

**SOUTH POLE USERS'
COMMITTEE
(SPUC)
TELECON & GoTo-MEETING**

**14 June 2011
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 Madison
John Kovac, Harvard University
Brian Vasel, NOAA/ESRL/GMD
Scott Palo, University of Colorado Boulder
Kent Anderson, IRIS (Did not attend)

Other Science Community Attendees:

Dave Besson, University of Kansas Lawrence
Bill Bristow, University of Alaska Fairbanks
Bob Clauer, Virginia Polytechnic Institute
Harald Frey, University of California Berkeley
Peter Gorham, University of Hawaii
James LaBelle, Dartmouth College
Matthew Lazzara, University of Wisconsin Madison
Stephen Mende, University of California Berkeley
Clem Pryke, University of Minnesota
Kenneth Ratzlaff, University of Kansas Lawrence
Michael Taylor, Utah State University

National Science Foundation:

Jessie Crain, Research Support Manager (AIL) (Did not attend)
Scott Borg, Division Director (ANT)
Vladimir Papitashvili, Antarctic Astrophysics & Geospace Sciences (ANT)

Raytheon Polar Services Company:

Steve Kottmeier, Director of Science Support
Bill Coughran, 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
Julie Bonneau, Planning Support Manager
Laura Rip, Energy Engineer
Neil Miller, Power Plant Engineer
Lindsay Powers, Manager Science Support Planning
Beth Watson, Planning Support Manager
Paddy Douglas, Manager South Pole Logistics
Jack Corbin, South Pole Sr. Science Construction Coordinator
Joe Crane, South Pole Sr. Construction Coordinator
Andres Martinez, South Pole Technical Support Manager
Martin Lewis, South Pole Area Manager
Ted Doer, Senior Environmental Project Manager
Leslie Blank, Planning Support Manager

2011 SPUC Meeting Agenda Tuesday, June 14, 2011

Participants

Dial In Number: 1.877.336.1275

Access Code: 1274113

(International Dial in: 1.404.443.6391 - use Access Code above)

RPSC Personnel are meeting in the Palmer Auditorium

GoTo Meeting Link for SPUC 2011

<https://www2.gotomeeting.com/join/755741691>

Mountain Day Time:

10:00 – 10:15 Opening

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

10:15 – 11:15 Updates

- Electromagnetic Interference [Weatherwax]
 1. Current Status (Palo radar 100% duty cycle request)
 2. Future/Current Science (SuperDARN, ARA, PENGUIn HF)
 3. Solar & Wind Power at South Pole [Crane]
- Snow maintenance [Lewis/Martinez]
 1. Dark Sector
 2. Clean Air Sector
 3. Operations Sector

11:15 – 12:00 Updates (continued)

- IT [McAfee]
 1. Satellite(s) status and future plans (SkyNet 4?)
 2. Bandwidth – Forecast for the outyears [Papitashvili]
- Power –status [Miller/Rip]
- USAP contract transition period [Coughran]

BREAK (15 min)

12:15 – 13:00 South Pole Other

- Population current status and projected 2011-12 season [Contos/Sullivan]
- New Basler Opening model for South Pole [Lewis]
- South Pole Cargo Constraints [Douglas]

- South Pole Centennial [Coughran]

13:00 – 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 opened with the introduction of attendees. NSF – Dr. Scott Borg welcomed both grantees and RPSC to the SPUC 2011. He stressed the need for the grantees to step back and look at a aggregate picture of all science at South Pole when advising RPSC. SPUC recommendations may also be brought to the NSF's attention through other mechanisms such as the Office Advisory Committee (OAC).

Accomplishments for the 2010-11 season included the completion of the IceCube detector, replacement of the SPT AZ bearing and a myriad of other projects reflect a multi-user station. The ongoing work in electromagnetic interference (EMI) supervised by Al Weatherwax has shown forward progress by keeping issues active and the stakeholders informed.

Dr. Borg also noted the Ice Coring community is looking at South Pole and access to the Antarctic plateau in the future. As South Pole has shown its ability to be an effective field science hub, this trend should continue evolving into the future.

Dr. Borg mentioned the budget outlook for FY12 does not look favorable and will most likely be “flat”. He stressed the need to be successful even in if the budgets are less than flat.

Electromagnetic Interference (EMI)

The 2011 SPUC chair of the EMI Subcommittee, Dr. Al Weatherwax, noted the group has been working issues for the last 10 years regarding evaluation of transmitters which has fostered an environment of working together to solve the challenges. Dr. Vladimir Papitashvili and Dr. Weatherwax agreed that an EMI website should be setup where people can upload information regarding individual experiments concerns plus promote general discussion in other areas including wireless communication and use of alternative (wind/solar) energy systems.

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 (1 min on/1 min off) since 2006. The PI (Dr. Scott Palo) would like to begin 100% duty cycle operations. The discussion on this request is bulleted below:

- Dr.Palo's request for 100% duty cycle

- Requesting upgrade from 1 minute on, 1 minute off for 50% of the time to 1 minute on, 1 minute off 100% of the time
- Original plan – 50% for one year
 - 4 years have passed
- Current Status
 - No final resolution at last year's SPUC
 - Willing to work with other projects to coordinate going off the air for calibration requests
 - Already discussed with IceCube
- Concerns
 - IceCube: not overly concerned, although need to discuss with other IceCube personnel to verify
- Dr. Papitashvili approves 100% duty cycle
 - *Group to go ahead and recommend moving to 100%
- Interference
 - No ill effect to current instruments
 - Can't speak for new projects
 - Off periods to check for interference
 - 24 hour off period not enough time to check – Dr. Clem Pryke
 - Suggestion: 1 week in winter when transmitters are turned off so radio telescopes can check if there is an effect
 - *To be discussed in an “email EMI” group
 - See what makes sense with Palo's objectives and time frame required
 - Be flexible with week off to adapt to unpredictable events that may occur
- Will need to require that all transmitters are tied to GPS seconds to make sure they are on the same schedule.

SuperDARN:

This experiment is currently being planned for installation at South Pole in the 2011-12 field season. The present location is driven by the need to place beam pattern null over the Dark Sector and the CUSP antenna field. However, the proximity of this location to the ARO facility could present EMI issues for NOAA/ESRL instrumentation that is not in the null of SuperDARN. There should be discussions between the PIs of other experiments and SuperDARN PI Dr. Bill Bristow to alleviate these concerns. A bulleted discussion on SuperDARN follows:

- SuperDARN
 - Location: near boundary of station sector/clean air sector and quiet sector
 - Timeframe: array in place by Jan 1, cabling and turning on transmitters ~Jan 20, 2012
 - No complaints in McMurdo that SuperDARN is creating any EMI issues
 - Concerns

- Out of Band Emissions
 - RF neutrino experiments: ARA and ANITA are concerned with this
 - Groups would like to see data measurements of the out of band emissions
 - SuperDARN out of band emissions are pretty good (22KHz bandwidth)
 - Transients should be no different from one frequency to another
 - Suggestion: improve the filtering to limit out of band emissions, whether they are expected to be there or not
 - Projects need to actively track out of band emissions
 - *Dr. Weatherwax to gather input for suggestions on filtering out of band emissions
 - *Paul Sullivan to follow up with SPAWAR to find out if there is a current report on the out of band emissions
- Location
 - Jim LaBelle is concerned that large reflecting objects within 100m of his project will eliminate the null
 - ARO is cheap to move and is currently in the shadow of the proposed SuperDARN
 - Need to be as far from SuperDARN as they are from the station
 - Propose to move one antenna this coming year
 - Requires cable and GA support
 - NOAA instrumentation at ARO has EMI problems already
 - NSF Input
 - There are not a lot of options for locations; sector management issue
 - This is the best location they found
 - As it is a boundary between sectors nothing high will be built there
 - Issues do exist
 - Can consider moving other projects into Dark Sector
 - *Dr. Papitashvili requests that SPUC members provide a short paragraph on their instruments, why they are concerned, solution suggestions, and potential long term issues
 - *Dr. Weatherwax to talk with Paul Sullivan on ways to present concerns on SPUC website

*SPUC members to provide Dr. Weatherwax with information about any instruments that have experienced an increase in noise

Wireless Communications at South Pole:

Presently, the SPUC has approved the use of wireless devices only during the austral summer timeframe at South Pole. In recent years, there have been two science experiments that began using low power wireless communications devices to accomplish science goals because the distances make trenching and cabling expensive, and in some cases not possible because of other obstacles. ARO/NOAA would like to explore using newer wireless technologies year-round to assist with their stated science goals. The salient points of this discussion are captured below:

- ARA would like to explore using wireless comms in remote locations (5-6 km out)
 - 2.4 GHz, low power, directional
- Wireless Interference
 - Dr. John Kovac – experience with 2.5 and 5 GHz wireless receivers near their experiments
 - Interference exists when wireless receiver is in close proximity
 - Keep wireless out of Dark Sector
 - In support of low power wireless on station that is very controlled
- Moving Forward

SPUC members need to show that wireless is required for the science

Solar and Wind Turbines as an EMI issue at South Pole:

Both grantees and RPSC have been testing small photo-voltaic (PV) and wind turbine systems over the past several seasons. The results seem encouraging enough that further expanded use of alternative energy power sources can be viable for either grid-tied or stand alone methods. While no adverse affects have been noted by the science community to date, increasing the use of both PV and wind turbine technology at South Pole will require coordination among NSF, RPSC and the grantees. RPSC outlined the current energy systems and presented plans for future use:

- Current energy systems
 - Wind turbine
 - Location: Rodwell 3
 - *RPSC to get start date for wind turbine so that interference data from before and after can be analyzed
 - Autonomous Turbines
 - Location: Dark Sector
 - Current tests – no noise seen so far
 - No inverters or charge controllers in these turbines
 - Microturbines
 - Location: Between ARO and main station
 - No longer in operation
 - Solar PV Array
 - Location: Summer camp

- 6 inverters
- *RPSC to get start date for solar PV array so that interference data from before and after start of operation can be analyzed
- Future Systems
 - Solar PV Array (Hypertats)
 - Location: summer camp
 - 40-185 W panels
 - Dr. Kovac – no concern with this
 - Wind turbine expansion
 - Location: near Rodwell 3
 - 10 kW turbine denied
 - EMI inspection has not been done
 - Want to work with science groups to be able to move forward with alternative energy systems while keeping science projects in mind
- Information Distribution

*SPUC members recommend putting the energy system map in a communal location so science parties can see construction plans

Snow Maintenance at South Pole

RPSC/Martin Lewis presented the ongoing challenges associated with managing the drifting snow at South Pole. He mentioned there will be continued work in the Dark Sector as in the past including the planned maintenance of IceTop and the IceCube Drill camp. As in the previous seasons, the snow will be pushed downwind of the IceCube Lab (ICL) and also in the grid-west direction. Placing experiment(s) grid-west of the ICL will need to be factored in the long term snow maintenance planning for the Dark Sector.

For the station side of the skyway, most of the snow gets hauled downwind of the station and towards grid-east buffeting against the Quiet Sector. At present the groomed area of packed snow including the berms and the “edge of the world” amounts to roughly 125 acres. Snow maintenance around ARO will consist of working the downwind area as was addressed last season. RPSC would like to remove volumes of snow and ice upwind of ARO to help preserve the buildings lifespan, but this would come at a cost to the NOAA/ESRL science goals. If SuperDARN gets installed grid-east of ARO along the 110 degree Clean Air Sector boundary, this could present issues with snow maintenance around this experiment.

At the request of the NSF, RPSC surveyors produced a comprehensive contour map around the station and ancillary buildings that shows the various elevations. This information is available for any interested parties.

IT Updates

RPSC/Bill McAfee provided a status of the current South Pole Satellite Communications systems while updating the SPUC on the potential additions for the future. Highlights from the presentation are detailed below:

South Pole Satellite Communications - Status

- GOES F3 – 1.5 Mbps inbound, 1 Mbps outbound. Used for general station IP traffic (HTTP, VoIP, SSH, VPN, SFTP, etc). No changes are currently planned for the system. Satellite life expectancy projected to be reliable through 2012.
- TDRS – 5 Mbps bi-directional link used for general station IP traffic (HTTP, VoIP, SSH, VPN, SFTP, etc), and 150 Mbps unidirectional link used for bulk data transfer (SPTR). Utilizes multiple TDRS satellites with a highly dynamic schedule (changes daily). No changes are currently planned for the system.
- Iridium Multi Channel System – 22.1 Kbps (effective) link over twelve inverse-multiplexed Iridium channels is available when primary satellites (GOES and TDRS) are unavailable. Used to transfer lightweight email traffic and limited IM traffic (test phase).

South Pole Satellite Communications - Projected

- Skynet 4c “Phase 1” system is tentatively scheduled for installation at South Pole in January 2012.
- System is expected to provide a minimum of 1.5 Mbps bidirectional connectivity, and will support general station IP traffic (HTTP, VoIP, SSH, VPN, SFTP, etc).
- Skynet 4c “Phase 2” is tentatively scheduled for the 2014 season, with actual bandwidth TBD.

Power Updates

RPSC/Laura Rip gave a presentation on South Pole power projections focusing on historical power usage, limiting factors on the demand, soliciting assistance and recommendations from the grantees, and power mitigations. The salient points from that presentation are below:

Current Status:

- Three 750 kW generators
- One 239 kW peaking generator
- Two 239 kW generators for emergency power plant

Limiting Factors on Power Demand:

- Maximum Generator Power 790kW
- Capacity of Electrical Equipment 725kW
- Generator Fuel Consumption 690kW
- Peaking Generator Runtime 680kW
- Efficient Fuel Use 660kW

Assistance and recommendations from SPUC:

- Define power use. Highest accuracy possible when SIP is created.
- Monitoring power use. Meters on individual projects may be added.
- Update predicted loads often. Relay any new information to Science Support/Ops/Facilities to incorporate into projections.
- Evaluate if 24/7 power use is required.
- Heat recovery from equipment.

Mitigations

- Energy efficient measures: lighting, controls improvements, appliances, etc
- Load leveling: galley, greenhouse, garage shifts, etc
- Wind power. NREL funded 2.5kW turbine near RRW3.
- Solar power. 1kW test bed at summer camp working well. Part of original elevated station concept.
- Solar thermal heat. Testing array this summer season. Could offset electric heat in some buildings.
- Creating energy guidelines for new construction.

USAP Contract Transition Period

RPSC/Bill Coughran provided the SPUC with updates on the USAP contract transition noting the new Antarctic Support Contractor (ASC) will assume duties on April 1, 2012.

- RPSC will ensure the contract transition is smooth.
- Winter Overs will change companies on April 1, 2012.
- The focus will be continuity of science and station operations.
- New ASC representatives will be on station during the 2011-12 season.

Centennial Celebration

RPSC/Bill Coughran summarized the level of activity and number of persons South Pole may expect to see during the 2011-12 austral summer.

- Expect the number of visitors to increase between December 14, 2011 & January 17, 2012.
- ALE may set up a field camp at South Pole to support visitors.
- NSF has a task force to work with the tour operators.

South Pole Population

RPSC/Paul Sullivan provided an update on population at South Pole and touched on some of the constraints that could affect both deployment and redeployment.

Basler Opening Model for South Pole

RPSC/Martin Lewis provided the SPUC with the new model for opening South Pole station with the focus to get station infrastructure operational.

- Model for 2011-12 is changed slightly based on previous successes
- 3 flights to open station – dates Oct 17, 19, and 21, 2011
 - Intent: prepare skiway and get infrastructure up and going
 - Critical personnel only
- Supporting Science
 - First week of November, 2011 will have a slightly reduced capacity for supporting science
- Single shift for LC-130 operations for first week of November, 2011.
- Full capacity by the second week of November (Nov 7), 2011.

South Pole Cargo Constraints

RPSC/Paddy Douglas informed the meeting attendees about the potential impacts to the USAP cargo system.

- Flight dates may be delayed by earthquakes in Christchurch and the limited facilities there.
- IceCube retro
 - Hope to have a 3rd shift dedicated to this effort.
 - As much as 1.2 million lbs of retro.

Working Group Suggestion & Future of the SPUC

During the EMI discussion, it was noted that a website could be set up to assist stakeholders by providing a common site where users can upload/download information relevant to their specific issues. Power and Bandwidth may not need such a tool, but it was noted a method to actively manage the EMI information is needed for the NSF, grantees and RPSC. It was also noted that it may be beneficial to start having discussions pertaining to sector management and project locations, especially in light of the current concerns regarding the location of SuperDARN.

Recommendations generated from meeting*:

1. Dr. Palo's group to go ahead and prepare a recommendation to move to 100% duty cycle.
2. Discuss turning transmitters off for a week during the winter to look for interference.
3. Dr. Weatherwax to gather input for suggestions on filtering out of band emissions.
4. Paul Sullivan to follow up with SPAWAR to find out if there is a current report on the out of band emissions.
5. SPUC members to provide Dr. Weatherwax with a short paragraph on their instruments, why they are concerned, solution suggestions, and potential long term issues. Dr. Weatherwax will turn the report in to Dr. Papitashvili.
6. Dr. Weatherwax to talk with Paul Sullivan on ways to present SuperDARN concerns on the SPUC website.
7. SPUC members to provide Dr. Weatherwax with information about any instruments that have experienced an increase in noise.

8. RPSC to provide SPUC members with the dates the wind turbines and the solar PV array came online so that interference data from before and after installation can be analyzed.
9. RPSC to work with Dr. Weatherwax to put the energy system map in a communal location so that grantees can see planned construction operations.
10. Dr. John Kovac to head up a working group/forum to discuss data bandwidth compression.
11. Dr. Weatherwax to look into setting up a website that allows people to share information.