WP	**6a**
Agenda Item:	4.1.1
Person Responsible:	D Bromwich

D.XXXIV SCAR Delegates Meeting

Kuala Lumpur, Malaysia, 29-30 August 2016

Standing Scientific Group on Physical Sciences (SSG-PS) Report

Executive Summary

Authors: D. Bromwich, M. Candidi, and S. Colwell.

Important Issues or Factors:

Provide a brief summary of the document, no more than 100 words, with the most important point(s) of your paper.

Expert Group IPICS was externally reviewed and received outstanding endorsement from all reviewers for its continuation.

Scientific Research Programme AntClim[21] was enthusiastically supported by the external reviewers.

Recommendations/Actions and Justification:

Provide input on what you would like the Delegates to do with this information. Should delegates just note the update? Are you asking SCAR to take an action – if so, please indicate that here. Limit ~50 words.

Renewal of Expert Group IPICS is strongly recommended.

Continuation of Scientific Research Programme AntClim[21] is strongly recommended.

Support for new Expert Group FRISP and Action Group TATE is strongly recommended.

Action Groups PACT and Southern Ocean Acidification will complete their activities by the end of 2016 and be disbanded.

Budget Implications:

If you are requesting funds, please indicate how much and what it will be used for in 1 sentence.

SSG-PS requests 28.5K in 2017 and 28.5K in 2018 to support meetings and research activities of the Action and Expert Groups.

Introduction/Motivation

The Standing Scientific Group (SSG) on Physical Sciences includes the following Action and Expert Groups plus the Scientific Research Programmes (SRPs) on Astronomy and Astrophysics from Antarctica (AAA) and Antarctic Climate Change in the 21st Century (AntClim21). A very high level overview of the activities for the past two years by the Action and Expert Groups are presented here. Please see the individual group reports that are presented nearby for details. The online SRP reports summarize their extensive activities.

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

Progress to Date

Most groups organized or participated in important meetings. Particularly noteworthy were the 2nd International Open Science Conference of IPICS and the ANTOS planning meeting to be an Expert Group. SnowAnt conducted Snow Science Winter Schools in 2015 and 2016. ISMASS arranged 4 meetings since the Auckland SCAR OSC.

Other activities included ACCE putting their important publication into a wiki for ease of updating. The ASPeCt digital underway ice observation method, version 2 has been launched; voyages from October 2015 - March 2016 are using this version 2. OpMet in conjunction with the WMO Antarctic Task Team (ATT) put together an information paper that will go to the Antarctic Treaty Consultative Meeting (ATCM) on the state of operational meteorology in Antarctica. PACT will complete its tropopause database by December 2016, and Southern Ocean Acidification will release its long awaited report in Kuala Lumpur. SERAnt met with GRAPE in Kuala Lumpur to scope out the ReSourCE proposal (see below). Remote Sensing met in Kuala Lumpur with the new Southern Ocean Observing System (SOOS) Working Group on Censusing Animal Populations from Space (CAPS).

SORP has been very active since its last panel meeting in September 2015 with extensive participation in international research coordination and collaboration with relevant programs, including SOOS, the Ocean Observations Panel for Climate (OOCP), the WMO Polar Prediction Project (PPP) and the WMO Polar Climate Predictability Initiative (PCPI).

Finally, IPICS underwent external review for renewal as an Expert Group and was strongly supported by all reviewers. The AntClim[21] Scientific Research Programme was also reviewed and all reviewers enthusiastically endorsed its efforts. The online documents contain the review results.

Future Plans

All continuing groups have active programs planned for 2017 and 2018 including supporting scientific meetings. Some highlights are the following.

GRAPE has recently established a task force in conjunction with SERAnt and AAA to propose a new Scientific Research Programme entitled ReSourCE (Radio Sciences Research on AntarCtic AtmosphEre) to be presented at the 2018 SCAR meeting.

ACA will establish a database of polar cloud observations.

SnowAnt will propose pristine snow areas for protection.

IPICS will actively plan for its 2020 Open Science Conference.

A new Expert Group on Forum for Research into Ice Shelf Processes (FRISP) is proposed. A short summary is appended, and a much more extensive document was prepared that is available if needed. This Expert Group is distinct from and complementary to the existing ISMASS Expert Group in that FRISP concentrates on the processes controlling ice shelf behaviour whereas ISMASS is broadly concerned with the ice sheet contribution to sea level rise.

A new Action Group on Tropical Antarctic Teleconnections Action Group (TATE AG) is proposed. The proposal is attached. This proposed AG is distinct from and complementary to the AntClim21 Scientific Research Programme in that it is concerned with the processes linking the tropics to Antarctica which are not well understood yet are key to the future trajectory of Antarctic climate. AntClim21 is a much broader effort that emphasizes coupled climate modelling for the 21st century.

Elections

The following officers were elected for 2016-2020 during the SSG-PS business meeting on August 24, 2016:

Chief Officer: David Bromwich (USA)

Deputy Chief Officer: Open as no suitable candidates were present at the business meeting. Four potential candidates, not from the US or UK, have replied as of August 28, 2016

morning to an email solicitation for interest in the position. An electronic election will be held and the result forwarded to the SCAR Executive Committee.

Secretary: Steve Colwell (UK)

Maurizio Candidi is thanked for his long service to SSG-PS. He did not stand for re-election as Deputy Chief Officer.

Recommendations/Expected Outcomes

Renewal of Expert Group IPICS is strongly recommended.

Continuation of Scientific Research Programme AntClim[21] is strongly recommended.

Authorization of proposed FRISP EG is recommended.

Authorization of proposed TATE AG is recommended.

PACT and Southern Ocean Acidification will complete their activities by the end of 2016 and be disbanded.

Proposed SCAR SSG-PS Budget for 2017 and 2018

Group	2017	2018	Use/Comments
ACCE EG	**2000**	**2000**	**SCAR Budget Convenience**
ANTOS EG (LS/GS)	**2000**	**2000**	**Workshop. Database develop.**
ASPECT EG	**3000**	**3000**	**Meetings**
FRISP EG (TBD)	**2000**	**2000**	**Meetings**
GRAPE EG (GS)	**4000**	**2000**	**Mtgs,-website.**
IPICS EG	**0**	**3000**	**Oldest Ice Meeting.**

ISMASS EG	**2500**	**2500**	**Workshops.**
OpMet EG	**2000**	**2000**	**AMOMFW Mtgs. 17 & 18.**
SORP	**2000**	**2000**	**SCAR Budget Convenience**
ACA AG	**0**	**0**	**No funds requested**
Remote S. AG (LS)	**500**	**500**	**Early Career Travel**
SERAnt AG	**1500**	**1500**	**Mtgs.**
SnowAnt AG	**2000**	**2000**	**Snow Schools**
TATE AG (TBD)	**500**	**500**	**Meetings**
SSG-PS	**4500**	**3500**	**Contingency/Early Career Travel.**
Total:	**$28.5K**	**$28.5K**	

Appendices

PROPOSAL FOR A NEW SCAR ACTION GROUP

NAME: Tropical Antarctic Teleconnections Action Group (TATE AG)

Proposers:

Azizan Abu Samah (Malaysia)
David Bromwich (USA)
Francisco Aquino (Brazil)
Jefferson C. Simões (Brazil, Chair)
Kyle Clem (New Zealand)
Seong-Joong Kim (Korea)

Overview

There are very distinct connections between tropical and Antarctic climates, particularly over the South Pacific and South Atlantic with the West Antarctic/Antarctic Peninsula regions, but these are not fully explored. For example, atmospheric wavetrains show spatial and temporal (seasonal, interannual) variations in both regions.

All these variations have important roles on the tropical-Antarctic relationships including, for example, the one between climate and sea ice extent. Coupling of tropical forcing with the SAM also impacts the weather and climate throughout the Southern Hemisphere. For example, extreme weather events in subtropical South America result from interactions between tropical and Antarctic regions.

Goals

1. This AG intends to increase discussion and collaboration to explore tropical and polar weather and climate interactions, carrying out at least one interdisciplinary workshop;

2. To investigate the tropical forcing of the atmospheric circulation in the present and in the recent past (the last 200 years based on proxy records such shallow ice core studies);

3. To explore the air-sea ice coupled systems and their relation to weather and climate of the tropics and subtropics, including interactions with the monsoons systems;

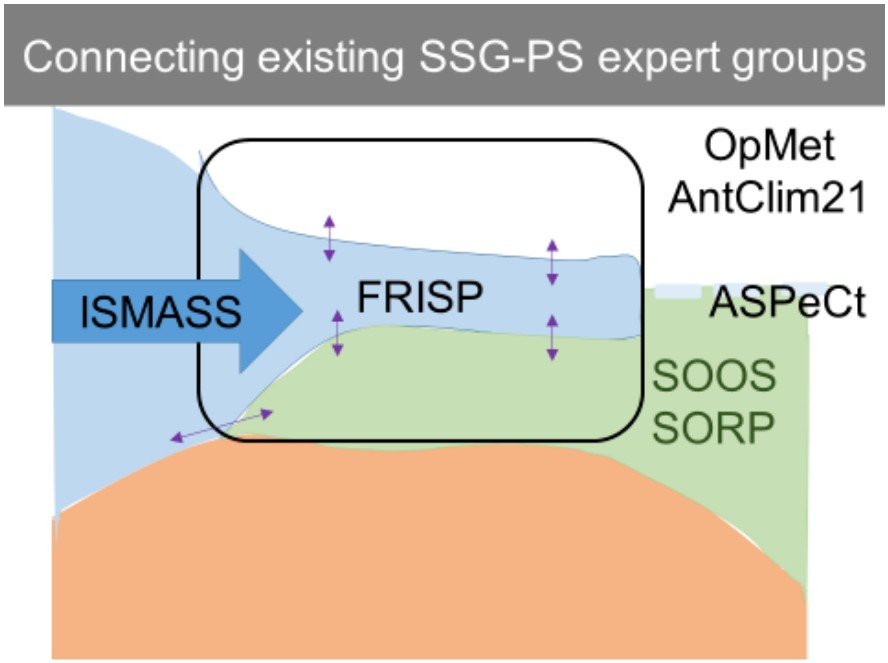
4. To conduct case studies on the relation between complex weather and climate patterns in the South Atlantic, Indian and Pacific regions and the Southern Ocean sea ice cover, and how they are connected to natural modes of climatic variability (e.g., ENSO, SAM, PSA, PDO) or anthropogenic-induced changes;

5. To organize a session at the XXXV SCAR (Davos, 2018) exploring the tropical polar teleconnections (to be carried out together with IASC);

6. To produce at least one special volume of articles on the tropical polar teleconnections.

Proposed new Expert Group: Forum for Research into Ice Shelf Processes (FRISP)

- Developed by SCAR in 1983 with specific geographical focus on the Filchner-Ronne Ice Shelf.
- Broadened its scope to entire Antarctica and Greenland.
- Will hold 30th conference October 2016 in Sweden.
- Desires to be a SCAR expert group under SSG-PS to focus on the oceanic and atmospheric processes governing the behavior of ice shelves that are key to the ice sheet contribution to sea level change.



Funding Request:

- 3K USD each in 2017 and 2018 to support FRISP workshop participants who have limited access to travel support especially students and early career scientists.
- SSG-PS is acknowledged in all workshop announcements.
- Awarded individuals are referred to as "SCAR Bursaries."

1) The availability of SCAR Bursaries and the criterion for application (the need for financial support for attendance) will be indicated in the workshop announcements.
2) Those wishing to apply for a SCAR Bursary will be required to indicate their intention when registering and provide a separate one page justification (including intended workshop contribution, an estimate of the total cost of attendance, including travel, and a justification for the award of a Bursary).
3) The closing date for SCAR Bursary applications will be in advance of the general registration deadline and will be notified in the workshop announcements.
4) Awards will be confirmed shortly (typically two weeks) after the closing date.
5) No funds will be paid directly to awardees, but the bursary will be used by the local organising committee of the relevant workshop to subsidise the registration and accommodation costs, such that awardees can be charged reduced rates.
6) The scheme will be administered by the local organising committee, but the distribution of awards will be subject to approval by the FRISP Steering Committee.
7) The operation of the Scheme will be subject to periodic review by the FRISP Steering Committee.

FRISP – Forum for Research into Ice Shelf Processes

Summary

FRISP has been an active organisation since 1983, with the mission of promoting international cooperation in the study of ice shelves and their interaction with the ocean. When it was established by SCAR, it had a specific geographical focus on the Filchner-Ronne Ice Shelf, and the membership was drawn primarily from those nations whose Antarctic logistical infrastructure afforded the opportunity to work in the southern Weddell Sea region. With time, the links with SCAR and the geographical focus weakened, while the international membership broadened. Recent expansion has been driven by the growing recognition of ice-shelf-ocean interactions, Antarctic-wide and beyond, as a scientific priority. It is now clear that ocean forcing of ice shelf thinning and tidewater glacier retreat is a driver of mass loss from the ice sheets of Antarctica and Greenland, and that understanding the processes involved is a necessary step towards reliable projections of their future sea level contribution.

Throughout the past 33 years the main activity of FRISP has been the organisation of annual workshops, of which the 30th will take place on 3-6 October 2016 in Sweden. The growing attendance at these workshops has necessitated the adoption of more formal arrangements and larger venues, and that has inevitably increased the cost for delegates. One of the great benefits of the informal nature of the workshops is that they have been an ideal forum for students and early career scientists to present often preliminary results from their research and discuss them with experts from around the world. Recognising that the increased cost of attendance could jeopardise that function, the Steering Committee decided to explore the possibility of renewing the historical link with SCAR and applying for modest financial support to subsidise the costs of attendance for those with limited travel budgets.

The FRISP Steering Committee therefore wish to apply for formal recognition of FRISP as a SCAR Expert Group under the Standing Scientific Group on Physical Sciences.

FRISP Steering Committee

21st August 2016

Mission Statement

FRISP exists to promote inter-disciplinary scientific research into the interactions between the Earth's ice sheets and oceans.

Understanding those interactions is critical to reducing uncertainty in projections of the future sea level contribution from the ice sheets and in quantifying the impacts of the associated freshwater input on the state of the ocean and climate.

FRISP recognises the need for a whole Earth System approach to the study of ice-sheet-ocean interactions that encompasses the atmosphere-ice-ocean dynamics that control the delivery of ocean waters to the ice sheet margins and the atmosphere and ice dynamics that control the delivery of ice and meltwater to the ocean.

FRISP aims to promote international collaboration, to enhance the coordination of field programmes, and to encourage the participation of all, especially early career scientists, in an informal and open forum for scientific discussion.

Current and Future Activities

FRISP remains an active organisation whose primary goal is the organisation of an annual workshop that is open to all who wish to present and discuss the results of any scientific investigations into the interactions between ice sheets and oceans, the physical processes that control those interactions and the impacts they have. The workshops are typically held in mid-June at a venue that is decided during the course of the preceding workshop, and they are publicised via the "cryolist" email listserver. From time to time FRISP also offers non-financial support to other meetings and conferences covering the FRISP themes, and will on occasion combine the annual workshop with such a meeting.

In 2016 FRISP was a co-sponsor of the International Glaciological Society's International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean, held at the Scripps Seaside Forum, Scripps Institution of Oceanography, La Jolla, California, U.S.A., on 10-15 July. In addition, a separate FRISP workshop is scheduled for 3-6 October at a University of Gothenburg marine science field station. The later-than-usual date was chosen to avoid the otherwise near-clash in timing with the IGS Symposium. Given that late timing, plans are already in place for a 2017 workshop that will be held on 19-22 June at the Panorama Hotel on the island of Sotra, near Bergen, Norway. We anticipate further workshops in subsequent years at venues yet to be decided, and the Steering Committee will explore the possibility of arranging the 2018 workshop as a satellite meeting during the SCAR/IASC Open Science Conference in Davos.

Links with Other Activities

The scientific focus of FRISP naturally puts its activities at the interface between those of ISMASS, SORP and SOOS, while complementing the efforts of MISOMIP, and the FRISP Steering Committee includes representatives from the Steering Committees of those groups. Establishment of further links with other relevant SCAR groups, such as ASPeCt and AntClim21 will be discussed at the next FRISP Steering Committee meeting, scheduled for Thursday, 6th October 2016.

Terms of Reference

FRISP exists to promote inter-disciplinary scientific research into the interactions between the Earth's ice sheets and oceans.

Research on the floating ice shelves and the ocean circulating beneath them are core themes, but the scope extends to ice sheets that feed ice shelves and marine-terminating glaciers, the continental shelves that supply waters to the sub-ice cavities and calving fronts of tidewater glaciers, forcing of ice and ocean from atmosphere and sea ice, and the investigation of archives retained in ice and sediments of the past functioning of those systems.

FRISP aims to promote international collaboration through the sharing of early results, to enhance the coordination of field programmes so that the scientific return from available logistical infrastructure can be maximised, and to encourage the participation of early career scientists in an informal and open forum for scientific discussion.

To achieve the above aims, FRISP organises an annual international workshop that is open to anyone working on relevant topics and is publicised on the "cryolist" email listserver.

Presentations on all aspects of ice-ocean research are encouraged, including, but not limited to:
• formation, flow and disintegration of ice shelves and tidewater glaciers;
• response of ice shelves and tidewater glaciers to past, present and future climate variability;
• surface and basal mass balance of ice shelves;
• ice-ocean interaction at the base of ice shelves and calving front of ice shelves and tidewater glaciers;
• mass transport across the grounding line;
• ocean circulation and water mass transformation beneath ice shelves and within pro-glacial fjords;
• impact of ice shelves on the global ocean;
• processes controlling the delivery of ocean heat to glaciated coastlines;
• climate records from on, beneath or near current or former ice shelves;
• iceberg calving, drift, melting, and decay.
Studies based on observation, modelling or a combination of the two are equally welcome.

The location of each workshop is decided on by a Steering Committee and the decision is usually ratified at the preceding workshop by all attendees.

The Steering Committee will also consider requests for non-financial co-sponsorship of other meetings devoted to the FRISP science themes, and if appropriate will consider combining the annual workshop with such a meeting.

The Steering Committee is composed mainly of representatives from nations supporting a sustained programme of relevant scientific research, and encourages the addition of new programmes and representatives.

Steering Committee as of 21st August 2016

Chair: Adrian Jenkins, British Antarctic Survey, U.K.

National representatives:

U.K.: Keith Nicholls, British Antarctic Survey.
Germany: Hartmut Hellmer, Alfred-Wegener-Institute (also SORP representative).
Norway: Svein Østerhus, Bjerknes Centre for Climate Research (also SORP representative).
Sweden: Anna Wåhlin, University of Gothenburg (also SOOS representative).
U.S.A.: David Holland, New York University (also ISMASS and MISOMIP representative).
Korea: Sang Hoon Lee, Korean Polar Research Institute (also SOOS representative).
Australia: Richard Coleman, University of Tasmania.
Japan: Shin Sugiyama, Hokkaido University.

Early career scientist representatives:

Elin Darelius, University of Bergen.
Tore Hattermann, Alfred-Wegener-Institute.
Laura Herraiz-Borreguero, National Oceanography Centre Southampton.

Proposed Budget for 2017/2018

Funding is requested to provide financial support for the International FRISP Workshops planned for 2017 and 2018. Specifically the funds will be used to subsidise the registration and accommodation fees of researchers wishing to present work of relevance to the FRISP science themes, but whose limited access to travel support would otherwise jeopardise their attendance.

The financial support of SCAR will be acknowledged in all announcements of the workshop and the awards to individuals will be referred to as "SCAR Bursaries". The SCAR Bursary Scheme will work as follows:

1) The availability of SCAR Bursaries and the criterion for application (the need for financial support for attendance) will be indicated in the workshop announcements.
2) Those wishing to apply for a SCAR Bursary will be required to indicate their intention when registering and provide a separate one page justification (including intended workshop contribution, an estimate of the total cost of attendance, including travel, and a justification for the award of a Bursary).
3) The closing date for SCAR Bursary applications will be in advance of the general registration deadline and will be notified in the workshop announcements.
4) Awards will be confirmed shortly (typically two weeks) after the closing date.
5) No funds will be paid directly to awardees, but the bursary will be used by the local organising committee of the relevant workshop to subsidise the registration and accommodation costs, such that awardees can be charged reduced rates.
6) The scheme will be administered by the local organising committee, but the distribution of awards will be subject to approval by the FRISP Steering Committee.
7) The operation of the Scheme will be subject to periodic review by the FRISP Steering Committee.

Budget for 2017

Workshop location:	Panorama Hotell & Resort Austefjordveien 165, 5379 Steinsland, Norway
Workshop dates:	19-22 June 2017
Estimated registration/accommodation fees:	$550-700
Indicative level of SCAR Bursary:	$300
Indicative number of SCAR Bursaries:	10
Total budget for 2017:	$3000

Budget for 2018

Workshop location:	To be confirmed
Workshop dates:	June 2018
Estimated registration/accommodation fees:	$500-650
Indicative level of SCAR Bursary:	$300
Indicative number of SCAR Bursaries:	10
Total budget for 2018:	$3000

APPENDIX I: A Brief History of FRISP

FRISP was established in 1983 as the "Filchner-Ronne Ice Shelf Programme", a subcommittee of the SCAR Working Group on Glaciology, with the aim of stimulating and coordinating glaciological research on the Filchner-Ronne Ice Shelf. An initial report summarised the work that had been done to date and plans for the future, with contributions from representatives of Argentina, Germany, Norway, UK, USA and USSR. Initially the German field programme was the most active, being centred on the Filchner Station that had been established on the ice shelf in the 1981/82 summer season. The first science workshop, hosted by the Alfred-Wegener-Institute in Bremerhaven, Germany, on 11-12 October 1984, and the subsequent Report No. 2, summarised the early findings of the German programme. A second international workshop, held on 4-5 June 1986 at Scott Polar Research Institute in Cambridge, UK, included delegates from Germany, Norway and the UK, and set the pattern for the coming years. Workshop locations rotated around the three main nations undertaking fieldwork on Filchner-Ronne Ice Shelf and in the broader southern and eastern Weddell Sea region. They comprised presentations of recent field results and the sharing of plans for fieldwork in the coming seasons, enabling the scope for logistical cooperation to be explored. Short summaries of the presentations and discussions were documented in a series of reports, produced by the Alfred-Wegener-Institute.

Through the late 1980s and the 1990s FRISP remained active with well-attended workshops and an expansion of the geographical spread both of the scientific activities reported and of the affiliations of the attendees. Most workshops attracted around 30 delegates, but numbers peaked at around 50, and participants were drawn from not just the three core nations but also from Austria, Belgium, Chile, Finland, the Netherlands, Sweden and the USA. The report series also continued, with the contributions tending towards preliminary papers rather than the extended abstracts and data reports of earlier volumes. Nevertheless, by the time of the 14th Workshop, held at Madingley Hall, Cambridge, on 15-16 June 1999, there was a recognition that the name no longer fitted the organisation. The activities of the core nations were no longer so focussed on the Filchner-Ronne Ice Shelf, and the calving of iceberg A-38 the previous October, carrying Filchner Station with it, brought a symbolic end to an era of German field activity there. However, there was unanimous agreement that the workshops were of great value and that FRISP had become a well-known moniker for activities that now had a scientific focus on ice-shelf-ocean interactions at their core, rather than the earlier geographical focus. Of particular value was the fact that FRISP had long been a forum for inter-disciplinary discussions among specialists from the fields of glaciology and oceanography that were conventionally seen as having little common ground. A decision was therefore taken to rename FRISP as the "Forum for Research into Ice Shelf Processes".

The first two workshops of the new era attracted only 26 delegates between them, forcing a further consideration of what the future might hold for FRISP. The broadening of the geographical focus meant that the discussion of field plans, one of the major components of the early workshops, became a steadily smaller part of the proceedings. However, the size and scope of Report No 14 that emerged from those workshops and the attendance of delegates from as far away as Australia were testaments to the growing importance of the science presentations. Starting with this report, publication of the report series was taken on by the Bjerknes Centre for Climate Research, in Bergen, and PDFs of the published papers were made available online. The 17th Workshop, held at the British Antarctic Survey, Cambridge, on 17-18 June 2003, was combined with an annual workshop of the UK Natural Environment Research Council's "Autosub Under Ice" programme, so numbers were swelled to 45, and the future of FRISP seemed secure as the next three workshops attracted around 20 delegates each. The geographical spread of the science was now truly circum-polar, covering Filchner-Ronne, Ross, Amery, Fimbul, Brunt, Larsen, George VI and the Amundsen Sea ice shelves, while a small number of presentations focussed on ice-ocean interaction in Greenland and the Arctic, and delegates were drawn from as far afield as China and New Zealand. At

the last of these, the 20th workshop, held at the British Antarctic Survey on 21-22 June 2006, a decision was taken to hold joint workshops with the US West Antarctic Ice Sheet Initiative (WAIS) during the International Polar Year (IPY) era.

The joint FRISP/WAIS workshops that were held in 2007, 2008 and 2009 effectively completed the transition from the fieldwork-focussed workshops of the early years to the small, informal science workshops of recent years. The two meetings hosted in the US (2007 and 2009) were larger and followed the traditional WAIS format, while the 2008 workshop, hosted in the UK, was a flavour of what post-IPY FRISP workshops would become. The venue was somewhat remote (in the heart of the Peak District National Park) to ensure that interaction among the 50 delegates could continue beyond the formal scientific proceedings, and poster sessions were included to increase the amount of science that could be presented without cutting down on discussion time. Most recent workshops have been similar in character, with attendances of up to 70 delegates drawn from Japan, Korea, France and Iceland in addition to the nations previously mentioned. The growth of the workshops during the IPY years, and the continuing trend towards presentations of material that is closer to formal publication, brought the published report series to a natural end. In 2011 and again in 2015 the annual workshops were held in conjunction with International Glaciological Society Symposia, held in La Jolla and Cambridge, respectively. So for those two years the workshops became week-long science conferences, with some of the proceedings published in thematic volumes of the Annals of Glaciology, but the intervening and subsequent years have seen a return to the now traditional workshop format.

APPENDIX II: Complete list of International FRISP workshops

30th International FRISP Workshop to be held at Kristineberg Field Station, University of Gothenburg, Sweden, 3-6 October 2016.

29th International FRISP Workshop held in conjunction with the International Glaciological Society's International Symposium on Contemporary Ice-Sheet Dynamics: ocean interaction, meltwater and non-linear effects at Churchill College, University of Cambridge, U.K., 16-21 August 2015.

28th International FRISP Workshop held at Schloss Wahn, Cologne, Germany, 22-25 June 2014.

27th International FRISP Workshop held at Gregynog Hall, Tregynon, Powys, Wales, 17-19 June 2013.

26th International FRISP Workshop held at Utö, Stockholm archipelago, Sweden, 12-14 June 2012.

25th International FRISP workshop held in conjunction with the International Glaciological Society's International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean at Scripps Seaside Forum, Scripps Institution of Oceanography, La Jolla, California, U.S.A., 5-10 June 2011.

24th International FRISP Workshop held at Evangelisches Bildungszentrum, Bad Bederkesa, Germany, 21-24 June 2010.

23rd International FRISP Workshop held in conjunction with the WAIS Workshop at Pack Forest Conference Center, Eatonville, Washington, U.S.A., 27-29 September 2009.

22nd International FRISP Workshop held in conjunction with the WAIS Workshop at Losehill Hall, Castleton, Derbyshire, U.K., 18-20 September 2008.

21st International FRISP Workshop held in conjunction with the WAIS Workshop at Algonkian Regional Park, Sterling, Virginia, U.S.A., 5-8 September 2007.

20th International FRISP Workshop held at British Antarctic Survey, Cambridge, U.K., 21-22 June 2006.

19th International FRISP Workshop held at Geophysical Institute, University of Bergen, Norway, 7th - 8th June 2005.

18th International FRISP Workshop held at the AWI Biological Institute, Helgoland, Germany, 5-7 October 2004.

17th International FRISP Workshop held at British Antarctic Survey, Cambridge, U.K., 17-18 June 2003.

16th International FRISP Workshop held at Geophysical Institute, University of Bergen, Norway, 25-26 June 2002.

15th International FRISP Workshop held at Institut für Geophysik, University of Münster, Germany, 6-7 July 2000.

14th International FRISP Workshop held at Madingley Hall, Cambridge, U.K., 15-16 June 1999.

13th International FRISP Workshop held at Alfred-Wegener-Institute, Bremerhaven, Germany,22-23 June 1998.

12th International FRISP Workshop held at Department of Geological Sciences, University College London, U.K., 19-21 June 1997.

11th International FRISP Workshop held at Department of Physical Geography, University of Stockholm, Sweden, 13-14 June 1996.

10th International FRISP Workshop held at Institut für Angewandte Geodäsie, Leipzig, Germany, 11-14 June 1995.

9th International FRISP Workshop held at Geophysical Institute, University of Bergen, Norway, 5-6 June 1994.

8th International FRISP workshop held at Madingley Hall, Cambridge, U.K., 10-11 June 1993.

7th International FRISP Workshop held at Schloss Senden, Münster, Germany, 24-26 June 1992.

6th International FRISP Workshop held at Hotel Mundal, Fjærland, Norway, 10-11 June 1991.

5th International FRISP Workshop held at Madingley Hall, Cambridge, U.K., 27-28 June 1990.

4th International FRISP Workshop held at Alfred-Wegener-Institute, Bremerhaven, Germany, 22-23 June 1989.

3rd International FRISP Workshop held at Norsk Polarinstitutt, Oslo, Norway, 13-14 June 1988.

2nd International Workshop of the "Filchner-Ronne Ice Shelf Programme" held at Scott Polar Research Institute, Cambridge, U.K., 4-5 June 1986.

1st Filchner Colloquium held at Alfred-Wegener-Institute, Bremerhaven, Germany, 11-12 October 1984.

APPENDIX III: Complete list of FRISP Reports

FRISP Report No. 17 (2006), compiled by Lars H. Smedsrud, Bjerknes Centre for Climate Research, Bergen, Norway, and summarising presentations at the 19th and 20th FRISP workshops.

FRISP Report No. 16 (2005), compiled by Lars H. Smedsrud, Bjerknes Centre for Climate Research, Bergen, Norway, and summarising presentations at the 18th FRISP workshop.

FRISP Report No. 15 (2004), compiled by Lars H. Smedsrud, Bjerknes Centre for Climate Research, Bergen, Norway, and summarising presentations at the 17th FRISP workshop.

FRISP Report No. 14 (2006), compiled by Lars H. Smedsrud, Bjerknes Centre for Climate Research, Bergen, Norway, and summarising presentations at the 15th and 16th FRISP workshops.

FRISP Report No. 13 (2000), compiled by Hans Oerter, Alfred-Wegener-Insitute for Polar and Marine Research, Bremerhaven, Germany, and summarising presentations at the 14th FRISP workshop.

FRISP Report No. 12 (1998), compiled by Hans Oerter, Alfred-Wegener-Insitute for Polar and Marine Research, Bremerhaven, Germany, and summarising presentations at the 13th FRISP workshop.

FRISP Report No. 11 (1997), compiled by Hans Oerter, Alfred-Wegener-Insitute for Polar and Marine Research, Bremerhaven, Germany, and summarising presentations at the 12th FRISP workshop.

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FRISP Report No. 4 (1990), compiled by Heinz Miller, Alfred-Wegener-Insitute for Polar and Marine Research, Bremerhaven, Germany, and summarising presentations at the 3rd, 4th and 5th FRISP workshops.

FRISP Report No. 3 (1986), complied by Heinz Kohnen, Alfred-Wegener-Insitute for Polar and Marine Research, Bremerhaven, Germany, and summarising presentations at the 2nd FRISP workshop.

FRISP Report No. 2 (1985), complied by Heinz Kohnen, Alfred-Wegener-Insitute for Polar Research, Bremerhaven, Germany, and summarising presentations at the first Filchner Colloquim.

FRISP Report No. 1 (1984), complied by Heinz Kohnen, Alfred-Wegener-Insitute for Polar Research, Bremerhaven, Germany, and summarising previous work and ongoing and planned activities.