



**WP** **09**  
Agenda Item: 4.2  
Person Responsible: B Lyons

**EXCOM 2015**

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# **SSG GEOSCIENCES**



## Executive Summary

**Title:** SSG Geosciences

**Authors:** W. Berry Lyons (Chief Officer), Jesús Galindo-Zaldivar (Deputy Chief Officer), Naresh C. Pant (Secretary). Contributions of Chief Officers of Expert Groups, Action Groups and other activities.

**Introduction/ Background:** SSG- Geosciences is responsible for 6 Expert Groups (ADMAP, ANTPAS, ANTVOLC, GIANT, GRAPE and IBCSO) and 2 Action Groups (CGG and GeoMap). In addition there is a proposal for the final approval of Action Group on Geological Heritage and Geo-conservation. The SSG-Geosciences is also related to the activities of PAIS and SERCE Scientific Research Programmes. These groups share their activities with other groups of SSG-PS and SSG-LS. During the XXXIII Biennial Meetings (Auckland, 2014) the Antarctic Volcanism (ANTVOLC) Expert Group was approved. This group is focused on the study on different subjects related to the volcanic features and activity in Antarctica, including the advice for volcanic crisis. Besides this in 2014 the SSG GeoMAP Action Group was also approved. This AG promotes the compilation and integration of geological mapping and surficial features in Antarctica. In 2015, the XII International Symposium on Antarctic Earth Sciences (ISAES) was held in Goa (India), with an attendance of more than 400 scientists of 27 countries. This symposium has provided an opportunity of sharing and discussion of the geological knowledge on key issues in Antarctica and promoted the meeting of different groups.

**Important Issues or Factors:** The new groups ANTVOLC and GeoMap are progressing and started their different activities. The proposal on the Action Group on Geological Heritage and Geo-conservation is completed and presented to be approved by the ExCom. The SSG-Geosciences recognize the success of the ISAES 2015, and congratulates the organizing committee.

**Recommendations/Actions and Justification:** SSG-Geosciences support the final approval by the ExCom of Action Group on Geological Heritage and Geo-conservation. No additional recommendations or actions have been received from Expert and Action Groups.

**Expected Benefits/Outcomes:** All the groups continue adequately their activities improving the integration of Antarctic researches and the scientific results in their fields. It is remarkable that the new compilation of magnetic anomalies ADMAP 2 is nearly ready and also other SCAR products like the high-resolution bathymetry map in the Drake Passage is also likely to be released soon.

**Partners:** IAVCEI - International Association of Volcanology and Chemistry of the Earth's Interior.

**Budget Implications:** ANTPAS has requested additional funds. No additional funding has been requested by other groups.

## SSG GEOSCIENCES

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### 2. Major Future Initiatives and Actions

#### **APPROVAL OF ACTION GROUP ON GEOLOGICAL HERITAGE AND GEO-CONSERVATION**

In order to approve the Action Group on Geological Heritage and Geo-conservation, the SSG- Geosciences was requested by the SCAR Delegates during the XXXIII Biennial Meetings (Auckland, 2014) to fulfil all the requirements on Terms of Reference, Chair persons and membership. After internal discussion of the proponents, these issues have been solved and we present now this group to be finally approved by the SCAR ExCom. We present this group for the final approval in a separate document.

#### **ADMAR (EG)**

This group should continue over the next years since it can be expected that numerous new aeromagnetic and marine magnetic data will be acquired (or have already been acquired, but were not yet ready for release in ADMAR2). Though it is not planned to aim for another map production in the near future it is envisaged that

the data base will continue to grow and it needs a coordinate effort through the international community to establish the data base as a tool for all Antarctic researchers, to keep it alive and further develop it. This will be the major task over the next years and there is no better way to than to continue with the expertise of this "Expert" group.

### **ANTPAS (EG)**

In 2016 ANTPAS plans to develop its new strategical plan, to be developed in two main meetings: a full-day workshop to be held at the International Conference on Permafrost in Potsdam (Germany, 20-24 June 2016) and a further workshop to be held at the SCAR Open Science Conference in Kuala Lumpur (20-30 August 2016). Specific sessions have been submitted to both conferences to be organized by ANTPAS.

### **ANTVOLC (EG)**

ANTVOLC's future initiatives include: 1) Setting up an AntVolc website or a data/information repository. 2) Possibility of proposing an AntVolc session at the next EGU (deadline for proposals: September 2015) and/or for the SCAR Open Science Conference in Kuala Lumpur 2016 (this has already been flagged with SCAR and accepted, but details of the session are needed). 3) Explore the feasibility of a Joint group with IAVCEI. We will start in September 2015 the discussion with the new President (Don Dingwell) and Secretary (Roberto Sulpizio). 4) Write a white paper, to be presented at the SCAR Open Science Conference in 2016, in which overarching and discipline specific key topics for future Antarctic volcanology are discussed. 5) A new organisational structure and a steering committee will be proposed by November 2015 (i.e. ahead of the new Antarctic field season).

### **GEOMAP (AG)**

GeoMAP action will develop continent-wide datasets that are a fundamental description of the geosphere – which provide underpinning information to constrain biological and ecological research, help locate geoindicators of climate change, and help constrain the scale of Antarctica's influence on global climate and its potential contribution to future sea level rise.

### **GIANT (EG)**

It is planned a training school in collaboration with SERCE SCAR SRP: POLNET/SERCE Glacial Isostatic Adjustment (GIA) Training School , 13 -19 September 2015, Lake Erie, Ohio, USA.

Within GIANT activities we have an Action to do from the SCAR Delegates meeting that came from SSG-GS for: "SCAR President to send a letter of support for the UN GGIM (Global Geospatial Information Management) resolution and shall be involved in UN GGRF (Global Geodetic Reference Frame) WG activities". Unfortunately we have to inform that it was not possible to realize the action for the reason that the chairman, Alessandro Capra (ITA), verify with the UN GGM chair, Gary Johnstone (AUS), that only singular Nations should be officially included in the list of participants, therefore any scientific body or association, like SCAR, could not be invited directly but the single countries could do.

We apologize but for this reason I did not ask to our SCAR president to write the letter to UN and, for the moment, we have to renounce to this action.

### **IBCSO (EG)**

A joint Arctic-Antarctic Seafloor Mapping Meeting is planned to be held most probably in Monaco, May-June 2016. The aim is to get most members of the IBCSO Editorial Board together to exchange additional bathymetric data in preparation of a 2<sup>nd</sup> Version of IBCSO. This Version 2.0 is planned with an increased extent up to 50°S.

### **Bathymetric Map of the Drake Passage**

This is a compilation of the available bathymetric data of different countries (UK, Spain, Korea, USA, and others) that is being published in the GEOMAP series of BAS (UK) as an SCAR product.

### 3. Major Activities and Significant Progress

#### XII International Symposium on Antarctic Earth Sciences

The ISAES 2015 ([www.isaes2015goa.in](http://www.isaes2015goa.in)) was held at Marriott Spa and Resort, Goa, India from 13-17<sup>th</sup> July 2015. The five-day symposium was kick started by an Ice-breaker event on 12<sup>th</sup> July 2015. National Centre for Antarctic and Ocean Research, Goa hosted the symposium.

The plenary speakers included Lonnie G. Thompson, Byrd Polar and Climate Research Center, OSU, USA, Paul Upchurch, University College London, London, Terry Wilson, OSU, USA, Martin Siegert, Imperial College, London, Ross Powell, USA, Ian Dalziel, UT at Austin, USA, Shailesh Nayak, MOES, India, SWA Naqvi, NIO, India, Jeronimo Lopez-Martinez, University of Madrid, Spain, Anil Kulkarni, IISc Bangalore, India and Chris Carson, Geoscience Australia, Australia. Dedicated poster session of one and a half hour for the first four days was part of the symposium.

A total of 32 sessions on each facet of polar earth sciences constituted the subject matter of the oral and poster presentations. The sessions titles such as Geochronology of Antarctic orogens, Exploring unknown Antarctica, Interactions between cryosphere, atmosphere and oceans in coastal Antarctica, Key drivers of Antarctic biodiversity through Cenozoic, Structure and evolution of the Antarctic continent in light of recent geophysical and geological investigations, The Rodinian orogeny in east Gondwana- implications for supercontinent evolution, Antarctic meteorites and micrometeorites, Past Antarctic icesheet behaviour and response to external forcing, The Himalayan Cryosphere- global versus regional climate forcing, Paleoclimate records from Antarctic drilling projects, Southern ocean paleoclimatology and lake sediment records of past changes in sea level and climate during the late Quaternary reflect the comprehensive nature of scientific deliberations during the course of the symposium.

ISAES symposium at Goa represented a major international event with participation from 27 countries of around 400 scientists nearly equally divided between the overseas and the Indian participants.

#### ADMAP (EG)

ADMAP 1 (Antarctic Digital Magnetic Anomaly Project) was the first international magnetic anomaly compilation of Antarctica and was completed in 2001 (Golynsky et al., 2001), six years after its first launch in 1995. Since the production of this magnetic anomaly map, the international geomagnetic community has acquired close to 2 million line-km of new air- and shipborne data. In particular, the increased international dimension of magnetic surveying has enabled several major previously largely unexplored Antarctic frontiers to be investigated.

Main activities of the SSG-GS Expert Group ADMAP were the continuing efforts towards the ADMAP2 compilation (*ADMAP2: a new generation international magnetic anomaly compilation project to aid Antarctic geosciences*). To help realize this ambitious project the Korean Polar Research Institute (KOPRI) funded the position of a Data Manager which is held by A. Golynsky (VNIIO St.Petersburg). The second major activity in the period from SCAR Auckland 2014 until now was the workshop held in during the XII ISAES in Goa in July this year.

The workshop was dedicated to specific ADMAP concerns, in particular to review the status of the new ADMAP2 project. Major points to discuss were a) to engage more with international stakeholders and data owners that have yet to release their data b) re-assess the roadmap, milestones. Time-lines and products to be delivered by ADMAP2 c) discuss the techniques to be used, d) how to continue enhancing the geological utility of Antarctic magnetic surveys, d) how to help foster and launch new international magnetic anomaly surveys and strengthen interdisciplinary links with other Antarctic geosciences communities. The workshop was convened by D. Damaske (ADMAP-chair) and F. Ferraccioli.

The workshop included three presentations, i.e., a report on recent German aeromagnetic work (e.g. the GEA project) and reports on the US-led GIMBLE and ICECAP campaigns. The present status of ADMAP2 compilation and the techniques required to process, assimilate, archive & release the data was reviewed by A. Golynsky with a contribution by F. Ferraccioli.

A number of datasets that are still missing and/or incomplete were identified and an action/timeline plan agreed: A hard deadline for including data in the ADMAP2 compilation was discussed. Given the financial support of KOPRI for the data manager which will run out in December a HARD DEADLINE was agreed upon for END-OCTOBER.

At SCAR XXXIV in Kuala Lumpur ADMAP2 should be ready and presented to the community. A Release-Paper should be prepared. Action/Timeline: A. Golynsky to prepare a draft well before the SCAR 2016 meeting. In the beginning of July 2016 he will circulate a manuscript among the steering committee. The paper should be ready shortly after the meeting in Kuala Lumpur. A printed version of the ADMAP2-map should be available shortly after the SCAR meeting. It was discussed whether a distribution similar to BEDMAP2 (i.e. at AGU, EGU) is possible. Action: F. Ferraccioli checking at BAS on costs for printing. After knowing costs D. Damaske to check on availability of SCAR funds for printing.

It has been pointed out again that a data base is – apart from the map – a major outcome for ADMAP2. The advantage of early access of such a data base, e.g. for regional and continental projects/implications has been stressed. Database issues: The entire database is very large, how can the database be split? Action/Timeline: A. Golynsky to make a suggestion on how to split and to circulate this to the Steering Committee by the end of December this year.

It has been agreed that apart from the business meeting ADMAP will hold during SCAR XXXIV a workshop similar to the one held in Goa would be desirable. It has been agreed that for SCAR XXXIV ADMAP should not seek an own session but should look for an integrated session with the geologic community in line with the intentions of SCAR Action Group Connecting Geology and Geophysics (AG CGG).

### **ANTPAS (EG)**

Following the decisions from the Auckland meeting in 2014, ANTPAS in the period 2014-16 will focus on implementing a workshop for developing a new strategical plan to be held in 2016. In 2015, ANTPAS organized a session at XII ISAES in Goa (13-17 June 2015), with 8 oral presentations and 5 posters. For this event, ANTPAS has opened a call for grants and funded the participation of one young researcher from South Africa. The session had a significant audience and participation having contributed to the consolidation of the ANTPAS contribution to ISAES.

ANTPAS has once again collaborated in the State of the Climate Report contributing to the section on permafrost: Noetzli J, Christiansen HH, Romanovsky VE, Shiklomanov NI, Smith SL, Vieira G, Zhao L. 2015. Permafrost [in “State of the Climate in 2014”]. Bull. Amer. Meteor. Soc., 96 (7), S17–S18.

### **ANTVOLC (EG)**

ANTVOLC was formed in 2014. The group aims to promote the study of Antarctic volcanism and disperse information; Discuss protocols, methods, best practices; Integrate and share geological information; Facilitate regional correlations (e.g. tephrochronology); Compile, integrate and publish databases (e.g. outcrop maps, geochemistry); Identify priorities, critical issues, future scientific directions; Develop collaborations and international joint research projects; Exchange data and ideas with other SCAR Scientific Programmes or Expert Groups; Provide a clear route map for obtaining expert advice in case of volcanic crises, e.g. Deception Island, Mount Erebus, Mount Melbourne; Develop productive links with related science disciplines (e.g. glaciology, biology, modelling).

ANTVOLC started its activities in 2015. Two meetings have taken place, kickstart meeting at Catania (Italy), and a short ad hoc meeting at Goa (India) during the XII ISAES.

Both meetings were successful as the first important steps to widen knowledge of the EG existence and to begin building up the Antarctic volcanic community. As a result of the two meetings, the group is now active, with more than 75 persons from more than dozen countries registering their interest.

At Catania, the first part of the meeting was dedicated to comprehensive reviews by selected experts to establish the current state of the art of knowledge of Antarctic volcanism (see Appendix). These presentations will be available to the whole scientific community, once we reconcile issues of confidentiality (images & information in several talks were unpublished and require protection). A dozen of posters resulting from key researches of the last years were also presented.

The second part of the meeting involved ad hoc brainstorming in which all participants contributed ideas in order to (1) identify overarching key topics for future Antarctic volcanology; and (2) define and agree on common activities and possible deliverables, and identify necessary or advantageous interactions we might/should develop with other communities or institutions (e.g. National Programs, SCAR-SSG, IAATO

etc). The organizational structure (e.g. group membership, steering committee, regional/national/discipline coordinators) was also briefly discussed.

At Goa about 20 people attended a short introductory meeting. The intention was to announce the formation of the group to the SCAR community in general. In addition to describing who we are and what the rationale is for our existence, a short report was also presented on the outcomes of the Catania meeting.

A short discussion followed in which we were encouraged to continue developing the group activity and to pursue interactions and links with other SCAR Expert/Action groups, Scientific Programs and with other institutions, such as IAVCEI.

### **GeoMAP (AG)**

The SSG GeoMAP Action Group, launched at SCAR 2014, is progressing from strength to strength. Over 35 people, representing 11 different nations, participated at a workshop prior to the Goa ISAES XII meeting. The group would like to hold a meeting in association with the SCAR August 2016 conference in Kuala Lumpur. Capability development, either from one nation to another, or through training of next generation scientists, is seen as a priority.

GeoMap conducted a workshop “Towards improved geological maps of Antarctic rocks and surficial deposits: Underpinning datasets for studies of glacial dynamics and climate change” SCAR GeoMAP Action Group Workshop, 12 July 2015, ISAES XII, at the Goa Marriott. An example of GeoMAP-style dataset presented:

Cox, S.C.; Rattenbury, M.S.; Martin, A.P.; Morgan, F.; Townsend, D.B.; Smith Lyttle, B. 2015 A Transantarctic Mountains digital geological map resource. p. 562 In: Tandon, S.K. (convener) XII International Symposium on Antarctic Earth Sciences ISAES 2015, 13-17 July 2015, Goa Marriott: abstracts.

GeoMAP will facilitate an integrated programme to promote the capture of existing geological map data, update its spatial reliability, improve representation of glacial sequences and geomorphology, and enable data delivery via web-feature services. A working team has been established, supported by the wider group, and a clear pathway and action plan established – albeit funded only by individual goodwill and enthusiasm. Capability development, either from one nation to another, or through training of next generation scientists, is seen as a priority. Although a number of informal exchanges will occur, the next meeting is planned for the SCAR August 2016 conference in Kuala Lumpur. The group is looking for travel support funding for participating students and/or exchange of GIS trainers.

### **GIANT (EG)**

Collaboration in co-organizing the session GD6.2/CR2.5 “Geodynamic evolution of the polar regions and interaction with the cryosphere ( convener: Douglas Wiens co-conveners: Terry Wilson, christen Gohl, Pippa Whitehouse) at the EGU 2015 General Assembly , Wien, Austria, 12-17 april 2015)

Co-organization of the workshop ”Autonomous GPS & Seismic Station” ( workshop leaders: Terry Wilson, Rick Aster, Sridhar Anandakrishnan, Paul Carpenter, Alessandro Capra, Aurdey Huerta, Joe Petit, Paul Winberry, David Saddler ) at the 12th ISAES, GOA, India, July 2015.

### **IBCSO (EG)**

The EG IBCSO has held an Editorial Board Meeting during the SCAR Open Science Conference, Auckland, NZ. Keypoints of this meeting were the identification and gathering of data and a discussion about the framework of an upcoming 2<sup>nd</sup> Version of IBCSO. This Version is now planned with an increased extent up to 50°S.

Ongoing bathymetric data identification and gathering.

IBCSO status report has been held at the joint meeting of the Sub-Committee on Regional Undersea Mapping (SCRUM) and Technical Sub-Committee on Ocean Mapping (TSCOM) of GEBSCO in Mountain View, CA, USA.

IBCSO Version 1.0 has been integrated in the new global bathymetric model of the General Bathymetric Chart of the Oceans ‘GEBSCO\_14’ (Weatherall et al. 2015, doi: 10.1002/2015ea000107).

An outreach 3D lenticular map product, based on the IBCSO bathymetric model, has been produced at AWI in collaboration with the TU Dresden.

#### **4. Budgetary Implications**

##### **ANTVOLC**

Budget of the group (2000 US\$) was entirely employed (plus 4000 Euro of Co-funding of PNRA-Italian Program of Antarctic Researches ) for organising the Kickstart meeting in Catania and as a partial contribution to the travel and accommodation expenses of some invited speakers and attendee.

##### **ANTPAS**

In order to enlarge the participation in the workshop to be held in Potsdam in 2016, ANTPAS requests for its annual budget to be increased to USD 5,000 in 2016. Funds will be used to open a call for grants for young researchers (6 grants of 550 USD = USD 3,300) and sponsor travelling of the chairs (1700 USD). The joint results of this workshop, together with Kuala Lumpur meeting, will be a new strategical plan for ANTPAS for 2017-2020.

##### **IBCSO**

As was already pointed during SCAR XXXIII, the group request 4000 \$ travel expenses to meetings/conferences.

#### **Appendices**

##### **ANTVOLC**

Below is a list of Scientific Presentations at Catania

- Review of Antarctic volcanism - physical volcanology & palaeoenvironmental aspects (J. Smellie – Leicester University - UK)
- Overview of Cenozoic volcanism: A petrological perspective (K. Panter - Bowling Green State University – USA)
- Antarctic volcanism: An overview of tephrochronological studies (N. Dunbar - New Mexico Tech – USA)
- Cenozoic magmatism-tectonics-geodynamics in Antarctica (S. Rocchi – University of Pisa – Italy)
- Volcano monitoring at Mt. Erebus (W. McIntosh New Mexico Tech – USA and G. Giudice INGV Palermo Italy)
- Volcano hazard at Deception Island (A. Geyer CSIC Barcelona – Spain)

**GeoMAP** - A report on the GeoMAP workshop can be provided.