

Notes from the SCAR SSG for Physical Sciences and Expert Group on Operational Meteorology in Antarctica meetings

These notes cover several sessions and are my own interpretation of what was said. They are provided for information and do not represent the formal proceedings of the meeting. Some remarks are recorded as presented without further comment, others have additional comment from me, particularly in response to points raised during the week. The paragraphs are in no particular order.

Concern was expressed over the duplication of observing stations on King George Island. In addition to those normally listed there is also Flagstaff Hill (89250). The two GSN stations are important, but others are less so, and it would be more scientifically useful if the money could be spent on sondes for Bellingshausen [or Ferraz, not sure if they use AIR or Vaisala sondes?]. To retain national ownership it might be possible to identify that sondes launched on Monday are from country A, those on Tuesday from country B etc. It appears that Brazil operates an ozone-sonde programme from Ferraz, however the TEMP part of the flight is not transmitted on the GTS, perhaps because the station does not have a WMO number. It was suggested that it would be helpful to debate the KGI issue further at the WMO EC-WGAM.

There was a suggestion that it would be scientifically useful to have special observing periods during the IPY when a full programme (ie two per day) of radiosonde flights would be flown.

It was suggested that temporary stations should use MOBIL code, rather than having an assigned WMO number. It is intended to do this for Wisconsin stations not having a WMO number. The WMO should not issue a number to a proposed station within 50 km of an established station unless a good scientific justification can be provided [perhaps endorsed by SCAR?]. This raises the question as to whether Ferraz should have a number or use the MOBIL code forms.

It may be better to have an optimal long-term network than many stations with fragmentary short term records.

The Chinese have set up AWS on the traverse to Dome A, named DT008, DT217, DT401 and Dome A.

A question was raised on whether there is a risk from tsunami at coastal stations and how tsunami warnings could be issued to stations and field parties. [One explanation for the disappearance of an early summer only station on the Argentine Islands was that it was washed away by a tsunami during the winter]. Tsunami warnings are available on the GTS and could perhaps be relayed to Antarctic stations. It may be a matter to refer to COMNAP.

Australia is investigating the use of AMDAR on its aircraft, however this is an expensive option. BAS uses manual coding of observations relayed by the pilots.

There is a long term climatological record from Scott Base since 1957, however this isn't currently a GCOS station. Data up to 2002 is on the SCAR READER database. I have asked GCOS to include it, as it provides valuable comparison with McMurdo.

A comment from after the meeting – monthly CLIMAT values should be computed as the mean of the four main observation hours in polar regions. Tests during the preparation of the READER database show variations of up to 4° in temperature using other techniques (eg mean of max & min) as there is little diurnal variation.

It was thought useful for the WMO to invite representatives from ECMWF and NCAR to the forthcoming EC-WGAM. This meeting will also need to discuss if systems are in place for routing MOBIL observations.

McMurdo has an X-band satellite data reception system and Casey will have one operating by 2008. The McMurdo system provides motion vectors, albedo etc and the data is being archived by the National Science Foundation contractor for the AARC/Scripps group – Dan Lubin is PI. Other data that should be included within Compass include stratospheric aerosol, etc. IPAB will archive buoy data. Aspect will archive sea-ice data.

The Network for Detection of Stratospheric Change has recently been renamed the Network for Detection of Atmospheric Composition Change. Contacts are Dr. Michael J. Kurylo and Dr. Geir O. Braathen. Antarctic stations listed for the network are South Pole, Arrival Heights, Dumont d'Urville, McMurdo, Scott Base and Concordia. The web page (under the old title) is at <http://www.ndacc.org/>

In order to cut down the amount of forecast data transmitted to the Antarctic the Australians have a system to cut down their model output to just the region of interest.

Setting up an action group to produce a brochure similar to the Arctic Observations Network one was suggested, however this is actually a lengthy document of 116 pages. The group could consider what the optimum scale length for the surface, upper-air and ozone observing network is based on scientific analysis. Information on where the optimum location for AWS would also be useful. GCOS has already selected the climate observing stations. Other components of the network include sea-ice, XBT/CTD, buoys, ionosphere, magnetic, glacio/chemistry etc. An expert group was set up to characterize the observing system for all physical sciences interests across Antarctica (eg observational meteorology, sea-ice, XBT, buoys, ionosphere, magnetics etc), with a particular remit to characterize the optimum scale length for observatories in each component. It would also look at deficiencies and where there was over provision and perhaps identify optimum locations for new AWS. Another aspect would be the creation of a virtual observatory where the ICESTAR group had set up a draft at <http://antarcticdata.net>. The draft proposal is given at the end of the document.

Christian Haas gave a report on IPAB. Ideally the network should have a 500km grid for buoys, however this is currently not met. There is currently no supervision that buoy data gets onto the GTS, however IPAB will do this in future. Most buoys are deployed in the Weddell or Ross Seas. Data is used to calibrate satellite drift measurements. Several groups (Australia, Germany, US, South Africa, New Zealand, Japan and China) have plans to release buoys for IPAB in IPY. The network is difficult to maintain because of seasonality of releases. It would be useful to have a listing of ship intentions in a single place. Germany has three buoys for deployment next season. There is a managed New Zealand fishing fleet in the Ross Sea, which perhaps could deploy buoys or report met obs.

The Polarview portal <http://www.polarview.org/services/regions.htm#antarctic> provides information on several aspects of Antarctic data and was thought to get data from the GTS.

Patriot Hills conducts weather observations in support of air operations. If issued with a WMO station number they would upgrade the facility and transmit observations to the GTS. The operation is run by a NGO, so the next EC-WGAM should make a request on their behalf. The USA is also considering plans to install an AWS at Patriot Hills.

The South African station SANAE has resumed visual observations, however it is listed as an AWS in WMO No 9 Vol A.

Argentina has expressed formal concern over Argo drifters entering their EEZ without appropriate notification. This raises similar issues for drifting buoys etc. Radio-sondes are not a concern, because the atmosphere is not regarded as a resource.

Iridium data relay for Argo floaters is being developed and this may be applicable to other applications, although currently only short burst data at 256 bytes can be used. Iridium is also considering a GTS insertion service similar to Argos. See <http://www.nalresearch.com/StandardModems.html> for details of the 9601-DG modem.

The IPY web page will be publishing a picture of the day. It should be a good opportunity to submit images of meteorological phenomena to gain wider publicity with the public.

Several resolutions were prepared for the SSG plenary meeting and accepted. These will go forward as formal recommendations to SCAR or COMNAP, or be incorporated into the SSG report as appropriate. Remarks in [...] are for additional amplification.

1. SCAR web sites should use the .aq domain if possible.
2. Could SCAR request the Australian BoM to put meteograms for Antarctic and sub-Antarctic stations in the public domain. [BoM willing but needs a formal request]
3. In order to facilitate real-time weather forecast information in support of IPY field programmes, the group suggested that SCAR should endorse setting up a server

- for holding current forecast model output data covering 40° S to the pole from centres such as ECMWF, NCAR, BoM, UKMO etc for IPY, accessible by authorized users. This would create a legacy to allow all Antarctic users access to real-time weather forecast information.
4. The group suggested that certain selected research ships could be equipped with enhanced instrumentation for IPY to assist with parameterization of certain NWP components. For example, boundary layer fluxes are of great importance in coupled ocean-atmosphere-cryosphere models. Suitable measurements are too demanding for the typical Voluntary Observing Ship but an extra effort by research vessels during IPY would greatly assist modellers. [To go in SSG report.]
 5. The group recommended that the SCAR READER database should be extended to cover the sub-Antarctic islands. Such a development would be of benefit to oceanographers and biologists in addition to the meteorological community. [several already are, to go in SSG report]
 6. In order to help planning of instrument deployment opportunities the group requested COMNAP to construct a web page listing intended ship movements. This would also assist greatly with search and rescue planning.
 7. The group noted that it would be important for traverse parties to report meteorological observations in real-time using the WMO MOBIL code.
 8. The group noted that the sonde station at Marambio was currently unable to meet its GUAN commitments. It also noted that the long term upper air programmes at Vostok and Bellingshausen had been suspended. It asked SCAR to request the IPY Office to make efforts to secure consumables to allow a full GUAN programme to continue during the IPY. [IPY Office willing to do so. The APICT group (ionosphere) were also concerned about the cessation of the sonde programmes of Antarctic Peninsula stations and proposed a parallel recommendation urging funding agencies to support such programmes – this is given below, along with the other recommendations as they went forward to SCAR].
 9. Real-time surface meteorological observations from both land and sea remain critical in providing accurate weather forecasts. Such observations are also vital for many science programmes and are the key data for studies of climate change. The SCAR PS SSG recommends that:
 - a) All research and supply ships operating in Antarctic waters should contribute real-time meteorological observations to the WMO GTS.
 - b) Climatic data from land stations should be submitted to GCOS via the WMO GTS shortly after the end of each month. [This is potentially important if for example temperature records are set]

Recommendation SSG/PS – 3 upper air and ionospheric observations along the Antarctic Peninsula

The Antarctic Peninsula is a unique topographic feature in Antarctica which may significantly interact with the tropospheric flow and thus may be a source of atmospheric gravity waves which can propagate to ionospheric heights. In view of the relevance of

such investigations, it is requested that SCAR recommend that upper air and ionospheric observations along the Antarctic Peninsula should be continued on a regular basis at least till the end of the IPY. Countries currently supporting these observations should be encouraged to provide further funding to secure the continuation of these observations. Countries not participating in the observations should consider the possibility of providing financial support.

Recommendation SSG/PS – 5 Sea ice observations

The Antarctic Sea Ice and Climate Program has developed a protocol for making standardised and quantified observations of sea ice properties from vessels operating in the Antarctic pack ice zone. The ASPECT data archive now comprises 83 voyages of data that provide an extremely valuable resource to the climate and modelling communities. The SSG/PS recommends that COMNAP urges national programmes to contribute sea ice observations made from their icebreaking research and supply vessels. This may include training of ship officers to conduct observations.

Recommendation SSG/PS – 6 Drifting buoys

As part of the plan for increased observations in the sea ice zone for IPY, SCAR encourages delegates to commit financing for one or more data buoys to be deployed by the logistic resources which is being coordinated by the International Programme for Antarctic Buoys.

Recommendation SSG/PS – 7 Meteorological observations for weather forecasting and the IPY

Real-time surface meteorological observations from both land and sea remain critical in providing accurate weather forecasts. Such observations are also vital for many science programmes and are the key data for studies of climate change. SCAR recommends that:

- a) All research and supply ships operating in Antarctic waters and traverse parties (using the MOBIL code) should contribute real-time meteorological observations to the WMO GTS.
- b) Climatic data from land stations should be submitted to GCOS via the WMO GTS shortly after the end of each month.
- c) In order to help planning of instrument deployment opportunities the group requested COMNAP to construct a web page listing intended ship movements.
- d) meteograms for Antarctic and sub-Antarctic stations should be put in the public domain.

For information the SCAR Expert Group web page on Operational Meteorology in Antarctica is currently at http://www.antarctica.ac.uk/met/jds/met/SCAR_oma.htm

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SCAR XXIX, Hobart, Tasmania

Pan-Antarctic Observations Network (PAntOS)

A Proposal for a Multidisciplinary Action Group of the Standing Scientific Group on Physical Sciences (SSG/PS)

Antarctica is a region with a very limited record of in-situ observations – with low spatial coverage and only about half a century of regular observations. Although climate changes across the Antarctic continent and Southern Ocean are not yet as pronounced as are currently seen in the Arctic, expected environmental changes in the Antarctic might be abrupt and pose specific concerns such as a high risk of rapid sea level rise due to melting and destruction of the West Antarctic ice sheet. Connecting solar-terrestrial (geospace) physical processes to the Antarctic atmosphere dynamics may help in identifying triggering mechanisms for environmental change in the snow and ice cover and Antarctic ice sheets dynamics.

These make compelling arguments for the reanalysis of the existing Antarctic observation infrastructure and recommending improvements that will help deliver a coherent set of pan-Antarctic, long-term, and multidisciplinary observations focused on the entire chain of effects from geospace to the Earth's surface. It is impossible to describe current environmental conditions in the Antarctic without these interconnected observations, let alone understanding some of the climatic changes that are underway around the Antarctic Peninsula and their connections to the rest of the Earth climate system.

The proposed multidisciplinary Action Group on the Pan-Antarctic Observations Network (PAntOS) will focus first on the composition and potentials of the existing observing networks in various scientific disciplines covered by the SSG/PS objectives. The main goal of the proposed Action Group is to address the scope and implementation strategies for the follow-on development of the interdisciplinary Pan-Antarctic Observations Network encompassing the Antarctic Continent and (maybe) Southern Ocean. The optimum network scale for each element of the observing system will be investigated. This system of observing networks will focus on the measurement of conditions and detection of fundamental variations of physical parameters in the Antarctic system, providing data that are easily compared and analyzed via cyberspace-based tools (e.g., virtual observatories). This network can serve both scientific and operational needs.

So that the network can be built on and enhance existing national and international observing efforts for delivery of easily accessible and reliable pan-Antarctic observations. The PAntOS Action Group will:

- 2007 Deliver a comprehensive analysis of the existing Antarctic observations networks with an initial assessment of where deficiencies or over-provision exist, and recommend protocols for including data in a virtual Antarctic observatory;
- 2008 Provide recommendations to improve and enhance existing systems for the forming of the interconnected multidisciplinary Antarctic observing network.

Interim Leaders (an initiative group):

Vladimir Papitashvili (USA; solar-terrestrial sciences)

Jonathan Shanklin (UK; meteorology)

David Bromwich (USA; atmosphere)

Paul Mayewski (USA; snow and ice)

Berry Lyons (USA; oceanography)

Victoria Lyttle (Norway; permafrost)

Scott Palo (USA; aeronomy)