

Meeting Summary
Submarine Arctic Science Program
Science Advisory Committee (SAC) Meeting
February 2 – 3, 2012
National Science Foundation, Room 730
4201 Wilson Boulevard
Arlington, VA

Attendees

SAC members attending:

Jackie Richter-Menge (Chair) – Cold Regions Research and Engineering Laboratory

Tim Boyd – Scottish Association of Marine Science

Margo Edwards – University of Hawaii

Ray Sambrotto – Lamont-Doherty Earth Observatory

Bill Smethie - Lamont-Doherty Earth Observatory

Mark Wensnahan - Polar Science Center, Univ. of Washington

Terry Tucker – Terry Tucker Research

Interagency Committee (IAC) members attending:

Martin Jeffries (Chair) – Office of Naval Research

John Farrell – US Arctic Research Commission

Erica Key – National Science Foundation

Larry Estrada – Arctic Submarine Laboratory (by phone)

Randy Ray – Arctic Submarine Laboratory (by phone)

Other Attendees:

CDR Dan Eleuterio – Office of Naval Research

Simon Stephenson – National Science Foundation

Scott Harper – Office of Naval Research

Florence Fetterer - National Snow and Ice Data Center

George Newton, US Arctic Research Commission

Renee Crain – NSF Arctic Logistics

Mike Meyers – Office of Naval Research

CDR Blake McBride – OPNAV N2/N6E - Navy Task Force Climate Change

LT Jeffrey Payne – OPNAV N87

CDR Tony Miller OPNAV N2/N6 - Task Force Climate Change

Ann Windnagel – National Snow and Ice Data Center (by phone)

LCDR Michael Vancas – National Ice Center

Pablo Clemente- Colon – National Ice Center

Kathy Farrow – US Arctic Research Commission

Julia Kamari Drapkin – US Arctic Research Commission

Introduction and Overview:

- Chair Jackie Richter-Menge reviewed the agenda and objectives of the meeting. The primary aims of the meeting were to review the State of SCICEX, summarize activities which took place in association with ICEX 2011, and begin to develop a data management strategy for SCICEX SAMs.
- Simon Stephenson introduced Erica Key, the new program manager for the Arctic Observation Network (AON) and pointed out that SCICEX has national value as an important part of the AON.

State of SCICEX

- Opening discussions made it clear that an overarching concern continues to linger in the mind of many of those attending the meeting regarding the level of operational Navy's support of SCICEX and the Science Accommodation Missions (SAMs). From this followed more discussion (see below) to explore the roots of this concern, its validity, and actions that can be taken to bolster this critical support.
- Chair Jackie Richer-Menge reiterated the original MOU stating that the overall goal of SCICEX Phase II is intended to mutually support objectives of both the scientific and military communities.
 - The high interest in the rapidly changing Arctic strongly motivates the utilization of SCICEX.
 - Development of the SAM strategy occurred after the 1998 decision to end the dedicated SCICEX cruises.
 - Science Plan for SAMs was developed to assist ASL in maximizing the use of submarine transits and ice camp exercises for science data collection when possible.
 - Past experience has shown the value of all historic submarine data.
- Discussion followed regarding the value of SCICEX to the Navy; a subject that has been discussed in past SAC and IAC meetings. ASL, which has the most direct link to the operation side of Navy, provided important insights on the *perception* from the operational side:
 - No doubt that data collected on SCICEX SAMs has strong scientific value.
 - Other than for strategic planning, it is difficult to show value of SCICEX to the operational Navy.
 - The submarine has on-board sensors which describe the immediate operational environment.
 - For mission planning the most important variable is the ice edge location which is retrievable from satellite imagery.

SAC perspective on State of SCICEX

Recent progress and activities include:

- SCICEX 2011 – first SAM since 2005
- Poster of SCICEX 2011 at Fall AGU, Dec 2011
- New SCICEX web site now operational

- Efforts to Promote value of SCICEX to the Navy:
 - Naval Arctic Environmental Capabilities-Based Assessment acknowledged SCICEX.
 - New and revised white papers aimed at high level operational Navy authored by:
 - Martin Jeffries, prepared for Dr. Mike Meyers
 - George Newton, prepared at the request of CDR Warren Fridley
- Shift of responsibility of all aspects of data management from LDEO to NSIDC.
- Current agency support of SCICEX and SCICEX-related activities:
 - ONR
 - Boyd – XCTD purchasing and testing
 - Sambrotto and Smethie – Water sampling protocol
 - Wensnahan – Historical ice draft processing and quality assessment
 - NSIDC – Data Archive
 - NRL (Gardner and Brozena) – Comparison of submarine and airborne ice thickness measurement
 - USARC
 - SAC travel
 - Publication of Science Plan
 - SCICEX logo

Concerns of the SAC regarding the SCICEX program:

- Conducting at least one SAM per year is the highest priority
 - Requires operational Navy support for SCICEX.
 - Value of SCICEX to Navy must be established.
- Navy support for Arctic Submarine Laboratory
 - ASL budget reduced by 13%.
 - ICEX frequency decreased to 3 years or longer.
- SAM data collection protocol development
 - Quality of collected data needs to be demonstrated.
- Without timely demonstration of its value, risk possible loss of SCICEX program

Martin Jeffries discussed SCICEX from the IAC perspective

- NOAA and NASA were invited to the meeting but did not attend.
- Recent successes include the new web site and some aspects of SCICEX SAM 2011 .
- Concerns include:
 - Data management plan is only useful if there are data.
 - Problems separating SCICEX from non-SCICEX data on SCICEX SAM 2011.

SCICEX 2011 Activities

Larry Estrada and Randy Ray reported on ASL activities related to SCICEX and ICEX -2011. Objectives included:

- Revival of SCICEX (first SAM since 2005).
- Focus on gaining experience with new:

- Submarine classes (Seawolf and Virginia)
 - Submarine data recording systems
 - Topsounder systems (it was noted that the Common Topsounder is not common at all)
 - Underice SSXCTDs
 - Water sample locations.
- Platform Participants in SCICEX SAM 2011 were:
 - USS CONNECTICUT (SEAWOLF Class) from Pacific area
 - USS NEW HAMPSHIRE (VIRGINIA Class) from Atlantic area
 - APLIS – 2011.
- SCICEX data collection took place at opportunities during the ice camp operations and during transits. Discussion of SCICEX sampling and data systems involved took place at this time.
 - Topsounder data taken by the common, onboard system is not routinely recorded and archived, outside of SCICEX collection periods. The SAC had previously understood that all topsounder ice draft data was recorded and archived, regardless of whether the operation was in support of SCICEX.
 - During the SCICEX SAM 2011, very little useful topsounder data was collected. Problem with quality of data is related to how the topsounder was operated – one of the lessons learned from 2011.
 - A TempAlt may be required to record topsounder data. This was new information to the SAC. The SAC needs to work closer with ASL to determine when TempAlts will be required.
 - The SAC perspective is that the two basic data sets that every Arctic-bound submarine should record and retain, within the Data Release Area, are bathymetry and ice draft.
 - ASL does not have a vote on what data is recorded and retained during system design for submarines. The warfighter requirement is for knowledge of ice draft, keel depth, etc only in the immediate vicinity of the boat, thus recording and retaining ice draft information are not necessary.
 - All bathymetry data are recorded and sent to NGA for post processing. The recording device may be sent to the sonar or software vendor for data extraction prior to NGA processing. The complete process was not made clear during the meeting.
 - A spreadsheet matrix containing class of submarine, data recorded and mechanics of data recording should be constructed to assist in TempAlt development for SCICEX SAMs.

SCICEX Website Guided Tour

Florence and Ann Windnagel (by phone) presented a demonstration of the new SCICEX website: <http://nsidc.org/scicex/>.

SCICEX 2011 Activities – Continued

Tim Boyd reported on XCTD testing:

- 12 XCTD probes were tested; 8 passed pre-launch test and were launched.
- 7 probes returned data, 5 to the design depth of 1100 m.
- 3 were in proximity of APLIS camp; 2 close to NPEO.
- The 7 XCTD profiles were generally successful.
- Still some confusion over correct software.

Ray Sambrotto and Bill Smethie reported on water sampling:

- Both boats took a few water samples.
- Nutrient samples look reasonable from samples on both boats.
- There appeared to be some sampling problems for Dissolved Organic Carbon and some tracers.
- Better training procedures – insufficient time was available for Ray to demonstrate proper procedures to responsible crew prior to deployment.
- Shipboard storage and shipping procedures need to be standardized.
- In general, water sampling was quite acceptable.

Data Management

Florence Fetterer had prepared templates outlining the data route map from boat to archive. In this phase of the process, investigators were to define the data, outline the transition process and estimate resources necessary. The transition process includes who handles the data, what is done to the data and how it is done.

Ray Sambrotto and Bill Smethie – Biological and Chemical Samples:

- Data includes: Calibrations for underway data, Tracers, Dissolved and Particulate Pools, Phytoplankton and Bacteria characterization, and Other.
- On-board collection and processing of discrete water samples.
- On-board storage and subsequent shipment of samples.
- Analysis and quality assurance/quality control by individual labs.

Tim Boyd – Expendable CTD Profiles:

- Raw data consists of Sippican export data files and log files provided by ASL.
- During transition process data is de-spiked, filtered, and sub-sampled to produce profiles of measured properties (temperature, conductivity) and derived properties (salinity, potential temperature, density, potential density) as well as metadata.
- An individual investigator can process and produce data from one SAM (20-30 profiles) in about a week.

Tim Boyd – Submarine Sail CTD:

- Raw data is SeaBird binary files of time, temperature, conductivity sampled at 16 Hz, assuming use of ASL's CTD.
- Transition process is complicated involving segmenting data to constant depths, removing outliers, filtering, merging with navigation data and calculating derived quantities.
- An individual investigator can process and produce data from a SAM in several months.

Margo Edwards – Single-Beam Bathymetry:

- Binary or ASCII data files of Longitude, Latitude and Depth. May include sound velocity profile, pitch and roll of the boat.
- Transition process is not clear with new submarines. Needs to be defined.
- Resources required depend on quality of data and ancillary data collected.

Mark Wensnahan – Ice Draft Data:

- Raw data consists of uncalibrated ice draft data with time stamp, ship speed, ship depth, ship location, ship bearing. Data acquired by the Common system may require a TempAlt separate recorder to retain topsounder data for the cruise.
- Transition process produces calibrated pairs of distance along track and draft for segments of cruise track at constant depth and bearing. This is highly interactive process that ties navigation to drafts, identifies open water for offset, excludes bad data, splits data into segments, does final QC, seeks declassification and documents the data.
- SCICEX data will be declassified when released to designee (currently Mark W.).
- Processing will require 1 – 2 months for an entire cruise.

February 3, 2012

Summary of yesterday’s meeting by Jackie.

- Overall – SCICEX is at a “use it or lose it” point. If we cannot get routine SAMs, the program will likely wither and die.
- Must engage the operational Navy:
 - Some new points of contact have been identified, requires follow up.
 - Change focus of SCICEX Navy benefits to safety and efficiency of Arctic missions.
 - Establish high priority environmental needs to Navy and science.

Discussion regarding Navy environmental needs.

- Ice draft, bathymetry, and salinity are important navigational safety parameters to Oceanographer of the Navy.
- Example - big Navy environmental data issue if SAR (Synthetic Aperture Radar) data ends.
- ASL briefs SCICEX to the operational Navy as an ancillary, scientific activity that is willingly supported, barring interference with higher priority operational activities.
- Point made again that operational Navy is concerned only with current tactical needs, not climate change.
- SAC should help ASL develop the message that SCICEX SAMs are collecting critical environmental data and all data will help improve operations.
- Pablo Clemente-Colon noted that NIC has operational need for ice draft data.
 - He will provide need requirements to us.

Summary of SCICEX 2011 lessons learned:

- Valuable data collection and experience.
- Good start on developing sampling protocols.
- Need to address topsounder ice draft and bathymetry problems:
 - How to recover topsounder data.
 - Understanding processing and securing release of SCICEX bathymetry and nav data.
- Communication is the key to success.

Review of Data Management discussed yesterday:

- Outline transfer of data from submarine to NSIDC in SCICEX disciplines.
- NSIDC will follow-up to address gaps.

Sustainment and Support of SCICEX

- IAC should work on establishing support for SCICEX:
 - Should MOA be modified and renewed?
 - Should other agencies be invited to join IAC?
 - Perhaps demonstrate a successful SAM prior to asking other agencies to join.
 - Suggest preparing a Flag level brief outlining the value of SCICEX data to Navy; including list of environmental data needs for safe and effective operations
- Ideal case would be SCICEX data collected from any submarine going to Arctic.
 - Force Commanders will have to buy off on this.
 - ASL perspective - nothing to prevent collection and release of SCICEX data from transiting submarines (if approved by submarine force) except dealing with new technology of data collection systems (e.g. extracting topsounder and bathymetry).
 - Only 1 or 2 ASL ice pilots per mission so science requirements must be reasonable.
 - if switching on recorder is all that is required, data collection is very possible.
 - Data is classified at a higher level for deployed missions.
- Few submarines now transit the Arctic, 0 or 1 per year.
- Processing data by SAC members should be distinct from analysis.
 - There should be no perception that SAC members have exclusive use of SCICEX data.
- SCICEX vs. non-SCICEX data:
 - Both need to be processed but non-SCICEX data requires clearance prior to release.
 - Ice draft data within SCICEX box can be submitted for release approval after rounding time and position.
 - Non-SCICEX bathymetry usually requested for release at 5 yr intervals.

Membership of SAC

- Beginning this year 2 current members will rotate off each year
- SCICEX IAC to coordinate request for nominations for new members.