



International
Science Council

Paper No: 11 Agenda item: 4.2.1

SCAR SG

Geosciences

Person
Responsible:

Jesús Galindo-
Zaldívar

XXXVII SCAR Delegates Meeting

India, September 2022

Geosciences Group (GSG)

2020-22 Report

Summary

Report Author(s)

Jesús Galindo-Zaldívar (Chief Officer, Spain),

Naresh C. Pant (Deputy Chief Officer, India),

Marcelo Leppe (Secretary, Chile)

Contributions of Chief Officers of Expert Groups and Action Groups.

Summary of activities from 2020-22

This report includes the activities of Geosciences Group in a setting where the global COVID19 pandemic has delayed the programmed activities. Geosciences Group included 7 expert groups and 3 action groups, four of them cross-disciplinary. EG / AG continue their activities and do not have any major issue. Please peruse details of their activities in Progress reports submitted by each EG / AG.

GSG summary and recommendations following the Business Meeting on 29/07/2022:

1. The Geological Heritage and Geoconservation AG has closed after successfully completing the objectives. Their activities are acknowledged.
2. GEOCON EG, ICEPRO AG has been approved and RINGS AG is being supported. Remaining AG / EG of the Geosciences Group are recommended for continuation.
3. Need to continue in-situ geodetic and geophysical measurements in Antarctica, especially GNSS, to secure foundation of reference frame and enable critical applications in geodynamics, geophysics, glaciology and atmospheric sciences.
4. Need to collect bathymetric and other geophysical data on the way to and from Antarctica and in transit in order to share the data with all nations to improve the Southern Ocean bathymetry map and geophysical dataset for everybody's use.
5. Support to Chile to organize ISAES2025.
6. Approve a budget of \$49.000 for 2023 and 2024 and reallocate the unexpended budget of the groups due to the pandemic setting in order to continue their activities.
7. Support to the elected GSG steering committee (Jesús. Galindo-Zaldivar, chief officer; Naresh C. Pant, deputy chief officer; Laura De Santis, secretary) and acknowledge M. Leppe (former secretary, that has not applied for re-election).

Summary Budget 2021 to 2024

	2021	2022	2023	2024
	Spent	Allocated	Request	Request
(US\$)	31196	60114	24500	24500

Progress to date

Sub-group Outcomes to date

Reports of ANTOS, GRAPE and AntArchitecture cross-disciplinary groups are already included in LSG and PSG. They are not duplicated in this GSG report.

Sub-group	Activity/Outcome
ADMAP	<ul style="list-style-type: none"> + Ongoing data acquisition in Antarctica. + Diverse publications using and/or building on ADMAP2 data compilation and newer, not yet compiled, data.
ANTPAS	<ul style="list-style-type: none"> + Organization of the session “Periglacial and paraglacial environments in Antarctica” within the 6th European Conference on Permafrost. International Permafrost Association. Puigcerdà (Catalonia), 19-24 June 2023
ANTVOLC	<ul style="list-style-type: none"> + Organisation of 2 scientific sessions (EGU2021 – EGU2022) + Geological Society of London Memoirs “Volcanism in Antarctica: 200 million years of subduction, rifting & continental break-up” (editors: John Smellie, Kurt Panter and Adelina Geyer) “The Geochemistry and Geophysics of the Antarctic Mantle” (editors Adam P. Martin and Wouter van der Wal). +Online databases on tephra record and analyses.
CGG	<ul style="list-style-type: none"> + BGR expedition “GANOVEX XIV-BOOST” with high-resolution aeromagnetic survey and geological field work in northern Victoria Land. + Contribution to the new Gondwana Map (Antarctic part). + Contributions in AGU and EGU.
GEOLOGICAL HERITAGE AND GEOCONSERVATION	<ul style="list-style-type: none"> + Identification of 9 Geological Frameworks for Antarctica that allow the systematic identification of individual Geosites and identification as a Geosite the Cretaceous-Paleogene transition at Seymour (Marambio) Island. An Editorial Note about this was published in Antarctic Science. + SCAR Working Paper “Systematic identification of globally important geological sites in Antarctica” submitted by SCAR to the ATCM XLIII and CEP XXIII held in Paris in June 2021. + List of national repositories (museums, universities, institutes, etc.) housing Antarctic geological and palaeontological specimens.
GIANT	<ul style="list-style-type: none"> + Measurement campaigns and reprocessing data. + Publication preparations at PANGAEA. + Meetings and workshops.
IBCSO	<ul style="list-style-type: none"> + IBCSO publication / IBCSO v2 paper / IBCSO v2 publicly available. + Identification of data sets / increased data coverage / increased seafloor representation by measurements. + Development of IBCSO workflow SEAHORSE / advanced product generation.

Sub-group Cash Flow

Most of the groups have not been able to spend their budget, due to the pandemic setting. It is requested that amounts may be reallocated to the next years, when there is an increased opportunity of developing group activities.

Sub-group	Allocation	Amount spent		
		2020	2021	2022
ADMAP	6500	1100		
ANTARCHITECTURE	2000			
ANTOS	2000			
ANTPAS	7500	728		
ANTVOLC	5000	5000		
CGG	5000			
GEOLOGICAL HERITAGE AND GEOCONSERVATION	6924	3438		
GEOMAP	4500			
GIANT	6000			

Future plans

Sub-group future plans

ANTOS, GRAPE, AntArchitecture and RINGS are cross-disciplinary groups already included in LSG and PSG reports. They are not duplicated in this GSG report.

Sub-group	Planned activity
ADMAP	+ EGU splinter meeting 2023. + SCAR/OSC group meeting 2024.
ANTPAS	+ Organization of the session “Periglacial and paraglacial environments in Antarctica” within the 6th European Conference on Permafrost. International Permafrost Association. Puigcerdà (Catalonia), 19-24 June 2023. + SCAR/OSC group meeting 2024. + Antarctic session 12th International Conference on Permafrost 2024.
ANTVOLC	+ SCAR White Paper on the state of Antarctic volcanic research and future directions. + Meetings and conferences (EGU, AGU, SCAR...) + Reinforce the link between the AntVolc and the International Association of Volcanology and Chemistry of the Earth's Interior -IAVCEI-.
CGG	+ Analysis, publication of “GANOVEX XIV-BOOST” data set, high-resolution aeromagnetic survey and geological field work in northern Victoria Land. + Finalize the new Gondwana Map (Antarctic part). + EGU, AGU, OSC meetings and proposal of a new SRP.
GEOCON	+ Advance the identification of Geosites. + Update the list and information on repositories of geological specimens. + Maintain contacts with SCATS and with the SCAR Scientific Research Programme Ant-ICON for inputs related to geoconservation.
GIANT	+ Reprocessing GNSS data. + Metadata and increasing visibility, providing information on GNSS monumentation. + Meeting and workshops. EGU, AGU, OSC, INSTANT.
IBCSO	+ Printing and distribution of IBCSO v2 chart. + Participation in SCAR Science Meeting.
ICEPRO	+ Build working groups focusing on every traditional and newly-developed paleoproxy. + Define common sampling strategy and harmonize analytical work. + Organize an open town hall meeting during the INSTANT Conference 11-14 September 2023.

Sub-groups recommended for closure

(Provide full name, current leads, and brief explanation for closure)

Sub-group	Leaders	Reasons for closure
GEOLOGICAL HERITAGE AND GEOCONSERVATION	Marcelo Reguero Luis Carcavilla Kevin Hughes	Group has successfully completed their tasks.

New sub-groups being proposed

(Provide full name, proposed leads, and cross-reference to establishment document)

Sub-group	Leaders	Cross-reference SCAR Delegates Paper
GEOCON	Jeronimo Lopez-Martinez Marcelo A. Reguero Kevin Hughes Anne Grunow Cliff Atkins	See Sub-group reports on website: 2022 New Group Proposal EG-GEOCON
ICEPRO	Johan Etourneau Carlota Escutia Amy Leventer Julianne Müller	See Sub-group reports on website: 2022 New Group Proposal AG-ICEPRO
RINGS***	Kenichi Matsuoka	This group, previously approved by SCAR Delegates, is now supported by GSG

Budget

Planned use of funds for 2022 to 2024

The global pandemic prevented in person meetings in some cases and most of the tasks have been delayed. In this framework, the planned use of funds is flexible and the amounts may be reallocated.

A Geosciences Miscellaneous item will be created to reallocate in an efficient way the amounts that is the requirement of the different groups. Also, due to the late arrival of the requests of some groups, amount indicated is \$0 and funds will be provided considering their requests by transfer from Miscellaneous Geosciences.

Year (YYYY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2023-24	ADMAP	0	Graeme Eagles	graeme.eagles@awi.de
2023-24	ANTARCHITECTURE	2000	Robert Bingham	r.bingham@ed.ac.uk
2023-24	ANTOS	2000	Craig Cary	caryc@waikato.ac.nz
2023-24	ANTPAS	0	Mauro Guglielmin	mauro.guglielmin@uninsubria.it
2023-24	ANTVOLC	5000	Adelina Geyer	ageyer@ictja.csic.es
2023-24	CGG	7500	Joachim Jacobs	joachim.jacobs@uib.no
2023-24	GEOCON	6000	Anne Grunow	grunow.1@osu.edu
2023-24	GIANT	6000	Mirko Scheinert	mirko.scheinert@tu-dresden.de
2023-24	GRAPE	4500	Giorgiana De Franceschi	giorgiana.defranceschi@ingv.it
2023-24	IBCSO	0	Boris Dorschel	boris.dorschel@awi.de
2023-24	ICEPRO	3000	Johan Etourneau	johan.etourneau@u-bordeaux.fr
2023-24	RINGS	2000	Kenichi Matsuoka	Kenichi.Matsuoka@npolar.no
2023-24	Miscellaneous Geosciences	11000	Jesus Galindo Naresh Pant Laura De Santis	jgalindo@ugr.es pantnc@gmail.com ldesantis@ogs.it
TOTAL		49000		

Membership

Leadership

The steering committee have been elected with the agreement of a new period of 4 years (ending in 2026, due to the special circumstances of the pandemic setting), there has been re-elected Jesús Galindo-Zaldivar (chief officer) and Naresh Pant (deputy chief officer). The former secretary (Marcelo Leppe) has not applied for re-election and there has been elected Laura De Santis (Secretary).

Role	First Name	Last Name	Affiliation	Country	Primary Language	Email	Date Started
Chief officer	Jesús	Galindo-Zaldivar	Universidad de Granada	Spain	Spanish	jgalindo@ugr.es	sept, 2016
Deputy chief officer	Naresh Chandra	Pant	University of Delhi	India	English	pantnc@gmail.com	sept, 2016
Secretary -END	Marcelo	Leppe	Instituto Antártico Chileno	Chile	Spanish	mleppe@inach.cl	sept, 2016
Secretary-ELECTED	Laura	De Santis	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS	Italia	Italian	ldesantis@ogs.it	aug, 2022

(Please identify early-career researchers with * in first column)

Other members

Updated member list on the webpage: <https://www.scar.org/science/gsg/contact/>

First Name	Last Name	Affiliation	Country	Primary Language	Email
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*(Please identify early-career researchers with * in first column)*

Additional information (optional)

Notable Papers

1. Cannone, N., Malfasi, F., Favero-Longo, S.E., Convey, P., Guglielmin, M., Acceleration of climate warming and plant dynamics in Antarctica. *Current Biology*, 2022 Apr 11; **32**(7):1599-1606.e2.

This work has been written during the pandemics by almost all members of ANTPAS and enhance the role of Climate Change in Antarctica and its effects on the permafrost ecosystems

2. Cianfarra, P., Locatelli, M., Capponi, G., Crispini, L., Rossi, C., Salvini, F., & Federico, L., 2022. Multiple reactivations of the Rennick Graben Fault system (northern Victoria Land, Antarctica): New evidence from paleostress analysis. *Tectonics*, **41**, e2021TC007124. <https://doi.org/10.1029/2021TC007124>.

In this paper we investigated strike-slip tectonics affecting the Rennick Graben in the northern Victoria Land sector of East Antarctica.

3. Dorschel B., Hehemann L., Viquerat S., Warnke F., Dreutter S., Schulze Tenberge Y., Accettella D., An L., Barrios F., Bazhenova E., Black J., Bohoyo F., Davey C., De Santis L., Escutia Dotti C., Fremantle A.C., Fretwell P.T., Gales J.A., Gao J., Gasperini L., Greenbaum J.S., Jencks J.H., Hogan K., Hong J.K., Jakobsson M., Jensen L., Kool J., Larin S., Larter R.D., Leitchenkov G., Loubrieu B., Mackay K., Mayer L., Millan R., Morlighem M., Navidad F., Nitsche F.O., Nogi Y., Pertuisot C., Post A.L., Pritchard H.D., Purser A., Rebecq M., Rignot E., Roberts J.L., Rovere M., Ryzhov I., Sauli C., Schmitt T., Silvano A., Smith J., Snaith H., Tate A.J., Tinto K.J., Vandembosche P., Weatherall P., Wintersteller P., Yang C., Zhang T., Arndt J.E., 2022. The International Bathymetric Chart of the Southern Ocean Version 2. *Scientific Data* **9**, 275, <https://doi.org/10.1038/s41597-022-01366-7>.

This paper is the release paper of IBCSO v2, the most detailed and comprehensive map of the seafloor south of 50°S.

4. Dziadek, R., Ferraccioli, F., and Gohl, K., 2021. High Geothermal Heat Flow beneath Thwaites Glacier in West Antarctica Inferred from Aeromagnetic Data. *Commun. Earth Environ.* **2**, 162. doi:10.1038/s43247-021-00242-3.

In this paper (published in a Nature portfolio journal), which estimates geothermal heat flux beneath the fastest changing sector of the West Antarctic Ice Sheet, we performed new magnetic analyses and geological interpretation of the West Antarctic Rift System.

5. Ebbing, J., Y. Dilixiati, P. Haas, F. Ferraccioli, and S. Scheiber-Enslin, 2021. East Antarctica magnetically linked to its ancient neighbours in Gondwana: *Scientific Reports*, **11**, 1–11, doi: 10.1038/s41598-021-84834-1.

In this paper (published in a Nature portfolio journal), which conforms aeromagnetic and satellite anomaly data together for the first time, we performed new interpretations of East Antarctic provinces within Gondwana.

6. Florindo, F., Siegert, M., De Santis, L., & Naish, T. R. (2022). *Antarctic Climate Evolution—second edition*. Elsevier.

This contribution summarizes the knowledge concerning the ice and climate evolution of the Antarctic continent and its surrounding seas through the Cenozoic era to present day and into the future.

7. Hrbáček, F.; Oliva, M.; Abramov, A.; de Pablo, M.A.; Ramos, M.; Vieira, G.; Goyanes, G.; Hansen, C.; O'Neill, T.; Lacelle, D.; Ponti, S.; Guglielmin, M.; Pastirikova, L.; Schaefer, C. & Francellino, M. (submitted). Variability of active layer and permafrost thermal regime and thickness in Antarctica. *Earth-Science Reviews*.

This work has been written during the pandemics in order to summarize the current state of knowledge of permafrost (and active layer) state in Antarctica. It constitutes a summary paper carried out by ANTPAS members that is expected to be a reference for future researchers working on permafrost science in Antarctica.

8. Hughes, K.A., Carcavilla, L., Crame, A., Díaz-Martínez, E., Elliot, D., Francis, J., López-Martínez, J., Reguero, M. (2020). Seymour (Marambio) Island: an outstanding example of Antarctic geological heritage. *Antarctic Science* **32**, 167.

This editorial provides brief details of the new methodology for identification of Antarctic Geological Heritage developed by the Action Group. It describes the application of the methodology to identify the first Geosite in Antarctic using the methodology adopted by SCAR.

9. Kumar, A., Imura, S., Kim, S. J., Krishnan, K. P., Mohan, R., Pant, N. C., & Turner, J. (2021). Polar Studies-Window to the changing Earth. *Polar Science*, 30, 100767

The polar regions are a critical component of the global climate system, with changes taking place at high latitudes having global implications. The contributed articles in this issue describe polar scientific studies from various national and international research organizations.

10. Smellie, J.L., Panter, K.S. and Geyer, A. (eds) 2021. Volcanism in Antarctica: 200 million years of Subduction, Rifting and Continental Break-up. *Geological Society, London, Memoirs*, **55**, 816 pp.

This book provides a summary on the present-day knowledge on Antarctic volcanism.

Direct support from outside organisations received for your activities

(Numbered list with values indicated if direct cash support. Please restrict in-kind support to substantive in-kind support only)

AntVolc: ICTJA- CSIC – in kind support

Major collaborations your Science Group has with other SCAR groups and with organisations/groups beyond SCAR

Within SCAR

1. Links crossing geosciences groups.
2. SERCE
3. PAIS
4. SCATS
5. INSTANT
6. Geothermal Heat Flux
7. Quantarctica 3
5. AnT-ERA
6. AntEco
7. ANTOS

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8. Standing Committee on Antarctic Geographic Information (SCAGI)
9. Standing Committee on Antarctic Data Management (SCADM)

Outside SCAR

1. IAVCEI
2. IGCP-628: Geological map of Gondwana
3. IGCP 648: Supercontinent cycles & global geodynamics
4. ESA & 3D Earth
5. 4D Antarctica
6. IUGG
7. International Lithosphere Programme (upcoming focus on East Antarctica)
8. Antarctic Resolution
9. One Geology
10. PGC: Polar Geospatial Centre webserver imagery, photos and data (eg. REMA)
11. IPA (International Permafrost Association)
12. LTER Long Term Ecological Research
13. ITEX (international Tundra Experiment)
14. IAG (International Geomorphology Association)
15. Nippon Foundation – GEBCO Seabed 2030 Project
16. General Bathymetric Chart of the Oceans
17. International Association of Geodesy (IAG) Subcommittee 1.3f: Regional reference frame in Antarctica
18. International Association of Geodesy (IAG) Subcommittee 2.4: Gravity and Geoid in Antarctica

Outreach, communication and capacity-building activities

AntVolc

AntVolc now has a new priority line to promote Education and Outreach. Our first step here has been setting up active social media accounts for our group. These are now online and can be found on twitter and facebook by searching @antvolc (or here: <https://twitter.com/antvolc> ; <https://www.facebook.com/AntVolc>). The coordinator is an Early Career Scientist, Max Van Wyk de Vries (vanwy048@umn.edu).

CGG

Press release on papers on the new magnetic anomaly compilation of Gondwana and the paper on the interpretation of new magnetic anomaly data at South Pole.

IBCSO

The release of IBCSO v2 was prominently featured in public media, including [the BBC](#) and [National Geographic](#). An attention score is provided by [Altmetrics](#). This amazing media echo highlighted the general public interest in the Southern Ocean, Antarctica, GEBCO, and Seabed 2030. And it has already been used in the recent good news story of the return of fin whales to Antarctica <https://doi.org/10.1038/s41598-022-13798-7>.

Contributions to equality, diversity, and inclusion (EDI)

During the Geosciences 2022 meeting, it has been aimed to improve EDI activities in the different groups.

SCAR Fellowship Reviewers

First Name	Last Name	Email	Principal Expertise
Adam	Martin	a.martin@gns.cri.nz	Mantle petrology; igneous chemistry; Erebus volcanic province
Adelina	Geyer	ageyer@ictja.csic.es	Active volcanism; Deception Island
Alessio	Di Roberto	Alessio.diroberto@ingv.it	Tephrochronology
Andreas	Läufer	andreas.laeufer@bgr.de	Tectonics, geochronology, geodynamics
Antonia	Ruppel	antonia.ruppel@bgr.de	Geophysics, geodynamics
Berry	Lyons	Lyons.142@osu.edu	Ecology Aquatic
Boris	Dorschel	Boris.Dorschel@awi.de	Geology, Habitat mapping
Detlef	Damaske	d.damaske@t-online.de	Aeromagnetism
Fausto	Ferraccioli	ffe@bas.ac.uk	Potential fields, tectonophysics, geodynamics
Graeme	Eagles	Graeme.Eagles@awi.de	Plate Kinematics
Joachim	Jacobs	joachim.jacobs@uib.no	Tectonics, geodynamics, geochronology
John L.	Smellie	jls55@leicester.ac.uk	physical volcanology, especially glaciovolcanism, eruptive palaeoenvironments
Kurt	Panter	kpanter@bgsu.edu	Igneous petrology / geochemistry / mantle geochemistry
Laura	Crispini	andreas.laeufer@bgr.de	Structural geology geodynamics
Marc	Oliva	marcoliva@ub.edu	Permafrost Quaternary Geology
Matt	King	Matt.King@utas.edu.au	Geodesy, GNSS, GIA
Mauro	Guglielmin	Mauro.guglielmin@uninsubria.it	Permafrost, Ecology
Max	Maximillian Van Wyk de Vries	vanwy048@umn.edu	Volcano-ice interactions, glaciology, volcanic hazard modelling.
Mirko	Scheinert	Mirko.Scheinert@tu-dresden.de	Geodesy, GNSS
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