

ICE



**NEWS BULLETIN
OF THE INTERNATIONAL
GLACIOLOGICAL
SOCIETY**



Ice

News Bulletin of the International Glaciological Society

Number 159

2nd Issue 2012

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Cover picture: Striking and unusual ice formations on a Copenhagen lake. This photo, which he calls 'phoenix', was taken in January 1997 by Morten Hindø. Morten also took the photograph on the cover of *ICE* number 131, which was incorrectly credited to a different photographer.

Scanning electron micrograph of the ice crystal used in headings by kind permission of William P. Wergin, Agricultural Research Service, US Department of Agriculture

EXCLUSION CLAUSE. While care is taken to provide accurate accounts and information in this Newsletter, neither the editor nor the International Glaciological Society undertakes any liability for omissions or errors.

From the Editor

Dear IGS member

At the time of writing this we have 947 members for 2012 and we are still getting renewals and new members signing up. It has indeed been a good year.

At its meeting in Fairbanks, Alaska, the IGS Council decided to make page charges compulsory for the *Journal of Glaciology* starting with the first issue of volume 59 (2013). There are several reasons behind this decision.

- All our peer journals have compulsory page charges.
- Some institutions will not pay page charges if they are not compulsory so, by having 'voluntary' page charges, we are missing out on some revenue that instead goes to publishers who have compulsory page charges.
- The general move in scientific publishing is towards open access. The IGS Council views that as a good thing but it will inevitably mean that regular subscriptions revenue will go down and thus we will have to rethink our 'business model'. It costs money to publish a quality journal and the money has to come from somewhere, i.e. page charges. So we are gearing up for the inevitable.

At the same time, the IGS Council wants to affirm its commitment to continue to provide waivers and discounts for reasons of financial hardship, but we will be stricter than we have been up until now.

After a period of being 'out in the cold' for a few years, the *Annals of Glaciology* has now received its impact factor. This all important magical number has been carefully calculated by the esteemed commercial enterprise Thomson and the outcome is a very respectable 1.800. Good news indeed.

Speaking of *Annals*, I would like to reiterate that the *Annals of Glaciology* is a thematic and time-constrained publication. It is an excellent vehicle for putting together a comprehensible collection of the most 'up to date science' in a particular discipline. But we must all remember that precisely because of that there are time constraints. It is not like the *Journal* where, if a paper is not ready, it will simply go into the next issue. So – deadlines must be adhered to.

To finish off this editorial I would like to quote Louise and say 'The IGS membership reached record levels in 2012. It's now time to break that record!' Your IGS membership for 2013 is now available for renewal at <http://www.igsoc.org/membership/renew.html>.

Magnús Már Magnússon
Secretary General



The Frozen Treasure House

BY LINDA RIEBEL, PhD

This short tribute to the work of the glaciological community was sent to Dr Lonnie Thompson recently. Lonnie thought it was thoughtful and apposite and would apply to all glaciologists, so he sent it to the IGS for inclusion in *ICE*. Thanks are due to Dr Riebel for allowing us to publish her work.

The snowy poles are the earth's museum, preserving layers of archaic water, air and dust in mile-deep sheets of ancient ice. To those of us who love to peer into the past – seeing in our minds' eyes mastodons and saber-tooth cats and *Homo habilis* – the poles hold buried secrets more precious than diamonds.

I am of the tribe of curious – a distant cousin, I admit. The truly, passionately curious go to deserts to dig up ancient bones, to mountaintops to find fossils wedged in ridges that once were ocean floors, and under seas to plumb sunken civilizations. They dig up bones, seek bugs in amber, peer into DNA, count tree rings, unearth footprints that captured an instant in time. They gather their gear, endure grinding hardships, and send home shards and rocks and bones that reveal our origins. Some, enamored of an even more distant past, choose the Arctic as their frozen treasure house. Intrepid ones shiver through six-month nights to slake their thirst for knowledge. They plunge long tubes deep into ice that was fixed and still before our ancestors left Africa.

An ice core is a time machine, a cylinder extracted from glaciers of compacted snow a hundred millennia old. My

curious cousins, with their microscopes and spectrographs, know how to read its signs. Soon they will confer, debate, and publish. I am the amateur consumer of their finds, who reads their articles and gazes reverently at their photographs. From these hints, I conjure up the story of the past, creating in imagination the very first living things, envisioning how they led to lichens and dinosaurs and dawn horses. I love the white expanses of northern ice and buried southern continent that harbor clues about the majesty of creation. My parka'd cousins extract from depths of ice the very crystals of snow that fell and dust that floated when the earth was young – dust stirred up by beasts of many shapes in savannahs far away, and carried there by winds. The ice is the storehouse of earth's childhood, a faithful keeper of its secrets. Now – just as we've invented tools to decode these secrets – the storehouse is melting. Ungratefully, we are turning it to slush.

O, stay frozen, distant glaciers. Fold in your white blanket the hidden diamonds that we've just learned to understand. Make haste, you scientists. Find the secrets in the frozen treasure house.

Or is it too late? Beneath the snowfield, the ice weakens. Icebergs break off and float away; records swirl down eddies, perishing as surely as the library at Alexandria. Silently I plead for time, so that scientists can extract one more ice core, spend one more season in the frozen zones, and summon their skill and intuition to find the story of the earth.



International Glaciological Society

JOURNAL OF GLACIOLOGY

Papers accepted for publication between 1 July and 30 September 2012. The papers are listed in alphabetical order by first author. Some of these papers have already been published.

Parameterization of lateral drag in flowline models of glacier dynamics
Surendra Adhikari, Shawn J. Marshall

Calibration and evaluation of a high resolution surface mass balance model for Paakitsoq, west Greenland
Alison F. Banwell, Ian C. Willis, Neil S. Arnold, Alexandra Messerli, Cameron J. Rye, Marco Tedesco, Andreas P. Ahlstrøm

Chemical analysis of ice vein μ -environments: II. Analysis of glacial samples from Greenland and Antarctica
Robert Barletta, John Priscu, Heidy M. Mader, Warren L. Jones, Christopher H. Roe

Late Holocene changes in character and behaviour of land-terminating glaciers on James Ross Island, Antarctica
Jonathan L. Carrivick, Bethan J. Davies, Neil F. Glasser, Daniel Nývlt, Michael J. Hambrey

Accelerating recession of Patagonian glaciers from the 'Little Ice Age' (c. AD 1870) to 2011
B.J. Davies, N. F. Glasser

Characterizing the glaciological conditions at Halvfaryggen ice dome, Dronning Maud Land, Antarctica
Reinhard Drews, Carlos Martín, Daniel Steinhage, Olaf Eisen

Assessing the accuracy of Greenland Ice Sheet ice ablation measurements by pressure transducer
Robert S. Fausto, Dirk Van As, Andreas P. Ahlstrøm, Michele Citterio

Helicopter electromagnetic data map ice thickness at Mount Adams and Mount Baker, Washington
Carol Finn, Maria Deszcz-Pan, Paul A. Bedrosian

Ice shelf basal channels in a coupled ice-ocean model
Carl Gladish, David Holland, Paul R. Holland, Stephen F Price

Surface elevation and velocity changes on the South Central Greenland Ice Sheet: 1980–2011
Kenneth C. Jezek

Grain size evolution of polar firn: a new empirical grain growth parametrization based on X-ray micro-computer tomography measurements
Stefanie Linow, Maria W. Hörhold, Johannes Freitag

Using surface velocities to calculate ice thickness and bed topography: a case study at Columbia Glacier, Alaska
R.W. McNabb, R. Hock, S. O'Neel, L.A. Rasmussen, Y. Ahn, M. Braun, H.B. Conway, S. Herreid, I.R. Joughin, W.T. Pfeffer, B.E. Smith, M. Truffer

Ice-core net snow accumulation and seasonal snow chemistry at a temperate-glacier site: Mount Waddington, southwest British Columbia, Canada
Peter D. Neff, Eric J. Steig, Douglas H. Clark, Joseph R. McConnell, Erin C. Pettit, Brian Menounos

Outlet glacier response to forcing over hourly to inter-annual time scales, Jakobshavn Isbræ, Greenland
David Podrasky, Martin Truffer, Mark Fahnestock, Jason Amundson, Ryan Cassotto, Ian Joughin

Subaqueous calving margin morphology at Mueller, Hooker and Tasman glaciers in Aoraki/Mount Cook National Park, New Zealand
Clare M. Robertson, Douglas I. Benn, Martin S. Brook, Ian C. Fuller, Kat A. Holt

Glaciological twins: basally controlled subglacial and supraglacial lakes
Olga V. Sergienko

Normal modes of a coupled ice-shelf/sub-ice-shelf cavity system
Olga V. Sergienko

Impacts of increasing Antarctic Ice Shelf melting on the Southern Ocean hydrography
Caixin Wang, Keguang Wang

ANNALS OF GLACIOLOGY 53(60)

The following papers have been selected for publication in Annals of Glaciology 53(60) (thematic issue on Interactions of Ice Sheets and Glaciers with the Ocean), edited by Slawek Tulaczyk

Basal melting at the Ekström Ice Shelf mapped by SAR interferometry using the mass continuity assumption
Niklas Neckel, Reinhard Drews, Wolfgang Rack, Daniel Steinhage

Ice shelf basal melting in a global finite-element sea ice–ice shelf–ocean model
Ralph Timmermann, Qiang Wang, Hartmut Hellmer
Annals 53(60) is now complete

ANNALS OF GLACIOLOGY 53(61)

The following papers have been selected for publication in Annals of Glaciology 53(61) (thematic issue on Physics, Chemistry and Mechanics of Snow), edited by Barbara Turnbull

The stratigraphic complexes of a snow cover
Nikolay A. Kazakov, Yury Gensiorovskiy, S.P. Zhiruev, M.S. Drevilo
Dependence of the content and distribution of metals in snow cover on natural and anthropogenic factors (Southern Sakhalin)
E.N. Kazakova, V.A. Lobkina, N.V. Zarubina, E.V. Elovskiy
Recrystallization of snow pack on sites with various degrees of humidifying
Valentina Lobkina

The influences of temperature and normal load on the shear strength of snow consisting of precipitation particles
Hiroki Matsushita, Masaru Matsuzawa, Osamu Abe
Refinement of MPS method for practical application to snow avalanches
Yoshihiko Saito, Hirotaka Kato, Masaya Otsuki, Ichiro Kimura, Yasuyuki Shimuzu, Evgeny Isenko
More papers for *Annals* 53(61) will be published in the next issue



Books received

Cross LD (2012) *Code Name Habbakuk: a secret ship made of ice*. Heritage, Vancouver, Canada. 137 pages. ISBN: 978-1-927051-47-4 (paperback).

Sturm M (2012) *Finding the Arctic*. University of Alaska Press, Fairbanks, Alaska. 258 pages. ISBN: 978-1-60223-163-4 (paperback); 978-1-60223-164-1 (e-book.).

ANNALS OF GLACIOLOGY 54(62)

The following papers have been selected for publication in Annals of Glaciology 54(62) (thematic issue on Seasonal Snow and Ice), edited by Matti Leppäranta

Modelling snow and ice thickness in the coastal Kara Sea

Bin Cheng, Marko Mäkynen, Markku Similä, Laura Rontu, Timo Vihma

Study of spatial distribution characteristics of sea-ice-hazard risk in Bohai

Wei Gu, Chengyu Liu, Shuai Yuan, Ning Li, Jinlong Chao, Lantao Li, Yingjun Xu

Seasonal and inter-annual variability of elemental carbon in the snowpack of Storglaciären, Northern Sweden

Susanne Ingvander, Gunhild Rosqvist, Jonas Svensson, Helen E. Dahlke

Tracking the motion of recognizable sea ice floes from coastal radar image sequences

Juha Antero Karvonen

Marine radar observations on icebergs distribution in summer Southern Ocean

Peng Lu, Zhijun Li, Liqiong Shi, Wenfeng Huang

On the accuracy of the thin ice thickness retrieval using MODIS thermal imagery over the Arctic first year ice

Marko Mäkynen, Bin Cheng, Markku Similä

Large-scale ice thickness distribution of first-year sea ice in spring and summer north of Svalbard
Angelika H.H. Renner, Stefan Hendricks, Sebastian Gerland, Justin Beckers, Christian Haas, Thomas Krumpen

Ice edge detection from Japanese C-band radar and HF radar coastal station

K. Shirasawa, N. Ebuchi, M. Leppäranta, T. Takatsuka

Snowpack estimations in the starting zone of large-scale snow avalanches in the Makunosawa valley, Myoko, Japan

Yukari Takeuchi, Hiroyuki Hirashima

Long-term variations of the seasonal snow cover in Nordland, Norway: the influence of the North Atlantic Oscillation

Wilfred H. Theakstone

A combined optimal interpolation and nudging scheme for the assimilation of OSISAF sea ice concentration into ROMS

Keguang Wang, Jens Debernard, Ann Kristin Sperrevik, Pål Erik Isachsen, Thomas Lavergne

More papers for *Annals* 54(62) will be published in the next issue

ANNALS OF GLACIOLOGY 54(63)

The following paper has been selected for publication in Annals of Glaciology 54(62) (thematic issue on Glaciers and ice sheets in a warming climate), edited by Gwenn Flowers

The role of cooperative iceberg capsizing in ice shelf disintegration

Justin Burton, L. Mac Cathles, Grant Wilder

Constraining turbulent heat flux parameterisation over a temperate maritime glacier in New Zealand

J.P. Conway, Nicolas J. Cullen

Glacier mass balance of Norway from 1961–2010 calculated by a temperature-index model

Markus Engelhardt, Thomas V. Schuler, Liss M. Andreassen

The ice thickness distribution of Flask Glacier, Antarctic Peninsula, determined by combining radio-echo soundings, surface velocity data, and flow modelling

Daniel Farinotti, Hugh Corr, G. Hilmar Gudmundsson

Towards remote monitoring of sub-seasonal glacier mass balance

Matthias Huss, Leo Sold, Martin Hoelzle, Mazzal Stokvis, Nadine Salzmann, Daniel Farinotti, Michael Zemp

Ice-volume changes, bias-estimation of mass-balance measurements and changes in subglacial lakes derived by LiDAR-mapping of the surface of Icelandic glaciers

Tómas Jóhannesson, Helgi Björnsson, Eyjólfur Magnússon, Sverrir Guðmundsson, Finnur Pálsson, Oddur Sigurðsson, Thorsteinn Thorsteinsson, Etienne Berthier

Modelling the coupling of flood discharge with glacier flow during jökulhlaups

Jonathan Kingslake, Felix Ng

The flexural dynamics of melting ice shelves

Douglas R. Macayeal, Olga V. Sergienko

Surface velocity and ice discharge of the ice cap on King George Island, Antarctica

Batuhan Osmanoglu, Matthias Braun, Regine Hock, Francisco Navarro

Relative contribution of solar radiation and temperature in enhanced temperature-index melt models from a case study at Saint-Sorlin glacier, France

Christian Vincent, Delphine Six

More papers for *Annals* 54(63) will be published in the next issue



Annual General Meeting 2012

Thursday 28 June

Wood Center, University of Alaska Fairbanks, Fairbanks, Alaska, USA

The President, Douglas R. MacAyeal, was in the Chair.

98 persons from 20 countries attended, of whom 93 were members.

1. *The previous AGM's minutes*

The Minutes of the last Annual General Meeting, published in *ICE* 2011, No 156, p. 23–27, were approved on a motion by Olga Sergienko, seconded by Robert Bindshadler and signed by the President.

2. *The President's report*

The President gave the following report for 2011–2012:

Dear Members, Ladies and Gentlemen

It is my pleasure to report to you on the status of the International Glaciological Society during its 76th year of existence and the end of my first year in my 3-year term as the Society's President. This report shall consist of a brief outline of what the IGS is all about (particularly, to inform our many new members who may have not yet had a chance to inspect the IGS website where these things are recorded), what it does, how it functions and what challenges it faces in the year to come.

The IGS is a learned society that has five objectives (which I paraphrase):

1. To stimulate interest and learning in glaciological science; to facilitate communication about glaciological science; to be a source of glaciological knowledge for the rest of the world.
2. To publish the *Journal of Glaciology*, *Annals of Glaciology*, and *ICE*.
3. To organize, sponsor and co-sponsor symposia, lectures, field-trips, and summer schools where snow and ice science are at play.
4. To provide services to its members in the form of subscriptions, publication and editorial services, registration services, and to run internet media such as the IGS website and other outlets of information.
5. Finally, to make awards that recognize scientists who contribute to glaciological knowledge.

The IGS is organized as a registered charity under the laws of the United Kingdom. It has its home office in Cambridge.

Highlights of the past year:

As of June, 2012, the IGS has about 920 members located throughout the world. About one-third of the IGS members are students and/or early career scientists. It is also notable to say that approximately one-third of all members (both regular and students alike) have opted for 'online-only' (or paper-free) subscriptions to the IGS journals during 2012, the first year that this has been possible. Membership this year is up from about 750 in 2010 and 800 in 2011.

The 2012 membership year is notable in that it is the first year that 'online-only' access to the IGS publications is available as a membership option. So far, about a third of all members have opted for paper-free subscriptions, and many of the institutional subscribers have opted for online-only as well.

Currently in the 2012 institutional subscription year, the IGS has about 260 institutional subscribers to the *Journal*, and about 160 institutional subscribers to the *Annals*. A worrisome trend is that the current subscription number of 260 is down from 312 in 2010. This trend is in spite of the fact that our institutional subscription rates are considered relatively reasonable (e.g., £332 for the *Journal* in 2012).

In 2011, the *Journal of Glaciology* published 1793 pages spread over 6 issues, and *Annals of Glaciology* published 785 pages spread over 4 issues. This production rate reflects a continuing trend of increasing paper submissions. The number of pages the *Journal* published in 2010 was just about half of what was published in 2012. As of the present, it looks like 2012 will continue to outpace previous years for both pages published and papers submitted. Other metrics attesting to the progress of our *Journal* and *Annals* include: the number of color pages per issue has doubled (from about 30 to about 60) over the past 2 years, the number of papers involving complex mathematical typesetting has increased, and the IGS now assigns doi numbers and has modified its referencing format to be more consistent with industry standards.

It is of particular importance to point out that the 'old stereotype' of the IGS editing and production process being 'slow' (for review, post-review production and copy editing, etc.) have been strictly and completely obsolete for

years, and the IGS journals represent a truly first-class means to achieve rapid, high-quality dissemination of scientific research. In 2011, the average time between a manuscript's acceptance and appearance as a published paper on the IGS website was reduced to less than 50 days.

Additional aspects of note are the fact that the *Annals* is now an ISI publication with an impact factor of 1.8. The *Annals* continues to increase its stature as it is now being considered more commonly by other cryospheric organizations as a possible outlet for publication.

The flagship *Journal of Glaciology* continues to be regarded as an eminent if not superior product for the dissemination of glaciological knowledge (its impact factor is listed as 2.3 for 2012). This is due to the cooperation of three entities: the editorial board led so ably and so generously by Jo Jacka, the CE of the IGS, the referees at large, who continue to serve the science through their unheralded but essential contribution, and the authors, who continue to be both sophisticated and flexible in their response to the scientific peer-review system that the IGS operates.

It is important to note that over the last several years, the IGS has changed its official 'point of publication' from the printing of the paper volume to the posting of the official IGS PDF on the IGS website. This represents a huge modernization of the IGS publications. Every paper that is published by the IGS spends a short period of time (lasting 8 weeks typically) in 'open access' before it is sequestered behind the IGS membership login. The IGS has a very liberal (but distinctly IGS-favorable) 'institutional archiving' policy that allows appropriate posting of IGS publications on the internet when this is required by institutions and government funding sources.

Since the last AGM held in La Jolla, in June 2011, the IGS has been the main sponsor of two symposia (Lahti and Fairbanks, in spring of 2012) and has co-sponsored numerous other symposia, including the various branch meetings. The IGS has also provided financial assistance in support of the Alaskan Glaciological Summer School and has assisted the ISMAS workshop to be held next month in Portland, Oregon. Next year, the IGS will hold two symposia, one in Beijing and one in Lawrence, Kansas. There will be IGS branch meetings in Scotland, Sweden, the USA and New Zealand in the coming year.

The IGS has a home office with a staff of one permanent employee (our revered and much admired Secretary General, Magnús Magnússon) and five part-time employees whose duties range from typesetting and other production tasks for the *Journal* and *Annals*, to membership, to accounts and billing. In addition to the part-time staff in the IGS office, there are external contractors (usually

students at the University of Cambridge) who do copy editing and other tasks on a piece-by-piece basis. Having visited the IGS home office twice in the past year, I can say that the Secretary General (SG) runs a happy ship that continues to be both innovative and efficient in performing its work at a high level of quality.

In terms of finances, the IGS, under the watchful eye of our Treasurer, Ian Willis, who will report separately in a moment, and as a result of the proactive efforts of our SG and the new Membership and Accounts Manager, Ms Louise Buckingham, has become nearly balanced after a long period of deficits. I shall defer to the Treasurer for further information on the IGS's financial status.

Now that I have summarized the status of the IGS, I turn to expressing my thoughts on what I think our coming challenges will be. As I do so, I make note of the fact that the IGS has done a remarkable job in rising to past challenges (including raising the status of the *Annals* to an ISI-listed journal, renovating the accounts and invoicing systems within the home office, renovating membership and registration procedures, increasing membership, and organizing new and interesting symposia). This success is due entirely to the foresight of the previous presidents, including the immediate past president, Eric Brun, and his predecessor, Atsumu Ohmura, and to the hard work of our SG, Magnús Magnússon, and his colleagues in the home office.

What are the challenges that lie ahead?

In my view, the IGS would benefit from adopting a 'mandatory' policy for page charges. Following a lengthy discussion of this view among Council members (beginning before the previous Council meeting in Grenoble, 2011, and continuing at the Council meeting at Lahti, 2012) and the publication committee of the IGS, the Council meeting in Fairbanks, held a few days ago, decided to make page charges for the *Journal of Glaciology* 'mandatory'. The page charging system for the *Annals* is unchanged (recall: 4 free pages to authors registered for symposia, and mandatory charges on all other pages, etc.). The Council also reaffirmed its commitment to the publication of papers where authors and their institutions are unable to honour page charges for financial, social and other reasons. While nobody likes to pay page charges, they are necessary to support the high-quality peer-reviewed publication process that the IGS fosters. Our hope is that institutions and authors who have previously felt that 'non-compulsory' page charges could not be honoured because of budget shortfalls elsewhere in their support will now view page-charge payment as an obligation that is equal to the other obligations in their research budgets.

The IGS depends on the loyalty of new young members. Over the past year, as I have visited various IGS branch meetings and spoken informally with students and early-career scientists, I have become more aware of how important it is to continue to encourage new, youthful membership. Accordingly, based on my recommendation, the Council has approved (here in the Fairbanks meeting) the creation of a new online student membership category at a significantly reduced fee during the 2013 membership renewal season. In addition, early-career scientists under 30 who are not students may be members at the rate presently published (as printed in ICE and on the website).

The loss of institutional subscribers continues to be a concern. And this loss could become a landslide if and when the publishing industry converts to an 'open access' policy. The Council is thinking about ways to encourage continued institutional subscriptions, for the purposes of both maintaining an income stream as well as continuing with the objective of maintaining high access to our journals worldwide. One idea that is being considered is to adopt a two-tiered system of subscription rates to allow smaller institutions, such as associated campus labs and field stations, to access IGS materials at a substantially lower cost than large institutions such as the major research universities around the world. During the Council meeting in Fairbanks, the SG was asked to explore and institute a two-tiered institutional subscription rate in time for the 2013 subscription season.

At this point I shall close my report and shall ask the Secretary General and Membership and Accounts Manager, Louise Buckingham, to assist me in answering your questions.

Respectfully submitted

Douglas R. MacAyeal, President

The Secretary General invited members to discuss the President's report.

R. Jacobel asked whether a library that stopped its subscription would retain its online access. The President responded that libraries and institutes retain access to whatever specific issues they have previously paid for (subscribed to) ad infinitum.

R. Braithwaite indicated that he reluctantly supported compulsory page charges. The President thanked him for his understanding, and indicated that his support was indeed very important to the IGS.

U. Herzfeld expressed her general objection to page charges and that she felt that page charges would discourage paper submission. She felt that acceptance of papers should be based on scientific

merit. The President responded that publication of all papers in IGS publications is indeed based on scientific merit and that the scientific editing of manuscripts is, and will continue to be, 'blind' to the ability of the authors (or their institutions) to honour page charges. He further indicated that the IGS strongly adheres to the publication of papers by authors who (for whatever reason) cannot cover page charges.

M. Truffer asked what the procedure for the page charge waiver, partial or otherwise, was. The President responded that it had not been finalized but at present it was left up to the SG's discretion. Discounts and waivers granted to authors in such cases will be financially supported by the aggregate of IGS income, which includes the payment of page charges by authors and institutions that can afford to do so. Applications for discount or waiver will, for the time being, be under the control of the SG and the IGS accounts manager and financial officers, not the Scientific Editors, as the scientific editing process is independent of all financial considerations. Ultimately, the waiver or discount of page-charges would be determined on need and the financial conditions of the IGS at the time.

T.H. Jacka proposed, and Regine Hock seconded, that the President's report be accepted. This was carried unanimously.

2. The Treasurer's report

The IGS Treasurer, Dr I.C. Willis, presented the following report with the audited Financial Statements for the year ended 31 December 2011.

Like last year, we opted to have our accountants undertake an Independent Examiner's Report rather than a full Audit this year.

The Society's finances are best summarized by considering the changes from 1 January 2011 to 31 December 2011, as shown on page 10 of the accounts. In the table, the Restricted Fund is money earmarked specifically for costs associated with the Seligman Crystal and the Richardson Medal. The Unrestricted Funds is everything else.

Restricted Funds: increased by £156 from £8,206 to £8,362 as a result of accrued interest. No Seligman Crystals nor Richardson Medals were awarded this year (2011); however, it is noted that a Seligman Crystal has been awarded in 2012).

Unrestricted Funds: decreased by £19,355 from £373,964 to £354,609 showing that the income to IGS largely from membership, sales of the *Journal* and *Annals*, page charges and symposia attendance fell short of expenditure associated with *Journal* and *Annals* printing and publication, and associated office support, and office support for activities related to running symposia.

Total: The Society had net resources expended before revaluation of £18,434 resulting in the negative movement in the Society's funds of £19,199 in 2011, compared to the bigger loss of £70,573 in 2010, an even bigger loss of £122,499 in 2009 a smaller loss of £4,837 in 2008, and a net profit of £11,327 in 2007.

This continued reduction in the net loss of the Society since 2009 is encouraging but we still have a little way to go before we break even or turn in a small profit. We are heading in the right direction and if we continue along the recent trend we should produce a small surplus again in 2012. **This must be our major aim.**

In more detail, income is itemized in notes 2–6, and expenditure is listed in notes 3 and 7–10 on pages 14–18. The accounts are presented under the same headings that were introduced for 2009 of 'Journal, ICE & Books', 'Annals', and 'Meetings/Symposia' to reflect the three main activities of the Society.

Income:

Note 2. Voluntary income was £1,522 in 2011 compared to £6,308 the year before. This reflects fewer royalties associated with lower sales of individual articles through Ingenta and licensing fees (for copying individual articles) collected by the Publishers Licensing Society Ltd (PLS).

Note 3. Trading activities associated with the sale of IGS merchandise turned in a tiny profit of just £33 compared to a small profit of £915 the year before. This largely reflects the cost of manufacturing hats and ties this year; merchandise that has not yet been sold.

Note 4. Due to the transfer of IGS reserves into medium-term investment accounts in July 2011 (£200,000 into a 2-year account and £100,000 into a 1-year account) investment income is higher in 2011 (£7,842) than in 2010 (£4,800) and 2009 (£4,973). But interest rates are still very much lower than in 2008 when income from this source was £29,986.

Note 5. Income from membership subscriptions and sales of the *Journal*, *ICE & Books* to libraries and individuals is up by £17,420 from £242,880 in 2010 to £260,300 in 2011. Similarly, income from sales of *Annals* is also up by £70,286 from £69,632 in 2010 to £139,918 in 2011. Conversely, income from conferences and symposia is down by £83,362 from £133,393 in 2010 to £50,031 in 2011. These three points are considered separately below.

Membership subscriptions (see page 10) are up by £1,979 from £54,745 to £56,723. This continues the trend from last year. Membership numbers have continued to go up and payments have increasingly been received before the new subscription year or early in the year as a result

of much better management of the membership database and sending out of renewal notices. See Membership and Accounts Manager report for more details.

Journal sales to libraries and other organizations (see page 16) were up slightly by £2,056 from £86,658 (2010) to £88,714 (2011), a rise of 2.4%. (A virtually identical rise occurred 2009–2010.) In 2010–2011, the annual subscription rate rose by 3.5% (£313 to £324). Together, this shows that the number of libraries subscribing to the *Journal* fell between 2010 and 2011. The Membership and Accounts Manager's report shows that *Journal* subscriptions to libraries were down by 12. This continues the trend from 2009–2010 and 2010–2011 and should continue to be a concern to the Society.

Journal page charge income increased by £14,553 from £99,425 (2010) to £113,978 (2011), an increase of 14.5%. This compares to an increase of £10,984 (2009–10), an increase of £11,697 (2008–9) and an increase of £21,695 (2007–8). Page charges to authors remained the same from 2008 to 2011. The increased income of 14.5% compared to an increase in pages published of just 1% shows that more authors were able to honour page charges in 2011 compared to 2010. This is a good sign and continues the trend from 2009–2010. This should continue to be monitored.

Total income from *Annals* is up by £70,108 from £69,632 (2010) to £139,740 (2011), up by about 100%. (NB. This does not include income for the *Annals* from delegates at conferences who essentially receive their copy 'free', i.e. this is accounted for under the income to meetings/symposia heading). This item is dominated therefore by income from library subscriptions and page charges. These both increased in 2011 compared to 2010 since the number of volumes increased from two to five (NB. 51(56) from 2010 was actually delayed into 2011), and the number of pages increased from 513 to 961. There was also a generous £22,894 contribution towards the publication of *Annals* 53(61) from the Sakhalin Centre for Regional Marketing.

The reduction in income from meetings/symposia from 2010 to 2011 is primarily because we had three symposia in 2010 and only one in 2011.

Expenditure:

Note 7. The Society did not receive requests for support for meetings/symposia in 2011. This compares with two such requests in 2010 and the donations amounting to £3,212 associated with the sponsorship of the activities of UKPN and the Alaska Glaciology Summer School.

Note 8. The direct costs associated with editing, printing, publishing and distributing the

Journal and *Annals* and material for Meetings/Symposia increased by £5,086 from £130,411 to £135,497. This compares to an increase of £8,676 (2009–10) an increase of £16,568 (2008–09) and a decrease of £9,513 (2007–08). Wages and salaries associated with these activities increased slightly, largely due to the extra time needed to work on the extra *Annals* volumes in 2011 cf. 2010. Editorial fees and expenses decreased, as did proof reading and editorial costs. This is despite the fact that the Society published more *Journal* and *Annals* pages in 2011 cf. 2010. This is a good sign, providing the quality of our publications has not suffered.

Note 9. The support costs associated with *Journal*, *Annals* and meetings/symposia activity have decreased by £61,664 from £354,185 to £292,521. This reverses the trend of year-on-year increases since 2008 (+£81,754 in 2009–10; +£39,475 in 2008–9 and +£77,793 in 2007–8). The decrease this year partly reflects the reduced costs associated with running one symposium rather than the two or three of recent years. But encouragingly, it also reflects a reduction under the 'wages and salaries' heading associated with recent streamlining of work practices in the IGS office and the creation of the position of Membership and Accounts Manager. It also reflects a massively reduced cost under the 'pensions' heading. The 2011 £9,021 figure represents the realistic annual cost of the pension scheme introduced the previous year. The inflated figure of £30,109 for 2010 reflects not only the contributions for 2010, but also the backlog contributions that Council agreed to pay to employees for the previous 2 years.

However, there are some big increases in costs in other areas and effort needs to be made to reduce these costs in the future. These include:

1. *Telephone, stationery and postage.* This increased by £6,157 (16%), largely as a result of increased mailing costs of our printers, Page Bros. This item might be expected to drop in future as more members opt to receive their copies of the *Journal* on line.

2. *Computer costs.* These have increased by £9,630 (48%) largely due to the overdue upgrade of hardware and software and to the revamping of the website (including the setting up of the 'Members Only' section).

3. *Travel and subsistence costs.* This increased again this year by £3,808 (20%). Previous years' increases were: £3,467 (23%) 2009–10; and £4,299 (40%) 2008–9. So the rate of increase of this item is coming down, but it is still increasing at well above background inflation nevertheless. This item was £10,843 in 2008 and was £22,417 in 2011, representing a doubling in 4 years. The costs are largely associated with our Secretary General

(and occasionally other members of the office or editorial staff) representing the Society at meetings and symposia. So the increases reflect the greater number of meetings attended (symposia attendance was less in 2011 than in 2010), as well as, I suspect, the increased costs of air travel. It is important for our Secretary General to represent the Society at meetings, of course, but continued care must be taken to ensure this item of expenditure does not increase out of proportion with other support costs, which it has been doing of late.

The provision of doubtful debts represents a negative cost (credit) to the Society since continued substantial effort with a lot of success has been expended on chasing up aged debts. All debtors are now less than a few months old, rather than up to several years old as was the case a few years ago. As note 18 on page 21 shows, net debtors (i.e. after the provision has been removed) amounted to £22,888 in 2011. This continues the downward trend of £32,423 in 2010, £49,859 in 2009 and £110,481 in 2008. This continued reduction in the net debt and the provision for the debt is therefore a very good thing for the Society. The new online management/payment system together with restructuring of personnel within the IGS office has reduced net debtors within the year to sensible numbers. It is hoped that this can be reduced still further by continued prompt invoicing (and hopefully payments received).

Note 10. Governance costs associated with running the Society as a charity increased slightly in 2011 compared to previous years, as a result of one-off-costs associated with professional advice and staff time taken up with dealing with the backlog of VAT payments that were due on page charges from UK tax payers over recent years (see also item under note 8 'Additional VAT on page charges'). These payments are now factored in to the new page charging scheme and will not represent a net expenditure to the Society in future.

Summary

The Society's finances are in much better shape than they have been for some years. We ran a moderate deficit in 2011 (5% of funds) which compares with a bigger deficit in 2010 (~18% of funds) a much bigger deficit in 2009 (~27% of funds), a small deficit in 2008 (<1% of funds), a small profit in 2007 (~2% of total funds) and a bigger profit in 2006 (~5.5% of total funds). The net result over the past six years is we have been running at a loss. Our assets are still £362,971 and so there is no need for major alarm, but clearly our recent position is unsustainable in the long term. The Society is now setting a budget on all key items of income and expenditure and is more closely monitoring each item on a weekly to monthly basis. If this improved budgeting

continues to next year, and if the trends in income vs expenditure continue, it is anticipated that the Society will turn in a small profit next year. **This should certainly be its major goal.**

The following paragraph is taken verbatim from my report last year. I repeat it here since it is still relevant, and contain thoughts that need to be explicitly addressed by council over the next year and beyond.

‘On the income side, the Society has increased its paying membership recently and it is hoped that more people will be encouraged to join in the future. More innovative ways of attracting younger members and members from emerging industrialized nations, especially India and China, should be investigated. The Society must also try to ensure that library subscriptions to the *Journal* and *Annals* do not continue to slip and, again, investigate possible different ways of obtaining more income from sales/online access to libraries/institutions. The Society has recently moved some of its bank assets to a higher interest account, but until interest rates increase generally, the Society will continue to suffer from lack of revenue from this source. Perhaps the Society should investigate the possibility of obtaining grants from private industry sponsors to support some of its activities. Sale of merchandise online could also be investigated.’

On the expenditure side, the Society’s expenses now look to have stabilized and to have been brought under control. A few big items of expenditure in recent years (purchase of the MRM management system and its integration with the SAGE accounting system; wages and salaries of extra employees brought in to oversee the transfer of database details from the old to the new management system; pension backlog; redundancy payment) are now behind us.

Ian C. Willis, Treasurer
18 May 2012

The SG invited members to discuss the Treasurer’s report.

R. Bindschadler asked whether the Society was on course in its budget and what was the predicted outcome for the present year. The Treasurer and SG responded that at present the Society was on target for the 2012 budget. The budget for 2013 will not be finalized until the end of the summer.

H. Jiskoot asked whether the Society had in the past received legacies of any sort and whether that was something that should be looked into in the future. The SG responded that in the past the Society had indeed received legacies, most notably from the estate of G. Seligman. The issue had been raised before by former IGS President,

R. Bindschadler, but had not been further looked into. Perhaps it was time to do so now.

E. King proposed, and U. Herzfeld seconded, that the Treasurer’s report be accepted. This was carried unanimously.

4. *Election of auditors for 2012 accounts*

On a motion from the Secretary General, R. Bindschadler proposed, and H. Jiskoot seconded, that Messrs Peters Elworthy and Moore of Cambridge be elected ‘Independent Inspectors or Auditors’, whichever is appropriate for the 2012 accounts. This was carried unanimously.

5. *Elections to Council*

After circulation to members of the Society of the Council’s suggested list of nominees for 2011–2014, no further nominations were received, and the following members were therefore elected unanimously.

Vice-president: Regine Hock

Treasurer: Ian C. Willis

Elective Members: Stephen Déry
Ashwagosha Ganju
Julienne Stroeve
Jemma Wadham

These appointments were unanimously approved by the AGM.

The President thanked the outgoing Council members and welcomed the newly elected members.

The President recognized the attendance of past presidents Garry C.K. Clarke and Robert Bindschadler.

6. *Other business*

R. Bindschadler said that following his keynote talk this past Monday he had received several supportive comments regarding his statement that the Society should occupy a more ‘public stance’ for the various discussions relating the changing climate. He would thus like to put forward the following motion:

‘That the Council form a committee to organize and make available to IGS members materials (such as statements, figures, illustrations and photographs) that effectively communicate the current state of the cryosphere, observations of change within the cryosphere, the role of the cryosphere in climate change and the impact of these changes on global society.’

As for a name, he suggested it might be called the Communication Committee or the Outreach Materials Committee, or something else to the Council’s liking.

T.H. Jacka expressed his concern that the Society would be seen not being neutral and stressed that all ventures by the Society into the

public domain should be purely on scientific grounds. The proposer was asked how this would be implemented and he responded that he foresaw that the Society would be a proactive proponent of good science and would provide material on which members could draw. In a sense the Society would be a 'sort of clearing house'.

E. King agreed with the proposer and said it would be good for members to have a consistent story to tell.

M. Truffer suggested that all IGS material thus made available would automatically be assigned a copyright permission to make things smoother.

R. Braithwaite pointed out that there are other organizations that provide a similar service. The President responded that as a Learned Society the IGS would be well-placed and a beneficial addition to that pool.

W.T. Pfeffer proclaimed his support; however he was concerned that it would be difficult to do. The Society should remain professional at all times and should stick to its ideals.

T. Jóhannesson said the Society should provide data and not presume it would be providing the last word. The service should direct members towards relevant papers and figures.

The motion was seconded by T. H. Jacka and approved by a show of hands.

U. Herzfeld then asked that the Council members who were at the meeting be introduced to the rest of the meeting. The Secretary General then explained why some members have been co-opted onto the Council.

The AGM was adjourned on a motion from G.K. Clarke, seconded by M. Truffer, at 12:32.

❄️ 2011 Seligman Crystal Award

The Society's Council agreed unanimously in 2011 that a Seligman Crystal should be awarded to Almut Iken. The Crystal was presented at the International Symposium on Glaciers and Ice Sheets in a Warming Climate, held in Fairbanks, Alaska, in June 2012, after the following introduction by the President, Doug MacAyeal:

It is my distinct pleasure to call to order this special Awards Presentation and Ceremony to honor one of our most respected and beloved glaciological scientists: Dr Almut Iken.

For those of you who are new to glaciology and the IGS, the Seligman Crystal is the highest honour bestowed on individual scientists by the IGS. It is given to scientists who are recognized by the IGS for contributions of the greatest scientific significance, both through advancement of specific bodies of knowledge and through a lifetime of contribution to glaciology in ways that influence the direction of research.

Let me emphasize this: according to the IGS Charter for the award, 'The Seligman Crystal shall



Almut Iken with Doug MacAyeal and Magnús Magnússon, President and Secretary General respectively of the IGS, in Denali National Park during the pre-symposium tour.



Almut Iken, the 32nd Seligman Crystal laureate of the IGS, holds the manual of the finite-element simulation package she used in the 1970s to simulate the response of glacier ice to bed topography and subglacial water. On the table is the Crystal itself, a vase of mountain flowers (from Will Harrison's garden), several rolls of adhesive tape (critical to all glaciological field work, and expertly used by the laureate herself) and Swiss chocolate, the energy behind the incredible work Almut has done over the years.

be awarded from time to time to one who has made an outstanding scientific contribution to glaciology so that the subject is now enriched'.

In late 1962, the concept of an award for excellence in the discipline of glaciology took shape at a Council meeting in Obergurgl, Austria: not a gold medal but a hexagonal crystal of high-quality glass named the Seligman Crystal, after the Society's founder: Gerald Seligman, who became the first recipient in 1963. Since that time, there have been 31 Crystals awarded. This afternoon, we shall award the 32nd to Dr Almut Iken, who has enriched the subject of glaciology through her life-long dedication to its study.

I shall now turn the floor over to the citationist for the 32nd Award of the Seligman Crystal, Martin Truffer, who will be assisted by Martin Lüthi.

A delightful personal perspective on the life and work of Dr Iken was then given by Professor Martin Truffer, a University of Alaska at Fairbanks local who had been a student and colleague of Dr Iken for many years. Professor Truffer's speech was as follows:



Martin Lüthi assisted Martin Truffer in providing the citation honouring Almut Iken. To remind her of the basic necessities of field work, Martin provided a key ingredient: Swiss chocolate.

It gives me great pleasure to be able to witness and contribute to tonight's ceremony to award glaciology's highest honour, the Seligman Crystal, to Almut Iken. The president and the chairman of the IGS have asked Martin Lüthi and myself to contribute some words and slides to this event. Given that Almut is unlikely to dwell on the impact of her glaciological achievements, we thought it appropriate to spend some time on that topic and give you a quick overview. Also, Almut has not published in the scientific literature in the past 10 years, so some of the younger members in this audience might not be as familiar with her work as they perhaps should be.

One could, of course, just dwell on statistics. Almut's total number of publications is not necessarily impressive by today's standards. There may well be glaciologists active today who



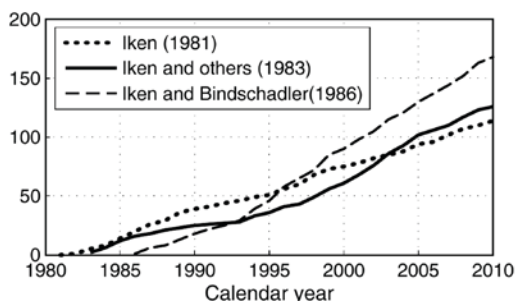
Almut Iken with Garry Clarke, the 27th recipient of the Seligman Crystal, immediately following the award ceremony at the symposium in Fairbanks, Alaska.

publish as much in a year as she did during her entire career. What stands out about her work is the lasting impact it has had. One could take the reference list of the newest edition of Cuffey and Paterson, extract all the Iken references and have an almost complete publication list! Also, almost every one of her publications continues to be cited and has citations within the last year.

One of the topics that Almut is best known for is the influence of subglacial water on ice motion. She investigated this topic for her dissertation in the late 1960s on Axel Heiberg's White Glacier. I think she will say more about those expeditions in her own address. By tracking water levels in moulins and relating those to glacier motion, she established a clear correlation. What makes Almut's work a legacy is the way she followed up on this result, both in terms of observational methods and with modeling.

In a seminal 1983 paper on Unteraargletscher these observations were carefully interpreted to show that the maximum horizontal motion occurred at the time of maximum rates of surface uplift. This paper still stands as one of the most carefully executed observational studies in glaciology.

It soon became clear that measuring water levels in moulins was not sufficient, because it provided very biased access to the glacier bed. Almut therefore embarked on a program to develop a lightweight hot water drill to access the glacier bed. This involved solving numerous engineering challenges. The result was a drill that was used on several glaciers in the Alps, and eventually penetrated to 1500 m on Jakobshavn Isbrae in Greenland. This was a truly pioneering achievement. Access to the glacier bed allowed a careful assessment of subglacial water pressures. Together with very detailed theodolite measurements, she established a clear link of water pressure, separation of ice from the bed, and increase in horizontal velocities that was published in another classic paper. These papers form the basis for all sliding laws still in use today.



Cumulative citations by year of several of Iken's most important publications

It was not sufficient to just drill holes to the glacier bed, though. Almut paid great attention to continuously monitoring these holes to assess how well connected they were to the subglacial drainage system, and how water flowing into the hole affected the measurements. She was one of the pioneers of engineering-type borehole tests in glaciology. These proved useful for assessing the state of the subglacial drainage system.

A solid observational record of water pressure and glacier motion begged for some theoretical developments to better understand this connection and the exact timing of speed-up events. Almut chose cutting-edge computational tools to address this problem. In the age of mainframe computers and punch cards, she applied a finite element code developed for rock mechanics to the problem of ice flow. The growth of cavities was modeled in an iterative procedure, where she adapted the shape of the cavity from the velocity field solutions until they reached steady state. To accomplish this in the late 1970s required a tenacity that is difficult to comprehend now. To my knowledge this kind of modelling was not repeated until very recently.

It might come as a surprise to many that Almut's first scientific accomplishment at VAW/ETH was the application of a finite element model to the problem of a breaking ice lamella into a proglacial lake. ETH Zurich had a long tradition of doing basic as well as applied research, and the frequent occurrence of glacially induced disasters led to a great interest in understanding the calving process. In a 1977 paper, she established a functional relationship of ice velocity versus time that is still used to predict the catastrophic failure of hanging glaciers. Again, this was 35 years ago!



Preparing a borehole experiment on Findelengletscher in 1982.

The tool of hot water drilling also opened avenues for other studies, such as the details of vertical and shear deformation in boreholes, or the study of vertical deformation through sampling of cross-hole electric conductivity. A collaborative study with the University of Alaska led to a series of papers that laid the foundation for a better understanding of the mechanism of rapid motion of large outlet glaciers, such as Jakobshavn Isbrae. These papers have gained great importance for correctly interpreting recent changes at that glacier. It is very satisfying that these studies of ice deformation, as well as those of water-induced acceleration, have come to full fruition now, as we are learning that the ice sheets are much more responsive to dynamical changes than previously thought.

Finally, I would just like to point out how appropriate it is that Almut is the first woman to receive glaciology's highest honour. Looking round this room, it might not appear as exceptional to be a female glaciologist as it once was. When Almut started working in this field, most national programmes did not yet allow women on Antarctic field programmes. I think it only enhances her scientific achievements, recognizing that they were often accomplished against the odds and prevailing prejudice.

The one thing that stands out throughout Almut's career is her very careful and methodical approach. This was absolutely necessary to achieve reliable velocity records with a theodolite, or when running iterations on mainframe computers with punch cards. The last scientific talk I heard from her was at the IGS meeting in Yakutat in 2003. I sat next to Chris Larsen. After she concluded, he told me: 'This is the scientific method at work'. Her great insights were all made



Almut in the field, Jakobshavn, 1995.

possible by an incredible attention to detail in observation, as well as analysis, all fuelled by incredible amounts of Swiss chocolate.

In addition to her great theoretical achievements, Almut was primarily an observationalist, fascinated by nature, and happiest in a tent on a glacier. She extracted great scientific results with often very basic tools. Martin Lüthi will now present her with a few of these essential ingredients.

Another student and colleague, Dr Martin Lüthi, then presented Dr Iken with various items and mementos of her work as a glaciologist, including 'mountain flowers' from Will Harrison's garden in Fairbanks, Swiss chocolate, Puma tape and a manual for the finite-element modeling package she had used in the 1970s. This was followed by the presentation ceremony itself, after which Dr Iken gave the following address.

Seligman Crystal acceptance speech: **MY PATH TO GLACIOLOGY**

I spent my early years in Bremen and Leipzig. Both towns are situated on flat country with no mountains or glaciers. A chain of events was required to lead my attention eventually to glaciers. The first link in the chain was my interest in physics, which started in high school.

At the end of the war, when the Russian Red Army planned to replace the American troops in Leipzig, my parents decided to move to Bremen. We went in an overcrowded train, where we fixed our bicycles on the outside of railway cars with wire. In Bremen I entered high school (at that time a school for girls only). At first my interest in school was low: I preferred bird-watching and observing stars. It came to the point that my parents and teachers thought I should leave school (in which case I wanted to work with horses). Fortunately school changed for the better just then: arduous



On Gornergletscher, 1979.



An early field trip to Greenland.

calculations like 'divide a 12-digit number by a 4-digit number' were replaced by algebra (letters replacing numbers) and constructions of triangles, which was really fun. And best of all, a new subject started: physics. I got enthusiastic about it.

After completing school and working for half a year in factories, I started to study physics, mathematics and chemistry at the University of Heidelberg with a grant from 'Villigst', a Protestant student support organization. My plan was to follow the example of my former teachers and become a teacher too.

At the University of Heidelberg (where a main field of research was atomic spectroscopy), the director of the physics institute was Professor Hans Kopfermann, much respected by students and colleagues. In my first term we were but seven physics students, which meant an informal atmosphere – we were like members of a family. The institute for theoretical physics was in a former villa in a beautiful garden. We could work in the library any time and also borrow books without much fuss. No books disappeared (in contrast to the theological library: the story was that books did disappear there).

In the physics laboratory some older students warned us about Professor Kopfermann: he might ask difficult questions. One day Professor Kopfermann appeared in the laboratory and walked directly to the table where a colleague and I were carrying out an experiment on friction in turbulent flow. I do not remember any severe questions, but an amusing illustration of friction in turbulent flow; he said as follows:

'Consider two trains, one going north, the other south. Passengers start to jump from the north-bound train through the open windows into the south-bound train, and likewise passengers from the south-bound train jump into the north-bound one. What will happen?'

Both trains slow down and this is the same as friction in turbulent flow.

From Heidelberg it is not far to the Black Forest, and in my first term I hitchhiked there with a friend. Soon we arrived at the Feldberg and walked up to the top. It was on a clear day and we got a terrific view of the Alps. We were very impressed and decided to leave the Black Forest the next day and travel to the Alps. A bus brought us to Kleines Walser Tal. From there we walked up to an alpine hut (Schwarzwasser Hütte) in pouring rain. I still remember a beautiful, dream-like meadow on our way, full of wet white blossoms. In the hospitable hut we stayed overnight and dried our clothes. The next morning we climbed a mountain in bright sunshine. This was the first of many hikes in the Alps, soon leading to higher altitude, and to glaciers. Later I also went hiking in Sweden and Norway. My dream was to visit the Arctic one day.

After the intermediate exam, I studied for one year at the University of Hamburg. There were also highlights: I had the chance to go to the lectures of Professor Carl Friedrich von Weizsäcker, philosopher and physicist, who lectured on life under the influence of modern physics. The large lecture hall was always crowded, students were standing on the stairs. Then there was Professor Lehmann, a young physicist popular for his casual way of teaching and very clear arguments and derivations. I registered for his lectures on mechanics and on quantum theory. Last, not least, I took a course in sailing.

I completed my studies in Heidelberg, took the final exam and a teacher's training course. Finally, after a teaching exam, I became a high school teacher in Bremerhaven.

Seven years later I remembered my old plan to visit the Arctic. I thought it was time now – before getting too old. I was 33 then. I considered a visit of 1 or 2 years. But how to accomplish that? I went to the public library and found a book on Antarctic research, written by a journalist. In the acknowledgements he mentioned the help and advice of Professor R.P. Goldthwait. Therefore I wrote a letter to this professor. To my delight, I soon received a booklet on American research in Antarctica and an application form. In my reply I mentioned that I was a woman. Now it took a little longer until I got a reply. Eventually I received a detailed, hand-written letter from Professor Colin Bull. He expressed his regret that Antarctica was not yet open to women, but gave me two addresses where I might apply for fieldwork in the Arctic. In addition, he recommended that I first of all use my summer vacation to work in glaciological training camps in Europe, and gave me several addresses. (I was very impressed! Certainly Colin Bull had much more important work to do at his university than to answer the letter of a crazy German high school teacher asking for fieldwork in the Arctic!)



Working on Findelengletscher in 1982.

Following Colin's suggestion, I spent my next summer vacation in Tarfala in north Sweden, and learned there to survey with a theodolite and other techniques. Vibjörn Karleen was my teacher there. Thereafter I applied for a 2-year job. Fritz Müller at McGill in Montreal was the first to answer. (I had also received an invitation from Walter Wood of the Arctic Institute of North America for the training camp at Kluane Lake.) Fritz Müller then suggested that I first go to Kluane Lake and later in the summer join his group going to Axel Heiberg Island. Now a most wonderful period in my life started.

Kluane Lake is situated at the north-west corner of Canada. I met a nice group of people, scientists and volunteers. The first jobs were to paint the huts and to help prepare an airstrip near surging Steele Glacier. Soon Walter Wood invited me for a trip in his airplane, and this great experience was soon topped by looking over huge glaciers (some surging) and at majestic mountains 5000 high and more. Never before had I seen anything like that.



On Findelensgletscher, 1982.

Next I joined George Rigsby and Sam Collins. We established a surveying network at Rusty Glacier, which was expected to surge. We camped in a remote wilderness, surrounded by snow-covered mountains. I enjoyed the company of George and Sam, got more surveying practice, and learned to cook good spaghetti! Spaghetti has to be put into boiling water – not into warm water!

A few weeks later I returned to Montreal and joined Fritz Müller's group on the way to Axel Heiberg Island.

Axel Heiberg Island is a small, beautiful island west of Ellesmere Island. It has an ice cap, several mountain ranges with glaciers, fjords and outwash plains. There grow various plants, for instance poppies, and animals live that have never seen human beings and are not (very) shy. My job was to investigate the movement of the White Glacier. Using a T-2 theodolite, I surveyed lines of poles drilled into the ice. At the beginning of the melt season lakes formed on the glacier and along its sides. There was such a lake near the poles, which I surveyed. I wanted to record the growth and drainage of this lake and installed a level recorder. A few days later I went to look at the records but was unable to find the recorder, until I noticed that it was already under the water surface! Not a good start to my career as a field worker to have drowned an instrument! I decided to rescue the level recorder, took off all my clothes except the innermost layer and waded through the water to the level recorder. It was mounted with bolts and nuts on a stand, and I started to unscrew the nuts. But I soon lost the feeling in my fingers and then had to give up.



Refuelling in Antarctica, 1987.

I walked quickly out of the water, put on my dry clothes and ran to my tent and sleeping bag.

As the melt season proceeded more moulins formed and old ones were re-activated. Peaks of melt water input into the glacier occurred at about the same time as peaks of glacier velocity. To get more information we started to lower pressure gauges, hanging from cables, into the moulins. With these gauges we could measure the depth of water in a moulin channel and register its variations. These variations correspond to variations of water pressure at the glacier bed. Following Weertman and Liboutry, I assumed that variations of subglacial water pressure would influence the velocity of sliding of the glacier over its bed. But can White Glacier slide over its bed? 'No' said the climatologists: it must be frozen to its bed. The mean annual air temperature is -20°C , and the glacier is thin and not steep. But eventually they accepted that the glacier does slide at least over parts of its bed.

Observing White Glacier was a fascinating, often thrilling, project, especially when moulins were inspected with pressure gauges hanging from cables.

The study was carried out with the able assistance of Michèle Tallman in 1968, Judith Niemi in 1969 and 1971, and Susan Pusback in 1970. I also got help from various other members of the expedition, especially Doug Knight and Max Kâlin. I am grateful to all of them. I am also indebted to Professor Fritz Müller who planned and organized the expedition and supervised my PhD thesis describing this study.

When I got the message that I would receive a Seligman Crystal I was overwhelmed. I had never expected anything like that! I have some doubts that I deserve it. But since the IGS Awards Committee has decided to present the Seligman award to me I am very happy and grateful for so much recognition of my work in glaciology, and I want to say, thank you very much!

Almut Iken



Kalevala: the Finnish Maiden who vanished in the Seasonal Snow and Ice

(at the IGS conference)

Lahti, Finland, 28 May–1 June 2012)

A long time ago, north of the land of the reindeer, east of the mighty gulf of Bothnia, a brash young glaciologist, Joukahainen, challenged the old man of northern lakes, Väinämöinen, to a contest of knowledge. The subject of the contest was the shape of Lake Vesijärvi, and whether there could be sediment-heat-driven convection during the time of winter ice cover that would stratify the deeper parts of the lake. The brash young glaciologist had not heard the saga of William Rizk (presented during a lake-ice session at the Lahti IGS symposium), where the secret to sub-ice convection (being the lack of snow cover atop the ice) was revealed. Joukahainen was defeated in the contest and to save his life, so that he could hear the rest of the sagas on lake ice and ecology of ice-covered waters, was forced to promise Väinämöinen his sister's hand in marriage. Aino's mother is pleased with the mighty suitor, but Aino's thesis advisor, Matti Leppäranta, is concerned that the marriage to such a man would encourage Aino to be too lazy in her quest for new ways of knowing the secrets of the seasonal ice zone. Aino mourns her fate to be given away in marriage to an old man who knows much about detecting snow cover on open surfaces, but who knew little about how to detect snow below forest canopy.

Better a snow flake among the nevė
Dwelling deep below the hoar
As a sister to the firn
And a comrade to the reindeer,
Than to be an old man's comfort
And a research assistant to a retired emeritus
Tottering round in crampons
Stumbling over every palsa.

As advised by her academic advisor, Matti Leppäranta, and to please her husband-to-be, Aino reluctantly dresses up in silk, gold and silver. She walks into the forest and hopes to die. Wandering aimlessly for three days, she reaches the edge of a shrub covered snow field (interestingly, also the well-known refugium for reindeer herds that are otherwise plagued by clouds of mosquitoes) and there falls asleep while attempting to measure its albedo and SWE. Early next morning (all sessions started at 8:30, no excuses given for the long

'white nights' of Lahti), she sees three Finnish graduate students measuring how far short wave radiation penetrates into the snowpack and joins them. Later, in a forlorn mood, she skis across a nearby frozen lake to a lonely island, but the island sinks into the lake and Aino with it.

Väinämöinen weeps the loss of his beautiful bride (to say nothing of how difficult it will be for him, from now on, to simulate northern Eurasian SWE), and goes fishing. As he fishes, he sees three Finnish brothers fishing nearby.

(The tale of what Väinämöinen saw as he started to fish has become another saga that is commonly referred to, even in modern days, when an illustration of the Finnish propensity to be spare with conversation is needed:)

The three brothers start fishing at the summer dawn (sun rises over lake Vesijärvi at 2 a.m.). After 3 hours, the first says:

'Not a single bite yet...'

The shadows shorten and eventually, under the noon sun, the second brother says:

'No, no bites for me either...'

Finally, at the end of the day, as the sun sets over lake Vesijärvi, the third brother says:

'If you two hadn't been talking so much, maybe we would have caught some fish!')

As Väinämöinen fishes, a snow flake lands on his coat. It is Aino, who has been transformed into an odd snowflake (the one that is too secret to be explicitly displayed on the official IGS dish). Because Väinämöinen does not recognize Aino,





Finland is the ‘design capital’ of the world, and among its most beautiful products are the colorful and creative fabrics created by Finnish artists and purveyors of fine design. To welcome symposium registrants to Finland, and to give them a taste of Finnish design, each was given a Marimekko bag at registration. The most difficult part of registration turned out to be the effort required to choose which bag to take!



The IGS President, Doug MacAyeal, kicked off the week with a short word of welcome that mentioned the fact that Jean Sibelius, the great Finnish composer, had taken inspiration from Finland’s winter landscapes of snow and ice to compose some of his symphonies (particularly his 6th, about which Sibelius had said: ‘[It] reminds me of the scent of first snow’). Following the President’s opening comments, the municipal engineer of Lahti welcomed the symposium to Lahti, and provided some interesting perspectives on the local glacial landscape (Lahti was built atop an esker which both provides some of the world’s most pleasing drinking water and serves as the right of way for rail traffic between the forests of the north and the sea coast).

she disappears by melting into a bead of water as the sun warmed his jacket. In this land, the icy snow-covered surfaces of Winter are transformed to mosquito-infested mires every Spring.

Aino’s mother regrets forcing her daughter into the marriage, and has to take up the problem of typesetting her daughter’s thesis to Matti Leppäranta’s exacting standards (he happens to be the CE of *Annals of Glaciology* 54(62) on the theme of Seasonal Snow and Ice). Fortunately, Aino’s mother knew LaTeX, and the thesis was quickly converted to an IGS proof by the IGS home team in Cambridge, UK. The foreword of long-vanished Aino’s thesis contained the following lines:

Flowed a tear, another followed
Falling from the sky like rivulets,
Downward from her haggard cheeks,
Down upon the gentle bosom of Norther Finland,
Dotting the landscape with lakes and mires,
And indeed this became the land of seasonal
snow and ice.

And so, 3000 years later, started the IGS symposium on Seasonal Snow and Ice held in Lahti, Finland, 2 May–1 June 2012.

Delegates arrived at the symposium venue located at the southern end of the great ‘water lake,’ Vesijärvi (reference to the fact that this lake has water that can be drunk with great pleasure), on a delightful sunny afternoon with warm, shirtsleeve weather. Registration was set up in the Lahti Ski Museum, site of three giant ski jumps (to say nothing of the smaller, but still frightening ‘learner’s jumps’ used by Finnish school children who are in kindergarten, and to be the site of the 2013 Nordic ski competitions), and featured in addition to the normal IGS paraphernalia, smart Marimekko bags (one of Finland’s most popular design purveyors) filled with the official IGS ‘dongle’ (thumb drive containing the symposium program, abstracts and other vital information for attendees).

After a restful, and well lit, night (the sun rises at 2:30 a.m. in the summer in these high latitudes), the Symposium opened with a welcome by Matti Leppäranta, the leader of the local organizing committee, another by Jorma Vaskelainen, the Director of Lahti’s Municipal Engineering, a welcome by Yulia Zaika, President of APECS, and an opening statement by the IGS President, Doug MacAyeal. The opening presentation was a specially arranged talk by Prof. Pekka Aikio, who held the audience’s attention for a full hour while describing the life of reindeer in the changing environment. (We learned that these remarkable animals are specially adapted to seasonal snow and ice. During summer, they have a digestive system based on bacteria that can digest plant material. During winter, when only lichen is available beneath the snow cover, their



The icebreaker was held Monday evening, after the last oral presentation of the day, in the anteroom of the great Sibeliusstalo, the Sibelius concert hall.

gut is filled with protozoa, which help them digest fungus and algae.)

The symposium venue was Lahti's most beautiful and famous public building, the great Sibeliusstalo (Sibelius Hall), where the Lahti Symphony Orchestra resides when in season. The great maestro, Jean Sibelius, did not live in Lahti, but was a Finnish composer who was greatly inspired by the snowy landscapes of Finland. Of his 6th symphony, he was known to have said: '[It] reminds me of the scent of first snow.' The Sibeliusstalo was the centre of all symposium activities, hosting the icebreaker on Monday evening, as well as all the coffee breaks and lunch buffets. The lecture hall, where oral presentations were given, was set in a wing adjacent to the great orchestra auditorium, and had a wonderful view of the Vesijärvi (the water lake). Posters were



Arttu Jutila and Katriina Juva, graduate students who helped run the registration desk, projector services and microphone system, take a break during the icebreaker to enjoy a glass of wine and some Finnish delicacies in the hall of the Sibeliusstalo.



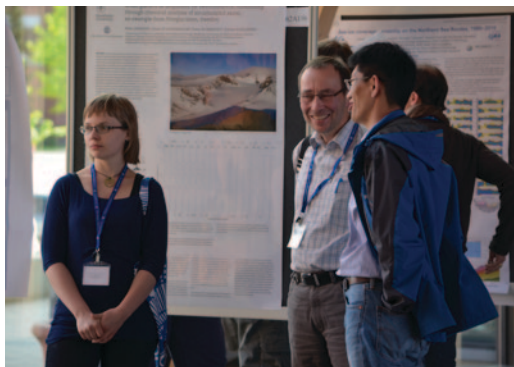
Among the attentive audience here are Chris Derksen, Sebastian Hoerz, Kari Luojus, Charles Fiertz, Wenfeng Huang and Bin Cheng. The hall used for oral presentations was panelled in light birch wood, and featured wall-to-ceiling picture windows with a beautiful view of the lake on which Lahti is situated.

presented in the great lobby of the Sibeliusstalo in an area adjacent to the coffee and lunch area.

Overall, the week was very demanding for the symposium attendees, as sessions began at 8:30 every day (except Monday) and did not usually close until after 17:00. There were sessions on: the



Secretary General Magnús Magnússon identifies what makes Matti Leppäranta so formidable as the chairman of the local organizing committee and the Chief Editor of the *Annals of Glaciology* issue on 'Seasonal Snow and Ice': the IGS tie and IGS fleece! Matti did a formidable amount of work (to say nothing of the vast amount of work his students also did) to conceive of, plan, prepare for, and run this symposium. Matti also turned out to be the great sage of the 'smoke' sauna, indicating to those around him: 'We in Finland don't converse much when we are in the sauna.'



Charles Fierz and Elina Jaatinen inspect a poster at the session on Tuesday afternoon.



Tom Kokkonen, Ioanna Merkouriadi and Jari Uuskivi enjoying the afternoon coffee break before plunging into and amongst the posters for the poster session on Tuesday.



After the last session of the day, participants gathered at various cosy establishments across Lahti for renewed scientific discussion and further expressions of their thirst for knowledge. Here, Tom Kokkonen, Martin Doble, Stefan Hendricks and Arttu Jutila expend their curiosity on one of Finland's best microbrews.



Onni Järvinen and Elina Jaatinen sit down to an elegant table setting ready for the banquet at the Lahti Officers' Club.

physics of snow, the physics of sea ice, the micro-dynamics of snow and ice, the ecology of ice-covered waters, lake ice, remote sensing of snow, frozen ground and glaciers, sea-ice modelling, and floating ice. On Tuesday afternoon following the first of the two poster sessions (the other being Thursday), Yulia Zaika, the able president of the APECS, convened a panel discussion on 'international collaboration in the 'cool' sciences.' This was well attended, as the Lahti symposium was remarkable for the large number of students and early career scientists who attended.

The mid-week excursion on Wednesday afternoon was the highlight of the week, as it allowed for much informal discussion of scientific research in addition to the pleasant trip by lake boat to the lake-side resort and sauna called Lehmonkärki. After 3 hours of boat travel under blue sky and between dense birch forests on either side, the variety of saunas at Lehmonkärki were a welcome way to relax. Featured were several saunas, including an authentic Finnish 'smoke sauna' (photo on p. 21) which was enjoyed by all participants (and which left smoky 'tattoos' on unwary bather's backs!). The other sauna, with a glass wall, was less authentic, but gave a magnificent view of the landscape while enjoying the deep heat. Within the dark smoke sauna, Matti Leppäranta explained that the Finns have a special word for sauna steam that differs from the word for regular steam, and that is also very close to the Finnish word for 'soul': löylyä hyvä! Good sauna steam! Following the sauna, a fish and potato boil was held on the beach. The delegates of the symposium enjoyed this special Finnish treat under a canopy of birch trees whilst listening to Finnish folk songs played by the Lehmonkärki hosts.

The signature formal event of the week was the symposium banquet held on Thursday evening in the Lahti Officer's Club. After a cocktail of lingonberries and Finnish vodka, the delegates feasted on fine wines, Finnish delicacies (raw salted whitefish, hot smoked salmon, vendace mousse croustades avec queue de poisson, grated cucumber dill, mushroom salad, local cheeses and new potatoes), a main course of reindeer fillet Wellington with carrot relish and new potatoes, and a desert of Lapp cooked cheese and buckthorn jam (the cheese gave a curious 'snapping' sound when chewed). During the dinner, various toasts were given, and an effort to find the most entertaining Finnish joke was made (the Secretary General of the IGS did the best with his rendition of the Finnish temperature scale: '...and at -300°C , Hell freezes over, and Finland wins the Eurovision song contest...'). Valuable and rare IGS snowflake dishes (with six visible snowflakes and two secret, invisible snowflakes representing the souls of Aino and Väinämöinen) were given to Matti Leppäranta and his team of local organizers (the oompa loompa crew: Onni Järvinen, Elisa Lindgren, Arttu Jutila, Anni Jokiniemi and Katrina Juvaai).

The symposium concluded on Friday afternoon, with departing delegates holding back their sadness to have to depart Lahti after an excellent stay, say goodbye to their new and old colleagues, and say goodbye to Finland and new Finnish friends until the next time the IGS gathers in this wonderful land of the Suomi.

Doug MacAyeal



The top table at the symposium banquet was overlooked by the portrait of Finland's greatest general, Marshal Carl Gustav Emil Mannerheim. Seated at the table are Lasse Makkonen, Charles Fierz, Eric Brun, Matti Leppäranta, Magnús Magnússon, Doug MacAyeal and Atsushi Sato.



Matti Leppäranta enjoys conversation and refreshment with a group of student participants while cruising up Vesijärvi toward the destination (sauna and beach cook-out) of the mid-week excursion. (Many of these students contributed much to the symposium's success by working behind the scenes during the entire week.)



If there is one thing that old glaciologists do well, it's the management of cerebral albedo. Two participants enjoy the afternoon sun on Lake Vesijärvi while avoiding the dire consequences of excessive incoming shortwave by the deployment of carefully selected headgear.



The Finnish cookout on the beach at Lehmonkärki featured freshly caught vendace stew in a savoury broth flavoured with dill cooked over a birch fire.

Into the Wild

A report on the IGS conference on 'Glaciers and Ice Sheets in a Warming Climate'

Fairbanks, Alaska, USA, 24–29 June 2012

Greetings from Fairbanks!... I now walk into the Wild.

Christopher (a.k.a. Alex) McCandless, 1992

In the last part of June 2012, nearly 255 glaciologists (plus 11 accompanying persons) hitchhiked, flew and drove to Alaska and walked into a remote city in the wilderness north of Mt McKinley. Two weeks later, mosquito-bitten, suntanned and glaciologically better informed, they travelled home having experienced the best glaciology the North American continent has to offer.

The IGS International Symposium on Glaciers and Ice Sheets in a Warming Climate began on Sunday 24 June, with the traditional icebreaker held in the pub at the University of Alaska's Wood Center. In addition to the many hours of daylight at this time of year, registrants were delighted to find that Fairbanks has many microbrews to fill their IGS logo pint glasses. The formal part of the symposium started on Monday and ran until Friday with 84 15-minute oral presentations and 193 posters (spread across two poster sessions). A wide variety of topics were covered by the symposium, and many were introduced by special keynote lectures by invited experts. Bob Bindschadler kicked off the first presentation of the symposium with his



Bob Bindschadler gives the keynote address at the opening of the symposium on 'Our communal response to warming: are we on the right track?' He reminds the symposium participants that 'we' are the community that informs the world about the state of our planet's glaciers and ice sheets. It's a lot of responsibility and we need to get it right.

keynote address on 'our communal response to warming', which referred to the responsibility glaciological science has to 'get it right' and to 'inform well' in the coming years as earth's snow and ice begin to have recognized impacts on human welfare and activity. Roger Braithwaite gave a keynote on 'glacier mass balance goes global', where the sobering challenge of making informed projections for hundreds of thousands of ice bodies that must rely on a more human-scale observation and monitoring knowledge base was made quite apparent. Martin Sharp and Tad Pfeffer gave keynote addresses on 'glacier changes in northern Canada' and 'Columbia Glacier in 2012' respectively, and informed the symposium attendees from far and wide about the current state of glaciers in North America. Christian Schoof gave the final keynote address of the week on 'hydraulic controls on glacier and ice-sheet flow', highlighting one of the key feedback mechanisms that links surface climate conditions to the basal controls on ice-flow velocity. It was particularly interesting for many



Dinner Monday night along the Chena River in beautiful Alaskan summer sunshine and pleasant temperatures. Tim Bartholomaeus (in his signature modified baseball cap and with the help of a large University of Washington student contingent) instructs various international participants in the finer points of American cheeseburger cuisine.



Two minutes to go. Session Chair Bob Bindschadler keeps to the schedule like a fine Swiss timepiece.

of the younger participants, and satisfying for the more experienced, to note that the work presented in Christian's keynote talk was itself 'kicked off' by many of the observations made by Almut Iken, the 2011 Seligman Crystal laureate, who received the award at the Symposium on Tuesday afternoon.

One of the innovations of the symposium was the creation of an online poster video library, where participants (and those who could not attend the symposium as well) could view short presentations associated with the posters. Given the fact that this type of supplemental material for posters had not been made available before, only 13 videos were submitted. Four were chosen to receive informal awards (two for each poster session, with one for best 'straight' video and one for best 'funny' video). All the videos were very good (and it was generally agreed that this type of supplemental material would be valuable if continued at other IGS symposia), but the most memorable was associated with a poster (63A512) entitled 'Climate influences on crystal orientation and growth in snow and firn' sung (with altered libretto) to Gilbert and Sullivan's 'I am the very model of a modern Major-General' from *The Pirates of Penzance*.

Another innovation of the symposium was the fact that it was coupled with a glaciological summer school held immediately prior to the symposium (see separate report in ICE). The University of Alaska glaciological summer school held in McCarthy, Alaska, at the foot of the Wrangell Mountains was co-sponsored by the IGS. The curriculum for the summer school was designed so that participants (including keynote lecturers) of the symposium would also be lecturers at the summer school. Students were encouraged to culminate their summer school experience by attending the symposium,



Although sceptical of most glaciological claims until subject to appropriate asymptotic analysis, young dynamicist Christian Schoof is willing to kick off his shoes and feel the veritable 'grass between the toes' if the idea can be translated into striking computer graphics.

and those who did generally remarked that the experience was extremely enlightening.

IGS symposia are always the place to have meaningful professional exchanges and social interactions outside of the lecture hall or poster room, and the Fairbanks experience was well within this norm. Lunches, coffee break treats, a barbeque and the symposium banquet were all magnificently run, delicious and endowed with sufficient time for conversation (the organizer, Ms Elizabeth Lilly, is thanked for making this possible). In addition to breaks and mealtimes, there were interesting natural and cultural visits made during the week. Following the Seligman Crystal ceremony for Almut Iken (reported elsewhere in this issue of ICE), a barbeque was held at the Museum of the North, where participants were able to view exhibitions featuring the art, culture and natural history of Alaska.



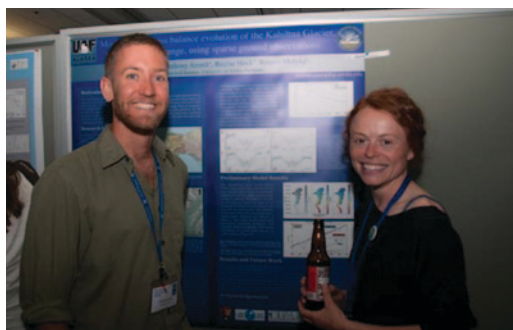
Many of the women in glaciological science gathered for a picture with Almut Iken after the Seligman Crystal ceremony on Tuesday evening.



Want to know how such a great symposium gets organized? Look no further than this picture. Gwenn Flowers, Chief Editor of the *Annals* issue on the theme of the symposium; Regine Hock, Chair of the Local Organizing Committee; Elizabeth Lilly, director of operations.



Carl Benson and Almut Iken, pioneers and authors of some of glaciology's greatest hits.



Brad Lipovsky and Joanna Young study a poster about the Kahiltna Glacier's mass balance, which reveals, among other things, why the blue ink cartridge keeps running out.



Susan Campbell guides Almut Iken, Garry Clarke and his wife, Julie Cruikshank, through the gift shop at the Museum of the North, which was visited by participants following the barbeque on Tuesday evening.



Meredith Nettles is amazed by Mark Fahnestock's enthusiasm as they board the riverboat *Discovery* for the symposium banquet on Thursday evening.

(headed by Regine Hock) who had organized the symposium gave a perhaps unrealistically positive view of Alaskan glaciologists in general. To temper this positivity, the story of Glacier Joe was told to participants assembled on the mid-deck of the *Discovery* by Regina Carns. This is how it goes:

The Story of Glacier Joe

By Regina Carns (rcarns@uw.edu),
IGS Poet Laureate

There are strange things done 'neath the midnight
sun by the folks who study ice
They'll spend hours of time on a glacier climb just
to check on some strange device.
With their crampons donned they ascend beyond
the realms where sane folk go
Yes, they're all bizarre, but the oddest by far was
the one called Glacier Joe.

The letters I.D. marked his sole degree – 'That's
"Doctor of Ice",' he'd say
From a glacial perch he'd perform research in his
own peculiar way.

He'd carefully take his ablation stake back home
at the start of spring
For the sunny glare might cause wear and tear if
snowmelt exposed the thing.
He hated to dig, so his snowpit rig was a big over-
clocked hair dryer

He never would change, though his numbers
were strange and his notebook often caught fire.

I answered an ad for a glacier grad, that's how I
joined Joe's lab

He'd heard some stories 'bout inventories and
wanted to take a stab.

Our first sortie was altimetry with a stopwatch and
big flashlight

But so blindingly fast those light pulses went past
that our glaciers had negative height.

So next Joe raves about seismic waves and runs
out to buy TNT

But it came to pass that each change in mass was
just what we'd blown to debris.

He thought he'd shoot for the theory route with
area-volume scales;

So Joe would divide feet-long by leagues-wide
and end up with volume in bales.

Said Joe, 'I guess the IGS are a bunch of clever
sots,

They're hosting some sym-pos-i-um so I'll go
expound my thoughts.'

He showed fifty-six slides dense as bricks with
text in Comic Sans

And spoke with such flair that the Session
Chair dragged him offstage with both hands.

We went for beers with our glacial peers and
they told us of what they did



Helgi Björnsson, Thomas Schuler and Jon Ove Hagen prepare to settle in for the first morning session at the symposium with coffee and notebooks at the ready.



Model Modern Glaciologist Regina Carns, from the University of Washington, appears on her poster video before an amazed crowd of onlookers (including the IGS Chief Editor, Jo Jacka).



Participants try their luck at panning for gold on the mid-symposium excursion. Perhaps someone will hit paydirt and be able to fund some extra field work on their favorite glacier! Who says IGS symposia don't pay for themselves?



Shin Shugyama, Ralf Greve and Olivier Gagliardini inspect the derelict gold dredge at Chatanika on the mid-symposium excursion.



On the bus in Denali National Park during day 1 of the pre-symposium excursion. Hey, is that a bear on the left side!!?



The symposium was blessed with a very large contingent of students. Here, some of them raise a glass in celebration of glaciology at the beer garden following the symposium banquet.

And all this news made Joe enthuse like a sweet-shop-dwelling kid.

So back we went to our field tent to add to our data stores

Energized anew, we both set to the task of drilling cores.

We drilled and cored and dug and bored 'til our hands were sore and tired

And I strained my eyes to analyze the samples we acquired.

Well, day by day went on this way and the data rose like the tide

But nary a bit of that data would fit no matter how hard Joe tried.

'I'll never know how the glaciers flow,' Joe cried out in despair

'From the top to the bed, it's all over my head – I tell you, it just ain't fair.'

'I know some folks can use full Stokes, but my models ain't even one-D.

From densification to surface ablation, these glaciers befuddle me.'

And after this spiel, Joe turned on his heel – and threw himself down a moulin!

With a rope from the sledge I raced to the edge, but by then he was long gone.

Unhappy and damp I returned to the camp and pondered poor Joe's fate;

Down the hole he'd been flushed to be frozen or crushed – it was awful to contemplate.

But later that night in the fading light I awoke to a bellow grand

Like a trumpet brass from a deep crevasse, saying 'NOW I understand!'

'It's all so clear from way down here!' exclaimed the voice with glee.

'Every wax and wane of stress and strain is an open book to me!'

'I can see each kernel of snow and firn'll become a crystal grain

And each drop of melt makes its presence felt in the branched subglacial drain.'

The ice folks say that to this day a student or a seeker

Can strain an ear, and faintly hear, from beneath the ice: 'Eureka!'

There are strange things done 'neath the midnight sun by those studying ice and snow
Yes, they're all bizarre, but the oddest by far was the one called Glacier Joe.

This story was well received by the audience, and a hearty round of applause was given to Regina Carns for having reminded the participants that not all glaciologists in Alaska are as successful or brilliant as they are at the University of Alaska.



Participants on the pre-symposium excursion hiked up a local peak to get a better look at the Muldrow Glacier. In the distance, the base of Denali rises upward into the clouds.

Pre-symposium excursion to Denali National Park

It is hard to say which excursion associated with the symposium was the most interesting and fun; both were indescribably enjoyable and successful. Immediately prior to the start of the symposium, a group of approximately 40 participants, including students who had attended the summer school in McCarthy, Alaska, took the buses provided by the University of Alaska from Fairbanks to Denali National Park for a 2-day visit. The first day featured a dedicated and guided bus ride along the park road from the park entrance visitor center to Eilson Visitor Center at the edge of Muldrow Glacier, about 100 km into the park. During the two-way bus ride, 11 grizzly bears, four caribou and several moose and mountain sheep were spotted alongside the road. Rob Burrows and Danny Capps, the park glaciologist and geologist respectively, accompanied the excursion on both days and provided valuable insight into the features of the landscape we were experiencing.

On day 2 of the excursion to Denali National Park, there was more time for exploration and various fun activities. A large group took two flight-seeing planes for an hour and a half flight over Mt Denali (Mt McKinley), the highest peak in North America. This flight was notable for its clear weather and the extremely good views of the massif and the surrounding glaciers and peaks. Some participants spent time hiking in the neighbourhood of the Park Visitor Center, others took river-rafting trips down the neighbouring Nenana River, and others relaxed at the sled dog kennels and visitor center. That afternoon and evening, the excursion returned to Fairbanks in time for a good rest before the start of the symposium with the icebreaker the following day.

Post-symposium excursion along the Fairbanks–Valdez Highway and Prince William Sound

Immediately following the symposium, about 55 participants (plus about 20 1-day participants who departed late in the afternoon of the first day) began a 4-day excursion southbound down the highway through the Alaskan Range, skirting the Wrangell Mountains, cutting through the Chugach Mountains and ending in the port city of Valdez (also the terminus of the trans-Alaskan oil pipeline). Featured stops on the first day included an overview of the terminal moraines of Black Rapids Glacier (which previously surged in 1936), Gulkana Glacier (one of the glaciers for which observations have been conducted since the 1960s by the University of Alaska) and the high plateau surrounding the Tangle Lakes on the Denali Highway. The first evening was spent at a rustic lodge on the high plateau crossed by the Denali Highway, where hearty meals were enjoyed for dinner and the following breakfast. After the evening meal, the ‘council of elders’ had an open meeting amidst the mosquitoes, but managed to keep them at bay through the use of cigar smoke, whisky vapor (from a commemorative bottle of whisky that is a replica of bottles found at Shackleton’s Cape Royds Hut, Antarctica) and Puuko knives (acquired during the previous IGS symposium held in Lahti, Finland).



Paco Navarro crosses the suspension bridge at Gulkana Glacier during the first day of the post-symposium excursion.



Grant Wilder (first time on a glacier!), Ashley York, David Alexander and Juliana Costi stand on the surface of Gulkana Glacier.

Day 2 of the excursion featured movement down the road from Tangle Lakes to Valdez, with stops at the Wrangell St. Elias National Park visitor center (for a cloudy view), the Worthington Glacier (where participants hiked high above the terminus to the snowline both on the ice itself and along a bounding ridge) and the port city of Valdez.

Day 3 of the excursion was spent entirely on a sight-seeing cruise boat out of Valdez to visit the iceberg infested fjords of Columbia and Meares glaciers, see various wildlife, including humpback whales, sea otters, sea lions and eagles, and experience the beauty of Prince William Sound. At the end of the day, participants gathered at a local Valdez restaurant for an excursion banquet, where again, various toasts and statements of appreciation were given to the



What? The coach has a dead battery? Far worse things happen on glaciological field expeditions. Tad Pfeffer and Tómas Jóhannesson make fast work of giving the bus a jump start as the group on the post-symposium excursion reassembles at the end of the day's hike on the Gulkana Glacier.



Three 'heavies' break open a case of Shackleton's replica whisky with Finnish Puuko knives acquired at the IGS meeting in Lahti, Finland. This meeting of the council of elders was held on the deck of the night's accommodation during the pre-symposium tour, which gave a beautiful view of the Nenana River valley and allowed interesting conversation about various Alaskan social issues with the hotelier.

excursion organizers (including Roman Motyka, Regine Hock, and Jason Amundson), and stop coordinators/narrators (Tim Bartholomaeus, Tad Pfeffer and Julie Elliot).

On the final, 4th, day of the excursion, the participants boarded the coach and retraced the road back to Fairbanks, with only a few stops along the road to discuss the Denali Fault, and recent earthquake activity. The excursion concluded with a salmon bake in Fairbanks and a few hurried shuttle trips to the airport to catch red-eye flights back to various more 'civilized' parts of the world where glaciologists also roam.

Regina Carns and Doug MacAyeal



Viewing the tidewater terminus of the Meares Glacier on day 3 of the post-symposium excursion.



THE SECOND INTERNATIONAL SUMMER SCHOOL IN GLACIOLOGY: A REPORT

McCarthy, Alaska, USA, 10–20 June 2012

Nestled at the end of a long dirt road, 60 miles from the nearest gas station in the town of Chitina and 12 hours from Fairbanks, lies McCarthy, Alaska. A vestige of the early 20th-century copper boom in up-valley Kennicott, McCarthy possesses the character of a former era while simultaneously reemerging as a center for both tourism and natural science education.

The Wrangell Mountains Center (WMC), based at McCarthy's Old Hardware Store, exemplifies sustainable living at its best: the water is unfiltered rain and glacial melt, what minimal electricity is used comes from solar panels, the restrooms are outhouses, the vegetables and herbs are from the back garden, and all prepared meals are vegetarian. The center takes advantage of its location in the Wrangell–St Elias National Park (the nation's largest) and is dedicated to fostering: 'appreciation, understanding, and stewardship of wildlands and mountain culture in Alaska through scientific and artistic inquiry in the Wrangell Mountains'. Programs at this experiential learning center include writers' workshops, science lectures, wildlands field research for undergraduates, artists in residence, sketching and journalism seminars, and day programs. On 10 June 2012, our group of 36 scientists from all over the world descended upon McCarthy for the second WMC-hosted International Summer School in Glaciology.

The summer school is an intensive, 9-day course drawing 27 glaciology graduate students from the US and 10 other countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Denmark, France, Germany and the UK. Only 15 of the 27 students were from various US institutions. The nine instructors* are prominent figures in the field and hailed mostly from University of Alaska at Fairbanks (the organizing university) but also from CU Boulder, Clark University and the University of Manchester, UK. The course goal was to provide students with a 'comprehensive overview of the physics of glaciers and current research frontiers in glaciology' through formal lectures, group work, advised projects, and interactions with scientists researching a diverse range of glaciological questions.

We drove 12 hours from Fairbanks, many of us having arrived only the evening before, and were surprised when dropped off at a footbridge. McCarthy is not accessible by public road, and



McCarthy's Old Hardware Store, where the Wrangell Mountains Center is based. We ate all of our meals and completed our group work in this building. Photo by Andy Aschwenden.

the residents want to keep it that way. We loaded up dollies with our belongings (everything from computers and posters to tents and crampons) and pulled them across the river. It was on the metal footbridge that we had our first view of the 25-mile Kennicott Glacier that dominates the local landscape and provided an appropriate natural setting for a week of intensive study. Once we were on the other side, staff from the WMC arrived in vehicles (they pay \$350 per year to drive into and out of the valley on private land) for transporting the academic materials to town. Some of the staff stayed behind to lead us to 'tent city,' our home for the week, and



Tent city, our home for the duration of the course. Photo by Alexandra Giese.



The Wrangell Mountain Center's recently acquired second building, Porphyry Place, where we attended lectures. The building was a cabin formerly owned by American glaciologist Ed LaChapelle. Photo by Andy Aschwanden.



Alex Gardner of Clark University helps students with remote sensing exercises. Photo by Regine Hock.

provide instructions on how to avoid attracting the resident grizzlies and black bears.

Tent city is about a 10-minute walk from town, which has a few private homes, a hotel, hostel, bar, coffee shop, general store, two flight-seeing businesses, and the WMC. The WMC's recently acquired 'Porphyry Place' held particular significance for the group: the beautifully crafted 24 ft x 28 ft winterized cabin was the former residence of Ed LaChapelle and his partner Meg Hunt. Holding lectures in the home of this glaciologist, renowned for his avalanche research and photography, seemed almost too fitting.

At 7:45 each morning, we would arrive at the Old Hardware Store for a prepared breakfast and then start lectures promptly at 8:30. The glaciological topics covered during the course ranged from the remote sensing of glaciers through satellite data to climate change impacts on glaciers; from ice sheet modeling to research frontiers in the field. After 4 hours of class, we ate lunch and, on most days, spent several afternoon hours completing exercises to reinforce the morning's teaching. To introduce a research component into the course, all of the instructors advised on student projects they had carefully designed to fit the 9-day time constraint while still posing significant scientific questions. They worked closely with groups of two or three students who expressed topic preferences, ranging from surface energy balance to inverse modeling, prior to the start of the course.

Perhaps even more valuable than the formal curriculum, however, were the interactions with instructors who took more than a week out of their busy schedules to live with and teach graduate students. They didn't show up, lecture, and then

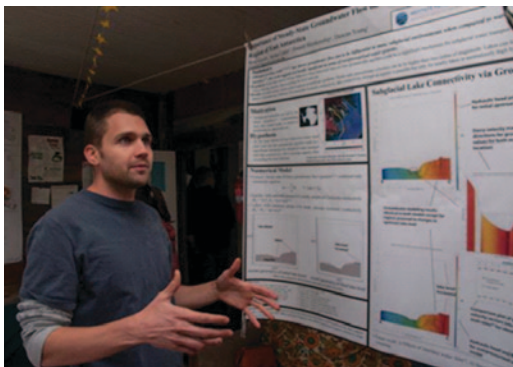
leave. Instead, they sat in the Old Hardware Store with us when we were working on our exercises and projects, ready to answer questions or offer suggestions. They ate with us, some camped with us, and they socialized with us in the evenings, often around a bonfire, engrossed in conversations that inevitably – but organically – returned to science.

In addition to direct contact with esteemed and engaging faculty, we had formal opportunities to connect with our fellow students on an academic level. We were required to bring a poster summarizing our graduate research and, on one of the first days, had a poster session during which we learned about our future colleagues' work, practiced communicating about our own, and shared feedback.

While not specifically a 'field course', the summer school also had designated time for exploring the nearby glaciers. Some student projects involved fieldwork (e.g. photogrammetric or radar measurements of the ice), and the group also devoted one and a half days to exploring



Students and lecturers share a meal outside the Old Hardware Store. Photo by Regine Hock.



Student Brad Gooch explains his work on Antarctic subglacial hydrology. Photo by Andy Aschwanden.

the Kennicott Glacier and its tributary, the Root glacier. Bob Anderson of CU Boulder conducts much of his research on how the Kennicott Glacier responds to the evolving hydrologic system in the glacier, including the rapid drainage of the side-glacier Hidden Creek Lake. He gave us tours on the ice and around the sediment at its terminus. In another lake basin beside the glacier, located a few hours' hike over the ice, he downloaded his water pressure gauge and his time-lapse video of lake level fluctuations from May to the present. He also showed us the gauges anchored to the Kennicott River bridge at the terminus, which record the river stage over the season, including the flood when the ice-dammed Hidden Creek Lake outbursts.

Of course, we did some exploring, too. Many of us took our first steps on glacier ice, but for the first-timers and seasoned glacier travelers alike, the surroundings were awe-inspiring. The melted rivers, medial moraines, moulins, ice falls, supraglacial lakes and surrounding cliffs left all



Tad Pfeffer of CU Boulder points out a feature of the Kennicott's terminus. Photo by Regine Hock.



Students Alexandra Giese and Allen Pope walk through an ice canyon on the Root Glacier. Photo by Flavien Beaud.

of us speechless. The highlight of the day on the ice was the discovery of a winding canyon of ice in the middle of the glacier. With our crampons on, we were able to explore this narrow passage, melted by a supraglacial stream, and marvel at its incomparable blue color.

When Bob Anderson gave a public lecture for the WMC, he began by reflecting on why scientists study glaciers. Yes, they're important for understanding and predicting the effects of climate change. Yes, they affect water and agricultural resources. But most of all, we study them because they're cool. Our 9 days in McCarthy proved to be productive and formative ones. The connections we made with fellow scientists from across the globe and the opportunity to marvel, collectively, at the breathtaking beauty of the bodies of ice we all study renewed our dedication to understanding their characteristics and the role they play on Earth.



Students explore an ice cave formed on the edge of the glacier. Photo by Andy Aschwanden.



The students and instructors of the 2012 International Summer School in Glaciology. Photo by Andy Aschwanden.

*Note: Students would like to thank the instructors for their time, dedication, and advice: Regine Hock (principal organizer; University of Alaska Fairbanks), Andy Aschwanden (UAF), Ed Bueler (UAF), Mark Fahnestock (UAF), Martin Truffer (UAF), Bob Anderson (University of Colorado at Boulder), Roger Braithwaite (University of Manchester, UK), Alex Gardner (Clark University) and Tad Pfeffer (University of Colorado at Boulder).

Generous funding from the following sponsors supported the course and substantially subsidized student tuition: NASA, International Glaciological Society, College of Natural Sciences and Mathematics, University of Alaska Fairbanks,

Geophysical Institute, and International Union of Geodesy and Geophysics/International Association of Cryospheric Sciences.

These organizations made our experience possible, and we hope that the International Summer School in Glaciology will reconvene for many years to come, providing future graduate students with the same opportunity to interact with peers and senior glaciologists in an intimate setting.

Alexandra Giese and Gunter Leguy



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on
Changes in Glaciers and Ice Sheets:
observations, modelling and environmental interactions



Beijing, China
28 July–2 August 2013

Co-sponsored by:

- ❄ Institute of Tibetan Plateau Research,
Chinese Academy of Sciences (ITP, CAS)
- ❄ Cold and Arid Regions Environment and Engineering Research
Institute, Chinese Academy of Sciences (CAREERI, CAS)
- ❄ Chinese Academy of Sciences (CAS)
- ❄ National Natural Science Foundation of China (NSFC)
- ❄ Third Pole Environment (TPE)

SECOND CIRCULAR

October 2012

<http://www.igsoc.org/symposia/2013/beijing>

<http://iscgis.csp.escience.cn>

The International Glaciological Society will hold an International Symposium on 'Changes in Glaciers and Ice Sheets: observations, modelling and environmental interactions' in 2013. The symposium will be held in Beijing, People's Republic of China, from 28 July–2 August 2013.

THEME

Glaciers and ice sheets are important components that control sea level change. In response to a warming climate, Greenland and West Antarctic ice sheets have significantly lost mass during the last decade, and mountain glaciers worldwide have rapidly declined. Changes in mountain glaciers have direct impacts on human activities, especially in mid-latitude regions, where high-altitude snow and ice contribute to the hydrological controls of human activity. Therefore, the symposium specifically includes topics pertinent to the Earth's 'Third Pole' (the high-altitude plateaus of Central Asia). To improve our understanding of the dynamics of cryospheric change, interactions with the climate and impact on the living environment of mountainous regions, it aims to provide a general discussion of changes in these components of the global cryosphere with broader aspects from recent in situ observations, remote sensing measurements and modelling efforts.



中国科学院
CHINESE ACADEMY OF SCIENCES



国家自然科学基金委员会
National Natural Science Foundation of China





TOPICS

Meeting participants are encouraged to present on a wide variety of topics. These include, but are not limited to:

1. *Assessment of the current state of ice sheets and glaciers*, and their trajectories of change, determined by remote sensing, including airborne and satellite
2. *Remote sensing methodologies and techniques* for providing critical information on glacier and ice sheet profiles, thickness, melt patterns, flow fields, snow layer characteristics and other parameters relevant to the changing cryosphere
3. *Ground-based field studies* of glacier and ice sheet change, including in situ observations of mass and dynamic changes of mountain glaciers, ice caps, ice sheets and ice shelves, glacier inventories and firn layers, permafrost, snow cover, and observation method
4. *Ice-core records* of past change that is relevant to understanding the current changing states of ice sheets and glaciers both in polar and non-polar environments; special emphasis will be placed on ice-core records from Asia
5. *Subglacial and proglacial sediment–landform records* relevant to understanding present rates of ice sheet and glacier change
6. *Glacier and ice sheet mass balance*, including glacier meteorology, surface energy exchange, snow accumulation processes, mass-balance indices and the relation between glacier mass balances and atmospheric indices. Verification and assessment from in situ observations and remote sensing techniques. Challenges related to scaling assumptions
7. *Assessment of changing ice in the ‘Third Pole’*, impacts and drivers. Including glacier monsoon meteorology, dust impact on snow and ice albedo, proglacial lake dynamics, debris-cover effects and human impacts, commonalities between Asian and South American glacier systems
8. *Modelling the processes of glacier and ice-sheet change*, including the thermal and mechanical processes that govern how ice sheets and glaciers respond to changing environmental conditions. Partitioning of climatic and dynamic mass-balance components, key unknowns, critical observations and limitations to progress
9. *Projection and prediction* of changing glaciers and ice sheets, response to climate change, ice–atmosphere–ocean iterations. Challenges of downscaling methods. Model intercomparison. Sea-level rise experiments specifically designed to inform policy makers, including the AR6 of the IPCC
10. *Glacio-hydrological processes* that have a bearing on accelerating current rates of ice-sheet and glacier change, including the impact of meltwater and subglacial processes in glacier ponding, surface lakes on Greenland, moulin dynamics



11. *Hazards and societal impacts* relating to changing glaciers and ice sheets, including the contribution of glacier wastage to sea-level rise, water resources in different climates, glacier engineering, glacier hazards, glacier outburst floods, ocean circulation, terrestrial and marine bio-geochemical cycles and ecosystems, as well as isostatic changes
12. *General glaciology*: all topics relevant to glaciological science are welcome at the symposium (subject to time and space availability); however, presenters wishing to publish papers on topics not related to those listed above will be invited to submit their manuscripts to the *Journal of Glaciology* rather than to the specifically themed *Annals of Glaciology*.

Additional topics may be added on the basis of requests and abstract submissions. Questions and ideas can be referred to the co-Chief Editors/ co-Chairs of the Scientific Committee.

PROGRAMME

The symposium will consist of a mixture of oral and poster (A0 size, W 90 cm × H 120 cm) sessions, with a large amount of free time to allow participants to exchange scientific information in an informal setting. Wednesday afternoon will be reserved for a symposium activity or excursion. A symposium banquet will be held on Thursday evening.

ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper (either oral or poster) at the symposium will be required to submit an abstract by 15 April 2013. Abstract submission will be through the symposium website, <http://www.igsoc.org/symposia/2013/beijing/>. Those unable to submit online should contact the IGS office directly (e-mail igsoc@igsoc.org). Each abstract will be assessed on its scientific quality and relevance to the symposium theme. Authors whose abstracts are accepted will be invited to make either an oral or poster presentation at the symposium. First or corresponding authors will be advised by 1 May 2013 of their acceptance or otherwise; other authors will not be informed separately. Authors who have not received notification by that date should contact the IGS office in Cambridge in case their abstract was not received. A program and collection of submitted abstracts on a USB stick will be provided for all participants at the symposium.

The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the symposium themes. Submissions to this issue will not be contingent on presentation at the symposium, and material presented at the symposium is not necessarily affirmed as being suitable for consideration for this issue of the *Annals*. Participants are encouraged, however, to submit manuscripts for this *Annals* volume. The deadline for receiving *Annals* papers is 9 June 2013.



REGISTRATION FEES

All fees are in US dollars, \$

– Participant (IGS member):	\$480
– Participant (not IGS member):	\$580
– Student or retired (IGS member):	\$240
– Student or retired (not IGS member):	\$290
– Accompanying person (12+ years):	\$240
– Accompanying person (6–11 years):	\$200
– Accompanying person (<6 years):	Free
– Late registration surcharge (after 15 May 2013):	\$80

The fees include the icebreaker, banquet, daily lunches and suppers (Sun–Fri), daily morning/afternoon coffee/snacks and the mid-week excursion.

Please note that the deadline for full refund is 9 June 2013, while the deadline for partial (on a sliding scale) refund is 12 July 2013. After that, refund requests will not be accepted.

REGISTRATION BY MAIL: Although we strongly prefer registration through the website, it can however also be done by filling in and returning the back page of this circular. If payment by credit card is not possible, contact the IGS office to arrange for a bank transfer. Payments made after 15 May 2013 must include the additional \$80 late-registration fee and any incurring bank charges. When completed, please send the form to the Secretary General at the IGS address.

STUDENT/POSTDOC SUPPORT: Funding is available to partially support student and postdoc attendance at this symposium. If you would like to apply for this support, please send a CV and an abstract to Dr Wu Guangjian (iscgis@itpcas.ac.cn) by 1 March 2013.

VISA: Those who need a Chinese visa will need to complete the form requesting an invitation letter. You can access this on the local symposium website, <http://iscgis.csp.escience.cn>. A link will be provided on the IGS website as well.

LOCATION: The symposium will be held at Beijing Conference Center (BCC, <http://www.beijingshuizhongxin.com>), Beijing. The end of July is characterized by moderate precipitation and typical daily temperatures of 25–33°C (77–86°F) but peaks up to 35°C (95°F) may occur.





ACCOMMODATION: Beijing Conference Center (BCC) is located at No. 88 Laiguangying West Road, Chaoyang District and adjacent to the Olympic Park and ITP CAS. Special discount prices for symposium participants will be offered based on the agreement between the Local Organizing Committee and BCC.

- Suite room: two rooms with one big bed (5 star, 420 RMB per day per room)
- Single room: one room with one big bed (5 star, 310 RMB per day per room)
- Double room: one room with two beds (5 star, 300 RMB per day per room)

(100 RMB≈15.7 USD ≈ 12.5 EUR ≈ 10.0 GBP, exchange ratios in Sep 2012)

NOTE: Those prices are the 2012 special standard and do NOT include breakfast. The breakfast price is 30 RMB per person per time. The exact accommodation price will be announced in 2013. We will reserve a certain number of rooms at the ‘symposium rate’ but it will only be possible to guarantee that rate until 5 July 2013 so please make your hotel booking in good time, asking for the ISCGIS rate. After the deadline we will be able to guarantee neither the symposium rate nor the availability of accommodation in the symposium hotel.

You can also choose other hotels as you wish. Information regarding additional hotels will be provided on the local symposium website.

MID-WEEK ACTIVITIES: A half-day mid-week excursion will be organized on Wednesday afternoon to explore some of Beijing’s natural or cultural sights.

RECEPTION: There will be an icebreaker reception on Sunday 28 July in Beijing Conference Center. You will also be able to complete your symposium registration there. Come along to meet your fellow delegates, get your bearings and collect your registration package.

BANQUET: The banquet will be held on Thursday evening.

POST-SYMPOSIUM EXCURSION: Three excursions are planned:

- Excursion A: tour to Tibet, with the route Beijing – Lhasa – ITP Stations – Nam Co – Yomdrok Lake – Xigaze (glacier) – Lhasa
- Excursion B: tour to Jiuzhaigou – Huanglong – Dujiangyan – Chengdu, Sichuan Province
- Excursion C: tour to Li River, Guilin and Yangshuo, Guangxi Province

Because three excursions will start simultaneously after the symposium, participants can choose only one of them. The formal excursion application deadline is 3 June 2013. The symposium website (<http://iscgis.csp.escience.cn>) will post additional information for post-symposium travels.



SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society)

SCIENTIFIC STEERING AND EDITORIAL COMMITTEE

Douglas MacAyeal (Univ. of Chicago, USA) and Weili Wang (NASA, USA), Co-Chief Editors; Surendra Adhikari (Canada), Olaf Eisen (Germany), Peter Kuipers Munneke (Netherlands), Lindsey Nicholson (Austria), Andrew Shepherd (UK), Tian Lide (China). More scientific editors will be added at a later stage as needed.

LOCAL ORGANIZING COMMITTEE

Qin Dahe (Co-Chair), Yao Tandong (Co-Chair), Weili Wang, Ren Jiawen, Ding Yongjian, Wang Ninglian, Tian Lide, Xu Baiqing, Kang Shichang, Wu Guangjian.

CONTACTS FOR FURTHER INFORMATION

Magnús Már Magnússon

International Glaciological Society

Scott Polar Research Institute

Lensfield Road, Cambridge, CB2 1ER, UK

Tel: +44 (0)1223 355 974/Fax: +44 (0)1223 354 931/Email: igsoc@igsoc.org

Symposium website: <http://www.igsoc.org/symposia/2013/beijing/>

Professor Yao Tandong

Institute of Tibetan Plateau Research, Chinese Academy of Sciences (ITP, CAS)

Building 3, Courtyard 16, Lincui Road, Chaoyang District, Beijing 100101, China

Tel: +86 (0) 10 8409 7080 Fax: +86 (0) 10 8409 7079

E-mail: iscgis@itpcas.ac.cn

Website: <http://iscgis.csp.escience.cn>

IMPORTANT DATES

Student/Postdoc support application deadline:	1 March 2013
Abstract submission deadline:	1 April 2013
Notification of acceptance:	1 May 2013
Pre-registration deadline:	15 May 2013
Post-symposium excursion application:	3 June 2013
Deadline for full refund:	9 June 2013
Paper submission deadline:	9 June 2013
Deadline for Chinese visa application:	21 June 2013
Deadline for accommodation booking at BCC:	5 July 2013
Deadline for refund:	12 July 2013
Registration and Icebreaker:	28 July 2013
Conference begins:	29 July 2013

INTERNATIONAL SYMPOSIUM ON CHANGES IN GLACIERS AND ICE SHEETS:
OBSERVATIONS, MODELLING AND ENVIRONMENTAL INTERACTIONS
Beijing, China 28 July–2 August 2013
REGISTRATION FORM

Register online at www.igsoc.org/symposia/2013/beijing/registration

Family Name: _____

Given Name: _____

Address: _____

Tel: _____ E-mail: _____

Accompanied by:

Name: _____ Age (if under 12) _____

Name: _____ Age (if under 12) _____

Dietary and other requirements: _____

☐ I want to give a presentation: ☐ Oral ☐ Poster ☐ Either

☐ I wish to participate in the Post-Symposium Excursion: ☐ A ☐ B ☐ C

☐ I need a Chinese Visa for the Symposium

Registration fees (US dollars)

Participant (IGS member)	\$480
Participant (not IGS member)	\$580
Student or retired (IGS member)	\$240
Student or retired (not IGS member)	\$290
Accompanying person (12+/-11)	\$240/\$200
Late registration surcharge (after 15 May 2013)	\$80

TOTAL REGISTRATION FEES \$_____

Payment of registration fee by MasterCard, VISA or American Express

Card number

Expiration / CVV (last 3 numbers on signature strip)

Name of card holder as shown on card: _____

Signature: _____



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on Radioglaciology



Lawrence, Kansas, USA
9–13 September 2013

Co-sponsored by:

- ❄ Center for Remote Sensing of Ice Sheets (CreSIS)
- ❄ University of Kansas (KU)
- ❄ KU School of Engineering
- ❄ Kansas Office of Research and Graduate Studies

SECOND CIRCULAR

October 2012

<http://www.igsoc.org/symposia/2013/kansas>

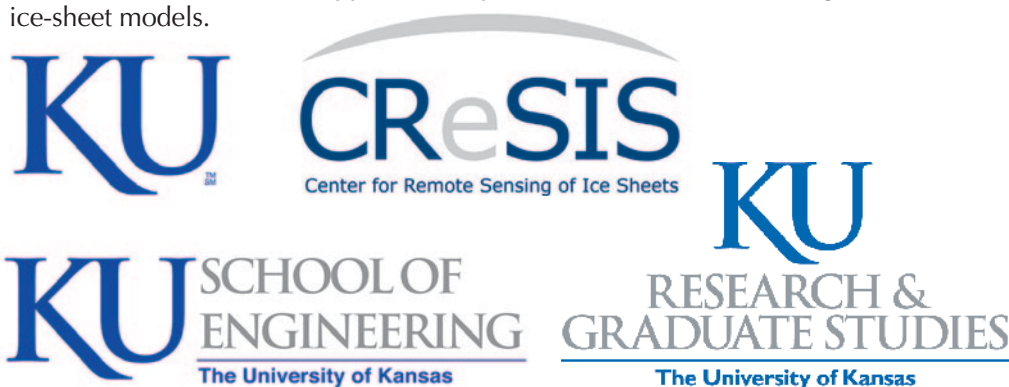
<http://www.cresis.ku.edu>

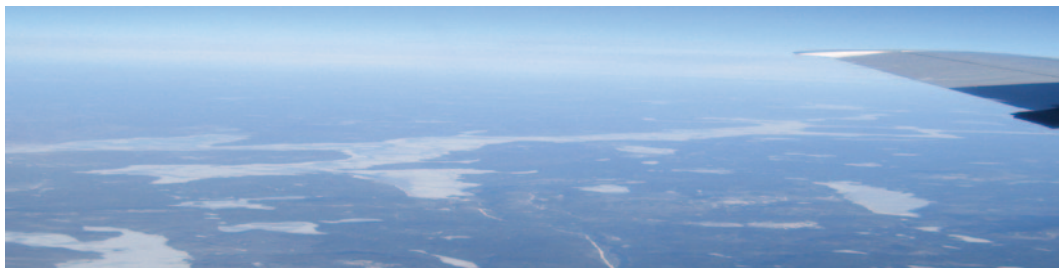


The International Glaciological Society (IGS) will hold an International Symposium on Radioglaciology in 2013. The symposium will be hosted by the Center for Remote Sensing of Ice Sheets (CReSIS). It will be held at the University of Kansas, Lawrence, Kansas, USA, from 9–13 September 2013.

THEME

This symposium will take a comprehensive look at the latest technological innovations in radars and signal processing techniques for investigating ice sheets, glaciers and their geophysical settings, with emphasis on polar and other logistically challenging settings. Recent advances in radio frequency, microwave and digital technologies have enabled the development of innovative radars that are used to sound and image glacial ice in new ways. This has allowed researchers to produce 3-D images of the ice-bed interface even when that surface is covered by more than 3 km of ice. Radars have been developed that can successfully sound most challenging areas such as fast-flowing glaciers and ice-sheet margins. In addition, ultra-wideband radars are being used for fine-resolution mapping of near-surface internal layers in polar firn, for strain rate measurements, ice melt, and other innovative applications. The symposium will cover recent measurements and signal processing advances that are leading to new discoveries. It will also examine the observational needs of the next-generation ice-sheet models, and how radioglaciology can support modeling requirements. The overarching purpose of this meeting is to discuss the latest technical improvements in radars and signal-processing techniques for polar research, to present recent measurements, and to report on analyses and interpretations of recent observations. Additionally, the meeting will provide an opportunity to discuss observational requirements for radars that will most benefit and support development and validation of next-generation ice-sheet models.





TOPICS

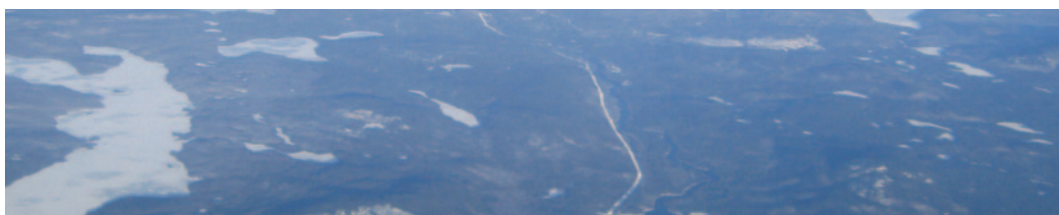
Meeting participants are encouraged to present on a wide variety of topics tied to radioglaciology. These include

1. Radars and signal processing techniques for sounding and imaging of polar ice sheets
2. Ultra-wideband radar technology and innovative polar research applications
3. Recent observations and results over the Greenland and Antarctic ice sheets
4. Enhancements of radar measurements needed for improving next-generation ice-sheet models
5. Refining algorithms for basal condition assessment
6. Addressing the gap in radar capabilities for surface-based observations using radar/seismic intercomparisons
7. Remote sensing techniques for smaller ice masses and ice masses in logistically challenging areas outside the poles.

Additional topics may be added on the basis of request and abstract submissions. Questions and ideas can be referred to members of the Scientific Steering Committee.

ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper (either oral or poster) at the symposium will be required to submit an abstract by 27 April 2013. A program and collection of submitted abstracts on a USB stick will be provided for all symposium participants. The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the symposium themes. Submissions to this issue will not be contingent on presentation at the symposium, and material presented at the symposium is not necessarily affirmed as being suitable for consideration for this issue of the *Annals*. Participants are encouraged, however, to submit manuscripts for this *Annals* volume. The deadline for receiving *Annals* papers is 8 July 2013.





REGISTRATION FEES

All fees are in US dollars, USD

– Participant (IGS member):	\$440
– Participant (not IGS member):	\$510
– Student or retired (IGS member):	\$220
– Student or retired (not IGS member):	\$260
– Accompanying person (18+ years):	\$200
– Accompanying person (12–17 years):	\$110
– Accompanying person (<12 years):	Free
– Late registration surcharge (after 15 June 2013):	\$80

The fees include the icebreaker, daily morning/afternoon coffee/snacks and luncheons (Mon-Fri), a mid-week excursion followed by a BBQ buffet, and the symposium banquet.

Please note that the deadline for full refund is 22 July 2013, while the deadline for partial (on a sliding scale) refund is 24 August 2013. After that, refund requests will not be accepted. All refunds will be made less any bank charges as applicable.

REGISTRATION BY MAIL: Although we strongly prefer registration through the website, it can also be done by filling in and returning the back page of this circular. If payment by credit card is not possible, contact the IGS office to arrange for a bank transfer. All bank transfer payments must include bank charges. Payments made after 15 June 2013 must include the additional \$80 late-registration fee. When completed, please send the form to the Secretary General at the IGS address.

ACCOMPANYING PERSONS: The accompanying person's registration fee (\$200 for 18 and over; \$110 for ages 12 to 17; under 12 free) includes the icebreaker, the mid-week excursion with BBQ, and the symposium dinner. Short excursions and activities in and around Lawrence can be offered on request at additional cost. These include short trips to sightseeing spots in the city, day trips to the surrounding regions, etc.





STUDENT/POSTDOC SUPPORT: Funding is available to partially support student and postdoc attendance at this symposium. Application details will be posted on the IGS/CRISIS symposium webpages later in November 2012.

VENUE AND LOCATION

The meeting will be held on campus of the University of Kansas, Lawrence. Lawrence is situated along the banks of the Kansas and Wakarusa Rivers, and is a 45-minute drive from Kansas City and the Kansas City International Airport (MCI). It has a population of roughly 90 000. Early September is characterized by occasional precipitation and average daily temperatures of roughly 20°C (68°F). Peaks up to 27°C (80°F) frequently occur. Lawrence is one of the few remaining Midwestern cities with a vibrant and thriving downtown area. It is a downhill 10-minute hike from the KU campus with a regular daily public bus service. The city boasts a wide variety of local dining options, busy coffee-shops, bookstores, art galleries, live music venues and locally owned businesses including a brewery, a bakery–café and an art-house film theatre located in the historic Liberty Hall building. The surrounding areas also offer ample scope for geological and cultural excursions. You can hear live jazz in Kansas City, drive to the continent's largest remaining tract of tallgrass prairie in the Kansas Flint Hills, or take a 20-minute walk to Haskell Indian Nations University, a national center for Indian education, research and cultural preservation on the outskirts of the city.

ACCOMMODATION

Fifty rooms have been held on the University of Kansas campus at the Oread Hotel, at a fixed rate of \$115 per night. Additional rooms have been reserved at the Holiday Inn for \$75 per night (also includes breakfast on site at the Holiday Inn). There will be shuttle transport to campus from the Holiday Inn to the conference location (KU Memorial Union). Parking passes are available for local delegates who are commuting to and from the conference.





MID-WEEK ACTIVITIES

Two half-day mid-week excursions will be organized to explore some of the region's natural and cultural surroundings on Wednesday 11 September 2013. Delegates will return to Lawrence in the later afternoon and be shuttled to the nearby Haskell Indian Nations University for a 6 pm BBQ and live event. A group of professional intertribal Powwow performers will drum, sing and dance in full traditional costume at the historic Haskell gazebo.

These two options are:

1. A ranger-guided tour of the Tallgrass Prairie Reserve, in the Kansas Flint Hills, followed by a horse/cattle handling demonstration with old fashioned refreshments and a packed lunch at a nearby working ranch

or

2. A guided tour of the world-class Nelson Museum of Art with lunch at the museum café, followed by a visit to the World War I Museum in Kansas City. This is in close walking distance of Kansas City's newly restored Union Station.

RECEPTION

There will be an icebreaker reception on the fifth floor terrace of the Oread Hotel (KU campus) on Sunday 8 September from 5–10 pm. You will be able to pick up your registration package at this location.

BANQUET

The banquet will be held on Thursday evening at the KU Alumni Association (KU campus) from 6–10 pm. Transport to and from the venue will be provided for guests staying at the Holiday Inn.





SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society)

SCIENTIFIC STEERING AND EDITORIAL COMMITTEE

Prasad Gogineni (University of Kansas, USA), Chair of the Scientific Committee;

David Braaten (University of Kansas, USA), Chief Editor; scientific editors

Sridhar Anandakrishnan (Penn State University, USA), Dorte Dahl-Jensen (University of Copenhagen, Denmark), Hugh Corr (British Antarctic Survey, UK)

LOCAL ORGANIZING COMMITTEE

Sivaprasad Gogineni (Chair), Carl Leuschen, John Paden, Leigh Stearns,

Cornelis van der Veen, Stephen Yan

INVITED SPEAKERS

Confirmed invited speakers include Dr Richard Alley, Dr H. Jay Zwally,

Dr Dorte Dahl-Jensen. Other invited speakers will be confirmed on the symposium webpages shortly.

CONTACTS FOR FURTHER INFORMATION

Magnús Már Magnússon

International Glaciological Society

Scott Polar Research Institute

Lensfield Road, Cambridge, CB2 1ER, UK

Tel: +44 (0)1223 355 974/Fax: +44 (0)1223 354 931/E-mail: igsoc@igsoc.org

Symposium website: <http://www.igsoc.org/symposia/2013/kansas/>

Sorcha Hyland

Center for Remote Sensing of Ice Sheets (CREStS), University of Kansas

2335 Irving Hill Road, Lawrence, Kansas, 66045-7612, USA

Tel: +1 785.864.7998/ Fax: +1 785.864.7753/E-mail: shyland@crestis.ku.edu

Local symposium website: <https://www.crestis.ku.edu/meetings/conferences>

IMPORTANT DATES

Abstract submission deadline:	27 April 2013
Notification of acceptance:	17 May 2013
Pre-registration deadline:	15 June 2013
Paper submission deadline:	8 July 2013
Deadline for refund:	22 July 2013
Registration and Icebreaker:	8 September 2013
Conference begins:	9 September 2013
Final revised papers deadline:	21 October 2013

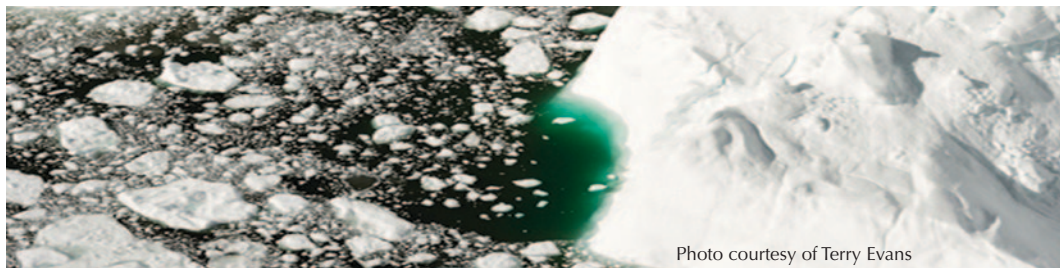


Photo courtesy of Terry Evans

INTERNATIONAL SYMPOSIUM ON RQDIOGLACIOLOGY
Lawrence, Kansas, USA, 9–13 September 2013

REGISTRATION FORM

Register online at www.igsoc.org/symposia/2013/kansas/registration

Family Name: _____

Given Name: _____

Address: _____

Tel: _____ E-mail: _____

Accompanied by:

Name: _____ Age (if under 18) _____

Name: _____ Age (if under 18) _____

Dietary and other requirements: _____

Registration fees (US dollars)

Participant (IGS member)	\$440
Participant (not IGS member)	\$510
Student or retired (IGS member)	\$220
Student or retired (not IGS member)	\$260
Accompanying person (18+/12–17)	\$200/\$110
Late registration surcharge (after 15 June 2013)	\$80

TOTAL REGISTRATION FEES \$_____

Payment of registration fee by MasterCard, VISA or American Express

Card number

Expiration / CVV (last 3 numbers on signature strip)

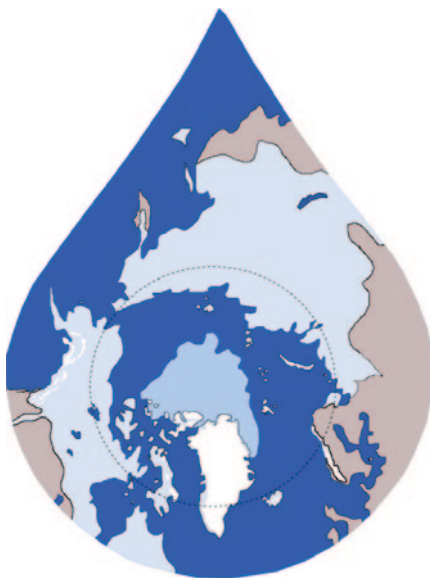
Name of card holder as shown on card: _____

Signature: _____



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on
The Changing Arctic Cryosphere



Edmonton, Alberta, Canada
25–30 August 2014

Co-sponsored by:
Earth and Atmospheric Sciences, University of Alberta

FIRST CIRCULAR
October 2012
<http://www.igsoc.org/symposia/2014/edmonton>
<http://igs2014.easweb.eas.ualberta.ca>

The International Glaciological Society will hold an International Symposium on 'the Changing Arctic Cryosphere'. The symposium will be held in Edmonton, Alberta, Canada, from 25 to 30 August 2014.

THEME

Seasonal ice covers wide zones around the globe mostly in sub-polar latitudes. The main forms are seasonal snow, sea ice, lake and river ice and frozen ground. The extent of the seasonal ice zone is highly sensitive to climate as small climatic variations can have a large impact on the environment as well as human living conditions. Ice–climate feedback mechanisms are important to study as they are often first identified in the seasonal ice zone.

New technologies have broadened our ability to examine the seasonal ice zone, though large uncertainties about its current state remain. Numerical modelling is advancing but thin ice and seasonal snow covers close to the climatological ice margin remain difficult to model because of their transient nature.. Ecological impact studies in the seasonal ice zone have increased over the past ten years, and serve to further highlight the important roles seasonal ice have on the many physical, chemical and biological systems of the sub-polar latitudes.

In view of these advancing technologies, modelling improvements and ecological studies, we announce a symposium focussed on the understanding of seasonal snow and ice. The goal of the symposium is to further progress in understanding how seasonal snow and ice is responding to changes in the environment and climate, and what changes can be expected in the future. This meeting seeks to address these problems by bringing together scientists from diverse communities engaged in research on snow, sea ice, freshwater lake and river ice and frozen ground.

TOPICS

Topics include, but are not limited to

1. Observations of temporal changes of seasonal snow and ice cover, including snow and ice phenomenology, in situ observations and mathematical modelling techniques.
2. Physical, chemical and biological processes of seasonal snow and ice, including snow metamorphosis, snow structure models and the effect of snow quality on the biosphere.
3. Micro-dynamics of ice, including analysis, modelling and interpretation of ice microstructures, and linking microstructures to geophysical signals.
4. Seasonal sea-ice dynamics and the impact of seasonal sea ice on the ocean, including scaling of ice dynamics, mathematical models, ice ridges, and the oceanic boundary layer under sea ice.
5. Frozen ground and permafrost, focusing on observations, theoretical advances and modelling.
6. Lake and river ice, including ecology of frozen lakes, river ice models, estuaries.
7. Ecological impact of snow cover and snow quality.
8. Remote sensing techniques applied to seasonal snow and ice, including sea and lake ice and snow-mapping technology.
9. Theoretical and numerical advances in modelling seasonal snow and ice, including coupling of cryosphere models with regional climate models and intercomparison of models.
10. Projections and forecasts of seasonal snow and ice in a changing climate, including downscaling methods and evaluations.

ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper at the workshop are required to submit an abstract. There will be oral as well as poster presentations. A pre-print of submitted abstracts will be provided for all participants at the symposium. The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants and non-participants alike are encouraged to submit manuscripts for this volume.

SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society)

SCIENCE STEERING AND EDITORIAL COMMITTEE

Ross Brown, Chief Editor (Environment Canada); Martin Sharpe; further Scientific Editors will be determined later.

LOCAL ORGANIZING COMMITTEE

Martin Sharp (Chair).

ADDITIONAL ACTIVITIES

A half-day mid-week excursion will be organized to explore some of Edmonton's geological and cultural surroundings. Details will be forthcoming in the Second Circular.

POST-SYMPOSIUM EXCURSION

To be determined.

VENUE

The meeting will be held at the Centennial Centre for Interdisciplinary Science, University of Alberta, Edmonton. The surroundings offer plenty of scope for geophysical, geological and geographical excursions.

FURTHER INFORMATION

If you wish to attend the symposium please log onto the IGS website at <http://www.igsoc.org/symposia/2014/alberta/preregistration/> and register your details and interest to attend the symposium.

Although we strongly encourage prospective attendees to register online it can also be done by filling in and returning the form on the back page of this circular as soon as possible.

The Second Circular will give further information about accommodation, the general scientific programme, additional activities, preparation of abstracts and final papers. Copies of the Second Circular will be sent to those who pre-register or return the attached reply form. Members of the International Glaciological Society will automatically receive one. Information will be updated on the conference website, <http://www.igsoc.org/symposia/2014/alberta/> and the local website <http://igs2014.easweb.eas.ualberta.ca/> (a link will be introduced on the IGS site).

**INTERNATIONAL SYMPOSIUM ON
THE CHANGING ARCTIC CRYOSPHERE**

Edmonton, Alberta, Canada

25–30 August 2014

Family name: _____

Given name(s): _____

Address: _____

Tel: _____ Fax: _____

E-mail: _____

☐ I hope to participate in the Symposium in August 2014

☐ I expect to submit an abstract

My abstract will be most closely related to the following topic(s):

☐ I am interested in a 3-day post-symposium excursion

PLEASE RETURN AS SOON AS POSSIBLE TO:

Secretary General, International Glaciological Society
Scott Polar Research Institute
Lensfield Road
Cambridge, CB2 1ER, UK

Tel: +44 (0)1223 355 974

Fax: +44 (0)1223 354 931

E-mail: igsoc@igsoc.org

Web: <http://www.igsoc.org>

Seligman Crystal for David Sugden

The Awards Committee of the IGS has decided to award a Seligman Crystal to David E. Sugden. The full citation for this award reads as follows.

David Sugden is one of the key glacial geomorphologists of the last 50 years. His career is remarkable not only in its longevity but also in its breadth and quality of output, his ability to develop new interests at the forefront of important glaciological research and his inspirational leadership.

While his research interests span the disciplines of glacial geology and glaciology, both poles and many previously glaciated regions, perhaps his most significant achievements have been made in Antarctica. He first went south in the 1970s and with Brian John and Chalmers Clapperton developed a series of seminal papers on the geomorphology and glacial chronology of the Antarctic Peninsula and sub-Antarctic Islands. Many of the results from these papers endure today, including observations on former ice shelf collapse, Holocene glacier fluctuations, the timing of post-glacial retreat, and relative sea-level change.

His interests shifted to the Ross Sea and Transantarctic Mountains and, with George Denton and David Marchant, he was at the forefront of the so-called 'Sirius debate', where strongly contrasting views on the long-term stability of the East Antarctic Ice Sheet were debated through the 1990s. David's contribution was to bring a geomorphological perspective to the long-term landscape evolution of the Trans-Antarctic Mountains, and to show researchers from other disciplines that the field of geomorphology had an important contribution to make that could not be developed from other sources. He is also well-known for the discovery of 'the oldest ice on earth' in Beacon Valley, and the ensuing debate about the origin and stability of this ice.

Some of the insights he has provided can be traced to his work in linking glaciology and geomorphology/geology, which really began in the Arctic. He was among the first to link these fields, as is evident in his seminal text book (*Glaciers and Landscape* (1976), which he co-wrote with Brian John). He showed how knowledge of the glacial histories of the Laurentide and Greenland ice sheets can be used to improve understanding of the Antarctic Ice Sheets. To lead quantification of glacial



history, he supervised a series of students (Tony Payne, Nick Hulton, Andy Kerr, Alun Hubbard) who developed 3-D thermomechanical models of ice sheets whose behaviour could be compared to field observations. As a consequence of his leadership, ice-sheet modelling now contributes regularly to debates on ice-sheet behaviour past, present and future.

In the last decade, David has been involved in the application of cosmogenic isotopes to understand glacial and landscape history in Antarctica. He was quick to see that these techniques could revolutionize our understanding by allowing quantification of rates of landscape modification and of the timing of glacial retreat in previously un-dateable settings.

David has also created considerable scientific impact through his research in southern Patagonia. This work focussed on the relative phasing of change between the Northern and Southern Hemispheres and has been at the forefront of ideas about how the pattern of timing and change may differ in the two hemispheres. More recently, he demonstrated that the origin of Antarctic dust during glacial periods, as observed in ice cores, was from Patagonia.

Throughout his career, David has been a well-regarded mentor of PhD students and early-career researchers, leaving a considerable legacy with his supervision of over 40 PhD students. Many of his former students have made significant contributions to polar research and an astonishing number occupy permanent faculty positions across the world, working in a range of glaciological fields. This is in no small part due to David instilling a broad set of skills dealing with field observations and model development, and passing on his insights into clear writing.

His work has already been recognized nationally and internationally by awards that include the UK Polar Medal from the Queen and the Vega Medal awarded by the King of Sweden. We believe the award of a Seligman Crystal is truly merited and would be hugely welcomed by the glaciological community.

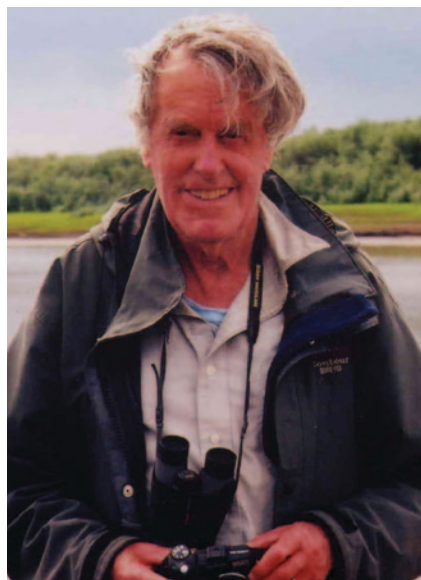
The Awards Committee of the International Glaciological Society

Richardson Medal for Stan Paterson

William Stanley Bryce (Stan) Paterson graduated in 1949 with an honours degree from the University of Edinburgh, where he worked as a lecturer prior to his selection for the survey team on the British North Greenland Expedition in 1953/54. This venture introduced him to glaciology and saw him involved in measuring altitudes at 300 points on a 1200 km traverse across the Greenland ice sheet. From 1955–56, he was employed as assistant surveyor of the South Georgia Survey; there Mount Paterson (54°39'32" S, 36°7'37" W, 2196 m a.s.l.) is named after him.

Stan emigrated to Canada in 1957, earning a PhD in Physics from the University of British Columbia in 1962, and studied glaciers in the Canadian High Arctic and the Rocky Mountains, mainly under the auspices of the Canadian Government's Polar Continental Shelf Project (PCSP); initially part of the Department of Mines and Technical Surveys and then the Department of Energy, Mines and Resources. During this time he produced the first edition of *The Physics of Glaciers* (1969).

He was the architect of Canada's original ice-coring programme on Meighen Island and Devon Island. In the early 1970s, through his involvement with the National Research Council of Canada's Subcommittee on Glaciers, and as IGS Correspondent, he produced regular reports on Canada's snow and ice research. The influence of his work with the PCSP, as one of Canada's leading glaciologists through the 1960s and 1970s, and that of his book, then in its second edition, was recognized by the International Glaciological Society with the award of Honorary Membership in



1994. The third edition of *The Physics of Glaciers*, published that year, has been cited in every single *Journal of Glaciology* and *Annals of Glaciology* since then and has been translated into several other languages, including Russian and Chinese. The book is now in its fourth edition.

Since his retirement from the government in 1980, and move to British Columbia, Stan has worked as a consultant. He has been a visiting scientist with the Geophysics Department at the University of Copenhagen, and with the

Australian Antarctic Division. He has also given a comprehensive lecture course at the Institute of Glaciology and Geocryology in Lanzhou, China.

Below are some of the personal endorsements for Stan's nominations

His text book The Physics of Glaciers, first published in 1969, has been the standard reference for glaciologists for over 40 years. This truly classic reference simply, but rigorously, explains the physical basis of glacier behaviour and highlights the importance of ice masses in the climate system, a focus which has become increasingly important over the 40+ year period.

Ian Allison

A measure of its prominence is that as glaciology evolved and more was known, we insisted that Stan prepare revised edition after revised edition, rather than replacing his text with some one else's version and presentation of glaciology. Stan stood for decades as the glaciological oracle and new glaciologists were educated by studying the current version of The Physics of Glaciers. Writing such an accessible text spanning such a broad field is difficult enough; maintaining a quality text in such a rapidly expanding field as glaciology seems a Herculean task and one that has not come with adequate recognition.

Robert Bindshadler

I was recently asked to participate in an outreach activity presenting the arts to the public as part of the Scientific Committee on Antarctic Research (SCAR) Open Science meeting in Portland. I set the story of the ice sheets to an old folk tune, and presented The Physics of Glaciers in G Major. Anyone who knows glaciers understands immediately, because they all know Paterson. It is entirely appropriate to recognize his great contributions with the Richardson Medal.

Richard Alley

We would be remiss in not having Stan as the first one recognized with a Richardson Medal for a book that, in its various editions, has been so fundamental to us and our colleagues. We need to set the bar high for this aspect of the award and with Stan we could set it no higher. In my opinion there is no more influential book — it is an outstanding contribution to glaciology.

Simon Ommanney

**The Awards Committee of the International
Glaciological Society**



Glaciological diary

** IGS sponsored

* IGS co-sponsored

2012

2–6 July 2012

**International Training Workshop:
Micromorphology of Glacigenic Sediments**

Centre for Micromorphology, Queen Mary,
University of London, London, UK
Details: [http://www.igsoc.org:8000/symposia/
Flyers_etc/CfM_2012.pdf](http://www.igsoc.org:8000/symposia/Flyers_etc/CfM_2012.pdf)
Contact: Simon Carr [s.carr@QMUL.AC.UK]

13–25 July 2012

**SCAR 2012: Antarctic Science and Policy
Advice in a Changing World**

Portland, Oregon, USA
Website: <http://scar2012.geol.pdx.edu/>

14 July 2012

***ISMASS 2012 Workshop**

Portland, Oregon, USA
Website: [http://www.climate-cryosphere.org/
en/events/2012/ISMASS/Home.html](http://www.climate-cryosphere.org/en/events/2012/ISMASS/Home.html)

13–17 August 2012

**Asia Oceania Geosciences Society/American
Geophysical Union Joint Assembly**

Resorts World Sentosa, Singapore
Website: [http://www.asiaoceania.org/
aogs2012](http://www.asiaoceania.org/aogs2012)

26–30 August 2012

**4th International Disaster and Risk
Conference**

Davos, Switzerland
Website: <http://www.idrc.info/>

26–30 August 2012

**IGU 32nd International Geographical
Congress**

Cologne, Germany
Website: [https://igc2012.org/frontend/index.
php](https://igc2012.org/frontend/index.php)

26 August–1 September 2012

**ESF Summer school, ‘Microstructures of Ice
and Snow’**

Obergurgl, Austria
Website: [http://microdice.eu/activities/summer-
school-microstructures-of-ice-and-snow/](http://microdice.eu/activities/summer-school-microstructures-of-ice-and-snow/)

5–6 September 2012

****International Glaciology Society British
Branch Meeting 2012**

Aberdeen, UK
Contact: Douglas Mair [d.mair@abdn.ac.uk]

11–14 September 2012

**4th International Geologica Belgica Meeting
2012 (GB2012): Moving Plates and Melting
Icecaps**

Brussels, Belgium
Website: [http://www.geologicabelgica.be/
gb2012](http://www.geologicabelgica.be/gb2012)

11–22 September 2012

**Karhaus course on Ice Sheets and Glaciers
in the Climate System**

Karhaus, Italy
Website: [http://www.projects.science.uu.nl/
iceclimate/karhaus/](http://www.projects.science.uu.nl/iceclimate/karhaus/)

12–14 September 2012

UK Antarctic Science Conference 2012

Cambridge, UK
Contact: Nicola Munro [asc2012@bas.ac.uk]
Website: [http://www.antarctica.ac.uk/about_
bas/events/ukasc2012/index.php](http://www.antarctica.ac.uk/about_bas/events/ukasc2012/index.php)

16–23 September 2012

5th International Workshop on Ice Caves

Barzio and Milano, Italy
Website: <http://users.unimi.it/icecaves/IWIC-V/>

20–22 September 2012

**19th Annual West Antarctic Ice Sheet
Initiative Workshop**

Eatonville, WA, USA
Website: [http://depts.washington.edu/
wais2012/wais_operations_meeting/users.
unimi.it/icecaves/IWIC-V/](http://depts.washington.edu/wais2012/wais_operations_meeting/users.unimi.it/icecaves/IWIC-V/)

24–29 September 2012

**Symposium: 20 years of Progress in Radar
Altimetry**

Venice-Lido, Italy
Website: <http://www.altimetry2012.org/>

1–5 October 2012

***International Symposium on Ice Core Science**

Giens, France
Website: <http://www.ipics2012.org/>

13–20 October 2012

**Interdisciplinary Climate Change Research
Symposium**

Colorado Springs, Colorado, USA
Website: <http://discrs.org/a>

18 October 2012

Parallel Ice Sheet Model (PISM) Workshop

Seattle, Washington, USA
Contact Andy Aschwanden [[aaschwanden@
alaska.edu](mailto:aaschwanden@alaska.edu)]

19–20 October 2012

Northwest Glaciologists Meeting

University of Washington, Seattle,
Washington, USA

Website: [http://www.ess.washington.edu/
Surface/Glaciology/Glaciology/Home.html](http://www.ess.washington.edu/Surface/Glaciology/Glaciology/Home.html)

23–26 October 2012

**Arctic in Rapid Transition (ART) Science
Workshop**

Sopot, Poland

Website: <http://tinyurl.com/Sopot2012>

Contact: Christie Wood [chwood@clarku.edu]

25–27 October 2012

**International Glaciology Society Nordic
Branch Meeting 2012**

Stockholm, Sweden

Contact: Susanne Ingvander[susanne.
ingvander@natgeo.su.se]

1–3 November 2012

**XI International Scientific Conference:
Integrated Researches of Spitzbergen Nature**

Murmansk, Russia

Website: <http://icc.skics.ac.cn/>

5–9 November 2012

**26th Scientific Conference and First
Workshop on Geomatics in Earth Sciences**

San Miguel de Tucumán, Tucumán, Argentina

Website: [http://www.aaggreunion.org/eng/
contents/info](http://www.aaggreunion.org/eng/contents/info)

10–12 November 2012

**International Conference on the Cryosphere:
Changes, Impacts and Adaptation**

Sanya, China

Website: <http://icc.skics.ac.cn/>

3–7 December 2012

American Geophysical Union Fall Meeting

San Francisco, California, USA

Website: <http://fallmeeting.agu.org/2012/>

10–12 December 2012

**2012 Ice Sheet System Model (ISSM)
Workshop**

Irvine, California, USA

Website: [http://issm.jpl.nasa.gov/
issmworkshops/](http://issm.jpl.nasa.gov/issmworkshops/)

2013

6–8 January 2013

SEG/AGU Cryosphere Geophysics Workshop

Boise, Idaho, USA

Website: [http://www.seg.org/events/
upcoming-seg-meetings/cryo2013](http://www.seg.org/events/upcoming-seg-meetings/cryo2013)

Contact: Hans-Peter Marshall [hpmarshall@
boisestate.edu]

14–17 January 2013

**Third International Symposium on Arctic
Research (ISAR3): Detecting the change in
the Arctic System and searching the global
influence**

Tokyo, Japan

Contact: Japan Consortium for Arctic

Environmental Research [jcar-office@nipr.ac.jp]

Website: <http://www.jcar.org/isar-3/>

17–20 January 2013

World Snow Forum

Novosibirsk, Russia

Website: <http://www.worldsnowforum.org/>

20–25 January 2013

**Arctic Frontiers: Geopolitics and Marine
Production in a Changing Arctic**

Tromsø, Norway

Website: <http://www.arcticfrontiers.com/>

14–15 February 2013

17th Alpine Glaciology Meeting

Grenoble, France

25–28 February 2013

**Workshop on the Dynamics and Mass Budget
of Arctic Glaciers / IASC Network on Arctic
Glaciology Annual Meeting**

Obergurgl, Austria

Contact Carleen Tijn-Reijmer [c.h.tijn-reijmer@
uu.nl]

Website: <http://ny.arcticportal.org/workshop.html>

4–5 April 2013

Conference: Holocene Climate Change

London, UK

Contact Steve Whalley [steve.whalley@
geolsoc.org.uk]

8–13 July 2013

**Joint IACS/IAMAS Conference: Air and ice –
interaction processes**

Davos, Switzerland

Contact: Charles Fierz [fierz@slf.ch]

Website: http://www.daca-13.org/index_EN

28 July–2 August 2013

****International Symposium on Changes
in Glaciers and Ice Sheets: observations,
modelling and environmental interactions**

Beijing, China

Contact: Secretary General, International
Glaciological Society

Website: [http://www.igsoc.org:8000/
symposia/2013/beijing/](http://www.igsoc.org:8000/symposia/2013/beijing/)

27–31 August 2013

**8th IAG International Conference on
Geomorphology**

Paris, France

Website: [http://www.geomorphology-iag-
paris2013.com/](http://www.geomorphology-iag-paris2013.com/)

4–5 September 2013

****International Glaciology Society British Branch Meeting 2012**

Loughborough, UK

Contact: Richard Hodgkins [r.hodgkins@lboro.ac.uk]

9–13 September 2013

****International Symposium on**

Radioglaciology: advances in radio frequency, microwave and digital technologies

Lawrence, Kansas, USA

Contact: Secretary General, International Glaciological Society

Website: <http://www.igsoc.org:8000/symposia/2013/kansas/>

7–11 October 2013

ISSW International Snow Science Workshop 2013

Grenoble and Chamonix Mont-Blanc, France

Website: <http://www.issw2013.com/>

Flyer as PDF at <http://www.extranet.insight-outside.fr/upload/compte367/File/flyerissw2.pdf>

2014

9–14 March 2014

****International Symposium on Sea Ice**

Hobart, Australia

Contact: Secretary General, International Glaciological Society

17–20 March 2014

13th International Conference on the Physics and Chemistry of Ice (PCI-2014)

Hanover, New Hampshire, USA

Website: <http://engineering.dartmouth.edu/pci-2014>

26–30 May 2014

****International Symposium on Observations, Modelling and Prediction of the Cryospheric Contribution to Sea Level Change**

Chamonix, France

Contact: Secretary General, International Glaciological Society

22 August – 3 September 2014

XXXIII SCAR Biennial Meetings and Open Science Conference

Auckland, New Zealand

Contact: Katrina Hall [gateway-antarctica@canterbury.ac.nz]

Website: <http://www.scar2014.com/>

25–30 August 2014

****International Symposium on the Changing Arctic Cryosphere**

Edmonton, Alberta, Canada

Contact: Secretary General, International Glaciological Society

2015

August 2015

****International Symposium on Contemporary Ice-Sheet Dynamics: ocean interaction, meltwater and non-linear effects**

Cambridge, UK

Contact: Secretary General, International Glaciological Society

2016

June 2016

****International Symposium on the Hydrology of Glaciers and Ice Sheets**

Iceland

Contact: Secretary General, International Glaciological Society

August/September 2016

****International Symposium on Polar Sea Ice, Polar Climate and Polar Change**

Boulder, Colorado, USA

Contact: Secretary General, International Glaciological Society



New members

Dr Erkut Aykutluğ

Department of Earth System Science, University of California, Irvine, 3200 Croul Hall, Irvine, CA 82697-3100, USA
Tel +1 949 232-5977
eaykutlu@uci.edu

Mr John Anton

Earth and Environmental Science, CUNY 365 Fifth Avenue, New York NY 10016, USA
jaanton311@yahoo.com

Ing. Francesco Avanzi

Via Vivaldi 7, Garbagnate Milanese IT-20024, Italy
Tel +39 3337856344
avanzi.francesco@gmail.com

Martin Brader

Department of Geography, Durham University South Road, Durham DH1 3LE, UK
m.d.brader@durham.ac.uk

Samaneh Ebrahimi

Earth Science, University of Calgary 2500 University Dr NW, Calgary, Alberta T2N 1N4, Canada
Tel +1 403 8800245
ebrahimi_samaneh@yahoo.com

Miss Mariana Esteves

41 Alderley Road, Hoylake Wirral CH47 2AU, UK
mdsresteves@gmail.com

Ms Verity Flett

School of the Environment, University of Dundee Nethergate, Dundee DD1 4HN, UK
Tel +44 (0)7547113459
v.t.flett@dundee.ac.uk

Dr James Floyer

Department of Geoscience, University of Calgary 2500 University Drive NW, Calgary, Alberta T2N 1N4, Canada
jafloyer@gmail.com

Mr Harold Lovell

School of Geography, Queen Mary University of London
Mile End Road, London E1 4NS, UK
h.lovell@qmul.ac.uk

Mr Cedomir Marangunic

Geostudias
Los Aromos 3408, Las Vertientes, San José de Maipo-Santiago, 946000 Chile
Tel +56 28711727
anamarangunic@geoestudios.cl

Charles Michaud

80 William Street, Sturgeon Falls, Ontario P2B 2A8, Canada
Tel +1 705 753 0584
cp.michaud@bell.net

Mr Matthew Owens

9109 Colt Lane, Annandale, VA 22003, USA
matthewowens95@yahoo.com

Miss Iina Ronkainen

University of Helsinki
Ruututorppa 8 C 29, Espoo, FIN-02610, Finland
iina.ronkainen@helsinki.fi

Mr Joseph Souney

Institute for the Study of Earth, Oceans and Space, University of New Hampshire
Morse Hall, 8 College Road, Room 236, Durham, NH 03824, USA
joseph.souney@unh.edu

Mr Gifford J. Wong

Dartmouth College
6105 Sherman Fairchild Hall, Hanover, NH 03755, USA
Tel +1 603 646 0285
gifford.wong@gmail.com

Prof. Dr Heinz J. Zumbühl

Institute of Geography
Halen 34, Herrenschwanden Berne, CH-3037 Switzerland
Tel +41 (00)41313019609
zumbuehl@giub.unibe.ch

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Scott Polar Research Institute, Lensfield Road
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Editor: M.M. Magnússon (Secretary General)

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All enquiries about the International Glaciological Society should be addressed to:
Secretary General, International Glaciological Society, Scott Polar Research Institute,
Lensfield Road, Cambridge CB2 1ER, UK

Tel: +44 (1223) 355 974 Fax: +44 (1223) 354 931

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