Number 169 *3rd Issue 2015*

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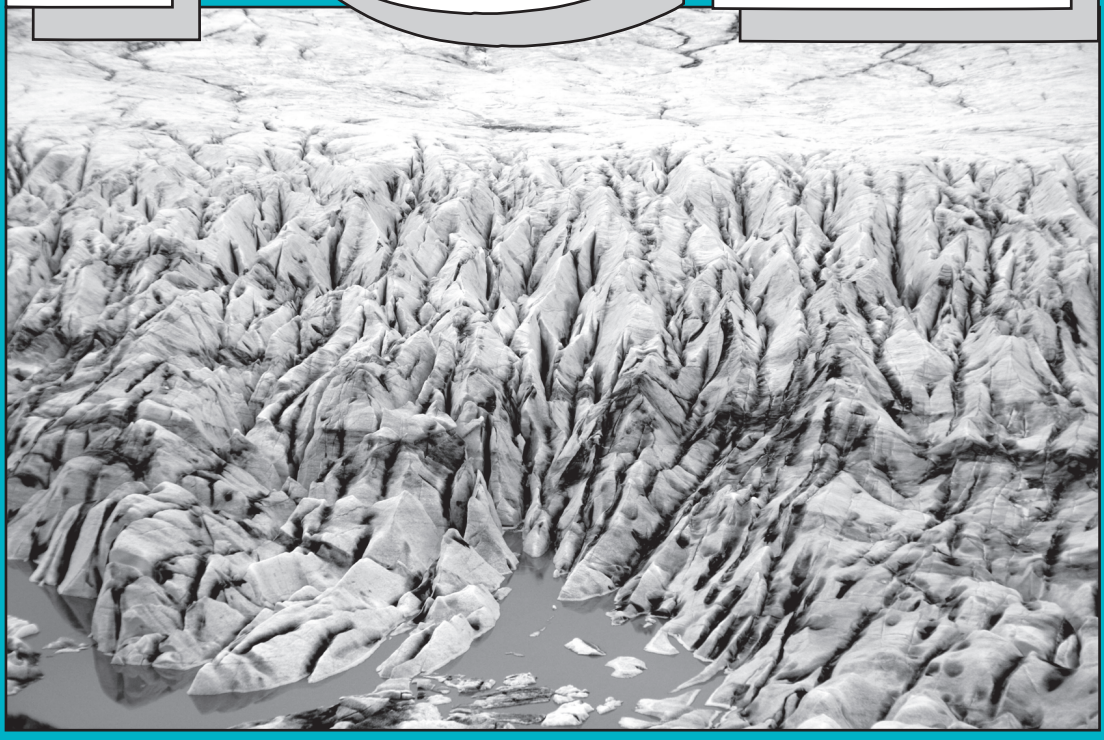


NEWS BULLETIN OF THE INTERNATIONAL GLACIOLOGICAL SOCIETY

ISSN 0019–1043

Ice

News Bulletin of the International Glaciological Society

Number 169 3rd Issue 2015

Contents

Cover picture: A closer look at the ice margin of Hoffellsjökull, Iceland. Photograph by Alexandra Messerli.

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

We are over the first hurdle! Cambridge University Press (CUP) has now fully taken over the production of the IGS journals. The new submission system seems to be working fine and we are off to a flying start with submissions. At the time of writing we have received more submissions than ever before for January and February. The fact that all publications are Gold Open Access has obviously been well received.

But all this comes at a price. The people who have borne the brunt of IGS production in the past and have played a major part in making the *Journal* and the *Annals* the quality publications they now are have all gone. Only Louise and myself are left in the IGS office. So it can be a bit lonely. We have had some wonderful people working for the IGS. The last to go was Craig Baxter and before that, it was Sukie Hunter and Rachel Brown; Rowena Baxter had left us in the spring. You are familiar with these names and I am sure you join me in thanking them for a great job they did for the IGS.

Production at CUP is slowly falling into a routine and the first Journal papers have just been published online. CUP is putting the emphasis on getting the *Journal* up and running and then they will get moving on the *Annals*. We have been working with CUP to smooth out the bumps and we are getting there. The fact is that things always take longer than anticipated. To quote the IGS Chief Editor, Jo Jacka, 'we need to get used to each other's idiosyncrasies'. And I would like to stress, yet again, that the IGS will retain full editorial control of the *Journal* and *Annals of Glaciology*. We will appoint all the editors and they will process your submissions in the same way as we have always done.

Louise has been sending out membership renewal notices and so far we have close to 650 paid up members for 2016. We had 1050 members in 2015 so we still have a way to go. If you are reading this you will already have renewed, for which we are grateful. But please encourage your colleagues to renew/join – as we head in the new direction with our publications and organization, we really need a strong membership. As my old professor, Charlie Raymond, always said during one of the first lectures of the semester, 'If you are going to be glaciologists you have to join the IGS.'

At the risk of sounding repetitive I would like to repeat what I said in my last *ICE* editorial. 'Only by retaining our membership will we be able to provide you with our continued service as a prestigious learned society, organizing the various symposia, meetings and workshops, collating the *ICE* newsletter and continuing with the prestigious Seligman Crystal and Richardson Medal awards. As an IGS member you have access to a wide network of glaciologists within which you can share your ideas and establish contacts.'

We look forward to receiving your membership renewals.

Magnús Már Magnússon
Secretary General

International Glaciological Society

JOURNAL OF GLACIOLOGY

Papers accepted for publication between 1 October and 31 December 2015. The papers are listed in alphabetical order by first author. Some of these papers have already been published.

Ahmed M. Abdelrazek, Ichiro Kimura, Yasuyuki Shimizu
Simulation of three-dimensional rapid free-surface granular flow past different types of obstructions using the SPH method

Jason M. Amundson
A mass-flux perspective of the tidewater glacier cycle

David B. Bahr, W. Tad Pfeffer
Crossover scaling phenomena for glaciers and ice caps

Megan J. Barnett, Mark Pawlett, Jemma L. Wadham, Miriam Jackson, David C. Cullen
Demonstration of a multi-technique approach to assess glacial microbial populations in the field

Sophie Berger, Lionel Favier, Reinhard Drews, Jean-Jacques Derwael, Frank Pattyn
The control of an uncharted pinning point on the flow of an Antarctic ice shelf

Ed Bueler
Stable finite volume element schemes for the shallow ice approximation

Marie G. P. Cavitte, Donald D. Blankenship, Duncan A. Young, Dustin M. Schroeder, Frederic Parrenin, Emmanuel Le Meur, Joseph A. MacGregor, Martin J. Siegert
Deep radiostratigraphy of the East Antarctic Plateau: connecting the Dome C and Vostok ice core sites

Michael Conlan, Bruce Jamieson
Naturally triggered persistent deep slab avalanches in western Canada. Part I: Avalanche characteristics and weather trends from weather stations

Michael Conlan, Bruce Jamieson
Naturally triggered persistent deep slab avalanches in western Canada. Part II: Weather trends from model forecasts

Alexander D. Fraser, Melissa A. Nigro, Stefan R.M. Ligtenberg, Benoît Legrésy, Mana Inoue, John J. Cassano, Peter Kuipers Munneke, Jan T.M. Lenaerts, Neal W. Young, Adam Treverrow, Michiel van den Broeke, Hiroyuki Enomoto
Drivers Of ASCAT C Band backscatter variability in the dry snow zone of Antarctica

Shuji Fujita, Kumiko Goto-Azuma, Motohiro Hirabayashi, Akira Hori, Yoshinori Iizuka, Yuko Motizuki, Hideaki Motoyama, Kazuya Takahashi
Densification of layered firn of the ice sheet at Dome Fuji, Antarctica

Robert E. Grimm, David E. Stillman, Joseph A. MacGregor
Dielectric signatures and evolution of glacier ice

Skylar A. Haines, Paul A. Mayewski, Andrei V. Kurbatov, Kirk A. Maasch, Sharon B. Sneed, Nicole E. Spaulding, Daniel A. Dixon, Pascal D. Bohleber
Ultra-high resolution snapshots of three multi-decadal periods in an Antarctic ice core

Preston J. Hartzell, Peter J. Gadomski, Craig L. Glennie, David C. Finnegan, Jeffrey S. Deems
Rigorous error propagation for terrestrial laser scanning with application to snow volume uncertainty

Matthew J. Hoffman, Andrew G. Fountain, Glen E. Liston
Distributed modeling of ablation (1996–2011) and climate sensitivity on the glaciers of Taylor Valley, Antarctica

Iulian-Horia Holobâcă
Recent retreat of Elbrus glacier system

Mike R. James, Penelope How, Peter M. Wynn
Pointcatcher software: analysis of glacial time-lapse photography and integration with multi-temporal digital elevation models

Stewart Jamieson, Chris R Stokes, Stephen Livingstone, Andreas Vieli, Colm O'Cofaigh, Claus-Dieter Hillenbrand, Matteo Spagnolo
Subglacial processes on an Antarctic Ice Stream bed 2: can modelled ice dynamics explain the morphology of mega-scale glacial lineations?

Trine S. Jensen, Jason E. Box, Christine S. Hvidberg
A sensitivity study of annual area change for Greenland ice sheet marine terminating outlet glaciers: 1999–2013

Ian R. Joughin, Ben E. Smith, Ian M. Howat, Twila Moon, Ted A. Scambos
A SAR record of early 21st century change in Greenland

Quirine Krol, Henning Loewe
Analysis of local ice crystal growth in snow

Stephen Livingstone, Chris R Stokes, Colm O'Cofaigh, Claus-Dieter Hillenbrand, Andreas Vieli, Stewart Jamieson, Matteo Spagnolo, Julian A. Dowdeswell
Subglacial processes on an Antarctic ice stream bed 1: sediment transport and bedform genesis inferred from marine geophysical data

Maria-Gema Llorens, Albert Griera, Paul D. Bons, Jens Roessiger, Ricardo Lebensohn, Lynn Evans, Ilka Weikusat
Dynamic recrystallization of ice aggregates during co-axial viscoplastic deformation: a numerical approach

Tom Matthews, Richard Hodgkins
Inter-decadal variability of degree-day factors on Vestari Hagafellsjökull (Langjökull, Iceland) and the importance of threshold air temperatures

P.A. Mayewski, A. Kuli, G. Casassa, M. Arévalo, D.A. Dixon, B. Grigholm, M.J. Handley, H. Hoffmann, D.S. Introne, A.G. Kuli, M. Potocki, S.B. Sneed
Initial reconnaissance for a South Georgia ice core

C.A. Middleton, C. Thomas, A. de Wit, J.-L. Tison
Visualizing brine channel development and convective processes during artificial sea ice growth using Schlieren optical methods

Victoria V. Miles, Martin W. Miles, Ola M. Johannessen
Satellite archives reveal abrupt changes in behavior of Helheim Glacier, southeast Greenland

Brent Minchew, Mark Simons, Helgi Björnsson, Finnur Pálsson, Mathieu Morlighem, Helene Seroussi, Eric Larour, Scott Hensley
Plastic bed beneath Hofsjökull Ice Cap, central Iceland, and the sensitivity of ice flow to surface meltwater flux

J.F. Nye
The mechanics of a glacier snout

Igor Petenko
Yukimarimo at Dome C, Antarctica

Gerard H. Roe, Marcia B. Baker
The response of glaciers to climatic persistence

Rubén Basantes-Serrano, Antoine Rabatel, Bernard Francou, Christian Vincent, Luis Maisincho, Bolívar E. Cáceres, Remigio Galarraga, Danilo Alvarez
Slight mass loss revealed by reanalyzing glacier mass balance observations on Glaciar Antisana15α; (inner tropics) during the 1995–2012 period

Thomas E. Shaw, Ben W. Brock, Catriona L. Fyffe, Francesca Pellicciotti, Nick Rutter, Fabrizio Diotri
Air temperature distribution and energy balance modelling of a debris-covered glacier

Christian Vincent, Luc Moreau
Sliding velocity fluctuations and subglacial hydrology over the last two decades on Argentière glacier, Mont Blanc area

Martin G. Wearing, Richard C.A. Hindmarsh, M. Grae Worster
Assessment of ice flow dynamics in the zone close to the calving front of Antarctic ice shelves

Matthew J. Westoby, Stuart A. Dunning, John Woodward, Andrew S. Hein, Shasta M. Marrero, Kate Winter, David E. Sugden
Sedimentological characterisation of Antarctic moraines using UAVs and Structure-from-Motion photogrammetry

Guangjian Wu, Xuelei Zhang, Chenglong Zhang, Tianli Xu
Mineralogical and morphological properties of individual dust particles in ice cores from the Tibetan Plateau

Florian Ziemen, Regine Hock, Andy Aschwanden, Constantine Khroulev, Christian Kienholz, Andrew K. Melkonian, Jing Zhang
Modeling the evolution of the Juneau Icefield between 1971 and 2100 using the Parallel Ice Sheet Model (PISM)

ANNALS OF GLACIOLOGY 57(71)

The following papers have been selected for publication in Annals of Glaciology *57(71) (thematic issue on Glaciology in High Mountain Asia), edited by Graham Cogley*

Lisa Dreier, Yves Bühler, Christian Ginzler, Perry A. Bartelt
Comparison of simulated powder snow avalanches with photogrammetric measurements

Eva Huintjes, David Loibl, Frank Lehmkuhl, Christoph Schneider
A modelling approach to reconstruct Little Ice Age climate from remote-sensing glacier observations in southeastern Tibet

I. Severskiy, E. Vilesov, R. Armstrong, A. Kokarev, L. Kogutenko, Z. Usmanova, V. Morozova, B. Raup
Changes in glaciation of the Balkhash–Alakol Basin over the past decades

Kamal K. Singh, Ashavani Kumar, Anil V. Kulkarni, Prem Datt, Sanjay K. Dewali, Manoj Kumar
Experimental investigation of dielectric properties of seasonal snow at field observatories in the northwest Himalaya

Jakob F. Steiner, Francesca Pellicciotti
Variability of air temperature over a debris-covered glacier in the Nepalese Himalaya

Phuntsho Tshering, Koji Fujita
First in situ record of decadal glacier mass balance (2003–14) from the Bhutan Himalaya

Mark W. Williams, Alāna M. Wilson, Dendup Tshering, Pankaj Thapa, Rijan Bhakta Kayastha
Using geochemical and isotopic chemistry to evaluate glacier melt contributions to the Chamkar Chhu (river), Bhutan

Hao Xu, Shugui Hou, Hongxi Pang, Chaomin Wang
Effects of ENSO on the major ion record of a Qomolangma (Mount Everest) ice core

Wangbin Zhang, Shugui Hou, Wenling An, Liya Zhou, Hongxi Pang

Variations of atmospheric dust loading since AD 1951 recorded in an ice core from the northern Tibetan Plateau

Annals 57(71) is now complete

ANNALS OF GLACIOLOGY 57(72)

The following papers have been selected for publication in Annals of Glaciology *57(72) (thematic issue on Hydrology of glaciers and ice sheets), edited by Alexander H. Jarosch and Ian Hewitt*

Charalampos Charalampidis, Dirk van As, William T. Colgan, Robert S. Fausto, Michael MacFerrin, Horst Machguth
Thermal tracing of retained meltwater in the lower accumulation area of the southwestern Greenland ice sheet

Jeff Crompton, Gwenn E. Flowers
Correlations of suspended sediment size with bedrock lithology and glacier dynamics

Bergur Einarsson, Eyjólfur Magnússon, Matthew J. Roberts, Finnur Pálsson, Thorsteinn Thorsteinsson, Tómas Jóhannesson
A spectrum of jökulhlaup dynamics revealed by GPS measurements of glacier surface motion

Gwenn E. Flowers, Alexander H. Jarosch, Patrick T.A.P. Belliveau, Lucas A. Fuhrman
Short-term velocity variations and sliding sensitivity of a slowly surging glacier

Sverrir Aðalsteinn Jónsson, Ívar Örn Benediktsson, Ólafur Ingólfsson, Anders Schomacker, Helga Lucia Bergsdóttir, William R. Jacobson Jr, Hans Linderson
Submarginal drumlin formation and late Holocene history of Fláajökull, southeast Iceland

Toby W. Meierbachtol, Joel T. Harper, Neil F. Humphrey, Patrick J. Wright
Mechanical forcing of water pressure in a hydraulically isolated reach beneath Western Greenland's ablation zone

Kristin M. Schild, Robert L. Hawley, Blaine F. Morriss
Subglacial hydrology at Rink Isbræ, West Greenland, inferred from sediment plume appearance

More papers for Annals 57(72) will be listed in the next issue

Blaðsmiður's Saga

The five elements and the troubles with glacier Water…

(A report on the IGS symposium on the Hydrology of Glaciers and Ice Sheets, Höfn, Iceland, 21–27 June 2015)

As told by Pierre-Marie 'Pim' Lefeuvre, doctoral student of the half-troll Gristlebeard, and Doug MacAyeal, speaker of sleep-inducing tales

There was a man named Blaðsmiður, the porter of Grimsy, the forest cat, and carrier of leather strops for Owen the blade master, son of elder Magnús who sat at the table of Cavendish, husband of nimble-minded and strong-of-home Karen the fair, father of Magnús the younger and Jón the cat-master of Sindra, brother of Jackur the editor of scientific sagas, and seventh descendant of Sveinn Pálsson the glacier whisperer, who foresaw the feud between Ice and Fire when the people first landed on the island now called Iceland. Blaðsmiður was a Berserk, and held the purse for a tribe called the International Glaciological Society (IGS).

Blaðsmiður began his life as a lowly digger of bog iron. At an early age, he longed for a life that involved the excitement of international symposia. One day, he stowed away aboard a passing Viking longboat and soon found himself taken to the land of Erik the Red, Tómas the eater of cod cheeks and Helgi the son of Björn.

The Viking longboat was filled with sage men and women from the tribe called IGS, who travelled to the land of ice and fire to solve a riddle that had ensnared the entire world. The riddle involved two of the five elements of nature: Ice and Water. The other three elements – Fire, Rock and sharp-edged Steel – were less important, but added their mixture of mystery and wonder to the riddle.

The riddle was both simple and complex: Ice, the first element of the riddle, was normally patient and long-lived, of a strength that could carve rock and extinguish flame, and was of such gentle spirit as to move very slowly and majestically so as to allow the settlers of Iceland time to move their farms out of its way should it decide to advance down a valley. Water, the second element of the riddle, was the blood of ice, and could be made from ice in places where the sun's rays were strong.

Normally, Ice and Water would live in a peaceful coexistence but, first in Iceland and then spreading to the rest of the known glaciological world, Water had developed a strange power over Ice. It was found that Ice would drink deep drafts of Water by swallowing it into cracks called moulins. Once swallowed, the Water would find its way to the narrow layer forming the stomach of Ice, located just above the rock surface. The result of Ice drinking Water was a frightening intoxication wherein the Ice became Berserk. As the Water was swallowed, the Ice would bulge upward and crack. The Berserked Ice would then careen unceremoniously, sometimes with great speed, down valleys, and through fjords. Sometimes the intoxicated Ice would vomit the contents of its stomach across sandurs with great violence and destroy the farms, bridges and roads built by men and women.

Because of Water, Ice had joined the Berserks of ancient legend. Ice Berserked in Greenland. Ice Berserked in Alpine lands. Ice Berserked in Antarctica. Sometimes, Ice Berserked so completely as to send jökulhlaups down majestic valleys of the Himalaya. Great scab-lands, eskers, drumlins and proglacial channels showed that Ice had Berserked in the past, and in places now Ice-free and settled by the gentle people.

Blaðsmiður soon learned that the Viking travellers he accompanied (as a stowaway, he was relegated to handling their registrations and finding their lost baggage) were wise people who specialized in riddles of Ice and Water and were headed to a town called Höfn, the Island's haven for Languistoules and Hákarl.

The Hotel Vatnajökull in its mountainous setting. Photo: Hester Jiskoot.

The Icebreaker was full of animated conversation as participants caught up with their friends.

The wise men and women from the IGS, the 'participants', gathered at a luxurious Hotel named Vatnajökull. The hotel was named after the Ice that fed scenic outlet glaciers viewed from the rooms where the participants met. The participants consisted of 120 glacio-hydrologists, who disembarked from their Viking longboat for the 2015 IGS symposium on the Hydrology of glaciers and ice-sheets from 21-27 June 2015.

The participants departed sunny and warm Reykjavik on the day of the summer solstice for a 10-hour journey to Höfn on the southeast coast. Upon arrival, a group of 25 persons undertook a pre-excursion trip to the glacier Skálafellsjökull where they drove snow-scooters through the low clouds. The sky opened up near the top of the glacier and offered a stunning view of the ice cap. This was celebrated back at the Hotel with drinks and delightful Icelandic treats during the symposium Icebreaker.

Tómas Jóhannesson and the mayor of Höfn officially opened the meeting on Sunday evening.

Glaciological discussion always goes better with a bottle or two of beer.

The Icebreaker featured a delightful local beer called Vatnajökull 'Frozen in Time'. The originality of its recipe is the use of icebergs that are collected from the nearby lagoon and melted to release the special 'water from the glacier'. Familiar names and faces emerged; the younger generations were well represented and constituted the major part of the crowd. The Icebreaker was cut short by the departure of the bus that took many of the participants to the nearby hotels and a camping site located closer to Höfn.

On Monday, we rapidly dived into the subglacial hydrological system. Cuffey and Paterson, in a later edition of their textbook, would say that we followed the white rabbit into a Moulin, i.e. into Wonderland. Matt Hoffman and Toby Meierbachtol showed that the drainage system in Greenland is far from being understood, in the light of recent water pressure data that show out-of-phase variation with surface velocity. Matt has modelled this behaviour by including a poorly connected drainage system to his published subglacial hydrological model. Toby instead explains the anti-correlation from load transfer, or stress redistribution, at the glacier base.

More questions arose than answers. Laura Stevens offered a neat lecture on her recent Science paper based on GPS data from an impressive array placed near a supraglacial lake of the Greenland Ice-Sheet. She concluded that tension stresses at the glacier bed controlled lake drainage as opposed to water depth. Another type of lake drainage was later shown by Tómas Jóhannesson. As part of the symposium organization, the committee arranged to trigger a Jökulhlaup for the pleasure of the audience. The week before the conference, an Icelandic team drilled a borehole inside a cauldron in the W-Vatnajökull ice cap in order to monitor a subglacial geothermal lake. As planned, the drilled borehole forced a connection between a supraglacial aquifer/lake and the subglacial reservoir. The surface water rapidly drained into the hole and forced the subglacial lake to reach the critical water level required to trigger an outburst flood. A few days later, the flood was recorded on the river Skaftá in the vicinity of the ice cap with a peak discharge around 120 $m^3 s^{-1}$ A cubic metre per second per participant, Tómas noted.

The rest of the day focused on glacier catchment talks. Surprisingly, there were few mass-balance presentation despite the theme of the symposium being hydrology. Andrés Rivera from Chile entertained us with comments on the sometimes difficult interaction between scientists and politicians. The Andes has undergone little precipitation in recent years and the contribution of glaciers to runoff is increasing

Manning the desk at an IGS symposium takes it out of a Secretary General.

Brighid Ó Dochartaigh contemplating glacier runoff and ground water.

near the populated region of Santiago. Glaciers are also under stress from aerosols produced by open-pit mines. Andrés gave us a nice overview on their current glaciological, geodetic and hydrological investigations. Sophie Biskop from the University of Jena, Germany, complemented the analysis with a poster on modelling the effect of aerosols on surface melt for the same glacier catchments. In the dust-albedo topic, Susan Kaspari reconstructed past deposition of aerosols from an ice core taken at a glacier in Washington State, USA. Her study showed that a layer of black carbon could be linked to a 2011 forest fire, a particular wind pattern and a strong melt event.

After the coffee break, a group from the British Geological Survey and UK partners presented results from an ongoing and intensive project on the hydrological components of Virkisjökull glacier in southeast Iceland. The talk from Brighid Ó Dochartaigh was particularly inspiring. She investigated the interaction between glacier runoff and ground water in the glacier forefront. She found that the distance from the glacier and its proglacial rivers has a large effect on the water table. The first day concluded at 18:00 when buses departed for the camping sites. Those who had been to Iceland before (Bergur Einarsson and Alexander Jarosch) led the others to the local swimming pool, where they relaxed in the hot tub.

The sessions were well attended from the first day...

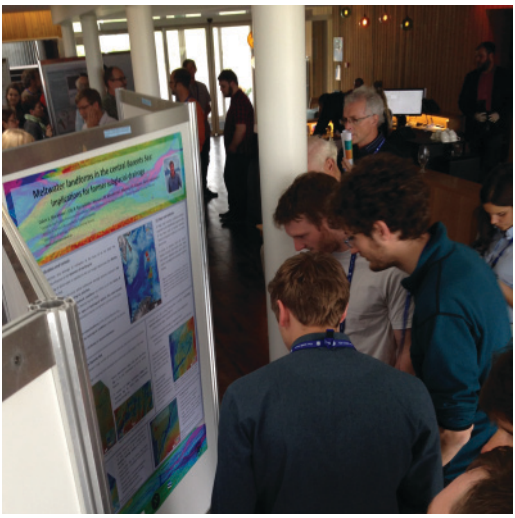
Notable in the early mornings was the Vancouver crew (Gwenn Flowers, Laurent Mingo and Flavien Beaud), who insisted on an early morning swim. No sunrise, but a monotonous lid of cloud that seemed to get higher and higher would herald the new day. Andrew Fountain started the second day of the symposium by arguing that englacial fractures are important pathways that route meltwater through the ice toward the bed and proglacial area. His research employed video cameras lowered down boreholes at Storglaciären, Sweden. Fractures are sometimes observed, but whether they convey water efficiently is another question. Andrew showed that some boreholes were connected englacially, even when they didn't reach the glacier bed, because they displayed the same water-pressure signal. This is an issue for the validation of subglacial hydrological models, as mentioned by Basile de Fleurian. There are currently no data for validating these models, so Basile introduced to us a benchmark experiment to understand the difference between published hydrological models. He showed that the models may not have any parameters in common, a big issue for future assessment. Lukasz Stachnik then described the

At the end of the first day, Trevor Faulkner talked about 'A hypothetical model for the deglacial hydrology of ice sheets in mountainous areas'.

formation of naleds ('icings' in English), another piece of the subglacial hydrological system that is not accounted for in models. The approach of Douglas Brinkerhoff was instead to reduce the complexity of a common subglacial hydrological model through non-dimensionalization and analysis of parameter correlation. He successfully decreased the number of parameters from seven to three and could still reproduce observations from Kennicott Glacier, Alaska, USA.

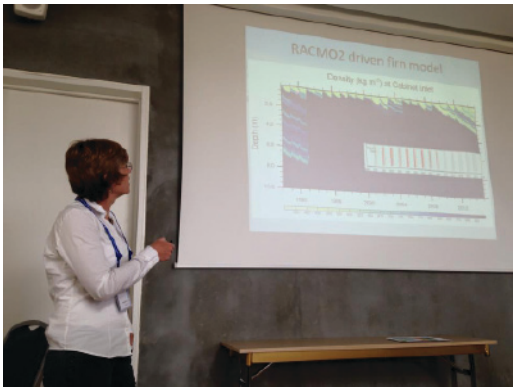
In the afternoon, Christine Dow presented an application of Mauro Werder's subglacial model (GlaDS) to investigate the drainage of subglacial lakes under a synthetic ice-sheet. It is not easy to implement such a model, because treatments of boundary conditions remain difficult. She nevertheless managed to reproduce cyclic lake drainages on expected timescales. Sebastian Goeller and Ian Willis showed that the community is still trying to determine how many subglacial lakes exist under the Antarctic Ice-Sheet. Sebastian's lake predictions, based on a hydraulic potential model, increase the previously determined number of lakes threefold. His study is backed by airborne radar taken over Dronning Maud Land. Recovery Glacier, where one of the largest catchments in Antarctica is drained, was shown to hold a large number of lakes. The participants from the Alfred Wegener Institute reported that they are involved in efforts to study subglacial lakes in Antarctica. There was an additional presentation on the reconstruction of lake dynamics from palaeo records (Gerhard Kuhn) as well as a poster on the swampiness of the base of Recovery Glacier (Angelika Humbert).

The poster sessions originally consisted of two groups of 18 presentations each, but all posters were put up the same day as there was enough room in the hotel hall. They covered a wide range of topics: changes in glacier mass balance in High Mountain Asia (Wang Xin and Bao Weijia) and in the Canadian Rockies (Samaneh Ebrahimi), subglacial palaeolandforms of the Barents Sea Ice-Sheet (Mariana Esteves and Calvin Shackleton from CAGE, a new Nordic Center of Excellence on Gas hydrates), sediment production at Werenskioldbreen (Elżbieta Majchrowska) and thermal states of glaciers in Nordenskiöld land (Ilya Marchuk), both in Svalbard. Of particular interest, Bulat Mavlyudov presented his



The poster session elicited much keen interest...

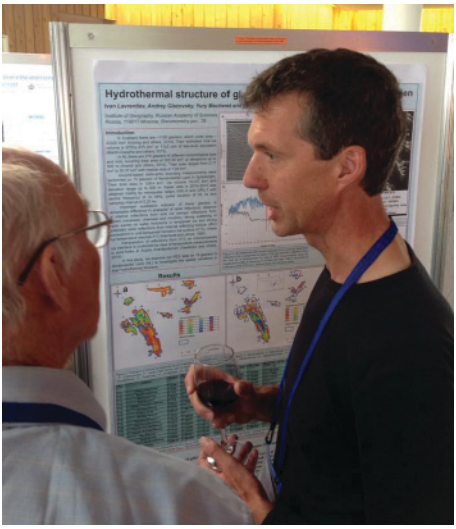
...even without the posters.



Suzanne Bevan's presentation was on melt-pond formation on the Larsen C ice shelf. Photo: Hester Jiskoot.

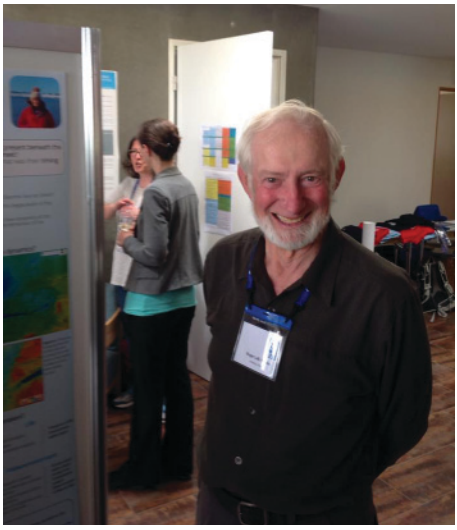
controversial views on the hydrology of glaciers based on long speleological experience in the northern Norwegian archipelago. He argued that subglacial water does not flow through channels and cavities but along basal shear planes. This may be an element to consider for polythermal glaciers, although it does not seem applicable for temperate glaciers. Anyway, it is true that a cold-based front can force subglacial water to flow along shear planes and reach the glacier surface as stunning upwellings. Bulat's punchy poster triggered a lot of discussion, thus furthering the aim of the symposium. Another interesting point made by ice cave enthusiast Kiya Riverman is how knickpoints (waterfall-like structures) form in englacial channels and how they potentially influence water flow. Finally the question of whether semicircular subglacial channels are a myth or reality was debated. Channel roughness is a key element to parameterize the complexity in the shape of channels, as noted by Alexander Jarosch and Doug Benn in their talks.

Halfway through the symposium, on Wednesday, the discussions showed no signs of fatigue. Firn hydrology was the hot topic of the day. Clément Miège explored radar lines collected over the Greenland Ice Sheet in order to extract water-table levels for the firn aquifer. Surprisingly, the aquifer is not interrupted by crevasses and even persists downstream of highly crevassed areas. This data will be valuable for firn hydrological models like the one created by Stefan Ligtenberg. Stefan showed preliminary results of his one-dimensional physical model previously used in Antarctica. A notable recent improvement is the implementation of a percolation scheme, including the effect of ice layering, instead of a tipping bucket method for the sub-surface routing of water. Sergei Marchenko provided some



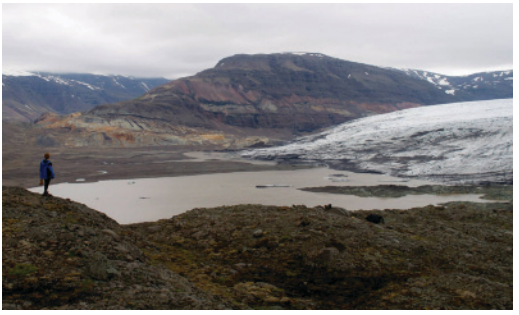
Ian Willis breaks off from his study of Ilya Marchuk's poster on the glaciers of Spitsbergen to chat to Trevor Faulkner.

insights on the spatial and three-dimensional shapes of these ice layers at his group's field site at Lomonosovfonna, Svalbard. In collaboration with Rickard Petterson, Sergei walked his 'radar dog', as he called it, along a grid in order to obtain high-resolution imaging of the dielectrical properties of the firn. The results show higher concentrations of ice lenses at some depth, but no layer was absolutely continuous. The last talk of the day was rather unconventional. Hester Jiskoot asked for delegates (and glaciologists at



Roger Hooke was at the symposium in a supporting role.

The midweek excursion visited the laguna in front of Hoffellsjökull with its stranded, banded icebergs. Photo: Laura Stevens.



On the other side of the laguna participants had a splendid view of the land-terminating part of Hoffellskjökull and mountains beryond showing colourful volcanic layers. Photo: Laura Stevens.

large) to send her all their 'useless' time-lapse imagery when a fog blocks the field of view of glaciers being photographed. She presented an interesting dataset that tackles the question of how fog affects the near surface temperature. The presence of fog was suggested to significantly affect air temperature and thus could drastically reduce surface melt.

The midweek excursion visited Hoffellsjökull, an outlet glacier that was part of the daily scenery from the Hotel Vatnajökull. Two buses and four cars brought the participants to the end moraine, where they started a 3-hour hike around the newly formed laguna (moraine-dammed lake). The tour was continually punctuated by short presentations from our two guides, Finnur Pálsson and Snævarr Guðmundsson. The glacier has two termini because the main trunk splits around a ridge, which was the path along which the delegates hiked. One of the glacier fronts has calved into the laguna since 2009, when it dramatically retreated from the frontal moraine. Unfortunately for the locals, who wanted to start a paddleboat business, the laguna has never maintained deep enough water and the local river that originated on that front side even dried out. The laguna currently drains below the glacier where the ridge meets the ice. There, the glacier is so thin that it cannot contain the water level of the laguna and water flows out to the other front of Hoffellsjökull. The icebergs floating within the laguna or stranded on the beach are particularly nice, with their banded surfaces. The view from the ridge was stunning and some hardy delegates immortalized the moment by taking a bath in a freshwater pond. The participants returned to the start of the hike and were treated to local refreshments including shots of brennivín, the local spirit, and fried meat as well as tropical fruits. For some reason, the waiters didn't want to tell us the type of meat we were eating and it was only later that we discovered that it was horsemeat, a local delicacy. After this mise en bouche, we headed back to town to finish dinner in one of the local seafood restaurants, which served any kind of dish you could imagine, always with lobster on the side.

A smaller group hiked up the eastern side of the laguna where were plenty of opportunities for honing their selfie-stick skills and snapping others taking selfies.... Photo: Pierre-Marie Lefeuvre.

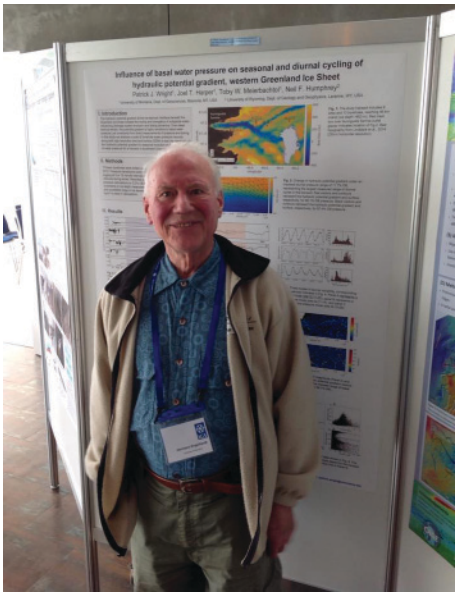
The trip to Hoffellsjökull involved a lot of people in a lot of scrambling. Photo: Hester Jiskoot.

The fourth day covered basal sliding and ice dynamics and the effect of hydrology. Olivier Gagliardini presented his first results from implementing the GlADS model in ElmerIce. Dorothée Vallot investigated temporal variation of basal drag, based on an inversion approach, that may result from changes in subglacial hydrology. Andy Smith presented preliminary results of the iSTAR project, which investigates basal conditions and how they govern ice flow near the tributaries of Pine Island Glacier, Antarctica. Teresa Kyrke Smith studied hydrological controls on the formation of ice streams. A group from Harvard University (Matt Fernandes, Thibault Perol, John Platt) and Stanford University (Cooper Elsworth) showed very interesting theoretical ideas that characterize shear margins of ice streams in terms associated with underlying basal hydrology. Their study is based on the assumption that a Röthlisberger channel runs beneath and parallel to the shear margin. Sarah Child ended the morning session with an analysis of basal crevasse formation and evolution.

Glacier surges are a favourite topic for symposia on ice and water, and the participants were reminded that no single process has fully dominated the others as the explanation for surging. Martin Truffer explained that the Black Rapid Glacier surge (Alaska) was related to a backstress effect associated with tributary glaciers that flow into its main trunk. The blockage caused by this backstress enhances the buildup of ice mass. Thickening then leads to a change in the thermal regime that subsequently triggers the glacier's acceleration. Takahiro Abe proposed that Donjek Glacier in Yukon surges because of a similar buttressing effect due to a narrowing of the glacier valley. Thomas Schuler took a different approach, suggesting that a hydraulically driven change in thermal regime from cold-based to temperate-based initiated the surge of Basin 3 in Svalbard. The most poignant talk of the week was given by Herman Engelhardt, who presented rare cinema footage of the famous Variegated Glacier surge and the investigation led by Barclay Kamb. This surge is thought to have been caused by a change in basal hydraulics. Watching the rough icescapes in the cinema footage made it seem unthinkable that funding agencies in the modern world would now allow scientists to work in such regions, because of health and safety regulations. A participant asked Herman whether they could see the glacier moving? Herman answered, 'Standing on the glacier, we could see the scenery pass by.' It really felt that we were listening to a tale that your grandpa would tell you, throwing here and there some amazing stories about passionate and intrepid glaciologists of yesteryear.

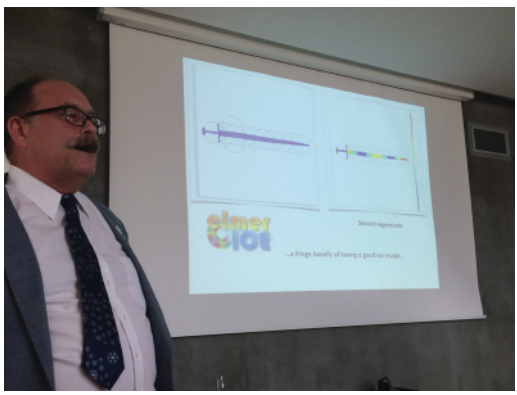
The midweek excursion ended with a spread of local Icelandic delicacies...

...including delicious cubes of mysterious fried meat on sticks.



Hermann Engelhardt was there to show us a video from 1983 featuring the 'passionate and intrepid glaciologists of yesteryear'. (Incidentally, these included both Tómas Jóhannesson and our esteemed Secretary General!)

The final poster session started with 2-minute condensed presentations that provided a nice overview for everyone to choose posters of particular interest. Studies on supraglacial lakes were well represented. Grant Macdonald and Andrew Williamson presented work on lake volume and shape on the Greenland Ice Sheet. Grant investigated more particularly lakes on the floating tongue of Petermann Glacier. A parallel could be drawn with Alison Banwell's poster, which presented a study of the visco-elastic response of ice shelves to water volume changes in supraglacial lakes. The drainage of supraglacial lakes has a strong effect on vertical strain in the interior of the Greenland Ice Sheet and was described in Nathan Maier's poster. Wesley Farnsworth presented some initial work on reconciling the past evolution of glaciers in Svalbard with the geological record. Denis Cohen modelled the erosional power of glaciers in the Swiss Alps during the Last Glacial Maximum to assess the safety of locations considered for the burial of nuclear waste.



Doug MacAyeal introduces us to the perfect sword shape derived from modeling of the second eigenmode with ElmerIce. Photo: Olivier Gagliardini.

All discussions ended when Doug MacAyeal entered the stage for his pre-banquet presentation on the origins of glaciology. Doug demonstrated that the fathers of glaciology and eventually the IGS were as much into metal forging as the current IGS President (Doug himself) and Secretary General (not Ban Ki-Mun but Magnús Magnússon, obviously). Going back into the history of the IGS, Doug recounted how Gerald Seligman and various colleagues within the Cavendish Laboratory in Cambridge had pivotal roles in shaping modern glaciology. According to history, a physical chemist (and protégé of Gerald Seligman), Max Perutz, together with his PhD student John Glen, took the first steps to examine the deformation mechanism of ice as an example of how metals deform (dislocations). In a nearby office sat John Nye, under the supervision of Egon Orowan. All of them originally studied metal deformation, but Nye and Glen continued on in glaciology, and this led to where the science is today.

Following Doug's presentation, the IGS symposium banquet was held in the restaurant of the Hotel Vatnajökul. A local jazz band played melodic music as the delegates recounted the many new ideas that they had learned over the previous four days. The party continued later after the bus departed, with Olivier Gagliardini taking to the dancefloor to the music of Mugison, a rock'n'roll band from Iceland that is world-known. Those whose accommodation was at the campground hung out outside their cabins after the banquet, enjoying a beautiful sunset, mountains and the ice cap.

The final day, sometimes sparsely populated at other meetings, began with a full room. The instrumentation session notably included Joanna Sziło's complete remote sensing study on glacier–ocean interactions at King George Island, Antarctica, and Laurent Mingo's innovative static radar for monitoring the drainage of a marginal lake. Jason Amundson then presented rare footage of the advancing Taku glacier in Alaska. He emphasized that the glacier releases large amounts of sediment that supports the base of the

Martin Truffer and Jason Amundson enjoying the midweek excursion.

glacier and its advance. In contrast, as the glacier retreats, it leaves behind palaeo landforms such as drumlins, a topic of focus in the next several talks. Sverrir Jónsson presented a study suggesting that drumlins follow the model of the bird's egg, which is the best shape for passing through a narrow hole. In effect, the drumlin is an 'egg' being released along the bed of a glacier. Flavien Beaud looked at at erosional landforms created by sediment transport in turbulent-flow-dominated channels. His model reproduces canyon features and promises great developments. Perhaps one of the most spectacular presentations in terms of scale was Edward King's on an active drumlin field under Rutford Ice Stream in Antarctica.

On the last morning, Jason Amundson presented a Jökullhlaup song and translated the Taku glacier from Tlingit to Icelandic. Photo: Hester Jiskoot.

An august group of symposium notables: the IGS Secretary General and President, chairman of the Local Organizing Committee Tómas Jóhannesson and Hermann Engelhardt, photographed by Hester Jiskoot enjoying the post-symposum tour.

Glaciology and glacial geomorphology converged in the final session. Robert Storrar presented an impressive collection of manually delineating eskers in Canada. He correlates spacing between eskers and meltwater production and also showed that esker geometry is similar to the modelled network of channels in modern glaciology. As a climax, the audience attended three presentations on the latest research on the mighty jökulhlaup. Bergur Einarsson and Daniel Binder both observed reversed motion at the glacier surface from GPS measurements. This surface expression of a wave (oscillation-like) is assumed to be caused by a subglacial hydraulic wave that propagates as a sheet flow. Eyjólfur Magnússon demonstrated that subglacial lake filling and draining can be monitored with repeated ground-penetrating radar. It is a fantastic dataset for investigating the effect of geothermal heat flux on lake dynamics and the formation of surface depressions.

From start to finish, the symposium was upbeat and generated plenty of discussion on the future of hydrology for glaciers and ice-sheets. It is clear that what is happening at the glacier bed remains a subject of large uncertainty, but the community seems to make steady progress.

Once the symposium concluded, Blaðsmiður found himself to be fascinated with the subject of glacial hydrology, with the natural wonders of Iceland and with the delegates themselves. To avoid being banished to Greenland for the imposition of his passage to Iceland as a stowaway, he submitted himself to be an indentured servant to assist with the post-symposium trek that had been arranged by the locals for the visiting delegates.

Kotárjökull and Rótarfjallsjökull outlet glaciers from the ice-covered Öræfajökull stratovolcano. The symposium group is standing on thick outburst flood sediments left by a catastrophic jökulhlaup in 1727 that killed three people and caused widespread destruction of farms and farmland. The depression in the foreground is a kettle hole left where an enormous ice block carried with the floodwater melted. Such kettle holes are common on outwash plains overrun by jökulhlaups. The thick jumble of glacier ice brought by the flood from the ice-covered volcano to the lowland took many decades to melt away. In his account of the 1727 eruption and jökulhlaup, Jón Þorlákssson, minister at Sandfell church in Öræfi, described the course of events when the steep glacier became destabilized by the floodwater: 'Thereafter, the glacier itself slid down to the lowland like molten metal poured from a cauldron'. This description shows an early appreciation by the Icelanders of the kinship between metallurgy and glaciology, a relationship that was reflected upon by Doug MacAyeal in his pre-banquet presentation.

The two-day post-symposium excursion began early on Saturday, embarking on a long and convoluted route from Höfn back to Reykjavik that would take 2 days instead of a mere 6 hours. Each day featured several scenic and scientifically interesting stops along the south coast of Iceland where Ice, glacial hydrology, sea-floor spreading, hot-spot volcanism and warm Icelandic hospitality intersect. Highlights of the trip included a boat ride among the icebergs of Breiðamerkurlón, a walk across a stand of ancient tree stumps at Drumbabót, all broken off at the same level by a jökulhlaup, visits to the uplands, where narrow canyons carved by rushing subglacial waters could be viewed, scenic waterfalls, distinctive ice margins and delicious meals. The sights of the two days were narrated by the able and informative guides, Þorsteinn Þorsteinsson and Tómas Jóhannesson, who took great pains to ensure that each day was packed with delights of the mind as well as of the muses.

The tour ended on Sunday afternoon, at which point all the delegates went their separate ways to all the great corners of the world (including some out-of-the-way places such as the bog iron field where Blaðsmiður was born). At this point, Blaðsmiður found himself most gentled and calmed. He was no longer a Berserk. The experience had left him with great affection and curiosity for the other riddles that present

A cave in the hyaloclastite face of cape Ingólfshöfði near Vík in Mýrdalur village. The cape is surrounded by flood waters during the immense jökulhlaups caused by eruptions of the volcano Katla under the Mýrdalsjökull ice cap; the last such outburst flood occurred in 1918.

The sediment sequence in this several-metres-thick section by the river Markarfljót west of Mýrdalsjökull ice cap (left) bears witness to eleven Holocene jökulhlaups from Katla towards the west; the largest ones 4400, 3500 and 2000 years ago, with an estimated maximum discharge of ~300 000 $m^3 s^{-1}$. The thick gravel layers were closely inspected by the symposium group (right).

The ~20 m deep Tröllagjá canyon near the Markarfljót river was completely submerged in the largest jökulhlaups from Katla towards the west during the Holocene. The floods covered the entire ~1 km wide valley bottom seen on the photo and are inferred to have been more than 30 m deep at the location of the canyon.

The Drumbabót birch stumps are the remains of a forest that was destroyed by a jökulhlaup towards west from Katla 1200 years ago. The trees were broken off at the surface by the flood and many stumps lean slightly along the inferred direction of the current. The surface has since been eroded, exposing the stumps over a 100 ha area.

themselves in a world composed only of Ice, Water, Rock, Fire and sharp-edged Steel. With a sudden spark of elation, Blaðsmiður realized that the sadness he felt, brought on by the end of the symposium, could be alleviated by starting his trip to Cambridge, UK, where the next symposium, on the riddle of ice-sheet dynamics, would begin just 6 weeks later.

British Branch Meeting 2015

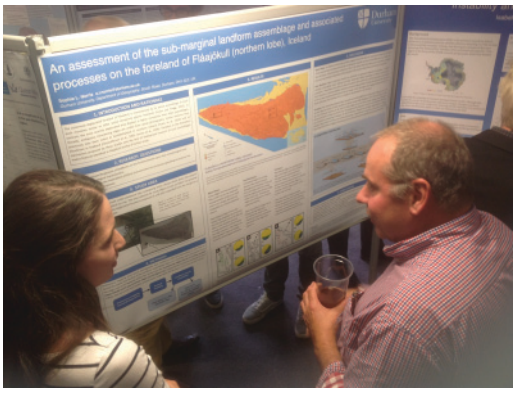
University of Durham, Durham, UK, 3–4 September 2015

The 40th Annual Meeting of the International Glaciological Society British Branch, with a total of 113 delegates, was hosted by the Department of Geography at the University of Durham. Day 1 kicked off bright and early with a warm welcome from Chris Stokes, anticipating two days of presentations covering many aspects of glaciology. These included 38 talks (with 13 delivered by postgraduate students) and a whopping 50 posters (perhaps a record?).

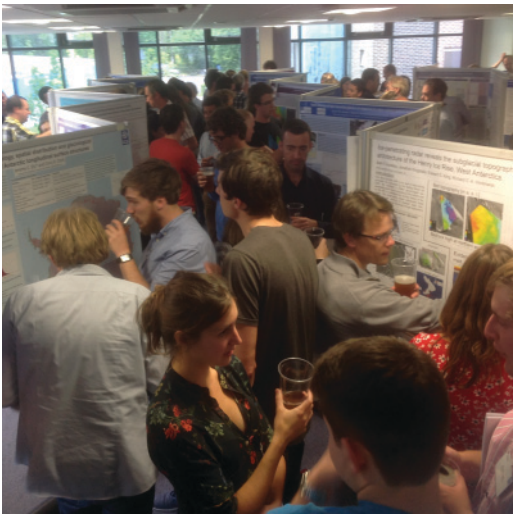
The first session on Day 1 focussed on glacier dynamics and mass balance, with particular reference to the Greenland Ice Sheet and glaciers in Nepal and Chile. We learned that, although the higher melt rates on the Greenland Ice Sheet in recent years have typically resulted in higher summer velocities, there appears to be a general slow-down of ice velocities over decadal timescales. Next came an equally intriguing session concentrating on the more historical aspects of glaciology, from West Antarctica to Kamchatka, Russia.

Lunch was provided on three floors and, with the large number of delegates, the crucial task of finding the shortest and/or fastest-moving queue quickly became obvious to most.

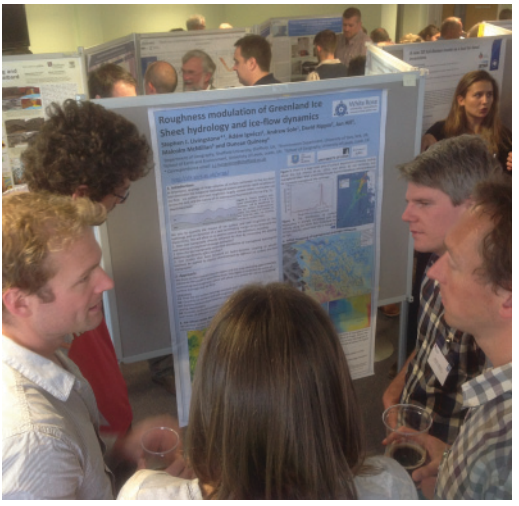
The afternoon session focussed on glacier geology and geomorphology. In only an hour and a half, we travelled from Greenland to Iceland, to Canada, to Scotland, and finally to the Himalaya. This was followed by an extremely busy and stimulating poster session, where the provision of free-flowing local beers seemed only to enhance the energy levels and the quality of the discussions.



The Great Hall of Durham Castle was the location for the wonderful Conference Banquet. Dinner was preceded by an optional tour of the Castle by our own distinguished guide, Anne Le Brocq, who led us through poky passages, spooky stairwells and to the dark depths of the dungeons. During the dinner itself we were able to admire the backdrop of Cromwellian breastplates, helmets and muskets, although it was the collection of



The poster session was exceptionally popular.



The setting of the Banquet was most impressive. Some of the Great Hall of Durham Castle dates from the 13th century (although the windows and panelling are 19th-century). Photo: Hilmar Gudmundsson.

Meeting organizer Chris Stokes chairs the AGM. Photo: Hilmar Gudmundsson.

Poul Christoffersen, Pete Nienow and Rob Arthern in Durham Castle's dungeon bar. Photo: Hilmar Gudmundsson.

swords that particularly caught the attention of our Secretary General. Festivities continued in the Castle's dungeon bar, and for some, they were prolonged yet further at various hostelries in town. Luckily, not everyone had to accidentally circumnavigate the Castle walls before finally escaping into the town centre.

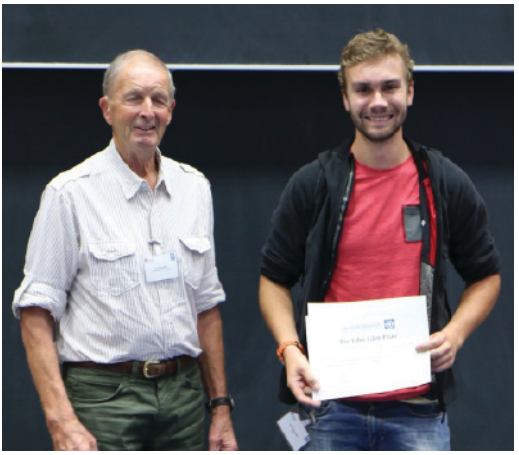
Day 2 kicked off with a session on ice shelves and ice-ocean interactions. Particularly memorable was Joe Todd's 3-D fly-through movie of the calving front of Store Glacier, which made several stomachs twist and turn (particularly those that were already feeling a little sensitive after the previous night's exploits).

Lunch was devoted mainly to the Annual General Meeting, at which the locations of IGS BB meetings were eagerly discussed (perhaps too eagerly, some might argue) and planned for up to 10 years into the future! The only finalized venue for a future meeting, though, is Southampton for next year.

The bar was every bit as popular as the poster session.

Ian Hewitt looks unimpressed (though apparently he was quite the opposite) to hear about Bryn Hubbard's massive ice layer in the Larsen C Ice Shelf. Photo: Hilmar Gudmundsson.

Jo Jacka awards Donald Slater the John Glen Prize for the best student talk. Photo: Hilmar Gudmundsson.



David Sugden awards Sebastian Rosier the John Glen Prize for best student poster. Photo: Hilmar Gudmundsson.

The first afternoon session focussed on glacier hydrology, with a strong emphasis on the subglacial hydrology of the Greenland Ice Sheet. Second came a session on various geophysical and 'emerging glaciology' techniques.

The British Branch Meeting finished with the customary awarding of the John Glen prizes for the best student presentations. Unfortunately John Glen was unable to attend this year; however David Sugden and Jo Jacka did an excellent job of selecting and awarding the prize-winners on John's behalf. Donald Slater won the award for the best talk, which focussed on the effect of meltwater plumes on the submarine melt rates of marine-terminating glaciers, with special mentions given to Stephen Chuter, Rebecca Burns, Joe Todd and Damon Davis. The award for the best student poster went to Sebastian Rosier, who is modelling the response of ice streams to tidal effects, and special mentions were given to Isabel Nias, Beth Hungleby, Emily Langley, Lucy Kissick and Stephen Brough.

The local organizing committee were thanked for providing us with such a smooth-running and intellectually stimulating meeting, and we can all look forward to the next British Branch Meeting in Southampton in September 2016.

Alison Banwell

IGS Secretary General Magnús Magnússon engaged in the important job of keeping the 'Friends of the International Glaciological Society' Facebook page up to date during the sessions. Photo: Hilmar Gudmundsson.

Annual General Meeting 2015

Wolfson Hall, Churchill College, Cambridge, UK, 20 August 2015

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

82 persons, from 16 countries, attended, of whom 73 were members.

1. The previous AGM's minutes

The Minutes of the last Annual General Meeting, published in the 3rd issue of *ICE*, 2014, No. 166, pp. 29–33, were approved on a motion by M. Siegert and seconded by M. O'Leary and signed by the President.

2. The President's report

The President gave the following report for 2014–15:

Dear Fellow Members:

Overview of 2014/15:

Over the past 4 years, there has been considerable discussion within the IGS Council, Publication Committee and with members at large over the ever quickening evolution of the general climate of scientific publication. This discussion culminated early last year with the conduct of a survey addressed to IGS members and to all authors who have submitted papers to the IGS publications over the past 5 years. The survey revealed that the quality, integrity, accessibility and technical production standards of the *Journal of Glaciology* and *Annals of Glaciology* are what matters most to IGS members and authors. After carefully considering the results of the survey, members of the Publication Committee and Council together with the Secretary General and IGS staff considered what steps could be taken to ensure that the *Journal* and *Annals* meet the expectations of the community. It was decided, and set into motion, at the Chamonix Council meeting in May 2014 that the best course of action was to modernize the publication model of the *Journal* and *Annals* in a number of ways (including transitioning away from paper copy printing); however, the leading modernization was identified as being the need to shift both the *Journal* and *Annals* to Open Access Gold. (This is the publication standard that allows articles to be accessed immediately on publication by anyone who wishes, and where the costs of publication are borne primarily by the author though page charges or other fees.) The Council passed two motions in Chamonix: the first was to shift the burden of paying for printed copies of the *Journal* and *Annals* to readers/subscribers who are willing to pay the full costs for printing and distribution (members thus no longer get print copies automatically without paying the fee), and the second, most important motion was to shift the *Journal of Glaciology* to Open Access Gold by January 2016 (with the *Annals* to follow).

Since the Council's 'Chamonix decision' in May 2014, the Publication Committee and various officers, members of Council, the Treasurer and Secretary General have worked tirelessly, and relentlessly toward developing a plan to implement the modernization of the *Journal* and *Annals* in general and their transition to Open Access Gold in particular. (Special words of appreciation are given to Christina Hulbe, chair of the Publication Committee, Eric Wolff, Liam Colgan, Gwenn Flowers, Regine Hock, Ian Willis and others for donating large amounts of their time and energy over the past year, and especially over the past 4 months, pursuing various plans and options regarding the transition.) This band of volunteers cast a wide net to gather information on a variety of possible ways in which the IGS could change how it publishes the *Journal* and *Annals*. This variety included options to work primarily within the current system of production, but to meet challenges through further innovation, options to partner with commercial publishers, options to partner with non-profit/university press publishers, options to partner with a major Data Archiving centre associated with the University of Colorado, as well as options to partner with the Public Knowledge Project (PKP).

Over the past 4 months, and especially during 12 hours of Council meetings held during the first three days of the Symposium held in Churchill College, the various options were vetted and analysed using various criteria including financial criteria and considerations regarding innovation and placement within the publishing landscape relative to peer journals and publishers. After deliberating on the three most serious and well defined options (one of which included maintaining all publication production processes within the current IGS office), the Council decided to pursue the option that will partner the IGS with Cambridge University Press (CUP). Accordingly, the Council passed a motion to authorize a working group (chaired by Christina Hulbe, and involving members in the local Cambridge area as well as others) to negotiate a partnership with CUP and produce a contractual plan that will be submitted to the Council for approval on or about 15 September 2015.

The reasons for selecting CUP as a publishing partner involve many considerations. The principal consideration is that CUP provides a relatively low-risk (financially) pathway to Open Access Gold for both future issues of the *Journal* and *Annals* (starting in 2016) and for all back issues (over a period of months). CUP would essentially take over the post-acceptance production workflow of the *Journal* and *Annals* that is currently performed by IGS staff, and would provide the one-source location for all on-line presentation of IGS publications. The Scientific Editing and Review process that is performed prior to the acceptance of papers in IGS publications will remain firmly within the sole control of the IGS board of editors. Details of the partnership with CUP are under negotiation and thus cannot be described further. Once the negotiations have been completed, and the Council's approval has been received, a general announcement will be made regarding details of the new partnership. This announcement is anticipated to be made shortly after mid-September.

Aside from this very important development in the operation of the IGS, I can report that the IGS has done very well in other respects over the 2014/15 period. Most notably, as reflected in the Treasurer's report, the IGS has maintained a very profitable and healthy financial condition over the period. This healthy financial condition makes the transition of IGS publications to Open Access Gold much easier and allows greater flexibility than would have been the case if the IGS staff and Secretary General had not worked diligently to keep the financial conditions in good shape. I continue to note the success of IGS publications, with steady submissions to the *Journal* and several issues of the *Annals* having been published in 2014/15, and I thank the Chief Editor and members of the scientific editing teams for all IGS publications for their fine work. I make note of the fact that our current Chief Editor, Dr Jo Jacka, who has performed in this office for the past 13 years, will be retiring in 2016. A search process for a new CE (or a team of CEs) will be started shortly. Jo will continue to serve as CE until July of 2016, and he has generously offered to help with the transition process to a new CE over the coming year. Finally, I note the fact that the IGS has conducted three very fine symposia over the first 8 months of 2015: Kathmandu, Nepal, Höfn, Iceland and here in Cambridge, UK. These symposia have been very successful in fostering the exchange of scientific information, and the IGS staff and community volunteers who comprise the local organizing committees are very much appreciated for facilitating this important mission of the IGS.

I close my report by thanking you, the general membership of the IGS, for remaining loyal to the IGS – both by submitting your papers to us and by paying generously your membership dues. We will need your loyalty (and your continued participation as members) over the coming year as we face the various challenges of converting our publications to Open Access Gold. Eventually, within a 1–2 year time frame, we expect to see a new, revitalized IGS emerge from the fine traditions of its past, and we who participate in the governance of the IGS thank you, the members, for making this transition possible. Your opinions (as expressed in the survey) and your financial support (through dues and page charges) have put the IGS in a position to make a radical improvement in the service it provides without undue risk and hardship.

Thank you.

The President suggested that questions relating to his report be deferred until item 6 on the agenda, 'Other business', as his presentation was directly related to the open forum discussion that was planned. The request for a motion to accept or reject the President's report would also be deferred to item 6 on the agenda once the general discussion has taken place.

3. The Treasurer's report

The IGS Treasurer, Dr I.C. Willis, presented the following report with the audited Financial Statements for the year ended 31 December 2014.

Dear fellow members, ladies and gentlemen

As our turnover was >£500k in 2014, we were obliged to have a full Audit this year. Throughout this report I will make reference to the Society's fully audited accounts for the year 2014 and refer to the relevant page numbers.

The Society's finances are summarized by considering the changes from 1 January 2014 to 31 December 2014, as shown on page 11 of the accounts. In the table, Restricted Funds refers to money associated specifically with the Seligman Crystal and the Richardson Medal. The item Unrestricted Funds refers to everything else.

Restricted Funds: decreased by £1015 from £6962 to £5947 as a result of the difference between interest payment income and expenditure on engraving the one Seligman Crystal presented in 2014.

Unrestricted Funds: increased by £98 219 from £392 578 to £490 797 showing that the income to IGS largely from membership, sales of the *Journal* and *Annals*, page charges and symposia attendance slightly exceeded expenditure associated with *Journal* and *Annals* printing, publication and associated office support, and office support for activities related to organizing symposia and running the Society.

Total: The Society had net resources accrued before revaluation of £98 396 resulting in the positive

movement in the Society's funds of £97 204 in 2014, compared with £8477 in 2013, £28 092 in 2012, and losses between 2008 and 2011.

Thus, I am pleased to report that the Society's finances are in profit for the third year in a row and that we turned in the biggest annual profit for over 9 years. The last 3 years have seen a cumulative profit of £133 773 which has gone a good way to offsetting the periods of loss between 2008 and 2011. Since 2007, we have a cumulative deficit of £72 008. I hope the Society can continue to reduce that over the next year by turning in a modest profit again for 2015. Our total funds at the end of the year were £496 744 and our average annual expenditure for the last three years has been £551 472. As I have stated in previous reports, I would like to see our total funds equal to our annual expenditure and we are not quite realizing that.

In more detail, income is itemized in notes 2–6, and expenditure is listed in notes 3 and 7–11 on pages 15–19. The accounts are presented under the headings '*Journal*, *ICE* & Books', '*Annals*', and 'Meetings/Symposia' to reflect the three main activities of the Society.

Income:

Note 2. Voluntary income was £9453 in 2014 compared with £2048 in 2013. This mostly reflects a grant of €10k from the European Social Fund to enable student bursaries to be given out for the Chamonix Conference.

Note 3. Trading activities associated with the sale of IGS merchandise turned in a small profit of £709 in 2014 compared with a smaller profit of £632 in 2013 and a small loss of £365 in 2012. Over the past few years, trading of T-shirts, fleeces, hats, etc. has made a small profit; it would be nice if this profit could be increased.

Note 4. Income from interest on investments increased slightly in 2014 compared with 2013: up £411 from £7384 to £7795. A few 'higher interest' investments matured in 2014 and these were reinvested in similar low risk accounts, which however, yielded slightly higher interest than our regular bank account.

Note 5. Income associated with *Journal*, *ICE* & Books was up by £56 457 from £250 680 in 2013 to £307 137 in 2014. Some of this increase was due to increased membership subscriptions, shown separately on page 11, where we see that membership income increased by £6589 from £61 488 to £68 077. The rest of the increase associated with *Journal*, ICE & Books is associated with sales to non-members, libraries and other organizations, and page charges. These are discussed further below with respect to Note 6. Income associated with *Annals* was down by £41 548 from £165 508 in 2013 to £123 960 in 2014. I discuss this further below too with respect to Note 6. Income from Meetings & Symposia was up by £130 015 from £72 621 in 2013 to £202 636 in 2014. This is despite the fact that two Symposia took place in both 2013 (Beijing & Kansas) and 2014 (Hobart & Chamonix). This is to some extent offset by the higher costs of running the Meetings/Symposia in 2014 cf. 2013 (see note 10 below). A preliminary investigation suggests that the Society's Meetings & Symposia tend to make a small loss (when overheads associated with the IGS Office are factored in) and that the extent of this loss depends heavily on the 'success' of the meeting as measured by numbers attending and degree of sponsorship that the local committee are able to muster. I accept that there are other ways of measuring 'success' of a conference and the IGS should not lose sight of that. But, I would encourage Meetings/Symposia to be offered that are likely to attract significant numbers (as then the Society benefits from 'economies of scale') and where extra funds are forthcoming wherever possible.

Note 6. *Journal* sales to libraries and other organizations were up slightly by £1440 from £89 908 (2013) to £91 348. This reflects the increased cost of the *Journal* to libraries, which slightly offset the small drop in the number of library subscribers and an increase in the percentage taking online only (which is cheaper than the paper copy). [Since 2012, the number of library subscribers has dropped from 302 to 284 and the number taking online only has increased from 21 to 79. This needs to be monitored into the future, especially when the *Journal* goes Open Access in 2016]. Conversely, income from page charges dropped by £28 065 from £134 566 (2013) to £106 501 (2014). Income from the Open Access Fee increased from £2300 (1 paper) in 2013 to £34 500 (15 papers) in 2014. Taken together, income to the *Journal* from authors rose slightly by £4135. The Publications Committee and the Treasurer are currently trying to anticipate likely scenarios for the changing balance between income from libraries and income from authors over the next few years as the *Journal* moves to Open Access.

Note 6. As mentioned above, total income from *Annals* is down £41 548 from £165 508 in 2013 to £123 960 in 2014. This decrease in *Annals* income largely reflects the smaller number of *Annals* issues published in 2014 cf. 2013 (four issues in 2014 – all single; five issues in 2013 – one single and two double). Six authors opted to pay the Open Access Fee.

Expenditure:

Note 8. The direct costs associated with editing, printing, publishing and distributing the *Journal* and *Annals* and material for Meetings/Symposia

decreased slightly by £5444 from £137 717 (2013) to £132 273 (2014). This compares with bigger increases of £8753 (2012/13) and £6533 (2011/12). Printing costs are generally dropping as more and more members and libraries subscribe to online only (and one less *Annals* issue was produced in 2014 cf. 2013). Wages and salaries associated with these activities dropped slightly by £2165 as one less *Annals* issue was produced. Similarly, proof reading and editorial costs dropped slightly. Editorial fees and expenses rose slightly as the Chief Editor's allowance rose with inflation and he attended two conferences in 2014 cf. one in 2013 (albeit one was in his home city of Hobart).

Note 9. The Society paid out £3187 to student members to help with their costs of attending IGS Symposia. [*NB*. This is < the €10k given for this purpose (see note 2 above); the remainder was forwarded to be administered by the local organizing committee].

Note 10. The total support costs associated with *Journal*, *Annals* and Meetings/Symposia activity increased by £56 384 from £301 823 (2013) to £358 207 (2014). This is largely made up of the increased costs associated with running the Hobart/Chamonix symposia compared with running the Beijing/Kansas meetings (an increase of £48 225). This is to some extent offset by the increased income associated with Meetings/Symposia – see note 5 above. Some of these year-to-year differences in income/expenditure of Meetings/Symposia reflect whether the IGS is involved in paying upfront for accommodation, banquet, etc. Telephone, stationery & postage costs continue to fall (as fewer paper copies of the *Journal* and *Annals* are posted). Similarly, Travel and subsistence costs (largely the costs of our Secretary General representing the Society at Meetings (not Symposia, which are accounted for elsewhere) continue to fall. The big hike in Computer costs of £10 369 is related to a change in the date on which prepayment for website hosting occurred in 2014 cf. 2013. We should expect a similar drop in 2015 cf. 2014.

I am very pleased to report that there is no longer any need for a 'provision for doubtful debts' item. How different the situation was a few years ago!

Note 11. Governance costs associated with running the Society increased by £5751 in 2014 cf. 2013 (13.5%). (They also increased by £10 008 in 2013 compared with 2012 (27.6%)). These year-on-year increases are largely associated with increased salary costs.

Note 14. Overall staff costs went up by £5696 in 2014 cf. 2013 (3.7%). This compares with an increase of £17 983 in 2013 cf. 2012 (partly due to a step pay rise for the Secretary General in recognition of his 10 years of service to the Society) and a fall of £11 107 in 2012 cf. 2011. The fluctuations from year to year largely represent: i) variations in the number of hours that production staff spend on producing the *Annals* (the number of issues of which varies from year to year); ii) staff changes and the extent to which there is overlap or a gap in continuity; iii) whether a student intern is employed in the summer.

Summary:
The Society's finances are in quite a good shape and better than they have been in recent years, with the largest annual profit since before 2007. We ran a significant surplus in 2014 (20% of funds). This compares with a very small surplus in 2013 (2% of funds), a slightly bigger surplus in 2012 (~7% of funds), and various deficits between 2008 and 2011 (ranging from ~1% to ~27% of funds). The net result over the past 9 years is that we have been accumulating a deficit, although we have gone a good way to closing that over the last 3 years. I recommend that we strive to ensure that the surpluses of recent years continue for the next year or two.

On the income side, there are three pieces of good news: i) the Society's membership continues to be stable and has even risen slightly; ii) library subscriptions to the *Journal* and *Annals* are largely being maintained (although both have dropped slightly in recent years); and iii) authors are honouring page charges and more are paying the Open Access fee. The effects on these income streams of the *Journal* going fully Open Access are unknown although the Publications Committee and I have been modelling various possible scenarios with the aim of presenting to Council suggestions for precisely what the Open Access fee ought to be and how to manage library subscriptions to back issues in future years. It is a balancing act not to set the Open Access fee too high to discourage authors, but neither to set it too low to cut off what will be the major income instream in the future.

On the expenditure side, the Society's costs have largely stabilized in recent years. Our key items of expenditure are, of course, employing a full-time Secretary General, a part-time Membership & Accounts Manager, and the equivalent of slightly less than two full-time production staff; renting an office in central Cambridge; providing a Chief Editor allowance; paying proof editors and producing hard copies of the *Journal* and *Annals*. Ignoring a one-off step increase for the SG in 2013, wages and salaries are incremented each year by the UK Retail Price Index, which since 2007 has averaged 3.3%.

It is not immediately obvious from the way the accounts are presented, and it is not something that I've mentioned in my previous reports, or analysed here, but for the past 3 years (2012–14) the Society has made a loss on the running of Meetings/Symposia

when income (largely from the conference fee charged to delegates) minus the expenditure (which includes a proportion of overheads associated with running the IGS office) associated with this area of IGS activity is considered separately from the two other main areas (i.e. producing the *Journal* and producing the *Annals*). Symposia have made an average annual loss of ~£35k. Conversely, the *Journal* has made a profit of ~£45k and the *Annals* a profit of ~£33k.

Ian C. Willis, Treasurer
22 August 2015

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

A member asked whether any forecasts had been made regarding what effect going 'Open Access' would have upon the finances of the society. The Treasurer responded that several scenarios had been modelled looking at how subscriptions will fall off and the number of papers that will be submitted. The IGS has been working with CUP on those predictions and further negotiations are necessary. The IGS and CUP are both optimistic about the future and are confident that the IGS will survive this transition. But it will be necessary to make savings wherever possible. The President added that it was clear that it will be very stressful financially as we are losing library subscriptions and we start to wind down the journal production within the IGS office and transfer it to CUP. The IGS membership has been very loyal and supportive and the IGS is grateful for that.

The treasurer was also asked about the reserves of the Society and he responded that it is considered prudent to have funds to cover a year's operation of the Society.

T. Scambos proposed, and B. Kulessa seconded, that the Treasurer's report be accepted. This was carried unanimously.

4. Election of auditors for 2015 accounts
The Secretary General proposed the IGS remain with our current auditors. A question from the floor asked whether an alternative and possibly cheaper accounting company could be found. The SG and the Treasurer replied that we did look into this some years ago and found that the quotes received were not substantially different from what our current accountants, Messrs Peters Elworthy and Moore, could offer and since they had been doing our accounts for several decades they knew the innards of the IGS very well. The floor suggested that perhaps that would be a good reason in investigate whether an alternative company could be found, the current accountants could be complacent in the knowledge that the IGS was a 'secure' client. The Treasurer and the SG replied that it would certainly be a good idea to start looking around in the new year but in light of the major transition the IGS is undergoing it should not be during this current financial year.

On a motion from the Secretary General, G. Hamilton proposed, and T. Bartholomaus seconded, that Messrs Peters Elworthy and Moore of Cambridge be elected 'Independent Inspectors or Auditors', whichever is appropriate, for the 2015 accounts. This was carried unanimously.

5. Elections to Council
After circulation to Society members of the Council's suggested list of nominees for 2015–2018, no further nominations were received. The following members were therefore elected unanimously by the AGM.

Vice-Presidents:	Gwenn Flowers
Elective Members:	Helen Fricker
	Jennifer Hutchings
	Shichang Kang
	Andrew Mackintosh
	Carleen Tijm Reijmer

The President raised the question of whether the Council should take steps to further involve the membership in the nominating process, and to encourage members to be more pro-active in putting forward nominations for officers and Council members. He then thanked the outgoing Council members and welcomed the newly elected members.

6. Other business:
The President and the Secretary General then responded to a period of open questions and discussion covering a variety of topics. Topics discussed included: the need for IGS investments to be ethical and environmentally sound, the status of IGS membership, is it healthy and how can we make it more attractive to early career glaciologists? The progress towards Open Access was discussed, as was the availability of back issues of IGS publications. Members discussed and emphasized the historical legacy of the Society. Several members raised the question of the possibility of having some or all presentations at various IGS symposia broadcast as videos and e-posters. The discussion also touched on how the IGS could interact with other organizations in the future, such as jointly sponsoring Chapman Conferences with the AGU and bundling memberships with APECS. A question was raised as to whether it might be possible to get subsidises from agencies and possibly companies. The decision to offer only 'online-only' membership was also discussed.

The AGM was adjourned on a motion from J. Shea and seconded by T. Scambos at 19:00 local time.

News

Staff changes at the IGS

2015 saw some major staff changes at the IGS; four of our staff left the Cambridge office. Back in April our reference editor, Rowena Baxter, retired. Rowena started work for the IGS in October 2005 so she was with the IGS for almost 10 years. She became well known for the particular attention she paid to ensure the references in your papers were up to date and correct. To celebrate her retirement she set about fulfilling a lifelong ambition to go on an African safari. Luckily we still see her on a regular basis as she often drops in for coffee.

Rowena Baxter.

Then towards the end of the year we closed down our production department following our partnership with Cambridge University Press (CUP). This meant that three more valued members of our staff left the employment of the IGS.

Craig Baxter started work for us in November 2003. Most of you will have had dealings with Craig at some point over the years and know how helpful he always was. He set up, and was in charge of, the online submission system, along with all his other duties of journal production. Because of his playwriting skills he was invaluable in putting thoughts into words. So much output from the IGS office benefitted from this talent as he always had the 'right' way of saying things. Craig has now moved to CUP where he will maintain involvement on the production of IGS publications.

Sukie Hunter.

Sukie Hunter started work in the IGS office in January 2009 but she had been doing freelance work for us for several years before then. Sukie typeset all your papers and prepared the layout of our journals. She was responsible for making your papers look so professional once published. Also, we could always turn to Sukie with technical problems; if she did not already know the answer she would figure out a solution

Craig Baxter.

pretty quickly. Sukie was also responsible for producing our newsletter *ICE*, a task she will continue with on a freelance basis. She produced the material for our symposium USBs and made up the interactive programme, etc., another task she will hopefully continue to do on a freelance basis. And I must mention her corgi dogs. Sukie is an enthusiastic breeder of corgis and the IGS office has benefited from that! A couple of her puppies have literally been raised in the office and we have enjoyed their company very much. They got to know us and every time they came into the office they would go around and greet everyone. Not only will we miss Sukie, we will also miss her dogs.

Rachel Brown joined us in the office in September 2013, but she had been part of our freelance copy-editing team for quite some years. Rachel is very attentive to detail and very thorough in her work. Having an artistic streak she became responsible for setting up the covers for the *Annals* and the *Journal*. She read over all your papers and made certain they complied with the IGS style. With her copy-editing experience she also edited all our symposium abstract booklets and other material relating to symposia, as well as *ICE* and any material we sent out to our members.

Rachel Brown.

It is sad to say goodbye to your colleagues of many years but luckily we have all become good friends and we plan to continue our IGS get-togethers such as the 'IGS Midwinter Gastronomic Extravaganza'. But I am sure you all will join me in thanking them for their contributions to the IGS and wishing them all the best in their future careers.

Book received

Bigg GR (2015) Icebergs: their science and links to global change. Cambridge University Press, Cambridge. 240 pp. ISBN: 978-1-107-06709-7 (Hbk £79.99/$125.00)

INTERNATIONAL GLACIOLOGICAL SOCIETY

International Symposium on

Interactions of Ice Sheets and Glaciers with the Ocean

Scripps Seaside Forum
Scripps Institution of Oceanography
La Jolla, California, USA
11–15 July 2016

Co-sponsored by:
- Forum for Research into Ice Sheet Processes (FRISP)
- Institute of Geophysics and Planetary Physics
- Scripps Institution of Oceanography

FIRST CIRCULAR
July 2015
http://www.igsoc.org/symposia/2016/lajolla

The International Glaciological Society will hold an International Symposium on 'Interactions of Ice Sheets and Glaciers with the Ocean' in 2016. The symposium will be held on the oceanfront in La Jolla, California, USA, from 11–15 June 2016.

THEME

This symposium is in direct continuation of the symposium held in 2011 with the same theme. It is felt that considerable advances have been in the last five years to warrant a revisit to it.

The mass balance of the Antarctic and Greenland ice sheets and the circulation of the adjacent oceans are strongly coupled through physical processes occurring at the ice-ocean interfaces (i.e., the fronts and bases of ice shelves and glacier tongues, and the termini of tidewater glaciers). Improved understanding of these processes is essential so that they can be realistically represented in models of how ice sheets and glaciers would evolve in a changing climate, and to improve predictions of global sea level change. The goals of this symposium are: (1) to assess the status of our knowledge of ice–ocean interactions; and (2) to discuss what is needed for development of reliable, quantitative models of ice sheet evolution and associated changes in ocean circulation. We hope this symposium will attract experts in ice shelf, ice sheet, glacier, ocean and climate studies whose research addresses interactions of the ocean and ice in the global climate system using in situ observations, remote sensing and/or modeling. Come and attend what will be a stimulating and productive symposium in a beautiful setting in Southern California.

SUGGESTED TOPICS

The thematic focus of the Symposium is on ice–ocean interaction in the broadest sense, and all interpretations of this theme will be welcome as submissions for presentation at the meeting. Suggestions for specific topics of interest are:

1. Mass balance of ice shelves and tidewater glaciers, including the physics of melting and freezing at the ice–ocean interface and iceberg calving, forcing from ocean and atmosphere, and sensitivity to climate change.
2. Dynamics of ice shelves and tidewater glaciers, including: the response to changes in surface and basal mass balance; response to tidal forcing; impact of calving events; and processes influencing ice rheology and susceptibility to fracture.
3. Coupling between grounded and floating ice, including controls on the location of grounding lines, response of inland ice to thinning and break-up of ice shelves and termini of tidewater glaciers, transmission of tidal forcing across the grounding line.

4. Oceanic response to the input of ice, including the impact of meltwater and drifting icebergs on regional and global ocean circulation and sea level.
5. Role of atmosphere/sea ice/ocean processes in delivering ocean heat to glaciated coastlines, including the impact of past, present and future climate variability.
6. Records of change in ice shelves and tidewater glaciers, including time series derived from direct observation and studies of the past impacts of ice sheet–ocean interaction preserved in the ice core and marine geological record.
7. Observational and modelling techniques that advance our understanding of ice sheet–ocean interaction, including strategies for understanding and monitoring ocean forcing and ice sheet/glacier response, techniques for coupling ice sheet/shelf models with ocean circulation/climate models.

PROGRAMME

A mixture of oral and poster sessions, interlaced with ample free time, forms the general framework of the symposium, which is intended to facilitate exchange of scientific information between participants in an informal manner. Additional activities include the customary icebreaker, a symposium banquet and a selection of activities for the traditional Wednesday afternoon mid-symposium break.

ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper (either oral or poster) at the Symposium will be required to submit an abstract by **15 March 2016** (please note that this is different from the date originally published). A collection of submitted abstracts will be provided for all participants at the Symposium. The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Participants are encouraged to submit manuscripts for this *Annals* volume.

SYMPOSIUM ORGANISATION

Magnús Már Magnússon (International Glaciological Society)

SCIENCE STEERING EDITORIAL COMMITTEE

Chief Editor: Helen Fricker (University of California, San Diego).
Associate Editors include: Adrian Jenkins, Laurie Padman, Eric Rignot and Ted Scambos.

LOCAL ORGANIZING COMMITTEE

Helen Amanda Fricker (Chair), Sarah Gille, Laurie Padman.

VENUE

The symposium will be held at the Scripps Seaside Forum, an extraordinary, oceanfront conference center facility located in the heart of Scripps Institution of Oceanography, with a breathtaking view over the Pacific Ocean. Just steps from the sand, it offers a relaxed and comfortable atmosphere, yet provides conference support through state-of-the-art audio-visual equipment ranging from 3-D projection systems, multiple computer connections, and surround-sound. The beachfront location offers plenty of opportunity for mid-week leisure activities such as surfing, sea-kayaking, sailing, volleyball, walking, etc.

LOCATION

San Diego is renowned for its idyllic climate, enjoying beautiful weather year round with an average daily temperature of 70.5ºF (21.4ºC). California's second largest city and the United States' eighth largest, San Diego has a citywide population of nearly 1.3 million. As well as its beaches, San Diego has an impressive array of world-class family attractions, such as the San Diego Zoo and Wild Animal Park, Sea World San Diego and LEGOLAND California. San Diego offers an expansive variety of things to see and do, appealing to guests of all ages. This would be the ideal destination for an accompanying family! The most difficult decision to make regarding a trip to San Diego is determining what to do and see among the region's vast and diverse offerings.

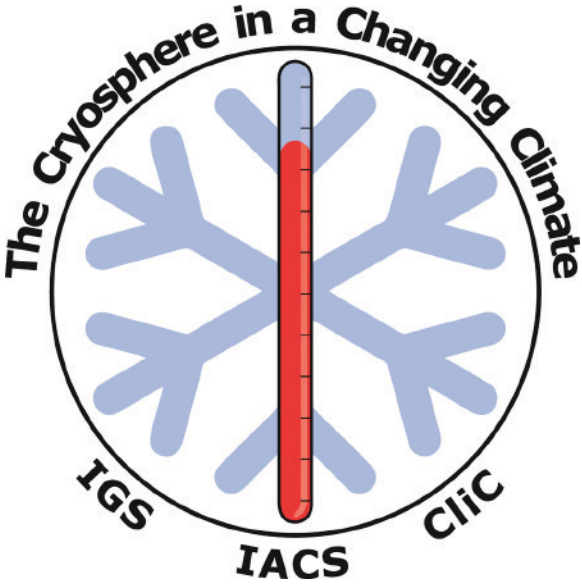
FURTHER INFORMATION

If you wish to attend the symposium please register your interest online at http://www.igsoc.org/symposia/2016/lajolla/.

The Second Circular will give further information about accommodation, the general scientific programme, additional activities, preparation of abstracts and final papers. Members of the International Glaciological Society will automatically receive one, as will all those who have pre-registered. Information will also be updated on the IGS conference website, http://www.igsoc.org/symposia/2016/lajolla/ as it becomes available. A local website will open later in 2015.

International Symposium on

The Cryosphere in a Changing Climate



Wellington, New Zealand, 12–17 February 2017

Co-sponsored by:
- International Glaciological Society
- International Association of Cryospheric Sciences (IACS)
- World Climate Research Programme
  Climate and Cryosphere (CliC) project

FIRST CIRCULAR
November 2015

The International Glaciological Society (IGS) will co-sponsor an International Symposium on 'The Cryosphere in a Changing Climate', in Wellington, New Zealand, from 12–17 February 2017.

CONTACTS

Magnus Mar Magnusson, Secretary General, International Glaciological Society (IGS); Andrew Mackintosh, Secretary General, International Association of Cryospheric Sciences (IACS) and Chair of Local Organizing Committee (LOC); Gwen Hamon, Executive Officer, CliC (World Climate Research Programme Climate and Cryosphere Project)

THEME

This is the first international symposium that will bring together three of the leading international organisations in the field of cryospheric research: IGS, IACS and CliC. The theme of the conference 'The Cryosphere in a Changing Climate' is global in scope with a focus on physical processes within the cryosphere, and interactions between the cryosphere and the climate system.This symposium will also serve as the 2017 meeting of New Zealand Snow and Ice Research Group (SIRG; the NZ regional branch of the International Glaciological Society).

TOPICS

Topics will include (but are not limited to)

1. Contribution of glaciers and ice sheets to sea level changes, past, present and future
2. Thresholds and processes for ice shelf loss in a warming world
3. Attribution of cryospheric changes to natural and anthropogenic climate changes
4. Glacier and ice sheet dynamics: processes, uncertainties, boundary conditions, field and laboratory experiments and modelling
5. Coupling of global climate models to glacier, ice sheet and snow models
6. Ice cores and climate
7. Ice–ocean interactions in a changing climate
8. Contrasting hemispheric sea ice behaviour
9. Cryospheric feedbacks to climate change, including polar amplification of climate
10. Snow processes and their relevance in a changing climate
11. Snow and glacier hydrology, and changing runoff in a warming climate
12. Effects of climate variability and change on mountain glaciers
13. Emerging areas of cryosphere/climate research

LOCAL ORGANIZING COMMITTEE
Andrew Mackintosh (chair), Victoria University of Wellington.

– Victoria University of Wellington: James Renwick, Ruzica Dadic, Brian Anderson, Huw Horgan, Nick Golledge, Nancy Bertler, Shaun Eaves, Richard Selwyn Jones, Tim Naish, Lionel Carter, Rob McKay, Kevin Norton
– Canterbury University, Christchurch: Heather Purdie, Wolfgang Rack, Adrian McDonald
– Aqualinc Research Ltd, Christchurch: Tim Kerr
– Otago University, Dunedin: Christina Hulbe, Nicolas Cullen, Christian Ohneiser, Pat Longhorne, David Prior
– NIWA: Andrew Lorrey, Natalie Robinson, Christian Zammit, Helen Bostock, Craig Stevens
– GNS Science: Richard Levy, Marcus Vandergoes
– University of Tasmania, Hobart, Australia: Matt King, Ben Galton Fenzi, Rob Massom

SCIENCE STEERING AND EDITORIAL COMMITTEE
Ian Allison (chair), Ben Galton Fenzi, Charles Fierz, Marika Holland, Christina Hulbe, Christine Schøtt Hvidberg, Gerhard Krinner, Andrew Mackintosh, Marilyn Raphael, James Renwick, Shin Sugiyama, Carleen Tijm-Reijmer, Tessa Vance.

ABSTRACT AND PAPER PUBLICATION
Participants wishing to present a paper (either oral or poster) at the Symposium will be required to submit an abstract by Monday 12 September 2016 (5 months prior to the symposium). The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Submissions to this issue will not be contingent on presentation at the Symposium, and material presented at the symposium is not necessarily affirmed as being suitable for consideration for this issue of the *Annals*. Participants are encouraged, however, to submit manuscripts for this *Annals* volume. The deadline for submission of *Annals* papers will be published at a later date.

PRE-CONFERENCE FIELD TRIP – Organizer: Dr Shaun Eaves
Tongariro National Park is one of only a few UNESCO 'mixed' cultural and natural World Heritage sites, famous for its spectacular volcanoes, endemic vegetation and cultural heritage. Several small glaciers remain on the highest mountain in Tongariro National Park (Mt Ruapehu, 2797 m). The field trip will include a full-day (~8 hour) mountain walk known as the 'Tongariro Alpine Crossing', as well less strenuous sight seeing. This will include a soothing visit to a natural hot pool. It is a four hour drive to Tongariro National Park, and guests will depart by coach from Wellington on Friday 10 February, returning in time for the symposium icebreaker in Wellington on Sunday 12th.

POST-CONFERENCE FIELD TRIP – Organizer: Dr Heather Purdie
A 4–5 day field trip will be organised to immediately follow the conference. The field trip will depart from Christchurch, and participants will spend 2–3 days based at Aoraki/Mt Cook village, where there will be opportunity to join a guided walk to the Hooker Valley, including a visit to Hooker and Mueller Glaciers, a cruise amongst the icebergs on Lake Tasman and a scenic flight around Tasman Glacier and the summits of Aoraki/Mt Cook and Mt Tasman (weather-dependent, at own cost). Note: Participants will need to organize their own transport from Wellington to Christchurch (1 hour flight, >10 flights per day).

MID-CONFERENCE FIELD TRIP
We will visit Martinborough in the Wairarapa for lunch or an early dinner. This region is famous for its sunshine, fresh produce and fine Pinot Noir wines. The Wairarapa is located approximately 90 km east of Wellington, across the Rimutaka Range.

BANQUET: The banquet will be held in a restaurant on Wellington's waterfront on the evening of Thursday 16 February.

TRAVEL GRANTS FOR STUDENTS: We will offer a limited number of travel grants for early career researchers, and/or researchers from developing countries. An application including a motivation letter and CV will be required during the time of abstract submission.

VENUE
The conference will be based in the Alan McDiarmid Building, with state-of-the-art lecture theatres and communal spaces on the Kelburn Campus of Victoria University of Wellington, adjacent to the Antarctic Research Centre. Accommodation will also be available within Victoria University of Wellington's student halls of residence.

Wellington is the capital city of New Zealand. Known for its quality of life and consistently featuring as a top destination on tourism hit lists, Wellington is affectionately known as the 'coolest little capital'. It is a dynamic small city of approximately half a million residents, well known for its culinary scene, coffee and microbrewery culture. It has a strong university and government research sector, and several hundred earth and atmospheric scientists are based there.

Wellington is situated at the southern tip of the North Island of New Zealand in a hilly, harbour-side setting. Nature is close at hand; pockets of temperate rainforest, penguin and seal colonies are situated within the city limits. Outstanding mountain biking and sea kayaking await within just a few minutes of the city centre.

It can be wet and windy at any time of year in New Zealand, but February is the warmest and most settled month; mean daytime temperature in Wellington is 20°C, and rarely exceeds 25°C. Overnight temperatures average a cool 13°C. It is the best time of year to enjoy Wellington and, if you have the opportunity, New Zealand as a whole.

Glaciological diary

** IGS sponsored * IGS co-sponsored

16–17 October 2015
NorthWest Glaciologists Meeting
Portland, Oregon, USA
Contact: Andrew Fountain [andrew@pdx.edu]

26–28 October 2015
Workshop: Halogen chemistry over the sea ice in the Antarctic winter and spring
Grenoble, France
Website: http://www-liphy.ujf-grenoble.fr/halogen-chemistry-antarctica/
Contact: Guillaume Méjean [guillaume.mejean@ujf-grenoble.fr]

29–31 October 2015
IGS Nordic Branch Meeting
Copenhagen, Denmark
Contact: Christine Hvidberg [ch@nbi.ku.dk]; Andreas Ahlstrøm [apa@geus.dk]
Website: https://sites.google.com/site/igsnordicbranch2015/

6–8 November 2015
9th Graduate Climate Conference
Woods Hole, Massachusetts, USA
Website: http://www.graduateclimateconference.com/

10–11 November 2015
FRAM Science Days: Multi-stressors in the Arctic Marine Ecosystem
Fram Centre, Tromsø, Norway
Website: http://mform.imr.no/view.php?id=42242

10–13 November 2015
1st Central European Polar Meeting
Vienna, Austria
Contact: Marion Rothmüller [cepm2015@polarresearch.at]
Website: http://www.polarresearch.at/conference

16–19 November 2015
Sixth Symposium on Polar Science
Tokyo, Japan
Website: http://www.nipr.ac.jp/symposium2015/e/

2016

13–15 January 2016
32nd Nordic Geological Winter Meeting
Helsinki, Finland
Session: Arctic Research. Conveners: Anne Lehtinen; Jon Engström [jon.engstrom@gtk.fi]
Website: http://www.geologinenseura.fi/winter_meeting/registration.php

14–20 February 2016
2nd Snow Science Winter School
Preda and Davos, Switzerland
Website: http://www.slf.ch/dienstleistungen/events/snowschool/index_DE

21–23 January 2016
IDPO Science Planning Workshop: Subglacial Access Drilling
Herndon, Virginia, USA
Website: http://icedrill.org/2016-subglacial-planning-workshop/

24–26 February 2016
3rd CliSAP workshop, 'Arctic and Permafrost'
Hamburg, Germany
Website: https://www.clisap.de/research/b:-climate-manifestations-and-impacts/b1:-arctic-and-permafrost-regions/workshops-3/#c7707
Contact: Nina Maß <nina.maass@uni-hamburg.de> or Lars Kalesch <lars.kaleschke@uni-hamburg.de>

25–26 February 2016
20th Alpine Glaciology Meeting AGM 2016
Munich, Germany
Contact: Ludwig Braun and Christoph Mayer at post@keg.badw.de

29–31 March 2016
NASA Snow Meeting
Seattle, Washington, USA
Contact: Jessica Lundquist <jdlund@u.washington.edu>

2–3 April 2016
46th Annual International Arctic Workshop
Boulder, Colorado, USA
Website: http://instaar.colorado.edu/meetings/AW2016/

17–22 April 2016
European Geosciences Union General Assembly 2016
Vienna, Austria
Website: http://www.egu2016.eu//

9–13 May 2016
European Space Agency Earth Observation and Cryosphere Science conference 2016
hosted during the ESA Living Planet Symposium 2016
Prague, Czech Republic
Website: http://lps16.esa.int/

9–13 May 2016
4th CryoSat User Workshop
hosted during the ESA Living Planet Symposium 2016
Prague, Czech Republic
Website: https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/cryosat/news/-/article/cryosat-4th-user-workshop

24–29 May 2016
XVI Glaciological Symposium: Past, present, and future of the Earth cryosphere
St Petersburg, Russia
Website: http://www.glac2016.igras.ru/

31 May–3 June 2016
23rd IAHR International Symposium on Ice 2016: Research and Application of Ice Dynamics and Thermodynamics in Engineering, Ecology and Climate Change
Ann Arbor, Michigan, USA
Website: http://www.iahr-ice2016.org/

6–10 June 2016
Conference on Mathematical Geophysics
Paris, France
Website: http://cmg2016.sciencesconf.org/

14–17 June 2016
Snow Engineering VIII (8th International Conference on Snow Engineering)
Nantes, France
Website: http://www.snoweng2016.orgicop2016.org/

20–24 June 2016
Eleventh International Conference on Permafrost (ICOP 2016)
Potsdam, Germany
Website: http://icop2016.org

26 June–1 July 2016
Goldschmidt conference
Yokohama, Japan
Session 12f: Elemental and Isotopic Marine Biogeochemistry at a Range of Scales
Website: http://goldschmidt.info/2016/program/programViewThemes#theme12

10–15 July 2016
****International Symposium on Interactions of Ice Sheets and Glaciers with the Ocean**
La Jolla, California, USA
Contact: Secretary General, International Glaciological Society

30 July–15 August 2016
41th Scientific Assembly of the Committee on Space Research (COSPAR)
Istanbul, Turkey
Session COSPAR-16-A2.1: Scientific exploitation of new missions and heritage data sets in oceanography and cryosphere
Website: https://www.cospar-assembly.org/admin/session_cospar.php?session=524

20–30 August 2016
SCAR Open Science Conference: Antarctica in the Global Earth System – from the Poles to the Tropics
Kuala Lumpur, Malaysia
Session: Remote sensing of the Antarctic environment: Multi-disciplinary advances.
Conveners Ewe Hong Tat, Hans-Ulrich Peter, Rob Massom, Oscar Schofield, Shridhar Jawak <shridhar.jawak@gmail.com>
Website: http://scar2016.com/index.php

12–16 September 2016
European Conference on Applied Climatology
Trieste, Italy
Session UC4: The cryosphere and its interactions with the climate system
Website: http://meetingorganizer.copernicus.org/EMS2016/session/22051

13–24 September 2016
Karthaus course on Ice Sheets and Glaciers in the Climate System
Karthaus, Italy
Website: http://www.projects.science.uu.nl/iceclimate/karthaus/

17–20 October 2016
5th International Geo-hazards Research Symposium – in memory of Prof. Tsanyao Frank Yang (IGRS 2016)
Taipei, Taiwan
Contact: organizing committee at igrs2016@gmail.com

2017

12–17 February, 2017
****International Symposium on the Southern Cryosphere: Climate Drivers and Global Connections**
Wellington, New Zealand
Contact: Secretary General, International Glaciological Society

August/September 2017
****International Symposium on Polar Ice, Polar Climate and Polar Change: Remote sensing advances in understanding the cryosphere**
Boulder, Colorado, USA
Contact: Secretary General, International Glaciological Society

2018

15–27 June 2018
SCAR/IASC Conference
Davos, Switzerland
Contact: SCAR Secretariat [info@scar.org]

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International Glaciological Society

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1985 M.F. Meier	2000 S.C. Colbeck	
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ICE

Editor: M.M. Magnússon (Secretary General)

This news bulletin is issued to members of the International Glaciological Society and is published three times a year. Contributions should be sent to your National Correspondent or to the Secretary General, International Glaciological Society, Scott Polar Research Institute, Lensfield Road, Cambridge CB2 1ER, UK.

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