *Antarctic*: Cosmogenic C14 cores, hand auger (4 projects), SPICE Core, Taylor Glacier Blue Ice Cores, WAIS.
 - *Arctic*: Midwest US Ice Cores, Cosmogenic C14, Disko Bay, Greenland Firn Aquifer Investigation
- Other:
 - 8 papers in Annals of Glaciology
 - IDDO-TAB Meeting in Madison, WI. Sept 14-15, 2015
 - RAID and IDDO collaboration
- **IDPO Working Group Update – Ice Core Working Group (Ed Brook for Karl Kreutz)**
 - Karl Kreutz is rotating off SAB, so the SAB needs an ICWG rep
 - Reviewed update of membership and bylaws
 - Recommendations for archiving ice cores
 - Dorthe Dahl-Jensen recommends storing all of the core, not just sections
 - Overview of ongoing activities
 - Overview of ice coring projects from LRSP 2014
 - ICWG will have a virtual meeting on May 21.
- **NICL update (Mark Twickler)**
 - UNH has a subcontract from USGS-NICL grant to conduct NICL-SMO activities
 - Staffing update (no major changes)
 - SPICE core has arrived, reviewed CPL schedule
 - Update on R22 coolant: Bob Corell leading study on CO₂ system
 - *Options*: Build new freezer, refurbish freezer, build new facility
 - Funds maybe available thru NSF, no confirmation on when/if this is possible
 - Estisol 140 update – looking for usage ideas, field use and studies for using
 - Active carbon filter removes Estisol 140 fumes from air
 - Linda Morris recommended reaching out to retired teachers thru Colorado State Teaching Association for volunteers to man tours of NICL, and also recommended using Webcams for watching CPLs so that teachers anywhere can login and watch
 - Online inventory is in the process of being upgraded and interfaced at UNH
 - Scientists should write proposals to use existing cores

ACTION ITEM: IDPO consider holding a virtual meeting with the community to advertise existing cores at NICL to foster thinking about science proposals using existing cores

- **IDPO Working Group Update – Borehole Logging Working Group (Ryan Bay)**
 - Overview of ice as an observatory
 - Overview of IceCube-Gen2 requirements, benefits and uses
 - Upgrade of PINGU
 - Askaryan Radio Array (ARA) awaiting NSF approval to continue drilling
 - South Pole radio beacon using SPICE core location

- ARIANNA--~10,000 pits required for this project; also will need two cores & one hole
 - Ice diver-Melter probe
 - SUBGLACIOR (Grenoble) and RADIX to find oldest ice in East Antarctica
 - Review of members, recent logging projects, upcoming logging projects
 - IDDO winches – pre-deployment testing, winch operators & engineers
 - Create “borehole allocation committee” to manage resources, testing, tools maintenance and preservation of holes. See also LRSP.
 - Discussion of drill fluids – Estisol 140 has not worked well (viscosity, cloudiness, difficult to remove from core and material compatibility issues) and drillers are becoming ill.
 - SUBGLACIOR choose not to use Estisol 140 and is using Silicone based fluid
 - Can Butyl Acetate be rehabilitated? No intrinsic issues at low ppm
 - RAID would like to use Butyl Acetate over Estisol 140
- **IDPO Working Group Update – Subglacial Access Working Group (Ross Powell)**
 - Overview of projects and instruments either under development or in use
 - WISSARD – 99% clean
 - Overview of # species found in Whillans water column
 - Sediment cores were collected
 - Amphipods, fish and jellies in water column (appear stressed)
 - Subglacial Town Hall Meeting
 - Subglacial lake exploration: knowns and future planning
 - IDPO Subglacial Access U.S. Community meeting will be next fall
 - Community needs: Geophysical support (air and ground), traverse equipment, hot water and access drills, clean access, instrumentation development, regular community meetings and on-going support
 - Discussed the features and needs of Hot Water Drill beyond what is at IDDO
 - List of SCAR Horizon scan questions
 - Brief budget review
- **RAID Update (Blaise Stephanus)**
 - Overview of staff and goals
 - Presentation of testing and North American Test (NAT) site
 - Tested: fluid recovery and drilling in Antarctic conditions
 - Presentation of Fluid Recovery System (Estisol 140)
 - Reuse of fluid, separation system and control system
 - Development and Delivery schedule
 - Review of potential budget changes
- **International Perspectives and Plans (Dorthe Dahl-Jensen)**
 - Overview of European drilling programs/projects
 - Drilled ice cores locations
 - International drill setup
 - Publications
 - Projects lasting to 2020
 - Review of:
 - Planned ice cores and high priority science questions

- Data
 - Camp layout
 - Budgets
 - Innovations
- Drill liquids
 - Favor the Estisols (140 & 240) for drilling fluid
 - Review of pros and cons of Estisol 140 versus Estisol 240
 - Overview of papers published in the Annals of Glaciology
- Rapid Access Drills
 - SUBGLACIOR (silicon oil)
 - RADIX – Created with minimal resources
 - BAS (by Rob Mulvaney)
- **Drill Fluid & Logistics – Perspectives from SPICE & other projects (Howard Conway)**
 - SPICE Team drilled 736 meters of quality core, record!
 - 150 meters stored at South Pole
 - First visible layer of ash
 - Review of SPICE logistics
 - Drilling fluid, drilling equipment, clothing and equipment, generators, fuel
 - Five (5) LC-130's needed for the season to move cargo to and from Pole
 - Review of last seasons support requirements for SPICE
 - Requirements for moving to a remote site (Twin Otters, traverse, air drop)
 - Reduction of weight and more informed choices of equipment to reduce waste
 - Discussions needed going forward:
 - Reducing weights
 - Minimize size and infrastructure
 - Evaluate cost and practicality of traversing equipment
 - Estisol 140
 - Recommendations from SAB and IDPO
 - Synthetic fluid
 - Low odor threshold
 - Low toxicity (SDS)
 - Derived no effect level (20ppm for short term exposures)
 - SPICE drillers had headaches and other symptoms from exposure
 - Eats through gloves and other materials
 - IDDO working to ensure personnel safety
 - Changes in ventilation, ops and PPE
 - IDDO does NOT plan to use this fluid on future drilling projects
 - Group question and answer regarding drill fluid, protection and preservation of ice cores
 - Protective netting and packaging
 - Odor mitigation of drill fluid.
 - Are respirators an option?
 - Clean Access fluids – Any available? Can we start looking for one?
 - Colorado School of Mines has fluid testing facilities (physical properties)

ACTION ITEM: Move issue of Estisol odor mitigation forward.

ACTION ITEM: Investigate use of lighter weight drills and structures.

- **Hot Water Drilling Future – Mary Albert & Group**

- Potential subaward to U. Nebraska @ Lincoln (PI Frank Rack) for Hot Water Drill next year if currently pending science proposals get funded, as requested by NSF
- Lisa Clough discussed drills currently at UNL (not all pieces of the drill are owned by UNL)
- What is the best way to move forward on Hot Water Drilling needs?
- Should IDDO be the purveyor of major hot water drills? In the long term should there also be an IDPO subaward to UNL as well?
- How can we consolidate the drills and drilling needs? NSF cannot give funds to multiple organizations for duplicating hot water drilling investments.
 - Scalable hot water drill
 - WISSARD hot water drill
 - Hot water drill used to support PIG
- There is no oil field equivalent of hot water drilling
- How can we continuously fund a drill with support staff when the drill may not be used every year and may not receive proposal funding every year?
- Should the UNL equipment be or not be combined with the IDDO group?
 - Would there be a cost savings?
 - How would ownership of the drill be determined?
 - Currently it is owned by UNL
 - IDDO budget has \$1.5M for another scalable hot water drill
- Many types of ice drilling could be within IDPO

ACTION POINT: Sridhar, Ross and Jill write up SAB memorandum for Lisa Clough.

- **Prioritization of Drill Investments for LRP (Ed Brook)**

- Create guidance for IDPO Long Range Science Plan
- Discussions of:
 - What is needed this year?
 - What is needed within three years?
 - What is needed within five years?
 - IDD and Infrastructure is complete
- Updated priority list drafted

Friday, April 17, 2015

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IDPO: Mary Albert (Dartmouth), Blaise Stephanus (Dartmouth), Linda Morris (Dartmouth), Mark Twickler (UNH), Joe Souney (UNH), Alicea Bursery (Dartmouth)

IDDO (U. Wisconsin): Krissy Slawny, Mark Mulligan

NSF: Paul Cutler

- **Review & Discussion of Updates to LRP (Ed Brook & Mary Albert)**

- Review of timeline of due dates for Long Range Science Plan
 - End of April changes due
 - Third week of May needs to be approved
 - IDPO produces final formatted plan

- IDDO uses prioritization to create Long Range Drilling Technology Plan
 - Both the LRSP and the LRDTTP need to be posted to Fastlane by end of June
 - **ACTION ITEM:** Each SAB member will solicit input to the LRSP from their respective communities
- Review of LRSP
 - **ACTION ITEM:** Mary Albert will put draft Recommended Technology Investment prioritization in updated LRSP for community comment. SAB will continue to discuss prioritization and be prepared to finalize prioritization by the end of May
 - Review of Climate Change Planning Matrix timeline
 - Update coloring scheme for Climate Change Planning Matrix timeline (funding, proposed, planned)
 - Can we capture plans in narrative portion of plan?
 - **ACTION ITEM:** Add East GRIP to Renland
 - Ed Brook group would like to go to Taylor Glacier again
 - HERC Dome (RAID test site to look for oldest ice) needs a year to plan for and conduct traverse (too big to fly in, must be shipped and driven to site)
 - Change timeline of DISC drill for Oldest Ice? (Large budget implications)
 - Collaborate with European scientist to work on oldest ice (beyond EPICA, Dorthe Dahl-Jensen). Timing? How will sites be chosen?
 - Discussed Eric Wolff project funding in 2018
 - Needed IDDO drill upgrades and timeline
 - Upgrade of sonde electrical components (time sensitive, components can age out)
 - Scalable hot water drill – no current push
 - **ACTION ITEM:** Add line for going to East GRIP and depth (Sridhar to provide)
 - **ACTION ITEM:** WAIS project with Germans (Sridhar)
 - Shot hole drill (Scalable hot water drill)– 100m, 4.5” diameter, takes about 1-hour to drill the hole. Able to perform depths for all people not all diameters for all people. Make this larger for CTD tools?
 - Discuss with subglacial community
 - **ACTION ITEMS:** Need document showing all hot water drills and their respective institutions and where the drill is located now and which community is using it currently. Where is there overlap, redundancy? See Krissy Slawny’s slide in her presentation “Hot Water Drill Capability Comparisons” for a starter. Sridhar to add weight, cube, number of people, clean access (y/n and define best practices using code of conduct), drilling logistics to the table.
 - **ACTION ITEM:** Requirements on how to make the drill “clean”, when is “clean” needed? What is the definition of “clean”?
 - Science requirements are on the website

- Joe Souney suggested last page of newsletter includes table of drills that are ready to go versus being designed.
 - Ross Powell suggests regular subglacial access meetings, Sridhar agrees.
 - Physics group will review and make updates (Ryan Bay)
 - **ACTION ITEM:** SAB members need to send LRSP input to Mary Albert and Ed Brook by April 24, 2015.
 - **ACTION ITEM:** Update language in associated logistical challenges section of LRSP.
 - **ACTION ITEM:** ICWG -- Is there demand for a more agile / less deep intermediate drill? Another IDD for Greenland?
 - Need representative from each working group at future SAB meetings
 - Future working group meetings should occur before SAB meetings
 - TAB Annual Meeting will be September 14 & 15, 2015 in Madison, WI.
 - Ross Powell will attend (IDPO will provide travel)
- **SAB Terms of Reference (Ed Brook)**
 - **ACTION ITEM:** Update term rotation to 4 years; Sridhar stays on committee, add 2 new members in October (replace Karl Kreutz and Dorthe Dahl-Jensen). Ross Powell and Sridhar committee to rotate off in 2016. Howard Conway will rotate off this summer and not be replaced. Rotations end annually in October. Two people per year will rotate off the SAB.
- **SAB Membership and Rotations (Ed Brook)**
 - **ACTION ITEM:** The SAB requested that Mary Albert include travel for annual SAB meetings in the IDPO budget. Annual meetings can be held in alternate locations at NSF and UWISC-TAB meetings in alternating years.
 - Every other year, TAB and SAB have one overlapping meeting day at UWISC.
 - **ACTION ITEM:** List duties of members, need representation in specific areas, and procedure of nominations (subcommittee). Ed Brook will approach Vas Petrkenko, TJ Fudge, Sarah Aciego and Erich Osterberg regarding potential nominations. Jim White nominated Jerome Chappellaz. Dorthe Dahl-Jensen recommends Jacob Schwander, Mark Curran (Southern Hemisphere connection) and Nancy Bertler (Southern Hemisphere connection), Kumiko Goto-Azuma. Jill Mikucki nominates Jemma Watham (has Arctic connection). Ross Powell nominates Christina Hulbe. New members need to be in place in October or before.
- **Long Term Plans for Management of US Ice Coring (Sridhar)**
 - Discussion on becoming independent nonprofit versus part of another nonprofit versus cooperative agreements.
 - Examples of IRIS and UNAVCO
- **Working Lunch for SAB & IDPO-IDDO (as needed)**
 - Krissy Slawny would like some direction on clean drilling fluids.
 - Drilling fluid resolution: Ryan Bay (DESIGNEE), Mark Twickler, Krissy Slawny via Pavels' group.
 - Cost of silicon (Ryan Bay)
 - SAB Meeting 2016

- Avoid EGU (4/17-4/22/16) and April 15 (tax day)
- Target late Feb to mid March 2016 for the next SAB meeting
- **ACTION ITEM:** Jill Mikucki will provide Alicea Bursey with “clean” access bibliography for inclusion with the SAB minutes.