

IACS Bureau meeting, June 27, 2011, Melbourne

Past President's Report:

- In November 2010 I have attended and chaired the IACS Informal Bureau Meeting in Stockholm.
- In January 2011 I spend, together with former ICSI President Liz Morris, tow days at SPRI in Cambridge UK sorting out the ICSI Archives. The material stored in the BAS Archives for several years and in the SPRI basement after was checked and reduced considerable before being sent to NSIDC, Boulder. There, with the help of Richard Armstrong, archivists will look after the ICSI material before it gets stored in the NSIDC archives.
- During the same visit to Cambridge I met, again wit former ICSI President and former IGS President Liz Morris, with IGS SG Magnus Magnusson. In this meeting misunderstandings about an e-mail on a planned workshop in Russia were clarified. As a consequence of this misunderstanding it was decided to revitalize the “Cryospheric manager” meetings in which different parties dealing with ice an snow sciences try to coordinate planned meetings. The first of such meetings after a longer break was the held during the EGU Assembly in Vienna in April 2011. Among others, DH Charles Fierz, SG Manfred Lange and I attended. A MoU to be signed by interested partner organisations was prepared.
- On a short term request and based on an invitation from Pam Pearson, International Cryosphere Climate Initiative (ICCI) pampearson44@yahoo.com, www.iccinet.org, expressed to IACS, I replaced President Ian Allison in a meeting of the Subsidiary Body for Scientific and Technological Advice (SBSTA) to the UN Framework Convention on Climate Change (UNFCCC). This meeting was organised in the run up of the UNFCCC COP 17 to take place in Durban, SA) later this year. There, a solution is to be found for the time after the Kyoto Protocol. The contribution was: G. Kaser, I Allison: “Ice Changes in Antarctica, the Himalayas and Other Mountain Glacier Regions”.
- From June 16 – 19 I have participated in a small workshop in which 10 colleagues have started preparing a homogenised data set on the contribution of glaciers and ice caps to sea level rise for IPCC AR5. The workshop was co-sponsored by IACS. A basis was laid out for writing and publishing 2 – 3 papers which can then be cited in AR5. There is a next meeting planned for late September 2011.
- On behalf of WG chair Graham Cogley I can announce the completion of the “Glossary of Glacier Mass Balance” as one of four targets of the respective IACS Working Group. The Glossary is published as IACS Contribution No. 2 of the IHP-VII Technical Documents in Hydrology No. 86 of UNESCO.

PP Georg Kaser



Balance Sheet: IACS

as of:
06.07.2011

Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
2007	09. 09.	D 07.01		Closing budget: UCCS (USD 793,79 at exchg. Rate of Nov. 30, 2007)			536,69
	30. 11.	D 07.02	2	MOCA09 planning Meeting, Montreal, Canada, GK, travel expenses		513,83	22,86
	01. 12.		1	Miscellaneous costs for closing Swedish account		22,86	0,00
	27. 12.	D 08.02		Starting budget: Kreissparkasse Steinfurt, Germany			0,00
2008	05. 06.	D 08.01	I1	IUGG Allocation 2008: USD 22.980,00	14.707,20		14.707,20
		D 08.02	1	Courtage		3,68	14.703,52
	30. 06.	D 08.02	I2	Interest on balance	25,49		14.729,01
		D 08.02	1	Tax		7,65	14.721,36
		D 08.02	1	Solidarity fee		0,43	14.720,94
	18. 08.	D 08.03	3	SCAR Delegate Meeting, Moscow, Russia; GK, travel expenses		770,25	13.950,69
	19. 08.	D 08.04	2	IUGG EC Meeting, Karlsruhe, Germany; ML, travel expenses		366,00	13.584,69
	19. 08.	D 08.05	2	Refund, deposit hotel, Montreal; ML		120,00	13.464,69
	30. 09.	D 08.02	I2	Interest on balance	88,21		13.552,90
		D 08.02	1	Tax		26,46	13.526,44
		D 08.02	1	Solidarity fee		1,45	13.524,99
	18. 12.	D 08.06	8	Translation fee: Betsy Armstrong, Boulder, CO, USA, USD 573,00		392,60	13.132,39
		D 08.07	1	Courtage		2,00	13.130,39



Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
		D 08.07	1	Processing Fee		15,00	13.115,39
		D 08.07	1	Expense		2,00	13.113,39
	31. 12.	D 08.07	12	Interest on balance	77,34		13.190,73
		D 08.07	1	Tax		23,20	13.167,53
		D 08.07	1	Solidarity fee		1,27	13.166,26
Sums					14.898,24	1.731,99	13.166,26
2009	19.01.	D 09.01	13	Donation of Royalties, E. Brun; Cambridge Univ. Press: GBP 323,94	327,41		13.493,67
	18. 02.	D 09.02 & D 09.03	2	Travel expenses, GK; re-booking costs; STA Travel		227,05	13.266,62
	23. 03.	D 09.04 & D 09.06	2	Travel expenses, GK; MOCA09 Planning Meeting, Montreal		263,49	13.003,13
		D 09.05 & D 09.06	2	Travel expenses, GK; STA Travel		289,00	12.714,13
	31. 03.	D 09.07	12	Interest on balance	46,62		12.760,75
		D 09.07	1	Tax		11,66	12.749,09
		D 09.07	1	Solidarity fee		0,64	12.748,45
	22. 05.	D 09.08	3	Travel expenses, GK; IASC Meeting, Bergen		560,62	12.187,83
	26. 05.	D 09.09 & D 09.10	11	IUGG Allocation 2009: USD 22027,00	15.714,49		27.902,32
	27. 05.	D 09.10 & D 09.11	5	Student grant, MOCA09: L. A. Rasmussen: CAD 800		517,40	27.384,92
		D 09.10 & D 09.11	1	Courtage		2,00	27.382,92
		D 09.10 & D 09.11	1	Processing Fee		15,00	27.367,92



Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
		D 09.10 & D 09.11	1	Expense		2,00	27.365,92
	04. 06.	D 09.12 & D 09.11	6	Contribution to Summer School, IASC; GBP 5179,00		6.000,00	21.365,92
		D 09.12 & D 09.11	1	Courtage		2,00	21.363,92
		D 09.12 & D 09.11	1	Processing Fee		15,00	21.348,92
		D 09.12 & D 09.11	1	Expense		2,00	21.346,92
	08. 06.	D 09.10	I3	Donation of Royalties, E. Brun; Cambridge Univ. Press: GBP 208,17	208,87		21.555,79
	30. 06.	D 09.13	I2	Interest on balance	45,13		21.600,92
		D 09.13	1	Tax		11,28	21.589,64
		D 09.13	1	Solidarity fee		0,62	21.589,02
	10. 07.	D09.14a/b & D 09.15	8	Gifts to MOCA 09 organizers - "The Snowflake"; Amazon		49,17	21.539,85
	23. 07.	D 09.15 & D 09.16a/b	6	Expenses for IACS Bar-B-Q (reimbursement Dr. R. Brown)		489,14	21.050,71
		D 09.15	1	Courtage		2,00	21.048,71
		D 09.15	1	Processing Fee		15,00	21.033,71
		D 09.15	1	Expense		2,00	21.031,71
	24. 07.	D 09.15 & D 09.17	8	Breakfast, Dr. Beer (IUGG President) and wife		29,64	21.002,07



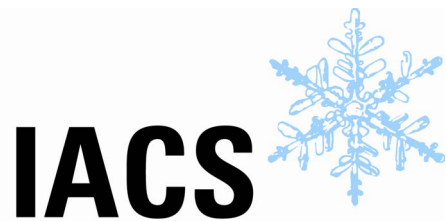
Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
	03. 08.	D 09.15 & D 09.18	2	Travel support. IACS Bureau Meeting, Montreal, Prof. Dr. Lange		500,00	20.502,07
	24. 07.	D 09.15 & D 09.19	2	Expenses Meeting room for IACS Bureau Meeting, Auberge Bonaparte		644,06	19.858,01
	12. 08.	D 09.20 & D 09.21	2	Travel support, G. Jones; reimbursed to G. Kaser		210,00	19.648,01
	01.10.	D09.22	I2	Interest on balance	46,82		19.694,83
		D09.22	1	Tax		11,71	19.683,12
		D09.22	1	Solidarity fee		0,64	19.682,48
	20.11.	D09.23& D10.01	6	Support GAPHAZ Workshop, Vienna (A. Kääh)		1.000,00	18.682,48
	30.12.	D10.01	I2	Interest on balance	31,24		18.713,72
		D10.01	1	Tax		7,81	18.705,91
		D10.01	1	Solidarity fee		0,42	18.705,49
Sums					16.420,58	10.881,35	5.539,23
2010	05.03.	D10.01 & D10.02	I1	Surplus from Montreal Conference (CAD 5 372,43)	3.788,02		22.493,51
	01.04.	D10.03	I2	Interest on balance	27,08		22.520,59
	01.04.	D10.03	1	Tax		6,77	22.513,82
	01.04.	D10.03	1	Solidarity fee		0,37	22.513,45
	30.04.	D10.04	I3	Royalty, University of Cambridge Press (E. Brun)	382,01		22.895,46
	09.06.	D10.04 & D10.05a/b	I1	IUGG 2010 Allocation (US\$ 26 400)	23.089,00		45.984,46
	01.07.	D10.04	I2	Interest on balance	38,32		46.022,78
	01.07.	D10.04	1	Tax		9,58	46.013,20
	01.07.	D10.04	1	Solidarity fee		0,52	46.012,68



Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
	01.10.	D10.06	12	Interest on balance	54,44		46.067,12
			1	Tax		13,61	46.053,51
			1	Solidarity fee		0,74	46.052,77
	26.11.	D10.07	2	Travel support. IACS Bureau Meeting, Stockholm, Prof. Dr. Lange		1.114,94	44.937,83
	22.12.	D11.01 & D10.09	2	Travel support. IACS Bureau Meeting, Stockholm, Prof. Dr. Kaser		723,58	44.214,25
	30.12.	D11.01	12	Interest on balance	51,24		44.265,49
	30.12.	D11.01	1	Tax		12,81	44.252,68
	30.12.	D11.01	1	Solidarity fee		0,70	44.251,98
Sums					27.430,11	1.883,62	25.546,49
2011	25.01.	D11.01 & D10.10	2	Travel support. IACS Bureau Meeting, Stockholm, Dr. Fierz		400,00	43.851,98
	01.04.	D11.01	12	Interest on balance	49,45		43.901,43
			1	Tax		12,36	43.889,07
			1	Solidarity fee		0,67	43.888,40
	06.05.	D11.02 & D11.03	2	Travel support. IUGG2011 SPC meeting, Vienna, Prof. Dr. Lange		472,78	43.415,62
	11.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Mr. I. Sudakov (includes € 42,00 in banking fees)		1.142,00	42.273,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Dr. N. Helbig		700,00	41.573,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Dr. A. van Hervijnen		700,00	40.873,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Mr. O. Marsh (includes € 42,00 in banking fees)		492,00	40.381,62



Year	Date	Docu- ment	Cate- gory	Description	Income, €	Expense, €	Balance, €
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Mr. F. Fernandoy		450,00	39.931,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Dr. A. Casteller (includes € 42,00 in banking fees)		942,00	38.989,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Dr. T. Redpath (includes € 42,00 in banking fees)		942,00	38.047,62
	18.05.	D11.02 & D11.04	5	IACS grant to attend the IUGG2011 Gen. Assembly to Mr. G. Babonis (includes € 44,00 in banking fees)		494,00	37.553,62



International Association of Cryospheric Sciences

DIVISION I SNOW AND AVALANCHES

HEAD: CHARLES FIERZ

Bureau Meeting, 27 June 2011, Melbourne

Head of division's report

General

This is my last report as Head of the Division Snow and Avalanches. It covers the half year since our last Bureau Meeting (Telecon, 21 Dec 2010). The division still needs to establish itself particularly by installing new and attractive Working Groups. A few attempts were made and a proposal could recently be sent to all Bureau Members. I wish my successor great success and satisfaction in strengthening that demanding division.

International Classification for Seasonal Snow on the Ground

Since our last meeting we can report some success regarding copyrights for translations. Norwegians and Russians were able to get authorizations from UNESCO Publishing. I hope others will follow soon. The last step of this adventure will be a wiki-based discussion version to manage much more easily and rapidly future changes. The international format for exchanging snow profile data has recently been released (<http://caaml.org/Schemas/V5.0/Profiles/SnowProfileIACS/index.html>). The standard is well received by both practitioners and scientists. The community is now starting the discussion about further standardizing data exchange in the field of snow and avalanches (see funding request for the proposed "CAAML Working Committee", Agenda Item 23.1).

Melbourne 2011

Unfortunately, the Joint Symposium on "*Snow - Atmosphere Interactions and Avalanches*" did not attract enough attention and had to be merged with "*Snow - Atmosphere Interactions*" to become "*Snow - Atmosphere Interactions and Avalanches*". It is obviously difficult to mobilize the few snow and avalanche specialists working in the Southern hemisphere!

DACA-13 Davos Atmosphere and Cryosphere Assembly 2013 – Ice & Air: Process Interactions

I work with the Swiss National Organizing Committee SNOC as liaison to IACS, our Secretary General being member of the Scientific Program Committee. The DACA-13 webpage is now online (www.daca-13.org) and interested colleagues can submit their ideas for symposia directly there.



The International Association of Cryospheric Sciences (IACS) aims to promote the study of the Cryosphere in all of its aspects.
IACS is an Association under the International Union of Geodesy and Geophysics IUGG.
<http://www.iugg.org>

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The Chairs of the SNOC will be in Melbourne and will make a short presentation during our Plenary Meeting.

Meetings and Cryospheric Managers

The "*International Symposium on Physics, Chemistry and Mechanics of Snow*" took recently place in Yuzhno-Sakhalinsk, Russia. This short notice meeting initiated a discussion among IACS, IGS, and the Cryospheric Division of EGU about coordination of events etc. A Memorandum of Understanding (Agenda Item 24) was drafted and circulated among Cryospheric Organizations. The feed-back is already very positive and I hope the "*Cryomanagers*", better, the "*Cryospheric Organizations Coordination Group*" will soon be revived.

The above mentioned Symposium, however, should also help defining a future and, I would hope so, pro-active IACS sponsoring strategy.

25 June 2011 / C. Fierz

IACS working group 'Flow law for polycrystalline ice' – 1st status report

This working group is still in the initial phase. So far only one meeting of a small subgroup, which attended the EGU conference, took place. During the initial phase, the definition of the topics that will be covered by the working group and the built up of the network, were addressed.

The next actions to be taken are divided into practical and strategically steps:

- planning of a database for laboratory creep test, including specification of a complete set of sample and load parameters, looking for a hosting institution and fundraising for the development
- evaluation of the state of the art of the research on constitutive equation(s) for polycrystalline non-Newtonian fluids beyond Glen's flow law
- developing recommendations for ensemble runs that address the uncertainties in ice sheet modelling

Upcoming meetings: we plan to establish regular meetings at the EGU

Communication to: iacs_flowlaw@zmaw.de and angelika.humbert@zmaw.de

Remarks Fz:

Connection to MicroDICE established (Sawyn)?

Connections to Grenoble ?

**Working Group on Mass-balance Terminology and Methods
International Association of Cryospheric Sciences**

SUMMARY OF ACTIVITIES, 2009-2011

15 June 2011

Introduction

Since its last report (Summary of Activities, 2008-09; 5 July 2009) the Working Group on Mass-balance Terminology and Methods has continued its work, begun in 2008, on the *Glossary of Glacier Mass Balance and Related Terms*. The Glossary was published by UNESCO-IHP in May 2011. The members of the Working Group are Anthony Arendt, Andreas Bauder, Roger Braithwaite, Graham Cogley (chairman), Regine Hock, Peter Jansson, Georg Kaser, Marco Möller, Lindsey Nicholson, Al Rasmussen and Michael Zemp.

Scope

The Working Group originally arranged its activities in terms of six themes: Mass-balance Terms; Methods of Measurement; Standards for the Reporting of Measurement Uncertainty; Methods of Interpolation and Extrapolation; Homogenization (Reanalysis) of Mass-balance Time Series; Access to Data.

The first theme has in fact consumed almost all of the Working Group's energy. A first draft of a document on methods of mass-balance measurement (theme 2) has been completed by Anthony Arendt, and may result in further work, but it seems unlikely that anything significant will be achieved under the remaining four headings before the Working Group's existence comes to a formal end in 2012. The Bureau will, however, be aware of the establishment of a new structure, including an Advisory Board, for the Global Terrestrial Network for Glaciers. Much of what was envisaged for the Working Group under the theme Access to Data is likely to be realized in this new GTN-G structure.

Mass-balance Glossary

Briefly, the Glossary (Cogley et al., 2011a) is a 2.8-megabyte downloadable PDF, or alternatively a 114-page paper document obtainable at no charge from UNESCO. It is prefaced by 16 pages of background and formulation; spells out 43 acronyms; presents 539 definitions, of which many are discursive and some are multiple; and adds a number of tables listing old definitions, reference values of the properties of frozen water, and similar information. There is also a simple index.

The Glossary was greatly improved by detailed reviews from six colleagues and by many comments from a broader sample of the community. This early broad participation helped to move the new terminology much closer to a community consensus than would have been possible by the unaided efforts of the Working Group. The group itself has been genuinely a *working* group, and as its chairman I take this opportunity to thank all of its members for their persistence and patience. It will not diminish any other member's individual contribution if I single out Regine Hock and Al Rasmussen for their late pedantic bloody-mindedness, which

complemented the early broad participation of the community and forced the Glossary out through the door.

The Glossary can be downloaded from

<http://unesdoc.unesco.org/images/0019/001925/192525E.pdf> . Paper copies can be ordered at no charge from the IHP Secretariat, UNESCO, Division of Water Sciences, 1 rue Miollis, 75732 Paris Cedex 15, France, or from ihp@unesco.org.

Outlook

Publicity for the Glossary is in hand. The reformulation and resulting terminology for mass balance are placed in historical context, including one or two jokes about pedantry, by Cogley (2011). A short article about the Glossary is to appear in *Ice*, the newsletter of the International Glaciological Society (Cogley et al., 2011b). The Glossary is to be announced to Cryolist and to the GLIMS mailing list. If the mailing process has gone according to plan, copies should be available for distribution at the IUGG conference in Melbourne. Paper copies are being mailed to 87 selected colleagues, to nearly 100 principal investigators and national correspondents of the World Glacier Monitoring Service (through the good offices of Working Group member and WGMS Director Michael Zemp), and to several journals for review and for the use of editors and copy editors.

Bureau members have been made aware of an initiative headed by Denis Samyn of Uppsala University (denis.samyn@geo.uu.se) and aimed at the production of a *Dictionary of Structural Glaciology*. This might become a worthwhile follow-on to the snow classification (IACS Contribution No.1) and the mass-balance glossary (IACS Contribution No.2).

After a pause for breath, the Working Group intends to return to the matter of generating a fully interactive, searchable online version of the Glossary. So far this has only been discussed in a preliminary way. It may require some financial support for the labour of converting all of the printed version's italicized cross-references, which exceed 1,000 in number, to hyperlinks.

Respectfully submitted on behalf of the Working Group
Graham Cogley (Chairman).

References

- Cogley, J.G., 2011, Mass-balance terms revisited, *Journal of Glaciology*, **56**(200), 997-1001.
- Cogley, J.G., R. Hock, L.A. Rasmussen, A.A. Arendt, A. Bauder, R.J. Braithwaite, P. Jansson, G. Kaser, M. Möller, L. Nicholson and M. Zemp, 2011a, *Glossary of Glacier Mass Balance and Related Terms*, IHP-VII Technical Documents in Hydrology No. 86, IACS Contribution No. 2, UNESCO-IHP, Paris.
- Cogley, J.G., R. Hock and L.A. Rasmussen, 2011b, A new glossary of mass balance and related terms, *Ice*, submitted.

IACS Bureau Nominations

List of candidates for the four year period 2011-2015

President Elect:

Charles Fierz, Switzerland

Secretary General:

Andrew Mackintosh, New Zealand

Vice-Presidents:

Andrés Rivera, Chile

Xiao Cunde, China

Olga Solomina, Russia

Division Heads

Continental Glaciers and Ice Sheets:

Cecilie Rolstad Denby, Norway

Marine and Freshwater Ice:

Hiroyuki Enomoto, Japan

Snow and Avalanches:

Ethan Greene, USA

Cryosphere, Atmosphere and Climate

Valerie Masson, France

Planetary and other Ices of the Solar System:

Ralf Greve, Japan

The position of President is not due for re-election until 2013 and the present President remains in place until then:

President:

Ian Allison, Australia

We have one nomination only for each position.

Oslo, 20th March 2011

Jon Ove Hagen

Chairman – IACS nomination committee

Steering Committee for the Global Terrestrial Network for Glaciers

27 March 2009 version, with 6 January 2010 edit

1. Background and Aim

Worldwide collection of information about glacier changes was initiated in 1894, with the foundation of the International Glacier Commission at the 6th International Geological Congress in Zurich, Switzerland. Since 1986, the World Glacier Monitoring Service (WGMS), based in Zurich, has continued to collect and publish standardized information about ongoing glacier changes and distribution and was in charge of the Global Terrestrial Network for Glaciers (GTN-G), in close collaboration with the US National Snow and Ice Data Center (NSIDC) in Boulder, and the Global Land Ice Measurements from Space (GLIMS) initiative. The WGMS is a service of the International Association of Cryospheric Sciences (IACS/IUGG), having the formal status of an IACS Standing Group, and the Federation of Astronomical and Geophysical Data Analysis Services (FAGS/ICSU).

A GTN-G Steering Committee is established to coordinate, support, and advise the WGMS, the NSIDC, and the GLIMS initiative concerning the monitoring of glaciers and ice caps. The GTN-G Steering Committee consists of:

(a) an Executive Board that is responsible for (i) the development and implementation of the international observation strategy for glaciers and ice caps, (ii) providing standards for the monitoring of glacier fluctuations (e.g., length change, mass balance) and for inventories, and (iii) the compilation and distribution of such information in a standardized form, and

(b) an Advisory Board that is to (i) support, (ii) consult, and (iii) periodically evaluate the work of the Executive Board and its three operational bodies concerning the monitoring of glaciers and ice caps.

2. Generic structure of the *GTN-G Steering Committee*

GTN-G Executive Board

- 1 Representative of the WGMS
- 1 Representative of the NSIDC
- 1 Representative of the GLIMS coordinating institutions

GTN-G Advisory Board

- Division Head for Glaciers and Ice Sheets of the International Association of Cryospheric Sciences (IACS)
- 1 Representatives of data producers (field observations)
- 1 Representatives of data producers (remote sensing)
- 1-2 Representatives of data users (glaciological community)
- 1 Representative of an international umbrella organization (e.g., CliC, GCOS, GTOS, ICSU, UNEP, UNESCO, WMO)

-1/2 -

3. Terms of Reference

The GTN-G Steering Committee aims to coordinate, support and advise the WGMS, the NSIDC and the GLIMS initiative concerning the monitoring of glaciers and ice caps. It frames and adapts the monitoring strategies and standards for glacier and ice cap monitoring in the context of existing and new developments in nature, science and technology.

- The GTN-G Executive Board meets approximately annually to:
 - o assess the state of the international monitoring of glaciers and ice caps,
 - o coordinate the cooperation between the WGMS, the NSIDC and the GLIMS initiative,
 - o establish the issues and agenda about which the Advisory Board shall be consulted,
 - o and reports annually on the GTN-G activities to the GTN-G Advisory Board as well as to the funding agencies and umbrella organizations of the WGMS, the NSIDC, and the GLIMS initiative.
- The GTN-G Advisory Board:
 - o is chaired by the Division Head for Glaciers and Ice Sheets of the IACS,
 - o consists of the chair and a maximum of six representatives as described in the generic structure above,
 - o advises the WGMS, the NSIDC and the GLIMS initiative concerning present practice and future developments of the monitoring of glaciers and ice caps, and also on the delivery of datasets to the wider glaciological community,

o and periodically (approximately eight-year interval) evaluates the work of the GTN-G Executive Board and its three operational bodies concerning the monitoring of glaciers and ice caps by a process that consists of a self-evaluation report of the GTN-G Executive Board, a site-visit at one of the body's location, and a final evaluation report from the GTN-G Advisory Board.

The members of the GTN-G Advisory Board are jointly nominated by the IACS Bureau and the GTN-G Executive Board, will serve for four-year renewable terms, and will normally communicate electronically.

- The GTN-G Steering Committee members communicate electronically on a regular basis; meetings of the full GTN-G Steering Committee may be called if:

(a) Requested by the Executive Board, or

(b) Requested by a majority of Advisory Board members.



**University of
Zurich**^{UZH}

ICSU (WDS)
IUGG (IACS)
UNEP
UNESCO
WMO

wgms

World Glacier Monitoring Service

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Prof. Julian Dowdeswell
IACS Head of Division for Glaciers and
Continental Ice Sheets

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Scott Polar Research Institute &
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Zurich, 10 June 2011

WGMS Annual Report 2010 including a summary on the current status of the Global Terrestrial Network for Glaciers

Dear Julian,
Dear Bureau Members of the International Association of Cryospheric Sciences,

It is my pleasure to send you the WGMS Annual Report 2010 for the attention of the IACS Bureau Meeting(s) in Melbourne 2011. As discussed at the 6th Executive Board Meeting of the Global Terrestrial Network for Glaciers (GTN-G) in Vienna, our report includes a summary on the present status of GTN-G and was prepared in collaboration with our colleagues from the U.S. NSIDC and the GLIMS initiative.

With regard to the formal status of GTN-G within IACS, I suggest to integrate the GTN-G Steering Committee (which consists of an Executive and an Advisory Board) as an IACS Standing Group. For the WGMS itself, I feel fully confident with the historical status being a 'service' of IACS – analog to our status as a 'service' of ICSU's new World Data System, replacing the old system of World Data Centers and Data Analyzing Services.

As you can see from our annual report, the internationally coordinated glacier monitoring is well set up and we are looking forward to continuing our close cooperation with IACS. If you have any questions to the report or need any further information from my side, please do not hesitate to contact me.

I hope to be able joining a next IACS Bureau Meeting again and wish you successful working days in down under.

Sincerely

Michael Zemp
Director WGMS



ICSU (WDS)
IUGG (IACS)
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UNESCO
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WGMS Annual Report 2010

1. Background

Internationally coordinated glacier observation was initiated in 1894 with the founding of the *Commission Internationale des Glaciers* at the 6th *International Geological Congress* in Zurich, Switzerland. Since 1986, the *World Glacier Monitoring Service* (WGMS) has maintained and continued the collection of standardized information about distribution and ongoing changes of glaciers and ice caps. Today the WGMS is a service of the *International Association of Cryospheric Sciences* (IACS) within the *International Union of Geodesy and Geophysics* (IUGG) as well as of the *World Data System* (WDS) of the *International Council for Science* (ICSU), and works under the auspices of the *United Nations Environment Program* (UNEP), the *United Nations Educational, Scientific and Cultural Organization* (UNESCO), and the *World Meteorological Organization* (WMO). The WGMS maintains a scientific collaboration network of principal investigators and national correspondents in all the countries involved in glacier monitoring.

Detailed information about the WGMS, its partner organizations, monitoring strategy, and data products are available on the WGMS website: <http://www.wgms.ch>

2. Funding and Administration

Based on a decision in 2009 relating to the participation of Switzerland in the *United Nations Framework Convention on Climate Change* related *Global Climate Observing System* (GCOS), the *Swiss Federal Council* decided to provide long-term funding through GCOS Switzerland to the *Department of Geography* of the *University of Zurich* for the operational lead and coordination of the WGMS. The compilation of WGMS products and projects has been supported by national and international organizations such as the *Swiss Federal Office for the Environment* (FOEN), the *Swiss National Science Foundation* (SNF), FAGS/ICSU, IACS/IUGG, UNEP, UNESCO, and WMO.

In 2010, Wilfried Haerberli resigned from his position as Director of the WGMS. An international search committee nominated Michael Zemp as successor. The hand-over took place officially on the 1st of May 2010 and was ceremonially completed with a WGMS symposium on the ‘*Science and Monitoring of the Cryosphere*’ on December 8, 2010. Wilfried Haerberli remains available to the WGMS as Immediate-past Director in a consultative capacity. An additional position for a research associate was announced and the WGMS team was made completed with the hire of Samuel Nussbaumer on 1st of September 2010. In 2010, the following persons worked for the coordinating office of the WGMS (incl. employment status and funding institution):

Operational Team

- Michael Zemp (80%, director, *GCOS Credit*)
- Isabelle Gärtner-Roer (40%, research associate, *GCOS Credit*)
- Samuel Nussbaumer (50%, research associate, *GCOS Credit*)

Strategic Team

- Operational Team
- Wilfried Haerberli (5%, immediate-past director, *University of Zurich*)
- Frank Paul (5%, research associate, *University of Zurich*)
- Martin Hoelzle (5%, research associate, *University of Fribourg*)

Guest Scientists and Trainees

- Dorothea Stumm, Switzerland (on-site Support Greenwich Island)
- Barbara Naegeli, Switzerland (Trainee)
- Andrea Barrueto, Switzerland (Trainee)

3. Main Activities in 2010

Operations

The operational tasks of the WGMS included the management of its databases and website, the periodical publication of reported data, the response to data and information requests, the periodical contact with its scientific collaboration network of national correspondents, principal investigators, and partner institutions, measures of quality assurance of the reported data, as well as scientific assessments of the distribution and changes of glaciers and related monitoring methods and strategies. As such, the WGMS team responded to 190 data and information requests as well as 30 inquiries from the public media in 2010. In the same year, the WGMS website recorded a monthly average of about 3,800 visits. These visitors downloaded a total of 2,600 *Fluctuations of Glaciers* (vol. VII, VIII, IX) and 4,300 *Glacier Mass Balance Bulletins* (no. 1-10). The website with the latest mass balance data (2007/08) was accessed 2,800 times in 2010.

The year 2010 started with the shipment of 500 copies of the *Glacier Mass Balance Bulletin No. 10 (2006-2007)* and the online publication of preliminary mass balance values for the observation period of 2007/08. The call-for-data for the period 2008/09 was prepared in summer and sent out in October to all national correspondents and principal investigators and was announced on *Cryolist*. First mass balance values of 2007/08 were made available on the website in mid-December.

In 2010, the WGMS wrote official letters of support in request for the:

- Continuation of the mass balance monitoring (2000-2010) at Glaciar Bahía Del Diablo, Vega Island, Antarctica.
- Ecuadorian Expedition to Greenwich Island, Antarctica, for assessing the suitability of its glaciers for the establishment of a long-term mass balance program close to the Ecuadorian Research Station.
- Continuation of the glacier monitoring program of the *U.S. Geological Survey*, including mass balance series at Gulkana (1966-2010), Wolverine (1966-2010), and South Cascade (1953-2010), U.S.A.

The WGMS was represented at various national and international conferences, meetings and workshops and involved in selected education and public outreach activities.

WGMS General Assembly of National Correspondents

The *WGMS General Assembly* was held from 1–4 September 2010 at Riffelberg, Zermatt, and brought together national correspondents or their deputies representing 28 countries of its worldwide scientific collaboration network, the staff members of the central service, as well as special guests from the *Global Land Ice Measurements from Space* community, the *Norwegian Water Resources and Energy Directorate*, the *European Space Agency*, and from the *Swiss GCOS Office*. Besides the strengthening of the personal contacts within this network, the main goals of the meeting were to present and discuss (i) the international organization, strategy, and datasets of the *Global Terrestrial Network for Glaciers*, (ii) its implementation in the participating countries, (iii) the current status and challenges of glacier monitoring, (iv) measures to improve our service to the community, and (v) the definition of key tasks for the glacier monitoring in the coming decade.

A detailed report of this meeting that takes place at about every decade is available from the WGMS website and a summary report was published in the Swiss newspaper *Neue Zürcher Zeitung* on 22 September 2010.

Cooperation with ESA Initiatives and IACS Working Groups

The WGMS was involved in an advisory function in the *User Group* of the ESA-funded *GlobGlacier* project (2007-2010; <http://www.globglacier.ch>). The *Final User Group Meeting* was organized in close coordination and venue with

the *WGMS General Assembly* in Zermatt and, hence, nicely fostered the exchange between in-situ and remote sensing communities. The continuation of ESA's direct support of the internationally coordinated glacier monitoring will be guaranteed through the new *Glacier_cci* project within ESA's *Climate Change Initiative* (<http://www.esa-glaciers-cci.org>). The WGMS is represented in an advisory function in the *Key Science Body* of the project's *Climate Research Group*.

The WGMS is active in IACS working group on *Mass Balance Terminology and Methods* which prepared a new *Glossary of Mass Balance and Related Terms* to be published with UNESCO in 2011. Furthermore, the WGMS is in close contact and data exchange with the IACS working group on *Glacier and Permafrost Hazards in Mountains* and the IAVCEI/IACS *Joint Commission on Volcano-Ice Interactions*.

On-site support

In 2010, members and consultants of the WGMS provided on-site support for evaluating the feasibility of (i) starting a new glacier monitoring programs on Greenwich Island, Antarctica, and (ii) resuming interrupted mass balance series in Kirghizstan.

4. Global Terrestrial Network for Glaciers

In close collaboration with the *US National Snow and Ice Data Center* in Boulder (NSIDC) and the *Global Land Ice Measurements from Space* (GLIMS) initiative, the WGMS has been in charge of the Global Terrestrial Network for Glaciers (GTN-G) since its creation in 1998. In 2008, the three bodies proposed a generic structure and terms of reference for a GTN-G *Steering Committee* (including an *Executive Board* and an *Advisory Board*) to the IACS Bureau. This proposal was approved in 2009 and at the beginning of 2011 the *Advisory Board* (under the lead of IACS) was finally staffed with representatives from data user and producer communities, as well as from international organizations. At the 6th *Executive Board Meeting* during the EGU 2011 in Vienna, the interaction with and the tasks of the *Advisory Board* were discussed. There was a general agreement that the *Advisory Board* shall be actively informed about ongoing GTN-G operations through reporting as well as by direct involvement in activities. The main tasks should include reviewing and, if required, commenting on reports, invited feedback on specific issues, pro-active feedback in case of general disagreement with ongoing activities, and – as a main tasks – the evaluation of the GTN-G services (in 2013/14).

5. Conclusion and Outlook

In 2010, the WGMS operated for the first time under the new long-term funding through the *Swiss GCOS Office*. This, and the hand-over of the directorate, led to a reorganization of the operational structure and completion of the WGMS operational and strategic teams. Besides the operational tasks, the main focus of work in the 2010 was on the extended collaboration with NSIDC and GLIMS within GTN-G. The highlight of the year was the *WGMS General Assembly* which strengthened the scientific collaboration network and set the milestones for the internationally coordinated monitoring of glaciers and ice caps for the next decade(s).

Key tasks for the coming one to two years include the

- Production of the *Glacier Mass Balance Bulletin No. 11 (2008-2009)*,
- Integration of reconstructed glacier front variations into WGMS database and products,
- Call-for-data for the observation period 2009/10,
- GTN-G sessions on '*Glacier monitoring from in-situ and remotely sensed observations*' at the AGU fall meeting in 2011 and at the EGU meeting in 2012,
- Production of the *Fluctuations of Glaciers Vol. X (2005-2010)*,
- Organization of a workshop on uncertainty assessment of mass balance measurements, and
- Organization of a summer school on measurement of glacier mass balance.

Internationally Coordinated Glacier Monitoring

M. Zemp¹, S. Nussbaumer¹, R. Armstrong², F. Fetterer², I. Gärtner-Roer¹, W. Haeberli¹, M. Hoelzle³, A. Kääb⁴, J. Kargel⁵, F. Paul¹ and B.H. Raup²

¹World Glacier Monitoring Service, University of Zurich, Zurich, Switzerland, ²National Snow and Ice Data Center, University of Colorado, Boulder, U.S.A., ³World Glacier Monitoring Service, University of Fribourg, Switzerland, ⁴Global Land Ice Measurements from Space, University of Oslo, Oslo, Norway, ⁵Global Land Ice Measurements from Space, University of Arizona, Tucson, U.S.A.

Changes in glaciers provide one of the clearest evidence of climate change and as such they constitute an Essential Climate Variable in the Global Climate/Terrestrial Observing System (GCOS, GTOS) in support of the United Nations Framework Convention on Climate Change (UNFCCC). As recommended by the International Council for Sciences (ICSU), free and unrestricted international sharing of high-quality, long-term and standardized data and information products is one of the basic requirements for advances in research as well as for political decisions. This position has a long tradition in glaciology:

The internationally coordinated collection and distribution of standardized information about glacier changes was initiated back in 1894 and is today coordinated within the Global Terrestrial Network for Glaciers (GTN-G) **under the auspices of FAO, ICSU, UNEP, UNESCO, and WMO**. The GTN-G is jointly run by three operational bodies involved in glacier monitoring: the World Glacier Monitoring Service (WGMS, www.wgms.ch), the U.S. National Snow and Ice Data Center (NSIDC, www.nsidc.org), and the Global Land Ice Measurements from Space (GLIMS, www.glims.org) initiative.

With an online service (www.gtn-g.org), GTN-G provides fast access to regularly updated information on glacier inventory data. Currently, this includes glacier inventory data from about 100,000 glaciers mainly based on aerial photographs and maps, as well as digital outlines from also about 100,000 glaciers mainly based on satellite images. The GTN-G databases also include length change series from 1,800 glaciers, mass balance series from 250 glaciers, information on special events (e.g., hazards, surges, calving instabilities) from 130 glaciers, as well as 13,000 photographs from some 500 glaciers. All of these datasets are freely available and have been used in numerous scientific publications as well as in the assessment reports of the Intergovernmental Panel on Climate Change (IPCC).

In this presentation, we provide an overview of the operational structure, the monitoring strategy of GTN-G, and the available datasets within GTN-G. Furthermore, we address the current challenges of internationally coordinated glacier monitoring and its expectations of ICSU's new World Data System.

Memorandum of Understanding (MoU) between the Association of Polar Early Career Scientists, the International Association of Cryospheric Sciences

1 The Parties

The Parties to this MoU are the Association of Polar Early Career Scientists (APECS) and the International Association of Cryospheric Sciences (IACS).

1.1 Association of Polar Early Career Scientists

APECS is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early faculty members, educators and others with interests in polar regions and the cryosphere. By providing networking and career development opportunities, APECS' activities aim to raise the profile of polar research, develop effective leaders in education and outreach, and stimulate interdisciplinary and international research collaborations. APECS builds on extensive national and disciplinary networks to develop integrated research directions, meet career development needs, and communicate the urgencies of polar science to a worldwide audience. APECS decisions are made by an open Council, and an elected Executive Committee. An Advisory Committee of senior polar researchers provides guidance to APECS. Day to day operations of APECS are currently supported through an international directorate lead by the Director.

1.2 International Association of Cryospheric Sciences

The International Association for Cryospheric Sciences is the Association (IACS) of the International Union of Geodesy and Geophysics (IUGG) that is concerned with snow and ice science and which provides expert advice on cryospheric issues to governmental and non-governmental organisations. The objectives of IACS are to:

- promote studies of cryospheric subsystems of the Earth solar systems,
- encourage research in the above subjects by members of the cryospheric community, national and international institutions and programmes, and individual countries through collaboration and international co-ordination,
- provide an opportunity on an international basis for discussion and publication of the results of the above research,
- promote education and public awareness on the cryosphere, and
- facilitate the standardisation of measurement or collection of data on cryospheric systems and of the analysis, archiving and publication of such data.

2 Rationale for the MoU

The Parties share common goals of working internationally and across disciplines to increase our understanding of Earth's cold regions and their connections to the global system. The Parties recognize the importance of fostering the next generation of researchers that will be faced with increasingly critical challenges due to the impacts of climate change on these regions and their global significance. This agreement recognizes APECS as the preeminent organization for young researchers working in the Arctic, Antarctic, and Cryospheric regions that strives to provide a continuum of leadership in polar research. This agreement is between APECS and IACS. It does not preclude the Parties agreeing to other MoUs with other programs and organizations, or bilaterally between the Parties.

3 Terms of Agreement

This MoU identifies a joint commitment to the professional development of early career polar

researchers and the need for a continuum of leadership in polar researcher as important mutual aims of all Parties. Examples of activities through which this joint commitment may be pursued include, but are not limited to:

- Working together to ensure representation of early career researchers in all aspects of the Parties respective organizations, including but not limited to, participating in business, strategy, planning, and other meetings and activities;
- Communicating to each Parties members updates, newsletters, and other communications of interest;
- Providing endorsement, support, and dissemination of information on activities, projects, requests for participation, etc.;
- Agreeing to representatives of IACS serving as members of the APECS Advisory Committee to offer assistance and guidance; and representatives of APECS being available to IACS for early career perspectives.

4 Financial Implications of the Agreement

Parties to this Agreement will continue to be responsible for the costs of their own activities, but this does not preclude one party meeting or contributing to the occasional or ongoing costs of another if they so wish. Actual financial contributions to the activities and other implications of this MoU will be considered and agreed to by representatives of the Parties as they arise, and may be changed in accordance with the Parties requirements without any effect on the substance of this Agreement.

5 Duration, Revision and Termination of this MoU

This MoU remains in force for 5 years, at which time it will be reviewed for possible extension. No action by any of the parties will result in the cancellation of this MoU. The MoU may be revised at any time by mutual agreement between the Parties. Any of the parties may propose alterations to the MoU. Parties wishing to withdraw from this agreement should do so by a formal letter signed by the President and head organizational manager (i.e. Executive Secretary or Secretary General) of their respective organization.

Signed

President, APECS
President, IACS

Date:

1 **Terms of Reference: Ice Sheet Mass Balance and Sea Level (ISMASS)**

2
3 **Background:** In 1993 the Global Change in Antarctica (GLOCHANT) Group of Specialists
4 (GoS), a SCAR initiative, established a task group on the "Antarctic ice sheet mass balance and
5 sea-level" contributions (ISMASS) to address the requirements for a coordinated international
6 approach to resolving the role of the Antarctic ice sheet in sea-level change. The group was
7 established under the chairmanship of Professor Charles Bentley and ISMASS held their first
8 meeting at Cambridge in conjunction with the Fifth International Symposium on Antarctic
9 Glaciology (VISAG), in 1993. With the re-organisation of SCAR and the dissolution of
10 GLOCHANT, ISMASS became an Expert Group of the SCAR Physical Sciences Standing
11 Scientific Group (SSG).
12

13 In June, 2001, ISMASS held a workshop in Annapolis, MD, at which a strategy was formulated
14 to achieve a meaningful scientific approach to understanding and predicting Antarctic ice sheet
15 mass balance. The resulting report, "*Recommendations for the collection and synthesis of*
16 *Antarctic Ice Sheet mass balance data*" was published in *Global and Planetary Change* (vol. 42,
17 1-15, 2004). ISMASS contributed (including editing of the proceedings in *Annals of Glaciology*,
18 vol. 39) to the SCAR International Symposium on Antarctic Glaciology, Milan, Italy, August
19 2003, and co-organized (with the SCAR International Trans-Antarctic Scientific Expedition
20 (ITASE) Expert Group) and contributed to a symposium (including editing of the proceedings in
21 *Annals of Glaciology*, vol. 41) during SCAR at Bremen, Germany, July 2004.
22

23 Studies conducted over the past decade or so have focused attention on dynamic behavior of ice
24 streams and outlet glaciers in both Greenland and Antarctica, and on rapid changes that cannot be
25 explained by "conventional" ice-sheet models that form the basis for sea-level projections issued
26 by the Intergovernmental Panel on Climate Change. In its fourth assessment report, the IPCC
27 acknowledged short-comings of current models, stating that "dynamical processes not included in
28 current models but suggested by recent observations could increase the vulnerability of the ice
29 sheets to warming, increasing future sea level rise. Understanding of these processes is limited
30 and there is no consensus on their likely magnitude." Recognizing the importance of ice sheets
31 on controlling global sea level, and the inadequacies in current efforts to model the changes in ice
32 sheets in response to a warming climate, ISMASS published "*A need for more realistic ice-sheet*
33 *models*" (SCAR Report no 30) in November, 2007, and organized a three-day Workshop in
34 conjunction with the SCAR/IASC Open Science Conference in St. Petersburg, Russia, July 2008.
35 The outcome of this Workshop, "*Ice Sheet Mass Balance and Sea Level*" was presented at the
36 International Symposium on "*Glaciology in the International Polar Year*" (Newcastle-upon-
37 Tyne, UK, July 27-31, 2009) and published as SCAR Report no 38. A Summer School on "*Ice*
38 *Sheet Models for the 21st Century*" was held at Portland State University, Portland, Oregon,
39 August 3-14, 2009 (see SCAR Report no 36).
40

41 During the St. Petersburg Workshop it became evident that a bi-polar perspective is desirable for
42 ISMASS. Ongoing dynamical changes in Greenland outlet glaciers, such as the speed up and
43 rapid thinning of Jakobshavn Isbræ following weakening and disintegration of its floating
44 terminus, provide valuable insights into future response of Antarctic glaciers and ice streams
45 following further warming. The Workshop Report details further the need for studying both the
46 Antarctic and Greenland ice sheets to improve physical understanding of ice sheet processes
47 responsible for rapid change and to incorporate improved physical understanding into numerical
48 models.
49

50 **Proposal:** we propose that ISMASS be co-sponsored by SCAR (representing the Antarctic
51 science community), by IASC (representing the Arctic science community) and by IACS
52 (representing the cryospheric sciences community), to reflect the renewed focus on both polar ice
53 sheets as described in the following Terms of Reference.
54

55 **Terms of Reference for ISMASS**

- 56
57 1. To assess the status of research on interactions between Ice Sheets and the
58 Climate System and to identify gaps in current understanding requiring process
59 studies, sustained and targeted campaign-based observations, and model
60 experiments. ISMASS will serve SCAR, IASC, IACS and other organizations as
61 a source of knowledge on these issues, and will propose directions for future
62 research in this area.
- 63 2. To facilitate and serve as a forum for the evaluation and promotion of scientific
64 understanding of ice sheet models for both Antarctica and Greenland, in particular
65 with respect to their contributions to global sea level rise, and to make such
66 information readily available to scientists, policy makers, and the public at large.
- 67 3. To keep track of the status of Ice Sheet research and observations made by
68 various scientific organizations such as the World Glacier Monitoring Service
69 (WGMS), Global Land Ice Measurements from Space (GLIMS), Climate and
70 Cryosphere (CliC), and liaise with them to ensure that respective activities
71 contribute as much as possible to the objectives of SCAR, IASC and IACS.
- 72 4. To facilitate interactions between all disciplines (e.g. atmospheric, oceanographic,
73 cryospheric, biochemical, and paleoclimate) with an interest in interactions
74 between Ice Sheets and Climate, initially focusing on rapid response to modern
75 ocean and atmosphere forcings.
- 76 5. To work in concert with relevant SCAR and IASC panels and other groups to
77 integrate Ice Sheet observations and modeling into corresponding global and
78 regional activities and to ensure that the objectives of SCAR, IASC and IACS are
79 met and resources used most efficiently.
- 80 6. To work with appropriate agencies on issues related to the distribution and
81 archiving of Ice Sheet observations.
- 82 7. To help attract a new generation of scientists into the field of Ice Sheet and Polar
83 Research.

84



Proposal for the status of a IACS Standing Group for the current IACS/IPA Joint Working Group on Glacier and Permafrost Hazards in Mountains (GAPHAZ)

GAPHAZ goals and recent activities

GAPHAZ aims at:

- Improving the international scientific communication on glacier and permafrost hazards
- Stimulating and strengthening research collaborations in the field of glacier and permafrost hazards
- Compiling a state of knowledge related to glacier and permafrost hazards in high mountains
- Working towards a greater transfer of information and improved communication between the scientific and governmental/policy communities
- Signposting sources of advice to international and national agencies, responsible authorities and private companies
- Acting as a focal point for information for international media during relevant crises
-

Over the past years of its existence, GAPHAZ has addressed a broad range of topics that lie within the field of interest and competence of IACS and IPA, including outbursts of glacier lakes, destabilization of high mountain areas due to glacier retreat and permafrost degradation, ice/ rock/snow avalanches, alpine debris flows, and in general climate change impacts on cryosphere mountain hazards. GAPHAZ addresses aspects of observation and monitoring, ground based and remote sensing based, modeling, data compilation and distribution, assessment of hazards and risks, including development and dissemination of state-of-the-art methodologies and procedures. GAPHAZ has also worked towards the necessary better integration of social issues into risk reduction strategies.

Recent GAPHAZ activities include:

- Organization of a major international workshop on glacier and permafrost hazards in Vienna, November 2009. With over 70 international participants the workshop was extremely well attended and well received by the glacier, permafrost and hazard/risk communities. A workshop report was published in EOS in early 2010:
 - Huggel, C., Kääb, A. and Schneider, J.-F. (2010): Climate and Geomorphic Risks in High-Mountain Environments. EOS, Transactions, American Geophysical Union, 91(1), 103.
- Organization and sponsoring of two regular cryosphere sessions at the EGU General Assembly
 - Climate change impacts on glaciers and permafrost and related hazards
 - Glacier lake outburst floods – current issues and future concerns
- Various services to GAPHAZ members and interested experts, including compilation of bibliography and relevant links, facilitation of contacts to experts and institutions, etc.
- Close contacts to, and collaboration with, important national and international organizations and programs, such as WGMS (GTN-G), including GLIMS, ESA-Globglacier, GEO, UNEP, World Bank, IPCC, MRI and several others.

- Support to applied science projects in the field of glacier and permafrost hazards, including efforts to raise awareness among important government authorities and society.
- Maintenance regular contact to, and information exchange with, IACS, IPA, IUGG and other scientific association with an interest in the field.
- Maintenance and extension of the GAPHAZ webpage
- Development and continuous update of web-based global database of glacier and permafrost hazard and disaster events, publicly available

Current organization and structure

As a joint IACS/IPA Working Group GAPHAZ is currently organized with a structure of one Chair and three Vice-Chairs:

Chair: Andreas Käab, University of Oslo, Norway
 Vice-Chairs: Christian Huggel, University of Zurich, Switzerland
 Jeffrey Kargel, University of Arizona, Tucson
 Christian Hauck, University of Fribourg, Switzerland

Proposal of new structure as a IACS Standing Group (Joint IACS-IPA Standing Group)

Based on the successful development of GAPHAZ over the past years as a Joint IACS/IPA Working Group and its long-term perspective it is proposed to transform the Working Group into a Standing Group.

It should be noted that IPA is currently shifting to a new organization concerning working groups and committees. The newly established organization foresees 'Interest Groups'. Those will be led by Interest Groups chairs, who will be asked to provide a work plan every four years, and they will act as the core for the development of research activities and products. IPA Interest Groups will be able to be renewed indefinitely providing they remain viable.

Considering the respective structures of groups of IACS and IPA the exact name of a joint IACS-IPA group should be clarified between both associations. In the mean time we will refer to Standing Group.

For the status of a Standing Group it is proposed to modify the structure of GAPHAZ in the following way:

Group leadership: Chair, Vice-Chair, Secretary

Terms:

The Group leaders will include a chair, vice-chair, and secretary, each with 3-year terms on a staggered basis. At the start of a new year, the current chair will step down and become ex officio, the vice-chair will assume the chair, the secretary will assume the vice-chair, and a new person will be elected to assume the secretary position. This will enable a clear continuity in the organization.

Election:

The election of Group leadership will be through nominations from the Group members with guidance from existing leadership. Such guidance will be aimed at maintaining a broad scientific and geographic expertise among the Group leadership, as well as a balance between IACS and IPA, with both Associations represented by at least one out of three Group leaders.

Duties:

- Chair: overall responsibility for meeting/making progress on the Group goals;

- Vice-Chair: responsible for identifying the coming year's program of meetings and helping to promote and advertise those meetings;
- Secretary: responsible for communicating information about Group activities with the members via a newsletter / email / webpage and for fostering communications between subcommittees.

Members-at-large

Members-at-large should represent in a balanced way important geographic regions, thematic fields, and institutions and organizations. They should be affiliated with IACS and IPA, and best with both Associations. Members-at-large should also include representatives from the IUGG Commission Georisk, from the Permafrost Young Researchers Network (PYRN) and from the snow avalanche community to foster collaboration and exchange.

They should support the implementation of GAPHAZ goals and activities through their networks and affiliations.

The number of members-at-large is not necessarily restricted but should be around 6 to avoid a too large body. Members-at-large are appointed by the Group leaders, possibly considering requests from IACS and IPA.

This new structure is based on very positive experiences with a similar structure made by the IACS/IAVCEI Joint Commission on Volcano-Ice Interactions.

Proposal for an IACS Working Group: *From quantitative stratigraphy to microstructure based modeling of snow*

Motivation

In the past ten years several major advances have been achieved regarding the observation of the physical properties of snow. Among the most striking developments worth mentioning are (not in order of importance): i) observation of snow at the microstructure scale owing to the development of micro-tomography of snow, initially on casted samples, then more recently in-situ using tomography instruments installed in a cold room; ii) development of the SnowMicroPen, which allows to retrieve the penetration resistance of snow with a high vertical resolution iii) development of different instruments to accurately measure the specific surface area (SSA) of snow on pit walls, discrete samples and vertical profiles with a cm resolution.

Corroborated by numerical models operating at the microscopic scale, these developments led to fundamental paradigm changes in understanding the impact of microstructure on the physical properties of snow. In contrast, the majority of macroscopic one-dimensional snowpack models, which are indispensable for a wide range of applications in seasonal and polar snowpacks, are still based on antiquated but prevalent concepts.

This highlights the urgent demand to incorporate new, experimentally accessible quantities into models and vice versa, adapt experimental techniques to meet the capabilities and scope of models.

Goals

The proposed IACS Working Group “From quantitative stratigraphy to microstructure based modeling of snow” aims at initiating the discussion on the interpretation and use of data provided by newly developed instruments in view of necessity and sufficiency for an “optimal” description of physical properties of snow. As a basis for comparison, recommendations on the use of such variables are provided for the work with snow observations based on the newly developed instrumentations. Special emphasis is dedicated to the exchange of scientific ideas regarding the choice of newly developed physical variables which can be unambiguously defined and incorporated in microscopic and macroscopic snowpack models. The previous issue will serve as a firm basis to trigger necessary ideas on upscaling and homogenization of snow models. Only by bridging the apparent gap in model scales, macroscopic models will ultimately benefit from advances developed at the microscopic scale.

Related activities

Attention will be paid to foster collaborations with groups involved in remote sensing of snow (optics, microwave etc.) where snowpack variables play a key role in retrieval algorithms. The group will also respect the tight links with several other international initiatives supported by IACS, such as the International Classification of Seasonal Snow on the Ground (ICSSG). While some of the above-mentioned variables are not (yet) endorsed by the ICSSG, it is important to remain consistent with previous characterization of the physical properties of snow. Close contact is also desired with the CAAML Working Committee (Canadian Avalanche Association Markup Language), which aims at becoming an international standard for encoding and sharing snowpit data across physical, cultural and computer operating system boundaries.

Targeted kickoff meeting

In the event this proposal is accepted by the IACS Bureau, a financial contribution from IACS is requested for organizing a workshop or dedicated session on EGU 2012 or IGS 2012 which is intended as kickoff meeting.

Working group Co-chairs: *Samuel Morin, CNRM-GAME/CEN, Grenoble, France.*
Henning Löwe, WSL/SLF Davos, Switzerland

Initial working group members: *Ghislain Picard, LGGE, Grenoble, France, Martin Schneebeli, WSL/SLF Davos, Switzerland*

List of IACS Divisions

Name of Division	Name	Date Elected as head	Division Head Affiliation	e-mail	Date Division proposed	Date Division Approved	Remarks	Date Financial support proposed	Purpose of financial support	Date Financial support accepted	Amount of financial support
Snow and Avalanches	Charles Fierz	July 2007 (2nd term)	WSL Institute for Snow and Avalanche Research SLF,	fierz@slf.ch		July 2007					
Continental Glaciers and Ice Sheets	Julian Dowdesw	July 2007 (2nd term)	University of Cambridge, U. K.	jd16@cam.ac.uk		July 2007					
Marine and Freshwater Ice	Claude Duguay	July 2007	University of Waterloo, Canada	cduguay@fes.uwaterloo.ca		July 2007					
Cryosphere, Atmosphere and Climate	Valérie Masson-Delmotte	July 2007	Laboratoire des Sciences du Climat et de l'Environnement (LSCE), France	valerie.masson@cea.fr		July 2007					
Planetary and Other Ices of the Solar System	Ralf Greve	July 2007	Hokkaido University, Japan	greve@lowtem.hokudai.ac.jp		July 2007					

List of Working Groups (WGs)

Name of WG	Division	Web site	Name	Representative of WG Affiliation	e-mail	Date Application submitted	Date Accepted as WG	Date End of term	Date Renewal proposed	Date Renewal accepted	Remarks	Date Financial support proposed	Purpose of financial support	Date Financial support accepted	Amount of financial support
Mass balance terminology and methods	Continental Glaciers and Ice Sheets	http://www.cryosphericsscience.org/wg_mb.htm	Graham Cogley (Chair)	Trent University, Canada	gcogley1@cogeco.ca	July 2007?	April 2008	2012?							
Glacier and Permafrost Hazards in Mountains (GAPHAZ), Joint IPAIACS WG	Continental Glaciers and Ice Sheets ?	http://www.geo.uio.no/remotesensing/gaphaz/	Andreas Kääb (Chair)	Dept. of Geosciences, Oslo University, Norway	kaaab@geo.uio.no	?	April 2008	2011					Workshop in November 2009		Euro 500?
Snow Model Intercomparison Project for forest snow processes SnowMIP 2	Snow and Avalanches	http://www.cryosphericsscience.org/dlv_1.html	Richard Essery (Chair)	School of Geosciences, University of Edinburgh, Edinburgh, UK	ressery@staffmail.ed.ac.uk	July 2003	November 2003	July 2009 ?	8 July 2007	14 July 2007	Started as ICSIUCCS WG				

List of other partner organizations

Name of partner	Web site	Representative of partner organization			Date Partnership proposed	Date MOU signed	Date End of term	Date Renewal proposed	Date MOU updated	Remarks	Date Financial support proposed	Purpose of financial support	Date Financial support accepted	Amount of financial support
		Name	Location	e-mail										
CLIC (The Climate and Cryosphere)	http://cl.c.npolar.no/	Daqing Yang (Director)	Norwegian Polar Institute	yang@polar.no										
APECS (Association of Polar Early Career Scientists)	http://www.apecs.is/	Jenny Baseman (Director)	University of Tromsø, Norway	j.baseman@mail.com										
ICSIH-IAHS (Snow and Ice Hydrology)	http://iabs.info/	John Pomeroy (President)	University of Saskatchewan, Canada	john.pomeroy@sasc.ca										
WGMS (World Glacier Monitoring Service)	http://www.geo.unizh.ch/wgms/	Wilfried Haeberli (Director)	University of Zurich, Switzerland	haeberli@geo.unizh.ch or wqms@geo.unizh.ch										
International Glaciological Society														

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IUGG Liaison Officers for 2011-2015

(updated on 27 May 2011)

Name of the organization	Current liaison	IUGG/Association: Liaison nominated
U.N. Cartogr. Office	Luiz Paulo Souto Fortes (BRAZIL)	IAG: Fortes Luiz Paulo Souto Fortes (BRAZIL)
UNESCO IHP	Pierre Hubert (FRANCE)	IAHS: Pierre Hubert (FRANCE)
UNESCO IOC	Eugene Morozov ((RUSSIA)	IAPSO will take a decision on 29 June
WMO *	Arthur Askew (SWITZERLAND), John Turner (UK)	IAMAS: Hans Volkert (GERMANY) IAHS: Arthur Askew (SWITZERLAND) IAVCEI:
COSPAR	Eigil Friis-Christensen (DENMARK)	IAGA: Eric Donovan (CANADA)
SCAR	Ian Allison (AUSTRALIA)	IACS: Ian Allison (AUSTRALIA)
SCOPE **	Norman E. Peters (USA)	IAPSO: DISCONTINUE
SCOR	Mike MacCracken (USA), Lawrence Mysak (CANADA)	IAMAS: Athena Coustenis (FRANCE) IAPSO: New President (to be elected on 1 July)
SCOSTEP	Robert Vincent (AUSTRALIA)	IAGA: Vladimir Kuznetsov (RUSSIA)
CODATA	Charlie Barton (AUSTRALIA)	IUGG: UCDI Vice Chair to be appointed as the CODATA liaison - TBD
ICSU ROA	Richard T. Wonnacott (SOUTH AFRICA)	IUGG: Isabelle Ansorge (SOUTH AFRICA) and Ali Tealeb (EGYPT) as Alternate
ICSU ROAP ***	Sri Widiyantoro (INDONESIA)	ALL, especially IASPEI (please see comments below)
ICSU ROLAC +	Luiz Paulo Souto Fortes (BRAZIL)	IUGG: Jaime Urrutia Fucugauchi (MEXICO)
WCRP	Guoxiong Wu (CHINA)	IAMAS: Tom Beer (AUSTRALIA)
SCL/ILP ++	Kevin Furlong (USA), Kalanchand Sain (INDIA)	IASPEI and IAVCEI to nominate.
ICAO	William Rose (USA), Marianne Guffanti (USA, alternate)	IAVCEI:
PAIGH	Hermann Drewes (Germany)	IAG: Hermann Drewes (GERMANY)
CCTF	Claude Boucher (France)	IAG: Claude Boucher (FRANCE)
FAGS (WDS) +++	Ruth Neilan (USA)	IAG: Ruth Neilan (USA) IACS:
IRDR #		IUGG: Kuni Takeuchi (JAPAN)

* The third liaison (from IAVCEI) would be desirable as WMO has recently established a joint WMO-IUGG Volcanic Ash Scientific Advisory Group (VASAG).

** ICSU General Assembly in 2008 decided to discontinue SCOPE as an ICSU Scientific Committee. Meanwhile SCOPE continues as an independent (of ICSU) scientific body. The Executive Committee in Melbourne should decide whether IUGG should continue its membership in SCOPE. *IAPSO suggests to discontinue the IUGG representation in SCOPE.*

*** Sri Widiyantoro (INDONESIA) could continue: meanwhile he was not much interested in this position. The ROAP office is located in Kuala Lumpur, Malaysia. We would need a liaison from the region close to Malaysia (e.g., Indonesia, India, China) to reduce travel expenses. Unfortunately Malaysia is not an IUGG member.

+ The ROLAC moved in 2011 from Brazil to Mexico. Jaime Urrutia Fucugauchi (MEXICO) would be a good choice to represent IUGG.

++ IUGG needs proactive experts to be fully involved in the ILP Bureau and promote the IUGG activity. Neither Furlong nor Sain were active in the ILP Bureau as IUGG liaisons. Also because ILP is considered to be Eurocentric, please nominate experts from outside of Europe.

+++ FAGS (Federation of Astronomical and Geophysical data Services) was dissolved in 2009 and is replaced by the new ICSU structures called WDS (World Data System). Ruth Neilan was an IUGG Liaison to FAGS and the IUGG Secretary General is the second (ex officio) liaison. The Bureau proposes to ask Ruth Neilan, who is a member of the Scientific Committee of the World Data System, to serve as an IUGG liaison to WDS.

IRDR is the new ICSU-ISSC-UNISRD program on Integrated Research on Disaster Risk. Kuni Takeuchi (Chair of the IUGG GeoRisk Commission) is Vice Chair of the Scientific Committee for IRDR.

IUGG Union-Commission for Climate and Climate Change

An IAMAS Proposal (Draft V3)

That human activities had the potential to alter the climate on a par with natural influences was recognized in the late 19th century. During the middle decades of the 20th century, new approaches to observation, analysis, and simulation emerged that began to provide important scientific insights into Earth's long history, its dynamic present, and its likely future state. To provide a focus for advancing the emerging and exciting interdisciplinary research, the International Association for Meteorology and Atmospheric Physics (IAMAP) (now the International Association for Meteorology and Atmospheric Science, IAMAS) established the International Commission on Climate (ICCL) at its plenary session in Seattle on 22 August 1977. It was intended that the work of the ICCL should complement the work of the other commissions of IAMAS and that its scope should include climate variability and change, past, present, and future, as well as the science of the linkages between the atmosphere and other domains of the Earth system. ICCL dates back to a time when understanding of anthropogenic impacts on the climate system was just emerging, when "climate research" was largely viewed as the purview of atmospheric sciences. Today it is clear that an adequate scientific understanding of climate change itself as well as its impacts on the environment and society require a much broader interdisciplinary approach. As such, advancement of scientific understanding of climate and climate change, from the basic physics and chemistry to aspects affecting vulnerability, impacts and adaptation measures, provides an ideal topic for a new Union Commission, with the remit of promoting the objectives of the Union through coordination of research on climate and climate change, and especially development of targeted efforts to serve society with the scientific knowledge being gained through research. By coordinating and integrating the climate-related activities within our Union, IUGG will gain visibility and bring the Union's research expertise to bear on some of the most challenging and important environmental and societal challenges of the 21st century

To benefit the interests of both scientific research and society, IAMAS proposes the formation of the IUGG Union Commission for Climate and Climate Change (IUCCC) at the IUGG 25th General Assembly. A proposed commission charter for consideration, improvement and, it is hoped, eventual adoption by the General Assembly follows:

Charter (Draft V.3)

Status

The IUCCC has been established and operates within IUGG, being jointly sponsored by IAMAS, IAPSO, IACS, IAHS, and other interested Associations. The IUCCC was established at the 25th General Assembly of IUGG in Melbourne, Australia in 2011 in order to promote the advancement of scientific understanding of climate and climate change, to fulfill the objectives of IUGG and its associations, and to make available the knowledge and insights developed through scientific research to the benefit of society and planet Earth, including consideration of the science of global change, related vulnerability and impacts, and potential responses.

Scope

The Commission is an international forum for advancing the science of climate and climate change and making available the scientific knowledge and methods that assist in promoting environmental and public welfare in the face of climate variability and change. Advancing scientific understanding of climate and climate change is necessarily interdisciplinary, building on fundamental understanding of the functioning of the atmosphere (IAMAS), the oceans (IAPSO), the hydrologic cycle (IAHS), the cryosphere (IACS), the surface and interior of the Earth (IAVCEI, IASPEI) as well as other fields not represented in IUGG such as forestry, agricultural sciences and health sciences. In addition, understanding how to most effectively assist society in making use of scientific knowledge requires strong engagement with the social science community, including public education. The scope of the commission thus reaches beyond the participating IUGG Associations to other Unions within ICSU and to a much broader community.

Activities

IUCCC,

- **Convenes** symposia as an integral part of IUGG General Assembly sessions. Between General Assemblies, IUCCC symposia may be held independently or jointly with constituent IUGG Association meetings, or in cooperation with relevant partner organizations, including United Nations Specialized Agencies and NGOs.
- **Promotes** the advancement of scientific understanding through encouragement of cooperative observations and research among the world's scientific community and with international organizations and associations.
- **Publishes** papers in the peer reviewed literature as topical special issues or as special publications of relevant UN specialized agencies, by coordinating calls for papers, peer review and editing.
- **Provides** scientific expertise underpinning the work of relevant specialized agencies of the United Nations, for example, in the context of the development of a Global Framework for Climate Services. These agencies include, for example, the UN Framework Convention on Climate Change (UNFCCC), UNEP, WMO, FAO, WHO and UNESCO including its IOC.
- **Cooperates** with the relevant interdisciplinary bodies in the Earth System Science Partnership, IGBP, WCRP and IHDP and their relevant subsidiary projects.

Composition

The IUCCC membership is open to all interested scientists. The executive committee comprises two representatives from each participating IUGG Association. This committee elects a Chair, Secretary and Treasurer from amongst its membership. Representation on the committee, irrespective of leadership roles, is for a 4 year term, renewable once.

Resources

IUGG and the participating IUGG Associations (IAMAS, IAPSO, IAHS, IACS, ...) each

contribute up to US \$5000 dollars annually to defray some of the costs of running the commission. These contributions comprise a core budget of (\$25k) per annum. While recognizing the primary IUGG input into the work of the commission is its broad interdisciplinary network of scientific experts, the small core budget is necessary to ensure success of the commission. Commission members seek additional resources on an activity specific basis.



WMO Polar Activities

TEXT IN THE GENERAL SUMMARY OF Cg-XVI

11.9 OTHER CROSS-CUTTING MATTERS

WMO Polar Activities

11.9.1 Congress noted with appreciation the great effort of all Members who have operational activities in the Polar Regions, recognizing that the Polar Regions are extremely important in terms of their global impacts on weather, climate and water. It supported the need to establish an observational framework for Polar Regions, including the “Third Pole” (Himalaya and Tibetan Plateau) that balances space-based observations with in situ measurements while developing a methodology to address new observational requirements, including the identification of key polar variables from both a research and services perspective. Congress noted the success of the IPY Space Task Group (IPY-STG) in coordinating, across research and operational agencies, the planning, processing and archiving of Earth observation data sets supported the continuation of these efforts and requested the Executive Council to create the appropriate structures to oversee these future developments. Congress agreed that operational and research observing networks in Polar Regions should be integrated within the framework of the WMO Integrated Observing System (WIGOS) and the WMO Information System (WIS), be enhanced to include cryosphere related variables and it recognized that a major contribution to this objective will be through development of the Global Cryosphere Watch.

11.9.2 Congress agreed with the Executive Council that it is desirable to integrate all Antarctic networks into an Antarctic Observing Network (AntON) that will comprise all operational stations, all of which should produce climate messages, and adopted Resolution 11.9/1 (Cg-XVI) - The Antarctic Observing Network. Congress also extended its appreciation to other organizations, such as the University of Wisconsin, who fund and operate over half of these stations as automatic weather stations (AWS). Congress also noted with appreciation that the *Manual on the Global Observing System* (WMO-No. 544) was reviewed and adopted Resolution 11.9/2 (Cg-XVI) - Amendments to the *Manual on the GOS*, Volume II - Regional Aspects - The Antarctic.

11.9.3 Congress noted with concern that data from many Antarctic stations funded by research agencies are not available in real-time and, therefore, are not available to NWP systems. It noted that the high communication cost involved in using Iridium satellites is also a limiting factor. Congress requested the Executive Council and the Secretary-General, in collaboration with CBS and JCOMM, to investigate possible ways to reduce such costs through an international forum of users of satellite data telecommunication systems. It also expressed its desire that WIS would provide a suitable environment for collection and dissemination of data from research observing stations.

11.9.4 Congress recognized the importance of the relationship between WMO and the Antarctic Treaty Consultative Meeting (ATCM) and strongly encouraged the Executive Council and the Secretary-General to work with the ATCM on issues of mutual responsibility and to ensure representation of WMO at future ATCM meetings.

11.9.5 Congress noted with interest the decadal initiative to develop a Global Integrated Polar Prediction System (GIPPS), capable of providing information to meet user needs for decision making on timescales from hours to centuries. It noted the global benefits of such a system in enabling service delivery and developing observing strategies in Polar Regions, and in addressing key uncertainties in weather, climate, water and related environmental variability and change, thereby improving global prediction, contributing to all WMO high priorities, in particular Disaster Risk Reduction, and the Global Framework for Climate Services (GFCS). Congress agreed to embark on a multi-year endeavour towards GIPPS, as an IPY Legacy to benefit the global community. It also agreed that GIPPS shall engage regional associations, technical commissions, and relevant international organizations and academic research communities in the development of such a system. Noting the Concept Paper on GIPPS (see Annex to this paragraph) and recognizing the importance of this initiative, Congress adopted Resolution 11.9/3 (Cg-XVI) - Global Integrated Polar Prediction System (GIPPS).

11.9.6 Congress agreed that “Services” are an important driver that anchors the work of WMO Polar Activities. It appreciated that the Executive Council has completed an initial inventory of existing weather, climate, water and cryosphere services currently provided in the Polar Regions and agreed that further consultations to validate user requirements should be conducted. Congress urged the Executive Council to develop a comprehensive description of the global community’s polar service requirements and articulate the value to be delivered, and through mechanisms such as Polar Regional Climate Centres and Polar Climate Outlook Forums contribute to GFCS and by the GIPPS.

11.9.7 Congress noted with appreciation the accomplishments in WMO Polar Activities during the last four years. It noted that WMO Polar Activities were thus far funded from the PORS Trust Fund and encouraged Members to continue providing support to WMO’s Polar Activities through this Trust Fund and through supporting activities identified in the Project Compendium for Voluntary Funding (2012-2015). Congress agreed that WMO needs to have a focus on polar observations, research and services to meet its responsibilities on regional and global weather, climate, water and related environmental matters, and adopted Resolution 11.9/4 (Cg-XVI) - WMO Polar Activities.

International Polar Decade Initiative

11.9.8 Congress noted with satisfaction that at the Workshop on International Polar Decade (IPD) Initiative (St. Petersburg, Russian Federation, April 2011) representatives from key international environmental organizations as well as from leading polar associations and institutions had unanimously supported an IPD initiative. Congress also noted the Nuuk Declaration of the Seventh Ministerial Meeting of the Arctic Council (12 May 2011, Nuuk, Greenland), which tasked the Senior Arctic Officials to consider supporting a proposal to arrange an International Polar Decade Initiative. Congress agreed that the IPD planning should continue to maintain the momentum generated by the IPY, to engage existing programmes and available resources, and to align them with the targeted set of objectives that would take a decade to advance.

11.9.9 Congress agreed with the workshop conclusion that any scientific efforts under the auspices of an IPD must be aligned to meeting broad societal needs such as WMO desired societal outcomes and be anchored on delivering better, more reliable scientific information to inform risk-based decision and policy making activities in the Polar Regions. In this light, the climate component of an IPD would have the potential to strongly contribute to the implementation of the Global Framework for Climate Services.

11.9.10 Congress further agreed that the scientific focus of an IPD should include topics such as:

- (a) Development of improved polar weather, water, cryosphere and climate prediction systems and their use for service delivery and decision-making support;
- (b) Better understanding of the polar climate predictability and the role of Polar Regions in the changes of the global carbon cycle and sea level;
- (c) Optimization and development of observational methods, systems and networks in the Polar Regions;
- (d) A “peoples, societies and cultures” initiative to integrate new understanding into practices and culture and improve livelihoods and health of indigenous and other northern communities and the ecosystems upon which they depend.

11.9.11 Congress expressed its deep appreciation to the WMO/ICSU IPY Joint Committee for the publication of a comprehensive summary of all IPY activities and its legacies given in “Understanding Earth’s Polar Challenges: International Polar Year 2007-2008” (<http://www.icsu.org/publications/reports-and-reviews/ipy-summary/ipy-summary>) and pointed out that many elements of the IPY networks and initiatives described in the Summary could provide the building blocks for a comprehensive polar observing system in IPD. Congress confirmed that early establishment of data management arrangements and an open and free data access policy should be one of the first steps of IPD preparation if the initiative is to be launched. Continued support for existing data centers and related IPY legacy initiatives such as the Polar Information Commons (PIC) as well as early WIS involvement will be essential and necessary elements of the IPD.

11.9.12 Congress agreed that unlike the IPY, which was mostly a bottom-up collection of research with funding allocated on the basis of scientific merit within themes and focus areas that differed from nation to nation and from one funding agency to another, the IPD should address uniform programme goals that meet specific needs. The goals should be developed through interactions among stakeholders, funding agencies and the scientific community and should be implemented through the coordination and cooperation of funding agencies best equipped to help achieve the negotiated goals.

11.9.13 With respect of the IPD timeline, Congress recognized that there should be a balance between the need to keep the momentum of most important and promising activities developed during IPY and avoiding discontinuation of the current valuable activities, and the need to properly design, plan and support integrated IPD activities. The actual length and initiation of IPD should be determined as a part of the planning process and it should be noted that the IPD duration does not need to be exactly ten years.

11.9.14 Congress agreed that to move the IPD idea forward a consultative process would be needed. A steering group, in which key stakeholders would be represented, should be established in due course to lead the consultation and drafting process. Congress noted with appreciation and accepted the offer by the Workshop co-chairs to serve as initial leaders of such a group. The steering group should be supported by a small secretariat, which will help synthesizing information and preparing drafts of the IPD Concept Document. Congress agreed that WMO Members should further develop this Concept Document and noted with appreciation that the Research Council of Norway had kindly offered to seek some human resources for this purpose, and the International Arctic Science Committee would similarly provide some assistance. Congress agreed that WMO Secretariat will serve as the initial point of contact for such a secretariat. A critical milestone would be the Montreal 2012 IPY Conference “From Knowledge to Action”, at which a draft IPD Concept Document would be reviewed, corresponding community decisions recommended, and possible commitments expressed. Congress adopted Resolution 11.9/5 (Cg-XVI) - International Polar Decade initiative.

Global Cryosphere Watch (GCW)

11.9.15 Congress stressed the importance of the cryosphere, noting that it is global, existing in various forms spanning all latitudes and occurring in approximately one hundred countries, in addition to the Antarctic continent. It noted the unparalleled demand for authoritative information on past, present and future state of the world's snow and ice resources.

11.9.16 Congress considered the "Implementation Strategy for the Global Cryosphere Watch" developed by the Executive Council's Panel of Experts on Polar Observations, Research and Services (EC-PORS). It noted that countries from all six Regions have expressed their desire to be involved in WMO's cryosphere initiative and especially noted the interest from Members, where snow and ice does not occur, but were concerned about the impact of a changing cryosphere on their nation through changes in weather, climate, water resources and sea level rise. Congress noted with appreciation the efforts of the Norwegian Meteorological Institute in developing a WIS compliant web portal for GCW that would be interoperable with NMHS and external cryospheric data centres.

11.9.17 Congress agreed with the next steps for developing GCW as outlined in the GCW Implementation Strategy (see Annex to this paragraph). It encouraged Members to participate in the development of GCW and urged Members to support implementation on a shared basis through Project 4.4.1.50 on Implementation of activities of the EC Panel on Polar Observations, Research and Services (EC-PORS) in the Compendium for Voluntary Funding (2012-2015), thus complementing insufficient resources from the WMO regular budget. Congress agreed that WMO needs to have a focus on global cryosphere issues to be able to provide authoritative information to meet Members' responsibilities on regional and global weather, climate, water and related environmental matters, and adopted Resolution 11.9/6 (Cg-XVI) - Global Cryosphere Watch. Congress requested the Executive Council and the Secretary-General to oversee GCW's initial development to ensure optimal management of, and support to, the initiative. Congress also noted that GCW would be an important contribution of WMO to a potential International Polar Decade (IPD), if this were to be initiated.

RESOLUTION

Res. 11.9/5 (Cg-XVI) – INTERNATIONAL POLAR DECADE INITIATIVE

THE CONGRESS,

Noting:

- (1) Resolution 36 (Cg-XV) – International Polar Year 2007-2008,
- (2) Resolution 11 (EC-LXII) - Executive Council Panel of Experts on Polar Observations, Research and Services (EC-PORS),
- (3) The Report of the Workshop on an International Polar Decade (IPD) initiative, St. Petersburg, 14-15 April 2011, the first international stakeholder consultation, organized in accordance with the guidance by the sixty-second session of the Executive Council (June, 2010),
- (4) The Nuuk Declaration on the occasion of the Seventh Ministerial Meeting of the Arctic Council, 12 May 2011,

Considering:

- (1) That the preliminary results of the IPY 2007-2008 confirmed the global significance of polar processes and the role of the Polar Regions as drivers of change in global weather and climate, extreme events, global carbon cycle, and sea-level rise,
- (2) The urgent need to observe, understand and predict the extremely rapid and significant environmental changes occurring in high latitudes,
- (3) That substantial research investments made by many countries in IPY have resulted in new scientific knowledge and infrastructure, including new technologies for observations and analysis and improved models for prediction of all Earth System components,
- (4) The substantial societal benefit to be gained by capitalizing on these IPY investments by improving services including better predicting and assessment capabilities, for example, in securing shipping routes, managing risks related to resource mapping, exploration and development, protecting the fragile polar environment and improving welfare of indigenous and other northern communities,
- (5) That some governments are continuing to make added commitments, particularly in the Arctic, and that the Arctic Council countries have produced or are preparing strategies for economic development, environmental stewardship and support to indigenous communities to adapt to changes in polar environment,

Recognizing:

- (1) That the first international stakeholder consultation on the International Polar Decade (IPD) supported an IPD initiative and recommended that the IPD would start beyond 2015 to align to a set of agreed decadal scale polar initiatives,
- (2) That WMO polar initiatives such as Global Integrated Polar Prediction System and Global Cryosphere Watch would provide, if implemented, a substantial contribution to an IPD, and would strongly benefit from contributions by partner organizations;

Approves the WMO participation in the International Polar Decade should this initiative be endorsed by relevant international organizations as key stakeholders to build on the solid foundation that IPY has established;

Invites relevant international organizations and programmes, such as Arctic Council (AC), Antarctic Treaty Consultative Meeting (ATCM), the International Council for Science (ICSU), International Arctic Science Committee (IASC), Scientific Committee on Antarctic Research (SCAR), the International Association of Cryospheric Sciences (IACS) and other relevant associations of IUGG, UNESCO's Intergovernmental Oceanographic Commission (IOC), United Nations Environment Programme (UNEP), Arctic Council Indigenous Peoples, Council of Managers of National Antarctic Programmes (COMNAP), Forum of Arctic Research Operators (FARO), European Commission, European Science Foundation, European Environment Agency, Arctic Monitoring and Assessment Programme (AMAP), International Arctic Social Sciences Association (IASSA), Association of Polar Early Career Scientists (APECS), and others to participate in the IPD consultative process and identify their role and commitments to the IPD;

Requests the Executive Council through its Panel on Polar Observations, Research and Services:

- (1) To secure the WMO representation in a steering group that would be established to lead the IPD consultative process and prepare a draft IPD Concept Document for submission to the Montreal 2012 IPY Conference "From Knowledge to Action" (22-27 April 2012);
- (2) To consult with the relevant international organizations to define the framework, objectives, resource requirements, timing, and organizational structure of an IPD;
- (3) To coordinate the role and participation of WMO in the relevant initiatives that would be conducted under the auspices of an IPD;
- (4) To review and approve the IPD Concept Document at its sixty-fourth session with a view of determining modalities and the level of WMO participation in the initiative;

Requests the Secretary-General to bring this resolution to the attention of all concerned.

Note: This resolution replaces Resolution 36 (Cg-XV), which is no longer in force.

Report IUGG@WMOCongress-III by Arthur Askew

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Subject: IUGG at WMO Congress - III
Date: Wed, 25 May 2011 22:14:25 +0200

Dear Colleagues,

The following are my third set of notes on WMO Sixteenth Congress:

09

Let me start with the high profile decisions, some of which may have already reached you:

- Yesterday Michel Jarraud of France was re-elected Secretary General of WMO for a third and last period of four years running through until the end of December 2015. He was elected with 105 votes out of 151, the 2/3 majority giving him preferred and confirmed status in one vote.
- This morning David Grimes of Canada was elected President of WMO for the next four years. He takes on this role at the close of Congress and can be re-elected in 1015 for one further term of four years. He gained 74 of the 143 votes cast and so was elected on the first round. Ali-Mohammed Noorian (Iran) got 38 votes and Tyrone Sutherland (British Caribbean Territories) 31.

10

Over the past three days, Congress has moved smoothly through its agenda with a small but unimportant delay. In the past the tradition was to adopt the minimum of formal resolutions and to put most of the substance into the report of the debate. This has now changed and so Congress is adopting whole series of resolutions on every topic with all the "Noting", "Whereas", "Considering", "Decides", "Requests" and the like. I always saw it as one of the strengths of WMO that it did not follow this heavy intergovernmental means of recording its views and so, personally, I am somewhat saddened. However, every bureaucratic cloud can have its silver lining and in this case I can record that (a) the delegates are adopting all these heavy texts at great speed and with a very positive spirit, and (b) it has allowed me to add a word here or there more easily that getting changes to long phrases in texts composed of ordinary paragraphs.

11

The discussion of the Hydrology and Water Resources Programme went smoothly with enough interventions to prove its worth and no problems. Julius Wellens-Mensah (Ghana) took a very active role as Acting President of the Commission of Hydrology (CHy) - a post he has held for some four months since the President, Bruce Stewart (Australia), joined the WMO Secretariat. I intervened to talk of the close and long-standing links between this programme and IAHS. It was interesting to see interventions from Canada and Iceland in support of more work in the Arctic - see also 17 below. The next session of the CHy is expected to be held in October/November 2012, but no venue has been discussed. It will be in Geneva if no invitation is received to hold it elsewhere. The CHy Advisory Working Group is next expected to meet in December this year.

12

The Atmospheric Research and Environment Programme has ceased to exist and is replaced by the World Weather Research Programme and the Global Atmosphere Watch. These were presented by Dr Deon Terreblanche, the new Director of the Department who joined the Secretariat from the South African Weather Service only a few weeks ago. He replaces our old friend Len Barry who has moved to Cyprus to head an international institute there. No problems arose with these programmes. IAMAS had not briefed me to intervene and so I did not do so, but I would recommend that someone from IAMAS visit the Secretariat within the next six months to establish the personal contact with the new Director that is so much more valuable than formal statements, even in Congress.

13

It was interesting to note that Germany strongly objected to a draft text that would have had WMO appreciating the establishment of a weather modification centre in a country. They insisted that Congress only "note" its establishment, in line with the Organization's formal statement on the subject.

14

Drs Pachauri and Christ presented two papers on the IPCC. The papers overlapped a good deal and each presented a draft resolution with the same title. There were many interventions, all applauding the good work being done. The great majority of the speakers were from Africa. There was a clear push by the heads of the meteorological services for WMO to take more control of IPCC. It was equally clear that IPCC wants to retain its independence while acknowledging politely its debt to WMO and UNEP for founding it.

15

On Monday morning, I was joined by a gentleman who I did not know and who said that he had no documents or name plate. It was his first time at Congress and so I spent some time explaining how Congress worked and who was who and what was what. He then said that he was from ICSU and so I told him firmly but politely of the problems that we, IAHS and IUGG, have had with ICSU in the past. Then, to my surprise, he was invited to the podium - a rare honour - to present ICSU's new ten-year initiative on global sustainability research. That was when I discovered that he was Deliang Chen: the new Executive Director of ICSU!

16

This new ICSU initiative has been developed with inputs from IUGG but my WMO contacts see it as a very top-down affair and I understand that we have not been involved in the recent work on it. They have established a "Transition Team" to oversee its final definition, launch, strategy and fund-raising and WMO has been invited to send a representative to this "TT". I asked how and when the Associations would get a further chance to make an input and Deliang told me that it would be in September when the whole package would be presented to the ICSU General Assembly for adoption - a bit late for inputs in my opinion. It is "interesting" to note that ICSU have managed to link the whole thing to IFAD and its Belmont process, thereby having the funding agencies as partners rather than recipients of funding requests. I hope that the funding agencies will not tell us - the IUGG community - to go to ICSU in future for our funding requests rather than to IFAD and its members.

17

The last thing yesterday was a long and fruitful discussion of WMO's polar activities, strongly supported by David Grimes who was later elected as the new President of the Organization - see 9 above. The programme of activities is quite complex and involves, not only "WMO Polar Activities", but also an Integrated Polar Prediction System (GIPPS), an Antarctic Observing Network (AntON), a Global Cryosphere Watch (GCW) and the International Polar Decade (IPD). I intervened at the request of IACS to advise Congress of their establishment and desire to co-operate as appropriate in all such endeavours. Each of these initiatives had its own resolution which contained a list of potential collaborating partners and so I submitted proposals to the Secretariat to include IACS as potential partners in all the relevant places. If all these proposals are accepted, IACS will appear a number of times in key places in the final report,
BUT
this will only achieve anything if personal contact is made with those responsible for the activities on a day-to-day basis. The contact within the WMO Secretariat is Miroslav Ondras (+41 22 730 84 09 & mondras@wmo.int).

18

It was interesting to note that the USA raised a few "editorial questions" relating to references in the draft text to the meeting that was at the origin of the proposal for the IPD. I asked colleagues why there were these queries and discovered that many countries did not attend this meeting because our Russian colleagues had not managed to reach agreement beforehand with other important polar countries as to the content and name of this initiative. Therefore, for example, Canadian and American experts went to the meeting, that was held in St Petersburg in April this year, but only in their capacities as holders of certain international positions, not as representatives of their countries. Having said this, there was no public objection to the idea of the IPD being studied further and so, hopefully, these differences can be ironed out and agreement be reached before too long.

Until the next report,

Arthur Askew

IUGG representative to Cg-XVI

Proposal to nominate H. Gerald Jones as an “Honorary Member of IACS”

(IACS Statute 2.10)

IACS is indebted to many cryospheric scientists who helped the former ICSI to become the eighth IUGG Association in 2007. H. Gerald (Gerry) Jones, however, deserves particular recognition for having promoted and facilitated this change wholeheartedly and with great dedication.

Gerry became ICSI President Elect in a crowded room at Birmingham University during the 1999 IUGG General Assembly. At that time, he might not have envisioned the tremendous amount of work and requirement of commitment that lay ahead of him. At the IAHS Scientific Assembly in Maastricht, the Netherlands, where he took over the ICSI presidency from Liz Morris, Gerry already was “feu et flamme” and enthusiastically promoted the idea of a Cryospheric Association as part of the IUGG. This was convincingly expressed, for example, during the ICSI Plenary, when he personally addressed Kuni Takeuchi, at that time IAHS President.

Gerry then started to work relentlessly towards the establishment of an IUGG Cryospheric Association. Gerry’s amiability and communicability supported him on this long road. With the help of ICSI Secretary Georg Kaser and Roger Barry, a proposal for an International Association of Cryospheric Sciences was submitted to the Council of the 2003 IUGG General Assembly in Sapporo. The proposal was the first step towards an interim goal, namely the creation of the Union Commission for the Cryospheric Sciences UCCS in 2005. Gerry became its first Immediate Past President. One more step was to develop statutes and bylaws before gaining the status of a full IUGG Association. Gerry again employed his talents, expertise and meticulous attention to detail to draft statutes and bylaws for the new Association. His work resulted in IUGG revising its own statutes based on Gerry’s draft.

In 2007, at the IUGG General Assembly in Perugia, UCCS Immediate Past President H. Gerald Jones could step down, knowing almost with certainty that the IUGG Council would accept IACS as an eighth Association within its organization.

IACS would not be present in Melbourne without Gerry’s unselfish and untiring commitment. This alone warrants awarding Gerry IACS Honorary Membership. Many of us, however, would also do so for having shared unforgettable moments with Gerry, times at which not only Cryospheric Sciences were at the centre of the discussions.

Request for Funding Support from IACS

Summary of the proposed activity

The Fifth International Conference on Mars Polar Science and Exploration (<http://www.lpi.usra.edu/meetings/polar2011/>) is the latest in a continuing series of meetings that are intended to promote the exchange of knowledge and ideas between planetary and terrestrial scientists interested in Mars polar and climate research. In recognition of the broad scope, interdisciplinary nature, and strong international interest in this topic, the participation of any interested scientist with relevant theoretical, experimental, or polar field experience is strongly encouraged.

Based on the experience with the past meetings, 100-150 participants are to be expected. The meeting will be sponsored by the Lunar and Planetary Institute (Houston, Texas), the University of Alaska Fairbanks, the NASA Mars Program Office and IACS.

Timeframe of the activity

The Fifth International Mars Polar Science and Exploration Conference will be held in Fairbanks, Alaska, September 12-16, 2011, at the Fairbanks Princess Riverside Lodge (http://www.princesslodges.com/fairbanks_lodge.cfm, plenary) and Pike's Waterfront Lodge (<http://www.pikeslodge.com/>, guest rooms and dinner).

Requested contribution

An IACS contribution of EUR 2,000 is sought to help support travel costs for the participation of students and retired professionals.

Lead person

Steve Clifford (Lunar and Planetary Institute, Houston, Texas): Lead convenor.

Ralf Greve: Member of the Scientific Organizing Committee, representative of IACS.

Expected results and deliverables

The purpose of the conference is to assess the current state of Mars polar and climate research; discuss what might be learned from investigations of terrestrial analogs and the data returned from current and future missions; and identify the potential science objectives, platform options, and instrument suites for future robotic missions to investigate the Martian poles. This meeting is intended to advance such missions and to serve as an important resource for those scientists wishing to develop instruments, propose spacecraft, or participate as a member of a science team in response to any future Announcement of Opportunity.

From an IACS perspective, the meeting serves perfectly well the mission of the "Planetary and Other Ices of the Solar System" Division to foster active exchange between the planetary and terrestrial cryospheric science communities. Sponsoring and providing funding support for the meeting will be an excellent opportunity to fill these words with life.

Request for Funding Support from IACS

(i) Summary of the proposed activity

[CAAML](#) is the open source Canadian Avalanche Association Markup Language. Together with its inceptors we worked on an international format for the exchange of snow profiles that was recently released ([CAAML V5.0 Profile - Snow Profile IACS](#)). The format fully complies with the Snow Classification and is already used in both scientific applications (snow model output) and snow profile graphing software.

CAAML, however, is more than just that. It is designed to exchange snow and avalanche related info between avalanche safety organizations not excluding recreational operations. Such data could also be used for scientific work such as statistical analysis. Indeed, lately the European Avalanche Warning Services EAWS decided to use CAAML to foster and develop information exchange among their services. It is thus of importance that a Working Committee be established to further develop a standard that covers the needs of both practitioners and scientists. The Canadian Avalanche Association CAA has now taken the initiative to set up such a Committee (see attached Terms of Reference) and interested organizations are requested to consider becoming active members.

I propose to join this initiative by nominating a liaison person to the committee. Indeed, while I was first thinking IACS could lead the Working Committee, I realized it would be very technical in nature and not fit very well into our existing structure. I am convinced, however, that IACS ought to participate in order to provide advice whenever needed.

(ii) Timeframe of the activity

The Working Committee will be an ongoing initiative with no ending date. IACS would thus have to reconsider periodically its participation as with other “joint bodies”.

(iii) Requested contribution

The proposed Terms of Reference foresee an annual contribution of CND 500 per year and member. I don't think that IACS should commit itself to such returning financial contributions. If IACS decides to participate into this initiative, however, I feel a one time financial support to be appropriate. Accordingly, an IACS contribution of CND 500 is sought, covering the first year fee.

(iv) Lead person

Head of Division Snow and Avalanches

(v) Expected results and deliverables

This project will increase the visibility of IACS in both the practitioners' and snow scientists' communities. As an observer, IACS will help bridge the needs of these different communities and promote the use of the standard. A standardized format to exchange snow and avalanche related information will also be very valuable to organizations and scientists in countries where such services are not yet well established.

Attachments: Terms of Reference of CAAML Working Committee (draft)

Davos, 15 June 2011; Charles Fierz

CAAML WORKING COMMITTEE –TERMS OF REFERENCE

1.0 BACKGROUND

The Canadian Avalanche Association Mark-up Language (CAAML) is a standard for the electronic representation of information pertinent to avalanche safety operations. By building on existing Internet standards, CAAML expresses avalanche related information in a manner that can easily be shared over the World Wide Web.

The purpose of CAAML is to provide definitions for the data file structure to support electronic exchange of avalanche related information. CAAML defines the structure and elements of observations types, specifies how locations are referenced, provides a mechanism for linking observations with each other and contains a method for associating external data files.

Since the inception of CAAML in 2001 it has grown into an international open source initiative involving many stakeholders. Formalizing an international CAAML working committee was proposed as a way of ensuring long-term viability and sustainability of the initiative. Collectively this working group will address issues of maintenance and development as well as provide a venue to share financial and in-kind resources for the benefit of all users of the open source standard.

2.0 SCOPE

The CAAML Working Committee can consider any item of business or initiative in support of fostering the development of the CAAML open source XML standard and its use within the broader community.

3.0 PURPOSE

The CAAML Working Committee is a committee comprised of international stakeholders who pool human, financial and other resources for the long term maintenance and growth of the CAAML initiative.

4.0 MEMBERSHIP

4.1 Members

The CAAML Working Committee is composed of senior representatives from organizations with a direct stake in the CAAML specification. Founding members are;

- Canadian Avalanche Association
- INSERT FOUNDING MEMBERS HERE.

New members are accepted based on a vote of current members. A two-thirds majority vote is required to accept a new member.

CAAML WORKING COMMITTEE –TERMS OF REFERENCE

A list of current members will be kept at www.camml.org, the official website of the CAAML initiative.

4.2 Support

Each member may be accompanied by one subject matter expert to provide technical advice during meetings.

4.3 Chair

The position of chair rotates every three years, and is determined by majority vote at the spring meeting.

4.4 Financial Contributions

It is recognized that each member brings resources and expertise to the CAAML initiative and that there are nominal financial costs of administering and maintaining the CAAML specification. These costs include web hosting fees, periodic maintenance and developer fees and other costs as required. In recognition of the value of CAAML and the importance of its ongoing viability and sustainability each member organization agrees to contribute CAN\$500/yr into a collective pool to pay for these annual costs.

Furthermore, each member organization agrees to pay its equal share of any costs associated with larger development projects. When development projects are proposed they will be fully specified and approved by the committee before work commences including financial budgets. By working together and pooling human, financial and other resources it is hoped that cash contributions for development can be kept to a minimum.

A financial statement outlining the financial status of the working group's bank account will be tabled at each meeting. Annual contributions as outlined above may be skipped at times of sound finances. In order for an annual financial contribution to be skipped a two-thirds majority vote of members is required.

5.0 CAAML WORKING COMMITTEE MEETINGS

5.1 Preparation and Attendance by Members

To enhance the effectiveness of CAAML meetings, each member shall devote the time needed to prepare for and participate in each meeting by reading the background material provided for the meeting, and maintain an excellent attendance record.

CAAML WORKING COMMITTEE –TERMS OF REFERENCE

5.2 Attendance my Non-Members

Individuals acting for members in their absence are permitted and encouraged to attend and participate fully. Subject to approval of the chair, other non-members may attend for a specific purpose on behalf of a sponsoring member.

5.3 Meeting Frequency

The CAAML group shall meet once per year, in the spring. Meetings shall be held via conference call or when possible face to face at a location of mutual convenience. The chair is responsible for meeting logistics and administrative support, including designating a committee secretariat, notification to members, call for agenda items and distribution of any background materials. Notification to members shall occur no later than 1 month prior to the meeting date.

5.4 Minutes of Meetings

Minutes of each meeting are taken by the committee secretariat, and shall contain a record of the persons present. The minutes provide a record of discussion and further actions required. Key items will be reviewed and recorded in writing before the end of the meeting to ensure absolute clarity.

6.0 RESPONSIBILITIES

To the committee

It is the responsibility of each member to deliver the perspective of the organizations they represent.

From the committee

It is the responsibility of each member to communicate the work and perspective of the CAAML group to key positions within their organizations. Action items must be followed up on.

8 CAAML GROUP PERFORMANCE

At its annual meeting, the CAAML group shall review the appropriateness of its Terms of Reference, and the effectiveness of the committee. This will be done by measuring outcomes and deliverables against the purposes identified in the Terms of Reference.

Memorandum of understanding between Organizations acting in the field of Cryospheric Sciences

The following organizations enter into this Memorandum of Understanding (MoU):

Association of Polar Early Career Scientists, APECS

Cryosphere Research Focus Group, American Geophysical Union, AGU

Division on Cryospheric Sciences, European Geosciences Union, EGU

International Association of Cryospheric Sciences, IACS

International Commission on Snow and Ice Hydrology, ICSIH

International Glaciological Society, IGS

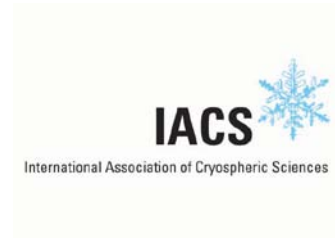
International Permafrost Association, IPA

Permafrost Young Researchers Network, PYRN

Scientific Committee on Antarctic Research, SCAR

Working Group on Cryosphere of the International Arctic Science Committee, IASC

- 1) The purpose of this MoU is to co-ordinate the activities of the above organizations, in particular the organization and planning of symposia, conferences and workshops so as to avoid conflict of those activities.
- 2) The above organizations agree to act in unison to promote their common interests.
- 3) Each organization will nominate one spokesperson to act as a contact for the purpose of this MoU.
- 4) The above organizations will seek every opportunity to meet regularly, preferably once per year at the EGU spring meeting, to review this MoU and future activities.
- 5) The above organizations agree to hold regular teleconferences to review upcoming activities.
- 6) The above organizations agree to actively promote joint sponsorship and co-sponsorship of activities of common interest.
- 7) The above organizations agree to join forces to facilitate participation of students, early career scientists, and delegates from developing countries in their activities.
- 8) The above organizations agree to implement a 'common' planning calendar where the individual organizations can enter information about upcoming events as soon as possible for other organizations to see what is being planned even though plans have not been finalized. This calendar will be confidential and only accessible to the respective nominated spokespersons.



Report on the Activities of the joint IAVCEI-IACS Commission on Volcano–Ice Interactions, June 2011

Summary of Commission Goals

The joint IAVCEI-IACS Commission on Volcano–Ice Interactions (CVII) was established in 2008 and supercedes the former Volcano-Ice Interactions Working Group that functioned from 2006-2008. The activities of the initial working group began in earnest in January 2006 when a full complement of officers was elected. Since the full establishment as a commission, CVII has relied on a solid structure and a significant range of activities.

The goals of the CVII are to:

1. Foster the study of terrestrial and extraterrestrial volcano-ice interactions;
2. Promote internationally the exchange of ideas, results and collaborative research opportunities within the volcanological and glaciological communities, and other societies relevant to this highly transdisciplinary field (e.g. International Glaciological Society, International Permafrost Association);
3. Provide a recognized point of contact for issues relevant to volcano–ice interactions.

Since inception, the working group has been a vigorous presence within the volcanological and glaciological communities and has made substantial progress on many of its objectives. This report summarizes the activities of the Commission.

Leadership

The CVII leadership consists of an elected chair, vice-chair, and secretary, as well as an advisory committee of permanent members. As described in the Commission charter (attached), elected officers serve for three years, spending a 1-year term in each of the positions of Secretary, Vice-Chair and Chair in order to ensure continuity. The elected officers are chosen to represent a balance between the sub-disciplines of (i) field-based interpretations of glaciovolcanic lithofacies, (ii) glacier physics, hydrology and hazards of observed eruptions, and (iii) extra-terrestrial volcano-ice interactions. For each cycle of election of commission officers an open process takes place during which each member of the Commission is contacted to suggest candidates and then to vote on the nominees. Since 2008 the working group leadership has consisted of the following members:

2008

Chair	Magnus Tumi Gudmundsson (University of Iceland)
Vice-Chair	Chris Waythomas (USGS)
Secretary	Mary Chapman (USGS)
Ex-Officio Chair	Sarah Fagents (Univ. Hawaii)

2009

Chair	Chris Waythomas (USGS)
Vice-Chair	Mary Chapman (USGS)
Secretary	Christian Huggel (Univ. of Zurich)
Ex-Officio Chair	Magnus Tumi Gudmundsson (University of Iceland)

2010

Chair	Mary Chapman (USGS)
Vice-Chair	Christian Huggel (Univ. of Zurich)
Secretary	Hugh Tuffen (Univ. of Lancaster UK)
Ex-Officio Chair	Chris Waythomas (USGS)

2011

Chair	Christian Huggel (Univ. of Zurich)
Vice-Chair	Hugh Tuffen (Univ. of Lancaster UK)
Secretary	Tracy Gregg (Univ. of Buffalo)
Ex-Officio Chair	Mary Chapman (USGS)

Advisory Committee, 2011: Ben Edwards (Dickinson College), Ron Greeley (Arizona State Univ.), Dave McGarvie (Open Univ.), C. Waythomas (USGS), Andres Rivera (Centro de Estudios Cienticos), John Smellie (Univ. Of Leicester), Sarah Fagents (Univ. Of Hawaii), Magnus Gudmundsson (University of Iceland), Mary Chapman (USGS).

As of 2011, the member list of the Commission contains close to 100 experts from different interdisciplinary fields of research related to the areas of the Commission.

Commission Website (<http://volcanoes.dickinson.edu/VIWG>)

The Commission website is the main communication and information dissemination forum.

The website hosts information related to the group's activities, and promotes communication with the working group membership and broader volcanological community. The Commission website contains:

- A summary statement of the goals of the Commission
- Details of the Commission charter and administration
- Details of upcoming and past events related to volcano-ice interactions (meetings, special sessions, symposia, etc.)

- Contact information for members of the Commission
- Links to other sites of relevance to the membership
- A database of images related to volcano-ice interactions (see below)

Over the years of the existence of the Commission the website has been highly appreciated and will continue to be developed as a useful tool for promoting collaboration and communication amongst volcano-ice researchers.

Volcano-Ice Interactions Image Database

The CVII has established a database of digital images of features and landforms produced as a result of volcano-ice interactions (<http://icon.dickinson.edu/viwig/>). The purpose of this database is to provide a suite of useful images to the broader volcanological community for educational and scientific use, such as giving lectures, writing grant proposals, etc. The database is searchable by keyword, feature type, eruption type, volcano type, country, or composition. So far there are some 100 images available. The Commission members are encouraged to submit their own images to this growing database.

Public and Scientific Outreach and Media Coverage

2010 Eyjafjallajokull Eruption, Iceland

The 2010 eruption at Eyjafjallajokull in southern Iceland created global media interest in volcano-ice interactions with respect to ash-aviation interactions. Several members of the Commission were interviewed by local, national, and international media outlets to provide background information on the volcano, the eruption, and the role of volcano-ice interaction in making the eruption so disruptive to air traffic. As an estimated 10 million people were directly affected by the temporary closure of European airspace, the public at large has a new appreciation for understanding the role of volcano-ice interactions.

Scientific Meetings

2008 IAVCEI General Assembly, Reykjavik, Iceland

A session on glaciovolcanism was sponsored by the CVII and allowed Commission members and interested experts to exchange research results and extend the volcano-ice interaction network.

Climate Forcing of Geological and Geomorphological Hazards, London, Sept. 2009

Several sessions at this conference were held on areas related to CVII and with active participation of CVII members. A special issue produced on the basis of this conference in the Philosophical Transactions of the Royal Society A produced a particularly large interest in the international press and media.

International Workshop on Glacier Hazards, Permafrost Hazards and GLOFs in Mountain Areas: Processes, Assessment, Prevention, Mitigation, Vienna, November 2009

Co-sponsored by CVII, this workshop attracted large interest among geoscientists working in high mountain areas. Volcano-ice interactions were among the keynote talks of the workshop. A report on the workshop was published in EOS in 2010.

2010 EGU General Assembly: CVII Session Glaciovolcanism as a climate proxy: progress and problems

Conveners: Ben Edwards, John Smellie

This session at EGU was organized by CVII and attracted contributions from field, analytical and/or theoretical studies using glaciovolcanism as a climate or environmental proxy.

AGU 2010: NH-11B CVII Session Magma-Ice-Meltwater Interactions: Physical Processes and Implications for Volcanic Hazards, and Hazards Associated With Snow- and Ice-Capped Volcanoes

This session was jointly sponsored by the Natural Hazards and Volcanology divisions of AGU, and covered physical processes of volcano-ice interactions as well as the hazards resulting from those processes.

2011 EGU General Assembly: The 2010 flank and summit eruptions at Eyjafjallajökull volcano (Iceland): History of an eruption from source to the atmosphere

Convener: Thorvaldur Thordarson

Co-Conveners: Susan Loughlin, Sigrun Hreinsdottir, Halldór Björnsson, Séverine Moune

Co-sponsored by CVII, this session attracted enormous interest by a wide geosciences community as well as by the international media. It followed from activities and recent studies performed by several members of CVII.

The 2010 flank and summit eruptions at Eyjafjallajökull volcano (Iceland) produced a wealth of data that are providing new avenues in volcanological research across several disciplines, such as in volcano seismology and deformation, geochemistry and petrology of mixed magmas, physical volcanology (i.e. conduit processes, volcano-ice interactions, eruption column dynamics and plume dispersal), volcano-environment interactions and hazard mitigation.

2011 IUGG General Assembly, Australia.

These IUGG sessions were co-organized by CVII or with participation of CVII members.

Subglacial and Subaqueous and Volcanism: processes, products and impact

Lead Conveners: Sharon Allen (Australia), Ben Edwards (United States of America), Hugh Tuffen (United Kingdom), Magnus Gudmundsson (Iceland)

The session brings together researchers within the fields of submarine/sublacustrine/subglacial effusive and explosive volcanism where confining pressure and ambient conditions influence the eruption processes. Particular emphasis will be on eruption dynamics, transport mechanisms, and hazards. The April 2010 eruption of Eyjafjallajökull, related volcano-ice interaction processes and continental-scale impacts are on the agenda of the session.

Subaerial and Subaqueous Lava flows

Lead Convenors: Thor Thordarsson (United Kingdom), Andy Harris (France), Sonia Calvari (Italy)

The session invites contributions on effusive eruptions at active volcanoes, in particular those with high recurrence intervals of such events, that have played a key role in linking flow field architecture, flow structures and magma rheology to the emplacement modes and mechanisms characteristic of individual lava types. Such studies also facilitate assessments of the hazard and risks posed by lava flows to populated areas and demonstrate the need for near-real time forecasting of lava flow length and path in order to protect the public.

Summer School on Volcano–Ice Interactions 2009

In June/July 2009, a 10 day long summer school on volcano–ice interactions was organized by CVII, in cooperation with the Nordic Volcanological Center at the Univ. of Iceland. This has provided students and researchers entering or working in the field of volcano–ice interactions to interact, and with an intensive introduction to the subject area, through lectures and fieldtrips. Topics addressed included: terminology, methods of studying glaciovolcanic deposits, heat transfer processes, ice mechanics, glacial hydrology, and associated hazards. Funds to support this summer school were available from Nordic countries cooperation funds, National Science Foundation, the American Geophysical Union, and other sources.

Concluding Comments

Since its establishment as a joint commission of IAVCEI and IACS in 2008 the CVII has been able to rely on a solid structure and organization. The leadership structure with three elected officers and an Advisory Committee has proven to allow CVII to develop and maintain a high level of activity and exert a considerable leadership in the field. Evidence of the success of the CVII are the now nearly 100 members.

The Commission website and the Volcano-Ice Interactions Image Database are important resources that are being made available to the scientific community or other interested institutions. The CVII has had a continuously high amount of sponsored and co-sponsored meetings, sessions and workshops that have contributed to promote the research field and foster research collaborations.

The 2010 Iceland Eyjafjallajökull volcano eruption and crisis was the most prominent event in relation with volcano-ice interactions over the past 4 years. It had a tremendous impact on Europe, and correspondingly the media coverage was particularly high over the globe.

However, a series of other important volcano-ice interactions events have taken place over this period and similarly had important impacts on a local or national scale.

For the next term, the CVII is committed to maintain the high level of activity in different fields, including scientific meetings, outreach and education. The Commission will furthermore continue to strain for successfully linking IAVCEI and IACS and promote collaborative, interdisciplinary research.

Particularly worth to mention is that CVII is currently preparing for the Third Conference on Volcano-Ice Interactions on Earth and Mars(VI13), to be held in Anchorage, Alaska, USA, around July 2012.

Volcano–Ice Interactions Working Group Charter

Note: The working group charter is based on the original proposal for an IAVCEI Commission on Volcano–Ice Interactions, which was formally submitted to IAVCEI executive committee January 2005, and accepted by IAVCEI in May 2005. However, rather than granting commission status, the IAVCEI executive committee approved the formation of a Working Group. As of March 2008, the working group was granted commission status as a joint venture with the International Association of Cryospheric Sciences. The original proposal to establish a commission is included below as originally written.

The proposal was submitted by an Adhoc Steering Committee established and elected on 18 November 2004. Committee Members: Ben Edwards, Ron Greeley, Magnus T. Gudmundsson, Christian Huggel, John Smellie, and Chris Waythomas

Statement of Need for a Commission

Because many volcanoes exist at high latitudes and/or extend to high altitudes and are at least seasonally covered with snow and ice, volcano-ice interactions play a key role for understanding eruption dynamics, the evolution of volcanic landforms, and many types of mass-flow hazards. The importance of volcano-ice interactions during glacial periods when ice covered many volcanic regions has become increasingly apparent as well. Such interactions between ancient and modern volcanoes and ice (including subsequently produced liquid and vapor) are a rapidly expanding area of interest among volcanologists, glaciologists, and paleoclimatologists.

For example:

- A recent email to solicit interest in this topic to the volcano listserv received responses from >40 scientists worldwide;
- >70 geoscientists participated in the first volcano-ice interactions conference in Iceland, August 2000;
- ~5% of the scientists attending the 2004 IAVCEI meeting in Pucon, Chile, expressed an interest in participating in a commission on volcano-ice interactions, and voted unanimously to establish such a commission on 18 Nov 2004; and
- A special session on volcano-ice hazards is scheduled for EUG 2005 (Vienna) and an IGS thematic meeting on terrestrial and extraterrestrial glacier volcano/geothermal interactions is being planned for 2006 (Reykjavik).

Scope and Purpose of an IAVCEI Commission on Volcano-Ice Interactions

The commission will focus on

4. Fostering the study of terrestrial and extraterrestrial volcano-ice interactions,
5. Promoting internationally the exchange of ideas, results and collaborative research opportunities within the volcanological community and with non-volcanological societies relevant to this highly transdisciplinary field (e.g., International Glaciological Society, International Commission on Snow and Ice, International Permafrost Association), and
6. Providing a recognized point of contact for issues relevant to volcano-ice interactions.

These goals will be met through venues such as workshops, field trips, special topical sessions at international meetings, and the establishment of relevant electronic databases open to the scientific community.

In addition to raising awareness in the geoscience and political communities, the commission will work to promote and encourage research aimed at improving our understanding of the terrestrial and extra-terrestrial interactions between volcanoes and ice in order to:

- Better assess hazards at active volcanoes mantled by ice,
- Better understand past changes in regional and global climates,
- Facilitate better-informed comparisons between volcano-ice processes on Earth and other planetary bodies, and
- Assist and improve identification of particularly promising off-Earth sites in the hunt for exobiology.

Organizational Structure

The commission officers will include a chair, vice-chair, and secretary, each with 3-year terms on a staggered basis [NOTE: for the first two elections, the staggering of terms means that the first Chair will only hold office for 1 year, and the first Vice-Chair will only hold office for 2 years]. At the start of a new year, the current chair will step down and become ex officio, the vice-chair will assume the chair, the secretary will assume the vice-chair, and a new person will be elected to assume the secretary position. This will enable a clear continuity in the organization.

Duties will include but not be limited to the following:

- Chair: overall responsibility for meeting/making progress on the Commission goal(s);
- Vice-Chair: responsible for identifying the coming year's program of meetings and helping to promote and advertise those meetings;
- Secretary: responsible for communicating information about commission activities with the members via a newsletter / email / webpage and for fostering communications between subcommittees.

Election of commission leadership will be through nominations from the commission members with guidance from existing leadership. Such guidance will be aimed at maintaining a broad scientific and geographic expertise among the commission leadership. For example, the leadership should strive to represent each of the 3 main "sub-branches" of volcano-ice researchers: 1) those principally concerned with interpreting lithofacies, 2) those concerned with glacier physics, hydrology and hazards of observed eruptions, and 3) those focused on extra-terrestrial volcano-ice interactions. Additionally, the leadership should attempt to maintain a diverse geographic representation to facilitate participation of commission officers at international venues.

For any given symposium / workshop / activity, an ad hoc committee will be formed, which will be either chaired (or participated in) by one of the officers.

Subcommittees will emerge as proposed by the members at large. Proposals for the formation of subcommittees will be circulated by the Secretary via the commission newsletter and advertisements in other appropriate venues to all IAVCEI members and other geoscientists (e.g., IAVCEI newsletter, EOS, Astrobiology Institute newsletter). Subcommittees will have a finite lifetime (two or three years) with a specific "sunset clause" that will dissolve them, unless proposed for renewal.

Preliminary List of Tasks Designed to Achieve Commission Purpose

1. Actively solicit commission members to initiate special sessions at relevant national and

international meetings. [ongoing]

2. Plan, sponsor and facilitate a second Volcano-Ice Interactions conference during the summer of 2007 (and possibly beyond). [to begin as soon as commission is formally approved]
3. Design and implement a method of communication among commission members including, but not limited to, a listserv or web page or tri-monthly report on the progress of the commission. [to be started within 3 months after official notification of commission approval]
4. Establish the use of glaciovolcanic sequences as important proxies for paleoclimatic reconstructions. [ongoing]
5. Form subcommittees to organize the specific interest groups, which might include the following:
 - Formation of mass flows and volcanic hazards generated by volcano-ice interactions;
 - Development of terminology for describing and interpreting glaciovolcanic features;
 - Documentation of differing styles of glaciovolcanism at stratovolcanoes;
 - Region specific interest groups (e.g., Antarctica, Iceland, Mars).
6. Organize and give short courses designed to train new researchers entering the field and their students on terminology and methods used to study glaciovolcanic deposits, heat transfer / ice mechanics / glacier hydrology, and /or assess hazards related to ice-clad volcanoes.
7. Organize an international symposium to focus on developing synergy between volcanologists and glaciologists/Pleistocene geologists, which could be the culmination of the commission's work, after which members will be able to assess the further need for the existence of the commission.

International Partnership in Ice Coring Science (IPICS)

IPICS was approved as an IACS Standing Group at the bureau meeting in 2009. It is also affiliated to IGBP-PAGES and to SCAR. IPICS information can be obtained at <http://www.pages-igbp.org/ipics/>; its steering committee consists of 32 representatives from 22 different nations. Its activities are focussed around 4 priority science projects, as well as a technical strand. The 4 priority projects are:

1. The oldest ice core: A 1.5 million year record of climate and greenhouse gases from Antarctica (a time period where Earth's climate shifted from 40,000 year to 100,000 year cycles).
2. The last interglacial and beyond: A northwest Greenland deep ice core drilling project (a deep ice core in Greenland recovering an intact record of the last interglacial period)
3. The IPICS 40,000 year network: A bipolar record of climate forcing and response
4. The IPICS 2k Array: A network of ice core climate and climate forcing records for the last two millennia

Much of the focus for IPICS in 2010 has been in Greenland with the completion to bedrock (2537 m) of the NEEM ice core drilling. Although bedrock has been achieved, there is a full field operation in 2011 to complete the processing of the deep ice and the brittle ice that was previously unprocessed, and to drill shallow cores. The aim of NEEM was to obtain ice from the last interglacial period. This has certainly been achieved, but work is still underway to understand the material that has been obtained.

In Antarctica, the US WAIS Divide drilling has also reached its target depth of 3330 m, and should soon be providing exciting new results about West Antarctic climate in the last glacial period (contributing to the IPICS-40k priority project). Other drillings covering the 40 ka period have been presenting data, and some synthesis papers combining several cores for this period are starting to emerge.

Considerable progress has been made in setting up a PAGES Antarctic-2K group, led by Tas van Ommen, and dedicated to synthesising the climate of Antarctica over the last 2000 years; this group is based on the IPICS-2k task. This new group will hold a workshop in Bern in July (associated with the INQUA meeting) to start to assemble data towards a product.

For the oldest ice project, a first problem is to identify a suitable drilling site. IPICS benefits from the major airborne geophysics programmes (AGAP and ICECAP) undertaken in East Antarctica in recent years, but there will have to be a long sequence of data interpretation and modelling before suitable targets can be identified.

Planning is now well underway for the IPICS Open Science Conference, which is to be held in Giens, France, October 1-5, 2012, with Jerome Chappellaz as chair of the organising committee. This conference is the first dedicated and open ice core conference for several years, and is expected to attract over 250 scientists, including those from related fields who wish to learn about the latest developments in ice cores. Sponsorship for this meeting has so far been obtained from EPICA (Descartes prize fund), SCAR, and French local sources.

IPICS Open Science Conference 2012

International Partnerships in Ice Core Sciences is organising an open science conference in November 2012. After an international call for venues, it was agreed (by a vote of the IPICS SC) that it should be held at Giens in France, October 1-5, 2012. The local organising committee is led by Jerome Chappellaz (LGGE), and an international scientific committee has been set up. The meeting expects to attract 250 scientists, including those outside the field of ice cores who wish to learn about recent advances. There will be an issue of *Annals of Glaciology* to accompany the meeting.

This is the first major open meeting dedicated to ice cores since the International Symposium on Ice Cores and Climate held in Kangerlussuaq (Greenland) in 2001 (although there have been smaller meetings devoted to individual projects such as EPICA). It also represents the first chance to discuss scientific progress in the 4 IPICS priority projects (and associated technical development) since IPICS was formed and formalised.

Sponsorship has already been obtained or promised from the EPICA Descartes Prize fund, and from SCAR (\$6000), as well as local French sources. In order to provide registration and travel support to as many as possible, particularly from less developed nations and for early career scientists, we are seeking further sponsorship. As IACS (along with SCAR and PAGES) is one of IPICS' "parents", we request a small sponsorship of \$3000 from IACS for the OSC in 2012. Naturally the IACS logo would appear on conference materials alongside that of the other sponsors. If agreed, the funds would be handled by the local organising committee and the conference organising company they have chosen (Floralis).

Eric Wolff and Ed Brook (IPICS co-chairs)

Jérôme Chappellaz (IPICS OSC chair)

Tas van Ommen (representing IPICS at IACS 2011 Bureau meeting)

IPICS: www.pages-igbp.org/ipics

Report from the International Permafrost Association: A New Strategy and Structure for the International Permafrost Association

In this biannual report to readers of *Permafrost and Periglacial Processes*, we present the strategy of the International Permafrost Association (IPA) as approved by the IPA Council at the Third European Conference on Permafrost in June 2010. We also describe IPA's action plans for 2010–16 based on this new strategy.

THE IPA AT 28-YEARS OLD

When the IPA was started by a group of scientists and engineers in Fairbanks, USA in 1983, permafrost research was a focused field with researchers concentrated in a limited number of countries. Since then, permafrost research has grown considerably in size and scope, with the involvement of an increasing number of countries and specialities. A rapid analysis of publications related to permafrost and periglacial processes shows that the number of published articles increased by an order of magnitude between the early 1970s and 2010 (Figure 1), with most of that change after 1983. Over that time, the IPA grew from an association largely concerned with the organisation of international conferences to one producing reference publications (maps, manuals, handbooks, etc.), organising meetings at two-year intervals (regional and international conferences on permafrost), initiating international studies, such as the Carbon Pools in Permafrost Regions, Arctic Coastal Dynamics, and Antarctic and Sub-Antarctic Permafrost, Soils and Periglacial Environments projects, and, most importantly, operating observing networks sponsored by the United Nations-supported global observing systems, namely the Thermal State of Permafrost and the Circumpolar Active Layer Monitoring, both parts of the Global Terrestrial Network for Permafrost (GTN-P).

The IPA has come a long way and can be justly proud of its many achievements: the IPA map of permafrost and ground ice (Brown *et al.*, 1997) is widely used, international conferences on permafrost attract more and more participants and regional permafrost conferences are showing ever-increasing prominence. These successes have created greater expectations and ambitions, particularly linked to

increasing interest in the fate of permafrost in a warming world and the possibility that carbon release from thawing permafrost may affect global climate. This interest has also produced a growing list of challenges:

- The need for the IPA to remain the pre-eminent voice in the scientific community on permafrost and permafrost-related issues, when other groups are becoming increasingly interested in questions concerning the impact of climate change on perennially frozen ground.
- The need to respond rapidly and frequently to enquiries from other scientific organisations and the media with accurate and up-to-date information.
- The desire to meet demands to financially support the activities of Task Forces and Working Groups, which are regarded as central to the IPA in the periods between international conferences on permafrost.
- The pre-eminent use of the internet to search for information in general, and the ability of the web to make information and data available at low cost, in contrast to the IPA's use of paper for many of its publications.
- The contrast between expanded requests for activities within the IPA while the organisation's capacity for action has been fixed because revenues have been essentially constant.
- The success of the Permafrost Young Researchers Network (PYRN) with more than 800 individual members (Bonnaventure *et al.*, 2009) and the consequent opportunity and need for the IPA to involve these members in the organisation.
- The financial vulnerability of the IPA as an organisation due to its dependence on external funding for the Secretariat (currently funded by the Alfred Wegener Institute; and in the past by the Norwegian Research Council, the Canadian National Research Council and the US National Science Foundation) with a level of sponsorship that easily exceeds the entire annual member dues.

A NEW STRATEGY FOR THE IPA

In the face of these growing challenges, the Executive Committee (EC) of the IPA initiated a revision of the IPA structures in 2009–10. The EC consulted with external polar science experts and Council members and developed a

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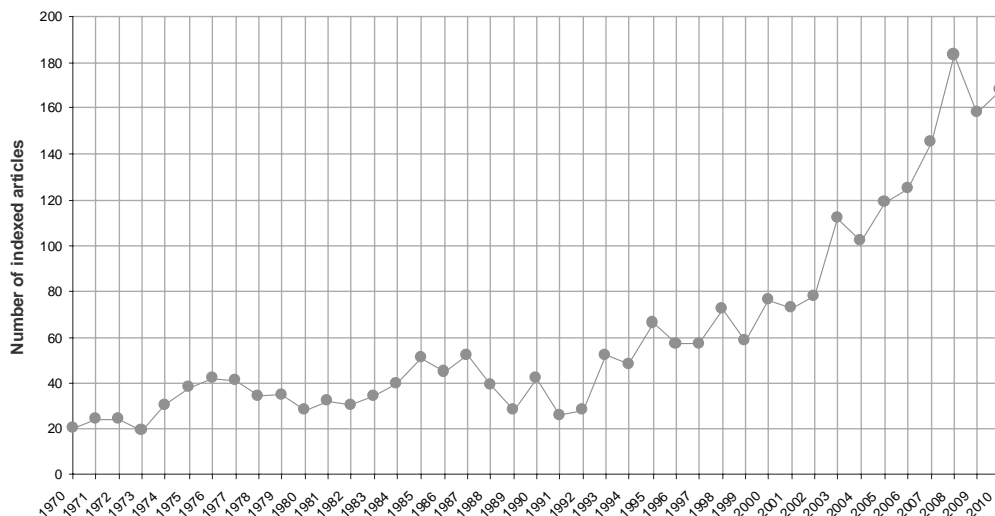


Figure 1 Number of indexed articles in Web of Science per year for articles with at least one of the following terms in the title: permafrost, frozen ground, periglacial, thermokarst, rockglacier, cryopeg, talik, cryolithology, cryoturbation, ice wedge, mud boil, frost heave, frost mound, ground ice, solifluction, geocryology, palsa, retrogressive thaw slump, pingo, oriented lake, segregated ice, sorted circle, cryosol, thaw settlement. Note: This analysis does not capture all articles relating to the subject matter since it is based only on journals indexed in the Web of Science.

strategy document with recommendations for the period 2010–16. These recommendations were discussed and approved by the IPA Council in June 2010 and the necessary revisions to the IPA Constitution and Bylaws were made. Here, we present the major changes and highlight their role in strengthening the organisation.

The most important changes introduced in 2010 relate to the structure of the association. First, the Secretariat of the IPA was strengthened to take on more responsibilities in the management of the association and the title of Secretariat Leader was changed to Executive Director. Second, the association decided to dedicate a larger part of its funds to newly established Action Groups. These groups will be able to request up to 2500 Euros per year, will have limited terms and must focus on the production of clearly defined research outputs. An application process for funding will be announced during spring 2011 through the Permalist mailing list. A consequence of the formation of Action Groups is the transformation of Working Groups into Interest Groups. These groups will retain the same mandate as their predecessor Working Groups, and will be eligible to form Action Groups to fund targeted initiatives. They will have to select a PYRN member as co-chair.

A new category of membership entitled 'individual membership' has been created. This category does not provide voting rights at Council, but entitles the members to several advantages listed on the IPA website. Individual members are encouraged to make a donation to support the organisation, thus providing an additional revenue stream.

The Standing Committee on Data, Information and Communication will now focus on data management only, and will have an oversight role in relation to the GTN-P. A separate Standing Committee on Education and Outreach

will progressively be put in place and will be operational in 2012.

An important outcome of the changes is the upgrading of the national committees. The establishment of individual memberships enables national representatives to easily contact their members, develop mailing lists, and organise and structure their community. Although the larger countries in the IPA could already do this, many of the smaller ones could not.

The production and printing of Frozen Ground constituted around 80 per cent of the expenses of the IPA in some years, and the Council decided to shift these resources to targeted actions and to transform Frozen Ground into a shorter and entirely electronic product (see <http://ipa.arcticportal.org/publications/frozen-ground.html>). Country reports will now be available online in a newly formatted interface, and will be easy to reference in online databases (<http://ipa.arcticportal.org/publications/country-reports.html>). For the first time in many years, the IPA Council voted to increase the annual membership fees for country members. In addition, the regional and international permafrost conference organisers are now required to provide a percentage of registration fees to the parent organisation. Taken together, these important decisions will allow funding of the Action Groups and thus lead to seed financial support for international collaborative permafrost science and engineering projects.

In total, these are big changes for a relatively young organisation but they were viewed as necessary to meet the level of expectations that now appears in the international science community. Thanks to the involvement of past IPA presidents, ECs, Council members, Working Party members and all individuals who devoted their energy to the progress

of permafrost research, permafrost is now widely acknowledged as a highly significant part of Earth system science. The IPA, through its activities and networks, has been instrumental in supporting that prominence, but it needed to modernise its structure to liberate additional support for its well-regarded activities.

We trust that these changes will contribute to strengthen the visibility of the IPA and permafrost science and engineering as a whole. The next milestone for the IPA will be the Tenth International Conference on Permafrost to be held in June 2012 in Salekhard, Russia, by which time most of these changes will have been fully implemented.

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