SOUTH POLE USERS' COMMITTEE (SPUC) TELECON-MEETING

12 May 2010
Raytheon Polar Services Company
Centennial, Colorado

Attendee List

Committee and Affiliated Members

Allan Weatherwax, Siena College – Acting Chair EMI Subcommittee
Albrecht Karle, University of Wisconsin
John Kovac, Harvard University
Brian Vasel, NOAA/ESRL/GMD
Scott Palo, University of Colorado
Rhett Butler, IRIS (Did not attend)

Other Science Community Attendees:

John Carlstrom, University of Chicago
John Ruhl, Case Western Reserve University
Bill Bristow, University of Alaska

National Science Foundation:

Jessie Crain, Research Support Manager (AIL)
Vladimir Papitashvili, A&A Sciences Program Director (ANT)
George Blaisdell, Operations Manager (AIL)

Raytheon Polar Services Company:

Tom Ellis, Director of Operations
Steve Kottmeier, Director of Science Support
Scott Marble, South Pole Area Director
Dave Nelson, Manager Science Operations
Paul Sullivan, Manager South Pole Science Support
Al Baker, South Pole Science Support Coordinator
Bill McAfee, Manager South Pole IT
Leah Street, Sr. Manager MREFC Projects
David Aremu, South Pole Facilities Engineer
Dave Scheuermann, McMurdo Sr. Site Operations Manager
Melissa Rider, Manager Science Support Planning
Dave Leger, Sr. Manager IT System Services
Paddy Douglas, Manager South Pole Logistics
Jack Corbin, South Pole Sr. Science Construction Coordinator
Joe Crane, South Pole Sr. Construction Coordinator
Jay Bollinger, IceCube Project Manager
Adam Fontana, Power & Water Supervisor
Katie Contos, Material Data Specialist
Leslie Blank, Planning Support Manager

2010 SPUC Meeting Agenda
Wednesday, May 12, 2010

Participants
Dial In Number: 1.877.336.1275
Access Code: 1274113

Mountain Day Time:
10:00 – 10:15 Opening

- Welcome and introduction of attendees [NSF/RPSC]
- Overview of meeting and agenda [Sullivan/Bonneau]

10:15 – 11:30 Updates

- Electromagnetic Interference [Weatherwax]
  1. Current Status (Palo radar 100% duty cycle request)
  2. Future Science (SuperDARN, ARA, PENGUIn HF)
  3. Wind Power? (Is South Pole going to employ wind on a large scale???)
- Snow maintenance [Lewis/Martinez]
  1. Dark Sector
  2. Clean Air Sector
  3. Operations Sector

11:30 – 12:00 Updates (continued)

- IT [McAfee]
  1. Satellite(s) status and future plans (SkyNet 4?)
  2. Bandwidth – Forecast for the outyears
- Power –status [Fontana]
- USAP Contract transition period

BREAK (15 min)

12:15 – 12:45 South Pole Other

- Population current status and projected 2010-11 season [Beth Watson]
- Long Range Planning (South Pole in the post-SPSM era [Dave Scheuerman]

12:45 – 13:30 Working Groups and Future Strategy

- Future of the SPUC?
- What kind of WGs are needed – EMI, what else?

13:30 – 14:00 Executive Session [if needed; Lead: Weatherwax**]**

Welcome and Introduction of Attendees

The meeting was open with the introduction of attendees. RPSC – Tom Ellis welcomed both grantees and the NSF to the SPUC 2010 teleconference. NSF – Vladimir Papitashvili addressed the users committee noting they advise RPSC and not the NSF. Mention was given to the future of SPUC teleconferences that could be web based. Thanks was given the EMI working group for keeping the SPUC moving on pertinent issues regarding the electromagnetic environment.

Electromagnetic Interference (EMI)

The 2010 SPUC was comprised mainly from members of the EMI Subcommittee from previous user committee meetings. In the past the EMI Subcommittee has provided guidance, testing and advice to both the NSF and RPSC regarding implementation of existing and new technologies for RF communications, lighting and wireless devices to name a few at the South Pole. These actions have helped preserve the pristine nature of the electromagnetic environment around the station thus keeping any negative impacts to the science at a minimum.

Several grantees advocated taking a different approach regarding EMI and suggest taking a more proactive path. Al Weatherwax brought up the need to get a hold on electromagnetic baseline at South Pole so that a reference can be established. This would help the science community understand "where we are" with respect to overall station noise level. Scott Palo brought up the topic of a long range and permanent monitoring across a sufficient frequency range that encompasses the spectral range of scientific interest on the Antarctic plateau. This could also include capabilities to monitor power coverage, power factor as well as the ability to determine antenna patterns and field strengths. NSF – Vladimir Papitashvili suggests the EMI Subcommittee put a group together to identify the tools needed and the techniques/strategies that would need to be put into practice.

John Ruhl proposed to circulate the known information regarding transmitters and updated spectral occupancy lists/logs as maintained by the USAP. It was soon realized that either a dedicated website or wiki will be needed to maintain a database containing this type of information. NSF – Vladimir Papitashvili recommended as an action item that Al Weatherwax work with Science Coordination Office for Astrophysical Research in Antarctica (SCOARA) to establish and maintain either a wiki or a website for the purposes of long term electromagnetic monitoring of the South Pole environment.

The discussion then shifted to the current EMI situation at South Pole regarding science transmitters, namely VLF Beacon Transmitter, Meteor Radar and in the near future SuperDARN.

<u>VLF Transmitter</u>:

Operational at ~4.8kW for 1 minute every 15 minutes at ~19.4kHz. The future of this experiment is not certain and RPSC will be planning for either continued support or retrograde of scientific equipment in the 2010-11 field season.

Meteor Radar:
Operational at 50% duty cycle with a peak power rating of ~ 10kW at ~46.3MHz. The Meteor Radar has also been on a 50% duty cycle since 2006 and the PI would like to know if the experiment can be ramped up to a 100% duty cycle provided no negative impacts would result. ***(Did the SPUC acknowledge and agree with this request?) Feedback from the PI – Scott Palo indicates there was no resolution to this request.***

John Ruhl & John Kovac noted that 1 min on/1 min off transmission schedule is not a good test for EMI given the current generation of CMB experiments and scanning strategies.

Albrecht Karle noted the RF coupling from the Meteor Radar to IceCube is not fully understood, but the Digital Optical Modules (DOM's) that are in the vicinity of that experiment experienced higher than normal trigger rates. A workaround for this issue came in the form of changing the settings in the photomultiplier tubes (PMT's) towards and higher gain and threshold. This strategy was also enabled during the 2009-10 season for the new DOM strings that were deployed. The lesson from this experience was that close collaboration between Albrecht Karle and Scott Palo was very helpful in coming up with a solution as this interference was unexpected.

NSF – Vladimir Papitashvili inquired as to how far the Meteor Radar would need to move to avoid this type of interference….

SuperDARN:
This experiment is currently not operational at the South Pole but has an analog at McMurdo station that was installed in the 2009-10 season. In the 2004-05 field season grantees for this project conducted a series of tests at South Pole under the guidance of a predetermined transmission schedule for the purposes of logging the times to check for EMI to other science experiments. Since that time papers have been written citing the potential for EMI but no conclusive evidence has been presented to date.

The future location of SuperDARN could be key in minimizing EMI. NSF – Vladimir Papitashvili and the SuperDARN PI (Bill Bristow) are investigating different locations around the South Pole and will join forces with the EMI Subcommittee to help understand the field strength at various angles and distances for off-axis values.

Wind Turbines:
South Pole has been testing a wind turbine over near Rodwell #2 since January 2010 and it is scheduled for continuous operation throughout the austral winter. The type/model is Abundant Renewal Energy, ARE 110-HV (2.5kW) Grid-Connect Model Wind Generator. It is mounted on a 40' tower and connected to the South Pole power grid via

voltage clamp, resistor load and inverter. Scott Palo asked if the wind vibration from this tower was of concern to the SPRESSO facility located ~5 miles to the grid east.

Autonomous Magnetometer Platforms:
The A-106-M grantees will be installing two low-power instrument platforms at South Pole during the 2009-10 field season. The PI – Calvin Clauer has requested the austral winter use of HF frequencies (5 MHz to 6 MHz) for the purpose of communication between the two instrument platforms. The transmit power will be 8 W peak envelope power (PEP), the mode will be frequency shift keying (FSK) and the maximum signal bandwidth is 3kHz. A suitable location should be chosen to minimize the EMI. The current testing schedule is for two systems in 2010-11 followed by two more systems in 2011-12. Both seasons indicate use of the HF frequencies during the austral winter.

Askaryan Radio Array:
The A-107-S grantees would like to setup and test three wind turbines in the Dark Sector adjacent to the IceCube Lab (ICL) during the 2010-11 field season. Ultimately the goal will be to have Autonomous Power Systems that include wind/solar power and wireless communications (~2.4GHz) over an area spanning tens of square kilometers. A suitable location should be chosen to minimize EMI. Use of the wind turbines, solar/wind & wireless communications would be a year round operation.

Land Mobile Radio's (LMR):
The current VHF communication system in use at South Pole use a central frequency of 450 MHz. Albrecht Karle noted that this frequency is bad for cosmogenic RF neutrino detection as exemplified by the Neutrino Array Radio Calibration (NARC) experiment PI – Dave Besson. At present notch filters are used to suppress the 450 MHz signal and this may be needed on the ARA experiment mentioned above. The question arose Is 450 MHz a long term choice? Are there other alternatives?

Long Range Planning

RPSC – Dave Scheuermann presented a brief discussion on long range planning and the future of South Pole. In short, the SPSM model was presented as a case that South Pole relied upon for the last 10 years. Now that new station is complete and SPSM is closed out as a project, what is the next model for South Pole? The station relied heavily on the large labor pool and associated resources to address operations, construction and support science. This labor force is not around for the 2010-11 season, so South Pole is attempting to define a "Sustaining" labor force based on the challenges that lay ahead whether it is station maintenance, science support or raising an outlying building. It was mentioned that input from the scientific community would be useful and this could be accomplished through their respective program directors at the NSF, specifically Vladimir Papitashvili since the station is weighted heavily in aeronomy and astrophysics. A goal to shoot for would be develop a 5 year comprehensive plan that shows sustaining station operations, outlying construction projects and also what are the science projects that will be coming to South Pole.

Snow Maintenance at South Pole

Managing the drifting snow at South Pole is an ongoing challenge as evidenced by the large piles still around downwind of the new station in December of the 2009-10 field season. During the early parts of the austral summer the surveyors conduct a drift survey and calculate volumes for the Operations people so they get an idea of how much labor and equipment will be needed to address moving the snow. In general the snow on the station side of the skyway heads towards the "end of the world" and more recently towards to old HF antenna field grid east of summer camp. On the Dark Sector side of the skyway the snow is moved downwind of the ICL and also towards the grid west. It was mentioned that AST/RO and VIPER present obstacles to snow management and they are being looked at as priorities for deconstruction in the upcoming 2010-11 season.

Recently, IceCube has made a request to manage and measure the snow over and around the IceTop tanks for purpose of science data integrity. The tasking associated with this request when added to the already existing work is starting to push the capacity of the available resources used for snow & drift management during the austral summer. To help measure the snow thickness in the local area of IceTop tanks tools exist that could facilitate the surveyors "leg work". A UNAVCO lidar was brought up as an aid that could help speed up the topography survey.

NSF – Vladimir Papitashvili asked if a comprehensive contour map could be constructed for all stakeholders to see. RPSC – Martin Lewis will look into this. Further discussions with NSF/George Blaisdell and Vladimir Papitshvili have looked into the resources needed to produce a comprehensive contour map.

Power Updates

RPSC – Adam Fontana presented the current power usage for South Pole and also the maintenance plan for the next three seasons. The main points were:

- Each of the three generators will have alternators replaced in successive austral summers beginning this season.
- The work is expected to take ~ 1 ½ months to complete for each generator.
- This will put the station at a higher risk exposure due to the length of downtime for each generator.
- The average power for the 2010 austral winter is higher than the previous winter to date.
- Need to do a good job of staying within our resource cap over the next three seasons.

USAP Contract Transition Period

For informational purposes: RPSC had its contract with the USAP extended until March 31st, 2011 or for a period of one year. One of RPSC's main objectives is to ensure a smooth transition and hand-off of USAP duties to the next contractor.

South Pole Population

RPSC – Beth Watson prepared a population picture based on the known priorities for the 2010-11 season coupled with some historical footprints from the grantees. The overall picture at that time looked fairly encouraging as there were only a couple of peaks above

250 people. It was also noted that IceCube would cease drill operation in early January 2011 so this could provide relief in the second half of the season. There was even mention that the station could get down to the 150 person station in the future.

As of the end of May, the picture doesn't quite look so good any more. The typical bad periods of Pre-Christmas in December and the entire month of January now have population peaks above 275.

Future of the SPUC

NSF – Jessie Crain spoke about getting the science community involved on specifics issues by soliciting feedback. Certainly EMI would require feedback from the grantees in terms of direct impact to experiments. NSF – Vladimir Papitashvili would like to see the SPUC have consistent representation from various disciplines and this could lead to achieving more consensus when attempting to resolve challenges.

It has been noted that working groups provide a good model for addressing and solving issues at hand. At present there is only an EMI working group, but others may be needed especially when dealing with satellite bandwidth in the outyears. Below are some other examples:

- EMI
- Data/Comms (Out of station)
- Power
- General resource working group
- Long Range Planning (LRP)

It was also noted that the current communication model where the SPUC advises the USAP contractor, who in turn advises the NSF may not be functioning correctly. John Kovac asked if the SPUC should be able to advise the Office Advisory Committee (OAC). NSF – Vladimir Papitashvili agrees that SPUC members should be able to access the OAC. In general, more timely and consistent communication is needed; this may require a dedicated and maintained website or wiki as mentioned earlier.