



EXCOM/COs Meeting 2011
Edinburgh, 16,18,19th July 2011

Agenda Item: 2.3.3
Person Responsible: T Yamanouchi

Report of SSG Physical Sciences

Executive Summary

Title: SCAR Standing Scientific Group on Physical Sciences (SSG/PS), Report to the Executive Committee, SCAR EXCOM 2011, 18 July 2011

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Relevant URLs or references to other reports:

Antarctica and the Global Climate System (AGCS) (WP12)

Astronomy and Astrophysics from Antarctica (AAA) (WP14)

Past and Future Change of the Antarctic Environment (PACE) (WP17)

Important Issues or Factors: (what do EXCOM need to be aware of)

One of the current SRPs, AGCS is coming to its final stage and seeking a transition to a new program planning group, PACE. ICESTAR, after achieving the major objectives, terminated as an SRP at the SCAR XXXI, and reformed as a new Expert Group. The AAA started as a new SRP from SCAR XXXI. New Action Groups were started. Antarctic Clouds and Aerosols Action Group (ACA) started its activities, and is hoped to hold the first meeting during IUGG 2011 in Melbourne this summer. SCAR Ocean Acidification Action Group (SO Acid) was approved at SCAR XXXI, and an initial core membership was proposed.

There have been some discussions about where IPICS (International Partnership in Ice Core Sciences) Expert Group belonged - it is currently under PS, but since it is related to the work of ACE there are obvious connections to GS. Co-sponsorship of IPICS by GS as well as PS could be discussed at a later date depending on how future interactions with IPICS proceed.

Proposal came up seeking the SCAR endorsement to transform the GWSWF Action Group into an Expert Group with revised Terms of Reference (ToRs). However, discussion arose that the new ToRs overlapped with those of the ICESTAR Expert Group and that the two groups should discuss the best way forward. One idea is to merge both the group into a single Expert Group.

SCAR Standing Scientific Group on Physical Sciences (SSG/PS)

Report to the Executive Committee, SCAR EXCOM 2011, 18 July 2011

Summary of new achievements within SSG/PS:

One of the current SRPs, AGCS is coming to its final stage and seeking a transition to a new program planning group, PACE. For the future updates of the ACCE Report, the most essential publications in the recent, Expert Group on ACCE has been formed and the group was involved in the preparation of a brief summary of recent advances in understanding Antarctic climate change and its impact for the 2011 Antarctic Treaty Meeting. ICESTAR, after achieving the major objectives, terminated as an SRP at the SCAR XXXI, and reformed as a new Expert Group. The AAA started as a new SRP from SCAR XXXI.

New Action Groups were started. Antarctic Clouds and Aerosols Action Group (ACA) started its activities with the lead of Tom Lachlan-Cope, and it is hoped to hold the first meeting during IUGG 2011 in Melbourne this summer. SCAR Ocean Acidification Action Group (SO Acid) was approved at SCAR XXXI, and an initial core membership was proposed with the lead by Richard Bellerby.

There have apparently been some previous discussions about where IPICS (International Partnership in Ice Core Sciences) Expert Group belonged - it is currently under PS, but since it is related to the work of ACE there are obvious connections to GS. The cryosphere sciences are of course generally one of those areas that are of interest to both PS and GS, and it might be an idea for IPICS to be a joint PS/GS activity. It was agreed on the Cross Linkages WS that a higher priority was to ensure that linkages were improved between SCAR as a whole and IPICS. If necessary co-sponsorship of IPICS by GS as well as PS could be discussed at a later date depending on how future interactions with IPICS proceed.

During the II GWSWF in Modena, April 2011, the meeting was dedicated to the discussions addressed to the formulation of a proposal seeking the SCAR endorsement to transform the AG into an Expert Group with revised Terms of Reference (ToRs). However, discussion arose during the Cross Linkages WS that the new ToRs overlapped with those of the ICESTAR Expert Group and that the two groups should discuss the best way forward. One idea is to merge both the group into a single Expert Group.

WMO Executive Council Panel of Experts on Polar Observations, Research and Services (EC-PORS) in order to support and strengthen WMO's Activities in the Polar Regions, is seeking to have a good communications and cooperation with a wide range of organizations including SCAR. One of those possibilities is proposed decadal initiative to develop an operational Global Integrated Polar Prediction System (GIPPS), and another is the proposed International Polar Decade (IPD). It is recommended to have a discussion for the future direction of SCAR in this EXCOM and in OpMet EG.

Reports and highlights of Program Planning Group, Expert Groups and Action Groups under SSG/PS

Past and Future Change of the Antarctic Environment (PACE):

At SCAR XXXI in Buenos Aires, Argentina in July 2010 the SCAR Delegates approved the creation of a new Programme Planning Group (PPG) on Past and Future Change of the Antarctic Environment (PACE). This programme is seen as a successor to the Antarctica and the Global Climate System (AGCS) Scientific Research Programme that has been in existence since 2004.

Operational Meteorology Expert Group (OpMet):

The Expert Group on Operational Meteorology in the Antarctic provides a point of contact between many groups undertaking meteorological work in the Antarctic. The group's web pages provide news and information about Antarctic meteorological activities. Two Google Earth plugins have been created, one to access the archived meteorological data that is held at the British Antarctic Survey (BAS) which includes data from most of the manned stations and from most of the automatic weather stations. The second one

gives access to the real-time meteorological data that are received at BAS. The expert group is looking into how precipitation measurements are currently made in Antarctica and evaluating the new optical precipitation measuring devices that are now available.

Oceanography Expert Group (Oceans):

The major focus of the SCAR/SCOR Oceanography Expert Group has continued to be the Southern Ocean Observing System (SOOS). After a period of community consultation and specifically commissioned reviews, the SOOS plan has been finalised. The final design plan is currently being formatted (as of May 2011) and will be made available both online and as hard copies.

In order to aid implementation of the SOOS an International Project Office (IPO) is being established in Australia, supported by the new Institute for Marine and Antarctic Studies at the University of Tasmania in Hobart. The SOOS IPO will be co-located with Australia's Integrated Marine Observing System (IMOS). An Executive Officer has been appointed and will commence in August 2011.

The SCAR/SCOR Expert Group on Oceanography will act as a Scientific Steering Committee for SOOS. John Gunn was appointed as Co-Chair with Mike Meredith. The intention is now to review and revise membership during 2011 to enable the group to fulfil its remit, in particular by promoting the implementation of SOOS in the first instance.

International Partnership in Ice Coring Science (IPICS):

Much of the focus for IPICS in 2010 has been in Greenland with the completion to bedrock of the NEEM ice core drilling. In Antarctica, the US WAIS Divide drilling has also reached its target depth of 3330 m, and should soon be providing exciting new results about West Antarctic climate in the last glacial period (contributing to the IPICS-40k priority project). Considerable progress has been made in setting up a PAGES Antarctic-2K group, led by Tas van Ommen, and dedicated to synthesising the climate of Antarctica over the last 2000 years; this group is based on the IPICS-2k task. This new group will hold a workshop in Bern in July (associated with the INQUA meeting) to start to assemble data towards a product.. Planning is now well underway for the IPICS Open Science Conference, which is to be held in Giens, France, October 1-5, 2012, with Jerome Chappellaz as chair of the organising committee.

Environmental Contamination in Antarctica (ECA)

More than fifty scientists are involved in the group.

The 3rd ECA meeting was held at the XXXII SCAR conference in Buenos Aires, the meeting was extended to scientists related to the biological aspects of Environmental contamination; in order to better integrate competence from SSG-PS and from SSG-LS. During the meeting was given a presentation the group activities. It was presented the reports already prepared or in preparation using the data set until now collected on organic and inorganic pollutants. At the end of the meeting was decided to continue its action as programmed by involvement of scientists from the SSG-LS in the steering committee.

The group recommends:

1. extending such studies to emerging contaminants in relation to the potential for change in diffusion and transport with climate change.
2. establishment of an internationally coordinated Antarctic Monitoring and Assessment Programme considering the biological aspects of environmental contamination.
3. making an inventory of all Antarctic Environmental Specimen Banks (AESBs), and setting up a suitable information system, including the availability of sample aliquots.
4. Efforts should be done to better recognize and separate local sources (bases, aircrafts, ships, traverses) from global contaminant signatures by identifying proxies of the potential sources. In this activity, the national responsible for the application of the Madrid Protocol should be involved..
5. The use of snow cores as archive samples recording input of pollutants to the region still needs to be assessed. The combination with data available for Antarctic air and snow, can give a significant contribution to learn more about the transport and cycling of contaminants in the Antarctic environment.
6. There are evidences that warming may remobilize contaminants buried or immobilized in soils by the permafrost producing a potential effect on the biota. Ad hoc studies should be carried out to consider this input in models.

The GPS for Weather and Space Weather Forecast (GWSWF):

The GPS for Weather and Space Weather Forecast (GWSWF), a joint Geoscience and Physical Sciences Action Group, aims to establish a suitable GNSS receivers network over the Arctic and Antarctica with the scope to develop a 3D image of the upper atmosphere as well as to develop algorithms for water vapor retrieval over Antarctica. Such a network is intended to use the existing GNSS standard receivers managed by the POLENET community, and GNSS receivers appropriately configured to observe the ionosphere under quiet and stormy conditions. During 2010 several goals have been successfully reached: an enlargement of the GPS bi-polar network for investigating the ionospheric irregularities and scintillations, publications co-authored by different institutions, presentations on multi-instrument inter-hemispheric scintillation studies, on the mitigation of ionospheric effects on GPS positioning over Antarctica and on the water vapour retrieval using GPS over Antarctica. The GWSWF web has been developed and is now accessible at “<http://www.gswsf.scar.org>” with the scope of results dissemination, data and software facilities sharing, attraction of new collaborations with other groups and institutions. Moreover closer interaction with SCADM will be sought regarding metadata standards, quality control standards & data formats for ionospheric scintillation. A GWSWF business meeting has been held during the SCAR OSC 2010 in Buenos Aires attended by 16 people from 7 Countries. The II GWSWF meeting will be held in Modena (Italy) 11-12 April 2011, to discuss the objectives in the perspective of the next SCAR OSC and Business Meetings in Portland (USA), 2012.

The II GWSWF meeting has been held in MODENA on April 11-12, 2011.

Detailed minutes, agenda, list of attendees and presentations can be found at: www.gswsf.scar.org. The first day of the meeting was devoted to recall the main achievements of the GWSWF AG in the period 2008-2010 and to update the principal activities and collaborations of the AG participants. During the second day the meeting was dedicated to the discussions addressed to the formulation of a proposal seeking the SCAR endorsement to transform the AG into an Expert Group (EG, 4 years duration project). Although some of the GWSWF participants were in favor of proposing to transform the current AG into a Scientific Research Project (SRP), the majority was in favor of an EG claiming that the GWSWF has surely demonstrated its potentialities through collaborations and joint activities but it doesn't yet reach the needed critical mass and the scientific extent to support the proposal of a SRP. After a brief discussion on this everybody agree to proceed for an EG proposal. A drafted implementation plan was the core of the debate to get ready to submit a first intention to the next SCAR Cross-Linkages meeting (5-6 May 2011, Ottawa, Canada).

The GWSWF agreed to propose an EG with the following **main objectives**:

- Create and maintain distributed networks of specialized GPS/GNSS Ionospheric Scintillation and TEC Monitors particularly at high latitudes.
- Identify and quantify mechanisms that cause scintillation and control interhemispheric differences, asymmetries and commonalities in scintillation occurrence and intensity as a result of the geospace environment conditions.
- Develop ionospheric scintillation climatology, tracking and mitigation models to improve prediction capabilities of space weather.
- Retrieve tropospheric PWV for input to weather forecast models and to develop regional PWV climatology for atmospheric sensing in remote areas.

Polar Atmospheric Chemistry at the Tropopause (PACT):

The initial version of the PACT database has been finalised, and currently includes ozonesonde data obtained by the Australian Antarctic program. These data will shortly be released through the PACT website (<http://data.aad.gov.au/aadc/pact/>). A paper is in preparation on initial results, and the early data are being used in chemistry transport validation for the Australian Community Climate and Earth System Simulator (ACCESS). Addition of data from several other Antarctic sites to the PACT database is underway.

Prediction of Changes in the Physical and Biological Environments of the Antarctic (PCPBEA)

The cross-SSG Action Group on Prediction of Changes in the Physical and Biological Environments of the Antarctic was established at the SCAR Delegates' meeting in Moscow during July 2008. It's brief is to improve our ability to predict how the Antarctic environment will evolve over the next century. It is a cross-disciplinary group that brings together meteorologists, oceanographers and marine and terrestrial biologists. It has an initial 4 year lifetime.

The group held its third meeting at SCAR XXXI in Buenos Aires, Argentina. Tom Bracegirdle gave a presentation on the upcoming IPCC Fifth Assessment report, which is scheduled for completion in 2013. The climate model data are now being made available for analysis and Tom showed current preparations for analysing the model projections of polar climate. John Turner introduced the SCAR Antarctic Data Atlas (http://www.antarctica.ac.uk/met/SCAR_ssg_ps/Atlas/index.html). The rationale for this project is to present existing datasets in a way that can be easily accessed by the wider SCAR community. Initially the scope is atmosphere and ocean climate parameters, however extensions to this were discussed.

Antarctic Cloud and Aerosol Working Group (ACA)

This group was recently formed as the result of the International Antarctic Cloud Workshop held in Madison (with some help from SCAR funds) in association with the 5th Antarctic Meteorological Observation, Modelling, & Forecasting Workshop. As a result of the workshop David Bromwich is leading the writing of a review paper on Antarctic Clouds that should be published sometime later this year. The long term object of the group is to plan an International campaign to observe clouds in Antarctic and it is hoped to hold the first meeting during IUGG in Melbourne this summer.

Ocean Acidification Action Group (SO Acid):

Richard Bellerby has come up with an initial core membership for the Ocean Acidification Action Group, consisting of the below five confirmed names plus one unconfirmed. As the COs of Life and Physical sciences please let me have any comments or observations by the end of next week. He seems to be getting good geographical balance (Norway, France, US, Australia and Japan confirmed) and gender balance (three female, two male confirmed).

Name of members, confirmed: Richard Bellerby, Uni Research, University of Bergen, Norway (Chair); Claire Lo Monaco, IPSL, Paris, France; Nikki Lovenduski, University of Colorado, Boulder, USA; Ben McNeil, Climate Change Research Centre, University of New South Wales, Australia; Kurihara Haruko, University of the Ryukyus, Okinawa, JAPAN; Philip Tortell (pending confirmation – on sabbatical) – NZ; Also need soon to find a benthic expert. A talk will be given in May to EPOCA as for the Action group. The processes will follow the Southern Ocean expert panel's approach and the membership will evolve as gaps and/or necessary experts identified.