

*Number 178*

*3rd Issue 2018*



**NEWS BULLETIN  
OF THE INTERNATIONAL  
GLACIOLOGICAL  
SOCIETY**





# Ice

## News Bulletin of the International Glaciological Society

Number 178

3rd issue 2018

### Contents

- |  |   |
|--|---|
| <b>2 From the Editor</b>   | <b>16 News</b>  |
| <b>3 Call for nominations for IGS awards</b>   | 16 Annual General Meeting 2018  |
| <b>4 International Glaciological Society</b>   | 22 Obituary: J. Graham Cogley, 1948–2018  |
| 4 <i>Journal of Glaciology</i>   | 25 Obituary: Johannes Weertmann, 1925–2018  |
| 5 <i>Annals of Glaciology</i> (59) 77  | 30 Obituary: Lorne Gold, 1928–2018  |
| 5 <i>Annals of Glaciology</i> (60) 78  | 32 Obituary: Trevor Chinn 1937–2018   |
| 6 <i>Annals of Glaciology</i> (60) 79  | 33 Second Circular: International Symposium on Glacial Erosion and Sedimentation, Madison, Wisconsin, USA, May 2019 |
| 7 Report on the course 'Glaciology of the Southern Andes', Mendoza, Argentina, August 2018 | 41 Second Circular: International Symposium on Sea Ice at the Interface, Winnipeg, Manitoba, Canada, August 2019    |
| 9 Report on the British Branch Meeting, Exeter, UK, September 2018                         | <b>53 Glaciological diary</b>   |
| 11 Report on the Nordic Branch Meeting, Rovaniemi, Finland, October 2018                   | <b>57 New members</b>   |
| 13 Report from the IGS Kyoto Symposium, Japan, March 2018                                  |   |

Cover picture: The Juneau Icefield, Alaska, USA. Photo by Brad Parsk BSc FRGS.

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

Welcome to the last issue of ICE for 2018. I realize we are almost 3 months into 2019 but as you can see this is a substantial issue. Sadly, it contains several obituaries for several IGS members who have died recently and the first issue of 2019 will include several more. This issue has the obituary of Hans Weertman. Hans joined the IGS in 1955 and obviously held the Society in high esteem as he left us a very generous legacy in his will. He is not the first IGS member who has done so and hopefully he will not be the last.

I would like to report on the 'changing of the guard' of the IGS Committees in the last few months. Let me start with the Awards Committee. We are very lucky in that Ian Allison has taken on the job of Chair. Elisabeth Isaksson and Dirk Notz continue on the committee to maintain continuity. The newcomers are Andrew Mackintosh, Sergey Sokratov, Shin Sugiyama and Carleen Tijn-Reijmer, and between them the members cover most of the disciplines within Glaciology.

The Nominations Committee is chaired by the immediate past president, Doug MacAyeal, as is customary. The rest of the committee are all new but are all well known to the glaciological community. They are Liss Andreassen, Kumiko Goto-Azuma, Jennifer Hutchings, Mikhail Ivanov and Allen Pope.

That brings us to the Publications Committee. Again we are very lucky that Gwenn Flowers has agreed to stay on as Chair. The rest of the committee comprises Kees van der Veen, Liam Colgan, Ian Allison and Valentina Radić, all of whom have served for at least a year. As with the other two committees, the IGS President and I are ex-officio members, but this time we are joined by the IGS Chief Editor, Hester Jiskoot.

The new committees have all been busy. The Awards Committee has issued a call for nominations for the various IGS awards, as you can see opposite. The Nominations Committee issued a call to all IGS members for suggestions as to who should replace the outgoing Council members, although it pains me to say that the uptake on that was very poor. But the Committee has managed to come up with a slate that will be sent to all IGS members shortly.

The Publications Committee is continuously reviewing the various aspects of publishing our journals. Their most recent accomplishment, in collaboration with the IGS Chief Editors, has been to greatly enlarge and strengthen the *Journal* editorial board. To list all the members of the board would take up the better part of a page, so I refer you to the IGS website for the complete listing.

Finally, the new IGS membership and events database is now fully operational, thanks to the hard work of our Membership and Accounts Manager, Louise Buckingham. This includes a secure payment portal where you can pay your membership and register and pay for the various IGS events. We will slowly expand the portal to include an online store where you will be able to purchase IGS merchandise.

**Magnús Már Magnússon**  
Secretary General



## Awards by the International Glaciological Society

The International Glaciological Society is currently seeking nominations for its three Honorary Awards:

- ❄ The *Seligman Crystal* (awarded to a single person or a collaborative group/team that has made exceptional scientific contributions to glaciology, defined as any snow and/or ice studies)
- ❄ The *Richardson Medal* (awarded to a single person or a collaborative group/team that has provided outstanding service to the International Glaciological Society and/or to the field of glaciology), and
- ❄ *Honorary Membership* (recognizes individuals who have made outstanding contributions to the field of glaciology at a national or regional level).

Details of these awards, their eligibility and the requirements of the nomination packages are available at <https://www.igsoc.org/awards/>. Members of the Awards Committee are listed at <https://www.igsoc.org/committees/awards/>.

Please note that the awards system has been revamped and that some awards have changed in scope and content. It is the intention of the IGS to give these awards from now on roughly on an annual basis.

Nominations can be made at any time, but the close-off date for the 2019 awards is **Friday 7 June 2019**. (Nominations received after that date will be considered for 2020.) Nomination packages should be sent by email, marked confidential, to the Chair of the Awards Committee,

Dr Ian Allison, ([ian.allison@utas.edu.au](mailto:ian.allison@utas.edu.au)),

and copied to the Secretary General ([magnus@igsoc.org](mailto:magnus@igsoc.org)).

All nominations will be acknowledged, and the result of any successful 2019 awards will be announced in July/August.

We look forward to receiving nominations of your peers from the community.



# International Glaciological Society

## *JOURNAL OF GLACIOLOGY*

Papers accepted for publication between 1 October and 31 December 2018. The papers are listed in alphabetical order by first author. Some of these papers have already been published.

**Luca Carturan, Federico Cazorzi, Giancarlo dalla Fontana, Thomas Zanoner**  
Automatic measurement of glacier ice ablation using thermistor strings

**Ryan Cassotto, Mark Fahnestock, Jason Amundson, Martin Truffer, Margaret Boettcher, Santiago de la Pena, Ian Howat**  
Nonlinear glacier response to calving events, Jakobshavn Isbræ, Greenland

**Julia Christmann, Ralf Mueller, Angelika Humbert**  
On nonlinear strain theory for a viscoelastic material model and its implications for calving of ice shelves

**Thomas Chudley, Ian Willis**  
Glacier surges in the north-west West Kunlun Shan inferred from 1972–2017 Landsat Imagery

**César Deschamps-Berger, Christopher Nuth, Ward van Pelt, Etienne Berthier, Jack Kohler, Bas Altena**  
Closing the mass budget of a tidewater glacier: the example of Kronebreen, Svalbard

**Florent Domine, Maria Belke-Brea, Denis Sarrazin, Laurent Arnaud, Mathieu Barrere, Mathilde Poirier**  
Soil moisture, wind speed and depth hoar formation in the Arctic snowpack

**Simon Filhol, Matthew Sturm**  
The smoothing of landscapes during snowfall with no wind

**Xiyu Fu, Zhen Li, Jianmin Zhou**  
Characterizing the surge behaviour of Alakesayi Glacier in the West Kunlun Shan, Northwestern Tibetan Plateau, from remote sensing data between 2013 and 2018

**Vikram Goel, Carlos Martin, Kenichi Matsuoka**  
Ice-rise stratigraphy reveals changes in surface mass balance over the last millennia in Dronning Maud Land

**Anna Ruth Halberstadt, Lauren Simkins, John Anderson, Lindsay Prothro, Philip Bart**  
Characteristics of the deforming bed: till properties on the deglaciated Antarctic continental shelf

**Zhengyi Hu, Pavel Talalay, Zhichuan Zheng, Pinlu Cao, Xiaopeng Fan, Guitao Shi, Yuansheng Li, Hongmei Ma**  
Air reverse circulation at the hole bottom in ice-core drilling

**Christian Kienholz, Jason Amundson, Roman Motyka, Rebecca Jackson, John Mickett, David Sutherland, Jonathan Nash, Dylan Winters, William Dryer, Martin Truffer**  
Tracking icebergs with time-lapse photography and sparse optical flow, LeConte Bay, Alaska, 2016–17

**Stanislav Kutuzov, Lonnie Thompson, Ivan Lavrentiev, Lide Tian**  
Ice thickness measurements of the Guliya ice cap, western Kunlun Mountains (Tibetan Plateau), China

**Lisbeth Langhammer, Lasse Rabenstein, Lino Schmid, Andreas Bauder, Melchior Grab, Philipp Schaer, Hansruedi Maurer**  
Glacier bed surveying with helicopter-borne dual-polarization ground-penetrating radar

**James Lever, Susan Taylor, Garrett Hoch, Charles Daghljan**  
Evidence that abrasion can govern snow kinetic friction

**Yongqin Liu, John Priscu, Yao TanDong, Trista J. Vick-Majors, Alexander B. Michaud, Liang Shen**  
Culturable bacteria isolated from seven high altitude ice cores on the Tibetan Plateau

**Juan Lopez Moreno, Jesus Revuelto, Luis Mariono del Rio, Oriol Montserrat, Jaime Otero, Javier Lapazaran, Alfredo Serreta, Ibai Rico, Enrique Serrano, Niccolò Dematteis, Guido Luzi, Ana Moreno, Miguel Bartolome, Samuel Buisan, Esteban Alonso**  
Ground-based remote sensing techniques for diagnosis of the current state and recent evolution of the Monte Perdido Glacier, Spanish Pyrenees

**David McClung, Chris Borstad**  
Probabilistic size effect law for mode II fracture from critical lengths in snow slab avalanche weak layers

**Benjamin Reuter, Martin Proksch, Henning Löwe, Alec van Herwijnen, Jürg Schweizer**  
Comparing measurements of snow mechanical properties relevant for slab avalanche release

**Johnny Sanders, Kurt Cuffey, Kelly MacGregor, Jeffrey Kavanaugh, Christine Dow**  
Variations in the surface velocity of an alpine cirque glacier

**Hakime Seddik, Ralf Greve, Daiki Sakakibara, Shun Tsutaki, Masahiro Minowa, Shin Sugiyama**  
Response of the flow dynamics of Bowdoin Glacier, northwestern Greenland, to basal lubrication and tidal forcing

**Vjeran Višnjević, Frédéric Herman, Yuri Podladchikov**  
Reconstructing spatially variable mass balances from past ice extents by inverse modelling

**Bangbing Wang, Bo Sun, Jiaxin Wang, Jamin Greenbaum, Jingxue Guo, Laura Lindzey, Xiangbin Cui, Duncan Young, Donald Blankenship, Martin Siegert**  
Removal of 'strip noise' in airborne radio-echo sounding data using combined wavelet and 2-D FFT filtering

**Christopher Wilson, Nicholas Hunter, Vladimir Luzin, Mark Peternell, Sandra Piazzolo**  
The influence of strain rate and presence of dispersed second phases on the deformation behaviour of polycrystalline D2O ice

**Guangjian Wu, Peilin Li, Zhang Xuele, Chenglong Zhang**  
Using a geochemical method of dissolved and insoluble fractions to characterize surface snow melting and major element elution

## **ANNALS OF GLACIOLOGY 59(77)**

*The following papers have been selected for publication in Annals of Glaciology 59(77) (thematic issue on Cryosphere and Biosphere), edited by Alex Anesio, Andrew J. Hodson and Martyn Tranter*

**Florie Giacona, Nicolas Eckert, Robin Mainieri, Brice Martin, Christophe Corona, Jerome Lopez-Saez, Jean-Matthieu Monnet, Mohamed Naaim, Markus Stoffel**  
Avalanche activity and socio-environmental changes leave strong footprints in forested landscapes: a case study in the Vosges medium-high mountain range

**Yusuke Harada, Ryuzo Wakabayashi, Yoshikage Inoue**  
Elevation-dependent behavior of hoar-prominent snowpack on forest slopes in the Japanese Central Alps based on a decade of observations

**Gautami Samui, Runa Antony, Meloth Thamban**  
Chemical characteristics of hydrologically distinct cryoconite holes in coastal Antarctica

**Thomas Turpin-Jelfs, Katerina Michaelides, Joshua Blacker, Liane Benning, James Williams, Alexandre Anesio**  
Distribution of soil nitrogen and nitrogenase activity in the forefield of a High Arctic receding glacier

More papers for *Annals* 59(77) will be listed in the next issue

## **ANNALS OF GLACIOLOGY 60(78)**

*The following papers have been selected for publication in Annals of Glaciology 60(78) (thematic issue on Timescales, Processes and Glacier Dynamics), edited by Jesse Johnson and Cornelis van der Veen*

**Penelope How, Kristin Schild, Douglas Benn, Riko Noormets, Nina Kirchner, Adrian Luckman, Dorothee Vallot, Nick Hulton, Chris Borstad**  
Calving controlled by melt-undercutting: detailed calving styles revealed through time-lapse observations

**Holly Still, Adam Campbell, Christina Hulbe**  
Mechanical analysis of pinning points in the Ross Ice Shelf, Antarctica

More papers for *Annals* 60(78) will be listed in the next issue



## ANNALS OF GLACIOLOGY 60(79)

*The following paper has been selected for publication in Annals of Glaciology 60(79) (thematic issue on Progress in Cryoseismology), edited by Fabien Walter*

**Louis Garcia, Karen Luttrell, Deborah Kilb,  
Fabian Walter**

Joint geodetic and seismic analysis of surface  
crevassing near a seasonal glacier-dammed lake  
at Gornergletscher, Switzerland

**Douglas MacAyeal, Alison Banwell, Emile Okal,  
Jinqiao Lin, Ian Willis, Becky Goodsell,  
Grant Macdonald**

Diurnal seismicity cycle linked to subsurface  
melting on an ice shelf

**Lukas Preiswerk, Clotaire Michel, Fabian Walter,  
Donat Fäh**

Effects of geometry on the seismic wavefield of  
Alpine glaciers

**Tao Zhang, Yuqiao Chen, Min Ding,  
Zhongyan Shen, Yuande Yang, Qingsheng Guan**

Air-temperature control on diurnal variations in  
microseismicity at Laohugou Glacier No. 12,  
Qilian Mountains

More papers for *Annals* 60(79) will be listed in  
the next issue





# Glaciology of the Southern Andes

Mendoza, Argentina, 6–13 August 2018



Students and lecturers of Glaciology of the Southern Andes, 2018, at IANIGLA, Mendoza, Argentina.

In August, we had the incredible fortune of participating in the fourth annual postgraduate course ‘Glaciology of the Southern Andes’ by the Instituto Argentino de Nivología, Glaciología y Ciencias Ambientales (IANIGLA-CONICET) in Mendoza, Argentina. With the support of the International Glaciological Society, this course offers a one-of-a-kind opportunity to learn about the unique glacial dynamics of the Southern Andes and gain hands-on experience with various glaciological research methods.

This year, the seven-day intensive course brought together 28 students and professionals with a deep interest in glaciology from across Argentina, Chile, Spain and the United States. In addition to being such an international group, we were struck by the diversity in experiences of the cohort: the group included government agency researchers, an engineering consulting professional, pre-graduate geology students, and paleoclimatology and biology doctoral students.

The course included lectures from the IANIGLA-CONICET staff on the fundamentals of glaciology, mountain hydrology, glacier dynamics, glacier geomorphology and the remote sensing of glaciers. We spent the afternoons working on collaborative lab exercises, including calculating glacier surface mass balance and energy mass balance, characterizing glacier

dynamics and practicing techniques in glacier satellite imagery processing. Each student gave a short presentation about our previous experience, work and interest in glaciology, and completed the course by taking a final exam.

For the final portion of the course, we spent three days high in the Andes in the valley of Morenas Coloradas, Cordón del Plata, Mendoza (between 69°19' and 69°26' W, and 32°55' and 32°59' S). From our home base at Refugio San Bernardo (2800 m), on the first day, we hiked up to the Hans Stepanek rock glacier (4194 m) in the Quebrada del Medio to learn about and observe the glacier's dynamics and flow. The next day, a bit more acclimatized, we trekked up an old ski run to a local weather station to learn about methods for collecting and utilizing meteorological data. We continued on, hiking over a non-active rock glacier, observing the impressive local peaks of Colorado (5124 m) and Maussy (4600 m) and sharing a few snowball fights.

The course was thoughtfully designed and extremely informative, but what made it truly unique was the opportunity to build relationships with passionate and inspiring students and researchers from all over the world who care deeply about glaciers. We left the course with a new network of friends and collaborators, and for this, we are very grateful. Muchas gracias!



The students and staff of IANIGLA heading to Morena Coloradas, the most famous rock-glacier of the Cordon del Plata, Central Andes of Mendoza.

### Cullen Personal Testimony

I have spent this year researching climate change, local glacier retreat and water scarcity in Chile as a Fulbright US Student Scholar. Taking this course with CONICET was key to my development as a glaciology and geography researcher, and directly improved my project work in Chile. As glacier retreat from climate change accelerates across the Andes, and across the world, hands-on, locally-focused courses such as this one are needed now more than ever. Taking the course in Spanish with local students and researchers made it even more meaningful and memorable for me. The experience further confirmed my desire to continue my education in glaciology, climatology and water resource management, continuing to focus in the Andes.

### Peltier Personal Testimony

I'm in Chile on a Fulbright grant studying past advances of the Patagonian Ice Sheet as part of my research for my PhD at Columbia University. I'm studying glacial deposits in Southern Chile and Argentina with the goal of figuring out when and why major climate changes have happened in the Southern Hemisphere. My research focus has been centered on a small part of Patagonia over a specific timescale, so this course provided me with the broader context for how my site fits into the region. The course catered to different learning styles by incorporating a mix of lectures, practicals and a trip into the field to see the landforms first-hand. Learning from six world experts on glaciology as well as my international contemporaries broadened my perspective



Mariano Masiokas, from IANIGLA, introducing to the students the automatic weather station at the foot of Morenas Coloradas rock-glacier.

on the diverse forms and functions of glaciers and the diversity in the ways that we interact with and study glaciers. We learned about how glacier systems function fundamentally, which is applicable over any timescale or region. I expect to benefit from the material I learned and the connections I made in the course throughout my career. Thank you!

**Kate Cullen (Fulbright Chile)**  
**Carly Peltier (Fulbright Chile, Columbia University)**



From right to left, Pierre Pitte, Juan Pablo Scarpa, Laura Zalazar and Lucas Ruiz from IANIGLA, explaining the morphological characteristics which characterize the surface of rock-glaciers, with the example of rock-glacier Stepanek at the back.



# British Branch Meeting 2018

University of Exeter, 4–5 September 2018

The 43rd Annual Meeting of the International Glaciological Society British Branch was hosted by the University of Exeter, between 4 and 5 September 2018. We were warmly welcomed to the beautiful Exeter campus by Anne Le Brocq and the rest of the organizing committee. We settled into the sunny southwest, ready for two days of presentations on all aspects of glaciology, stretching from the Greenland Ice Sheet, through mountain glaciers, to Antarctica. Altogether, we enjoyed 27 oral presentations, with 14 given by postgraduate students, and 28 poster presentations.

The first day started with a morning of talks on the Greenland Ice Sheet. This began with presentations by Susan Bevan and Josh Williams, informing us about recent changes in Greenland's dynamic behaviour. We then moved on to learn about approaches to high-resolution monitoring of Greenland, namely terrestrial time-lapse and drone surveys. After a short break, we heard about work on Greenland's hydrology, including Liz Bagshaw's Cryoeegs and the challenges of field testing them!

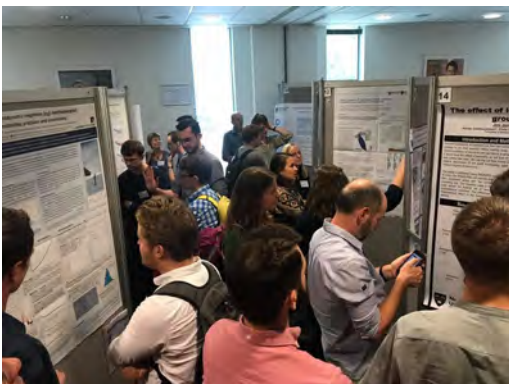
After lunch, the talks moved to a smaller scale and examined recent changes on glaciers and ice caps. This included some excellent work on surge-type glaciers and some mesmerizing videos of glacier dynamics from Adrian Luckman. Talks concluded mid-afternoon and we began a vibrant and very busy poster session. The posters covered a wide range of different topics and approaches, including numerical modelling, fieldwork and



Susan Bevan kicking off the first day of talks.

remote sensing. We saw data from across the world, with presenters discussing results from Antarctica, Greenland and the Himalaya. We even found out about glaciers on Mars! Overall, the poster session demonstrated the very high quality of work being done in UK glaciology and being presented at British Branch: many of the posters and talks would be very well placed at international conferences (and I'm sure many will be presented there in the near future!).

After the posters, we transferred the ongoing discussions to the conference dinner at Exeter University's impressive Reed Hall. After some delicious food and excellent beer, we had a lesson in Norse mythology from our very own Magnús.

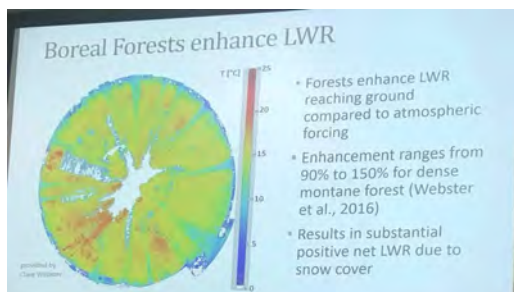


A very busy poster session!



Enjoying dinner and further glaciological discussions in Exeter University's Reed Hall.





One of the coolest (pardon the pun) figures from the talks: it shows temperatures in a forest canopy, looking upwards from the ground, and was presented by Markus Todt.

We learnt about Fenris, Helheim and Midgaard, known to some as part of the story of Loki and his sons, and others as a set of outlet glaciers in eastern Greenland! After the end of the tale, we finished our drinks and headed to a local public house to sample the excellent beer that Exeter has to offer.

Day 2 began bright and early with a session on subglacial environments. This was kicked off by David Sugden, talking about the pre-glacial geomorphology of Antarctica, followed by Kate Winter outlining the topographic controls in Antarctic ice flow. Two further talks on subglacial properties followed, delivered by Francesca Falcini and Emma Pearce. We then had the IGS British Branch Meeting, where we discussed future host venues and it was confirmed that the next meeting will be at Northumbria University in Newcastle.

The penultimate session saw three talks about snow, which is a major part of our cryosphere and so it was great to see it represented in the talk topics this year. We then moved on to a really interesting talk by Andrew Tedstone about the impact of algae on Greenland Ice Sheet melting. Finally, Nick Selmes presented Caroline Clason's talk, as she was unfortunately unwell and could not attend. We all wished Caroline a very speedy recovery and really hope to see her fit and well for next year's meeting.

The period after lunch was devoted to the IGS AGM, where we saw the treasurer's report and discussed future use of the funds held by the society. The final session focussed on ice-water interactions and took us a journey all over the globe, from mountain lakes in Sweden to the Nivlisen Ice Shelf in East Antarctica. Here, we got to see that money is definitely not everything when it comes to purchasing field kit, with Adrian Dye showing us great results from a toy boat he bought on eBay!

The British Branch Meeting finished with the customary awarding of the John Glen prizes for student presentations, which were judged by David Sugden, Liz Morris and Nick Rutter. The winners were Josh Williams for the best talk, entitled 'Decadal scale ice velocity change at land-terminating margins of the Greenland Ice Sheet' and Ben Davidson for his poster on 'Contrasting seasonal speed-ups of neighbouring Greenlandic tidewater glaciers'. Congratulations to both our winners and all the fantastic student presenters.

All that remains is to thank the local organizing committee for an interesting and productive meeting and to also thank everyone for presenting their work. We can all look forward to the next meeting at Northumbria University in September 2019.

## Rachel Carr



Presentations of the John Glen prizes to Ben Davidson (best poster, above) and Josh Williams (best talk).



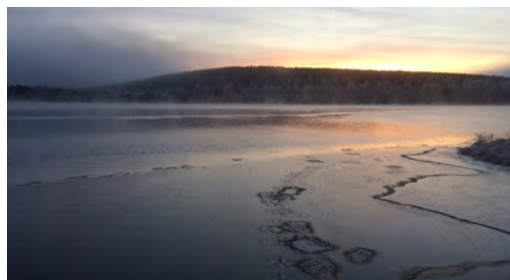
# Nordic Branch Meeting 2018

Arktikum Centre, Rovaniemi, Finland, 24–25 October 2018

The 26th Annual meeting of the International Glaciological Society Nordic Branch was hosted by the University of Lapland at the Arktikum Centre, Rovaniemi, northern Finland, on 24–25 October 2018. The IGS Nordic Branch meeting provides an opportunity for researchers, primarily from the Nordic countries but also from many other countries, including even small islands in the Southern Hemisphere, to meet and discuss current research.

An Icebreaker and registration preceded the two-day meeting, which had six oral sessions and poster presentations, with a large number of the 27 talks given by students and early-career scientists. On the first day of the meeting prior to the first session all participants were treated to a cold and crisp Arctic morning, with a heavy frost on the ground and trees creating the perfect Nordic backdrop to the meeting. For those participants arriving from lower latitudes the sense of being back in a cold climate was welcomed after the fierce summers experienced by many in both hemispheres in 2018.

The first session was opened by John Moore from the University of Lapland, who welcomed the participants, followed by some practical information given by Rupert Gladstone, who was responsible for overseeing much of the meeting's registration, handling of abstracts and other associated matters. It was intended that Alun Hubbard would open the meeting but, as many of us were to find out, getting in and out of Rovaniemi is not always without its challenges. With Alun still working his way up to Rovaniemi, the first-



A cold start to the first morning on the walk to the Arktikum Centre, Rovaniemi in late October.

presentation honour was handed over to Joni Mäkinen, who gave an interesting presentation on 'Murtoo', the missing link between channelized and distributed subglacial drainage systems. The presentations in the first session, including the first student presentation by Cheng Gong, were focused primarily on model developments, followed by poster presentations. There was no formal poster session, but instead the posters were discussed during coffee and lunch breaks, which provided the perfect informal backdrop to engage with the presenters. Two further sessions on Iceland and Svalbard bookended the day, followed by an engaging public lecture by John Moore on engineering ice sheets and whether this might help to mitigate the effects of sea-level rise.

The evening was spent having a wonderful conference dinner at the Arctic Boulevard, with Nordic delights, including reindeer, on the menu. The restaurant was well chosen by the organizers



The poster sessions were relaxed and provided a good opportunity to engage with the presenters and catch up on things.



The conference dinner at the Arctic Boulevard.



Felicity Holmes, a student from Stockholm University, kicking off the Svalbard focused session after lunch on the first day with an excellent talk about the impact of ocean temperature on frontal ablation rates at Svalbard tidewater glaciers.

as it fitted the group size perfectly, and created the ideal atmosphere to socialize and relax after a very interesting day of science presentations.

The second day consisted of three oral sessions that focused on Antarctica, Greenland and some 'assorted flavours', as well as ongoing poster discussions. At the start of the second session we were treated to Alun Hubbard's featured presentation, which was an excellent and interesting talk about the role of ice sheets in modulating methane storage and release. The honour of presenting the last talks of the meeting went to Jason Box and Richard Morris, who both gave insightful talks linked to satellite techniques.

The meeting was closed with some short announcements, and the presentation of the Ýmir prize for the best student presentation, which went to PhD candidate Joaquín Belart from the University of Iceland, for his oral presentation on spatially distributed mass balance of glaciers in



The Ýmir prize for the best student presentation went to PhD candidate Joaquín Belart (centre). The judges for the award were Olivier Gagliardini (left) and Tómas Jóhannesson (right).

Iceland and their links to the climate system. The judges for this award were Olivier Gagliardini and Tómas Jóhannesson.

In summary, this was an extremely enjoyable meeting with a diverse and interesting range of talks and posters, which provided the platform for stimulating discussions. There is something very unique to these small branch meetings and as a participant from afar, I would strongly encourage members to consider participating in meetings other than what you might regard as your own. It is a great way to connect to people in a setting that is much more relaxed than many of the larger and more complex meetings we often attend. The organization of the meeting was excellent and Rupert Gladstone and the organizing committee are warmly acknowledged for their efforts. The next meeting is being held in Iceland, which will surely be another Nordic highlight for those who are lucky enough to attend.

**Nicolas Cullen**



Group photo of the participants in the Nordic Branch Meeting 2018.



# Cryosphere and Biosphere

IGS Symposium Kyoto, Japan, 14–19 March 2018

The International Symposium on Cryosphere and Biosphere was held in Kyoto from Wednesday 14 March through Monday 19 March 2018. The local organizing team, headed by Nozomu Takeuchi, were charming, courteous and helpful in the extreme. The team pulled off the rare feat of running the meeting in a thoroughly organized and professional manner, yet left the delegates feeling relaxed and able to interact and talk together in an unrushed and informal manner throughout. The short walk to our daily lunch boxes or to a nearby cafe or restaurant was a great time to catch up with friends, both old and new, and to chat over the stimulating talks we heard during the morning sessions.

The programme contained some great interdisciplinary sessions. They reflect how biological processes are being integrated into the thinking and structure of our mother subject, glaciology, which has historically had an emphasis on physical processes. The key sessions included *Cryosphere, Ecosystems and Climate Change*; *Microbes and Biogeochemistry in Glaciers and Ice Sheets*; *Permafrost and Terrestrial Biota*; *Interaction between Snow Cover and Forest*; *Biomarkers and Biogeochemistry in Ice Cores and Frozen Ground*; *The Role of Sea Ice, Icebergs and Glacier Calving Fronts in Marine Ecosystems*; and *Biological Ice Nucleation*. The recent growth in the areas covered by these sessions enables one to appreciate just how much biology has infiltrated and is influencing glaciological thought, particularly that of our



Naoko Nagutsuka (left) and Akane Tsushima, manning the registration desk, were happy to demonstrate how the square of fabric issued to each participant converted into a carrying bag.



The Icebreaker featured a splendid display of Japanese finger food.



At the symposium opening, Nozomu Takeuchi (left) introduces the opening speaker, Professor Shuhei Takahashi, President of the Japanese Society of Snow and Ice

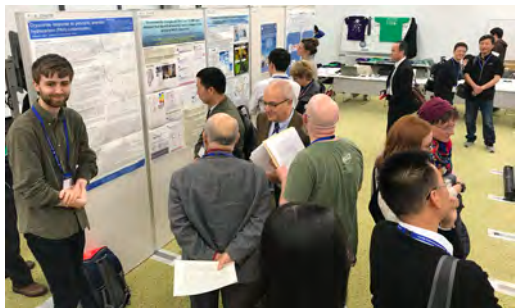


An interested audience in an impressive auditorium!

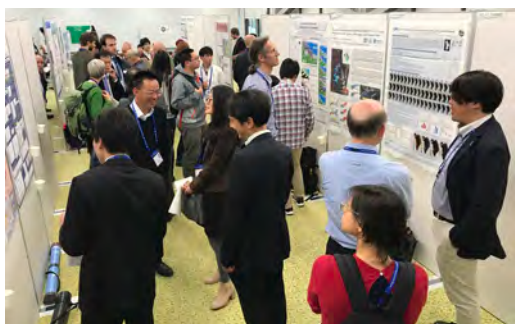




One of the midweek excursions was to Enryaku-ji, a Tendai mona-stery on Mount Hiei in Ōtsu, overlooking Kyoto and founded in 788. Delegates spent half a day wandering around the site and walking up and down some very grand steps.



At Enryaku-ji we were under the guidance of a practising Buddhist, who enlightened us about the various Buddhist sects in Japan.



Participants enjoying the lively poster session.

younger cohorts. By contrast, it was encouraging to learn how biologists perceive and appreciate the importance of the physical glaciological processes which help define the structure and nature of their terrestrial, marine and freshwater glacial ecosystems. Individual talks examined the microbiology of and microbiological effects on cryoconite holes and proglacial plains, the production and export of DOC, microbial and fungal variations in a range of cryospheric environments, and the interactions between forests, avalanches and meteorological conditions. The range of ice masses covered was impressive, and included studies from Antarctica, Greenland, the Himalayas and Central Asia, the European Alps and Svalbard.

The mid-symposium excursions were likewise well organized, but relaxed and informal. The temples, both in the city and outside, are sights to behold, and left indelible impressions on the participants. It seemed hard to surpass the excursions, but the Symposium Banquet managed



Faced with a barrel of exceptional saki...



... Martyn Tranter and Nozomu Takeuchi breached it expertly...



... and sampled the contents with equal expertise.

it. There was a barrel of exceptional saki, the food was everything you could have asked for, and there was remarkable entertainment from earthquake engineers in traditional dress. I cannot quite remember the detail of everything, such was the hospitality and potency of the saki, but the demonstrations of the stability of sand given different fluid conditions and the resonance of different sized buildings to ground shake, all undertaken as party games, is a blurry memory I would like to remember in greater detail! I know we had a heck of a night though.

Nozomu Takeuchi and his organizing team deserve great thanks. The science, organization and ambience were up there with the best conferences I have been to. I'd go back to Kyoto for another conference in a heartbeat if the same team were in charge.



The Symposium Banquet was held at 'In the Green' restaurant. It was a very convivial occasion with more excellent Japanese food.

### Martyn Tranter



Former President of the Society Atsumu Ohmura introducing the winners of the best student oral and poster presentations.



Mark Skidmore, IGS President Francisco Navarro and Atsumo Ohmura (the judging panel) with the winners: best orals Ewa Poniecka and Laura Perini; best posters William Smith and Chika Okamoto.





## Annual General Meeting 2018

5 September 2018, Henderson Lecture Theatre, XFi Building, University of Exeter, UK

The Vice-President, Hilmar Gudmundsson, was in the Chair.

50 persons, from 8 countries, attended of whom 14 were members.

### 1. The previous AGM's minutes

The Minutes of the last Annual General Meeting, published in the 2nd/3rd issue of *ICE*, 2018, Nos 176/177, p. 19, and on the IGS website, were approved on a motion by S. Palmer seconded by A. Le Brocq and signed by the Vice-President.

### 2. The President's report

The Vice-President gave the following report for 2017–2018 on behalf of the President:

Ladies and gentlemen, members of the IGS and dear colleagues

#### 1. Achievements during the last 8 months

As I started my term as President of the IGS quite recently, some 8 months ago, many of the achievements listed below are the result of the hard work by the previous President, Doug MacAyeal, the IGS Secretary General, Magnús Magnússon, and the members of the Council and the various committees of the IGS, to whom most of the credit should be granted. I am extremely grateful to all of them, as for sure are the rest of members of the Society. My thanks are also extended to the Membership and Accounts Manager, Louise Buckingham.

- a) In the Council meeting of 11 December 2017, it was agreed to prepare a letter to support our colleague in Argentina, Ricardo Villalba, who was struggling in court having been prosecuted because of actions, relative to the *Catalogue of Argentinean Glaciers*, performed following standard glaciological practices. A bilingual (English–Spanish) letter was soon prepared and sent to the relevant Argentinean authorities, to companion organizations (such as IACS and WGMS) and distributed through Cryolist and other usual outreach channels of the IGS (in addition to posting it on our website).
- b) The IGS core values were approved and published in early 2018. This was a much-needed document and we succeeded in compiling a brief text stating clearly our objectives, core values and scientific code of conduct. All IGS members are expected to be familiar with and adhere to these values.

- c) In April 2018 the Awards Committee finished the compilation of a new document on Awards Definition and Criteria, together with an accompanying document on Committee Procedures. This was followed by an e-mail discussion within the Council for about one month, from which some changes resulted, and the document was returned to the Committee for polishing the text according to the indications by the Council. The final version by the Committee was received on 15 June, and this final text was approved, with minor modifications, in the Council meeting of 20 June. This, again, was a much needed document to clarify and streamline the work of the Awards Committee. The document produced has been the result of a long-standing work by the Committee, which is thanked for its thorough work (with special thanks to the Committee Chair, Lora Koenig).
- d) In the Council meeting of 11 December 2017, Regine Hock put forward a motion to Council to establish an 'Early Career Scientist Committee', after having done some preliminary research amongst people who would have a stake in this and having received favourable feedback. This initiative was seconded by the Council and further discussed in the AGM of 14 December. Some early-career IGS members, including Laura Stevens and Doug Brinkerhoff, with the initial support of Regine Hock and Allen Pope, took on the duty of developing this initiative and, in particular, writing a draft Terms of Reference (ToR). The ToR were submitted to the Council and approved (subject to some required changes in the IGS Constitution, as well as a final choice for the name of the group and its Committee) in the Council meeting of 20 June 2018.
- e) The Publications Committee has been renovated, with a new Chair (Gwenn Flowers) and two new members (Valentina Radić and Ian Allison). Two additional members will be renewed by the end of 2018. The new Committee composition is as follows:  
*Chair:* G. Flowers (2017–2020)  
*Members:*  
 C.J. van der Veen (2017–2018)  
 W.T. Colgan (2017–2018)  
 Valentina Radić (2018–2020)

Ian Allison (2018–2020)  
F. Navarro (ex-officio)  
J.G. Cogley (ex-officio)  
M.M. Magnússon (ex-officio)

- f) This renovated Publications Committee prepared a brief text on IGS policy on posting of manuscripts, which was approved by the Council in its meeting of 20 June 2018. Thanks are given to the Committee, and in particular to its Chair, Gwenn Flowers, for dealing efficiently with this issue.
- g) Reconfiguration is pending for several IGS Committees:
- *The Nominations Committee*. Its new Chair, the past President of the IGS Doug MacAyeal, is working on renovating membership of the Committee.
  - *The Awards Committee*, whose Chair, Lora Koenig, and member Regine Hock have stepped down upon the recent completion of the new Awards documents.
  - The recently created *Early Career Committee* (Committee name still to be defined).
- h) The Council meeting of 20 June 2018, followed by some discussions and queries a posteriori, put forward a slate for the IGS Council that will be presented at the AGM of 5 September 2018. Of particular significance is the appointment of a new Treasurer, after many years of efficient service by the current Treasurer Ian Willis, whom I thank, on behalf of all the IGS, for his continued service and dedication. The new proposed Treasurer is Amber Leeson, from Lancaster University, UK.

## 2. Plan of action for next year

- a) The main task immediately ahead is the IGS governance changes demanded by many members of the Society and recommended by the new times. Many of these changes require a change to the Constitution of the IGS, whose last version (currently in force) is dated 21 July 1985. These necessary changes include e.g. the possibility to have online Council meetings, modify/adapt the Council membership and conditions for a quorum (which were designed for online meetings), and other possible changes to make the governance of the Society more efficient and according with the new times.

The first step towards these governance changes, which are envisaged to be designed according to the opinions of the membership, has been setting up an Ad-hoc Committee on Governance Changes, whose first task will be to design a survey of the IGS membership

on this matter, the analysis of its results and the draft of the required changes to the IGS Constitution. These will be reviewed and approved by the Council, before mandatory (as required by the current Constitution) final approval by the IGS membership.

The composition for this Ad-hoc Committee, approved by the Council at its meeting of 20 June 2018, is: Regine Hock (Chair), Hilmar Gudmundsson, Christina Hulbe, Doug MacAyeal, Magnús M. Magnússon, Francisco Navarro and Laura Stevens/Doug Brinkerhoff (Early Career). It includes people with ample experience in governance of other associations/unions (such as IACS or EGU) and with ample experience in IGS governance, as well as the voice of the youngest. It also encompasses people with different views on how the IGS governance should be undertaken.

This Committee has already initiated the design of the survey of members.

Other important challenges to face, which will focus the President's efforts in the forthcoming months, are:

- b) The IGS membership drop. This drop is most likely partly due to the shift of the IGS journals to open access, since now anyone – without the necessity of being an IGS member – can access freely the entire archive of IGS journals. Further reasons must be analysed, and possible solutions implemented. Addressing this issue will be one of my priority tasks, but this task will also need the personal involvement of the national correspondents and of IGS members in general.
- c) There has also been a recent slight drop in submissions to, and reduction in the number of published pages of, the *Journal of Glaciology*. These deserve attention by the Publications Committee and the Chief and Associate Chief Editors, and of course by the President and Secretary General of the IGS.
- d) The last few years have also seen fewer and thinner issues of the *Annals of Glaciology*, which calls for revitalising the *Annals*. Again, the Publications Committee, together with the IGS Chief Editor, the President and the Secretary General, should work on this issue.
- e) The three last items have budgetary implications, as the current income of the IGS comes mostly from membership fees and article processing charges. Appropriate control of the budget is therefore required to keep the IGS finances healthy. The new Treasurer to be appointed in the AGM of 5 September 2018, Amber Leeson, will take care of this

responsibility, with the support of the IGS Office (the IGS Secretary General and the Membership and Accounts Manager) and the IGS President.

Francisco Navarro  
President

The Secretary General invited attendees to ask questions or to comment on the President's report.

E.M. Morris asked whether the IGS had a safeguarding policy. The Charity Commission is very concerned about safeguarding and how charities look after the young and vulnerable and is asking charities to implement such a policy. The Vice-President responded and said that the IGS has recently approved a 'Core Values' document which outlines how the Society expects its members to behave. A link to this document is posted on the front page of the IGS website. This document relates to all events and functions that the IGS is affiliated with and beyond. E.M. Morris suggested this should be advertised at all IGS events to make everybody aware of what is expected of them.

R. Bingham proposed, and D Sugden seconded, that the President's report be accepted. This was carried unanimously.

### 3. *The Treasurer's report*

The Secretary General presented the Treasurer's report with the audited Financial Statements for the year ended 31 December 2017 on behalf of the IGS Treasure, I.C. Willis.

Fellow members, ladies and gentlemen

The Society's accounts underwent an independent examination rather than a full audit this year. Throughout my report, I will refer to the Society's unaudited accounts for 2017, referring to the relevant page numbers.

The Society's finances are summarized by considering the changes from 1 January 2017 to 31 December 2017, as shown on page 12 of the accounts. In the table, the Restricted Funds refer to money associated specifically with the Seligman Crystal and the Richardson Medal. The Unrestricted Funds is everything else.

*Restricted Funds:* increased by £110 from £5234 £5344 as a result of the interest on investments. No Crystals or Medals were awarded in 2017.

*Unrestricted Funds:* increased by £227 from £467 998 to £468 225 showing that the income to IGS largely from i) membership, ii) its contribution of author processing charges and library income from Cambridge University Press, and iii) symposia attendance, was slightly more

than the expenditure associated with running the IGS office and paying the salaries necessary to manage the IGS affairs.

*Total:* The Society had its net resources before revaluation drop by £8385 but this was more than offset by investment gains of £8722, resulting in the modest positive movement in the Society's funds of £337 in 2017, compared to a loss of £59 209 in 2016, profits of £35 697 in 2015, £97 204 in 2014, £8477 in 2013, £28 092 in 2012, and losses between 2008 and 2011.

This is good news for the Society, after the somewhat disappointing news last year. The Society has essentially broken even, and this comes as the Society settles down into its new mode of operation, having downsized and moved its office last year and having gone into partnership with CUP for the publication of the *Journal* and *Annals* the year before. I reported last year that the Society had a cumulative deficit of £95 520 running since 2007. We've hardly managed to close that deficit, which now stands at £95 183. The Society's expenditure is now of the order of ~£330 000 and its total assets are ~£474 000, similar to last year. In this respect, the Society is not in a bad place, but it would be nice to continue to at least break even in future years, and preferably to close the cumulative deficit that has accrued since 2007.

In more detail, income is itemised in notes 2–5, and expenditure is listed in notes 6–8 and in the unnumbered SUPPORT COSTS on pages 17–20.

#### **Income:**

*Note 2.* Donations were £2013 in 2017 compared to £20 in 2016. No grants were received in 2017.

*Note 3.* Income from interest on investments was comparable in 2017 to 2016: down slightly by £64 from £10 743 to £10 679. Income from this source had been rising for the last few years; 2017 was known to be a difficult one for markets generally so this slight fall is not surprising. The Society continues to invest part of its capital in 'higher interest' but still 'low risk' investment accounts, and this is reviewed each year.

*Note 4.* Incomes associated with ICE, and the CUP Royalty associated with the *Journal* and *Annals* were disappointingly down in 2017 compared to 2016. Thus, in 2017 the Society received £5255 from the direct handling of the *Journal*, ICE & Books, down from £12 407 in 2016. This now represents solely the sale of ICE to libraries and members and the sale of paper copies of the *Journal* to members (which are still managed directly by the Society) (see note 5). In 2016 this figure also included a vestigial income from the processing/sale of the *Journal* before

fully handing over to CUP. Similarly, the Society received £843 from the handling of *Annals* in 2017, down from £1909 in 2016. Again (see note 5) this now represents solely the sale of *Annals* to libraries and members directly by the Society.

The CUP Royalty was down £33 169 from £111 639 to £78 470. This has not been split by *Journal/Annals* but the drop represents the slightly fewer articles published in the *Journal* in 2017 cf. 2016, but mostly the far fewer articles published in the *Annals* (three issues were published in 2016 but only two in 2017)

Returning to Note 4, income from Meetings/Symposia was up by £127 487 from £52 134 in 2016 to £179 621 in 2017. This reflects the fact that one symposium occurred in 2016 (La Jolla) but two symposia were held in 2017 (Wellington and Boulder).

Income from membership was down by £4287 from £51 637 to £47 350. It fell by £12 803 from £64 440 between 2015 and 2016. This fall in membership since the Society moved to Open Access publishing is rather worrying, although it is good to see that the reduction in members did not drop as much last year as in the previous year.

### **Expenditure:**

*Note 6.* A summary of all expenditure shows that outgoings associated with running Meetings/Symposia were up by £84 517 from £124 937 in 2016 to £209 454 in 2017. This is due to one more symposium being run in 2017 cf. 2016. Expenditure on other charitable activities (everything else the IGS does besides run the Meetings/Symposia) was down by £60 254 from £183 253 in 2016 to £122 999 in 2017. As more time was dedicated to the Meetings/Symposia, proportionately less time was spent on everything else.

*Note 7.* In 2017, grants totalling £1321 were made to support the Glacial Seismology School and to support student attendance at the Glaciological Summer School in Alaska (whereas two grants totalling £7450 were awarded in 2016 to support the Alaskan and the Argentinian Glaciological Summer Schools).

Looking at the income and expenditure solely for Meetings/Symposia and ignoring the grants (comparing Notes 4 and 6), we see that in 2016 the one meeting had a deficit of £72 803 whereas in 2017 the two meetings had a deficit of £29 833 (an average of £14 917 per meeting). My report from last year also highlighted that the three meetings in 2015 ran at an average loss of £9414 per meeting. As I mentioned in my last report, the Society's symposia are running at a loss when the IGS office costs are factored in. There are economies of scale to be made when the IGS can run three symposia rather than two,

and certainly when it can run more than one. It would also be beneficial if the IGS in combination with local organizing committees could obtain additional grant income from sponsors to offset the direct and support costs associated with IGS office activity.

*Note 8.* Direct costs are down substantially in 2017 compared to 2016, from £26 322 to £11 521. Biggest reductions were in printing, as far fewer issues of *ICE* are now being printed as it is being read online; and in editorial fees and expenses, as a result of changes in the editorship of the *Journal*. Other direct costs showed either small gains or falls.

### **Support costs**

General support costs are up by £46 601 from £233 761 in 2016 to £280 362 in 2017. Many support costs have fallen. For example, rent is down substantially now that these costs reflect solely the rental of the new premises at BAS (IGS moved office towards the end of 2016, hence the higher costs last year). Similarly, computing and web hosting costs are down due to reduced number of staff in the IGS office and no major IT purchases. In 2016 we incurred IT costs relating to the move of the IGS office to BAS and setting up our IT system in the new office. Wages and salaries and associated NI and Pension costs are down slightly, reflecting the complete move over to CUP (there were vestiges of salaries paid by IGS for *Journal/Annals* production towards the beginning of 2016). The big hike in general support costs is for Symposia, reflecting (as mentioned previously) the running of two meetings in 2017 compared to just one in 2016.

Governance costs are stable and comparable to last year.

### **Summary**

The Society's finances are in reasonably good shape: it essentially broke even in 2017, encouraging given the loss incurred in 2016. We ran a negligible surplus compared to our total funds in 2017 compared to the significant deficit in 2016 (~11% of funds) and the surpluses in 2015 (~7% of funds), 2014 (~20% of funds), 2013 (~2% of funds), and 2012 (~7% of funds), and various deficits between 2008 and 2011 (ranging from ~1% to ~27% of funds). Despite this, our funds now exceed our annual expenditure, which is a healthy place to be in.

The Society must continue to monitor its income largely from CUP, membership fees, and symposia registration, and its outgoings associated with running symposia and running the IGS office.

As I mentioned in my report from last year, it is increasingly important for the IGS to hold on



to and attract new authors and have them submit articles to the *Journal* and to *Annals*. The more papers published, the greater the contribution the IGS receives from CUP. This is the main single revenue stream to the Society. The decline in papers published in the *Journal* over the last two years is regrettable and we should work harder with CUP to reverse this trend. It is also increasingly important for the Society to hold on to and attract new members, as membership fees are also a valuable source of income to the Society. Again, it will need to think of innovative ways of making the Society more attractive, especially now that a major reason for joining (copies of the *Journal*) is no longer an incentive because of Open Access. It is difficult to see how individual Symposia registration fees can be increased as these are already relatively high compared to, e.g., EGU and AGU. But obtaining external grants to sponsor certain aspects of IGS Symposia and which therefore benefit the Society would be advantageous.

On the output side, the Society must monitor its expenditure associated with running symposia and with generally running the IGS. Making greater use of online virtual meeting platforms for Council meetings and holding Council meetings at IGS Symposia (rather than at e.g. AGU or EGU) would save the Society some expenditure. There are economies of scale to be made when the Society runs more than one symposium per year and it is significantly advantageous if the Society can run at least two per year. Salary costs (including NI and pension contributions) are, as in many organizations of course, the most expensive item of expenditure (totalling £112 872 in 2017, 34% of all expenditure, down slightly from 2016). The Society should continue to ensure that salary inflation and travel and subsistence rates are sustainable.

I am indebted to Magnús Magnússon and Louise Buckingham for all they've done for the IGS over the past year, and for their help in checking some of the facts and figures in a draft of my report.

Ian C. Willis, Treasurer  
12th June 2018

E.M. Morris asked whether the staff cost included all aspects of employment such as pension, national insurance etc. The SG confirmed this is the case and he also said that a figure of 34% of the total turnover is not unreasonable for an operation like the IGS.

N. Rutter proposed, and A. Le Brocq seconded, that the Treasurer's report be accepted. This was carried unanimously.

#### 4. Election of auditors for 2018 accounts

The Secretary General proposed that the IGS remain with our current auditors, Messrs Peters Elworthy and Moore; as they had been doing our accounts for several decades they knew the innards of the IGS very well.

On a motion from the Secretary General, E.M. Morris proposed and I. Hewitt seconded that Messrs Peters Elworthy and Moore of Cambridge be elected 'Independent Inspectors or Auditors', whichever is appropriate for the 2018 accounts. This was carried unanimously.

#### 5. Elections to Council

After circulation to members of the Society the Council's suggested list of nominees for 2018–2021, no further nominations were received, and the following members were therefore elected unanimously.

Vice-President:	Gwenn Flowers
Treasurer:	Amber Leeson
Elective Members:	Regine Hock
	Christina Hulbe
	Andrey Glazovski
	Kang Shichang
	Shelley MacDonell

These appointments were unanimously approved by the AGM on a motion from R. Bingham and seconded by I. Hewitt

#### 6. Other business

The Vice President led off the discussion by inviting attendees to bring up any items they feel are important for the IGS. He led off by sharing his view that the IGS needs to make some changes. We have responded to some things, for example going over to Open Access, and that has been quite successful. Now that is behind us we can start to looking towards the future and discuss proactively what direction the IGS needs to take and what we need to do to improve the Society. He put forward the question: why does the IGS not have an annual symposium? That is, an annual meeting which would attract a large section of the cryospheric community. He felt that would be quite useful to the community and it could also be a good income source for the IGS. The IGS has a good selection of meetings on specific topics, which is very good, and we should continue holding such meetings. But we should also consider a meeting which would be an all-inclusive glaciology meeting.

E.M. Morris supported the idea and cited her experience when she was an 'early career' scientist. Every year there was such a meeting held in Cambridge and it was very beneficial as she got a good overview as to what direction she wanted her research to take. She also commented



that this is why the British Branch meetings are so good, one gets a good overview what research is being done and where. But that is only the British Branch. Hence she would strongly support an international multi-discipline meeting with all talks being held in the same auditorium (unlike the AGU and the EGU where each topic is in a separate meeting room).

The VP said this was the philosophy behind his idea, to have something that is of interest to the wider community rather than splitting it down into several specialized interest groups. Ideally this should be an annual meeting but maybe IGS could start off by having bi-annual meetings and once the idea is established, switch to an annual meeting.

R. Carr approved the idea but said the location has to be somewhere where such a meeting could be made affordable. She made the point that in recent years many IGS symposia have been held in the USA and that had made them expensive. It would be difficult for graduate students to attend, although this should be an important aspect of such a meeting, as E.M. Morris had commented. She also said that the timing should be such that those that teach are able to attend. But she added that she was speaking from an European point of view and hence following such a model would limit attendance from North America.

The VP acknowledged that there were several aspects that needed to be taken into account.

S. Palmer also voiced his support but pointed out that we would be encroaching on the 'big' meetings such as EGU, AGU and SCAR. Normally a person would not be able to attend more than one meeting per year and that would inevitably mean the success of such an IGS meeting would reduce the attendance of other meetings. The VP pointed

out that the IGS symposia and journals used to be the leading entity in the glaciological field and it was time to make the IGS number one again.

A Le Brocq suggested we should perhaps adapt the SCAR model of holding the meeting every few years and go 'around' the world.

R. Bingham raised the subject of how we could increase the membership of the IGS. He suggested that perhaps the IGS should consider an 'Early Career Award' scheme. Previously, glaciologists joined because they would get the *Journal* as part of their membership but that incentive had been removed. Nowadays early-career people are mostly concentrating on what will advance their careers, so having something to put on their CV is very valuable. He thought the IGS should have an award that was not associated with symposia and meetings. It would be for IGS junior members.

The Secretary General commented on the point the VP had made at the start of the 'Other business' discussion. He pointed out that the IGS is holding 'joint' symposia\meetings with other cryospheric organizations which have been very successful and that was perhaps something to take into account.

No other items were raised.

The SG asked people, should they have any ideas\ suggestions, to contact the officers and Council members in order to bring those ideas forward.

The Vice-President asked for a motion to adjourn the AGM.

The AGM was adjourned on a motion from A. Le Brocq and seconded by S. Palmer at 14:32 BST.

## Obituary: J. Graham Cogley, 1948–2018

Graham Cogley, Professor Emeritus in the Department of Geography, Trent University, Canada, passed away on 4 October 2018 in Peterborough, Ontario, at the age of 70. Graham has made substantial and enduring contributions to glaciology in particular to the understanding and quantification of glacier mass change, and he is also widely recognized for his sustained and outstanding service to the wider science community and several professional organizations.

After receiving his BA in Geography in 1969 from the University of Oxford, England, Graham emigrated to Canada and received a MSc in 1971 and a PhD in 1975 from McMaster University, Hamilton, Ontario. His PhD thesis was entitled 'Properties of surface runoff in the High Arctic'. He joined the Faculty of Geography at Trent University, Ontario, in 1975, where he spent his entire career, and was made Emeritus Professor in 2013.

Those who were privileged to work in the Arctic with Graham during his PhD research remember him as a wonderfully engaging and entertaining individual who gave generous help to novices on matters ranging from the installation of stage recorders to the calculation of rating curves and hysteresis loops. Evenings in the communal tent on Ellesmere Island were enlivened by Graham (cigarette in one hand, and a beaker of Islay Mist 8-year old malt whisky in the other) entertaining colleagues with excerpts from a biography of Thomas Cranmer, tales from his student life at Oxford, or his own idiosyncratic interpretations of periglacial landforms. A memorable moment came when he gazed out of the tent window at the Sverdrup River and jumped to his feet, exclaiming 'It's a jökulhlaup!' and so it was: a large ice-dammed lake in the catchment was draining subglacially, and Graham led the charge to rescue the water-level recorder while simultaneously devising ingenious methods to reconstruct the associated flood discharge. On another occasion he stalked a lone bull musk ox to obtain a close-up photograph, little appreciating the acute danger involved in approaching solitary males. Life in the field with Graham was never dull.

During the early years of his career Graham (together with his mentor Peter Adams) was instrumental in re-establishing the mass-balance



monitoring program on White Glacier on Axel Heiberg Island, which evolved into the longest mass-balance record of an alpine glacier in the Canadian Arctic. Graham's research has been extremely broad, covering a wide range of topics published both in the peer-reviewed literature and numerous technical reports. For example, his research included studies on evaporation, precipitation measurements, blowing snow, geochemistry, fluvial morphology, albedo of water, land surface schemes of General Circulation Models, continental margins, paleo-environments, image processing, direct solar radiation on inclined surfaces, map projections and determining global ocean area. From the 1990s his research shifted increasingly towards glaciology.

Above all, Graham is recognized for his major contributions to the understanding of global-scale glacier mass changes. For many years he was one of very few scientists who attempted to compute global mass balances based on direct glaciological records. He developed

statistical methods to extrapolate sparse data sets combining glaciological and geodetic data, and was particularly careful about quantifying uncertainties. For this purpose he compiled several widely used global-scale datasets including an extended version of the World Glacier Inventory (WGI-XF) and GMBAL, the most complete database of direct and geodetic glacier mass balances worldwide. In tedious work, systematically screening through the literature and especially any newly published papers or reports, he constantly updated this database, making it for years even more complete than similar datasets housed at global data centers. His remarkable language skills (he spoke French, Spanish and German fluently and had advanced reading knowledge of Russian, Italian, Portuguese and Latin) allowed him to access data and literature not available in English.

Graham also compiled a globally complete gridded data set of glacierized area, and developed several other global-scale data sets for further data analyses, such as global hydrographic or precipitation datasets. The glaciological datasets served as the standard for decades and have been widely used around the world. Only recently, the new Randolph Glacier Inventory (RGI), in which he also had a leading role, was compiled. His data, results and input were instrumental for the compilation of the global-scale mass-balance estimates of several assessment reports of the Intergovernmental Panel on Climate Change (IPCC). Most importantly, Graham always generously shared all his data sets, responding promptly to any data requests and providing exceptional user support.

Graham has also provided exceptional service to the glaciological community in numerous other ways. Since May 2016 he has served as Chief Editor of the *Journal of Glaciology* and *Annals of Glaciology*, which also included ex-officio functions on the IGS Council and its Publications Committee. He was chief editor of the 2016 *Annals of Glaciology* volume on 'Glaciology in High Mountain Asia' and associate editor of several other *Annals* volumes in addition to earlier editorships with other journals.

Another example is his outstanding contribution in his leading role in the Working Group on Mass-balance Terminology and Methods' (2008–12) of the International Association of Cryospheric Sciences (IACS) in compiling a 'Glossary of Mass Balance and Related Terms'. He skilfully led an international team of Working Group members over 3 years to produce the comprehensive >100 page consensus glossary. The high quality

of the product is largely due to his remarkable commitment, dedication and attention to detail, combined with his superb leadership and diplomatic skills.

He then went on to co-chair IACS's Working Group on the Randolph Glacier Inventory (RGI) and infrastructure for glacier monitoring (2014–18), which released several updated RGI versions. Graham single-handedly did all the technical work to include any new glacier outlines into the RGI. Here also, his care for details and accuracy was remarkable. No matter how small a glacier may have been and how much work it entailed, he made sure it was properly implemented into the next RGI update. He also served as member of the advisory board of the Global Terrestrial Network for Glaciers (GTN-G) from its start in 2011, providing valuable input to global glacier monitoring.

Graham contributed significantly to several IPCC reports both as lead and contributing author, as well as to other international and national science assessments. He was instrumental in detecting and tracing the source of the notorious false claim in the IPCC Fourth Assessment Report on rapidly disappearing glaciers in the Himalayas. Graham was also regularly invited to provide commentaries, for example, for high-profile journals on newly published studies; he also frequently explained glaciological matters to the public through newspapers, interviews or blogs. He performed an astounding number of reviews (dozens per year) for many different journals. His reviews were always remarkably thorough, detailed, constructive and of high quality. Highly deserving, he was twice acknowledged for 'Excellence in Refereeing' by *Geophysical Research Letters*.

Graham did not travel much to conferences or similar events, especially in recent years, but he was well connected with the glaciological community from his study room in his home in Peterborough, where he lived with his wife Kathie and their cat (which enjoyed the privilege of being allowed to sit on his keyboard as he typed). Graham actively collaborated in projects, co-authored papers, served in various international service functions, updated his databases, reviewed papers and proposals and responded to the daily flood of requests and questions from around the world until shortly before his death, despite struggling with chemotherapy, seemingly working tirelessly day and night. At times many of us wondered: 'Does he ever sleep?', given his almost instantaneous email responses no matter which time zone they came from.

Graham's contributions were widely sought and highly regarded not only because of his

Graham (third from left) on Ellesmere Island as part of the McMaster University Arctic hydrology research team in 1974. Left to right: Colin Ballantyne, Bruce Bennett, Graham Cogley, Ming-ko Woo, Rick Gillie and Randy Crispo.



broad scientific expertise, insight, dedication and fastidious attention to detail, but also because of his extraordinary collegiality, kindness, modesty and patience combined with a good sense of humor, tirelessly supporting scientists and students around the world and selflessly sharing data and knowledge. He has had a tremendous impact on generations of glaciologists and the field of glaciology at large. Graham will greatly be missed as a scientist, colleague, collaborator, mentor, and friend, but his legacy and spirit will live on.

**Regine Hock, University of Alaska Fairbanks**  
**Colin Ballantyne, University of St Andrews, UK**

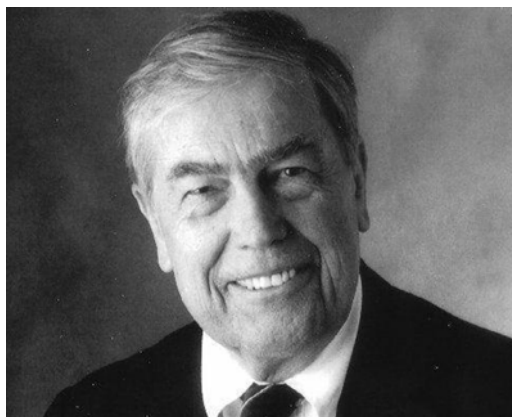


## Obituary: Johannes Weertman, 1925–2018

Johannes 'Hans' Weertman, the Walter P. Murphy Professor Emeritus of Materials Science and Engineering at Northwestern University, died at age 93 on 13 October 2018 in Evanston, Illinois, USA, after a brief complication with an infection. He is survived by his brother, son, daughter and grandson.

Weertman is generally regarded as a pioneer of glaciology who contributed theoretical work touching on a broad range of fundamental problems including basal sliding, creep deformation and constitutive theory, ice-sheet stability and ice-age climate theory. Much of what he contributed to glaciology came as a result of his eminence as a solid-state physicist who also worked at the forefront of materials science and metallurgy. Weertman was the Seligman Crystal laureate of the IGS in 1983, and was also widely honored in the broader scientific community, including being awarded the Robert E. Horton Medal of the American Geophysical Union (AGU) for his paper on 'Stability of Ice Age ice sheets' and election to the American Academy of Arts and Sciences in 1997. His scholarly work was prolific. Of 330 journal papers he authored, 76 were on glaciological subjects (including glacier sliding, marine ice-sheet instability, role of ice sheets in ice-age climate change, crevassing and fracture, surging, rheology and creep mechanisms, subglacial hydrology and ice-shelf deformation) and a further 26 were on geophysical and planetary science subjects (including mantle rheology, continental drift, planetary topography, fluid/fracture interaction and earthquake mechanics), with the large remainder on a broad range of materials science subjects (including dislocation mechanisms, microphysics of solids, fracture, fatigue and metallurgy). In 1964, Weertman published his most widely educational work, the textbook *Elementary Dislocation Theory*, which was co-authored with his wife. The text was published in three languages and reprinted in 1996.

Hans Weertman began his contribution to glaciology in 1956 when he submitted his first two glaciological manuscripts to the *Journal of Glaciology*. These studies, published in 1957, were 'On the sliding of glaciers' and 'Deformation of floating ice shelves,' and were completed just 4 years after Hans received his Doctorate of Science from the Carnegie Institute of Technology (in 1952), and while he was employed as a Solid State Physicist with the US Naval Research Laboratory in Washington, DC. In



his two inaugural glaciological research papers, Weertman effectively tackled the full spectrum of glaciological basal boundary conditions: constrained sliding for grounded ice sheets and glaciers, and inviscid sliding for floating ice shelves. As a testament to the enduring impact of these two papers, one or the other was cited 34 times in 2018, 61 years after their publication.

In the first of his glaciological papers ('On the sliding of glaciers'), Weertman included a parenthetical remark at the end of the first paragraph indicating why he, a 'metallurgist', should be interested in glaciology:

The creep behavior of metals is quite similar to that of ice. For this reason the extensive work on the creep of metals is of interest to glaciologists and the work on glaciers is interesting to metallurgists. Weertman, J (1957) On the sliding of glaciers. *J. Glaciol.*, **3**(21), 33–38.

In the last paragraph of this paper, he acknowledges how he became aware of glaciology and its connection to metallurgy and solid state physics:

The author wishes to thank Dr Peter Haasen for first arousing his curiosity in the problem of glacier flow and Dr J. W. Glen for a number of valuable suggestions for improving the calculations.

Peter Haasen was a solid state physicist of the same age as Hans, working at the Institute for the Study of Metals of the University of Chicago (now the James Frank Institute), who told Hans

about the glaciological work being done at the Cavendish Laboratory in Cambridge during a visit to the Naval Research Lab in 1956. Hassen soon left Chicago (a few years before Weertman moved to Evanston, a suburb of Chicago) to become an eminent professor of metallurgy at the Georg August University of Göttingen, Germany.

Weertmann also attributed his awareness of glaciology to the great physicist Enrico Fermi:

From my thermo course, I dimly remembered reading in Fermi's book [Fermi, E. *Thermodynamics*. New York: Prentice-Hall, 1937] that glaciers slide around bed bumps by the pressure melting phenomenon. A simple calculation showed me that this was too slow a process for large bumps. But it was immediately clear that creep lets ice get around the big bumps quickly.

Weertman's introduction to the work of Glen, plus his memory of the paragraph in Enrico Fermi's 1936 textbook on thermodynamics which describes the regelation movement of ice around obstacles, became the basis for his glacier sliding theory.

While profoundly committed to the view that glaciology and the broader field of metallurgical science were entwined, Hans also had a more personal reason for his interest in the flow of ice. This interest stemmed from his childhood experiences and the musical interests of his father.

Hans was born in 1925, the son of Roelof and Christina H. Weertman who immigrated to Fairfield, Alabama, USA, in 1923 from Rotterdam, Holland. In 1935, Roelof and Christina moved their family (including Hans's younger brother, William) from Fairfield to Beaver, Pennsylvania, where Roelof had two jobs. To earn a wage, he was a draftsman/engineer with the St Joseph Lead Company in nearby Pittsburgh. His other job was as a master craftsman making violins, violas and cellos, initially under G. M. Francois, and later on his own (especially after he retired, living in Falmouth, Massachusetts).

When Hans was an adolescent, Roelof made a violin for Harrison H. Richardson who, upon hearing Antarctic explorer Richard E. Byrd give a lecture at Beaver College, was invited to join the last Byrd Expedition to Antarctica as its youngest member (he was singled out as an 'Eagle Scout'). He overwintered with his Weertman-made violin in 1939–41 at Little America III. The violin was ceremoniously given back to the Weertman family after the expedition in appreciation for their support, and is still in the possession of the family to this day. In fact, in 1983, when Weertman was presented the Seligman Crystal of the IGS at the international symposium on Ice and Climate Modeling held at Northwestern University (Weertman's home institution), he played the exact same violin at the presentation ceremony.



Violin made by Roelof Weertman, Hans's father, that accompanied the American Antarctic Expedition of 1939–41 to Little America III. This violin was also played by Hans Weertman in 1983 during the ceremony in which he was awarded the Seligman Crystal by the IGS.

Perhaps having a violin since his youth that overwintered on the Ross Ice Shelf is another reason why Hans became interested in glaciology. In fact, as mentioned above, the topic of his second paper in glaciology was on ice-shelf flow. This paper developed the theory for the great increase in vertical strain-rate amplitude (going as the third power of the ice thickness) when ice sheets become ungrounded. Combining the ideas of his second paper published with those of his first led naturally to his concept of marine-ice-sheet instability which he developed in the early 1970s.

Being alive in the middle of the 20th century, Weertman became tangled up in the great difficulty of World War 2. In November of 1942, while Hans was in his last year of high school in Beaver, Pennsylvania, the USA passed a law that moved the mandatory military draft age from 21 down to 18. This was done in order to supply soldiers to the quickly developing US involvement in the war. Rising to his patriotic duty, Hans enlisted in the US Marine Corps in July 1943, a month after graduating from high school. Given his promise as an intelligent young man, he was selected to become one of the approximately 20 000 marines to enter alternative service with the US Navy's V-12 program. This was an extremely fortunate break for Hans, as the marine unit that he would eventually be attached to saw combat in the South Pacific.

The V-12 program of the Navy, and the Army Specialized Training Program (ASTP) of the Army, were the US response to the need to educate officers in the armed forces. This was accomplished by paying tuition for soldiers, sailors, marines and airmen to receive advanced training at various colleges, which benefited from



Weertman in 1942 as a marine private in the V12 program at Pennsylvania State University.

an income that would otherwise disappear with so few young men not involved in military duty. Over the period of the war, the Navy V-12 program involved 125 000 sailors and marines in training programs at 131 colleges and universities. Hans spent from July 1943 to August 1945 as marine private in V-12 training, primarily at Pennsylvania State University, State College, PA. He completed his V-12 training during the summer of 1945 and shipped out to the Pacific with the 2nd Battalion, 6th Marine Regiment of the 2nd Marine Division. It was assumed that this unit, after having previously fought in the battles to take Saipan and Tinian Islands in the Marianas, would be involved in the first assault on mainland Japan.

The American bombing campaign effectively ended the need for an invasion of Japan, but Hans's marine unit landed at Nagasaki, Japan, anyway, not as an invasion force, but as an occupying force that was deployed in Japan from September 1945 to August 1946. Hans was attached to the headquarters unit and undoubtedly witnessed the aftermath of the tragic destruction of Nagasaki. The occupation was short, and Weertman's unit was withdrawn from Nagasaki in January 1946.

Weertman returned to Pennsylvania, was honorably discharged from the marines, and decided to finish his undergraduate education at the Carnegie Institute of Technology in Pittsburgh, Pennsylvania, near his parents' home in Beaver. As promised for V-12 Marines, Hans achieved his Bachelor's degree in mechanical engineering by 1948, and began graduate study at the same institution immediately following, eventually earning his doctorate in 1951.

The key to Hans Weertman's rapid academic success at Carnegie Tech was his being 'discovered' by one of the eminent professors there: James S. Koehler, a metallurgist. Koehler was a significant solid-state physicist who was among the first American scientists to accept the dislocation theory of the deformation of solids, and is noted for the formulation of the Peach–Koehler force that governs dislocation movement. (Weertman developed this force theory to applications where there was significant hydrostatic pressure in 1964.) Prior to about 1949, the idea that dislocations in the lattice structure of metals and other crystalline materials such as ice were responsible for their deformation was controversial, especially in the USA.

Dislocation theory was first conceived by scientists in Europe in the 1930s, most notably by G.I. Taylor and others in Cambridge, UK. During World War 2, the effort to develop dislocation theory as a way to improve strategic materials and understand the failure of materials fell on the scientists of Lawrence Bragg's Cavendish Laboratory. A notable student of Bragg and Egon Orowan was John Nye, another pioneer of glaciology. Also working at the Cavendish was a student named John Glen, who was eventually charged by Orowan to perform experiments on the creep deformation of ice (and notably made use of the X-ray diffraction apparatus at the Cavendish lab operated by Max Perutz, Francis Crick and James Watson, all Nobel Prize winners).

Immediately following the war, in 1947, Bragg and Nye produced a transformative paper on the subject of dislocations that helped to produce a 'paradigm shift' in metallurgical thinking. This brought Koehler and Weertman into the fold as two of the most ardent advocates for the dislocation theory. The paper by Bragg and Nye described experiments with two-dimensional soap-bubble 'rafts' on the surface of water. Like the atoms in a polycrystalline metal or molecules of water in an ice crystal, bubbles on the surface of water have both attractive and repulsive forces. The attractive forces (surface tension) caused the bubbles to form rafts that provide a 2-D analogue for crystal structure, grain boundaries, the role of impurity atoms and voids, and ultimately the role of dislocations in allowing crystal deformation. An entertaining movie was made in 1952 by Bragg and Nye to illustrate the dislocation theory of the deformation of solids, and in his oral history Koehler mentions that he and Weertman were influenced by this movie.

If the transformation of solid-state physics, metallurgy and materials science wasn't complete enough with the acceptance of the dislocation theory in the USA, there was one more extraordinary historical transformation





Hans and Julia Randall Weertman as newlyweds.

that influenced Weertman and his scientific outlook. It was his 'discovery' of a brilliant young scientist named Julia Randall. Hans and Julia met at Carnegie Tech, where both were pursuing graduate degrees in materials science. They married in 1950 and began a life together that was extraordinary by any standards. Julia R. Weertman was destined to raise a family and, remarkable for the time, become the first female engineering professor at Northwestern University where she and Hans settled after about 1958. As mentioned above, Julia and Hans wrote a book together in 1964 on elementary dislocation theory (republished in 1992). Julia is known for helping to develop the ideas that drive nano-technology in modern metallurgy. Her lifetime contribution to science amassed a range of scientific honors equal to those of Hans. Possibly the greatest honors that Hans received are those shared with his wife: the Johannes and Julia Randall Weertman Graduate Fellowship recognizing outstanding PhD candidates in materials science and engineering at Northwestern University, the Julia and Johannes Weertman Educator Award of the Minerals, Metals and Materials Society (TMS Foundation), and the Julia and Johannes Weertman Medal of the European Geosciences Union (EGU). Julia died aged 92 on 31 July 2018, just a few weeks before her husband.

Upon being launched into the brave new world made possible through the dislocation theory, and after completing his doctoral degree in 1951 (on internal friction of single metal crystals),

Weertman became a Guggenheim postdoctoral scholar at the École normale supérieure in Paris for a year, and then moved to the US Naval Research Lab outside Washington, DC, for about 6 years to continue his research. For the last year he was with the Naval Research Lab, Hans was appointed to be the science liaison for the US Embassy in London. During the time he spent in the UK, Weertman met various members of the European glaciological community, most notably Gerald Seligman, John Nye and John Glen. He would return to the UK to spend a research sabbatical in the early 1970s (during the time he developed the underpinning of the marine-ice-sheet instability theory).

As noted above, while working at the US Naval Research Lab, Hans met Dr Peter Haasen, and was told by him about the existence of creep tests on materials relevant to Earth Science – the ice deformation experiments by John Glen. Hans immediately became fascinated by the fact that the dislocation theory of the deformation of solids could potentially explain glacier motion. This was before the discovery of sea-floor spreading and plate tectonics, and thus the flow of ice and glaciers was at the time the most visibly apparent example of where dislocation theory was evident in the Earth Sciences. Later in life, Hans would extend his Earth Science interests beyond glaciology to problems involving the deformation of mountains, planetary crusts and continental drift.

Soon after publishing his first two papers in glaciology, in 1959, Hans and Julia moved to Evanston, Illinois, so that he could join the faculty of the newly formed Department of Materials Science at Northwestern University. Julia joined the faculty of the same department in 1972, slightly later, after raising their son and daughter to school age. The US Army Corps of Engineers sponsored Snow, Ice, and Permafrost Research Establishment (SIPRE) had been located since 1951 in nearby Wilmette, IL. Hans immediately established a relationship with SIPRE that was to continue as a relationship with the Cold Regions Research and Engineering Lab (CRREL) when SIPRE moved from Wilmette to Hanover, New Hampshire in 1961. Among the many projects SIPRE and CRREL were concerned with at the time, the construction of the nuclear powered Camp Century in Greenland from 1959–66 was the main event. This giant under-ice research station had both military and civilian purposes. Militarily, it was a 'top-secret' prototype for the then-considered system of Project IceWorm (which was not widely known at the time, and only recently admitted to by the USA), which was to be a system of 4000 km of subsurface tunnels designed to constantly move 600 nuclear missiles that the USA would aim at the Soviet Union. Civilian-wise, Camp Century

led to the first 1367 m full-thickness ice core from a polar ice sheet in July of 1966. Hans went to Camp Century several times and was involved in many of the CRREL technical reports that resulted from the experiments conducted there.

Hans Weertman's interest in glaciology blossomed from his time at Camp Century onward, as he demonstrated by publishing about 60 glaciological papers between 1960 and 1986. This period of time included his enduring and insightful papers on grounding line stability for marine ice sheets, which are of extraordinary relevance to the 21st century and beyond. He also developed a theory of ice-sheet response to Milankovitch cycles in the context of a long and fruitful collaboration with his Northwestern University colleague G. Edward Birchfield (currently also Professor Emeritus at Northwestern University).

After 1986, Weertman published only two more papers on glaciological subjects (these were after 2000). A possible explanation for this absence of glaciological research was the fact that his son Bruce started graduate study in glaciology at the University of Washington in about 1986, to eventually earn his PhD in 1993 on problems involving radio-echosounding of the Antarctic Ice Sheet. It is fully consistent with Hans's nurturing and deferential personality to have 'stood aside' to let his son become the Earth scientist of the family. Bruce remains the Earth scientist of the Weertman family through his work at the IRIS Data Management Center in Seattle, Washington.

It is daunting to sum up Hans Weertman's intellectual contributions to glaciology. Glaciologists who have worked with him will remember him, as will those who have only heard him speak at conferences or read his papers. He was genuinely personable, and easily helped others to overcome logical humps in seeking to understand the essence of the phenomena of interest. The common remembrance people have of Hans relates to the character of his thinking.



Hans Weertman at Camp Century, Greenland, in 1961.

Weertman's thinking was fluid and simple, and could penetrate the complexity that often intimidates the rest of us. His life spanned the time when glaciology grew from being a curiosity to becoming essential in understanding the present and future of humankind's position on Earth. What he did during his life was to enrich our science, and he did so in a way that all of us should try to emulate: by clear thinking and a willingness to both find and follow strategic simplifications.

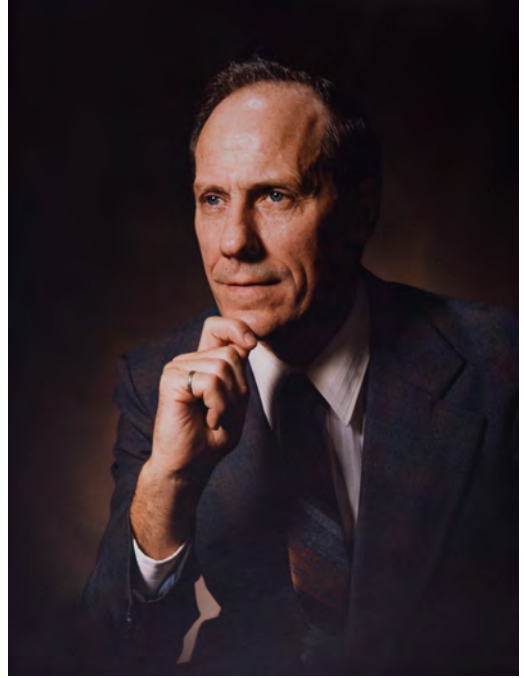
**Doug MacAyeal**

## Obituary: Lorne Gold, 1928–2018

Dr Lorne Gold, a respected member of Canada's 'Ice Research' community, and a long-time member of the IGS, died in Ottawa on 11 December 2018 at the age of 90. He was recognized by both engineers and scientists for his contributions to northern engineering and more specifically in the areas of ice, snow and permafrost. He was the pioneer of ice engineering research in Canada, and was the only 'ice research name' I knew of when I came to Canada in 1967. He was always willing to help newcomers like myself. Although I never worked with him directly, those who did have said that 'he was a mentor to staff at the National Research Council and generously shared his knowledge and experience with the broader engineering and scientific community in Canada'.

Dr Gold graduated from the University of Saskatchewan in Engineering Physics in 1950 and in the same year started his career in snow and ice research, joining the Division of Building Research at the National Research Council (NRC) in Ottawa. He was to spend his entire career there, rising to Associate Director in 1979 until his retirement in 1986. He formed and led a small team conducting ice and snow studies related to ice pressures on dams and bridge piers. This applied work was supported by fundamental research on the fracture and failure behaviour of ice, which has been published in a series of journal articles extending over five decades. One of his most cited papers, 'Use of ice covers for transportation' (1971), is still the best reference for making practical assessments of the quality of floating ice covers and their ability to safely support vehicles and equipment.

Lorne obtained his Masters degree (1952) and later, in 1970, his PhD from McGill University. After his retirement he was appointed to the prestigious position of Researcher Emeritus at NRC. He, and his wife, Joan, came to St John's, Newfoundland for a year in 1987/88 as Senior Visiting Scientist at C-CORE, and we got to know them both much better during that time. I remember a dinner party at which they served 'seal flipper pie', a Newfoundland delicacy, which he pronounced to be 'interesting'! We also worked together as organizers and co-editors of the conference on the Physics and Chemistry of Ice held in Ottawa in 1972, and published by the Royal Society of Canada.



Lorne was either author or co-author of over 100 publications, as well as a book, *The Canadian Habbakuk Project: A Project of the National Research Council of Canada*, published by the IGS in 1993. This book is an engaging story of a top-secret wartime project centred on ice engineering and the idea of building a ship out of ice to help the war effort. He spent a considerable amount of time researching archives in Canada and Britain, and persuading the authorities to de-classify the information and to allow him to publish the book. The fascinating story of this project can be found in his last publication: Lorne W. Gold (2004) Building ships from ice: Habbakuk and after. *Interdisciplinary Science Reviews*, 29(4), 373–384, DOI 10.1179/030801804225018783.

Dr Gold was a member of the Canadian Geotechnical Society, served on its Board of Directors from 1976–83, and was an Associate Editor of the *Canadian Geotechnical Journal* from 1964 to 1981. He was also a member of the Canadian Society of Civil Engineering, of which he was elected a Fellow in 1989. He chaired the Associate Committee on Geotechnical Research

from 1976 to 1983. His contributions to science and engineering in Canada were recognized by his election as a Fellow of the Royal Society of Canada and a Fellow of the Canadian Academy of Engineering.

Lorne provided exceptional service to the glaciological community by his involvement with the IGS. He joined the society in 1957 and remained a member well into his retirement. He served as President from 1978–81. His desire for the IGS to move toward more applied aspects of ice research must have influenced the decision to hold a Symposium on Problems of Applied Glaciology in 1976. It was while he was President

that the decision was made to start publishing the proceedings of IGS conferences as the *Annals of Glaciology*.

He is survived by his wife, Joan, a brother, four children, ten grandchildren and nine great-grandchildren.

**Stephen Jones/Bob Frederking/Simon Ommannney**



## Obituary: Trevor Chinn, 1937–2018

In early January a large crowd gathered at the Hawea Community Centre in Central Otago, New Zealand, to celebrate the life of Dr Trevor Chinn, who died on 20 December 2018 following a recent stroke. Specializing in glaciology, hydrology and geomorphology, Trevor's scientific career spanned more than 60 years, leading him to be regarded as the 'godfather' of New Zealand glaciers.

Trevor was an integral part of snow and ice research in New Zealand. His knowledge of the New Zealand and Antarctica cryosphere was immense: he had an impressive publication record, and undoubtedly the best known knowledge of glaciers large and small across the entire Southern Alps. His passion for the mountains, and drive to better understand snow and ice processes, meant that Trevor spent many hours in the field. He was a key player in the initiation of New Zealand's first glacier monitoring programmes on Tasman and Ivory Glaciers, and later pioneered a scheme to photograph 50 Southern Alps glaciers from an aircraft at the end of summer every year. This photographic monitoring programme has become one of the most comprehensive glacier data sets in the Southern Hemisphere. The photographs are used to assess glacier mass balance, providing valuable information about how New Zealand glaciers are responding to climate change. Trevor leaves a legacy of over 16 000 photographs of New Zealand glaciers, which are being archived by the National Institute of Water and Atmospheric Research (NIWA), so that future generations of scientists can benefit from and continue to add value to his work.

Growing up on the West Coast of the South Island of New Zealand, it was clear that Trevor had an enquiring (aka mischievous) mind, which led to many childhood adventures. His interest in rain and rivers saw him working for the North Canterbury Catchment Board, and later the Ministry of Works, where he got into snow and ice monitoring. In addition to working in the Southern Alps, Trevor made 20 trips to Antarctica, conducting research in the Dry Valleys. His impressive scientific career continued during his employment with the New Zealand national science agencies: GNS Science and then NIWA. In his later years, the glacier snowline flights became his main focus; even after his retirement, Trevor continued to organize and participate in the flights, and analyse and publish the results.

Trevor had an energy and spark that was contagious. He loved to engage with students and



delighted in encouraging the next generation of scientists – especially with a cheeky challenge to their hypothesis or interpretation. Trevor's outgoing personality meant that he was not only good at doing science but great at communicating it. He was the go-to person for media and education. His ability to take complex scientific processes and explain them to a general audience was legendary, especially the way his animated explanations were often accompanied by one of his original glacier cartoons!

Trevor was made a Doctor of Science of the University of Canterbury in 2007, having completed a Masters in Geology there back in 1975.

In 2016, in recognition of his outstanding service and contribution to glaciological research in New Zealand and Antarctica, the IGS awarded Trevor the prestigious Richardson Medal.

While doing all this amazing science, Trevor still made time to be an active member of the communities where he lived (most recently Hawea, located on a moraine from the Last Glacial Maximum), and enjoyed many adventures with his wife Barbara, sons Warren and Derek and grandchildren Sylvia, Georgia and Alexander. He is greatly missed by many.

**Heather Purdie, on behalf of the New Zealand snow and ice community**



INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on  
Glacial Erosion and Sedimentation



Pyle Center  
Madison, Wisconsin, USA  
12–17 May 2019

*Co-sponsored by:*

- ❄ Department of Geoscience, University of Wisconsin-Madison
- ❄ Wisconsin Geological and Natural History Survey

SECOND CIRCULAR

November 2018

<http://www.igsoc.org/symposia/2019/madison>



The International Glaciological Society will hold an International Symposium on 'Glacial Erosion and Sedimentation' in 2019. The symposium will be held at the Pyle Center in downtown Madison, Wisconsin, USA on 12–17 May 2019.

#### THEME

Since the last IGS symposium on glacial erosion and sedimentation in Reykjavik in 1995, techniques for characterizing these processes and their associated landscapes and sediments have improved markedly. Diverse remote-sensing techniques measure subaerial and submarine landforms at extraordinarily high resolution, and geophysical methods reveal evolving subglacial landscapes and processes. New and refined geochronological techniques place improved constraints on rates of erosion and deposition. Increased computer power allows models that address coupled processes of glacier flow, bedrock erosion, sediment transport and tectonic change over long time and length scales. New field and laboratory methods provide insight into the mechanics and kinematics of sediment-transport processes and their manifestations in glacial sediments.

Interesting and stubbornly enduring questions accompany these advances. How can glacial sediments and landforms inform us about glacier dynamics and how are glacier dynamics modulated by sediment-transport processes? How can large-scale models of glacial landscape evolution better approximate the small-scale processes that drive erosion and sediment transport? How can past climate variability be inferred from glacial sediments and landforms? How have rates of glacial erosion and sedimentation changed through time? How are drumlins and other subglacial bedforms sculpted, and what data can provide definitive hypothesis tests?







## SUGGESTED TOPICS

We seek papers and presentations on processes and products of glacial erosion and sedimentation, and their relationships to glacier dynamics. Key focus areas will include (but will not be limited to):

1. Processes and patterns of glacial erosion, sediment transport and deposition
2. Glacial history and dynamics, as inferred from sediments and landforms
3. Sediment transport feedbacks on glacier dynamics
4. Models of glacial landscape evolution
5. Rates of glacial erosion and sedimentation
6. Origins of glacial landforms
7. Geophysical studies of glacial landforms and subglacial processes
8. Climate signals of glacial sediments
9. Hazards associated with glacial sedimentation and erosion

## ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper (oral or poster) at the Symposium will be required to submit an abstract by 12 January 2019. Abstracts need to be submitted via the IGS website. Accepted abstracts will be posted on the Symposium website.

The Council of the International Glaciological Society will publish a thematic issue of the *Annals of Glaciology* (vol. 60 (2019), issue 80) 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. Submissions are being accepted now and the deadline for submitting papers is 7 June 2019. The call for papers is posted on [https://www.igsoc.org/annals/call\\_4\\_papers/a80\\_call\\_4\\_papers.pdf](https://www.igsoc.org/annals/call_4_papers/a80_call_4_papers.pdf).





## REGISTRATION FEES

All fees are in US dollars, \$

Early registration until 15 March 2019

– Participant (IGS member):	\$510
– Participant (not IGS member):	\$610
– Student or retired (IGS member):	\$400
– Student or retired (not IGS member):	\$475
– Accompanying person (21+):	\$175
– Accompanying person (12–20):	\$125
– Accompanying person (<12):	Free
– Delegate registration after 15 March 2019:	add \$50
– Delegate registration after 1 May 2019:	add further \$100

All prices will be charged in UK£ equivalent at the exchange rate valid near the date of transaction.

**The fees include the Icebreaker, the mid-conference excursion, the Symposium Banquet and morning/afternoon refreshments Monday through Friday.** Please register for the symposium through the IGS website. If you cannot do this, contact the IGS office directly at [igsoc@igsoc.org](mailto:igsoc@igsoc.org). If payment by credit card is not possible, contact the IGS office to arrange for a bank transfer.

Please check whether you will require a visa to enter the USA. If you need an invitation letter, please contact the IGS office at [igsoc@igsoc.org](mailto:igsoc@igsoc.org). The sooner you do this the more likely it is that your visa will be processed in time.

## ACCOMPANYING PERSONS

The accompanying person's registration fee includes the Icebreaker, the midweek excursion and the Symposium Banquet. **It does not include attendance at the presentation sessions.**





## STUDENT AND EARLY-CAREER SUPPORT

We anticipate being able to fund airfare and registration for a limited number of early-career researchers (graduate students, postdocs, recent hires in permanent positions). Awards of full or partial scholarships will be given on a competitive basis. An announcement will be made when the early-career support budget is confirmed, and travel support applications will be posted at that time.

## PROGRAM

True to tradition, the symposium will include oral and poster sessions interlaced with ample free time to facilitate the interactions of the participants. Additional activities include an opening Icebreaker, a Banquet dinner and a trip to the Kettle Moraine region of southeastern Wisconsin during the mid-symposium afternoon break.

## VENUE

The symposium will be held at the Pyle Center in downtown Madison, on the shores of Lake Mendota. The Pyle Center is located on campus and is just blocks from State Street with numerous eating venues and is less than a 5-minute walk from the Memorial Union Terrace with a lakeside sitting area and beer garden. Numerous hotels are within walking distance of the venue and lay on multiple bus lines.

## LOCATION

Madison is the second largest city in Wisconsin with a population of more than 208 000 people, and is surrounded by the classic geomorphology of the Green Bay Lobe of the Laurentide ice sheet. The city is home of the University of Wisconsin–Madison and the State Capitol and offers a large array of activities year-round. A large portion of downtown Madison sits on an isthmus between Lake Mendota and Lake Monona. The University's Memorial Union is located on Lake Mendota and serves as a popular gathering place for people to socialize and listen to live music. State Street,







the heart of downtown Madison, is alive with activity every day. Connecting the Capitol to the University, State Street features art galleries, cafes and restaurants, theatres, museums and more than 200 specialty shops. Madison is commonly considered the bike capital of the Midwest, with over 100 miles (160 km) of bike paths, including paths to the Pyle Center. B-cycle stations are located throughout the city for hourly or daily bike rental.

#### ACCOMMODATION

A number of hotels have provided group rates for the IGS for 12 May arrival through 18 May departure. You must contact these hotels and make the bookings yourself. To book and guarantee your room, please provide them with your credit card details by 31 March 2019. Use the codes provided below (different for each hotel) to secure your room. All hotels listed are located within walking distance of the conference venue. May is peak tourist season in the Madison region, so book as early as possible. Please note that rates may vary depending on property and the specific dates requested.

- **Madison Concourse Hotel**, 1 W. Dayton St, Madison, WI 53703 (1 km walk to Pyle Center): \$169.00 per night + tax single/double Phone: +1 608-257-6000. Parking available \$15. Booking link: <https://reservations.travelclick.com/6388?groupID=2394747> Website: <https://www.concoursehotel.com/>
- **Doubletree Madison**, 525 W. Johnson St, Madison, WI 53703 (0.8 km walk to Pyle Center): \$159.00 per night + tax single/double Phone: +1 608-251-5511. Parking available. Booking link: [https://doubletree.hilton.com/en/dt/groups/personalized/M/MSNDTDT-GEO-20190512/index.jhtml?WT.mc\\_id=POG](https://doubletree.hilton.com/en/dt/groups/personalized/M/MSNDTDT-GEO-20190512/index.jhtml?WT.mc_id=POG) Website: <https://doubletree3.hilton.com/en/hotels/wisconsin/doubletree-by-hilton-hotel-madison-MSNDTDT/index.html>
- **Graduate Madison**, 601 Langdon St, Madison, WI 53703 (0.2 km walk to Pyle Center): \$129.00 per night + tax Standard room. Phone: +1 608-257-4391. Parking available \$25. Booking link: <https://gc.synxis.com/rez.aspx?Hotel=77206&Chain=21643&arrive=5/12/2019&depart=5/18/2019&adult=1&child=0&group=190512UWDE> Website: <https://www.graduatehotels.com/madison>
- **Lowell Center**, 610 Langdon St, Madison, WI 53703 (0.2 km walk to Pyle Center): Current rates, see website. Phone: +1 608-256-2621. Parking available. Booking link <http://bit.ly/esglac12may> Website: <http://conferencing.uwex.edu/hotel-accommodations/>





## TRAVEL

Madison airport connects to 20 other US cities directly, including flights to both the east and west coasts of the USA. Chicago O'Hare airport is a 2-hour drive from Madison but the Van Galder bus company regularly runs buses directly between Madison and O'Hare. The drop-off location is one block from the venue. (<https://web.coachusa.com/vangalder/ss.ohareairport.asp>)

## ICEBREAKER

The Icebreaker will be held on Sunday 12 May 5:00–9:00 pm at the rooftop terrace at the Pyle Center. Refreshments (cash bar) and finger food with a complimentary drink will be available from 5:00 pm to 7:00 pm. Delegates can also use this opportunity to complete their registration and collect their conference bag materials.

## BANQUET

The Banquet will be held at the Memorial Union Great Hall on the evening of Thursday 16 May. The Memorial Union is located on the shore of Lake Mendota and has a reputation as one of the most beautiful student centers on a university campus. The banquet will be served buffet-style with a complimentary drink. A cash bar will be available and will require valid government-issued ID. Transportation will be provided between the symposium venue and the Memorial Union.

## MID-CONFERENCE EXCURSION

On Wednesday 15 May, there will be a mid-conference field trip to the Kettle Moraine region of Wisconsin, departing at 11:00 pm from the symposium venue. Lunch will be provided. The moraine was created where the Green Bay Lobe of the Laurentide Ice Sheet, on the west, merged with the Lake Michigan Lobe to the east, depositing sediment between the lobes as an interlobate moraine. The region contains world-class examples of drumlins, eskers, kames and glacial lake deposits, all of which will be visited on the trip. We will end at a local brewery near downtown Madison. Those who wish to skip the brewery will be transported to the symposium venue at 6 pm.





## SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society)

## SCIENCE STEERING AND EDITORIAL COMMITTEE

Chief Editors: Neal Iverson (Iowa State University) and Lucas Zoet (University of Wisconsin–Madison). Scientific Editors: David Egholm (Aarhus University), Gwenn Flowers (Simon Fraser University), Mark Johnson (University of Gothenburg), Shaun Marcott (University of Wisconsin–Madison), Chris Stokes (Durham University), and Martin Truffer (University of Alaska Fairbanks)

## LOCAL ORGANIZING COMMITTEE

Lucas Zoet (Chair), Dave Mickelson, Elmo Rawling, Shaun Marcott, Carrie Jennings, Urs Fischer.

## FURTHER INFORMATION

Please register your interest online if you wish to attend the symposium at <http://www.igsoc.org/symposia/2019/madison>.

## IMPORTANT DATES

### *Glacial Erosion and Sedimentation*

Opening of online abstract submission:	1 December 2018
Opening of online registration:	27 January 2019
Abstract submission deadline:	12 January 2019
Notification of abstract acceptance:	22 January 2019
Early registration deadline:	1 March 2019
Deadline for full refund:	15 April 2019
Deadline for refund on a sliding scale:	1 May 2019
Late registration surcharge starts:	2 May 2019
Symposium starts:	12 May 2019

### *Annals of Glaciology* volume 60, issue 80

Paper submission deadline:	7 June 2019
Final revised papers deadline:	30 August 2019

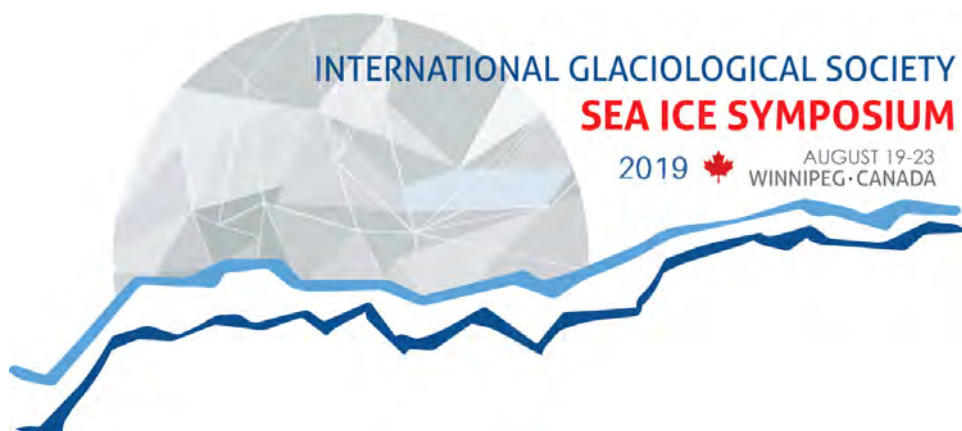
The Call for Papers for the *Annals of Glaciology* is posted on [https://www.igsoc.org/annals/call\\_4\\_papers/a80\\_call\\_4\\_papers.pdf](https://www.igsoc.org/annals/call_4_papers/a80_call_4_papers.pdf). Accepted papers will be published as soon as authors have returned their proofs and all corrections have been made.

Hard copy publication is scheduled for late 2019.



INTERNATIONAL GLACIOLOGICAL SOCIETY

## International Symposium on Sea Ice at the Interface



Winnipeg, Manitoba, Canada  
18–23 August 2019

*Co-sponsored by:*  
 University of Manitoba

SECOND CIRCULAR  
February 2019  
<http://www.igsoc.org/symposia/2019/winnipeg>  
Local website: [www.igswpg.com](http://www.igswpg.com)



The International Glaciological Society will hold the next International Symposium on Sea Ice in Winnipeg, Manitoba, Canada, 18–23 August 2019.

#### THEME

**Sea Ice at the Interface.** Sea ice plays a critically important yet highly dynamic role in global climate, polar marine ecosystems, globalization and Indigenous cultures. Ongoing dramatic changes to the sea icescape and freshwater–marine coupling, particularly involving ice sheets, glaciers, ice shelves, sea ice loss and continental runoff, have major implications for climate within and beyond the polar regions, environmental and ecological integrity, and regional and global socioeconomic development. This symposium presents a timely opportunity to showcase recent advances in our knowledge and technological capabilities in sea-ice-related research. In addition, the symposium will encourage holistic discussions amongst scientists, stakeholders and policy makers regarding the most recent changes, long-term trends and variability in the sea-ice environment in both hemispheres, and how best to engage and communicate with the general public.

#### CONFIRMED SESSIONS

Participants are encouraged to present on a wide variety of relevant topics in the following sessions:

1. **The role of atmospheric dynamics in a changing sea ice cover.** Chairs: Julianne Stroeve, Paul Kushner, Jennifer Lukovich
2. **Sea ice dynamics I: Processes.** Chairs: Chris Polashenski, Jennifer Hutchings, Andrew Mahoney, Arnold Song
3. **Sea ice dynamics II: Observations.** Chairs: Petra Heil, Jennifer Hutchings, Ruibo Lei, Polona Itkin
4. **Sea ice thickness and roughness variability and change.** Chairs: Christian Haas, Stefan Hendricks, Axel Schweiger
5. **Snow on sea ice I: Observations and modelling.** Chairs: Julianne Stroeve, Torsten Geldsetzer, John Yackel, Vishnu Nandan, Edward Blanchard-Wrigglesworth







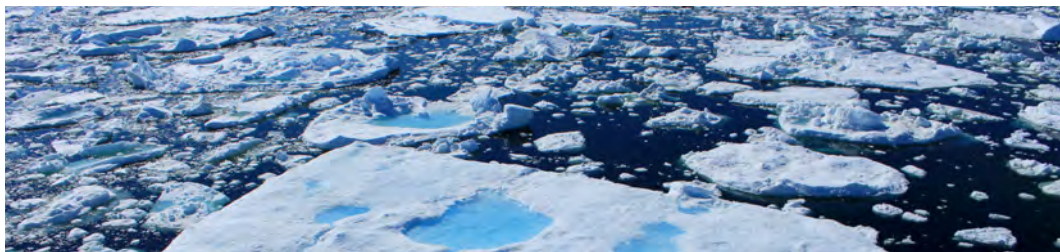
6. **Snow on ice (II): Processes and effects on sea-ice thickness.** Chairs: Stefanie Arndt, Sebastian Gerland, Stefan Kern, Rob Massom, Chris Polashenski, Melinda Webster
7. **Current and near future changes in seasonal/marginal ice.** Chairs: Paul Wassmann, Pat Langhorne, Byongjun (Phil) Hwang, Jeremy Wilkinson
8. **Optical properties and light propagation in Arctic and Antarctic marine systems.** Chairs: Jens Ehn, Marcel Babin, Tao Li
9. **Satellite microwave remote sensing for sea ice research.** Chairs: Gunnar Spreen, Walt Meier, Rob Massom
10. **Novel technologies for observations of the sea-ice system.** Chairs: Christian Katlein, Marcel Nicolaus, Marcel Babin, Ted Maksym
11. **Challenges in high-resolution sea ice modeling.** Chairs: Andrew Roberts, Adrian Turner, Elizabeth Hunke, Marika Holland
12. **Sea Ice in CMIP6 models.** Chairs: Alexandra Jahn, Marika Holland, Elizabeth Hunke, François Massonnet, Dirk Notz, Julianne Stroeve, Bruno Tremblay, Martin Vancoppenolle
13. **Sea ice, ocean and climate connections in the Northern Oceans and the Southern Oceans.** Chairs: Inga J. Smith, François Massonnet, Amy Solomon, Riccardo Farneti, John Fyfe
14. **Model-observation integration for enhanced understanding of Arctic and Antarctic sea ice.** Chairs: Lettie Roach, Chris Horvat, Rachel Tilling
15. **Glacier–sea ice coupling in the Arctic and Antarctic.** Chair: Dorthe Dahl-Jensen
16. **Paleo-reconstruction of glacier and/or glacier–sea ice coupling.** Chair: Dorthe Dahl-Jensen
17. **Iceberg production, drift and deterioration.** Chairs: Abigail Dalton, Wesley Van Wychen, Luke Copland





18. **Interactions between runoff and sea ice.** Chairs: Robie Macdonald, Zou Zou Kuzyk
19. **Biogeochemical processes within the ocean-sea ice-atmosphere – Part 1.** Chairs: Nadja Steiner, Letizia Tedesco, Sebastien Moreau, Klaus Meiners
20. **Biogeochemical processes within the ocean-sea ice-atmosphere – Part 2.** Chairs: Søren Rysgaard, Ryan Galley, David Walker
21. **Biodiversity and biogeochemical cycling associated to sea ice on different spatial scales – from local to pan-Arctic.** Chairs: Brandon Hassett, Rolf Gradinger
22. **Sea ice habitats and ecological processes across multiple scales.** Chairs: Christine Michel, Jody Deming, Steve Ferguson, C.J. Mundy, Benjamin Lange
23. **Sea-ice ecosystems: Genomes and phenomes of sea ice microbes.** Chairs: Eric Collins, Eeva Eronen-Rasimus, Maria Bautista, Jeff Bowman, Jody Deming
24. **Cryosphere storage, transport and transformation of legacy & emerging contaminants & oil spills.** Chairs: Kathleen Munson, Liisa Jantunan, Ken Lee, Zhouqing Xie
25. **Sea ice change impacts on Arctic marine operations and shipping.** Chairs: Lawson Brigham, Scott Stephenson
26. **Freshwater marine coupling in the Greater Hudson Bay Marine Region.** Chair: Jens Ehn
27. **Early sea ice explorations with ICESat-2.** Chairs: Nathan Kurtz, Ron Kwok
28. **Traditional knowledge and northern engagement in sea ice research.** Chairs: Brooke Milne, Ann Lennert, Michelle Kamula





## CONFIRMED PANEL DISCUSSIONS

1. **The Pikialasorsuaq partnership in the North Water Polynya** – a proposed international Inuit management area
2. **Northern Economic Development** – how climate change is increasing opportunities locally, nationally and internationally in the Arctic

## PROGRAM

True to tradition, the symposium will include oral and poster sessions interlaced with ample free time to facilitate the interactions of the participants. Additional activities include an opening Icebreaker, a Banquet dinner and a selection of activity during the mid-symposium Wednesday afternoon break (21 August). A post-symposium excursion to Churchill, Manitoba is also planned.

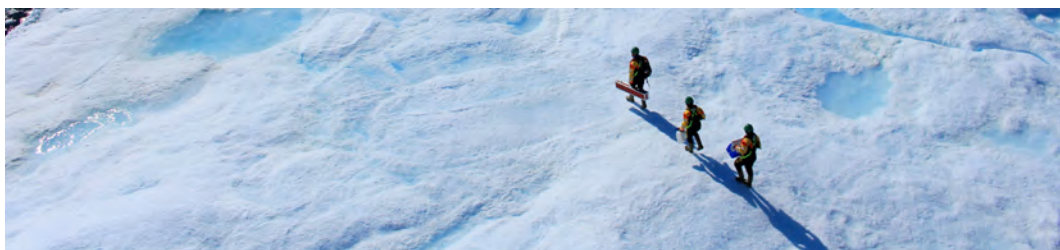
## SIDE MEETINGS

The organizing committee welcomes requests from groups and organizations for meeting spaces to host side meetings prior to or after the symposium. Send all requests to [Lucette.Barber@umanitoba.ca](mailto:Lucette.Barber@umanitoba.ca)

## ABSTRACT AND PAPER PUBLICATION

Participants who wish to present a paper (oral or poster) at the Symposium will be required to submit an abstract by 20 March 2019. Abstracts need to be submitted via the IGS website. Accepted abstracts will be posted on the Symposium website.

The Council of the International Glaciological Society will publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants are encouraged to submit manuscripts for this *Annals* volume. **The call for manuscript submission is NOW OPEN and closes 1 October 2019.** The deadline for providing the final manuscript version is 1 January 2020. Submit a paper at: [www.cambridge.org/core/journals/annals-of-glaciology/information/instructions-contributors](http://www.cambridge.org/core/journals/annals-of-glaciology/information/instructions-contributors)





## REGISTRATION FEES

All fees are in Canadian dollars (CAD).

Online registration opens 10 April 2019. Early registration until 26 June:

– Participant (IGS member):	\$785
– Participant (not IGS member):	\$885
– Student or retired (IGS member):	\$600
– Student or retired (not IGS member):	\$650
– Accompanying person (12+):	\$150
– Accompanying person (<12):	Free
– Delegate registration after 26 June 2019:	add \$100

**The fees include the Icebreaker, the mid-conference excursion, the Banquet, light refreshments upon arrival each morning, morning and afternoon coffee breaks, and all lunches.** Please register for the symposium at <http://igswpg.com/register/>. If you cannot do this, contact Lucette Barber via e-mail <[lucette.barber@umanitoba.ca](mailto:lucette.barber@umanitoba.ca)> . If payment by credit card is not possible, contact Lucette Barber to arrange for a bank transfer.

The maximum number of attendees is capped at 350 to ensure a more intimate and interactive symposium experience.

Please check whether you will require a visa to enter Canada (<http://www.cic.gc.ca/english/visit/visas.asp>). If you need an invitation letter, please contact the IGS office at [igsoc@igsoc.org](mailto:igsoc@igsoc.org). Proof of registration is required for an invitation letter. The sooner you do this the more likely it is that your visa will be processed in time.

**Refund policy:** Cancellation requests must be sent in writing to the Local Organizing Committee. An administrative fee of 10% will be applied to all refunds.

- 10 July – deadline for 90% refund
- 19 July – deadline for 50% refund

No refunds after 19 July.

To request a refund send email to: [Lucette.barber@umanitoba.ca](mailto:Lucette.barber@umanitoba.ca)

## ACCOMPANYING PERSONS

The accompanying person's registration fee includes the Icebreaker, the midweek excursion and the Symposium Banquet. **It does not include attendance at the presentation sessions nor the refreshments and lunches during the week.** It is also possible to purchase individual tickets during the participant registration process for the midweek excursion (\$50/person) and banquet (\$75/person). **If an accompanying person wishes to attend sessions they must register as a participant.**





## STUDENT AND NORTHERNER SUPPORT

We anticipate being able to subsidise a limited number of students and northern participants. Please forward requests to: [Lucette.Barber@umanitoba.ca](mailto:Lucette.Barber@umanitoba.ca).

## VENUE AND LOCATION

We look forward to welcoming the international glaciology and sea ice communities to Winnipeg, Manitoba. The University of Manitoba and the Province have a long history in Arctic, sea ice and Indigenous studies and activities. The meeting will take place in the historic Fort Garry Hotel in the heart of downtown Winnipeg, adjacent to the Winnipeg Forks and Exchange District. This venue is ideally situated within walking distance to the Canadian Human Rights Museum, the VIA Rail train station, and numerous eating venues, markets and shops.

<https://www.fortgarryhotel.com/winnipeg-conference-centre/meeting-spaces>

<https://www.exchangedistrict.org>

Winnipeg is the capital of and largest city in Manitoba, with a population of more than 800 000. The city is named after the nearby Lake Winnipeg, which comes from the Western Cree word for 'muddy water'.

Winnipeg lies at the junction of the Assiniboine and Red rivers, a location now known as 'The Forks'. This point was at the crossroads of canoe routes travelled by First Nations before European contact. Evidence provided by archaeology, rock art and oral history indicates that native peoples used the area in prehistoric times for trading, camping, harvesting, hunting and fishing. The region was a trading centre for aboriginal peoples long before the arrival of Europeans. French traders built the first fort on the site in 1738. Because of the city's unique position between the two rivers it became a popular place for river transportation by canoe or York boat.

Known as the Gateway to the West, Winnipeg is a railway and transportation hub. This multiculturally rich city hosts numerous annual festivals, including Le Festival du Voyageur, Folk Fest, Fringe and Folklorama. It is home to several professional sports franchises, including the Winnipeg Blue Bombers (Canadian Football League), the Winnipeg Jets (National Hockey League), Manitoba Moose (Minor hockey) and the Winnipeg Goldeyes (baseball).





## ACCOMMODATION

A number of hotels are providing group rates for the IGS conference for 18–23 August. We strongly recommend that participants reserve their hotels well in advance as the month of August is a busy time for conferences and is peak tourist season in Winnipeg. If you are planning to arrive early to attend a side meeting or for any other reason, please **reserve early**. All hotels listed are located within walking distance of the conference venue. When making your reservation use the promo code: IGS2019.

- The Fort Garry Hotel, (host venue for the symposium) 222 Broadway Avenue, Winnipeg, Manitoba, R3C 0R3. Phone: 1-204-942-8251. Parking available. Queen room \$159/night; king or double/double room \$179/night; one-bedroom suite \$299/night. The hotel will honour the conference rate for those arriving earlier and/or staying later for side meetings – just provide the code when you book. Website: [www.fortgarryhotel.com/](http://www.fortgarryhotel.com/)
- Delta Hotel, 350 St. Mary's Avenue, Winnipeg, Manitoba, R3C 3J2 (10 minute walk). Phone 1-204-942-0551. Parking available. Standard room \$144/night. Website: [www.marriott.com](http://www.marriott.com)
- Inn at the Forks Hotel, 75 Forks Market Road, Winnipeg, Manitoba, R3C 0A2 (8 minute walk). Phone 1-204-942-6555. Parking available. Deluxe king-size room \$168/night. Website: [www.innforks.com](http://www.innforks.com)

For other options visit: <https://www.tourismwinnipeg.com/places-to-stay/hotels>

## ICEBREAKER

The Icebreaker will be held on Sunday 18 August 2019 from 5:00–7:30pm in the Mezzanine at the Fort Garry Hotel. Delegates can also use this opportunity to complete their registration.

## BANQUET

The Banquet will be held Thursday 22 August 2019 in the Grand Ball room at the Fort Garry Hotel. Reception will start at 6:00 pm, followed by dinner, a guest speaker and entertainment.





#### **MIDWEEK EXCURSION**

On Wednesday 21 August there will be a wide range of mid-week excursions to choose from when you register (cost included in your registration fee). Departing Fort Garry Hotel (222 Broadway Avenue) at 12:00 noon. Options include:

##### **Sandilands Provincial Forest:**

For those wanting to escape the city and venture out into nature, we invite you to put on your hikers and join our trip out to the Sandilands Provincial Forest. Enjoy an afternoon of hiking through the Boreal Forest and Canadian Shield. Covering over 3000 km<sup>2</sup> of forest, wetlands and sand hills, the Sandilands Forest is managed land that provides public access for hiking, camping and hunting. There are several short ascents and descents which will give your legs a well deserved mid-conference stretch. We will visit the Sandilands Forest Discovery Centre which provides an outdoor teaching facility where visitors can learn about forests in a natural setting. See the tree planting rail car which is a travelling museum, fire tower, suspension bridge and more. A day with nature is a day well spent.  
<https://www.thinktrees.org/forest-centres/sandilands-forest-discovery-centre/>

##### **Assiniboine Park Zoo – Behind the scenes tour of the Journey to Churchill:**

Come explore the Assiniboine Park Zoo which features over 2000 animals across a variety of exhibits that focus on local prairie wildlife and animals from Canada's North. The Zoo's award-winning 'Journey To Churchill' exhibit recreates the feel of the Polar Bear Capital of the World – Churchill, Manitoba. This exhibit is home to Wolves, Muskox, Ringed Seals, Arctic Fox, Caribou, Snowy Owls and of course Polar Bears. A key component of the Journey to Churchill exhibit is the Leatherdale International Polar Bear Conservation Centre, which serves as a hub for environmental and wildlife education, research and conservation, and cares for orphaned cubs. You will be treated to a tour through the main exhibits and an exclusive behind the scenes tour of the Conservation center with Dr Stephen Petersen, the Head of Conservation and Research at the Assiniboine Park Zoo. It is an educational classroom unlike any other as you are transformed to the Arctic and all the wonders it has to offer.  
<https://www.assiniboineparkzoo.ca/zoo/home/explore/exhibits/journey-to-churchill>



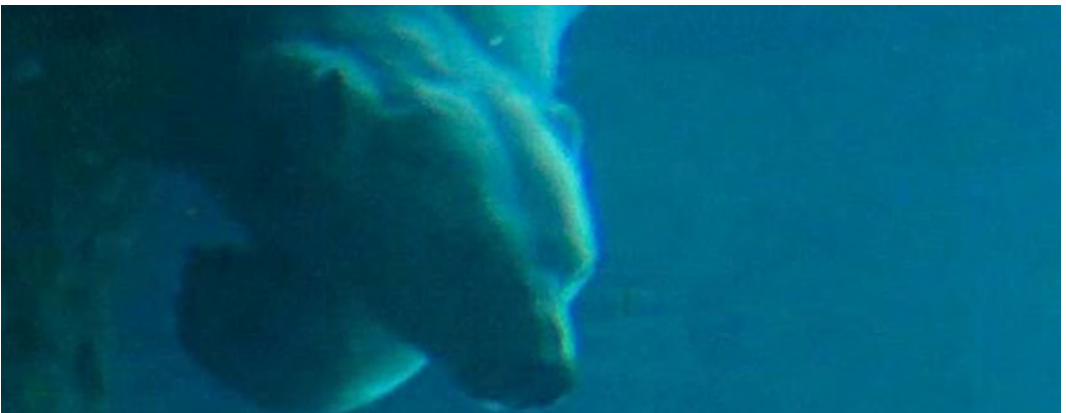


### **Canadian Museum for Human Rights:**

Canada's newest national museum rises from the prairies earth in Winnipeg at the Forks, where the Red and Assiniboine rivers meet on ancestral lands; a historic meeting place for thousands of years. From the moment you enter through its massive stone roots, to the time you emerge in its light-filled Tower of Hope, you will be moved by the power of human rights. The symbolism of this architectural wonder parallels the long road to freedom and human rights that so many who have travelled before us, leaving behind a legacy and their powerful stories. The only museum in the world solely devoted to human rights awareness and education, it stands as a beacon for visitors from around the globe. An amazing encounter with human rights awaits families, tourists and scholar alike. This is an experience you will not soon forget. <https://humanrights.ca/visit>

### **Winnipeg walking tour:**

Join us for an afternoon discovering the historical secrets, symbols and hidden meanings behind the mystical design of one of Winnipeg's grandest buildings - the Winnipeg Legislative Building. During this Canadian signature experience, uncover trails of occult clues hidden in the building's architecture including: hieroglyphic inscriptions, numerical codes and Freemasonic symbols that have escaped historians and visitors for nearly 100 years. We will take a break at one of Winnipeg's outstanding brew pubs and then begin our second journey walking through the historical exchange district. This national historical site features an exceptional collection of heritage buildings built between 1880 and 1920. Nicknamed the 'Chicago of the North' the exchange features massive stone and brick warehouses, narrow angled streets as well as cobblestone paths and alleyways. This guided tour highlights not only architecture but also the legends of power, corruption and heroism painting a glimpse into Winnipeg's history.







#### POST SYMPOSIUM EXCURSION TO CHURCHILL (Optional & Extra cost)

For the adventurous, a post-symposium 4-day excursion to Churchill, Manitoba, will be available for a maximum of 20–30 people, on a first-come first-served basis. Located on the shore of the sub-Arctic Hudson Bay, Churchill is a world-class tourist destination for viewing polar bears, beluga whales and the Aurora Borealis. This trip will include a visit to the town of Churchill, the new Churchill Marine Observatory research facility, the Churchill Northern Studies Centre, a beluga tour at the mouth of the Churchill River, a tour of the Prince of Whales Fort National Historic Site, interpretive dog carting excursion, and an afternoon on the tundra ending with a sunset dinner on the famous Tundra Buggies.

Learn more at: <http://igswpg.com/churchill-excursion/>

To add your name to the list contact: [amanda.vandewoestyne@frontiersnorth.com](mailto:amanda.vandewoestyne@frontiersnorth.com)

#### SYMPOSIUM ORGANIZATION

Magnús Már Magnússon (International Glaciological Society).

#### SCIENCE ADVISORY COMMITTEE

David Barber (Chair), Rob Massom (Past Co-Chair), Marcel Babin, Jorgen Berge, Alice Bradley, Luke Copland, Dorthe Dahl-Jensen, Jody Deming, Brent Else, Torsten Geldsetzer, Sebastian Gerland, Mats Granskog, Lawrence Hislop, Alexander Komarov, Kenneth Lee, Ann Lennert, Tao Li, Robie Macdonald, Marcel Nicolaus, Søren Rysgaard, Julianne Stroeve, Gunner Spreen, Randy Scharien, Rocky Taylor, Letizia Tedesco, Martin Vancoppenolle, Feiyue Wang, Muyin Wang, Zhouqing Xie





#### SCIENCE STEERING COMMITTEE

Feiyue Wang (Chair), Petra Heil (Past Co-Chair), David Barber, Tonya Burgers, Odile Crabeck, Jens Ehn, Ryan Galley, Nicolas-Xavier Geilfus, John Iacozza, Zou Zou Kuzyk, Dustin Isleifson, Christine Michel, CJ Mundy, Kathleen Munson, Tim Papakyriakou, Gary Stern, John Yackel

#### LOCAL ORGANIZING COMMITTEE

Lucette Barber (Chair), Debbie Armstrong, David Babb, David Barber, Lauren Candlish, Linda Chow, Laura Dalman, Madison Harasyn, Jennifer Hollar, John Iacozza, Ashley Soloway, Heather Stark, Denise Whynot

***The local website is now live!***

***Visit <https://www.igswpg.com>***

#### IMPORTANT DATES

##### *Sea Ice at the Interface*

Opening of online abstract submission:	6 February 2019
Abstract submission deadline:	20 March 2019
Notification of abstract acceptance:	9 April 2019
Opening of online registration:	10 April 2019
Early registration deadline:	24 June 2019
Deadline for 90% refund:	10 July 2019
Deadline for 50% refund:	19 July 2019
Symposium starts:	18 August 2019

##### *Annals of Glaciology volume 62, issue 82*

Manuscript submission deadline:	1 October 2019
Final revised papers deadline:	1 January 2020

The Call for Papers for the *Annals of Glaciology* is posted on <https://www.igsoc.org/annals/call4papers.html>. Accepted papers will be published as soon as authors have returned their proofs and all corrections have been made.

Hard copy publication is scheduled for mid 2020.



# Glaciological diary

\*\* IGS sponsored

\* IGS co-sponsored

## 2019

14–16 January 2019

### **Year of Polar Prediction (YOPP) Arctic Science Workshop**

Helsinki, Finland

Contact: YOPP International Coordination Office <office@polarprediction.net>

20–24 January 2019

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

Geilo, Norway

Website: <https://nag.iasc.info/workshop>

22–24 January 2019

### **Arctic Frontiers Science 2019: Smart Arctic**

Tromsø, Norway

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

7–8 February 2019

### **Cryospheric Science with ICESat-2 (CSI): Software Carpentry Workshop**

Seattle, Washington, USA

Contact: email-icesat@uw.edu

Website: <https://software-carpentry.org/>

11–15 February 2019

### **International Advanced Training Course on Snow and Avalanche 2019: 'Practice Meets Science'**

Davos, Switzerland

Website: <http://www.slf.ch/more/training>

13–14 February 2019

### **IASC Workshop on Effects and Extremes of High Latitude Dust**

Reykjavik, Iceland

Website: <https://iasc.info/upcoming-iasc-events>

20–22 February 2019

### **\*New Zealand Snow and Ice Research Group (SIRG: the New Zealand branch of IGS) Annual Workshop**

Kurow, New Zealand

Website: <https://sirg.org.nz/>

29–30 March 2019

### **Ice Drilling Program Subglacial Access Working Group Science Planning Workshop**

Herndon, Virginia, USA

Website: <https://icedrill.org/subglacial-access-science-planning-workshop-2019/>

3–5 April 2019

### **\*International Symposium on Mitigation Measures against Snow Avalanches and Other Rapid Gravity Mass Flows**

Siglufjörður, Iceland

Website: <http://snow2019.is/>

4–6 April 2019

### **5th Annual Students in Polar and Alpine Research Conference (SPARC)**

Brno, Czech Republic

Website: <https://sparc-brno.webnode.cz/>

15–18 April 2019

### **Permafrost conference 2019: Solving the puzzles from the cryosphere**

Pushchino, Russia

Website: <http://cryosol.ru/en/cryoconference2019en.html>

18–20 April 2019

### **International Workshop: Climate Change and Extreme Events in the Himalayan Region**

Mandi, Himachal Pradesh, India

Website: <http://c2e2himalaya.iitmandi.ac.in/>

5–11 May 2019

### **USC Next Generation Polar Research Symposium**

Wrigley Marine Science Center, Catalina Island, California, USA

Website: <https://dornsife.usc.edu/polar>

9–10 May 2019

### **Chilean Society of the Cryosphere (SOCHICRI) annual meeting**

La Serena, Chile

Contact: [sochicri@gmail.com](mailto:sochicri@gmail.com)

Website: <http://sochicri.cl/>

10 May 2019

### **Antarctic Climate Symposium**

Brussels, Belgium

Website: <https://ees.kuleuven.be/aerocloud-event/www.gsw2019.org/chgcs/>

10–14 May 2019

### **Workshop: Cryosphere and Hydrosphere for Global Change Studies (CHGCS 2019)**

Enschede, Netherlands

Website: <http://www.gsw2019.org/chgcs/>

12–17 May 2019

**\*\*International Symposium on Erosion and Sedimentation**

Madison, Wisconsin, USA

Contacts: Secretary General, IGS

Neal Iverson <niverson@iastate.edu>

13–17 May 2019

**ESA Living Planet Symposium**

Milan, Italy

Website: <https://lps19.esa.int/>

14–16 May 2019

**Arctic Data Workshop**

Orono, Maine, USA

Website: <http://arctic.icecoredata.org/>

15–17 May 2019

**Geological Society of America Cordilleran Section 115th Annual Meeting**

T20. Glaciers of the North American West.

Conveners: Andrew G. Fountain, Claire Todd, Erin Whorton

Portland, Oregon, USA

Website: [https://www.geosociety.org/GSA/Events/Section\\_Meetings/GSA/Sections/cd/2019mtg/techprog.aspx](https://www.geosociety.org/GSA/Events/Section_Meetings/GSA/Sections/cd/2019mtg/techprog.aspx)

19–23 May 2019

**15th Conference on Polar Meteorology and Oceanography  
hosted by the American Meteorological Society**

Boulder, Colorado, USA

Website: <https://www.ametsoc.org/index.cfm/ams/meetings-events/ams-meetings/15th-conference-on-polar-meteorology-and-oceanography1/>

22–30 May 2019

**International Arctic Science Committee 21st Arctic Science Summit Week**

Arkhangelsk, Russia

Website: <https://en.assw2019.science/>

Contact: [info@assw2019.science](mailto:info@assw2019.science)

16–22 June 2019

**Third Innsbruck Alpine Summer School, on Close Range Sensing Techniques for Alpine Terrain**

Obergurgl, Austria

Website: <https://www.uibk.ac.at/geographie/summerschool/2019/>

17–21 June 2019

**Cryospheric Science with ICESat-2 (CSI): Hackweek 2019**

Seattle, Washington, USA

Contact: [email-icesat@uw.edu](mailto:email-icesat@uw.edu)

Website: <https://icesat-2hackweek.github.io/>

17–21 June 2019

**4th Open Global Glacier Model (OGGM) workshop**

Grenoble, France

Website: <https://oggm.org/2019/02/08/4th-workshop-announcement/>

2–5 July 2019

**Third International Congress on Stratigraphy (Strati 2019)**

Session ST6.1: Combining Arctic and Antarctic paleoclimate and paleoceanographic stratigraphic records with models to understand past and future evolution of bi-polar linkage. Conveners: Florence Colleoni, Peter Bjil, Jochen Knies, Laura De Santis

Milan, Italy

Contact: Florence Colleoni <[fcolleoni@gmail.com](mailto:fcolleoni@gmail.com)>

8–12 July 2019

**\*\*International symposium on Five Decades of Radioglaciology**

Stanford, California, USA

Contacts: Secretary General, IGS

Dustin Schroeder <[Dustin.M.Schroeder@stanford.edu](mailto:Dustin.M.Schroeder@stanford.edu)>

8–19 July 2019

**Life and Earth Sciences and Sustainable Global and Regional Development (AKTRU2019)**

International Symposium and Summer Schools

Altai Mountains, Russia

Website: <https://nanoandgiga.com/aktru2019/>

Contact: Anatoli Korkin <[korkin@nanoandgiga.com](mailto:korkin@nanoandgiga.com)>

9–16 July 2019

**International Association of Cryospheric Sciences meeting**

at International Union of Geodesy and Geophysics General Assembly  
Montréal, Québec, Canada

Contact: Andrew Mackintosh <[Andrew.Mackintosh@vuw.ac.nz](mailto:Andrew.Mackintosh@vuw.ac.nz)>

22–26 July 2019

**13th International Symposium on Antarctic Earth Science (ISAES 2019)**

Incheon, Republic of Korea

Website: <https://www.scar.org/general-scar-news/isaes2019-1st-circ/>



25–31 July 2019

**20th Congress of the International Union for Quaternary Research (INQUA) 2019**

Dublin, Ireland

Session: Quaternary glaciations: Processes, Sediments and Landforms. Conveners: Lorna Linch <L.Linch@brighton.ac.uk>, Danni Pearce, Jan Piotrowski, Dave Evans

12–16 August 2019

**Community Earth System Model (CESM) Polar Modeling Workshop**

Boulder, Colorado, USA

Application form at: <https://goo.gl/forms/CvRemR7262HzRN3l2>

18–22 August 2019

**18th International Conference on Cold Regions Engineering and 8th Canadian Permafrost Conference**

Québec, Québec, Canada

Website: <http://https://www.agora-inscription.ca/iccre-cpc2019>

18–23 August 2019

**Goldschmidt Conference**

Barcelona, Spain

Session 09c: Biogeochemical Cycling in Changing Glacial Habitats and Downstream Ecosystems. Conveners: Trista Vick-Majors <tristyv@gmail.com>, Alexander Michaud, Katja Laufer, Susann Henkel  
Website: <https://goldschmidt.info/2019/program/programViewThemes>

18–26 August 2019

**\*\*International Symposium on Sea Ice**

Winnipeg, Manitoba, Canada

Contacts:

Secretary General, IGS

David Barber University of Manitoba <David.Barber@umanitoba.ca>

4–5 September 2019

**\*International Glaciological Society British Branch Meeting**

Northumbria University, Newcastle, UK

Contact: Nick Rutter <nick.rutter@northumbria.ac.uk>

4–6 September 2019

**ARCTIC FUTURES 2050: Science for Policy in a Changing Arctic**

Study for Environmental Arctic Change (SEARCH)

Washington, DC, USA

Webpage: <https://www.arcus.org/sites/all/modules/civicrm/extern/url.php?u=10456&qid=1589603>

8–12 September 2019

**International Mountain Conference**

Innsbruck, Austria

Website: <https://www.uibk.ac.at/congress/imc2019>

9–13 September 2019

**5th YES (Young Earth Scientists Network) Congress**

Berlin, Germany

Session 1.9: The Role of Polar Regions in the Earth System. Conveners: Josefine Lenz, Loeka Jongejans <loeka.jongejans@live.nl>, Gerlis Fugmann  
Website: <https://yesdeutschland.weebly.com/call-for-abstracts.html>

10–21 September 2019

**Karthus course: Ice Sheets and Glaciers in the Climate System**

Karthus, Italy

Website: <http://www.projects.science.uu.nl/iceclimate/karthus/>

Contact: Hans Oerlemans <J.Oerlemans@uu.nl>

15–18 September 2019

**33rd Forum for Research into Ice Shelf Processes (FRISP)**

Oxford, UK

Contact: [frisip2019@bas.ac.uk](mailto:frisip2019@bas.ac.uk)

18–19 September 2019

**International Thwaites Glacier Collaboration annual meeting**

Oxford, UK

Details to follow

24–26 September 2019

**Workshop: Glacial Isostatic Adjustment, Ice Sheets, and Sea-level Change – Observations, Analysis, and Modelling**

Ottawa, Canada

Contact: Thomas James <thomas.james@canada.ca>

30 September–3 October 2019

**8th International Ice Drill Symposium**

Copenhagen, Denmark

Contacts: D. Dahl-Jensen or S.B. Hansen on <[icedrillsymposium@nbi.ku.dk](mailto:icedrillsymposium@nbi.ku.dk)>

Website: [www.icedrillsymposium.dk](http://www.icedrillsymposium.dk)

4–14 December 2019

**First Southern Hemisphere Conference on Permafrost (SouthCOP)**

Queenstown, New Zealand

Website: <https://southcop19.com/>

## 2020

2–6 March 2020

### **Sixth International Symposium on Arctic Research**

Japan Consortium of Arctic Environmental Research (JCAR)

Tokyo, Japan

Website: <http://www.jcar.org/isar-6/>

Late August/early September 2020

### **\*\*International Symposium on Ice Stream Dynamics**

Durham, UK

Contacts: Secretary General, IGS

Chris Stokes <c.r.stokes@durham.ac.uk>

21–24 September 2020

### **\*Cryosphere 2020: International Symposium on Ice, Snow and Water in a Warming World**

Reykjavík, Iceland

Contacts: Secretary General, IGS

Þorsteinn Þorsteinsson <thor@vedur.is>

## 2021

27 June–2 July 2021

### **\*\*International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean**

La Jolla, California, USA

Contacts: Secretary General, IGS

Helen Amanda Fricker <hafricker@ucsd.edu>

September 2021

### **\*\*International Symposium on Southern Hemisphere Glaciers under Pressure: subglacial lakes, subaquatic environments, calving glaciers and climate**

Valdivia, Chile

Contacts: Secretary General, IGS

Andrés Rivera <arivera@cecs.cl>

## 2022

June 2022

### **\*\*International Symposium on Maritime Glaciers**

Juneau, Alaska, USA

Contacts: Secretary General, IGS

Jason Amundson <jmamundson@alaska.edu>



# New members

**Mr Anselm Arndt**

Klimageographie, Humboldt University in Berlin  
Unter den Linden 6, 10099 Berlin, Germany  
Tel: +30 2093-6824  
E-mail: [anselm.arndt@geo.hu-berlin.de](mailto:anselm.arndt@geo.hu-berlin.de)

**Miss Jennifer Arthur**

Department of Geography, Durham University  
Lower Mountjoy, South Road,  
Durham DH1 3LE, UK  
E-mail: [jennifer.arthur@durham.ac.uk](mailto:jennifer.arthur@durham.ac.uk)

**Mrs Claire Bernard-Grand'Maison**

Laboratory for Cryospheric Research, University  
of Ottawa  
60 University Pvt, Room SMD043, Ottawa,  
Ontario K1N 6N5, Canada  
E-mail: [cbern085@uottawa.ca](mailto:cbern085@uottawa.ca)

**Dr Karen Cameron**

Institute of Biological, Environmental and Rural  
Sciences, Aberystwyth University  
Penglais, Aberystwyth SY23 3DA, UK  
E-mail: [kac32@aber.ac.uk](mailto:kac32@aber.ac.uk)

**Mr Florian Deman**

Chemistry Department, Free University of Brussels  
Room F8.63, Pleinlaan 2, 1050 Brussels, Belgium  
Tel: +32-2-6293271  
E-mail: [florian.deman@vub.be](mailto:florian.deman@vub.be)

**Dr Evan Gowan**

Climate Sciences/Paleo-climate Dynamics, Alfred  
Wegener Institute  
Bussestraße 24, 7570 Bremerhaven, Germany  
E-mail: [evan.gowan@awi.de](mailto:evan.gowan@awi.de)

**Brandon Graham**

Department of Geology, The State University of  
New York University at Buffalo  
126 Cooke Hall, Buffalo, NY 14260, USA  
E-mail: [blgraham@buffalo.edu](mailto:blgraham@buffalo.edu)

**Dr Todd Grote**

Geosciences Program - School of Natural  
Sciences, Indiana University Southeast  
4201 Grant Line Rd, New Albany, IN 47150, USA  
Tel: +1 812-941-2077  
E-mail: [tdgrote@ius.edu](mailto:tdgrote@ius.edu)

**Mr Nick Homer**

UK  
E-mail: [nickhomer@hotmail.com](mailto:nickhomer@hotmail.com)

**Mr Indraneel Kasmalkar**

Institute for Computational and Mathematical  
Engineering, Stanford University  
Huang Engineering Center, 475 Via Ortega,  
Palo Alto, CA 94305-4042, USA  
E-mail: [ineel@stanford.edu](mailto:ineel@stanford.edu)

**Dr Yuri Kononov**

Bauman Moscow State Technical University  
2-nd Baumanskaya, 5, 105005 Moscow, Russia  
E-mail: [yu-v-k@yandex.ru](mailto:yu-v-k@yandex.ru)

**Mr Tom Mitcham**

School of Geographical Sciences, University of  
Bristol  
University Road, Clifton, Bristol BS8 1SS, UK  
E-mail: [tom.mitcham@bristol.ac.uk](mailto:tom.mitcham@bristol.ac.uk)

**Dr Alex Neches**

Uckfield TN22, UK  
E-mail: [alexgabriel.n@yahoo.com](mailto:alexgabriel.n@yahoo.com)

**Miss Rachel Oien**

School of Geosciences, University of Aberdeen  
St Mary's Building, G14, Aberdeen AB24 3UE, UK  
E-mail: [r.oien@abdn.ac.uk](mailto:r.oien@abdn.ac.uk)

**Ms Natasha M. Oviatt**

Exploration, De Beers Canada  
1601 Airport Road NE, Suite 300,  
Calgary, Alberta T2E 6Z8, Canada  
Tel: +1 416 645 1710 x2819  
[natasha.oviatt@debeersgroup.com](mailto:natasha.oviatt@debeersgroup.com)

**Dr Sam Pimentel**

Department of Mathematical Sciences, Trinity  
Western University  
Neufeld Science Centre, Langley, BC VCY 2S8,  
Canada  
E-mail: [sam.pimentel@twu.ca](mailto:sam.pimentel@twu.ca)

**Dr Sergey V. Popov**

Polar Marine Geosurvey Expedition  
St Petersburg, Russia  
E-mail: [spopov67@yandex.ru](mailto:spopov67@yandex.ru)

**Mr Matias Romero**

Center of Earth Sciences Research (CICTERRA),  
Universidad Nacional de Córdoba  
Av. Vélez Sarsfield 1611, Córdoba, Argentina  
E-mail: [matiasromero033@gmail.com](mailto:matiasromero033@gmail.com)

**Mr Balazs Szepcsik**

Zoltek  
Varga Jozef Ter 1, H-2537 Nyergesujfalu,  
Hungary  
E-mail: [szepcsik.balazs@mail.bme.hu](mailto:szepcsik.balazs@mail.bme.hu)

**Mr Guy D. Tallentire**

Geography and Environment, Loughborough  
University  
The Geography Building, Central Park,  
Loughborough LE11 3TU, UK  
E-mail: g.d.tallentire@lboro.ac.uk

**Ms Anna Thompson**

Department of Geological and Atmospheric  
Sciences, Iowa State University  
253 Science, 2237 Osborn Drive,  
Ames IA 50011-1027, USA  
Tel: +1 515-294-477  
E-mail: athompson211@gmail.com

**Dr Claire Todd**

Department of Geosciences, Pacific Lutheran  
University  
Rieke Science Center, Tacoma, WA 98447-0003,  
USA  
Tel: +1 253-536-5163  
E-mail: toddce@plu.edu

**Mr Kaleb Wagner**

Minnesota Geological Survey, University of  
Minnesota  
2609 Territorial Road, St Paul, MN 55114, USA  
E-mail: kewagner@umn.edu

**Dr Wei Mingdong**

Department of Mechanical Engineering, Aalto  
University  
PO Box 14100, FI-00076 Aalto, Finland  
E-mail: mingdong.wei@aalto.fi



# International Glaciological Society

Secretary General M.M. Magnússon

	<b>Council Members</b>	<b>Concurrent service on Council, from</b>
President	F. Navarro	2017–2020
Vice-Presidents	G. Flowers	2018–2021
	*G.H. Gudmundsson	2017–2020
	*J. Stroeve	2017–2020
Immediate Past President	D.R. MacAyeal	2011–2017
Treasurer	*A.A. Leeson	2018–2021
Elected Members	*L.M. Andreassen	2016–2019
	*K. Fujita	2017–2020
	*A. Glazovskiy	2018–2021
	R. Hock	2018–2021
	C. Hulbe	2018–2021
	*M. Ivanov	2016–2019
	*N. Karlsson	2017–2020
	Kang Schichang	2018–2021
	*S. MacDonell	2018–2021
	*D. Notz	2016–2019
	*A. Pope	2016–2019
	*A. Treverrow	2017–2020

\*First term of service on the Council

## IGS Committees

Awards	I. Allison (Chairman)
Nominations	D.R. MacAyeal (Chairman)
Publications	G. Flowers (Chairman)

## Correspondents

Australia	P. Heil	Japan	S. Sugiyama, K. Nishimura
Argentina	J.P. Milana, S. Marinsek	Netherlands	J. Oerlemans
Austria	E. Schlosser	New Zealand	H. Purdie
Belgium	J.-L. Tison	Norway	J.C. Kohler
Brazil	J. Simões	Poland	W. Dobinski
Canada	H. Jiskoot	Russia	V.N. Mikhaleenko
Chile	A. Rivera	Spain	F.J. Navarro
China	Yao Tandong	Sweden	R. Petersson
Denmark	A.P. Ahlstrøm	Switzerland	F. Paul
Finland	T. Vihma	UK	B.P. Hubbard
France	C. Ritz	USA (Eastern)	T. Neumann
Germany	O. Eisen	USA (Western)	H.B. Conway and
Iceland	Þ. Þorsteinsson		E.D. Waddington
Italy	C. Smiraglia	USA (Alaska)	M.A. Nolan

## Seligman Crystal

1963 G. Seligman	1989 H. Oeschger	2001 G.K.C. Clarke
1967 H. Bader	1989 W.F. Weeks	2003 K. Hutter
1969 J.F. Nye	1990 C.R. Bentley	2005 R.B. Alley
1972 J.W. Glen	1990 A. Higashi	2007 L.G. Thompson
1972 B.L. Hansen	1992 H. Röthlisberger	2009 P.A. Mayewski
1974 S. Evans	1993 L. Lliboutry	2011 A. Iken
1976 W. Dansgaard	1995 A.J. Gow	2012 D.E. Sugden
1977 W.B. Kamb	1996 W.F. Budd	2013 P. Duval
1982 M. de Quervain	1997 S.J. Johnsen	
1983 W.O. Field	1998 C. Lorius	
1983 J. Weertman	1999 C.F. Raymond	
1985 M.F. Meier	2000 S.C. Colbeck	
1986 G. de Q. Robin	2001 G.S. Boulton	

## Honorary Members

G.K.C. Clarke	J.W. Glen
V.M. Kotlyakov	G. Østrem
G. Wakahama	Yang Zhenning

## Richardson Medal

1993 H. Richardson	2012 W.S.B. Paterson
1997 D.R. MacAyeal	2013 J.W. Glen
1998 G.K.C. Clarke	2013 A. Weidick
1999 J.A. Heap	2016 T. Chinn
2003 C.S.L. Ommanney	2016 E.M. Morris
2010 T.H. Jacka	2017 J.M. Palais

The Society is registered as a charity in the United Kingdom with the Charity Commissioners – No. 23104

# International Glaciological Society

High Cross, Madingley Road  
Cambridge CB3 0ET, UK

## MEMBERSHIP

Membership is open to all individuals who have a scientific, practical or general interest in any aspect of snow and ice and benefits include online access to the *Journal* and *Annals of Glaciology* and *ICE*. To join please see our website at [www.igsoc.org/membership](http://www.igsoc.org/membership).

## ANNUAL MEMBERSHIP FEE 2019

	Sterling
Ordinary members	£52
Supporting members	£277
Contributing members	£137
Retired/partner members	£29
Student members (under 30 years or studying for PhD/MSc)	£26

Payment may be made on line using MasterCard, AmEx or VISA/Delta.

## ICE

Editor: M.M. Magnússon (Secretary General)

This news bulletin is available to members of the International Glaciological Society and is published online three times a year. Members can purchase hard copies at discounted rates.

Contributions should be sent to your National Correspondent or to the Secretary General, International Glaciological Society, High Cross, Madingley Road, Cambridge CB3 0ET, UK.

Annual cost for libraries, etc., and for individuals who are not members of the Society:

Sterling £47.00

All enquiries about the International Glaciological Society should be addressed to:

Secretary General, International Glaciological Society, High Cross,  
Madingley Road, Cambridge CB3 0ET, UK

Tel: +44 (1223) 355974 Fax: +44 (1223) 358334

E-mail: [igsoc@igsoc.org](mailto:igsoc@igsoc.org)

[www.igsoc.org](http://www.igsoc.org)