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Agenda Item:

4.1.1

Person Responsible:

D
Bromwich

**XXXIV SCAR Delegates Meeting
Kuala Lumpur, Malaysia, 29-30 August 2016**

Physical Sciences Action and Expert Group Reports

Action Groups:

- Antarctic Clouds and Aerosols (ACA)
- Antarctic Near-shore and Terrestrial Observing System* (ANTOS)
- **Southern Ocean Acidification****
- Polar Atmospheric Chemistry at the Tropopause (PACT)
- Animal monitoring via remote sensing** (Remote Sensing)
- Sun Earth Relationships and Antarctica (SERAnt)
- Snow in Antarctica (SnowAnt)

Expert Groups:

- Antarctic Climate Change and the Environment (ACCE)
- Antarctic Sea-ice Processes and Climate (ASPeCt)
- GNSS (Global Navigation Satellite System) Research and Application for Polar Environment*** (GRAPE)
- International Partnership in Ice Core Sciences (IPICS)
- Ice Sheet Mass Balance and Sea Level (ISMASS)
- Operational Meteorology in the Antarctic (OpMet)
- CLIVAR/CliC/SCAR Southern Ocean Region Panel (SORP)

* Sponsored by SSG-GS, SSG-LS and SSG-PS

** Co-sponsored by SSG-LS and SSG-PS

*** Co-sponsored by SSG-GS and SSG-PS

As of 1 August 2016:

Reports from Groups not submitted to the Secretariat are in red and not included in this document.



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Antarctic Clouds and Aerosols (ACA) Action Group

Contacts: Tom Lachlan-Cope

Over the last two years members of the group of organized and convened sessions on Antarctic clouds at IUGG in Prague and at EGU in 2016. These sessions have been very successful and have increased international cooperation. Over the period interest has increased in the processes that control clouds over the Southern Ocean as large errors in climate models over this area seem to point to problems in cloud parameterization. This has led to members of the group getting involved in major grant applications to investigate Southern Ocean clouds.

We have had an ad hoc meeting of the Action group during EGU in 2016. This meeting was very successful and led to a proposal to set up a database of polar cloud observations – starting with the Antarctic Observations. This activity will start with the setting up of a database of the metadata of cloud observations and will initially be hosted at BAS.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

**Date/Year Group Approved:
Date/Year Group is to End:**

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y (if possible)



SCAR Group xxx
SSG PS/LS/GS
Person xxx
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Further Details:

Major Activities and Significant Progress from past 2 years

Two symposium at IUGG and EGU

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

Setting up database of polar cloud observations

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

External Linkages – Support and Coordination beyond SCAR:



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Please describe your outreach, communication and capacity building activities:

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:



Person Responsible: xxx

[illegible]



SCAR Group

SOG

Person
Responsible:

ANTOS

LS

S. Craig
Cary and
Vonda
Cummings

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Kuala Lumpur, Malaysia, 29-30 August 2016**

Antarctic Near shore and Terrestrial Observation System (ANTOS)

Contacts: (name and email)

Craig Cary - caryc@udel.edu

Vonda Cummings - Vonda.Cummings@niwa.co.nz

Activities from 2014-2016

August 2014: A committee was elected at a workshop held at the SCAR OSC (Auckland); this was attended by 43 people from 10 nations. Following this meeting we proposed and were granted permission to establish an SCAR Action Group to further develop the idea of ANTOS.

ANTOS sits primarily within the SOG-LS, but is a cross-disciplinary project involving SOG-PS and SOG-GS. The Chairs are Craig Cary, New Zealand (primary) and Vonda Cummings, New Zealand (co-chair). Committee members include Dana Bergstrom, Australia; Megumu Tsujimoto, Japan (Secretary); Emmanuelle Sultan, France; Soon-Gyu Hong, Korea (Data management advisor); Charles Lee, NZ (Technical); and Elie Verleyen, Belgium.

August 2015: A workshop was held to develop an implementation plan for ANTOS. The workshop was attended by 25 researchers from 12 countries (Australia, Belgium, Chile, France, Germany, Italy, Japan, Korea, NZ, Sweden, UK, USA) and was supported through funds from the New Zealand Antarctic Research Institute (NZARI), AntEco, and the University of Waikato, New Zealand where the meeting was hosted.

A full report summarising the activities and outcomes of the meeting was produced, and is available on the ANTOS website (<http://www.scar.org/antos/antos-publications>).

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.



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We recommend that in order to become established ANTOS becomes a Task Group with an extended life span (≥ 4 years). This was a recommendation from the August 2015 workshop. We assume that this will require both a vote and approval.

Date/Year Group Approved: August 2014

Date/Year Group is to End: December 2016

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y

Further Details:

Major Activities and Significant Progress from past 2 years

August 2015 workshop:

Key characteristics of locations, parameters to measure, frequencies, scales and gradients of measurement, and the technical requirements of the system were discussed (i.e., what do we need to measure and monitor in order to detect change, where do we need to do this, and how?). The strong consensus was for locations that share basic characteristics of (a) representative biodiversity for the region concerned, (b) environmental features likely to be informative in a context of change studies, and (c) the practicality of access and working conditions. A 3-tiered approach both to platform complexity and cost was recommended, to enable wide national programme involvement and achievement of the scientific goals. At all tiers, biologically relevant attributes of change need to be assessed within six broad criteria (physical environment, colonisation, diversity, distribution, functional and genetic).

KOPRI (Soon-Gyu Hong) agreed to develop the database and data management and access plan for ANTOS. A data base sub-committee was



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established, comprised of Stefano Schiaparelli/Drew Lohrer (Italy/NZ; marine), Craig Cary/Charlie Lee (both NZ; terrestrial), Fraser Morgan (NZ; database design), and Adrian McDonald (NZ; statistics). We anticipate that the ANTOS database will be designed and established to allow easy access to the real-time data that is intimately linked to existing databases and follows internationally accepted protocols. This is huge step forward for ANTOS and will certainly enable the way forward for the programme.

Pilot deployments:

Two pilot Tier 1 terrestrial installations were deployed at Cape Adare in Northern Victoria Land in summer 2015/16. One of these units is fully telemetered and has been providing a continuous data stream since deployment. In conjunction with these installations a comprehensive biodiversity survey of the immediate area has been carried out as suggested in the ANTOS protocols. Also in summer 2015/16, pilot coastal marine ANTOS Tier 1 and 2 installations were deployed in Terra Nova Bay (Korean, Italy, NZ).

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

We request that ANTOS advances to a Task Group, to allow sufficient time and resources for its implementation. The strength of ANTOS is its (i) unification of researchers over the necessity for, and the extreme value of, a long-term vision for observation systems to understand biological systems in a changing environment, and (ii) the continent-wide approach. With KOPRI agreeing to develop and house the database we are now in a very good position to see this happen.

Actions include:

- A workshop at the Kuala Lumpur OSC, August 2016, to set tasks and timelines for final development and implementation.
- An international survey of scientists to scope areas they think are the best for long-term monitoring of environmental change. This will provide information on datasets currently in existence, what is being measured, length of records, etc. The aim of this will be get input on the most scientifically and biologically appropriate areas to target for ANTOS around the continent.



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Timeline:

We have two immediate tasks – to establish the Task Group (August 2016), and to conduct the scientific survey (August to December 2016). While we anticipate annual workshops will occur over the Task Groups' duration, other milestones will be determined in consultation with the wider ANTOS community (e.g., at the 2016 KL SCAR OSC).

Proposed Budget for 2017 and 2018

This will be decided on at the OSC ANTOS workshop in KL – this is just a projection.

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
July 2017	Technical Workshop	10,000	Craig Cary	caryc@waikato.ac.nz
June 2018	Database development	10,000	Craig Cary	caryc@waikato.ac.nz

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

The location of the technical workshop has not been determined yet as we will likely host the event central to those wishing to attend. Most if not all of the support will go to those needing support to attend including early career and countries with small Antarctic Programmes. If you look at our 2015 workshop – 80% of the funds went to these participants.

External Linkages – Support and Coordination beyond SCAR:

The New Zealand Antarctic Research Institute was the major sponsor of the August 2015 workshop, through an NZARI Type C grant.

Recognition of its importance and approval by national programmes will be key to the success of ANTOS. Therefore, one important goal as a new Task Group would be to connect more formally with COMNAP. The strength of ANTOS is its (i) unification of researchers over the necessity for and the extreme value of a long-term vision for observation systems to understand biological systems in a changing environment, and (ii) the continent-wide approach. Given the value of the information generated by ANTOS in



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informing policy and management of the region at national and international levels, we consider that COMNAP should be integrally involved in the development of ANTOS, to help ensure its long term viability. At the KL SCAR OSC meeting we will make every effort to have COMNAP representatives at the meeting.

Please describe your outreach, communication and capacity building activities:

At this point in with the ANTOS Action Group we have relied on our website and a SCAR sponsored list server to communicate with our members. We have also prioritized support of early career researchers with our limited funding (e.g. via travel grants).

Should we morph into an Task Group, we anticipate the website will be developed more extensively. We would also encourage further participation of young scientists and nations, as well as an equal gender balance, within ANTOS.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

August 2015 Workshop Report (<http://www.scar.org/antos/antos-publications>).

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

S. Craig Cary, University of Waikato, New Zealand
Vonda Cummings, NIWA, New Zealand
Charles Lee, University of Waikato, New Zealand



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Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

On the 'membership' page, please include this text:

"If you are interested in joining ANTOS, sign up to the list server circulation list HERE (antos-owner@lists.scar.org)."

Also include a list of the chairs and committee members.

Always the last thing to be addressed. We have a person who has agreed to do the web development. We will make sure that this has been done by the OSC.

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Craig	Cary	Uni. Of Waikato	NZ	caryc@waikato.ac.nz	8/14	8/16
Vonda	Cummings	NIWA	New Zealand	Vonda.Cummings@niwa.co.nz	8/14	8/16

S. Craig Cary -



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Bio: His research interests lie in the comparative physiology, biochemistry and ecology of marine and terrestrial microbial communities, with a focus on deep ocean geothermal and Antarctic terrestrial systems. Most recently his lab has focused on the use of high through-put genomic and metagenomic approaches to resolve biochemical adaptations for life in these extreme geochemical environments. In addition to the extremophile work he also is involved in the development of advanced genetic probing technologies for detect and enumerate bacteria and toxic harmful algal bloom species in the environment. A primary focus of both programs is the interfacing of new bioinformatic capabilities with genomic technologies specifically in metagenome analysis of complex microbial communities. The local environmental work has an emphasis in the development biometrics to assess ecosystem health. He currently leads a large laboratory at the University of Waikato in New Zealand, with a continued joint position at the University of Delaware, USA.

Web: <http://sci.waikato.ac.nz/about-us/people/caryc>



Other members

Committee:

Dana	Bergstrom	AAD	Aus	dana.bergstrom@aad.gov.au	8/14	8/16
Megumu	Tsujimoto	Japan	Japan	megumutsujimoto@gmail.com	8/14	8/16
Soon Gyu	Hong	KOPRI	Korea	polypore@gmail.com	8/14	8/16
Charles	Lee	Uni. Of Waikato	NZ	cklee@waikato.ac.nz	8/14	8/16
Emmanuelle	Sultan	National	France		8/14	8/16



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		History Museum				
Elie	Verleyen	Uni. of Ghent	Belgium	Elie.Verleyen@UGent.be	8/14	8/16
Byron	Adams	Bringham Young Uni.	USA	byron_adams@byu.edu	8/14	8/16

Also see the ANTOS list server for a more extensive list of interested researchers.



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Person Responsible:	xxx

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Polar Atmospheric Chemistry at the Tropopause (PACT)

Contacts: (name and email)

Andrew Klekociuk (Andrew.klekociuk@aad.gov.au)
Gennadi Milinevsky (<mailto:mgenmilinevsky@gmail.com>)

1-2 paragraph summary of activities from 2014-2016

Work for PACT continued towards finalizing a database on tropopause region parameters that is being derived using ozonesonde measurements poleward of 50° latitude. The database uses ozonesonde data from 13 Southern Hemisphere (SH) sites (including the lower latitude sites of Melbourne (Australia) and Lauder (New Zealand) for comparison), and 17 Northern Hemisphere sites.

Only limited work was possible in the reporting period as co-chair Klekociuk was seconded to other duties for a significant period. The current intention is to complete and submit the main publication and secondary publications by the end of 2016, and have the database material fully publically available once the main publication is accepted.

During the reporting period, we added ozonesonde data for 2015 from the World Ozone and Ultraviolet Data Centre and updated trajectory products to include Aura Microwave Lib Sounder chemistry to the end of 2015. A PhD student, Mr. Vladyslav Mogylchak at the Taras Shevchenko National University of Kyiv under the supervision of co-chair Milinevsky, began analysis of tropopause data from the polar ozonesonde sites included in the database.



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Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

Nil

Date/Year Group Approved:

Jul 2008

Date/Year Group is to End:

Dec 2016

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

N – Unfortunately, as neither of the co-chairs will be at the OSC.



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Further Details:

Major Activities and Significant Progress from past 2 years

The major activities have involved drafting of publications and finalization of the database. We have derived climatological means of tropopause height and sharpness, and placed limits on inter-annual and long-term variability in these parameters and ozone mixing ratios in the vicinity of the tropopause. The time period covered is generally 1990-2015 (2004-2015 for satellite-derived products), with some sites such as Syowa and South Pole extending to the early 1960s.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

Complete submission of papers and fully release the database.

Proposed Budget for 2017 and 2018

No budget proposed.

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
N/A				

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

External Linkages – Support and Coordination beyond SCAR:



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Data will be available from the Australian Antarctic Data Centre (<https://data.aad.gov.au/>). See <http://go.nasa.gov/1UMG67n>

Please describe your outreach, communication and capacity building activities:

Training of a PhD student.
Provision of information via the web (at AADC).
Peer-reviewed publications.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

Webpages:

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Please include any updates for your website below:

<http://www.scar.org/pact>
<http://go.nasa.gov/1UMG67n>



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If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Andrew	Klekociuk	Australian Antarctic Division	Australia	Andrew.klekociuk@aad.gov.au	Jul 2008	
Gennadi	Milinevsky	Taras Shevchenko national University of Kyiv	Ukraine	genmilinevsky@gmail.com	Jul 2008	

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

Dr Andrew Klekociuk is a Principal Research Scientist and research Section Leader with the Australian Antarctic Division (AAD) where he undertakes collaborative research on the development and analysis of advanced climate model simulations for the Antarctic region, the investigation of climate variability and ozone change, and the development of atmospheric remote sensing instruments. Dr Klekociuk has over 30 years of research experience in astrophysics, space physics, atmospheric physics and climate science, which includes more than four years of accumulated Antarctic field work.
<http://www.antarctica.gov.au/science/meet-our-scientists/dr-andrew-klekociuk>
<http://acecrc.org.au/people/dr-andrew-klekociuk>



Person Responsible: xxx

[illegible]



SCAR Group

Remote

SSG

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Person
Responsible:

H.-U.Peter

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Action Group on Remote Sensing

Contacts: Hans-Ulrich Peter <bpe@uni-jena.de>

1-2 paragraph summary of activities from 2014-2016

- Organizing workshops/sessions during the SCAR Open Science Conferences 2014 and 2016
- Organization and implementation of Action group-meetings during the SCAR conferences 2014 and 2016

Recommendations that Delegates and Chief Officers should consider (if any):Please indicate if voting/approval is necessary or if they are just asked to note information.

Date/Year Group Approved: 2013
Date/Year Group is to End: 2018ff?

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



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Person
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**Remote
Sensing**

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Further Details:

Major Activities and Significant Progress from past 2 years

Organizing workshops/sessions during the SCAR Open Science Conferences 2014 and 2016

2014: 27.August. „Remote Sensing of the Antarctic Environment“ with 12 talks (Convener: Peter Fretwell , Michelle LaRue and Hans-Ulrich Peter) AG gave financial support for young scientists

2016: 22. and 23.August: Session 21: Remote sensing of the Antarctic environment: Multidisciplinary Advances: Convener : Hong Tat Ewe, Shridhar Jawak, Rob Massom, Oscar Schofield & Hans-Ulrich Peter

. 20 talks and 16 poster presentations. One young scientist will get financial support from the Action Group

Organization and implementation of Action group-meetings during the SCAR conferences 2014 and 2016

25.8.2014

- Discussion about the use of an international Database to collect penguin breeding pair data . One possibility could be PANGAEA.
- First discussion about rules for using Drones to determine the size of bird colonies and seal concentrations. First results for penguins were presented.
- Informations about new satellites

20.08.2016

This is a joint meeting of the SCAR Action Group on remote sensing of animals and the new SOOS working Group Censusing Animal Populations from Space (CAPS). Half of the day will be devoted to SCAR Action Group business, and half to discussing the CAPS pack-ice seal census project.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years



SCAR Group **Remote Sensing**
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 Person H.-U. Peter
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The AG will follow the future developments: Recent technology in geospatial science over the last decade have motivated major advances in our understanding of the Antarctic continent and surrounding oceans. These developments have (and will) included the use of new satellite remote sensing platforms (e.g. WorldView and Landsat series of satellites) and methods to obtain geospatial information, such as, automatic/ semi-automatic extraction of information from remote sensing images, new mapping techniques for ice sheet properties (roughness, thickness and velocity) usage of remotely sensed data for Antarctic glaciological and mass balance studies and ice sheet flow and geodynamics over short temporal scales. Other important points are remote sensing of the marine cryosphere (including sea ice and its snow cover) and its interactions with ocean and atmosphere and generation of digital elevation models (DEMs) of Antarctic regions.

The fast developments in monitoring bird and seal populations and habitats with remote sensing applications used unmanned aerial vehicle (UAV) including disturbance capability and environmental impacts of UAVs on bird and seal populations.

Another development is the use of Autonomous Underwater Vehicle (AUV) technology to investigate small-scale characteristics and changes. Much of this research is cross-disciplinary in its nature and this has led to noteworthy advances across a range of Antarctic scientific disciplines.

The Action Group will focus in the future on such multi-disciplinary research and includes new and emerging research frontiers in Antarctic science. The AG will merge snow and ice studies with climate research, ice-ocean interaction, and animal monitoring via remote sensing. The next meeting will be during SCAR Biology in Belgium (2017) and SCAR/IASC Conference in Davos (Switzerland) 2018.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
08/2017	Travel for young scientist to SCAR Biology in Belgium	900	Peter, H.-U.	bpe@uni-jena.de
06/2018	Travel for young scientist to SCAR/IASC Conference	1100	Peter, H.-U.	bpe@uni-jena.de



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Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

For early career scientists: 100%

External Linkages – Support and Coordination beyond SCAR:
ATCM, CEP, CCMLR, COMNAP, IAATO

Please describe your outreach, communication and capacity building activities:

Results (on disturbance data by drones) will be used by CEP for rules to use drones near bird and seal concentrations.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

Casanovas, P., Black, M., Fretwell, P., & Convey, P. (2015). Mapping lichen distribution on the Antarctic Peninsula using remote sensing, lichen spectra and photographic documentation by citizen scientists. *Polar Research*, 34(0). doi:10.3402/polar.v34.25633

Fretwell, P. T., & Trathan, P. N. (2009). Penguins from space: Faecal stains reveal the location of emperor penguin colonies. *Global Ecology and Biogeography*, 18(5), 543-552. doi:10.1111/j.1466-8238.2009.00467.x

Fretwell, P. T., LaRue, M. A., Morin, P., Kooyman, G. L., Wienecke, B., Ratcliffe, N., Trathan, P. N. (2012). An Emperor Penguin Population Estimate: The First Global, Synoptic Survey of a Species from Space. *PLoS ONE*, 7(4). doi:10.1371/journal.pone.0033751

Fretwell, P. T., Staniland, I. J., & Forcada, J. (2014). Whales from Space: Counting Southern Right Whales by Satellite. *PLoS ONE*, 9(2). doi:10.1371/journal.pone.0088655



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Goebel, M. E., Perryman, W. L., Hinke, J. T., Krause, D. J., Hann, N. A., Gardner, S., & Leroi, D. J. (2015). A small unmanned aerial system for estimating abundance and size of Antarctic predators. *Polar Biol Polar Biology*, 38(5), 619-630. doi:10.1007/s00300-014-1625-4

LaRue, M. A., Kooyman, G., Lynch, H. J., & Fretwell, P. (2014). Emigration in emperor penguins: Implications for interpretation of long-term studies. *Ecography*, 38(2), 114-120. doi:10.1111/ecog.00990

Lynch, H. J., & LaRue, M. A. (2014). First global census of the Adélie Penguin. *The Auk*, 131(4), 457-466. doi:10.1642/auk-14-31.1

Rümmeler, M., Mustafa, O., Maercker, J., Peter, H., & Esefeld, J. (2015). Measuring the influence of unmanned aerial vehicles on Adélie penguins. *Polar Biol Polar Biology*. doi:10.1007/s00300-015-1838-1

Schwaller, M. R., Southwell, C. J., & Emmerson, L. M. (2013). Continental-scale mapping of Adélie penguin colonies from Landsat imagery. *Remote Sensing of Environment*, 139, 353-364. doi:10.1016/j.rse.2013.08.009

Zmarz, A., Korczak-Abshire, M., Storvold, R., Rodzewicz, M., & Kędzierska, I. (2015). Indicator Species Population Monitoring In Antarctica With Uav. *Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci. ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XL-1/W4, 189-193. doi:10.5194/isprsarchives-xl-1-w4-189-2015

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

Please ask me;: Hans-Ulrich.Peter@uni-jena.de

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below: **(will follow later)**



SCAR Group

SSG

Person
Responsible:

**Remote
Sensing**

PS + LS

H.-U.Peter

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If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Hans-Ulrich	Peter	Polar and Bird Ecology Group Jena	Germany	bpe@uni-jena.de	2014	2018

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.



birth: 15. March 1952 in Jena / Germany

 1970 study of biology at Jena University
 1974 diploma-thesis and examination (Institute of Ecology)
 1974-78 field work in the Nature Reserve „Leutratal“
 1979 doctoral-thesis and examination : summa cum laude
 since 1979 scientist at the Institute of Ecology, Jena University
 special fields: polar & bird ecology and systematics
 teaching experience in zoology, ecology, natural protection etc.
 1983-85 first Antarctic expedition to King George Island (18 month)
 since 1992 Head of the Polar & Bird Ecology Group
 at the Institute of Ecology, Jena University
 since 1990: 26 summer expeditions to the Antarctic (as Exp. leader),
 five summer expeditions to the Arctic



SCAR Group **Remote Sensing**
SSG PS + LS
Person H.-U.Peter
Responsible:

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research projects: impact of climate change and direct anthropogenic factors on penguins and other seabirds, Population ecology of skuas,
2006 - 2012: Consultant for the Ministry for Environment, the Ministry for Foreign Affairs and the Federal Environmental Agency in Antarctic questions

Further specifications

- Member of the Scientific Board of the “German Polar Society”
- Formerly Member of SCAR Expert Group on Birds and Marine Mammals
- Chair of the SCAR Action Group Remote Sensing since 2014
- Member of SCAR Scientific Standing Group ”Life Science”
- Member of Editorial Board for „Journal of Ornithology“ and other journals
- Referee for „Polar Biology“, “Marine Ecology”, „Journal of Ornithology“, DFG, Academic editor for “PlosOne”

Other members

First Name	Last Name	Affiliation	County	Email
Heather	Lynch	Stony Brook University	USA	<heather.lynch@stonybrook.edu>
Michelle	La Rue	University of Minnesota	USA	<larue010@gmail.com>
Peter	Fretwell	BAS	UK	<ptf@bas.ac.uk>
Osama	Mustafa	Think	Germany	<osama.mustafa@think-jena.de>
Ewe	Hong Tat	Universiti Tunku Rahman	Malaysia	<eweht@utar.edu.my> ,
Shridhar	Jawak	Nat.Centre for Antarctic and Ocean Research	India	<shridhar.jawak@gmail.com> ,
Rob	Massom	Australian Antarctic Division	Australia	<Rob.Massom@aad.gov.au>
Oscar	Schofield	Rutgers University	USA	<oscar@marine.rutgers.edu>
Mathew	Schwaller	NASA Goddard Space Flight Center	USA	mathew.r.schwaller@nasa.gov



SCAR Group

SSG

Person
Responsible:

**Remote
Sensing**

PS + LS

H.-U.Peter

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Malgorzata	Korczak-Abshire	Polish Academy of Sciences	Poland	mka@ibb.waw.pl
Paul	Morin	Polar Geospatial Center	USA	lpaul@umn.edu
Marie-Charlott	Rümmler	Jena University	Germany	marie-charlott.ruemmler@uni-jena.de
Barbara	Bollard Breen	Auckland University of Technology	New Zealand	bbreen@aut.ac.nz



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

**XXXIV SCAR Delegates Meeting
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Sun-Earth Relationships and Antarctica (SERAnt) Action Group

Contacts: (name and email)

Allan T. Weatherwax, Ph.D.
[Dean, School of Science and Engineering](#)
[Merrimack College](#)
315 Turnpike St., North Andover, Ma. 01845
Email: weatherwaxa@merrimack.edu
Phone: 978-837-5234

- Dr. Andrew J. Gerrard, Ph.D., Professor, NJIT, USA
- Dr Annika Seppala, SCAR representative in SCOSTEP Bureau
- Dr. Giorgia DeFranceschi, Chair of GRAPE EG

The SERAnt Action Group (Sun Earth Relationships and Antarctica) was formed in 2014. Its purpose was to determine the Terms of Reference for a Task Group on solar terrestrial physics to be proposed at the [XXXIV SCAR Meetings in Kuala Lumpur, Malaysia](#).

SERAnt will complement and parallel the Expert Group GRAPE (<http://www.scar.org/ssg/physical-sciences>), which concerns itself with ionospheric phenomena and the operation of GNSS equipment; the membership of SERAnt will ensure that synergy is implemented with GRAPE

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

None

Date/Year Group Approved: 2014
Date/Year Group is to End: TBD (2016)

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Yes



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

**XXXIV SCAR Delegates Meeting
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Further Details:

Major Activities and Significant Progress from past 2 years

In 2014 we established an Action Group (SERAnt) within SSG/PS to determine the Terms of Reference for an Expert Group on solar terrestrial physics, with the following objectives:

- Identify the science to be addressed, and the groups worldwide that are already active in research in the field;
- Formulate a proposal for its structure and composition;
- Analyze the interaction with GRAPE EG and avoid duplication, while promoting synergy; and
- Bridge over gap between ICESTAR, closed at Auckland, and future EG to be formed in Kuala Lumpur.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

We plan to request a budget of \$1500 per year, respectively, for each year in 2017 and 2018, to partly cover travel to for the leaders of the various subgroups of SERAnt.

Proposed Budget for 2017 and 2018

Month / Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2017	Planning/Organizing Meeting	\$1,500	Allan T. Weatherwax	weatherwax@merrimack.edu
2018	Working Meeting	\$1,500	Allan T. Weatherwax	weatherwax@merrimack.edu

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

**XXXIV SCAR Delegates Meeting
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External Linkages – Support and Coordination beyond SCAR:

<http://www.antarcticgeospace.org>

Please describe your outreach, communication and capacity building activities:

None to date.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

Intermittency on simultaneous observations of riometer at several Antarctic locations

EM Ovalle, AJ Foppiano, MV Stepanova, AT Weatherwax
Advances in Space Research 57 (6), 1338-1344

Further evidence for a connection between auroral kilometric radiation and ground-level signals measured in Antarctica

J LaBelle, X Yan, M Broughton, S Pasternak, M Dombrowski, ...
Journal of Geophysical Research: Space Physics 120 (3), 2061-2075

GPS phase scintillation at high latitudes during geomagnetic storms of 7–17 March 2012–Part 2: Interhemispheric comparison

P Prikryl, R Ghoddousi-Fard, L Spogli, CN Mitchell, G Li, B Ning, ...
Annales Geophysicae 2015

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

Allan	Weatherwax	Merrimack College	USA	weatherwax@merrimack.edu	2014	TBD
Giorgina	DeFranceschi					
Dr Annika	Seppala,					

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.



Allan T. Weatherwax is the Dean for the School of Science and Engineering at Merrimack College. He comes to Merrimack from Siena College in Loudonville, New York where he was the Dean of the School of Science and a Professor of Physics. Dr. Weatherwax is a teaching-scholar who has spent two decades contributing to fundamental research in space plasma physics, geophysics, and space weather. He has conducted research in the polar-regions since the 1990s, and has served as



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

[illegible]



SCAR Group	SnowAnt
SOG	PS/LS/GS
Person	Martin
Responsible:	Schneebeli

**XXXIV SCAR Delegates Meeting
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Name of SCAR Group

Contacts: (name and email)

Martin Schneebeli (schneebeli@slf.ch)

1-2 paragraph summary of activities from 2014-2016

The activities were twofold: organization of sessions snow in Antarctica specific sessions at EGU 2016 (merged due to too few participants) and SCAR-OSC 2016. The other activity was the organization of the Snow Science Winter Schools, which brought about 50 students in contact with SCAR, and provided a sound background on modern methods in snow analysis.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

In my view no voting necessary.

Date/Year Group Approved: September 2014

Date/Year Group is to End: 2018

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Yes



SCAR Group **SnowAnt**
SSG PS/LS/GS
Person Martin
Responsible: Schneebeli

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Further Details:

Major Activities and Significant Progress from past 2 years

The small size of the group did not allow further activities than presented in the summary of activities. It is planned that the action items of protection and implementation are coordinated with other SCAR-groups during OSC 2018.

There is in our view significant progress in recognizing snow as an important element of Antarctica, as demonstrated by successfully setting up a specific snow session for OSC 2016. However, it is extremely difficult to get researchers motivated to work for the very long-term objectives of SnowAnt.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

The key initiative will be to find additional active members for the Action Group. This will be done by more actively promoting the topic within the Snow Science Schools and in other snow related conferences.

Collaboration with the "Action Group Geological Heritage and Geo-conservation (Geoscience)" is in preparation and will be discussed during the OSC 2018. The goal of this collaboration is to use the knowledge with respect to the goals of protecting pristine snow areas. Goal is that the question of pristine snow areas will be taken up by Antarctic Treaty member states until 2018.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
Feb. 2017	SnowScience WinterSchool	2000		
Feb. 2018	SnowScience WinterSchool	2000		

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programs):



SCAR Group	SnowAnt
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Person	Martin
Responsible:	Schneebeli

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The funding proposed for the SnowScience Winter School is used for ECS and scientists of countries with small Antarctic Programs in the form of reduced fees (70%).

External Linkages – Support and Coordination beyond SCAR:

Activity to coordinate snow related problems are also pursued within the Cryosphere Working Group of IASC. A collaboration is in preparation with the

Please describe your outreach, communication and capacity building activities:

- 1st European Snow Science Winter School, Sodankylä, Finland (2015)
- 2nd Snow Science Winter School (2016)
- Presentation of SnowAnt at IUGG Prague 2015: Understanding and protecting snow in Antarctica: The goals SCAR Action Group "SnowAnt"

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

none

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

All members of the group would be willing to serve as reviewers

Webpages:



SCAR Group **SnowAnt**
SSG PS/LS/GS
Person Martin
Responsible: Schneebeli

XXXIV SCAR Delegates Meeting
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Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

-members, activities

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

links to conferences and workshops relevant to polar snow will be put into the web page

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Martin	Schneebeli	WSL-SLF	Switzerland	schneebeli@slf.ch	1.10.2014	30.9.2018

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

My current work is focused on [snow and firn](#). The work in the past years was focused on how to measure snow properties quantitatively and at higher spatial resolution, and from the field- to the micro-scale. To this goal, I am developing new instruments. Scientifically, I am interested in all physical and geological processes occurring in the snowpack, and in different environments. Recent expeditions to Antarctica and the Arctic widened my experience in these fascinating environments.

Specifically i work on the experimental investigation of snow physical properties at the micro- and macroscale (mechanical, thermal, optical), especially using micro-tomography. Using specific new tools, the processes in snow recrystallization, metamorphism and diagenesis are investigated. For this, I work on the development of new instrumentation (3 patents). One goal is also the application of quantitative stratigraphy to larger-scale processes, as remote sensing, avalanche formation and climate research.

http://www.slf.ch/ueber/mitarbeiter/homepages/schneebm/index_EN



SCAR Group **SnowAnt**
SSG PS/LS/GS
Person Martin
Responsible: Schneebeili

XXXIV SCAR Delegates Meeting
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Other members

First Name	Last Name	Affiliation	County	Email
Martin	Schneebeili	WSL Institute for Snow and Avalanche Research, Davos	Switzerland	schneebeili@slf.ch
Katherine	Leonard	École Polytechnique Fédérale de Lausanne, Lausanne	Switzerland	katherine.leonard@epfl.ch
Willem Jan	van de Berg	Institute for Marine and Atmospheric Research (IMAU) Utrecht University	The Netherlands	w.j.vandenberg@uu.nl
Ludovic	Brucker	NASA Goddard Space Flight Center, Cryospheric Sciences Laboratory, Greenbelt	USA	ludovic.brucker@nasa.gov
Alexey	Ekaykin	Arctic and Antarctic Research Institute, Saint	Russia	ekaykin@aari.ru



SCAR Group	SnowAnt
SSG	PS/LS/GS
Person	Martin
Responsible:	Schneebeli

[illegible]



SCAR Group xxx
SAG PS/LS/GS
Person xxx
Responsible:

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Antarctic Climate Change and the Environment Advisory Group

Contacts: (name and email)
Prof John Turner (jtu@bas.ac.uk)

1-2 paragraph summary of activities from 2014-2016

- Preparation of an annual paper to the treaty meeting on recent advances in Antarctic climate science and possible impacts on the environment.
- Loading of our book Antarctic Climate Change and the Environment into an editable wiki, which can be updated by a group of editors. The wiki can be found at http://acce.scar.org/wiki/Antarctic_Climate_Change_and_the_Environment.
- Maintenance of the SCAR READER data base, which is the definitive record of monthly mean, quality controlled meteorological data from the Antarctic stations. It is maintained by Steve Colwell and updated on a monthly basis. See <https://legacy.bas.ac.uk/met/READER/>. Data from READER continue to be used in many studies and publications in the refereed literature.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.
None

Date/Year Group Approved: 2011 as an Expert Group
Date/Year Group is to End: Open ended



SCAR Group	xxx
SSG	PS/LS/GS
Person Responsible:	xxx

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All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

N



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Further Details:

Major Activities and Significant Progress from past 2 years

Getting the ACCE book into a wiki.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

Updating the wiki is a priority.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
None				

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

n/a

External Linkages – Support and Coordination beyond SCAR:

We maintain close liaison with IAMAS.



SCAR Group	xxx
Ssg	PS/LS/GS
Person Responsible:	xxx

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Please describe your outreach, communication and capacity building activities:

We involve as many nations as possible in the production of our annual ACCE report. Web presence.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

Annual paper to the treaty meeting.

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:



Person Responsible: xxx

[illegible]



SCAR Group	xxx
SOG	PS/LS/GS
Person	xxx
Responsible:	

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Antarctic Sea ice Processes and Climate

Contacts:

Marilyn Raphael- Raphael@geog.ucla.edu;

Stephen Ackley Stephen.Ackley@utsa.edu

1-2 paragraph summary of activities from 2014-2016

ASPeCt participated two COMNAP workshops in 2015. The first was the Sea Ice Challenges Workshop in Tasmania, in May 2015. The aim of this workshop was to explore the sea ice challenges our National Antarctic programs are experiencing in some parts of Antarctica right now and especially the past few seasons. ASPeCt members gave presentations on the science and logistics and participated in the discussions. The second was the SCAR/COMNAP workshop in Tromsø in August 2015. This workshop discussed the logistics/infrastructure requirements coming out of SCAR Horizon last year. Steve Ackley participated in the workshop, providing the sea ice input for icebreakers, autonomous vehicles, buoy networks, satellite observations etc. Two surveys were conducted prior to that workshop and a majority of responses supported Sea Ice as a discipline. This indicates the growing importance of ASPeCt related science in the future undertakings in Antarctic/Southern Ocean research.

ASPeCt was an important planner and participant in the National Academy of Science's Antarctic sea ice variability and trends workshop held in January 2016. ASPeCt was represented by – Workshop Organizing Committee members – Marilyn Raphael, Ted Maksym and participants – Steve Ackley and Sharon Stammerjohn. This workshop addressed our current understanding of processes driving Antarctic sea ice changes. A workshop report will be out later in summer.

ASPeCt scientists at AWI conducted a Polarstern expedition to the Weddell Sea with a focus on sea ice thermodynamics and snow cover. They used an ROV for under-ice studies along and deployed a suite of buoys. A map and reports on this expedition may be found at <http://www.pangaea.de/PHP/CruiseReports.php?b=Polarstern> under the label PS89. This cruise also contributed to additional ASPeCt sea ice observations, which are also available from Pangaea.



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

N/A

**Date/Year Group Approved: 08/2014 Approved as SCAR Expert Group
Date/Year Group is to End: to be determined upon 8 year review?**

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Yes



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Further Details:

Major Activities and Significant Progress from past 2 years

The ASPeCt digital underway ice observation method, version 2 has been launched. Voyages from October 2015 - March 2016 are using this version 2. Additionally, near-real time upload is implemented, pending networking from vessel to central server. Automatic cameras are being implemented on some research cruises to take images that currently supplement ASPeCt visual observations and are being used for quality control and training of ice observers.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

ASPeCt Project to look at Terra Nova Bay and the Ross Ice Shelf Polynyas using NB Palmer funded by **NSF-USA**. A two month (April 15-June 15 2017) cruise into the Ross Sea on the US Icebreaker NB Palmer will be conducting an atmosphere-ice-ocean interaction experiment in the polynyas and sea ice regions of the western Ross Sea.

Project to work on IceBridge airborne lidar analyses for sea ice thickness from China funded by **NSF-China**. (**X. Wang PI(China), S.F.Ackley Co-I(USA) and H.Xie Co-I(USA)**). ***A paper is under review in the journal Remote Sensing of the Environment on methodology to extract snow elevation from these airborne lidar profiles with corrections to find local sea level and use it to provide the true snow elevation above sea level.***

ASPeCt will convene a session on Antarctic sea ice processes and ice shelves status at the SCAR OSC in Kuala Lumpur (August 2016) and will also hold a workshop at that meeting.

ASPeCt plans to work more closely with the Sea Ice and Climate Modeling Forum in order to maximize the use of observations for informing sea ice components to climate models.

Continuing work:

ASPeCt data collection and testing of software prototype by the AAD, AWI and CHINARE continues. Additions to the ship observations database (ASPeCt observations) are also being made on a continuing basis. In relation to this A joint subgroup was formed with CASIWG in 2014 in order to keep observation methods consistent between the Poles and reduce duplication of efforts.



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Development of the ASPeCt ship-based observation system and database for sea ice measurements taken by remote vessels (airborne and under ice), ship-based instruments and surface-based instruments and sampling is ongoing.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2017	See 1. below	\$4000	Marilyn Raphael/Steve Ackley	Raphael@geog.ucla.edu Steve.Ackley@utsa.edu
2018	See 2 below	\$4000		

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

2017- \$2K for travel for an ASPECT ex-officio participant to the SOOS SSG annual meeting is needed. Steve Ackley's term on SOOS ends this year, and there may not be a sea ice replacement named to the SSG. These funds will allow ASPeCt to keep our representation up on that group.

2018- \$2K also for providing an ice observer trainer on new cruises as we are planning to do with the South African Program. We hope to expand ice observations on vessels of other countries and being able to quickly respond, with some supporting funds will help a lot in promoting this expansion. There is potential for 100% of these funds to be directed at an early career scientist.

2017-2018 - \$4K Travel to meetings and other planning/coordination activities as they arise. For example, travel to YOPP meetings for co-chairs and travel



SCAR Group xxx
SAG PS/LS/GS
Person xxx
Responsible:

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to ASPeCt workshops in 2017 and 2018. Here we expect at least 50% of the funds to go towards early career scientists.

External Linkages – Support and Coordination beyond SCAR:

ASPeCt is also supported by the WCRP through CliC.

Please describe your outreach, communication and capacity building activities:

ASPeCt has ongoing communication with the South African Antarctic program in anticipation of expanding ice observations from their vessels.

Publications of your group to date:

These are publications during the period 2014 – 2016. We do not have a comprehensive list of publications but we will create one and do periodic updates after that.

Drews, R., Brown, J., Matsuoka, K., Witrant, E., Philippe, M., Hubbard, B., and Pattyn, F (2015) Anomalously-dense firn in an ice-shelf channel revealed by wide-angle radar, The Cryosphere Discuss., 9, 5647-5680, doi:10.5194/tcd-9-5647-2015.

Schwegmann, S., Rinne, E., Ricker, R., Hendricks, S., and Helm, V. (2015) About the consistency between Envisat and CryoSat-2 radar freeboard retrieval over Antarctic sea ice, The Cryosphere Discuss. 9, 4893-4923, doi:10.5194/tcd-9-4893-2015.

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 act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications.



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Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

Rob Massom (Australia) Sharon Stammerjohn (USA)

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

No updates at the moment.

Members:

Chair(s) Duration of Term**

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Steve	Ackley	UTSA	USA	Stephen.Ackley@utsa.edu	2010	??
Marilyn	Raphael	UCLA	USA	raphael@geog.ucla.edu	2010	??

**** We will be discussing changes to the current leadership structure at our workshop at the SCAR OSC in August 2016.**



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Original Group Membership*

S.F.Ackley (Co-Chair, USA)	Marilyn Raphael (Co-Chair, USA)
Kay Ohshima (Japan)	Elizabeth Hunke (USA)
Martin Vancoppenolle (Fr)	Marcel Nicolaus (Ger)
Petra Heil (Australia)	Klaus Meiners (Australia)
Rob Massom(Australia)	Sharon Stammerjohn (USA)
Ted Maksym (USA)	Ron Kwok (USA)
Thorsten Markus (USA)	Timo Vihma (Finland)
Pat Langhorne (NZ)	Jean Louis Tison (Be)
Hyoung Chul Shin (Ko)	

****Mailing list numbers more than 50. We will send that list in other email if necessary.***



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GRAPE-GNSS Research and Application for Polar Environment (cross-link between SSG PS and GS)

Contact: Giorgia De Franceschi- giorgiana.defranceschi@ingv.it

1-2 paragraph summary of activities from 2014-2016

After the SCAR OSC 2014 (Auckland, NZ, August 2014) GRAPE (www.grape.scar.org) meetings and scientific sessions have been organized within both URSI AT RASC (Gran Canaria, Spain, 18-22 May 2015) and Beacon Satellite Symposium (Trieste, 27 June -1 July 2016) aiming to disseminate the GRAPE results on the bi-polar neutral and upper atmosphere monitoring, investigations, and data management as well to attract new groups and institutions. A scientific session has been organized within the SCAR OSC 2016 in Kuala Lumpur (Session 16, 10 oral contributions and 6 posters contribution. New groups from Malaysia, not yet involved in GRAPE, submitted papers).

The GRAPE web site (www.grape.scar.org) has been maintained at INGV and updated regularly as well the SCAR web pages (www.scar.org) devoted to GRAPE.

A GRAPE task force has been established during URSI AT RASC to draft a possible new SRP to be discussed with all the communities interested during the SCAR OSC 2016 in Kuala Lumpur.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

**Date/Year Group Approved: August 2012 SCAR OSC 212-PORTLAND
Date/Year Group is to End:**



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All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



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Further Details:

GRAPE Meetings and scientific sessions:

- The GRAPE meeting within URSI AT RASC (www.at-rasc.org) was attended by more than 30 colleagues from different URSI Commissions (mainly from Commission G-Ionospheric Radio and Propagation). During the meeting SCAR Horizon Scan and scientific priorities were presented and discussed focusing on the GRAPE future contribution to this. A task force has been established to start a process toward a possible proposal leading to a SRP based on GRAPE and enlarged to other interested polar communities. The GRAPE scientific session was also quite interesting and more than 10 papers were submitted as oral presentations.
- A scientific session on the polar (high latitude) effects on GNSS has been organized in the frame of the Beacon Satellite Symposium 2016 (June 27- July 1, 2016 Trieste, Italy) (<http://t-ict4d.ictp.it/beacon2016/sessions>). The session received a good number of contributions as oral and posters (12 selected as oral and 6 as posters). Authors from USA, UK, IT, RU, NO, CA.

GRAPE participants from Italy, South Africa and Brazil supported the DemoGRAPE project 2014-2016 (www.demogrape.net) to build up a prototype of a new service based on local data and ad hoc processors, capable to demonstrate a significant improvement of the precise positioning over Antarctica. Antarctic facilities from these countries have been shared and thanks to the Cloud technology, the prototype will be accessible to a plethora of different stakeholders, from academic to private, interested in the high precision applications (e.g. geodetic prospections, land and glaciers monitoring,...), that need to be assisted by services capable to mitigate the ionospheric corruption on GNSS signals. The DemoGRAPE follow on has been recently submitted to PNRA (Italian National Program for Antarctic Research) in view to update the prototype and share this with other Antarctic Bases.

GRAPE has recently established a task force to arrange a proposal for a new SRP titled RESOURCE (Radio Sciences Research on Antarctic Atmosphere). It aims to gather the communities that investigate the bi-polar atmosphere, with particular reference to Antarctica, by means of radio probes into a common shared initiative. The task force is composed by scientists affiliated in several countries, among the others: Belgium, South Africa, Canada, Brazil, USA, Italy.



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Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

- Efforts will be addressed to maintain, improve, update the GNSS network, data and tools to assist the mitigation of the ionosphere impact on a variety of applications. The sharing of infrastructures and facilities will be also pursued.
- Activities addressed to the harmonization of all contributions for drafting the new SRP proposal (RESOURCE) will be continued in order to be mature for submitting the proposal to SSG PS and GS.
- The GRAPE web site will be maintained and updated.
- A scientific session on the polar ionosphere will be organized within the URSI GAS 2017. This will be an occasion to discuss the advancement in the field within an enlarged community in particular those involved in ionosphere, space weather and remote sensing (Commissions G and F).

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
01/2017	GRAPE web updating	2500	Giorgiana De Franceschi	Giorgiana.defranceschi@ingv.it
04/2017	URSI GAS registration fees for GRAPE participants of which 3 earlier career scientists presenting a paper.	5000	Giorgiana De Franceschi	Giorgiana.defranceschi@ingv.it
09/2017	SA,BE,BR scientific visits at INGV or viceversa	5000	Claudio Cesaroni, Pierre Cilliers Nicolas Benoit	Claudio.cesaroni@ingv.it
03/2018	SCAR OSC registration fees for GRAPE participants of which 3 earlier career scientists presenting a	5000	Giorgiana De Franceschi Lucilla Alfonsi Pierre Cilliers Nicolas Benoit	Giorgiana.defranceschi@ingv.it



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	paper.			

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

The total budget requested of 17500USD should be shared between SSG PS and GS. 20% of the budget (as minimum depending on how many earlier career scientists and/or scientists from countries with small Antarctic programmes are involved in the field). GRAPE launched the earlier career scientists/scientists from developing countries call for papers submission during the last SCAR OSC 2014 with two earlier career scientists that received a travel grant.

External Linkages – Support and Coordination beyond SCAR:

URSI
BSS

Please describe your outreach, communication and capacity building activities:

Several activities for outreach and communication to the general public have been carried out (see e.g. the DemoGRAPE web site www.demogrape.net). This project gave an example of capacity building too through the national infrastructures and facilities sharing.

Moreover papers have been presented during public conferences such as:

Nicolas Bergeot, Why do we need to continue scientific research in Antarctica? Cognac Rotary Club, France, March 2 2016 <http://rotary-cognac.org/conference-antartique/>

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.



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GRAPE-LIST OF PUBLICATIONS 2012-2016

2012

- Deshpande, K. B., G. S. Bust, C. R. Clauer, H. Kim, J. E. Macon, T. E. Humphreys, J. A. Bhatti, S. B. Musko, G. Crowley, and A. T. Weatherwax (2012), Initial GPS scintillation results from CASES receiver at South Pole, Antarctica, *Radio Sci.*, 47, RS5009, doi:10.1029/2012RS005061.
- Moro, J., Denardini, C.M., Abdu, M.A., Correia, E., Schuch, N.J., MAKITA, K. Correlation between the cosmic noise absorption calculated from the SARINET data and the energetic particles measured by MEPED: Simultaneous observations over SAMA region. *Advances in Space Research.* , v.51, p.1692 - 1700, 2012.
- Moro, J., Denardini, C.M., Correia, E., Abdu, M.A., Schuch, N.J., MAKITA, K. A comparison of two different techniques for deriving the quiet day curve from SARINET riometer data. *Annales Geophysicae (Berlin).* , v.30, p.1159 - 1168, 2012.
- Moro, J., C. M. Denardini, M. A. Abdu, E. Correia, N. J. Schuch, and K. Makita (2012), Latitudinal dependence of cosmic noise absorption in the ionosphere over the SAMA region during the September 2008 magnetic storm, *J. Geophys. Res.*, 117, A06311, doi:10.1029/2011JA017405.
- Jayachandran, P. T., K. Hosokawa, K. Shiokawa, Y. Otsuka, C. J. Watson, S. C. Mushini, J. W. MacDougall, P. Prikryl, R. Chadwick, and T. D. Kelly (2012), GPS Total Electron Content Variations Associated with Poleward Moving Sun Aligned Arcs, *J. Geophys. Res.*, doi:10.1029/2011JA017423
- Kinrade, J., C. N. Mitchell, P. Yin, N. Smith, M. J. Jarvis, D. J. Maxfield, M. C. Rose, G. S. Bust, and A. T. Weatherwax (2012), Ionospheric scintillation over Antarctica during the storm of 5–6 April 2010, *J. Geophys. Res.*, 117, A05304, doi:[10.1029/2011JA017073](https://doi.org/10.1029/2011JA017073).
- Prikryl, P., P. T. Jayachandran, S. C. Mushini, and I. G. Richardson (2012), Toward the probabilistic forecasting of high-latitude GPS phase scintillation, *Space Weather*, 10, S08005, doi:10.1029/2012SW000800.



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2013

- De Franceschi Giorgiana and Candidi Maurizio, GRAPE, GNSS Research and Application for Polar Environment, Expert Group of SCAR. Annals of Geophysics, Special Issue, Vol. 56, No2 (2013), ISSN 2037-416X.
<http://www.annalsofgeophysics.eu/index.php/annals/issue/view/488>.
- Prikryl, P., Ghoddousi-Fard, R., Kunduri, B. S. R., Thomas, E. G., Coster, A. J., Jayachandran, P. T., Spanswick, E., and Danskin, D. W.: GPS phase scintillation and proxy index at high latitudes during a moderate geomagnetic storm, Ann. Geophys., 31, 805-816, doi:10.5194/angeo-31-805-2013, 2013.
- Prikryl, P., Y. Zhang, Y. Ebihara, R. Ghoddousi-Fard, P. T. Jayachandran, J. Kinrade, C. N. Mitchell, A. T. Weatherwax, G. Bust, P. J. Cilliers, L. Spogli, L. Alfonsi, G. De Franceschi, V. Romano, B. Ning, G. Li, M. J. Jarvis, D. W. Danskin, E. Spanswick, E. Donovan and M. Terkildsen, An interhemispheric comparison of GPS phase scintillation with auroral emission observed at South Pole and from DMSP satellite, Special Issue of Annals of Geophysics, 56, 2, 2013, R0216; doi:10.4401/ag-6227.
- Prikryl, P. V. Sreeja, M. Aquino, and P. T. Jayachandran, Probabilistic forecasting of ionospheric scintillation and GNSS receiver signal tracking performance at high latitudes, Special Issue of Annals of Geophysics, 56, 2, 2013, R0222; doi:10.4401/ag-6219.
- Sarti P., Negusini M., Tomasi C., Petkov B., Capra A. (2013). Thirteen years of integrated precipitable water derived by GPS at Mario Zucchelli Station, Antarctica. Annals of Geophysics, Special Issue, 56, 2, 2013. ISSN: 2037-416X. doi: 10.4401/ag-6228
- Correia, E., Paz, A. J., Gende, M.A. Characterization of GPS-TEC in Antarctica from 2004 to 2011. Annals of Geophysics. , v.56, p.R0217-1 - R0217-5, 2013.
- Fernandez, José Henrique, Correia, E. Electron precipitation events in the lower ionosphere and the geospace conditions. Annals of Geophysics. , v.56, p.R0218-1 - R0218-10, 2013.
- Spogli, L., Alfonsi, L., Cilliers, P., Correia, E., De Franceschi, G., Mitchell, C.N., Romano, V., Kinrade, J., Cabrera, M. A. GPS scintillations and TEC climatology in the southern low, middle and high 2 latitude regions. Annals of Geophysics. , v.56, p.R0220-1 - R0220-12, 2013.



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- Correia, E., Raulin, J. P., Kaufmann, P., Bertoni, F. C., Quevedo, M.T. Inter-hemispheric analysis of daytime low ionosphere behavior from 2007 to 2011. *Journal of Atmospheric and Solar-Terrestrial Physics.* , v.92, p.51 - 58, 2013.
- Correia, E., Raulin, J. P., Kaufmann, P., Gavilán, H. R. Atmospheric changes observed in antarctica related to the sun-earth interactions. *Annual Activity Report - INCT-APA.* , v.3, p.20 - 25, 2013.
- Correia, E., Makhmutov, Vladimir S, Raulin, Jean Pierre, Makita, K. Mid- and low-latitude response of the lower ionosphere to solar proton events on January 2012. *IOP Conference Series. Earth and Environmental Science (Online).* , v.409, p.1/012186 - 4, 2013.

2014

- Koustov, A. V., P. V. Ponomarenko, M. Ghezelbash, D. R. Themens, and P. T. Jayachandran (2014), Electron density and electric field over Resolute Bay and F region ionospheric echo detection with the Rankin Inlet and Inuvik SuperDARN radars, *Radio Sci.*, 49, doi:10.1002/2014RS005579.
- Prikryl P., Jayachandran P. T., Mushini S. C., Richardson I. G., High-latitude GPS phase scintillation and cycle slips during high speed solar wind streams and interplanetary coronal mass ejections: A superposed epoch analysis, *Earth, Planets and Space*, **66** :62, 2014.
- Raulin, Jean Pierre, Trottet, Gerard, Gimenez de Castro, C. G., Correia, E., Macotela, E. L. Nighttime Sensitivity of Ionospheric VLF Measurements to X-ray Bursts From a Remote Cosmic Source. *Journal of Geophysical Research: Space Physics.*, 2014. DOI:10.1002/2013JA019670
- Ghezelbash, M., A. Koustov, D.R. Themens, and P.T. Jayachandran (2014). Seasonal and diurnal variations of PolarDARN F region echo occurrence in the polar cap and their causes, *J. Geophys. Res. Space Physics*, 119, 10,426–10,439, doi:10.1002/2014JA020726.
- Themens, D. R., P. T. Jayachandran, M. J. Nicolls, and J. W. MacDougall (2014), A top to bottom evaluation of IRI 2007 within the polar cap, *J. Geophys. Res. Space Physics*, 119, 6689–6703, doi:10.1002/2014JA020052.



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2015

- Athieno, R., P.T. Jayachandran, D.R. Themens, and D.W. Danskin (2015), Comparison of observed and predicted MUF(3000)F2 in the Polar cap region , *Radio Sci.*, 50, 509–517. doi:10.1002/2015RS005725.
- Prikryl, P., Ghoddousi-Fard, R., Spogli, L., Mitchell, C. N., Li, G., Ning, B., Cilliers, P. J., Sreeja, V., Aquino, M., Terkildsen, M., Jayachandran, P. T., Jiao, Y., Morton, Y. T., Ruohoniemi, J. M., Thomas, E. G., Zhang, Y., Weatherwax, A. T., Alfonsi, L., De Franceschi, G., and Romano, V.: GPS phase scintillation at high latitudes during geomagnetic storms of 7–17 March 2012 – Part 2: Interhemispheric comparison, *Ann. Geophys.*, 33, 657-670, doi:10.5194/angeo-33-657-2015, 2015.
- Linty, N., Romero, R., DAVIS, F., & Alfonsi, L. (2015, May). Benefits of GNSS software receivers for ionospheric monitoring at high latitudes. In *Radio Science Conference (URSI AT-RASC), 2015 1st URSI Atlantic* (pp. 1-6). IEEE. doi: [10.1109/URSI-AT-RASC.2015.7303110](https://doi.org/10.1109/URSI-AT-RASC.2015.7303110)
- Cilliers, P., Alfonsi, L., & Spogli, L. (2015, May). GNSS scintillation climatology at SANAE-IV, Antarctica: 2006 to 2014. In *Radio Science Conference (URSI AT-RASC), 2015 1st URSI Atlantic* (pp. 1-1). IEEE. doi: 10.1109/URSI-AT-RASC.2015.7303100
- Terzo, O., Ruiu, P., Alfonsi, L., Romano, V., & Spogli, L. (2015, May). International cloud infrastructure for space weather data management: The DemoGRAPE challenge. In *Radio Science Conference (URSI AT-RASC), 2015 1st URSI Atlantic* (pp. 1-1). IEEE. doi: 10.1109/URSI-AT-RASC.2015.7303109
- Themens, D. R., P. T. Jayachandran, and R. B. Langley (2015), The nature of GPS differential receiver bias variability: An examination in the polar cap region, *J. Geophys. Res. Space Physics*, 120, 8155–8175, doi:10.1002/2015JA021639

2016

- Linty, N., DAVIS, F., Romero, R., Cristodaro, C., Alfonsi, L., Correia, E., "Monitoring Ionosphere Over Antarctica by Means of a GNSS Signal



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Acquisition System and a Software Radio Receiver," *Proceedings of the 2016 International Technical Meeting of The Institute of Navigation*, Monterey, California, January 2016, pp. 549-555.

- Themens, D.R., and P.T. Jayachandran (2016), Solar Activity Variability in the IRI at high latitudes: Comparisons with GPS Total Electron Content, *J. Geophys. Res. Space Physics*, 121, 3793–3807, doi:10.1002/2016JA022664.
- A. Favenza, N. Linty, F. Dosis, "Exploiting Standardized Metadata For GNSS SDR Remote Processing: a Case Study.", *Proceedings of the 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2016)*, Portland (Oregon), September 12-16, 2016, (in publication).
- Linty N., Romero R., Cristodaro C., Dosis F., Bavaro M., Curran J., Fortuny-Guasch J., Ward J., Lamprecht G., Riley P., Cilliers P., Correia E. and L. Alfonsi (2016), Ionospheric scintillation threats to GNSS in polar regions: the DemoGRAPE case study in Antarctica, ENC 2016 IEEE Xplore Database and Conference Proceedings (in publication).
- Yamazaki, Y., M. J. Kosch, Y. Ogawa, and D. R. Themens (2016), High-latitude Ion Temperature Climatology during the International Polar Year 2007–2008, *Journal of Space Weather and Space Climate*. (Submitted March 4th, 2016)
- Bergeot N., Chevalier J.-M., Bruyninx C., Denis G., Camelbeeck T., Van Dam T. and Francis O., Study of space weather impact on Antarctica ionosphere from GNSS data, BNCGG - BNCAR symposium, Brussels, Belgium, April 29, 2016 (Presentation).
- Bruyninx C., Bergeot N., Van Dam T., Camelbeeck T., Francis O. and Tabibi S., High precision GNSS infrastructure around the Princess Elisabeth Base, BNCGG - BNCAR symposium, Brussels, Belgium, April 29, 2016 (Presentation)

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 act form a 'review panel' so if applications in your field are submitted we have people to contact to help assess relevant applications.



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Please list one or more people from your group who would be willing to serve as fellowship reviewers for the next few years.

Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

See info on GRAPE web above.

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

The complete list of people that are involved in GRAPE and in the previous group (action group) GWSWF (GNSS Weather and Space Weather Forecasting) is available at www.grape.scar.org.

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Giorgiana	De Franceschi	INGV	IT	Giorgiana.defranceschi@ingv.it	2008	



SCAR Group **xxx**

SSG PS/LS/GS

Person xxx

Responsible:

[illegible]

Expert Group: IPICS (International Partnerships in Ice Core Sciences)

Review document, May 2016

1. Introduction

International Partnerships in Ice Core Sciences (IPICS) consists of ice core scientists, engineers, and drillers from the leading laboratories and national operators carrying out ice core science, acting to further the aims as described in the mission statement. The mission is to define and develop priorities, enable coordination between different ice core laboratories, act as a voice for the ice core community, and train the next generation of ice core scientists. It now consists of representatives from 24 nations, and we believe all nations with an active ice core programme are members.

IPICS has been active since 2002. Although it has no formal parentage, it is affiliated in different forms to PAGES (Past Global Changes), SCAR (as an Expert Group under the Physical Sciences Working Group), and IUGG-IACS, thus providing a link to its major international partners in terms of discipline (palaeoscience), geography (SCAR) and medium (ice, IACS). It has also received support for meetings from the US National Science Foundation and the European Polar Board, as well as national agencies. The current co-chairs are Eric Wolff (UK) and Ed Brook (USA). These positions will be up for election in 2017.

Further details about IPICS can be found on our website, held under the PAGES website at pastglobalchanges.org (Note that, at the time of writing, access to the website is patchy as the PAGES domain has suffered heavy external attack. It is hoped this will be solved very soon.)

2. Achievements

The most notable achievement of IPICS has been to maintain a spirit of international collaboration and co-operation, and a coherency of voice in promoting ice core science. This has been achieved simply by sharing information and through our two open science conferences. However the activity generated by IPICS is probably best illustrated by discussing in turn the priority projects, then the activities of ICYS (Ice Core Young Scientists) and finally the Open Science Conferences. We will concentrate on activity undertaken since IPICS became a SCAR EG in 2008.

Before starting that, it should be obvious that not all IPICS activity is relevant to SCAR, as ice cores are also obtained in Greenland, and at non-polar locations. However an analysis we undertook after the SCAR Horizon Scanning exercise suggested that ice cores could contribute information to 27 of the 80 identified priorities – as well as the more obvious issues related to climate, ice sheet, and the atmosphere and the ocean surrounding Antarctica, ice cores can provide information about for example the impact of human activity, the frequency of solar events, and the changing environment to which ecosystems must adapt.

3. Priority projects

IPICS set itself a goal to define a series of priority projects, around which international efforts could coalesce, but keeping them to a small number (maximum 5). The current white papers are for Oldest ice, Last Interglacial, IPICS-40k, and IPICS-2k. There is also a white paper about technical challenges such as drilling technology.

a. Oldest ice

Ice cores have so far reached back 800,000 years. In doing that (through the European EPICA Dome C core, now replicated back to 720 ka by the Japanese Dome Fuji core), they have added unprecedented information about climate forcing and the resultant climate response, opening this entire period up to serious quantitative analysis and modelling. The entire period is characterised by glacial cycles recurring on an ~800 ka period. However it is well-known from marine records that, prior to 800 ka, climate had a periodicity of 40 ka. There are a number of ideas about why this shift (the so-called “Mid-Pleistocene Transition”) occurred, and an ice core reaching back into them would directly confront many of the ideas, including ones involving changing greenhouse gas concentrations. This white paper therefore proposes to find a place (in Antarctica, the only contender) to obtain ice up to 1.5 million years old, and to drill and analyse such a core.

The whole ice core community has been excited by this challenge, which has also attracted strong interest in neighbouring communities. In specific actions, IPICS has held two “Oldest Ice” workshops, attached to its open science meetings in 2012 and 2016. The first of these workshops led to a major international paper (Fischer et al, 2013) defining the conditions needed to obtain such a core. A series of airborne geophysical campaigns have provided data relevant to finding old ice, and ice modelling work has also been directed at the problem. Both the data and modelling work have been widely shared within the overall umbrella of IPICS oldest ice. Several nations or groups have expressed aspirations or started action to obtain a potential oldest ice core, and in each case they have cited the international context of IPICS, and the need for replicated records and international endorsement. Additionally, several new types of rapid access drill have been developed (and are now being tested) specifically with the goal of reaching and testing for old ice.

The oldest ice project remains a powerful aspiration which now has momentum in several nations (for example there was recently a funding call for exploratory work to find oldest ice from the European Union). It is likely that drilling will take place in the early part of the next decade, assuming suitable sites are indeed found. IPICS member organisations will lead each possible project, and IPICS as a whole can take credit for defining the project and providing it with momentum and visibility that have led to the current progress. This is a project that is entirely Antarctic based, and which SCAR may want to take a particular interest in.

Example publications specifically related to this white paper:

Fischer, H., et al. (2013), Where to find 1.5 million yr old ice for the IPICS "Oldest Ice" ice core, *Climate of the Past*, 9, 2489-2505, doi:10.5194/cpd-9-2771-2013.

Van Liefferinge, B., and F. Pattyn (2013), Using ice-flow models to evaluate potential sites of million year-old ice in Antarctica, *Climate of the Past*, 9(5), 2335-2345, doi:10.5194/cp-9-2335-2013.

Aleman, O., et al. (2014), The SUBGLACIOR drilling probe: concept and design, *Ann. Glaciol.*, 55(68), 233-242, doi:10.3189/2014AoG68A026.

b. Last Interglacial

This priority began as a white paper entitled “The last interglacial and beyond: A northwest Greenland deep ice core drilling project”. Its aim was to obtain a record through the last interglacial from Greenland. The best attempt at this was completed with the drilling and publication of the NEEM ice core (NEEM Community Members, 2013), and so it was agreed to replace that white paper

with a more general one entitled “History and Dynamics of the Last Interglacial Period from Ice Cores”. This was done in early 2015.

The last interglacial is of huge interest particularly because of the lessons it can teach us about sea level under a climate warmer than today. During the last interglacial (130-115 ka ago), both polar regions were at some stage warmer than today, and sea level was apparently 6-9 m higher than it is today. This calls for ice loss from both Greenland and Antarctica. Determining where the ice came from, and under what conditions, is a very important challenge to the ice core, and the wider glaciology, community. The NEEM record, along with earlier Greenland ice cores, constrains the sea level rise from Greenland, while posing a challenge as to why so much Greenland ice survived apparently large temperature change. Additionally it places a burden on us to find several metres of sea level rise from Antarctica, with West Antarctica normally emphasised. The white paper therefore call for acquisition and interpretation of new, high-resolution records of last interglacial forcing and climate response in both Greenland and Antarctica, with a particular emphasis on locations that might give decisive evidence about the state of the West Antarctic Ice Sheet.

A number of last interglacial records have been obtained from Antarctica in recent years, including Dome C, Dome Fuji, EDML, Talos Dome and Mount Moulton. Numerous parameters are now measured on such cores including novel isotopic measurements (Schneider et al., 2013). New records are in the pipeline, and projects aimed firmly at the WAIS question have recently been proposed (Steig et al., 2015). Advances in determining the relative timing in each hemisphere have allowed much improved modelling targets for understanding the evolution of climate during the last interglacial. Overall, IPICS science has significantly defined the conundrums of the last interglacial, but further work is needed to solve them.

Example publications specifically related to this white paper:

- Capron, E., A. Govin, E. J. Stone, V. Masson-Delmotte, S. Mulitza, B. Otto-Bliesner, L. C. Sime, C. Waelbroeck, and E. W. Wolff (2014), Temporal and spatial structure of multi-millennial temperature changes at high latitudes during the Last Interglacial, *Quat. Sci. Rev.*, **103**, 116-133.
- Masson-Delmotte, V., et al. (2011), A comparison of the present and last interglacial periods in six Antarctic ice cores, *Clim. Past*, **7**(2), 397-423.
- NEEM Community Members (2013), Eemian interglacial reconstructed from a Greenland folded ice core *Nature*, **493**, 489-494, doi:10.1038/nature11789.
- Schneider, R., J. Schmitt, P. Kohler, F. Joos, and H. Fischer (2013), A reconstruction of atmospheric carbon dioxide and its stable carbon isotopic composition from the penultimate glacial maximum to the last glacial inception, *Climate of the Past*, **9**(6), 2507-2523, doi:10.5194/cp-9-2507-2013.
- Steig, E. J., K. Huybers, H. A. Singh, N. J. Steiger, Q. H. Ding, D. M. W. Frierson, T. Popp, and J. W. C. White (2015), Influence of West Antarctic Ice Sheet collapse on Antarctic surface climate, *Geophys. Res. Lett.*, **42**(12), 4862-4868, doi:10.1002/2015gl063861.

c. IPICS-40k

The last 40,000 years includes the transition from the last glacial maximum into the Holocene warm period, and a sequence of abrupt swings in climate most clearly seen in Greenland ice cores, and known as Dansgaard-Oeschger (DO) events. It has long been clear that DO events and the glacial

termination have a global character, with a different style of millennial change in Antarctica. The challenge in the white paper “The IPICS 40,000 year network: a bipolar record of climate forcing and response” is to document, for Greenland and different regions of Antarctica the timing and nature of these events.

In recent years, several new records have emerged and a number of papers have integrated them together, using new techniques to tie timescales together between north and south, and to tie greenhouse gas timescales to the climate records in the ice phase. Arguably the most impressive advance has come with the production of new high resolution records, of a resolution comparable to that of Greenland cores, from the US WAIS Divide project. This project has shown conclusively how tightly coupled northern and southern climate are, and defined the lags between them, which greatly constrains possible mechanisms (WAIS Divide Project members, 2015). In other work, the evolution of carbon dioxide across the last glacial termination has been defined at very high resolution, confirming the existence of a series of rapid jumps of around 10 ppm in 200 years (Marcott et al., 2014). New records have further refined our knowledge of Holocene climate evolution, with a particular advance coming from a new record from the tip of the Antarctic Peninsula (Mulvaney et al., 2012).

Projects from the IPICS community have slowly added very detailed spatial and temporal detail to our knowledge of climate change in the last 40 ka, and provided strong evidence for modellers to use to work on ideas about changes in overturning circulation of the ocean, and the interactions between such changes and longer-term forcing. However to obtain further evidence it will be necessary to look at more than one termination, and at millennial changes under a range of boundary conditions. At the IPICS SC meeting in 2016, it was therefore agreed to end the 40k project and widen it into a more general project about glacial terminations and abrupt climate change. This becomes possible as more ice cores from Antarctica reach beyond the last glacial cycle. A new white paper will replace the 40k one later this year.

Example publications specifically related to this white paper:

Marcott, S. A., et al. (2014), Centennial-scale changes in the global carbon cycle during the last deglaciation, *Nature*, 514(7524), 616-619, doi:10.1038/nature13799.

Mulvaney, R., N. J. Abram, R. C. A. Hindmarsh, C. Arrowsmith, L. Fleet, J. Triest, L. C. Sime, O. Alemany, and S. Foord (2012), Recent Antarctic Peninsula warming relative to Holocene climate and ice-shelf history, *Nature*, 489(7414), 141-144, doi:<http://www.nature.com/nature/journal/v489/n7414/abs/nature11391.html#supplementary-information>.

Pedro, J. B., S. O. Rasmussen, and T. D. van Ommen (2012), Tightened constraints on the time-lag between Antarctic temperature and CO₂ during the last deglaciation, *Climate of the Past*, 8(4), 1213-1221, doi:10.5194/cp-8-1213-2012.

Wais Divide Project Members (2015), Precise inter-polar phasing of abrupt climate change during the last ice age, *Nature*, 520(7549), 661-665, doi:10.1038/nature14401

<http://www.nature.com/nature/journal/v520/n7549/abs/nature14401.html#supplementary-information>.

d. IPICS – 2k

Understanding present and future climate change requires a knowledge of natural climate variability. The period of the last 1-2 millennia provides sufficient time to see a range of cyclic internal behaviours and sporadic forcing such as volcanic eruptions, and is also a time over which high resolution climate modelling is feasible. The white paper “The IPICS 2k Array: a network of ice core climate and climate forcing records for the last two millennia” sets the challenge to produce a spatial array of records, preferably with annual resolution, extending back towards or beyond 2000 years ago.

In practice there is a nice range of annually resolved records from Greenland, and a few records extending some centuries from non-polar ice, but the main effort has gone into assembling suitable records from Antarctica. This is challenging because vast swathes of central East Antarctica have low snowfall and lack the resolution to use techniques commonly used on high resolution records. The effort has been devolved to the PAGES sub-project Antarctica-2k, led by IPICS SC member van Ommen and then Stenni. Antarctic records have been included in the major synthesis of the last 200 years (PAGES 2k consortium, 2013), and a major effort is underway, with a special issue in the pipeline, to improve the Antarctic contribution to this project. A major breakthrough is the improved ability to tie records together from north and south, and with volcanic eruption signals (Sigl et al., 2015). This arises in turn from the existence of annually counted timescales from both hemispheres, and new markers of unusual events that allow certainty in tying cores together. While the 2k effort remains focussed on climate variables, in particular temperature, accumulation rate and sea ice extent, the data have also been used to better understand how aspects of anthropogenic pollution have emerged in recent decades and centuries.

Example publications specifically related to this white paper:

Pages 2k Consortium (2013), Continental-scale temperature variability during the past two millennia, *Nature Geoscience*, 6(5), 339-346, doi:10.1038/ngeo1797.

Sigl, M., et al. (2015), Timing and climate forcing of volcanic eruptions for the past 2,500 years, *Nature*, 523(7562), 543-+, doi:10.1038/nature14565.

e. Drilling

The white paper “Ice core drilling technical challenges” set out a series of advances in technology that could be required by the ice core community. Advances have been made through individual initiatives, and close communication, including in particular a major ice core drilling workshop held under IPICS auspices in Wisconsin in 2013. There have been impressive achievements in for example drilling in warm ice, replicate and deviation drilling, and in the potential for rapid access drilling that includes downhole analysis.

For further details, please see the special issue of *Annals of Glaciology* on this topic at

<http://www.ingentaconnect.com/content/igsoc/agl/2014/00000055/00000068>

f. New white papers and initiatives

In addition to the revision of the 40k white paper, it was agreed at the SC meeting in 2016 that a new white paper on ice cores to advance understanding of ice dynamics should be produced. This will address the ways that ice cores can help us to understand changes in fabric and other properties

and their role in ice dynamics. The new EGRIP project in East Greenland is the first contributor to this project, but there is also potential for Antarctic projects investigating for example ice flow over ice rises, and the nature of unexpected deep ice features observed in radar records. It is expected that this white paper will enhance collaborations between ice core and ice dynamics and modelling experts.

It is also intended to promote more work on non-polar glaciers, probably as an initiative within IPICS 2k. IPICS has also endorsed and encouraged a new project “Saving Ice in Danger” to drill cores from endangered glaciers and store them in guaranteed cold conditions in Antarctica.

4. Ice Core Young Scientists (ICYS)

At the SC in 2012 it was agreed that IPICS should encourage early career scientists to form their own grouping. This has been done and ICYS now arranges social and training events at major conferences. There is some overlap with APECS and we encourage the ICYS SC to work with APECS. At the recent open science conference a 1-day workshop, consisting mainly of topics intended to enhance early careers, was held. IPICS is adopting a hands-off approach to ICYS, offering to help where required, but letting ICYCS organise its own agenda without interference.

5. Open Science Conference

The first IPICS Open Science Conference (OSC) was held at Giens, France in 2012, organised by a committee led by Jérôme Chappellaz. Over 200 attendees enjoyed an excellent week of talks, posters and discussions.

The second IPICS Open Science Conference was held in Hobart, March 7-11, 2016; the venue was chosen after an open competition. It was organised by a team led by Tas van Ommen. Over 200 people attended a very successful week of talks and poster sessions. The IPICS Steering committee, now with representatives from 24 nations (Iceland and Chile recently joined), met in Hobart and discussed the status and updates of priority projects. ICYS held a one-day workshop in Hobart with over 80 attendees that discussed career development and science communication. SCAR was one of a number of sponsors that supported early career travel to each of the OSCs. A special joint issue of the journals *Climate of the Past* and *The Cryosphere* is being produced as a product of the meeting – we anticipate around 20 papers.

About half the OSC attendees completed a survey after the meeting, and were overwhelmingly positive about it; 90% of those who responded to a question asking them to compare the OSC to other conferences they had attended in the last 3 years stated that the OSC was “better” or “much better”!

The third OSC will be held in 2020, with a venue to be decided by open competition during 2017.

6. Future plans

In the sphere of agenda setting, IPICS will undertake the production of the new white papers on “Glacial terminations and abrupt climate change” and “Ice cores for ice dynamics”. IPICS40k will be closed as a result.

IPICS will continue to exchange information and encourage collaborative work on its priority projects. In practice this is done mainly through the work of IPICS scientists within projects funded nationally or multi-nationally, or within initiatives such as PAGES Antarctic2K. We will take particular care to promote the oldest ice project, which requires considerable effort also from geophysics, glaciology and logistic partners. We anticipate that liaison meetings will be held under the auspices of projects such as the “European Beyond EPICA – Oldest Ice” project, but will intervene if this is not the case. We will also propose and promote relevant scientific sessions for our priority projects at meetings such as EGU, AGU and the PAGES OSM.

We will continue to encourage and offer support to ICYS, who generally arrange events at each major meeting (EGU, AGU).

Finally we will put in place plans for the 2020 IPICS Open Science Conference. In relation to SCAR this is the major event for which we request funds, and we will therefore anticipate making funding requests for it for the years 2019 and 2020.

7. Summary

IPICS can now claim to represent ice core scientists and engineers around the world. It has been successful in setting agendas and in providing a voice and presence for ice core science. As well as major advances by individual ice core scientists, IPICS initiatives and workshops have provided momentum to particular topics and provided focus for individual groups to contribute more than the sum of their parts. ICYS is providing a network for early career scientist while the OSCs have been very popular cement for the community. We hope this will commend IPICS to SCAR for its continuance as an EG.

Eric Wolff and Ed Brook, co-chairs, May 2016.



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ISMASS

Contacts: Frank Pattyn (fpattyn@ulb.ac.be), Catherine Ritz (catherine.ritz@univ-grenoble-alpes.fr), Francisco Navarro (francisco.navarro@upm.es)

1-2 paragraph summary of activities from 2014-2016

ISMASS is a joint SCAR-IASC-CliC Expert Group. Catherine Ritz is the chair of ISMASS. Representatives from member organizations are Frank Pattyn (SCAR), Francisco Navarro (IASC) and Edward Hanna (CliC).

ISMASS activities for the period 2014-16 cover:

- A model intercomparison initiative on West Antarctic Glacier-Ocean Models Kick-Off Meeting on 27-29 October 2014 at the New York University Campus in Abu Dhabi, United Arab Emirates, organized by David and Denise Holland. This resulted in a publication in EOS.
- A follow-up of this initiative was organized in Abu-Dhabi on 16-18 May 2016, focused on coupling of ice sheet and ocean models.
- A GIA Modeling workshop organized by Diana Campbell and Jeff Freymueller (endorsed by ISMASS) in Fairbanks, 26-29 May 2015.
- A meeting on 'Constraining Uncertainty in Greenland Ice Sheet surface mass balance model output and in situ validation' was organized by E. Hanna in Sheffield, May 2015.
- A workshop on Marine ice sheet model and Ocean model coupling (MISMIP-ISOMIP-MISOMIP) in Cambridge on 16 August 2015.
- A Mini-symposium co-organized by ISMASS and 3 major SCAR programmes (SERCE-PAIS-AntClim21) entitled 'The Antarctic ice sheet from past 2 future' at SCAR-OSC in Malaysia.
- An ISMASS session at SCAR OSC in Malaysia entitled 'Glaciers and ice sheet mass balance'.

Recommendations that Delegates and Chief Officers should consider (if any): Please indicate if voting/approval is necessary or if they are just asked to note information.

ISMASS bridges scientific groups and communities involved in better understanding of and improving projections of sea level change (past, present and future). This happens under the form of meetings and targeted initiatives.



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In this framework, ISMASS organized a plenary session at the SCAR OSC meeting in Malaysia, involving SRP AntClim21, PAIS and SERCE and focusing on the interactions between the different groups. All SRP representatives have been involved in this process. ISMASS is a long-standing working group that refocused its attention in 2012 to ice sheet mass balance and sea level. For that purpose, ISMASS is not solely a SCAR initiative, but is also linked to IASC and CliC. The main website of ISMASS is hosted by CliC.

Date/Year Group Approved: n/a
Date/Year Group is to End: n/a

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



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Further Details:

Major Activities and Significant Progress from past 2 years

A model intercomparison initiative on West Antarctic Glacier-Ocean Models Kick-Off Meeting was held on 27-29 October 2014 at the New York University Campus in Abu Dhabi, United Arab Emirates, organized by David and Denise Holland. This resulted in a publication in EOS (<https://eos.org/features/on-the-rocks-the-challenges-of-predicting-sea-level-rise>). A follow-up of this initiative was organized in Abu-Dhabi on 16-18 May 2016, focused on coupling of ice sheet and ocean models. A summary of that workshop will become available soon.

A GIA Modeling workshop organized by Diana Campbell and Jeff Freymueller (endorsed by ISMASS) in Fairbanks, 26-29 May 2015. The purpose of this workshop was to bring together those working on ice load reconstructions, modeling of (visco-)elastic processes and comparison to relative sea level and geodetic observations (e.g. GRACE, GPS, ICESat, CRYOSAT II) to refine our understanding of past to present ice/ocean load changes, and the characteristics of the solid Earth under time-varying loads, in order to advance our understanding of past ice sheet and sea level changes, and of the structure and rheology of Earth.

A workshop on Marine ice sheet model and Ocean model coupling (MISMIP-ISOMIP-MISOMIP) was organized in Cambridge on 16 August 2015. The workshop was focused on presenting the design of three MIPs: the third Marine Ice Sheet MIP (MISMIP+), the second Ice Shelf-Ocean MIP (ISOMIP+) and the first Marine Ice Sheet-Ocean MIP (MISOMIP1). The workshop unfolded in four sessions:

1. Experimental Design acquainted potential participants with the experimental design for each MIP
2. Logistics for Participation made potential contributors aware of the logistics for participating in each MIP
3. Remaining Design Questions asked for community feedback related to three open questions related to the experimental design:
 - a. Which basal friction law should be used in MISMIP+?
 - b. How should dynamic calving be handled (if at all) in each MIP?
 - c. To what extent should MISOMIP1 ask participants to submit results in a common configuration?
4. Future Directions presented possible next steps for each MIP



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A publication in GMDD with the description of the experiments has been published and is currently under review (<http://www.geosci-model-dev-discuss.net/gmd-2015-228/>).

A meeting on 'Constraining Uncertainty in Greenland Ice Sheet surface mass balance model output and in situ validation' was organized by E. Hanna in Sheffield, May 2015. The objectives of the meeting were (i) to prompt more comprehensive spatial comparisons between SMB model output from the several different SMB modeling approaches (RACMO2, MAR, SnowModel, Hanna et al. PDD approach) and (ii) to discuss how major discrepancies between GrIS SMB model estimates (e.g. relating to precipitation/snow accumulation amounts in inland south-east Greenland) can be better reconciled through the improved use and implementation of in situ validation observations, including (but not limited to) weather stations, ice radar and shallow ice cores. The workshop established a clear action plan, which can be found on the CliC website (<http://www.climate-cryosphere.org/activities/groups/ismass>).

A Mini-symposium is co-organized by ISMASS and 3 major SCAR programmes (SERCE-PAIS-AntClim21) entitled 'The Antarctic ice sheet from past 2 future' at SCAR-OSC in Malaysia. Adjacent to this, an ISMASS session at SCAR OSC in Malaysia entitled 'Glaciers and ice sheet mass balance' is also organized.

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

ISMASS will continue to endorse the ice-sheet-ocean model intercomparisons by helping organizing workshops related to this issue (e.g., MISOMIP). ISMASS budgets will be used for this purpose as well as to attract and subsidize young scientists to attend to these meetings, in collaboration with APECS.

A follow-up review paper for Nature is planned in 2017, in connection with a workshop that is planned for end of 2016, beginning 2017. It would highlight recent advances in ice sheet mass balance and sea-level rise based on the previous review paper from 2013:
<http://www.nature.com/nature/journal/v498/n7452/full/nature12238.html>



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ISMASS will also help to make the link between communities of model intercomparisons (such as MISIP) and IPCC-related intercomparisons that are part of CMIP6, such as ISMIP6.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2017	Workshop organization	2500	C. Ritz	
2018	Workshop organization	1000		
2018	SCAR OSC ISMASS activities	1500	C. Ritz	

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programmes):

Nearly all budget has been used with such purposes, and the plan is to continue to do so. The funding will be allocated to invite scientists and young APECS members to join the steering committee of ISMASS and workshops organized or co-organized by ISMASS, probably connected to the next SCAR OSC meeting (2018). In order to reduce the costs, we plan to revise the membership of the steering committee every two years (for instance during SCAR meetings).

The planned 2017 workshop would be to redo the exercise that was been done during the SCAR OSC meeting in 2012 in Portland, by outlining the state of the art of data analysis and modelling and focusing on the main challenges. These matters will be discussed during the next ISMASS steering committee meeting to be held at the SCAR OSC meeting in 2016.

External Linkages – Support and Coordination beyond SCAR:



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ISMASS is a joint activity with IASC and hosted by CliC.
Francisco Navarro (francisco.navarro@upm.es) is contact person in IASC.
Edward Hanna (E.Hanna@Sheffield.ac.uk) is contact person in CliC.

Please describe your outreach, communication and capacity building activities:

Outreach and communication is mainly organized in collaboration with CliC that enables a wide coverage.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

The publication output of ISMASS is rather limited as ISMASS facilitates science and is not a science actor or science programme. Therefore, one review paper has been published by ISMASS so far:

Hanna, E., F.J. Navarro, F. Pattyn, C.M. Domingues, X. Fettweis, E.R. Ivins., R.J. Nicholls., C. Ritz, B. Smith, S. Tulaczyk, P.L. Whitehouse, H.J Zwally (2013). Ice-sheet mass balance and climate change. *Nature*, **498**, 51-59, doi:10.1038/nature12238.

Given the support that ISMASS has given and continuous to give for ice sheet model intercomparison efforts, the following paper is worthwhile to mention:

X. S. Asay-Davis, S. L. Cornford, G. Durand, B. K. Galton-Fenzi, R. M. Gladstone, G. H. Gudmundsson, T. Hattermann, D. M. Holland, D. Holland, P. R. Holland, D. F. Martin, P. Mathiot, F. Pattyn, and H. Seroussi (2015) Experimental Design for three Interrelated Marine Ice-sheet and Ocean Model Intercomparison Projects. *Geophysical Model Development Discussions* 8, 9859-9924.

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.



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Edward Hanna (University of Sheffield, UK)
Xavier Fettweis (Université de Liège, Belgium)

Webpages: <http://www.climate-cryosphere.org/activities/groups/ismass>

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

The changes to the website are taken care of by CliC.

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

n/a

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Catherine	Ritz	Université Grenoble Alpes	France	catherine.ritz@univ-grenoble-alpes.fr	2012	2016
Frank	Pattyn	Université Libre de Bruxelles	Belgium	fpattyn@ulb.ac.be	2012	2016
Edward	Hanna	University of Sheffield	UK	E.Hanna@Sheffield.ac.uk	2012	2016
Francisco	Navarro	Universidad	Spain	francisco.navarro@upm.es	2012	2016



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Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

Short bio: Catherine Ritz

Catherine Ritz, obtained a Phd in geophysics in 1992 at the University of Grenoble. She is senior Scientist (Directeur de Recherche) in the CNRS at LGGE (Laboratoire de Glaciologie et Géophysique de l'Environnement) where she was the head of the ice sheet modelling group. Her research interest concerns ice sheet modelling and she has developed 3D, thermomechanically coupled models that simulate the evolution of ice sheets under various climatic conditions. The time scales of interest ranged from century (for IPCC like projections) up to 400 kyears (for paleostudies). This model has been applied to present ice sheets, such as Greenland and Antarctica, but also to the past ice sheets that covered part of the northern hemisphere during the glacial periods. She also participated to ice cores interpretation (dating, ice origin) and in continuation of this topic, she is involved in the selection of a very old ice drilling site by both modelling approach and associated geophysical observations.



Short bio: Frank Pattyn

Frank Pattyn is a glaciologist/ice-sheet modeller and director of the Laboratoire de Glaciologie of the ULB. He developed a number of ice-sheet



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models, such as a three-dimensional thermomechanical ice-sheet model including higher-order stress gradients (Blatter-Pattyn model). Such models are capable of simulating the behaviour of fast-flowing ice streams and ice flow across subglacial lakes. He is also actively involved in Ice-Sheet Model Intercomparison Projects (ISMIP), and led initiatives such as ISMIP-HOM, MISIP, and MISIP3D. He took part in several expeditions to Antarctica and to glaciers of the Arctic in order to study the interaction of glaciers and ice sheets with subglacial water and the ocean, using ice radar and differential GPS. He leads the GEMICE research group (Geophysics and Modelling of ice), focused on the multidisciplinary study of ice dynamics using geophysical observations, remote sensing and ice-sheet/ice-shelf modelling. He is currently president of the Belgian National Committee on Antarctic Research (SCAR delegate), vice-president of the International Glaciological Society (IGS), co-chief editor of Journal of Glaciology and scientific editor of The Cryosphere.



Short bio: Francisco Navarro

Francisco Navarro, PhD Geophysics, 'Profesor Titular' at Universidad Politécnica de Madrid. Since 1997 his research activity has focused on glaciology, with emphasis on modelling of glacier dynamics, glaciological applications of ground-penetrating radar and mass balance studies.



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Other members

First Name	Last Name	Affiliation	Country	Email
Dan	Dixon	University of Maine	USA	Daniel.Dixon@umit.maine.edu
Xavier	Fettweis	Université de Liège	Belgium	Xavier.Fettweis@ulg.ac.be
David	Holland	New York University	USA	david.holland@nyu.edu
Andrew	Shepherd	University of Leeds	UK	A.Shepherd@leeds.ac.uk
Pippa	Whitehouse	Durham University	UK	pippa.whitehouse@durham.ac.uk
Ellyn	Enderlin	Univ. of Maine (APECS rep.)	USA	ellyn.enderlin@gmail.com



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Operational Meteorology in the Antarctic (OpMet) Expert Group

Contacts: Steven Colwell src@bas.ac.uk

1-2 paragraph summary of activities from 2014-2016

Continues to maintain we pages that are updated on a weekly basis with news, information and data monitoring at

http://www.antarctica.ac.uk/met/jds/met/SCAR_oma.htm

Co-hosted a workshop on Antarctic meteorology in Cambridge from the 17-19 June 2015 y about 50 delegates from 10 different countries.

With the SSG-PS are part funding the 11th Antarctic Meteorological Observation, Modeling & Forecasting Workshop (June 6-8, 2016) in Columbus Ohio.

In conjunction with the WMO Antarctic Task Team (ATT) have put together an information paper that will go to the Antarctic Treaty Consultative Meeting (ATCM) on the state of operational meteorology in Antarctica.

Recommendations that Delegates and Chief Officers should consider (if any): None

Date/Year Group Approved:

Date/Year Group is to End:

All SCAR Groups are asked to produce a poster to highlight activities for the SCAR Open Science Conference. Do you plan to produce a poster?

Y



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

**XXXIV SCAR Delegates Meeting
Kuala Lumpur, Malaysia, 29-30 August 2016**

Further Details:

Major Activities and Significant Progress from past 2 years

OPMet co-hosted a workshop on Antarctic meteorology in Cambridge from the 17-19 June 2015 which was held at SPRI (Scott Polar Research Institute); the website for the meeting can be found at <http://amrc.ssec.wisc.edu/meetings/meeting2015/index.shtml>. The meeting was attended by about 50 delegates from 10 different countries. A report for the meeting was published in Advances in Atmospheric Sciences see <http://159.226.119.58/aas/article/2016/0256-1530/0256-1530-33-5-656.shtml>

Major Future Initiatives and Actions, including rough timeline, for at least the next 2 years

OpMet and SSG-PS are part funding the 11th Antarctic Meteorological Observation, Modeling & Forecasting Workshop (June 6-8, 2016) in Columbus Ohio and this will include a half day on the Year of Polar Prediction (YOPP) which is a World Meteorological Organisation (WMO) initiative.

OpMet in conjunction with the WMO Antarctic Task Team (ATT) have put together an information paper that will go to the Antarctic Treaty Consultative Meeting (ATCM) on the state of operational meteorology in Antarctica.

Proposed Budget for 2017 and 2018

Month/Year	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
2017	Attending meetings	2000	Steven Colwell	src@bas.ac.uk
2018	Attending meetings	2000	Steven Colwell	src@bas.ac.uk

Budget Justification (please indicate % of budget to support early career scientists and scientists from countries with small Antarctic programs):

100% to support scientists from countries with small Antarctic programs



SCAR Group xxx
SSG PS/LS/GS
Person xxx
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External Linkages – Support and Coordination beyond SCAR:

WMO EC-PHORS

https://www.wmo.int/pages/prog/www/polar/index_en.html

Please describe your outreach, communication and capacity building activities:

Members of the group publishing scientific papers and carrying out outreach but not specifically as OpMet.

Publications of your group to date:

Note: Please use the APA style. <http://www.citationmachine.net/apa/cite-a-journal> can help you. We will only ask for a complete list this year, after this we will ask for new publications every 2 years.

<http://159.226.119.58/aas/article/2016/0256-1530/0256-1530-33-5-656.shtml>

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 act 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 from your group who would be willing to serve as fellowship reviewers for the next few years.

Steve Colwell src@bas.ac.uk

Pablo Clemente-Colon Pablo.Clemente-Colon@noaa.gov

Jordan Powers powers@ucar.edu



SCAR Group xxx
SSG PS/LS/GS
Person xxx
Responsible:

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Webpages:

Many of the webpages for SCAR Groups have little information or are not updated regularly. Significant improvements are needed, and funding may be withheld until webpages are updated.

Please include any updates for your website below:

Website is at https://legacy.bas.ac.uk/met/jds/met/SCAR_oma.htm and is updated on a weekly basis. Many of the plots and information tables are updated automatically on an hourly basis

If you have suggestions on how to improve the structure of your group's webpages, please provide them below:

Members:

Chair(s) Duration of Term

First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End
Steven	Colwell	BAS	UK	src@bas.ac.uk	2010	NA

Please also include a short bio and photo of your chairs/officers and a link to their website as well as a few keywords on their research interests and area(s) of expertise. This will be used for a new database of SCAR experts.

<https://www.bas.ac.uk/profile/src/>

Other members

<https://legacy.bas.ac.uk/met/jds/met/members.htm>



SCAR Group

SSG

Person

Responsible:

SORP

PS

J Fyfe

**XXXIV SCAR Delegates Meeting
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CLIVAR/CliC/SCAR Southern Ocean Region Panel activities (September 2015 to June 2016)

The SORP has been very active since its last panel meeting in September 2015 (<http://www.clivar.org/sites/default/files/documents/Report%2010th%20SORP%20meeting.pdf>); with extensive participation in international research coordination and collaboration with several relevant programs, including the Southern Ocean Observing System (SOOS), the Ocean Observations Panel for Climate (OOCIP), the Polar Prediction Project (PPP) and the Polar Climate Predictability Initiative. The panel has a new co-chair (Inga Smith) and one new member (Riccardo Farneti).

The SORP has organized sessions at several internal conferences including the upcoming SCAR 2016 Open Science Conference (Kuala Lumpur, Malaysia ; August 2016) and the CLIVAR Open Science Conference (Qingdao, China; September 2016); and is also co-sponsoring a Townhall meeting on "Ocean-Cryosphere Interactions" at the CLIVAR Open Science Conference. The panel is presently helping to organize a Polar Prediction Workshop in Bremerhaven, Germany (March 2017) co-sponsored by the Polar Climate Predictability Initiative (WCRP-PCPI), the Polar Prediction Project (WWRP-PPP), and the Sea Ice Prediction Network (ARCUS-SIPN). Over the past six months the panel was represented at several international workshops, including the US Polar Research Board Antarctic Sea-Ice workshop in Boulder Colorado (John Fyfe and Lynne Talley; January, 2016), the Ozone and Climate Project (OCP) workshop in Boston Massachusetts (John Fyfe; June 2016) and the International Workshop on Coupled Modeling of Polar Environments in Columbus, Ohio (François Massonnet and Ben Galton-Fenzi; June 2016). The SORP has developed a template to maximize input from national reports, and has strengthened coordination of national representatives between SOOS and SORP (Inga Smith). The SORP has been actively promoting and strengthening ties with SOOS (Lynne Tally).

The SORP has reported out to several sponsoring and related organizations such as SOOS (Lynne Tally ; San Diego, May 2016), the Ocean Observations Panel for Climate (OOCIP; Katsuro Katsumata; Esporles, Majorca, April 2016); May 2016), the Polar Prediction Project (PPP) Steering Group (François Massonnet) and the CliC Scientific Steering Group (Kenny Matsuoka, February 2016, Copenhagen).