



**Paper 6**      **Agenda 2.1**

SG                      GS

Person Responsible:      Jesús Galindo

## **SCAR Executive Committee Meeting 2017**

**Brno, Czech Republic, 31 July - 2 Aug 2017**

# **SSG Geosciences** **2016-2017 Report**

### **Report Author(s):**

**Jesús Galindo-Zaldívar (Chief Officer), Naresh C. Pant (Deputy Chief Officer), Marcelo Leppe (Secretary). Contributions of Chief Officers of Expert Groups and Action Groups.**

### **Summary of activities from 2016-17 and any other important issues or factors (<150 words):**

SSG-Geosciences include 6 expert and 4 action groups, two of them cross-disciplinary. These groups are active, have regular meetings (e.g. OSC, AGU, URSI GASS, IAGA) and promote new meetings (e.g. 1<sup>st</sup> International Antpas Workshop, Varese). Their activities include the production of maps (Bathymetry and Geological Setting of the Drake Passage; Antarctic Digital Magnetic Anomaly Map 2, in latest stages of preparation; International Bathymetric Chart of the Southern Ocean V2.0., initiated; Geological maps compilation and integration). Moreover, groups aim to identify long term datasets, continuing the database development, and developing technical manuals and field researches (like GNSS measurements, geophysical and geological observations). Publications of results are envisaged in high-profile international geoscientific journals and special volumes. It is also remarkable the preparation of information papers (e.g. conservation strategies for Antarctic geological and geomorphological features, including fossils, with the aims that SCAR will delivery advice on this matter to CEP, ATS).

**Recommendations that EXCOM should consider (if any):** *Please indicate if approval is necessary or if they are just asked to note information.*

We recommend the continuity of the actions and expert groups and the confirmation of ongoing budget.

### **GIANT**

Geodetic GNSS observations on bedrock in Antarctica are indispensable since they provide the only in-situ measurement of recent deformations of the Earth crust. Thus, these measurements are being used in manifold respects of Antarctic research. The scientific aspects are especially covered by the SCAR Scientific Research Program SERCE and the Expert Group GIANT.

Each of these geodetic GNSS measurements is essentially based on a stable marker that is directly connected to bedrock. Only in this way it can be ensured that exactly the same point is being occupied each time an observation is repeatedly carried out or realized in terms of a time series recording.

In view of funding issues and the environmental protection in Antarctica the question was raised whether these markers could be removed.

**Together with the SCAR SRP SERCE Steering Committee we ask for a recommendation of the EXCOM that the geodetic markers on bedrock in Antarctica should be maintained in order to enable GNSS measurements being carried out at later times at exactly the same point.**

(Contact to SCAR SRP SERCE: Pippa Whitehouse, Matt King, Terry Wilson).

### **ANTPAS**

EXCOM should promote more relations and interactions between Antera, Anteco, Antos and Antpas because they are working at least in part on integrable topics and issues and more synergy will be a benefit for everybody.

## **Progress and Plans:**

### **Major Activities and Significant Progress from the past year (<500 words):**

-Most of the groups have meet one or several times.

-Bathymetry and Geological Setting of the Drake Passage Map, was released in Dec, 2016. It is an SCAR product.

**ADMAP** Preparation of the second edition of the Antarctic Digital Magnetic Anomaly Map (ADMAP2) and database is in the final stages.

**ANTOS** Measurement system technical manual (hardware, biological and environmental assessment, mapping, and monitoring schedule) is prepared;

Database management is designed by KOPRI; Survey launch: a web-based survey that will be used to poll the international research community about where infrastructure currently exists to collect long-term ecological and environmental data, where long term data are already being collected, and where investment is most needed to collect such data; Atlas of Ice Free Areas of Antarctica (AIFAA), product expected in 12-18 months from the BAS.

**ANTPAS** Meeting held in 2016 at Potsdam (Germany) during the International Permafrost Conference (IPA) in June and afterwards on SCAR-OSC at Kuala Lumpur. Process of internal review in order to define the new science priorities.

**ANTVOLC** A dedicated AntVolc website has been released, hosted at the Institute of Earth Sciences Jaume Almera (ICTJA-CSIC) (<https://antvolcscar.wordpress.com/>). Also development of a new AntVolc website (<https://antvolcscar.wordpress.com/>).

### **GEOLOGICAL HERITAGE AND GEOCONSERVATION**

This group aims to consider a code of conduct that would include advice relevant to geology, palaeontology, geomorphology and meteorite studies, particularly sampling protocols, with a delivery date for the Code of Conduct possibly in time for CEP 2019

**GEOMAP** Collaboratively build a modern geological dataset that classifies and describes the bedrock and surficial geology of Antarctica's rock exposures. The work is in progress.

**GIANT** Continuation of geodetic measurements in Antarctica, especially of geodetic GNSS; Relaunch of "SCAR GNSS Database" website; Publication of gridded dataset of gravity anomalies for Antarctica (Scheinert et al., Geophysical Research Letters, 2016); Launch of "Geodynamics In ANTArctica based on REprocessing GNSS dAta Initiative"(GIANT-REGAIN); International Workshop "Airborne Geodesy and Geophysics with Focus on Polar Applications", Dresden, Germany, 19-21 April 2017.

**GRAPE** Observing infrastructures (mainly based on GNSS receivers able to monitor ionospheric TEC and scintillations) is growing above all over Antarctica. A new Scientific Program proposal submitted in May 2017 to SCAR. The proposal, titled RESOURCE (Radio Sciences Research on AntarctiC AtmospherE). The main goal of the proposal, is to isolate the atmospheric contribution and use it in the study of the near-earth space environment.

**IBCSO** Meetings to preventing double acquisitions and enables listing of data that in the future can be incorporated in an IBCSO V2.0. Since 2017 IBCSO is part of the GEBCO initiative Seabed 2030 and AWI will become a Regional Data Assembly and Coordination Centre.

**Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years (<500 words):**

**ADMAP** Publication of the second edition of the Antarctic Digital Magnetic Anomaly Map (ADMAP2) and database is in the final stages. Publication is envisaged in a high-profile international geoscientific journal and a print version of the map.

**ANTOS** Several initiatives. It is remarkable to conduct a survey to identify potential high priority ANTOS sites and found support for installation.

**ANTPAS** This group aims enhance: ANTPAS communications; State of the Antarctic active layer CALM paper to Polar Geography; ANTPAS Permafrost and soils monitoring network – linking with GTN-P and CALM; Permafrost map of the World (IPA) – follow up possible meeting in Sapporo 2017; Project Planning – ecosystem services in Antarctica; Project planning – Brines/Mars environments; Selection of SCAR Horizon Scan questions; ANTPAS Terms of Reference. The 1<sup>st</sup> International Antpas Workshop entitled “From an Expert Group to a Research Program” will be held on 4-5 October in Varese at Insubria University.

**ANTVOLC** The second AntVolc workshop is scheduled for 22-24 November, at Barcelona. Session dedicated to bipolar magmatic, tectonic & geodynamic investigations will take place at POLAR2018. Editing special volume on Volcanism in Antarctica (memoir of the Geological Society, London). White Paper’ for SCAR summarizing the state of research into Antarctic volcanism and provide a roadmap for future volcanic research (late 2018).

**GIANT** Continuation of geodetic GNSS observations on bedrock. M. King (University of Tasmania, Australia) and M. Scheinert (TU Dresden, Germany) launched “Geodynamics In ANTArctica based on REprocessing GNSS dAta Initiative” (**GIANT-REGAIN**) with major processing activity in 2017/2018. A 2<sup>nd</sup> “SCAR Summer School on Polar Geodesy” will be held in Ladojskoje Ozero, Russia (near St. Petersburg). Participation in International Workshop on “Glacial Isostatic Adjustment and Elastic Deformation” to be held in Reykjavik, Iceland, 5-7 September 2017, and the next SCAR Meeting in Davos, 2018.

**GEOLOGICAL HERITAGE AND GEOCONSERVATION**

The focus of the next 6 months will be to finalise a draft information paper, to be circulated to members of the Action Group for input and comment for a final version to be submitted to SCAR Standing Committee on the Antarctic Treaty System (SCATS) for consideration in April 2018.

Primary objective is to deliver a document addressing conservation of Antarctic geological and geomorphological values (including fossils) to be used for SCAR’s advice on this matter to the CEP.

**GEOMAP** July-Aug 2017 Complete capture of Peninsula geology. Finalise north Victoria Land glacial geology. Aug-Jan 2017, Review cTAM glacial Geology. Improve definition of Ferrar-Beacon rocks. Jan-May 2018 Integration of Norwegian Polar Institute data from Dronning Maud Land. Capture eastern

Antarctic dataset. June 2018, Next main meeting of GeoMAP (at Davos Polar 2018 conference). Possible first version release of the beta-version of dataset for peer review and discussion. July-Nov 2018, Workshop of key action group members to review and harmonise seamless dataset. Jan-Jun 2019, Finalise data into GeoSciML.

**GRAPE** Efforts will be addressed to the activities proposed within RESOURCE. A scientific session has been planned within SCAR OSC 2018 titled: The Polar Atmosphere and Geospace as well the GRAPE-RESOURCE. Participation in the course “The Polar Upper Atmosphere: from science to operational issues” is scheduled in September 2018 at L’Aquila (IT).

**IBCSO** Details about the Seabed 2030 initiative will be discussed at the GEBCO Meeting in November 2017, Busan, South Korea. A kick-off meeting of IBCSO V2.0 is planned for the SCAR/IASC conference 2018 in Davos, Switzerland and IBCSO V2.0 is intended to start at this time. IBCSO V2.0 is intended to extent up to 50° S with a resolution of 500 m. Additional data sets have already been identified and will continue to be acquired in the next years.

**Please list any new outputs and deliverables (including publications and products that your group feels are part of your achievements):**

-Bathymetry and Geological Setting of the Drake Passage Map (Scar Product) (Dec, 2016)

**ADMAP**

2017

Jordan, T.A., Ferraccioli, F, and Leat, P.T. (2017), New geophysical compilations link crustal block motion to Jurassic extension and strike-slip faulting in the Weddell Sea Rift System of West Antarctica, *Gondwana Research* 42, 29-48.

2016

Maritati, A., A. R. A. Aitken, D. A. Young, J. L. Roberts, D. D. Blankenship, and M. J. Siegert (2016), The tectonic development and erosion of the Knox Subglacial Sedimentary Basin, East Antarctica, *Geophys. Res. Lett.*, 43, 10,728–10,737, doi:10.1002/2016GL071063

F. J. Davey, R Granot, S. C. Cande, J. M. Stock, M. Selvans, F. Ferraccioli, 2016. Synchronous Oceanic Spreading and Continental Rifting in West Antarctica. *Geophysical Research Letters*, DOI: 10.1002/2016GL069087.

A. R. A. Aitken, J. L. Roberts, T. D. van Ommen, D. A. Young, N. R. Golledge, J. S. Greenbaum, D. D. Blankenship & M. J. Siegert, 2016. Repeated large-scale retreat and advance of Totten Glacier indicated by inland bed erosion. *Nature* 533, 385-389, doi:10.1038/nature17447

A.R.A. Aitken, P.G. Betts, D.A. Young, D.D. Blankenship, J.L. Roberts, M.J. Siegert, 2016. The Australo-Antarctic Columbia to Gondwana transition. *Gondwana Research*, 29 (1), 136-152, doi:10.1016/j.gr.2014.10.019.

Frederick, B. C., Young, D. A., Blankenship, D. D., Richter, T. G., Kempf, S. D., Ferraccioli, F., and Siegert, M. J., 2016, Distribution of subglacial sediments across the Wilkes Subglacial Basin, East Antarctica, *Journal Of Geophysical Research: Earth Surface*, 121, 4, 790–813, 10.1002/2015JF003760

**ANTOS**

Report on the 2016 Antarctic Near-shore and Terrestrial Observing System (ANTOS) Action Group Workshop.

[http://www.scar.org/scar\\_media/documents/science/antos/2015-ANTOS-Workshop-Report.pdf](http://www.scar.org/scar_media/documents/science/antos/2015-ANTOS-Workshop-Report.pdf))

### **ANTPAS**

A special issue related to the 1<sup>st</sup> International Antpas Workshop entitled “From an Expert Group to a Research Program” that will be held on 4-5 October in Varese has been proposed to different ISI Journals and is under evaluation. A synthesis paper of GTN-P with large part of Antarctic permafrost temperature data has been finalizing.

### **ANTVOLC:**

Special volume: ‘Volcanism in Antarctica: 200million years of subduction, rifting & continental break-up’ is now underway. It will be published as a Memoir of the Geological Society, London.

**(late) 2015:**

- Almendros, J., Carmona, E., Jiménez, V., Díaz, A., Lorenzo, F., Berrocoso, M., De Gil, A., Fernández-Ros, A. and Rosado, B. 2015. Deception Island: Sustained deformation and large increase in seismic activity during the 2014-2015 survey, in: Venzke, E (ed.), *Bulletin of the Global Volcanism Network*, 40:6, Smithsonian Institution.
- Del Carlo P., Di Roberto A., Di Vincenzo G., Bertagnini A., Landi P., Pompilio M., Colizza E., Giordano G. (2015). Late Pleistocene-Holocene volcanic activity in northern Victoria Land recorded in Ross Sea (Antarctica) marine sediments. *BULLETIN OF VOLCANOLOGY*, vol. 77, ISSN: 0258-8900, doi: [10.1007/s00445-015-0924-0](https://doi.org/10.1007/s00445-015-0924-0)
- Ilanko, T., Oppenheimer, C., Burgisser, A. & Kyle, P. 2015, Transient degassing events at the lava lake of Erebus volcano, Antarctica: Chemistry and mechanisms, *GeoResJ*, 7, 43–58.
- Ilanko, T., Oppenheimer, C., Burgisser, A. & Kyle, P. 2015. Cyclic degassing of Erebus volcano, Antarctica, *Bulletin of Volcanology*, 77: 56
- Jones, L. K., Kyle, P. R., Oppenheimer, C., Frechette, J. D., & Okal, M. H. (2015). Terrestrial laser scanning observations of geomorphic changes and varying lava lake levels at Erebus volcano, Antarctica. *Journal of Volcanology and Geothermal Research*, 295, 43-54.
- Le Losq, C., Neuville, D.R., Moretti, R., Kyle, P.R., and Oppenheimer, C. 2015, Rheology of phonolite magmas – the case of the Erebus lava lake, *Earth and Planetary Science Letters*, 411, 53–61.
- Martin, A.P.; Price, R.C.; Cooper, A.F.; McCammon, C.A. 2015. Petrogenesis of the rifted Southern Victoria Land lithospheric mantle, Antarctica, inferred from petrography, geochemistry, thermobarometry and oxybarometry of peridotite and pyroxenite xenoliths from the Mount Morning eruptive centre. *Journal of Petrology*, 56(1): 193-226.
- Martin, A.P., Cooper, A.F., Price, R.C., Turnbull, R.E. and Roberts, N.M.W. 2015 The petrology, geochronology and significance of Granite Harbour Intrusive Complex xenoliths and outcrop sampled in western McMurdo Sound, Southern Victoria Land, Antarctica. *New Zealand Journal of Geology and Geophysics*, 58(1): 33-51.
- Molina, I., Burgisser, A., & Oppenheimer, C. 2015. A model of the geochemical and physical fluctuations of the lava lake at Erebus volcano, Antarctica. *Journal of Volcanology and Geothermal Research*, 308, 142-157.
- Padrón, E., Hernández, P. A., Carmona, E., Pérez, N., Melián, G., Sumino, H., Almendros, J., Kusakabe, M., Wakita, H., Padilla, G. 2015. Geochemical evidence of different sources of long-period seismic events at Deception volcano, South Shetland Islands, Antarctica, *Antarctic Science* 27, 557-565.
- Park, Y., Yoo, H.J., Lee, Ch-K., Lee, J., Park, H., Kim, J. and Kim, Y. 2015. P-wave velocity structure beneath Mt. Melbourne in northern Victoria Land, Antarctica: Evidence of partial melting and volcanic magma sources. *Earth & Planetary Science Letters*, 432, 293-299.
- Prudencio, J., De Siena, L., Ibáñez, J. M., Del Pezzo, E., Garcia-Yeguas, A. and Diaz-Moreno, A. 2015. The 3D attenuation structure of Deception Island (Antarctica), *Surveys in Geophysics*, 36, 371-390.

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Vignaroli G, Balsamo F, Giordano G, Rossetti F, Storti F (2015). Miocene-to-Quaternary oblique rifting signature in the Western Ross Sea from fault patterns in the McMurdo Volcanic Group, north Victoria Land, Antarctica. *TECTONOPHYSICS*, vol. 656, p. 74-90.

**2016:**

Bohoyo, F., Larter, R.D., Galindo-Zaldivar, J., Leat, P.T., Maldonado, A., Tate, A.J., Gowland, E.J.M., Arndt J.E., Dorschel, B., Kim, Y.D., Hong, J.K., Flexas, M.M., López-Martínez, J., Maestro, A., Bermudez, O., Nitsche, F.O., Livermore, R.A. and Riley, T.R. 2016. Bathymetry and Geological Setting of the Drake Passage (1:1 500 000) BAS GEOMAP 2 Series (Sheet 7) British Antarctic Survey, Cambridge, UK.

Iacovino, K., Oppenheimer, C., Scaillet, B., & Kyle, P. 2016. Storage and evolution of mafic and intermediate alkaline magmas beneath Ross Island, Antarctica. *Journal of Petrology*, 57, 93-118.

Leat, P.T., Fretwell, P.T., Tate, A.J., Larter, R.D., Martin, T.J., Smellie, J.L., Jokat, W. and Bohrmann, G. 2016. Bathymetry and geological setting of the South Sandwich Islands volcanic arc. *Antarctic Science*, 28, 293-303.

LeMasurier, W.E., Choi, S.H., Hart, S.R., Mukasa, S.B., Rogers, N.W., 2016. Reconciling the shadow of a subduction signature with rift geochemistry and tectonic environment in eastern Marie Byrd Land, Antarctica. *Lithos* 260, 134-153.

Liu, E.J., Oliva, M., Antoniades, D., Giralt, S., Granados, I., Pla-Rabes, S., Toro, M. and Geyer, A., 2016. Expanding the tephrostratigraphical framework for the South Shetland Islands, Antarctica, by combining compositional and textural tephra characterisation. *Sedimentary Geology*, 340, pp.49-61.

Narcisi, B., Petit, J.R., Langone, A. and Stenni, B. 2016. A new Eemian record of Antarctic tephra layers retrieved from the Talos Dome ice core (Northern Victoria Land). *Global and Planetary Change*, 137, 69–78.

Oliva, M., Antoniades, D., Giralt, S., Granados, I., Pla-Rabes, S., Toro, M., Liu, E.J., Sanjurjo, J. and Vieira, G. 2016. The Holocene deglaciation of the Byers Peninsula (Livingston Island, Antarctica) based on the dating of lake sedimentary records. *Geomorphology*, 261, pp.89-102.

Petit, J.R., Narcisi, B., Batanova, V.G., Savarino, J., Komorowsky, J.C., Michel, A., Metric, N., Besson, P., Vidal, C. and Alexander V. Sobolev. A.V. 2016. Identifying the AD 1257 Salamas volcanic event from micron-size tephra composition in two East Antarctic ice cores. *Geophysical Research Abstracts*, 18, EGU2016-5191.

**2017:**

Avery, M., Panter K.S., Gorsevski, P.V. (2017), Distinguishing styles of explosive eruptions at Erebus, Redoubt and Taupo volcanoes using multivariate analysis of ash morphometrics, *Journal Volcanology & Geothermal Research*, 10.1016/j.jvolgeores.2017.01.010

Narcisi, B., Petit, J.R. and Langone, A. 2017. Last glacial tephra layers in the Talos Dome ice core (peripheral East Antarctic Plateau), with implications for chronostratigraphic correlations and regional volcanic history. *Quaternary Science Reviews*, 165, 111-126.

Riley, T.R., Flowerdew, M.J., Pankhurst, R.J., Leat, P.T., Millar, I.L., Fanning, C.M. and Whitehouse, M.J. 2017. A revised geochronology of Thurston Island, West Antarctica, and correlations along the proto-Pacific margin of Gondwana. *Antarctic Science*, 29, 47-60.

*Masters theses:*

Avery, Meredith. 2015. Multivariate Analysis of Volcanic Particle Morphology: Methodology and Application of a Quantitative System of Fragmentation Mechanism Classification. M.S. Thesis. Bowling Green State University, USA. 171 p.

González Álvarez, I. N. 2016. Study of wave propagation anomalies at Deception Island volcano using numerical simulations and array techniques, MSc Thesis, Almendros, J. (advisor), MSc in Geophysics and Meteorology, University of Granada, Spain.

Díaz Gato, D. 2016. Análisis de terremotos volcánicos de la isla Decepción (Antártida) con técnicas de array, MSc Thesis, Carmona, E. (advisor), MSc in Geophysics and Meteorology, University of Granada, Spain.

Mead, S. 2016. Origin of sodic magma series: a comparative study of Deception Island, Antarctica, and Savo, Solomon Islands. MSc Thesis, University of Leicester, UK. [unpubl.]

Redner, Ellen. 2016. Magma Mixing and Evolution at Minna Bluff, Antarctica Revealed by Amphibole and Clinopyroxene Analyses. M.S. Thesis. Bowling Green State University, USA. 214 p.

### **GEOMAP**

A new dataset is 90% complete for the Ross Sea Region.

### **GEOLOGICAL HERITAGE AND GEOCONSERVATION**

AG has been requested to provide a short editorial to *Antarctic Geoscience* journal on Geological heritage and geoconservation issues. Will be completed late July 2017.

### **GIANT**

Scheinert, M.; Ferraccioli, F.; Schwabe, J.; Bell, R.; Studinger, M.; Damaske, D.; Jokat, W.; Aleshkova, N.; Jordan, T.; Leitchenkov, G.; Blankenship, D. D.; Damiani, T. M.; Young, D.; Cochran, J. R.; Richter, T. D. (2016): New Antarctic Gravity Anomaly Grid for Enhanced Geodetic and Geophysical Studies in Antarctica. *Geophysical Research Letters*, 1944-8007, doi: 10.1002/2015GL067439

The datasets are published at <https://doi.org/10.1594/PANGAEA.848168>

### **GRAPE**

Web page: [www.grape.scar.org](http://www.grape.scar.org) (updating is in progress and a new version will be soon available).

2016

Alfonsi, L., Cilliers, P. J., Romano, V., Hunstad, I., Correia, E., Linty, N., ... & Riley, P. (2016). First observations of GNSS ionospheric scintillations from DemoGRAPE project. *Space Weather*, 14(10), 704-709, doi:10.1002/2016SW001488.

Correia, E., Quevedo, M.T., Paz, A. J. . ANTARCTIC ATMOSPHERE RESPONSE TO THE SUN-EARTH INTERACTIONS. Annual Activity Report - INCT-APA, v. x, p. 15-22, 2016.

Linty, N., Romero, R., Cristodaro, C., Dovic, F., Bavaro, M., Curran, J. T., ... & Cilliers, P. (2016, May). Ionospheric scintillation threats to GNSS in polar regions: the DemoGRAPE case study in Antarctica. In *Navigation Conference (ENC), 2016 European* (pp. 1-7). IEEE. doi: 10.1109/EURONAV.2016.7530546

Linty, N., I. Hunstad, " Installation and configuration of an Ionospheric Scintillation Monitoring Station based on GNSS receivers in Antarctica. *RAPPORTI TECNICI INGV*, 2016, 354: 1-28. N

Negusini, M., B. H. Petkov, P. Sarti and C. Tomasi, (May 2016) "Ground-Based Water Vapor Retrieval in Antarctica: An Assessment," in *IEEE Transactions on Geoscience and Remote Sensing*, vol. 54, no. 5, pp. 2935-2948, doi: 10.1109/TGRS.2015.2509059.

Pignalberi, A ; Pezzopane, M ; Tozzi, R ; De Michelis, P; Coco, I: Comparison between IRI and preliminary Swarm Langmuir probe measurements during the St. Patrick storm period, *Earth, Planets and Space*, 68, 93, doi: 10.1186/s40623-016-0466-5, 2016.

Prikryl, P., Ghoddousi-Fard, R., Ruohoniemi, J. M., Thomas, E. G.: GPS phase scintillation at high latitudes during two geomagnetic storms, *Auroral dynamics and space weather*, *Geophysical Monograph Series Vol. 215*, Zhang, Y. and Paxton, L.J. (Editors), American Geophysical Union and John Wiley & Sons, Inc., ISBN 978-1-118-97870-2, 2016.

Prikryl, P., et al. (2016), GPS phase scintillation at high latitudes during the geomagnetic storm of 17–18 March 2015, *J. Geophys. Res. Space Physics*, 121, doi:10.1002/2016JA023171.

V. Sreeja (2016), Impact and mitigation of space weather effects on GNSS receiver performance, *Geoscience Letters*, doi: 10.1186/s40562-016-0057-0.

2017

- Cilliers, P., L. Alfonsi, L. Spogli, G. De Franceschi, V. Romano, I. Hunstad, N. Linty, O. Terzo, F. DAVIS, J. Ward, C. Cesaroni and J.A.E. Stephenson (2017), Analysis of the ionospheric scintillations during 20-21 January 2015 from SANAE by means of the DemoGRAPE scintillation receivers, Proceedings of URSI GASS, Montreal 19-26 August 2017, in publications on IEEE Xplore Summary Papers.
- Correia, E., L. Spogli, L. Alfonsi, C. Cesaroni, A. Gulisano, E. Thomas, R. Ramirez, and Alexandre Rodel. Ionospheric Response to the 26 September 2011 Geomagnetic Storm In Antarctica. *Annales Geophysicae*. 2017 Submitted
- Drews R., Pattyn F., Hewitt I. J., Matsuoka K., Helm V., Berger S., Bergeot N., Favier L., Actively evolving subglacial conduits and eskers initiate ice shelf channels at an Antarctic grounding line, *Nature Communications*, 8, 10.1038/ncomms15228, 2017.
- Giordanengo, G., L. Pilosu, L. Mossucca, F. Renga, S. Ciccina, O. Terzo, G. Vecchi, V. Romano, and I. Hunstad, "Energy Efficient System for Environment Observation", the 11th International Conference on Complex, Intelligent, and Software Intensive Systems - CISIS, 07/2017, accepted for publication.
- Mossucca, L., L. Pilosu, P. Ruiu, G. Giordanengo, S. Ciccina, G. Vecchi, O. Terzo, V. Romano, L. Spogli, C. Cesaroni, I. Hunstad, and A. Serratore, "Greenlab: autonomous low power system extending multi-constellation GNSS acquisition in Antarctica", Proceedings of URSI GASS, Montreal 19-26 August 2017, in publications on IEEE Xplore Summary Papers.
- Pattyn F., Bruyninx C., Tison J.-L., Bergeot N., Favier L., van Dam T., Drews R., Callens D., Philippe M., Matsuoka K. and Hubbard B., Constraining ice mass changes in coastal Dronning Maud Land, Antarctica (ICECON), final report Brussels : Belgian Science Policy 2009, 2017.
- Romero, R., N. Linty, C. Calogero, F. DAVIS and L. Alfonsi (2017, January), "On the Use and Performance of new Galileo signals for Ionospheric Scintillation Monitoring over Antarctica", Proceedings of ION ITM 2017, Monterey (CA), January 2017, pp.989-997, <https://www.ion.org/publications/abstract.cfm?articleID=14942>.

#### Presentations

- Bergeot N., Darrouzet F., Rasson J., Tzagouri I., Lichtenberger J., Marqué C., Chevalier J.-M., Martinez A., Katsiyannis T., Bruyninx C., Ranvier S., Lamy H., Tétard C., de Keyser J., Bracke S., Gonsette A. and Belehaki A., GNSS and Space Weather in East Antarctica around the Princess Elisabeth Belgian base, SCAR 2016 Conference, Kuala Lumpur, Malaysia, 20-30 August, 2016.
- Bruyninx C., Bergeot N., Van Dam T., Camelbeeck T., Francis O. and Tabibi S., High precision GNSS infrastructure around the Princess Elisabeth Base, BNCCG - BNCAR symposium, Brussels, Belgium, April 29, 2016.
- Capra A., A. Zanutta, M. Negusini, S. Gandolfi, F. Salvini, P. Sterzai, L. Vittuari, P. Cianfarra, M. Dubbini, A. Galeandro and F. Mancini, "VLNDEF: An integrated geodetic project and its latest results", poster presentation SCAR Open Science Conference, Kuala Lumpur, Malaysia, 22-26 August 2016.
- Chevalier J.-M., Bergeot N., Marqué C., Bruyninx C., Near-real time detection of solar radio burst impacting the GNSS signal reception, ESWW13, Oostende, Belgium, 14-18 November, 2016
- Drews R., Matsuoka K., Martin C., Callens D., Bergeot N. and Pattyn F., Evolution of Derwael Ice Rise in Dronning Maud Land, Antarctica, over the last millennia, BNCCG - BNCAR symposium, Brussels, Belgium, April 29, 2016.
- Drews R., Pattyn F., Berger S., Favier L., Matsuoka K. and Bergeot N., Ice-shelf channels: where they originate and how they evolve, BNCCG - BNCAR symposium, Brussels, Belgium, April 29, 2016
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### **IBCSO**

A new bathymetric map of the Drake Passage has been published in 2016:

Bohoyo, F., Larter, R.D., Galindo-Zaldívar, J., Leat, P.T., Maldonado, A., Tate, A.J., Gowland, E.J.M., Arndt, J.E., Dorschel, B., Kim, Y.D., Hong, J.K., Flexas, M., López-Martínez, J., Maestro, A., Bermudez, O., Nitsche, F.O., Livermore, R.A., Riley, T.R. 2016. Bathymetry and Geological Setting of the Drake Passage (1:1 500 000). BAS GEOMAP 2 Series, Sheet 7, British Antarctic Survey, Cambridge, UK.

**If your Group produces data, please report any new data generated and links to inclusions to the Antarctic Master Directory, etc.**

### **ADMAP**

Links do not yet exist for ADMAP2 materials at the four data centres.

### **GEOMAP**

Products, when ready, will certainly be made widely available.

### **GIANT**

For Antarctic GNSS data refer especially to the “Database of the SCAR Epoch Crustal Movement Campaigns (short: SCAR GNSS Database), accessible at <https://data1.geo.tu-dresden.de/scar> .

### **GRAPE**

GNSS-based (GPS+GLONASS) Total Electron Content data from POLENET, IGS networks, and Belgian stations from 1999 to 2016. The data were processed using the ROB-IONO software (Bergeot et al. 2014). Contact person Nicola Bergeot [nicolas.bergeot@oma.be](mailto:nicolas.bergeot@oma.be)

Data from Ionosonde, GPS-TEC JAVAD, GNSS for TEC and scintillation, riometers, VLF for ionosphere monitoring at Brazilian Antarctic Station Comandante Ferraz (EACF 62.8S, 58.4W). GNSS for TEC and Scintillation, riometers and VLF at Radio Observatory of Itapetinga (ROI, 23.2S, 46.6W), GNSS for TEC and Scintillation and riometer at Cawame (Roraima-Brazil, 2.82N, 60.76W ). Contact person: Emilia Correia [ecorreia@craam.mackenzie.br](mailto:ecorreia@craam.mackenzie.br)

Eswua [www.eswua.ingv.it](http://www.eswua.ingv.it) (work in progress to upgrade the data base)  
DemoGRAPE, GNSS data during DemoGRAPE campaigns, Contact person Lucilla Alfonsi [lucilla.alfonsi@ingv.it](mailto:lucilla.alfonsi@ingv.it)

### **IBCSO**

The new bathymetric map of the Drake Passage: can be downloaded here: <http://nora.nerc.ac.uk/515070/>

## Budget

### Planned use of funds for 2017 and 2018

#### **ADMAP**

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
12-17	AGU attendance support	2600	ADMAP	
03-18	Web-based costs- & staff time	2000	ADMAP	
04-18	EGU attendance support	1800	ADMAP	
06-18	SCAR-IASC attendance support	2000	ADMAP	
07-18	Early career visit VNIIO or BAS	1500	ADMAP	
11-18	Special Issue costs	2500	ADMAP	

**ANTOS** will discuss this at the SCAR Biology meeting in July 2017.

#### **ANTPAS**

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
<b>October 2017</b>	1 <sup>st</sup> Antpas Workshop Varese	7500	Mauro Guglielmin	Mauro.guglielmin@uninsubria.it
<b>June 2018</b>	IASC-SCAR Davos	3500	Mauro Guglielmin	Mauro.guglielmin@uninsubria.it

#### **ANTVOLC**

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
<b>11-17</b>	Workshop, Barcelona	3000	John Smellie	Jls55@le.ac.uk
<b>06-18</b>	SCAR OSC POLAR2018	3000	John Smellie	Jls55@le.ac.uk

### **GEOLOGICAL HERITAGE AND GEOCONSERVATION**

<b>Month/Year (MM-YY)</b>	<b>Purpose/Activity</b>	<b>Amount (in USD)</b>	<b>Contact Name</b>	<b>Contact Email</b>
<b>Before Dec 2017</b>	Possible travel to UK	\$1900 USD	Chris Carson	chris.carson@ga.gov.au
<b>2018</b>	Travel to Davos for XXXV SCAR	\$2000	Chris Carson	chris.carson@ga.gov.au

### **GEOMAP**

<b>Month/Year (MM-YY)</b>	<b>Purpose/Activity</b>	<b>Amount (in USD)</b>	<b>Contact Name</b>	<b>Contact Email</b>
<i>Dec 2016 Used leftover funding brought forward)</i>	<i>Student training and data capture</i>	<i>\$7000</i>	<i>Simon Cox</i>	<i>s.cox@gns.cri.nz</i>
<b>12/2017</b>	Student training & labour	\$3973	Simon Cox/Gianni Capponi	s.cox@gns.cri.nz
<b>11/2018</b>	Workshop of Action Group to review and harmonise data	\$4000	Simon Cox	s.cox@gns.cri.nz

### **GIANT**

<b>Month / Year</b>	<b>Purpose/Activity</b>	<b>Amount (US\$)</b>	<b>Contact Name</b>	<b>Contact Email</b>
04/2017	International Workshop "Airborne Geodesy and Geophysics with Focus on Polar Applications"	1000	M. Scheinert	Mirko.Scheinert @tu-dresden.de
09/2017	International Workshop "Glacial Isostatic Adjustment and Elastic Deformation"	986	M. Scheinert	Mirko.Scheinert @tu-dresden.de
2018	2 <sup>nd</sup> SCAR Summer School on Polar Geodesy	5000	M. Scheinert	Mirko.Scheinert @tu –dresden.de
2018	Travel Support (e.g. for research stay of PhD / Postdoc)	2000	A. Capra, M. Scheinert, M. King	Alessandro.Capra @unimore.it

**GRAPE**

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
12-17	ionospheric monitoring meeting at the Royal Observatory of Belgium	1986 (Funds allocated in 2017)	Nicolas Bergeot	Nicola.bergeot@oma.be
3-18	SCAR 2018 registration fees for GRAPE attending people and support to early stage researchers	2000	G. De Franceschi	Giorgiana.defranceschi@ingv.it

**IBCSO**

Month/Year (MM-YY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
06-18	POLAR 2018	2649	Jan Erik Arndt	Jan.Erik.Arndt@awi.de

**Briefly describe what the funds will be used for and what the desired results are:**

**ADMAP**

To support member(s) to attend at the AGU, EGU and SCAR meetings where ADMAP2 work will be presented to the scientific community.

**ANTOS**

Attendance by key individuals representing national programs to the Davos workshop is critical. Since ANTOS represents a significant long term investment from the National Programmes it is essential that we have significant buy-in from both researchers and COMNAP.

**ANTPAS**

The already planned 7500 euro for the organization of 1<sup>st</sup> Antpas Workshop Varese will be used mainly for giving grants to early or young researchers that will applied. A minor part could be used for the organization costs. The other money including the 1986 USD already available for 2017 and not spent and we are asking a little amount more (1514) in order to provide 5 grants of 500 USD (or 3 of 850 USD) for young and early researchers while 1000 USD will reserve for the Co-Chairs.

**ANTVOLC**

To pay local expenses and to offset travel costs of participants. Updates of current research and an outline roadmap.

### **GEOMAP**

We wish during the austral summer 2017-18 to focus on data capture from East Antarctica, most probably with student(s) from Australia (University of Tasmania). \$3973 allocated for 2017 will be spent directly for capability development and training of students in GeoSciML, using their labour to help collate datasets for the project. GNS Science have recently been granted 4-star accreditation for their digital geological map web services (on OneGeology), and provide supervision, host visit and/or work virtually on datasets. In 2018 we aim to hold a workshop to harmonize geological legends and a seamless continent-wide dataset. This requires individual experts with experience, so only ~40% of requested 2018 budget would be allocated to early career scientists.

### **GEOLOGICAL HERITAGE AND GEOCONSERVATION**

2017 - Possible use of Geo-heritage Action Group funds to offset travel costs to UK to visit to intensive workshop to finalise draft information. To be confirmed.

2018 – Request travel costs for SCAR XXXV Davos Switzerland for McLennan (early career researcher at Geoscience Australia, co-convener for geo-heritage session)

### **GIANT**

Funding was requested in order to support the logistics of the workshop “Airborne Geodesy and Geophysics” held in Dresden, 2017. Participation of young scientists in "Glacial Isostatic Adjustment and Elastic Deformation" International Workshop and the 2<sup>nd</sup> SCAR Summer School on Polar Geodesy will be held in Ladojskoje Ozero, Russia (near St. Petersburg). Support for research stays, preferably of young scientists in the framework of the project GIANT-REGAIN.

### **GRAPE**

Organization of a workshop on ionospheric monitoring and predictions at the Royal Observatory of Belgium. Registration fees and travel support for early stage researchers presenting a paper related to GRAPE.

### **IBCSO**

Travel/subsidence/conference cost to POLAR 2018 in Davos, Switzerland to organize and participate in IBCSO kick-off Meeting and representation

### **Provide an estimate on the % of the budget to be used for support of early career researchers:**

2017: ANTPAS 90%  
ANTVOLC 30%  
GEOLOGICAL HERITAGE AND GEOCONSERVATION 0%  
GEOMAP 100%  
GIANT 70%  
GRAPE 30%

2018: ADMAP 15%  
ANTOS 25%  
ANTPAS 70%  
ANTVOLC 70%  
GEOMAP 40%  
GEOLOGICAL HERITAGE AND GEOCONSERVATION 50%  
GIANT 80%  
GRAPE 30%  
IBCSO 100%

**Provide an estimate on the % of the budget to be used for support of scientists from countries with developing Antarctic programmes (as listed here: <http://www.scar.org/finances/contributions>):**

2017: ANTPAS 10%

2018: ANTOS 25%  
ANTPAS 10%  
GEOMAP 20%

## Linkages

**Please describe any direct support you receive for your activities beyond SCAR (eg. Funds from another organization for a workshop):**

### **ANTOS**

NZARI – supported both co-chairs to attend the KL meeting. All committee members attending the past workshops have been supported by their respective national programmes or other national agencies. In addition, the workshop at the University of Waikato was supported directly by the University by providing the venue and food service.

### **ANTVOLC**

International Association of Volcanology and Chemistry of the Earth's Interior.  
<http://www.iavcei.org/>

### **ANTPAS**

PNRA Italian national Program (4000 Euro for the organization of the 1st Antpas Workshop Varese)

### **GEOMAP**

GeoMAP relies almost entirely on **co-funding** and voluntary efforts. We estimate the co-funding to total **~US\$150,000** per annum:

New Zealand's contribution led by GNS Science is based on US\$70k from Direct Core Funding, US \$20k from a Ross Sea Region (RSR) Terrestrial Data Analysis project (Landcare MBIE CO9X1413) and US\$7k NZ Antarctic Research Institute grant. Marie Byrd Land work completed by Colorado College was supported by a Witter Internship (~US\$10k).

At the time of writing we do not have detailed information on the funding utilized by Gianni Capponi (Italy), John Goodge and David Elliot (USA), Alex Burton-Johnston (UK), or Brett Kitchner and Matthew Cracknell (Australia). Paul Morin and the Polar Geospatial Centre are doing all sorts of other work in support of GeoMAP, providing datasets that we utilize.

### **GIANT**

The International Workshop "Airborne Geodesy and Geophysics with Focus on Polar Applications", held in Dresden, Germany, 19-21 April 2017, was also supported by the Germany Research Foundation (DFG) and the German Society of Polar Research (DGP). The funding of DFG is not finalized yet, it will be in the order of 4000 to 5000 Euro. The DGP supported the workshop providing logistics for financial issues.

### **GRAPE**

Italian National Program for Antarctic Researches (PNRA)

**Please list any major collaborations your group has with other SCAR groups and with organisations/groups beyond SCAR:**

### **ANTPAS**

Official cooperation: IPA International Permafrost Association; not official: IAG International Association of Geomorphology) and IUSS (International Union of Soils Science

### **GEOMAP**

New Zealand Antarctic Research Institute  
Polar Geospatial Centre (PGC), University of Minnesota

### **GIANT**

SCAR Scientific Research Program SERCE  
International Association of Geodesy (IAG), Subcommittee 1.3f "Reference Frame in Antarctica"  
IAG Subcommittee 2.4f "Gravity and Geoid in Antarctica"

### **GRAPE**

EU PROJECTS and initiatives focusing on GNSS services and Space Weather, URSI COMMISSIONS G and F, IAGA.

### **IBCSO**

The IBCSO has strong collaboration to the General Bathymetric Chart of the Oceans (GEBCO), which operates under the joint auspices of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) (of UNESCO)

## Outreach and Capacity Building

**Please describe any outreach, communication and capacity building activities that your group participates in. Also provide information on activities that demonstrate effectiveness as a network. (coordinating activity for your discipline/topic, i.e. mailing list and diversity of scientists involved) (<250 words):**

### **ANTOS**

Several activities, and it is remarkable the support for early career.

### **GEOMAP**

GeoMAP was profiled in the SCAR March 2017 Newsletter and our pages on the SCAR website a reasonably up to date.

A series of presentations and posters were delivered at the SCAR 2016 conference, 2016 AGU Fall meeting and the 2017 NZ Antarctic Conference.

We have been using the same banner and logo for all posters and presentations, deliberately placing them together.

### **GIANT**

Communication is being maintained through the SCAR GIANT website as well as through a GIANT mailing list that is open to all interested persons. There is a strong component for capacity building in supporting (master and PhD) students as well as PostDocs to participate in the planned summer school as well as in possible exchange at expert institutions.

### **GRAPE**

Presentations:

Bergeot N., Why do we need to continue scientific research in Antarctica? Cognac Rotary Club, France, March 2, 2016 Presentation on Antarctica research at the Cognac Rotary Club.

Bergeot N., A little detour through Antarctica ? Berkendael prison, Belgium, May 26, 2017 Presentation in the frame of the "Clés pour l'Univers" association to give scientific presentation in closed institutions (here, prison for women).

Spogli Luca, "Space climate and space weather from the Arctic" lecture within the "Master in sustainable development, geopolitics of resources and arctic studies" organized by the Società Italiana per l'Organizzazione Internazionale (The Italian Society for International Organization), Rome July 2016.

### **IBCSO**

As a regional mapping program of GEBCO, IBCSO is able to benefit from the large GEBCO network of ocean mappers and the growing number of GEBCO/Nippon Foundation scholars. The work of the IBCSO EG is regularly presented on conferences.

As part of SCAR's Capacity Building efforts, such as the Fellowships and Visiting Professor Awards, we are looking for people from all the SCAR groups to form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications. **Please list one or more people (name and email address) from your Group who would be willing to serve as reviewers for the next few years.**

**ANTOS**

S. Craig Cary – [caryc@waikato.ac.nz](mailto:caryc@waikato.ac.nz)

Vonda Cummings - [vonda.Cummings@niwa.co.nz](mailto:vonda.Cummings@niwa.co.nz)

**ANTPAS**

Mauro Guglielmin [mauro.guglielmin@uninsbria.it](mailto:mauro.guglielmin@uninsbria.it)

Goncalo Vieira [vieira@campus.ul.pt](mailto:vieira@campus.ul.pt)

**ANTVOLC**

Massimo Pompilio, INGV-Pisa, Italy, [Massimo.pompilio@ingv.it](mailto:Massimo.pompilio@ingv.it)

John Smellie, Leicester Univ, UK, [jls55@le.ac.uk](mailto:jls55@le.ac.uk)

Adelina Geyer, Barcelona, Spain, [ageyer@ictja.csic.es](mailto:ageyer@ictja.csic.es)

**GEOLOGICAL HERITAGE AND GEOCONSERVATION**

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**GEOMAP**

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**GIANT**

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Lucilla Alfonsi [lucilla.alfonsi@ingv.it](mailto:lucilla.alfonsi@ingv.it)

**IBCSO**

Jan Erik Arndt ([Jan.Erik.Arndt@awi.de](mailto:Jan.Erik.Arndt@awi.de))



## Membership

### Leadership

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Chief Officer	Jesús	Galindo-Zaldívar	Universidad de Granada	Spain	jgalindo@ugr.es	2016	
Deputy Chief Officer	Naresh C.	Pant	University of Delhi	India	pantnc@gmail.com	2016	
Secretary	Marcelo	Leppe	Instituto Antártico Chileno	Chile	mleppe@inach.cl	2016	

*\* Please include any APECS representative / Junior Officers*

### Other members

First Name	Last Name	Affiliation	County	Email

### Requests to the Secretariat:

*If there are specific administrative tasks you would like help with such as your webpages, mailing list, online meeting tools, etc., please include them below:*

#### **ANTOS**

Help with establishing connections with COMNAP.

#### **GEOMAP**

Update webpages with posters and presentations from conferences.