



**NEWS BULLETIN  
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# Ice

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**Cover picture:** Hexagonal snow flake near North Pole; photograph by Nirmal Sinha (Canada).

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

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

# From the Editor

Dear IGS member

Last March we went 'live' with the new IGS membership database. Since then we have been busy getting to grips with it and sorting out the inevitable bugs. These bugs are of various sizes and shapes and there is one I would like to draw your attention to. The system consists of various packages. The one I am going to talk about is the web portal. We started using this for online registration for the Northumbria symposium. We are now planning to launch it for 'Members' details', i.e. for you to edit your contact details. But before we do, we must draw on the experience gained from the online registration to ensure we reap the full benefit from it. One problem in particular has caused us, and no doubt some of you when you were registering for the symposium, some grief.

The whole concept of the online registration is that you, as an IGS member, can benefit from the fact that we have your membership details on our database. What this means is that when you gain access to the system, the details we hold for you are automatically entered into the relevant fields. Thus it is very important that we have the correct information. A crucial piece of data is your e-mail address. Every contact in the database has a 'default' e-mail address. This default address is the key to your details.

When you first access the system you will need to obtain your password. This password is automatically generated and you will be able to change it once you have gained entry to the system. To do so you will need to click on the <Forgot your password> button. Do not enter anything into the membership or the password fields. You will then be asked to enter your e-mail and your password will be sent to that e-mail address. This is where things can go wrong! The system will search the database for the person who has that e-mail as their default e-mail address. If it finds it, it will return a password to that e-mail address and you can now access your

details. If the system does not find a person with a default e-mail address that matches what you have just entered, it will assume that this is a new person registering for the first time.

What can happen, and has happened, is that your e-mail address has changed and we do not know about the change. All your other details may still be the same, so you have been getting our postal mailings, i.e. the *Journal* and *ICE*. But since the system does not know about your new e-mail it will create a new entry for you on the database. If, when you log into the system, you are presented with a blank form and are asked to enter your details please stop and think for a minute. Are you or have you ever been a member of the IGS, have you attended any of our symposia or bought a publication from us? If so, you are already on our system. Please exit and send an e-mail to [igsoc@igsoc.org](mailto:igsoc@igsoc.org) and ask us to update your default e-mail address.

No database is better than the data it contains. So it is very important that you keep your details current. And it will be up to you to do so once the membership portal is up and running. But we will encounter some initial difficulties because many of you will have changed your 'default' e-mail address. I am using this editorial to inform you of this and to ask you to help us minimise those difficulties by informing us if you have changed your e-mail within the last year or so. And then, once the membership portal is up and running, if the system does not recognise you, but you are sure that we have your details, please get in touch with us.

I am confident that this new system will be of great benefit to the Society and to our members. We are already enjoying certain benefits within the office; some labour-intensive tasks can now be accomplished with a click of a button. More importantly, though, the IGS operation is getting more reliable and more accountable and that is a benefit to all of us.

**Magnús Már Magnússon**  
Secretary General



# Recent work

## Poland

The International Polar Year has led to an increased interest in and financing of glaciological research in Poland. As a result, during the annual GLACIODYN meeting in Obergurgl, attended by numerous scientists from Poland, an initiative was endorsed to reactivate the Polish branch of IGS. The next meeting of Polish glaciologists took place at the Workshop on Progress in Polish Polar Research in Warsaw on 27–30 November 2008, which was organised by the Committee on Polar Research, Polish Academy of Sciences, Institute of Geophysics PAS, and the Faculty of Earth Sciences, University of Silesia. The need for integration of and cooperation between everyone in Poland involved in research on any forms of ice occurring in nature is emphasised.

### SHORT HISTORY

The beginning of the scientific research in Polar regions is connected with the expedition of *Belgica* under Adrien de Gerlache de Gomery to West Antarctica in 1897–99. Geologist/geophysicist Henryk Arctowski was the scientific leader of the expedition, and Antoni Bolesław Dobrowolski was a crew member of the ship. Arctowski is remembered as the father of Antarctic geology and editor of excellent volumes on scientific results of the *Belgica* expedition published in Brussels. Dobrowolski is well known as the author of the first synthesis published in 1923 devoted to ice, entitled *Histoire naturelle de la glace*.

Other Polish scientists contributed to the creation of another field that, like glaciology, mainly deals with research into ice, i.e. permafrost and periglacial science. It is worth mentioning that permafrost covers nearly 24% of the land surface of the northern hemisphere. The term ‘perylacja’ was introduced to the scientific jargon by Walery Łoziński on the XI Geological Congress in Stockholm in 1910. And Leonard Jaczewski, in his work *O wieczno merzłoy pochwie v Sibirii*, published in 1889, was the first to present the southern extent of permafrost occurrence in EuroAsia and to distinguish Arctic and mountain permafrost.

Both Arctowski and Dobrowolski helped to launch polar studies in Poland once it regained its independence after the First World War. Starting with the overwintering in Björnöya in 1932/3

during the 2nd Polar Year, the Polish scientific expeditions to Spitsbergen in 1934 and 1938 and to West Greenland in 1937 devoted considerable effort to the studies of glaciers, their forefields and margins. Among the most active in this field, Stefan Z. Różycki, Alfred Jahn and Mieczysław Klimaszewski should be mentioned.

After the Second World War the Polish Academy of Sciences joined the international scientific community in Polar studies during the 3rd International Geophysical Year (III IGY), 1957/8. Under the leadership of Professor Stanisław Siedlecki, a geologist and well-known Polar explorer, who participated in three Polish expeditions to Svalbard in 1932/3, 1934 and 1936, and to west Greenland in 1937, a reconnaissance expedition of five men was sent to Spitsbergen in 1956. This expedition selected Isbjörnhamna in Hornsund as the best site for the Polish Polar Station, which was erected a year later. The station, presently bearing the name of its founder Stanisław Siedlecki, celebrated 50 years of service to science last year.

It was during III IGY that glaciology was selected as one of the main lines of Polish scientific research in Spitsbergen. Aleksander Kosiba, a climatologist and glaciologist, the disciple of Henryk Arctowski, a member of pre-war Danish expeditions of Lauge Koch to Greenland and leader of the 1937 Polish Expedition to west Greenland, was given the responsibility for organising the glaciological team and building the glaciological station on Werenskioldbreen.

Traditionally, Polish glaciological research has concentrated on Spitsbergen glaciers, particularly on Hansbreen and Werenskioldbreen, where extensive research has been carried out for many years. It was conducted in the years 1957–62 and then has been ongoing since 1970. Glaciological research is the top priority of the nearby Polish Polar Station and the S. Baranowski Station.

The Wrocław University glaciological school established by A. Kosiba included, among others, Stanisław Baranowski, Gabriel Wójcik, Jerzy Pereyma and Marian Pulina. With Pulina’s move to the Silesia University in Sosnowiec, a very active glaciological centre was established there, first under Pulina’s and now under Jacek Jania’s leadership. Glaciological studies at Hornsund are conducted by Polish and international teams using national and European Community grants,



**Figure 1.** Radar sounding of the subglacial drainage system of the frontal part of Werenskiöld glacier by Darek Puczko and Mariusz Grabiec in the autumn of 2007 (Photo J. Jania)

and the Siedlecki Scientific Station, headed by Piotr Głowacki, does its best to help scientists from various nations in their scientific tasks.

### PRESENT RESEARCH

At present at least six Polish universities, and a few other scientific institutions as well, are involved in glaciological research. Seventeen special projects, of which five include significant glaciological studies, are being carried out within the IPY framework. Some other projects funded by the Ministry of Science and Higher Education also contain glaciological studies.

In 2000 the University of Wrocław resumed its polar activity. The university, together with Czech colleagues (J. Rechak and others), has renovated a glaciological station near the Werenskiöld glacier, where research has been carried out into the discharge of meltwater from the permafrost active layer in the water balance of the region (S. Staško, H. Marszałek) and where the dynamics of thawing of the permafrost active layer have been constantly monitored (J. Klementowski).

Research into meteorological conditions of glacial processes and a meteorological study of the ablation process on Hans Glacier, as well as modelling of solar radiation for Werenskiöldbreen and Ariebreen, are being carried out by K. Mięgała and S. Sikora with A. Drzeniecka-Osiadacz and M. Kryza J. Pereyma and M. Szymanowski. The IPY project supported by Polish Ministry of Science and Higher Education, TOPOCLIM, is another form of scientific activity.

Within an international research project 'The dynamics of karst and climatic processes in the caves of different environmental features', research has been conducted into two Slovak ice

caves, Dobsinska and Dėmanovska, since 2002. The research concentrates on the following problems: the mass balance of cave ice; the thermics of ice monoliths in the caves; the role of air circulation in energy transfer within the cave system (the formation of a thermocirculation system of a cave); and the energy balance in the caves. The aim of the research is to determine environmental conditions of climatic processes in these caves and to study the processes of cave ice formation and degradation under increased human impact, which results from the exploration of the caves and from the caves being open to the public. The research programme has been carried out by the Institute of Geography and Regional Development of the University of Wrocław, the Institute of Geography at Ruhr University of Bochun, the Cave Administration of the Czech Republic and the Slovak Caves Administration (J. Piasecki, T. Sawiński).

The Field Meteorological Station of the University of Wrocław on Szrenica in the Karkonosze Mountains has been regularly monitoring the state of snow cover since 1961 and measuring its height, water supplies and snow density. Every few days detailed studies of structure, degree of metamorphism and chemical composition are made in the whole profile of snow cover. The aim is to document significant several-day changes in water supply and chemistry of snow cover. For 15 years pH, electrical conductivity and concentration of major anions and cations have been measured in samples of freshly fallen snow and other ice forms that greatly increase the pollution load in snow cover (M. Błaś, M. Sobik).

The Adam Mickiewicz University in Poznań has been conducting polar research on central Spitsbergen, near Petuniabukta Bay, for 25 years. Studies have been done as individual projects and as a part of large projects realised within IPY. They cover a wide scope of problems, e.g. monitoring of glaciers' movement around Petuniabukta, measuring of permafrost active layer and its thermics, changes of the marginal zone, the extent and speed of recession of glaciers: Elsa, Ferdinand, Sven, Hörbye, Ragnar, Bertram, Ebba, Pollock and Nordenskiöld, as well as No Name and McWhea, which are located in the Wijdefjorden catchment area. A GIS database has been constructed recording the extent of the glaciers mentioned above, which receded at the speed of 4–30 m a<sup>-1</sup> during the 20th century. Glaciological studies have been accompanied by geomorphological, geological, meteorological and hydrological studies, carried out on the forefields of some glaciers under the topic of 'Denudational dynamics and balance of glaciated catchments of Hørbyebreen, Ragnarbreen and Ebbabreen as well as of a non-



**Figure 2.** The Polish Polar Station on the shore of Hornsund Fiord, S Spitsbergen in late winter (Photo J. Jania)

glaciated catchment of Dynamiskbekken'. A number of researchers, led by A. Kostrzewski, have taken an active part in the research: M. Ewertowski, A. Karczewski, L. Kasprzak, M. Marciniak, G. Rachlewicz, M. Samołyk, M. Strzelecki, J. Szpikowski, W. Szczuciński, Z. Zwoliński. Some of them have participated in the research in Hornsund area and on King George Island in the South Shetland Islands. During the work on research projects on Svalbard, cooperation with French, Italian, Norwegian, Russian and Czech teams was established. Studies in Petuniabukta are carried out every year and recently there have also been some works at Hornsund, conducted by A. Nawrot, dealing with glaciological problems and the denudational balance of the Ariebreen catchment. More information concerning the expeditions of the Poznań centre can be found on its website: <http://www.staff.amu.edu.pl/~svalbard/>.

Several projects concerning glaciological issues are realised in Poland; they examine snow cover on lowlands (E. Bednorz), icing of the shoreline zone of the south Baltic Sea (A. Kostrzewski, G. Rachlewicz, M. Samołyk, Z. Zwoliński) and glacial phenomena in the caves of the Tatra Mountains (D. Kicińska, G. Rachlewicz, W. Szczuciński).

Nicolaus Copernicus University in Toruń and its research station located in Kaffiøyra (Oscar II Land) have been conducting glaciological, geomorphological, permafrost and environmental studies in this area (M. Grześ, R. Przybylak, I. Sobota, P. Wyszyński, M. Król). Glaciers are the dominant feature of the Kaffiøyra region. Since the end of the 19th century their area has decreased by about 30%. Thus one of the main scientific issues studied is the course and the reasons for the change in the glaciers' range, which can be determined by studying the mass balance of the glaciers. Presently the mass balance of four glaciers is studied: Waldemarbreen, Irenebreen, Elisebreen and Aavatsmarkbreen. The research includes both the summer balance – surface ablation and outflow from the glaciers – and winter snow accumulation. Detailed research plans also concern two large glaciers, Aavatsmark and Dahlbreen, which end up in the sea. The subaquatic glacial relief of the bays in the Forlandsundet region is under investigation as well. The results of the research can be obtained from the University Polar Station website: <http://www.stacja.arktyka.com>, from publications of the WGMSIAHS and from the website of CALM-IPA. Researchers (M. Grzes and his team) are also involved in monitoring the formation of river ice on the river Vistula.



**Figure 3.** Acoustic echo-sounding of the depth of the bay at the foot of Recherchebreen (a tidewater glacier in southwest Spitsbergen) in summer 2008 (Photo P. Zagórski)

Geomorphologists from the Nicolaus Copernicus University have a long tradition (since 1968) in glacio-geomorphological studies of the marginal zones of Icelandic glaciers and icecaps and during the last decade they prepared and published geomorphological maps of the frontal zones of the outlet glaciers Skeidararjökull, Mýrdalsjökull and Langjökull with interpretation of the origin of forms and processes (Leon Andrzejewski and Edward Wisniewski with co-workers and students).

The Marie Curie-Skłodowska University in Lublin uses the research station at Bellsund. The main subject of the studies there is permafrost and the dynamics of permafrost active layer changes within the CALM II project (K. Pękała, J. Repelewska-Pękałowa). In 2006 a solemn scientific session dedicated to Prof. K. Pękała was held to commemorate the 20th anniversary of the University's polar research. Glaciological studies include research into mass balance, changes in geometry and the evolution of Renard and Scott glaciers (M. Harasimiuk, P. Zagórski, A. Gluza, K. Siwek, G. Gajek in cooperation with the University of Silesia – J. Jania and the Institute of Geophysics, Polish Academy of Sciences). They are also carried out on the marginal zones of the glaciers of the northwest part of Wedel-Jarlsberg Land (J. Reder). At Bellsund snow cover is also investigated (J. Rodzik). Other selected geomorphological, meteorological and geomorpho-

logical issues concerning the research area are also studied (M. Harasimiuk, P. Zagórski, W. Jezierski, S. Bartoszewski, A. Gluza, K. Siwek, G. Gajek).

The University of Silesia's research group, led by Jacek Jania, have conducted glaciological studies in the Hornsund area, on Werenskioldbreen and Hansbreen glaciers and on Amundsenisen, for several years; these have been recently expanded into the Kinnvika and Bellsund region (Renardbreen and Recherchebreen). The long-term programme includes monitoring of changes in the glaciers' geometry and of the dynamics of their movement and calving; changes in thermal structure; space-time variation of snow cover; glacier-bed topography and sub- and in-glacial systems of glacier drainage. Cartographic documents based on land geodetic measurements, aerial photos and satellite pictures are also prepared (L. Kolondra). A new inventory of tidewater glaciers for the whole Svalbard archipelago was prepared based upon analysis of ASTER imagery (J. Jania and M. Blaszczyk). The studies are conducted in cooperation with both Polish centres (among others the Institute of Geophysics, the Polish Academy of Sciences; Nicolaus Copernicus University, Institute of Geography; Marie Curie-Skłodowska University, Institute of Earth Sciences; and the University of Science and Technology, Faculty of Physics and Applied Computer Science) and international teams (from among others the University of Oslo; the University of British Columbia; the Russian Academy of Sciences; the Arctic Centre, University of Lapland; and the Polytechnical University of Madrid). Studies of the geomorphology of the forefield of two large Icelandic glaciers, Skeidararjökull and Breidamerkurjökull, were carried out in co-operation with the University of Iceland (H. Björnsson) in 2002. Geomorph results of jökulhlaup in 1996 were surveyed by means of precise GPS profiling and by geo-electric resistivity methods. A number of buried icebergs and larger ice bodies have been detected under jökulhlaup outwash sediments cover with characteristic thermo-karst craters on its surface. The results of these studies have been used as a model for interpretation of the processes that formed the outwash plains in northern Poland during the last Pleistocene glaciation. The bathymetry of Jökulsárlón lake at the foot of Breidamerkurjökull has been surveyed. This lake could be treated as an analogue for studies of the origin of tunnel valleys in soft sediments during the last Scandinavian glaciation in northern Poland. Field works in Iceland and extensive paleoglaciological research in northern Poland was led by J. Jania (University of Silesia) with a team of younger scientist and PhD students.

For some years, thorough research has been conducted on the cryosphere of the Tatra Mountains and the inter-relationships of glacieret–permafrost–atmosphere have been studied (B. Gądek, M. Grabiec ). Similar studies, on the relationship between permafrost and a glacier, have been carried out for 2 years on Storglaciaren, Kebnekaise (W. Dobinski, M. Grabiec, A. Idziak) and on selected glaciers in the area near Hornsund (Spitsbergen), Ariebreen, Werenskioldbreen and Hansbreen (J. Jania, L. Kolondra, M. Grabiec and P. Głowacki, D. Puczko, A. Pořeba from the Institute of Geophysics, Polish Academy of Sciences). The studies make extensive use of geodetic and geophysical methods: ground penetrating radar, shallow seismic profiling and electroresistivity sounding.

Research by the Geomorphological Institute of the Faculty of Geography and Regional Studies, Warsaw University, deals with the relationship between the deglaciation dynamics of selected glaciers (Flájökull in Iceland, Elisebreen on Spitsbergen) and the development of periglacial processes and structures, particularly frost sorting (M. Dąbski, P. Angiel, E. Gryglewicz). It has also investigated tufurs in the area of seasonal ground freezing near Blöndulón Lake in central Iceland (K. Dołęgowski, M. Dąbski). The Institute has been working on the development of a lichenometric method of dating of moraines (M. Dąbski, B. Fabiszewski, A. Pękalska, 2005). At present, cryospheric research is concentrating on the geomorphological record of the deglaciation of Breiðamerkur glacier in Iceland and the periglacial and paraglacial transformations of the nunataks of Esjufjöll.

The summer expedition of the Jagiellonian University to Spitsbergen (led by W. Ziaja), conducting field work on the project ‘Changes of the western Sørkapp Land natural environment under the global warming and human activity since 1982’, surveyed the western extent of the interior of the Sørkappland glaciation and mapped the landscape changes originating from the glaciers’ recession there.

Research on marine ice and other forms of floating ice is being carried out at the Marine Academy in Gdynia and covers the Baltic Sea ice as well as that of the seas of the Arctic and Antarctic (A. Marsz, G. Kruszewski).

The results of studies are published in national journals (e.g. *Polish Polar Research*) and international ones. They are presented on numerous conferences organised both in Poland – the Polar Symposium – and abroad. It is worth noting the co-organisation in Poland of two annual meetings of the IASC–WGAG combined with workshops on Mass Balance of Arctic Glaciers. The first – the initial IASC–WGAG meeting – was held in Wisła in 1994 and another in Zakopane in 2003. Recently an international workshop on Progress in Polar Research, entitled ‘Nature of rapid response of Arctic glaciers to climate warming’ (Warsaw, 27–30 November 2008) was organised by the Committee on Polar Research of the Polish Academy of Sciences. Members of the IGS Polish Branch were present, and there was a special business session devoted to the future of our branch.

#### ACKNOWLEDGEMENTS

Information and comments from K. Birkenmajer, M. Dąbski, M. Grabiec, M. Grześ, A. Marsz, K. Migala, K. Pękała, R. Przybylak, G. Rachlewicz, I. Sobota, P. Zagórski, W. Ziaja, Z. Zwoliński and others are highly appreciated.

#### ABBREVIATIONS

CALM	Circumpolar Active-layer monitoring
GLACIODYN	The dynamic response of Arctic glaciers to global warming
IASC	International Arctic Science Committee
IGS	International Glaciological Society
IPY	International Polar Year
PAS	Polish Academy of sciences
TOPOCLIM	Fundamental causes of local climates as the basis of ecosystem differentiation and dynamics on the area of west Spitsbergen, Svalbard
WGAG	Working Group on Arctic Glaciology

**Wojciech Dobinski**  
**Jacek Jania**



# NICOLAUS COPERNICUS UNIVERSITY POLAR STATION, SPITSBERGEN

[www.stacja.arktyka.com](http://www.stacja.arktyka.com)



relative closeness to Ny Ålesund, a settlement which is a large international research centre. The Forland Strait is en route of small ships which run between Longyearbyen and Ny Ålesund. Besides, the N. Copernicus University Polar Station is located outside national parks and reserves. As a result, moving around and carrying out research is quite easy.

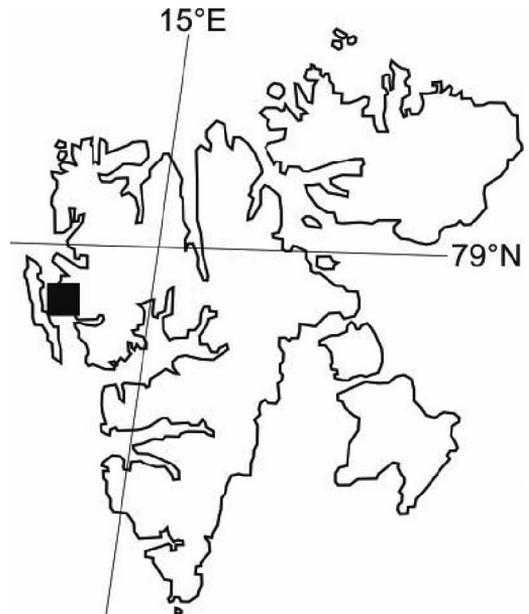
## HISTORY OF THE RESEARCH

Scientific exploration of the Kaffiøyra dates back to 1938. It was then that the first glaciological expedition to the Oscar II Land was inspired by Professor Antoni Dobrowolski, the Head of the Board of the Polar Section of the Association for Scientific Expeditions. The research area was selected by Reader Ludwik Sawicki. The studies included mainly the foreland of the Kaffiøyra glaciers. For many years this area was researched by Professor Mieczysław Klimaszewski, who in 1960 published a dissertation entitled *Geomorphological studies of the West Spitsbergen area between Kongsfjord and Eidembukta*. The paper includes a detailed description of the forms and deposits, as well as glacial and periglacial processes of the Kaffiøyra region. This was first such publication on the region. As a result, a group of geographers from the

## LOCATION OF THE NICOLAUS COPERNICUS UNIVERSITY POLAR STATION

The Polar Station of the University of Nicolaus Copernicus (Polish: Uniwersytet Mikołaja Kopernika – UMK) is located in the western part of the Oscar II Land, in the northern part of the coastal Kaffiøyra Lowland which is closed by the Forlandsundet from the west. The N. Copernicus University Polar Station is situated in the area called Heggodden, about 150 metres from the seacoast and at the foot of the head moraines of the Aavatsmarkbreen.

There were a few reasons for selecting the above site for the N. Copernicus University Polar Station. Predominantly, they include the following two: a large diversity of the environment of the area, and a relatively small distance from the glaciers which pose the main object of the research. Moreover, in the close vicinity the N. Copernicus University Polar Station there is a deep bay of Hornbaek. It makes a good shelter for ships and enables the expedition members to load and unload during stormy weather. Additionally, as early as mid-June the Forland Strait is free from ice. During summer season pack ice does not pose any threats to navigation. Small intermoraine lakes provide enough drinking water during the polar summer season. Another element which upgrades the attractiveness of the location of the N. Copernicus University Polar Station is its





**Figure 1.** Kaffiøyra during summer and spring time (I. Sobota).

Nicolaus Copernicus University in Toruń decided to organise an expedition into the same area to conduct comparative research. In 1975 the first Toruń Polar Expedition set sail. It was conducted by Professor Jan Szupryczyński from the Geography Institute of the Polish Academy of Sciences. The expedition worked in two teams. The first one carried out the research in the southern part of the Kaffiøyra Lowland, while the second one in its northern part. The northern team, headed by Professor Czesław Pietrucień, concentrated on hydrological and glaciological studies. That year, on the initiative of Professor Czesław Pietrucień, a special building was constructed by the moraines of the Aavatsmark Glacier. It was the beginning of the contemporary polar station.

In 1995 a new cycle of the summer expeditions to the Polar Station began, and in 1996 a series of spring expeditions was initiated. The main aim of these expeditions has been to study winter snow accumulation on the glaciers in the Kaffiøyra region, observations of winter outflow from the glaciers, geodesic work undertaken in the place inaccessible in summer, and penetration of glacier caves and tunnels. Since then, the expeditions have been headed by Marek Grześ, Ireneusz Sobota or Krzysztof R. Lankauf. As many as 300 people have taken part in the expeditions so far. These have mainly included scientists, but also climbers, speleologists and scuba-divers.

### *STUDIED ISSUES*

The Kaffiøyra region, together with the adjoining Aavatsmarkbreen (75 km<sup>2</sup>) and the Dahlbreen (132 km<sup>2</sup>), as well as the six glaciers flowing down into the Kaffiøyra (28 km<sup>2</sup>), takes up the area of about 310 km<sup>2</sup>. It makes up a mere 12% of the area of the Oscar II Land.

Mountain chains, valley glaciers and their marginal zones, together with the coastal Kaffiøyra, take 103 km<sup>2</sup>.

The Kaffiøyra, which is only 14 km long and 4 km wide, is a great place for scientific research due to its biological variety. Long-lasting measurements gave rise to a topographic map of the Kaffiøyra, which includes both the elements of relief and geological structure.

The undertaken research included almost all components of the geographical environment. Scientific programs put pressure on research in glaciology, glacial geomorphology, permafrost and periglacial processes, as well as climatologic and botanical studies. Since 1995 glaciological research and the studies of permafrost of various ground types and their seasonal thawing, as well as meteorological observations have been the major issues on the research agenda.

Glaciers pose the dominating feature of the Kaffiøyra region. Since the 19th century their area has decreased by about 30%. Thus, one of the main scientific issues studied there is the course and the reasons for the change in the glaciers' range. This can be achieved by studying mass balance of the glaciers. Presently, mass balance of four glaciers is studied: the Waldemarbreen, the Irenebreen, the Elisebreen and the Aavatsmarkbreen. The research includes both the summer balance (ablation and outflow from the glaciers) and the winter snow accumulation. The detailed research plans also refer to two large glaciers which end up

in the sea. Those are the Aavatsmarkbreen in the north and the Dahlbreen in the south of the Kaffiøyra. Currently, subaquatic glacial relief of the bays in the Forlandsundet region is under scrupulous investigation. The results of the research can be obtained from the station's website ([www.stacja.arctyka.com](http://www.stacja.arctyka.com)), from the



**Figure 2.** Studied glaciers on Kaffiøyra region (I. Sobota).



**Figure 3.** Measurements on studied glaciers (I. Sobota).

publications by the World Glacier Monitoring Service (WGMS- IAHS), as well as the website of the Circumpolar Active Layer Monitoring (CALM-IPA) and from the other publications and papers.

The research carried out in the N. Copernicus University Polar Station has enabled numerous scientists of most specialties of the Earth sciences (glaciology, climatology, hydrology, geomorphology, pedology and botany) to collect material for numerous papers, including master and doctoral theses. Scientific attractiveness of the Kaffiøyra's geocosystem has been appreciated by scientists from various scientific centres in Poland and elsewhere, who take part in interdisciplinary expeditions organised every year. Moreover, the station was also used for the research of the 4th International Polar Year.



**Figure 4.** Nicolaus Copernicus University Polar Station (I. Sobota).



**Figure 5.** Nicolaus Copernicus University Polar Station (I. Sobota).

### *THE STATION TODAY AND THE PERSPECTIVES*

Once the station has had an extension added, it can host 10–15 people at any one time. The new section of the station is 32 m<sup>2</sup> downstairs and 24 m<sup>2</sup> upstairs. This includes a study, a workshop, a bedroom as well as two bedroom entresols. The extension is connected with the old section of the station, which includes a living room and a bedroom, but there is also a separate entrance to the new part of the station. Additionally, the station gained extra storage floor, a laboratory, a bathroom, as well as a garage to keep boats, snowmobiles and engines. All together the station now has about 100 m<sup>2</sup>.

The station is used 3 to 4 months annually, but it is possible to stay there for as long as a whole year. It is equipped with necessary technical facilities, motor-generators, solar panels, motorboats and snowmobiles. More important measurement equipment includes: a weather station with the basic measuring instruments (the measurements conducted since 1975); automatic weather stations (with the measurements taken at any intervals); limnigraphs and loggers installed in the selected watercourses (measurements of water levels, flow rates and the selected physicochemical features of water since 1975); a system of ablation poles installed on the glaciers; ice drills; loggers for measuring ground temperatures and ice temperatures, and others.

The extension of the station will enable larger groups of scientists to work and conduct research. The fact that both the living and laboratory space has been enlarged is especially important, as the station is often visited by scientists from all over the world. As a result, the extension will make it possible to intensify current international



**Figure 6.** Selected transport equipments of Nicolaus Copernicus University Polar Station.

contacts, as well as start new co-operation projects in the Kaffiøyra region. Moreover, most Polish polar research in the north-west Spitsbergen is based on the N. Copernicus University Polar Station.

The new investment will enable the scientists to use the station all year round. This is especially crucial in terms of the research which needs systematic measurements. As a result, the scope of the studied issues and the number of expedition members will increase. A larger numbers of analyses made directly at the measurement site will lead to the decrease of the research costs, and will make the work both easier and safer for the expedition members.

In the coming years next polar expeditions of the UMK are being planned, as well as scientific conferences and fieldworks based on the N. Copernicus University Polar Station and its facilities.

**Ireneusz Sobota**



# International Glaciological Society

## *JOURNAL OF GLACIOLOGY*

*Papers accepted for publication between 6 January 2009 and 5 July 2009. The papers are listed in alphabetical order by first author. Some of these papers have already been published.*

Perry Bartelt and Brian McArdell  
Granulometric investigations of snow avalanches

Sascha Bellaire, Christine Pielmeier,  
Martin Schneebeli, Jürg Schweizer  
Stability algorithm for snow micro-penetro-  
meter measurements

Mike Craven, Ian Allison, Helen Amanda Fricker,  
Roland C. Warner  
Properties of a marine ice layer under the Amery  
Ice Shelf

Chris Debeer, Martin J. Sharp  
Topographic influences on recent changes of  
very small glaciers in the Monashee Mountains,  
British Columbia, Canada

Zhiwen Dong, Zongxing Li, Feiteng Wang,  
Mingjun Zhang  
Characteristics of atmospheric dust deposition in  
snow on the glaciers of eastern Tien Shan, China

Mark Dyurgerov, Mark F Meier, David Bahr  
A new index of glacier area change: a tool for  
glacier monitoring

Andrea Fischer  
Calculation of glacier volume from sparse ice  
thickness data, applied to Schaufelferner, Austria

Neil F. Glasser, Bernd Kulesa,  
Adrian J. Luckman, Daniela Jansen, |  
Edward C. King, Peter R. Sammonds,  
Theodore A. Scambos, Kenneth C. Jezek  
Surface structure and stability of the Larsen C Ice  
Shelf, Antarctic Peninsula

B. Grigholm, P. Mayewski, A. Kurbatov,  
Gino Casassa, A. Conreras, M. Handley,  
S. Sneed, D. Introne  
Chemical Composition of Fresh Snow from  
Marinelli Glacier, Tierra del Fuego, Chile

Jason Gulley  
Structural control of englacial conduits in the  
temperate Matanuska Glacier, Alaska, USA

Maria W. Hörhold, Mary R. Albert,  
Johannes Freitag  
The impact of accumulation rate on the  
microstructure and air permeability of polar firn  
at a high accumulation site

Ian Joughin, Slawek Tulaczyk, Jonathan L. Bamber,  
Don Blankenship, John W. Holt, Ted Scambos,  
David G. Vaughan  
Basal conditions for Pine Island and Thwaites  
Glaciers determined using satellite and airborne  
data

Michèle Koppes, Bernard Hallet, John Anderson  
Synchronous acceleration of ice loss and glacier  
erosion, Marinelli Glacier, Tierra del Fuego

Tron Laumann, Atle Nesje  
The impact of climate change on future frontal  
variations of Briksdalsbreen, western Norway

Douglas R. MacAyeal, Emile A. Okal,  
Richard C. Aster, Jeremy N. Bassis  
Seismic observations of glaciogenic ocean waves  
(micro-tsunamis) on icebergs and ice shelves

Ruth H. Mottram, Douglas I. Benn  
Testing crevasse depth models: a field study at  
Breiðamerkurjökull, Iceland

Felix S.L Ng, Shiyin Liu  
Temporal dynamics of a jökulhlaup system

Johannes Oerlemans, R.H. Giesen,  
Michiel R. van den Broeke  
Retreating alpine glaciers: increased melt rates  
due to accumulation of dust (Vadret da  
Morterastch, Switzerland)

Steven Palmer, Andrew Shepherd,  
Helgi Björnsson, Finnur Pálsson  
Ice velocity measurements of Langjökull, Iceland  
from InSAR

Frank Paul, Liss Marie Andreassen  
A new glacier inventory for the Svartisen region  
(Norway) from Landsat ETM+ data:  
challenges and results

Nial J. Peters, Ian C. Willis and Neil S. Arnold  
Numerical analysis of rapid water transfer  
beneath Antarctica

D.J. Quincey, A. Luckman and D. Benn  
Quantification of Everest-region glacier  
velocities between 1992 and 2002, using  
satellite radar interferometry and feature tracking

L. A. Rasmussen and J. M. Wenger  
Upper-air model of summer balance on Mt  
Rainier, USA

Jason L. Roberts, Tas D. van Ommen,  
Mark A.J. Curran, Tessa R. Vance  
MSA loss during ice core storage:  
recommendations based on new diffusion  
coefficient

Cecilie Rolstad, Torborg Haug, Bruce Denby  
Spatially-integrated geodetic glacier mass  
balance and its uncertainty based on  
geostatistical analysis: application to the Western  
Svartisen ice cap, Norway

Toshimitsu Sakurai, Yoshinori Iizuka, Shinichiro  
Horikawa, Sigfús J Johnsen, Dorte Dahl-Jensen,  
Jørgen P. Steffensen, Takeo Hondoh  
Direct observation of salts as micro-inclusions in  
the GRIP ice core

Michael Schirmer, Michael Lehning,  
Jürg Schweizer  
Statistical forecasting of regional avalanche  
danger using simulated snow cover data

Cheney M. Shreve, Gregory S. Okin,  
Thomas H. Painter  
Indices for estimating fractional snow cover in  
the Western Tibetan Plateau

Benjamin Smith, Helen Amanda Fricker,  
Ian R. Joughin, Slawek Tulaczyk  
An inventory of active subglacial lakes in  
Antarctica detected by ICESat (2003–08)

Nozomu Takeuchi  
Temporal and spatial variations in spectral  
reflectance and characteristics of surface dust on  
Gulkana Glacier, Alaska Range

## **ANNALS OF GLACIOLOGY 50(51)**

*The following papers have been selected for publication in Annals of Glaciology 50(51) (thematic issue on Radioglaciology and its Application), edited by Richard Hindmarsh*

Joseph A. MacGregor, Kenichi Matsuoka,  
Michelle R. Koutnik, Edwin D. Waddington,  
Michael Studinger, Dale P. Winebrenner  
Millennially averaged accumulation rates for the  
Vostok Subglacial Lake region inferred from deep  
internal layers

Frank Pattyn, Charlotte Delcourt, Denis Samyn,  
Bert De Smedt, Matt Nolan  
Bed properties and hydrological conditions  
underneath McCall Glacier, Alaska, USA

Kenichi Matsuoka, Anthony Gades,  
Howard Conway, Ginny Catania, Charles F.  
Raymond  
Radar signatures beneath a surface topographic  
lineation near the outlet of Kamb Ice Stream and  
Engelhardt Ice Ridge, West Antarctica

Philippe Huybrechts, Oleg Rybak, Daniel  
Steinhage, Frank Pattyn  
Past and present accumulation rate reconstruction  
along the Dome Fuji–Kohnen radio-echo sound-  
ing profile, Dronning Maud Land, East Antarctica

Richard C.A. Hindmarsh,  
Gwendolyn J.-M.C. Leysinger Vieli,  
Frédéric Parrenin  
A large-scale numerical model for computing  
isochrone geometry

Nanna B. KARLSSON, David M. RIPPIN,  
David G. VAUGHAN, Hugh F.J. CORR  
The internal layering of Pine Island Glacier, West  
Antarctica, from airborne radar-sounding data

*Annals 50(51) is now complete and has been  
published*

## ANNALS OF GLACIOLOGY 50(52)

The following papers have been selected for publication in *Annals of Glaciology 50(52)* (thematic issue on *Dynamics in Glaciology*), edited by Andrew Fowler

Peter L. Moore, Neal R. Iverson, Denis Cohen  
Ice flow across a warm-based/cold-based transition at a glacier margin

Trudy Wohlleben, Martin Sharp, Andrew Bush  
Factors influencing the basal temperatures of a High Arctic polythermal glacier

Karin Andreassen, Monica Winsborrow  
Signature of ice streaming in Bjørnøyrenna, Polar North Atlantic, through the Pleistocene and implications for ice-stream dynamics

Surendra Adhikari, Philippe Huybrechts  
Numerical modelling of historical front variations and the 21st-century evolution of glacier AX010, Nepal Himalaya

Helena J. Sykes, Tavi Murray, Adrian Luckman  
The location of the grounding zone of Evans Ice Stream, Antarctica, investigated using SAR interferometry and modelling

Luke Copland, Sierra Pope, Michael P. Bishop, John F. Shroder, Jr, Penelope Clendon, Andrew Bush, Ulrich Kamp, Yeong Bae Seong, Lewis A. Owen  
Glacier velocities across the central Karakoram

Monica Sund, Trond Eiken, Jon Ove Hagen, Andreas Kääh  
Svalbard surge dynamics derived from geometric changes

Alan W. Rempel  
Transient effective stress variations forced by changes in conduit pressure beneath glaciers and ice sheets

Douglas I. Benn, Lene Kristensen, Jason D. Gullely  
Surge propagation constrained by a persistent subglacial conduit, Bakaninbreen-Paulabreen, Svalbard

T.J. Fudge, J. T. Harper, N. F. Humphrey, W. T. Pfeffer  
Rapid glacier sliding, reverse ice motion, and subglacial water pressure during an autumn rain-storm

Selena Georgiou, Andrew Shepherd, Malcolm McMillan, Peter Nienow  
Seasonal evolution of supra-glacial lake volume from ASTER imagery

Patrick Heimbach, Veronique Bugnion  
Equilibrium sensitivities of the Greenland ice sheet inferred from the adjoint of the three-dimensional thermo-mechanical model SICOPOLIS

Peter L. Moore, Neal R. Iverson, Denis Cohen  
Ice flow at a frozen margin: insights from numerical modeling

Olga V. Sergienko, Douglas R. MacAyeal, Robert A. Bindschadler  
Stick/slip behavior of ice streams: modeling investigations

Helena J. Sykes, Tavi Murray, Adrian Luckman  
The location of the grounding zone of the Evans Ice Stream, Antarctica, investigated using SAR interferometry and modelling

Gaël Durand, Olivier Gagliardini, Thomas Zwinger, Emmanuel Le Meur, Richard C.A. Hindmarsh  
Full-Stokes modeling of marine ice-sheets: influence of the grid size

*Annals* 50(52) is now complete.

## ANNALS OF GLACIOLOGY 50(53)

*The following papers have been selected for publication in Annals of Glaciology 50(53) (thematic issue on World Glacier Inventory), edited by Roger Braithwaite and Simon Ommanney*

Yetang Wang, Shugui Hou, Yaping Liu  
Glacier changes in the Karlik Shan, eastern Tien Shan, during 1971/72–2001/02

J. Graham Cogley  
A more complete version of the World Glacier Inventory

S.R. Bajracharya and P. Mool  
Glaciers, glacial lakes and glacial lake outburst floods in the Everest region, Nepal

M. Citterio, F. Paul, A. P. Ahlstrøm, F. Jepsen and A. Weidick  
Remote sensing of glacier change in West Greenland: accounting for the occurrence of surge-type glaciers

J. Graham Cogley  
A more complete version of the World Glacier Inventory

Christoph Knoll, Hanns Kerschner  
A glacier inventory for South Tyrol, Italy, based on airborne laser-scanner data

Frank Paul and Felix Svoboda  
A new glacier inventory on southern Baffin Island, Canada, from ASTER data: II. Data analysis, glacier change and applications

C.S.L. Ommanney  
Canada and the World Glacier Inventory

A.E. Racoviteanu, F. Paul, B. Raup, S. J. S. Khalsa and R. Armstrong  
Challenges and recommendations in mapping glacier parameters from space: results of the 2008 GLIMS Workshop, Boulder, Colorado, USA

Shi Yafeng, Liu Chaohai, Kang Ersi  
The Glacier Inventory of China

Felix Svoboda and Frank Paul  
A new glacier inventory on southern Baffin Island, Canada, from ASTER data: I. Applied methods, challenges and solutions

Yetang Wang, Shugui Hou, Yaping Liu  
Glacier change in the Karlik Shan, Eastern Tien Shan during 1971/72 to 2001/02

Zhou Caiping, Yang Wenbin, Wu Liang, Liu Shiyin  
Glacier changes from a new inventory, Nianchu river basin, Tibetan Plateau

More papers for *Annals* 50(53) will be published in the next issue.

## REPORT FROM THE LANZHOU WORKSHOP

The International Workshop on World Glacier Inventory  
Lanzhou, China, 21–24 September 2008

With all our concerns about melting glaciers and rising sea levels, it may be surprising to know that in 2009 we still do not accurately know the locations and volumes of all the glaciers in the world. Just the areas would be nice! This information would have been contained in the World Glacier Inventory which was planned more than 40 years ago but never completed. National and regional glacier inventories in the Soviet Union, Scandinavia and the Alpine countries had shown the way and in 1977 Fritz Müller proposed extending the concepts and methods to the whole world. However, Müller's early death in 1980 robbed this initiative of its necessary momentum. A number of us reviewed progress towards a World Glacier Inventory at a workshop held in 1978 at Riederalp, beside the spectacular Aletschgletscher in Switzerland. Those of you who were not even born in 1978 can see the results of our deliberations in one of the 'red books' from the International Association of Hydrological Sciences (<http://iahs.info/redbooks/126.htm>).

Slow progress with World Glacier Inventory through the past decades has been accompanied by rapid progress in satellite techniques for monitoring glaciers and increasing demands for data from cryosphere modellers. It was therefore very timely that our past-President Atsumu Ohmura persuaded Chinese colleagues to host a workshop on World Glacier Inventory in 2008. The purpose of the workshop was to review current status and to discuss ways of achieving a complete global glacier inventory. Lanzhou was a highly appropriate venue for the workshop as more than 50 Chinese scientists, under the inspiration of Professor Shi Yafeng, completed a first-generation glacier inventory of the whole of China in 2002 using available maps and aerial photographs to depict the state of glaciers in the late 20th Century.

The basic format of the workshop was 3 days of authored papers and posters, a half-day excursion to the banks of *Huang He* (Yellow River) and a half day of plenary discussion. The opening theme on the first day was the need to complete the World Glacier Inventory (Ohmura), illustrated with experiences of completed inventories from China (Shi Yafeng) and the then-USSR (Khromova) using 'classical' techniques to depict glaciers in the late 20th Century. We then heard about techniques for current and future



**Figure 1.** We held a day of plenary round-table discussions after the formal presentation of papers. Note that young Chinese scientists are admirably split into a rough gender balance.

work based upon satellite methods, especially from workers associated with World Glacier Monitoring Service (WGMS) and Global Land Ice Monitoring from Space (GLIMS). Sessions on the second and third days were more loosely connected to World Glacier Inventory as a general opportunity for (mostly) Chinese scientists to present their work to an international audience. We then returned to the specific topic of World Glacier Inventory with our plenary round-table discussion on the fourth day. This resulted in the formation of a new working group, chaired by Roger Barry, which will publish its conclusions in due course.

A high point of the first day was a special session where workshop participants joined Chinese colleagues in celebrating the work of Shi Yafeng, who has been described as the Father of Chinese Glaciology. Aside from Professor Shi, several of us were veterans of the 1978 Riederalp meeting (Roger Barry, Roger Braithwaite, Atsumu Ohmura, Simon Ommanney and Xi Zichu) and we could exchange happy memories. We heard how Shi Yafeng returned inspired from the 1978 meeting and persuaded his government to support the big job of inventorying all of China's 46,377 glaciers (with a total area of 59,425 km<sup>2</sup>). The dataset is now a valuable datum for monitoring and modelling the expected shrinkage of Chinese glaciers as a result of global warming. This is one of the nicest examples of large-scale policy-relevant research that I know!



**Figure 2.** Shi Yafeng's wife proudly displays her husband's certificate of honorary membership of the International Glaciological Society, which he was awarded in 1994.

I enjoyed meeting old friends and talking about the great deeds of 30 years ago but the overall tone of the meeting was set by the many eager young people who are applying modern technology to the early 21st Century ice cover.



**Figure 3.** Some workshop participants pose beside the Huang He (Yellow River), which is fed in its upper reaches by melting snow and ice. The presence of scientists from India, Nepal and Pakistan demonstrates the growing regional cooperation that is necessary because glaciers take no account of international borders.



**Figure 4.** Some of the scientific editors discuss an abstruse point of editorial policy. Their ruminations are no doubt lubricated by a local beverage produced from the waters of the Yellow River.

The workshop was co-sponsored by Cold and Arid Regions Engineering Research Institute (CAREERI), World Glacier Monitoring Service (WGMS), Institute of Tibetan Plateau Research (ITP), Global Land Ice Measurements from Space (GLIMS), National Natural Science Foundation of China (NSFC) and Chinese Academy of Science (CAS). Accommodation, entertainments and excursions were superbly organised by the local organising committee chaired by Professor Qin Dahe, helped by Professor Liu Shiyin and Xie Aihong.

A thematic number of the journal *Annals of Glaciology* is now under preparation with about 18 carefully selected papers. In line with the new policy of the International Glaciological Society, this volume is in no way the 'proceedings' of the 2008 workshop but is an up-to-date edited review of the present results of the World Glacier Inventory and its future prospects. If you beg, borrow or steal this volume, you can compare and contrast the 2008 situation with the 1978 status in the IAHS 'red book' (<http://iahs.info/redbooks/126.htm>). I can see an essay topic here for my students!

**Roger J. Braithwaite**  
School of Environment and Development,  
University of Manchester, UK

# LANZHOU POST-WORKSHOP STUDY TOUR

24–27 September 2008

A group of six people went on the excursion to Dunhuang – a one hour flight northwest of Lanzhou. Dunhuang is an oasis town of about 100000 people in the Gobi Desert famous for the nearby Mogao caves where in 1906 Aurel Stein purchased for a few hundred pounds a collection of some tens of thousands of documents that had recently been discovered. These included the Diamond Sutra – a wood block printed document from AD 868, the first known printed document anywhere and 600 years earlier than Gutenberg!

The next day we drove for 5 hours into the Qilian Shan to an altitude of 4250m to the base of No. 12 glacier. Measurements were made there from 1958–62 and there were expeditions in the 1970s and 1980s. Integrated monitoring was resumed in 2006 and CAREERI has re-established a research station there. The party took a short walk along a very recent lateral moraine and saw the large ice mounds and dirt bands in the terminus area. No. 12 glacier is considered to be a typical extreme continental type glacier. AWS sites are set up at 5040m (neve), 4600m (junction) and 4260m (terminus). Along the road out we photographed the colourful yurts of a local shepherd.

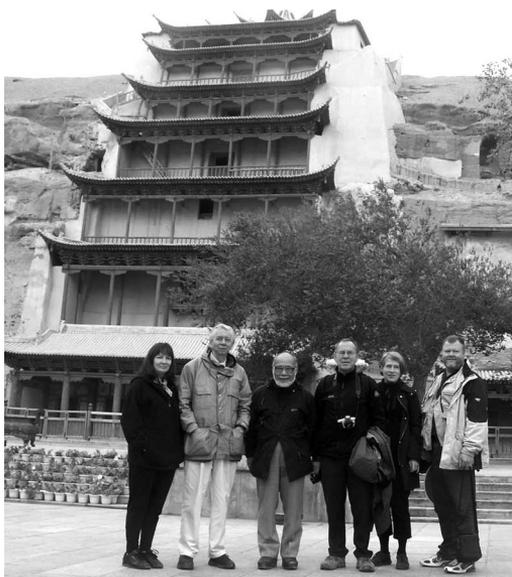
The next morning we visited the Mogao Buddhist caves decorated with murals dating from the 5th–14th centuries AD and including large statues of Buddha seated and reclining. We saw the room where the 50000 documents had been hidden until 1906. In the afternoon we visited the Singing Sand dunes, which extend over an area 40×20 km and are up to several hundred metres high and walked or rode Bactrian camels over to Crescent Lake, which has persisted amidst the massive dunes for two millennia. We then visited a silk carpet factory.

Three of the group left for Xian the next morning while the other three were driven to the extreme west end of the Great Wall dating from the Han Dynasty between 200 BC and AD 200. Remnants of the wall made of layers of clay and straw still remain, together with the Yunmen (Jade) gate on the northern Silk Route. This massive structure stands as a reminder of the controls the Han and later dynasties exercised over the camel trains that passed westward and eastward along the Silk Route especially during 600–900 AD.

We later went to the Yang (South) gate where there remains a massive beacon tower used for signalling along the Great Wall. There are many smaller examples of beacon towers all around Dunhuang. The gate itself no longer exists but there is a museum in classical style buildings. We visited the Yadan Geological Park – a scenic



**Figure 1:** A toast in saki at an elevation of 4300 m a.s.l. with our Chinese colleague.



**Figure 2:** The group at the Magao Buddhist grottoes. Behind is the front of the cave that contains one of the world's largest sitting Buddhas.

landscape of yellowish eroded buttes and ridges – an area known by the locals as the Evil City.

There are recently paved roads that made travelling throughout this region very smooth and comfortable. A final meal with our excellent guide and we boarded a late evening flight back to Lanzhou.

**Roger Barry**

# REPORT ON THE IGS NORDIC BRANCH ANNUAL MEETING 6–8 NOVEMBER 2008, HELSINKI



**Figure 1:** Tram guiding in Helsinki.



**Figure 2.** Enjoying a good meal at one of Helsinki's fish restaurants.

The Nordic Branch meeting 2008 took place on 6–8 November at the Finnish Institute of Marine Research (FIMR) in Helsinki, Finland. Olli-Pekka Mattila and the rest of the local organisation committee took good care of us during the meeting. As usual the meeting was informal, with no registration fee and those who wanted to give a presentation needed only to provide their title (no abstracts) prior to the meeting. A total of 61 participants from institutions in Finland, Denmark, Norway, Sweden, England, Germany and Netherlands attended.

Over two and a half days the participants presented their latest results and ongoing projects. The topics covered a wide range of topics of cryospheric research on seasonal snow, glaciers, sea ice and ice sheets covering process studies, modelling and remote sensing. A report from the IGS was also given by Secretary General Magnús Magnússon. In addition, there were general talks presenting the cryospheric and glacial research at the University of Helsinki. A small selection of posters was available for attendees to study during the coffee breaks. On Thursday evening the organisers arranged an icebreaker at FIMR starting with a slide show of 'Frozen Water and Land, Sun and Life' images by T. Vihma and M. Marnela. On Friday evening the organizers invited us to a guided excursion by tram through Helsinki city centre. Refreshments and local guiding provided an excellent start before the participants went off to enjoy Helsinki by night.

More information about the meeting and the meeting programme can be found at <http://www.geo.physics.helsinki.fi/NIGS-08/>

**Liss Andreassen**

# REPORT FROM THE WORKSHOP *NATURE OF RESPONSE OF ARCTIC GLACIERS TO CLIMATE WARMING*, WARSAW, POLAND, 28–30 NOVEMBER 2008

The workshop started with a pre-meeting on 27th November, where some of the workshop attendees met, mingled and measured their chances of delivering an attractive proposal to ESF's PolarClimate call. At the meeting it was informed that the pre-proposal had been gracefully received by ESF, who had asked for a full proposal, which set the agenda for the evening discussion, which also celebrated the chief organizer of the workshop Piotr Głowacki's elevation to Associate Professor, with bubbles and toasts at the Geophysical Institute of the Polish Academy of Science.

The proceedings of the workshop started off after morning coffee at the downtown halls of the Polish Academy of Science. First out was Paul Egerton from the European Polar Board who gave an interesting presentation of the future moves by European polar sciences. One of the interesting facts was the building of the EU-owned 200 m long icebreaker *Aurora Borealis*, planned to be launched by 2012. This vessel will strengthen European polar research by the introduction of a new logistical platform for ship-based work in the high Arctic. We just hope there will be ice to be broken up in the Arctic by that date.

Professors Jon Ove Hagen and Helgi Björnsson continued the session, talking of the situation of the ice masses in the Arctic, with a focus on Svalbard and Iceland. Jon Ove told us that about 15% of the glacier melt-derived eustatic effect is from the Arctic; and that all major Svalbard ice fields have lost mass, except the oddball Vestfonna on Nordostlandet that seems to 'fatten up'. Helgi reported that ice on Iceland is not as stable a commodity as one would believe from the name of the island. The ice fields were probably not present, at least not of sizes comparable to today, 2 ka ago. With the current shrinkage of Icelandic ice, and a possible increase in temperature by 2°C per century, they will probably disappear within 200 years. The name Iceland will probably then have to change to Nomoreiceland, another fact to ponder for hard-tested Icelanders!

The afternoon sessions focused on Svalbard glaciers, and their responses to climate and climate change. Marzena Kaczmarska reported 40 registered IPY projects active on Svalbard, making the archipelago into an IPY hotspot. Future dissemination of IPY results will have to find a way to filter the Svalbard effect. Students of



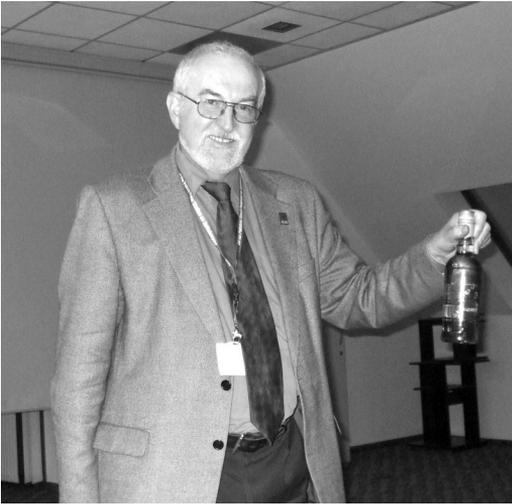
**Figure 1.** 'Icebreaker' and celebration of Piotr Głowacki's elevation to Associate Professor



**Figure 2.** The meeting was attended by delegates from 10 countries



**Figure 3.** Absorbing the local culture, Doug Benn without a tie



**Figure 4.** Jacek displaying the essential ingredient for any glaciological meeting



**Figure 5.** Dinner at 'Nowa la Boheme'. An extremely rare sight, Doug Benn wearing a tie!



**Figure 6.** The culmination of the social programme: a night at the Polish National Opera



**Figure 7.** All the buildings around this square were levelled during the Second World War and rebuilt in their original form.

the northeastern Vestfonna and Austfonna reported equilibrium lines at sea level for the past glaciological year, and that the large ice cap Austfonna, from geodetic studies within the uncertainties, is balanced. Studies from the western and southern part of Svalbard glaciers show a different story, with large imbalances and vigorous calving fronts. The sessions were then moved to a nearby restaurant, where Polish dumplings with various fillings cruised along the tables sided with Wyborowa creating a high 'stimmung'.

Next day was opened by our beloved IGS Secretary General, who noted that a part of the crowd was missing. The reason might be found in what one of the older professors replied at breakfast when asked if he'd enjoyed the nice party the night before; he replied 'It was just too nice'. The hall filled up fast, though, and John Moore and Rajmund Przybylak among others went through the climatological temperature and proxy archives to create a better picture of historical changes in the Arctic, followed by a set of presentations of actual measurements of weather parameters at the Polish Hornsund station on Svalbard.

The final session was started by the Spanish contingent Jaime Otero and Javier Lapazaran on the use of GPR to study glacier hydrology. It was followed by a talk by Youri Macheret on Russian radiophysical studies in the Arctic and Antarctic. The reminder of the session was taken up by our Polish hosts enlightening us on their research activities in the Arctic, especially in Spitsbergen. This was followed by a general discussion and closing remarks.

Following the scientific activities the social events took over. Several of us went by tram to a

wonderful restaurant, 'Nowa la Boheme' (as opposed to 'La Boheme Tower' where we had our lunches), near the Polish National Opera. After a very nice dinner we went across to the Opera to watch a performance of *Il Barbiere di Seviglia* by Rossini. And a delightful performance it was.

After the curtain came down we walked back to the Hotel in the crisp evening air. Our guiding beacon was the Stalinesque Palace of Culture and Science, the world's 187th tallest building at 237m.

The following day, those of us that were lucky enough to have a late departure time were treated to a guided sightseeing tour of old Warsaw. One would never have thought that the majority of the 'old' buildings had actually been rebuilt in their original form after the city was flattened in the Second World War. An enlightening experience for someone born in the second half of the 20th century.

Finally, we wish to thank the organizers Piotr, Jacek, Mikhail and others for arranging a generous and successful workshop.

**Veijo Pohjola and Magnús Már Magnússon**



**Figure 8.** A memorial to the Polish uprising during the war when the sewer system formed the main transportation routes.

## Notes from the production team

Authors using LaTeX, we are keen to minimise the possibility of errors being introduced during copyediting and typesetting. It will be of great help to us if, when submitting the electronic files of your final accepted paper you, you do the following:

Name your individual figure files in a style that states both the manuscript number and the figure number (e.g. '09J137Fig01.eps' or '54A012Fig03').

Submit a figure as a single file rather than one made up of several different elements (i.e. combine the files for '54A077Fig1a', '54A077Fig1b'.... '54A077Fig1z' into a single '54A077Fig1.eps' file).

Include a pdf version of your final accepted paper along with your text, bibliographic and figure files. This will help us to check in our typeset

version of your paper that all figures and equations are correctly numbered and in the correct position.

Avoid making alterations to 'igs.cls' or any of the distributed styles (downloadable from <http://www.igsoc.org/production/igs-v2.00-distrib.zip>). We always use our versions of these files rather than yours.

If you do create or use any add-on non-IGS styles, include the '.sty' files with your submission and add comments to the text so that we can understand the effect you are striving for.

Thank you.

**Craig Baxter**  
IGS Production

# REPORT ON THE IGS NEW ZEALAND BRANCH ANNUAL MEETING

16–18 FEBRUARY 2009, OTAGO, NEW ZEALAND

The IGS New Zealand Branch held its annual meeting from 16–18 February 2009 in Albert Town, Otago. A record 41 attendees travelled across the length and breadth of the country to hear about the latest snow and ice research in New Zealand, the Antarctic and farther abroad. The meeting was convened in the Albert Town Lodge, where everybody pitched in to prepare meals and take care of housekeeping. Three sunny central Otago days were the proverbial icing on the cake (the actual cake was coconut, also with icing).

Thirty talks were presented over one and a half days. Snow accumulation, studied via both observational and modelling approaches, was as always a popular topic, as was glacier mass balance monitoring. Debris of all sorts, englacial, supraglacial, proglacial and that left after the glacial, was discussed. Rock glaciers of the western United States even made an appearance. Antarctic glaciers had their admirers as well, with talks on East Antarctic outlet glaciers and the Ross Sea ice streams. Scaling up from regional studies, ice sheets embedded in global climate models were also discussed. The complete conference programme and planning information for 2010 can be found at [www.sirg.org.nz](http://www.sirg.org.nz).

Two field trips were offered on the final day of the meeting. One group, led by Laurel Morisson,



enjoyed a scenic walk to the Rob Roy Glacier. The other group, led by Trevor Chinn and Royden Thompson, visited key sites for understanding the glacial history of the Upper Clutha region.

The meeting, agreed to be a success by all in attendance, was organised by Jordy Hendrikx and Trevor Chinn. Sponsorship by Antarctica New Zealand and the National Institute of Water and Atmospheric Research (NIWA) ensured participation by all who were interested.

**Christina Hulbe**

## FORTHCOMING IGS BRITISH BRANCH MEETING 2–3 SEPTEMBER 2009, SHEFFIELD, UK

The 34th annual meeting of the International Glaciological Society British Branch will be held at the Department of Geography, University of Sheffield on Wednesday 2nd and Thursday 3rd September 2009. Presentations are welcome on all aspects of ice and snow research in oral or poster form (the deadline for abstracts is Monday 3rd August 2009).

Postgraduate students in particular are encouraged to attend and present their work, and postgraduate attendance will be supported by reduced registration and annual dinner fees, plus, where possible, the reimbursement of appropriate

costs incurred by travel to the meeting. Prizes for the best postgraduate oral and poster presentations will be awarded at the end of the meeting.

We hope that many of you will be able to join us for what we hope will be an excellent meeting. Please consult the meeting website at [www.sheffield.ac.uk/igs2009](http://www.sheffield.ac.uk/igs2009) for the most up-to-date information and do not hesitate to contact us at [igs2009@sheffield.ac.uk](mailto:igs2009@sheffield.ac.uk) if you have any queries.

We look forward to welcoming you to Sheffield in September!

**Darrel A. Swift**

*INTERNATIONAL GLACIOLOGICAL SOCIETY*

**INTERNATIONAL WORKSHOP ON  
SEA ICE IN THE PHYSICAL AND  
BIOGEOCHEMICAL SYSTEM**

*Tromsø, Norway  
31 May–4 June 2010*



CO-SPONSORED BY:

Norwegian Polar Institute  
Centre for Ice, Climate & Ecosystems (ICE)

*and the*

University of Tromsø

FIRST CIRCULAR

February 2009

<http://www.igs2010.org>  
<http://www.igsoc.org/symposia/2010/Tromso/>

*Registered Charity*

The International Glaciological Society will hold an International Symposium on Sea Ice in 2010. The symposium will be held in Tromsø, Norway from 31 May to 04 June 2010.

### THEME

Sea ice is a relatively fragile part of the Earth system, important for the understanding of a wide range of subjects, from climate to biodiversity, to society and culture. This symposium will present an opportunity for participants interested in all fields related to sea ice to meet. The suggested topics are intentionally interdisciplinary, including physical, biological, chemical, and socio-economic research on sea ice.

### TOPICS

- **Sea ice in the regional and global climate system**, including:  
atmosphere-ice-ocean interaction, feedbacks, large-scale observations, Arctic vs. Antarctic, GCM simulations, dynamics, conditions in the past
- **The role of sea ice in polar ecosystems**, including:  
marine mammals, birds, fish, copepods, microorganisms, algae, bacteria
- **Physical properties of sea ice**, including:  
growth and decay of sea ice, bulk properties, in-situ measurements, micro physics and models, lab experiments, theoretical approaches
- **Biogeochemistry and physics of sea ice**, including:  
brine composition and nutrients, oil and pollutants, iron, carbon and oxygen cycling, gas exchange, dissolved organic matter, black carbon
- **Sea ice thickness, drift and large-scale circulation**, including:  
in-situ measurements, remote sensing, and numerical modelling of sea ice thickness, concentration, drift, and ice mechanics
- **Snow on sea ice**, including:  
snow thickness and processes, melt ponds, atmosphere-snow interaction, gas exchange, effects for remote sensing
- **Social, economic and political importance of sea ice**, including:  
indigenous and local societies in a changing climate, shipping through sea ice,

economical use of the Arctic, use of local knowledge

- **Sea-ice research beyond the IPY**, including:  
international and interdisciplinary studies, legacy of IPY, observational systems, public outreach, education

### ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper at the workshop are required to submit an abstract. A pre-print of submitted abstracts will be provided for all participants at the symposium. The International Glaciological Society will offer a volume of *Annals of Glaciology* on "Sea ice in the physical and biogeochemical system", and participants are encouraged to submit manuscripts for this volume.

### SYMPOSIUM ORGANISATION

Magnús Már Magnússon (International Glaciological Society)

### SCIENCE STEERING AND EDITORIAL COMMITTEE

Victoria Lytle (Chief Editor), Sebastian Gerland

### LOCAL ORGANISING COMMITTEE

Sebastian Gerland (chairman), Fred Godtlielsen, Geir Gotaas, Mats Granskog, Stephen Hudson, Nalân Koç, Marcel Nicolaus, Christina A. Pedersen, Keguang Wang and Paul Wassmann

### ADDITIONAL ACTIVITIES

A mid-week excursion will be organised for participants to see some of the spectacular scenery around Tromsø. Additionally participants may choose to combine this meeting with the IPY meeting in Oslo the following week (<http://www.ipy-osc.no>), and travel south on the coastal steamer (<http://www.hurtigruten.com/norway>).

### FURTHER INFORMATION

If you wish to attend the symposium please return the attached form as soon as possible. The Second Circular will give further information about accommodation, the general scientific program and additional activities, and preparation of abstracts and final papers. Copies of the Second Circular will be sent to those who return the attached reply form. Members of the International Glaciological Society will automatically receive one. Information will be updated on the conference website, <http://www.igs2010.org>, as it becomes available.

**INTERNATIONAL SYMPOSIUM ON SEA ICE IN THE PHYSICAL AND BIOGEOCHEMICAL SYSTEM**

Tromsø, Norway, 31 May to 4 June 2010

Family Name: \_\_\_\_\_

Given Name(s): \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

I hope to participate in the Symposium in May-June 2010

I expect to submit an abstract

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

\_\_\_\_\_

\_\_\_\_\_

I would be interested in the coastal steamer tour after the symposium.

**PLEASE RETURN AS SOON AS POSSIBLE TO:**

Secretary General, International Glaciological Society

Scott Polar Research Institute

Lensfield Road

Cambridge, CB2 1ER

UK

Tel: +44 (0)1223 355 974 Fax: +44 (0)1223 354 931

E-mail: [igsoc@igsoc.org](mailto:igsoc@igsoc.org) Web: <http://www.igsoc.org>

*INTERNATIONAL GLACIOLOGICAL SOCIETY*

**INTERNATIONAL WORKSHOP ON  
SNOW, ICE AND HUMANITY IN A  
CHANGING CLIMATE**

*Sapporo, Japan  
21–25 June 2010*



CO-SPONSORED BY:

Japanese Society of Snow and Ice

FIRST CIRCULAR

June 2009

<http://www.igsoc.org/symposia/>  
<http://www.lowtem.hokudai.ac.jp/IGS-Sapporo/>

*Registered Charity*

The International Glaciological Society will hold an International Symposium on Snow, Ice and Humanity in a Changing Climate in 2010. The symposium will be held in Sapporo, Japan, from 21–25 June 2010.

### THEME

Snow and ice in the natural environment are facing drastic changes under the influence of rapidly changing global and regional climates. Since snow and ice play crucial roles in cold regions, such changes have substantial impacts on human societies and activities. For example, the amount of snowfall and the duration of seasonal snow cover have been affected in many places, with consequences for the water resources and avalanche risks. Thawing permafrost causes destruction of infrastructure, and formation of glacier-dammed lakes poses potential hazards in mountainous regions. On the other hand, reduction of the summer sea-ice extent in the Arctic creates new possibilities to use open water as a sea route for commercial vessels.

This symposium focuses on recent changes in the cryospheric components (snow, glaciers, ice sheets, permafrost, sea ice, lake ice, river ice) with respect to their influence on humanity. We invite contributions related to these subjects in a broad sense, including ground-based observations, remote sensing, laboratory experiments, numerical modelling, data compilations and analyses, risk management and social impact assessment. Topics are not restricted to present-day issues, but also extend to paleo-environmental records, as they are important for understanding the present and predicting the future. The conference will bring together researchers engaged in different fields of cryospheric science in order to discuss interactions of snow and ice with humanity in the past, present and future.

### TOPICS

- **Land ice and snow**  
including: snow cover, glaciers, ice sheets, permafrost, snow and glacier melt
- **Ice and snow in the hydrosphere**  
including: sea ice, ice shelves, icebergs, river and lake ice.
- **Hazards and social problems related to snow and ice**  
including: snow avalanches, glacier-dammed lake outbursts, permafrost thawing, snow and ice accretion, blowing snow, snow removal
- **Use of snow and ice**  
including: snow-air conditioning, tourism, teaching materials, recreation
- **Paleoclimate and paleoenvironment**  
including: ice-core records, past glaciation,

glacilacustrine and glacimarine deposits, subglacial and proglacial sediment-landform record.

- **Prediction of changes in the cryosphere**  
including: arctic sea ice, area and property of snow cover, glacier advance and retreat, sea level change

### ABSTRACT AND PAPER PUBLICATION

Participants wishing to present a paper at the workshop are required to submit an abstract. A pre-print of submitted abstracts will be provided for all participants at the symposium.

The Council of the International Glaciological Society has decided to publish a thematic issue of the *Annals of Glaciology* on topics consistent with the Symposium themes. Although the final volume title is yet to be determined, participants are encouraged to submit manuscripts for this volume.

### SESSIONS

Oral presentations will be held on four full days and one half-day. There will be ample opportunity for poster displays.

### ACCOMMODATION

Details will be given in the Second Circular.

### FURTHER INFORMATION

If you wish to attend the symposium please return the attached form as soon as possible. The Second Circular will give further information about accommodation, the general programme, and preparation of abstracts and final papers as well as a registration form. Copies of the Second Circular will be sent to those who return the attached reply form. Members of the International Glaciological Society will automatically receive one.

### SYMPOSIUM organisation

Magnús Már Magnússon (International Glaciological Society)

### SCIENCE STEERING AND EDITORIAL COMMITTEE

Perry Bartelt (Chief Scientific Editor), Douglas MacAyeal (Chief Scientific Editor)

### LOCAL organising COMMITTEE

A. Sato (chairman), K. Goto-Azuma, Y. Ishii, Y. Kodama, S. Matoba, T. Ozeki, S. Sugiyama

### ADDITIONAL ACTIVITIES

A half-day mid-week excursion will be organised. Details will be forthcoming in the second circular.

### UPDATED INFORMATION

Information will be updated on the conference websites, <http://www.igsoc.org/symposia/2010/sapporo/> and <http://www.lowtem.hokudai.ac.jp/IGS-Sapporo/> as it becomes available.

**INTERNATIONAL SYMPOSIUM ON SNOW, ICE AND HUMANITY IN A CHANGING CLIMATE**

Sapporo, Japan, 21–25 June 2010

Family Name: \_\_\_\_\_

Given Name(s): \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

I hope to participate in the Symposium in June 2010

I expect to submit an abstract

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

\_\_\_\_\_

\_\_\_\_\_

I would be interested in the midweek tour.

**PLEASE RETURN AS SOON AS POSSIBLE TO:**

Secretary General, International Glaciological Society

Scott Polar Research Institute

Lensfield Road

Cambridge, CB2 1ER

UK

Tel: +44 (0)1223 355 974 Fax: +44 (0)1223 354 931

E-mail: [igsoc@igsoc.org](mailto:igsoc@igsoc.org) Web: <http://www.igsoc.org>



# News

## Report of the Northwest Glaciologists Annual Meeting 2008

*held at the University of Washington, Seattle*

### BACKGROUND

In 1973 or 1974, when Mark Meier worked at US Geological Survey in Seattle, conducting mass balance studies at South Cascade Glacier, it was proposed that glaciologists in the Pacific North West should form a society of those who worked at institutions in the area, e.g. in Portland (Oregon), Tacoma and Seattle (Washington), Vancouver (British Columbia), and Fairbanks (Alaska).

This club took the name North West Glaciologists, and they decided to meet once a year, after the end of the field season, and just before the annual meeting of the American Geophysical Union which normally met in San Francisco. Thus, one could combine travel to San Francisco with a stopover at the NWG meeting, which always took place on the Friday and Saturday before the AGU started on the following Monday.

But later it proved necessary to change this tradition, because many of the NWG members had to go to field work in Antarctica, starting their travel so early that they would miss the NWG meetings. It proved almost impossible to combine all wishes for the timing of NWG meetings, and presently the meetings are held around the middle of October.

The venue has alternated among Seattle, Tacoma, and Vancouver, but meetings have also been held occasionally in Portland and in Fairbanks. In 2008 the University of Washington in Seattle was the host for our meeting, and in 2009 the Simon Fraser University in North Vancouver will arrange the meeting.

### PROGRAM

The meetings have always been very informal. As far as I know, no other organisation or society has so few rules as NWG has. No abstract is sent in beforehand, only a message that 'I want to participate in the meeting' is required. Not even the title of a presentation has to be given, only the subject matter. Further, no proceedings are prepared, so the speakers do not need to send in a written paper after the meeting!

At the very beginning of the meeting the organizer first gives some practical details, and then asks the audience some questions, such as:



**Figure 1.** Mark Fahnestock taking flight over the head of Barclay Kamb.

'Who will talk about Glacier Physics?', and notes the name(s) on the blackboard. The next question might be: 'Who will talk about Arctic Glaciers?'

This continues until all aspects are covered – often with assistance from the audience. Then the chair will count the total number of proposed talks, and by dividing the total number of hours we have at our disposal by the number of talks, an average length is determined for each talk! In the past this has been in the order of 17–26 minutes for each speaker.

The subject groups to be dealt with this time were:

- Subglacial phenomena
- Erosion
- Antarctica
- Alpine glaciers
- Greenland
- Models
- General overviews
- Climate.

In addition there were talks that could not be included in these groups.



**Figure 2.** .Pick me, pick me! Katie Leonard was showing different snow surface structures and looking for a consensus on whether they might be sastrugi!

## THE TALKS

The time for each talk was set to 15 minutes + 2–3 minutes for questions and/or comments. This was slightly less than previous meetings, because there were so many participants who wanted to discuss the results of their recent research or field work. For us, the older generation of glaciologists, this was a positive experience because so many young people came to this meeting to present their recent results. They had, in many cases, been urged by their professors to present their research, and many of them got valuable input from the audience, often with proposals for further investigations.

Thus, many of the young glaciologists benefited from taking part in the meeting, and other listeners acquired up-to-date information on what is presently going on in the field of glaciology. Some of the older glaciologists in the audience, such as Barclay Kamb (over 80 years!) and others made valuable contributions during the comments sessions. In this connection I should also mention Ed Waddington (who has arranged several NWG meetings in the past), Charlie Raymond, Andrew Fountain, Bernard Hallet, Will Harrison and Al Rasmussen, and several other celebrated individuals. Many young researchers have never met these people, whose literature they read as students, and they enjoy the opportunity of discussing problems face-to-face with experienced 'old-timers'.

It is impossible for me to give an exhaustive description or summaries of all the presentations given at this meeting, but I will try to mention at least some of the speakers and their subjects. Unfortunately, I often missed the speakers' full

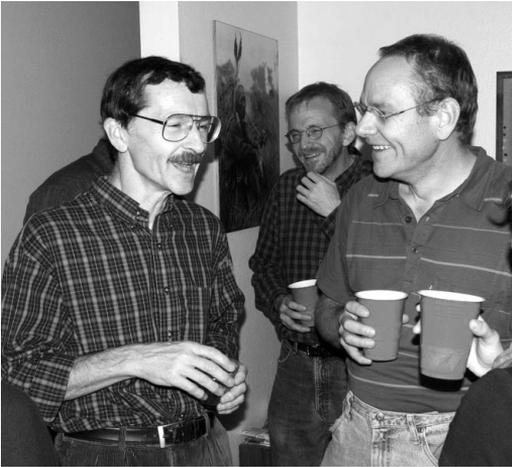
name, so in the following mostly their last names only are used. I must apologize for this – it proved impossible to take notes of everything during the compact programme!

The first day of the meeting, Friday 17 October, Tim Bronx presented his studies of ice crystals, Creyts talked about subglacial studies, Whorton and Mark Fahnestock about ice streams in Antarctica, whereas Winberry told us about the existence of free water under the inland ice. Adam Campbell mentioned the ice retreat in Graham Land, Hester Jiskoot described surging glaciers, Humphrey meltwater from glaciers, Warren informed us about findings of carbon in arctic snow, and Brandt about the determination of soot in snow. I was also given a time slot to talk about how studies of glaciers started in NVE in 1962, and how the International Hydrological Decade (1965–75) influenced glaciology in Canada, when detailed mass-balance studies started on five glaciers in the Rockies, particularly on Peyto Glacier, where we now have a continuous observation series dating from 1965. Finally I explained a little about remote sensing in Europe.

The second and final day, Saturday 18 October, had, in my view, even more interesting subjects: glacier seismology was dealt with by Leblanc, whereas Skidmore gave a very interesting talk on findings of living microbes in places under thick ice cover – in places this should have been impossible! Koutnik informed us about glaciers on the planet Mars's polar regions, where the temperature is 228–232 K, the ablation is 1 millimetre per year, and the ice is up to 2000 m thick. Steig talked about possible warming in Antarctica, Jarosch showed the relation between tree-rings and mass balance, Jessica Lundin had studied ice cores from Antarctica, and several speakers talked about 'ice quakes', which may be impossible to feel, but can always be recorded by seismometers. Various theories for their origin were discussed.

This is only a small selection of the total of 48 presentations that were given during the course of Saturday's session. This large number made it necessary to extend the meeting to about 6 o'clock in the afternoon, much later than it has been in the past. The normal closing time has always been at lunch-time on Saturday. So this year several of the participants had to stay overnight before they could fly from Seattle.

This made it possible for Al Rasmussen to invite some of the 'veterans' to a fish dinner on Saturday evening. This was an appreciated end of the 2008 meeting! (See also next section.)



**Figure 3.** Ed Waddington and Martin Truffer, with Mark Fahnestock joining in on the joke.



**Figure 5.** Will Harrison, Barclay Kamb and Charlie Raymond. Will was Barclay's post-doc and Charlie his PhD student.



**Figure 4.** Our host Sara McElroy talking to Roger Wheate.

### GENERAL COMMENTS

On Friday evening it is a tradition that one of the organizers of the meeting invites all participants for an evening meal in his home. We all contribute with a nominal amount during the day, but a lot of work has to be done by family members and colleagues to arrange an evening meal for more than 50 guests! In addition to eating, this get-together gives an opportunity for further discussion of the day's talks.



**Figure 6.** The author, IGS honorary member Gunnar Østrem, flanked by Howard Conway and Roger Wheate



**Figure 7.** Barclay Kamb still inspires the younger generation



**Figure 8.** In true Japanese fashion, everyone left their shoes by the front door before entering Charlie and Sarah's home.

During previous NWG occasions, many young glaciologists have been given a unique opportunity to spend time with old-timers such as Mark Meier, Wendell Tangborn, Stan Paterson, Austin Post and others, who often came to the meetings, although many of us had

up until then only known them from seeing their names in the literature!

Therefore, I strongly recommend institutions to send one or two representatives to the NWG meetings in the future. Experience has shown that many young glaciologists dare to stand up and give a short presentation of their work at a meeting that is so absolutely informal. Several researchers have been given valuable input from the audience, where older, experienced glaciologists also come to be informed about new research; and they are, in general, very happy to give their opinion and/or give advice to the younger participants,

It may be argued that it is too costly to send people to a meeting which lasts only two days, but it is always possible to make visits to various institutions or universities in the area. The organizers have always been helpful in assisting long-distance travellers to find interesting places to visit, so that the participants will gain much more from the experience than just the meeting itself.

**Gunnar Østrem**



## IGS staff changes

In May 2008, we were joined by Trevor Margereson. Trevor has wide-ranging experience in the automotive industry in the fields of design, research and development. Past employers were General Motors and the Motor Industry Research Association. Trevor is a Fellow of the Institute of Mechanical Engineers and is a Chartered Quality Engineer. His skills were brought to bear in the implementation of our new membership database, a major task, and in the streamlining of our administration processes. He works part-time.

Ali Woollatt, our typesetter and programmer, left at the end of 2008 and has been replaced by Sukie Hunter. Sukie has worked in publishing for many years and, as she had been working for us on a freelance basis, was able to slot in very quickly and efficiently. She has expertise in a variety of typesetting programmes and is particularly good at technical problem-solving. Sukie also works part-time.

In addition we have hired two summer students to work with Trevor, Cosmo Butler and Charlie Hibbert. They are working hard on bringing our memberships and database up to date.



## Books received

Jóhannesson, T., P. Gauer, P. Issler and K. Lied, editors. 2009. *The design of Avalanche protection dam: recent practical and theoretical developments*. EUR 23339 – European Commission – Project report. Brussels, Belgium. 205 pp. (ISBN: 978-92-79-08885-8 (Softcover)).

Schulson, Erland M. and Paul Duval. 2009. *Creep and Fracture of Ice*. Cambridge University Press. Cambridge, UK. 416pp, 189 figs. (ISBN: 978-0-521-80620-6, (hardback), GBP£65)

Bull, Colin. 2009. *Innocents in the Dry Valleys*. Victoria University Press, Wellington, New Zealand. 267pp, 5 maps. (ISBN: 978-0-86473-594-2, (softcover), NZD \$50)



# Glaciological diary

\*\* IGS sponsored

\* IGS co-sponsored

2009

16–19 February

## **GLACIODYN (IPY) meeting**

Workshop on the dynamics and mass budget of Arctic glaciers  
Biogeoscience Institute, University of Calgary  
Barrier Lake Station, Kananaskis Country,  
Alberta, Canada  
See <http://bgs.ucalgary.ca/>

26–27 February

## **The 13th Alpine Glaciology Meeting**

Innsbruck, Austria  
See [http://imgi.uibk.ac.at/IceClim/IceClim/CRYO/cryo\\_a.html](http://imgi.uibk.ac.at/IceClim/IceClim/CRYO/cryo_a.html)  
Contact: Irmgard Juen  
(Irmgard.Juen@uibk.ac.at), Andrea Fischer  
(andrea.fischer@uibk.ac.at), Georg Kaser  
(Georg.Kaser@uibk.ac.at)

2–4 March

## **GPS data analysis workshop in Europe**

LMU Munich, Germany  
Contact: Bob King (rwk@chandler.mit.edu)

15–20 March

## **Polar Marine Science Gordon Research Conference**

Il Ciocco, Lucca (Barga) Italy  
See <http://www.grc.org/programs.aspx?year=2009&program=polar>

22–24 March 2009

## **IPY Antarctic Sea Ice Workshop**

Lucca, Italy  
Contact: Tony Worby [a.worby@utas.edu.au]

22–27 March

## **Association of American Geographers, AAG, 2009 Annual Meeting**

Las Vegas, USA  
Includes: Glacier session, Changing Geographies of Arctic and more that may be of interest to glaciologists.  
See: <http://aag.org/annualmeetings/2009/index.htm>

24–26 March

## **Workshop on subglacial processes and related topics**

Svartisen subglacial laboratory, Engabreen glacier, Norway  
Contact: Miriam Jackson; mja@nve.no  
See [http://www.nve.no/modules/module\\_109/publisher\\_view\\_product.asp?identityID=23491](http://www.nve.no/modules/module_109/publisher_view_product.asp?identityID=23491)

6–10 April

## **\*\*International Symposium on Snow and Avalanches**

### **Manali, India**

Contact: Secretary General, International Glaciological Society  
See <http://www.igsoc.org/symposia/2009/manali/index.html>

16–17 April

## **5th Annual Polar Technology Conference**

IceCube Research Center, University of Wisconsin, Madison, Wisconsin, USA  
See <http://www.igsoc.org:8000/symposia/PolarTechnologyConference.org>

29 April–1 May

## **Atmosphere and Modelling Skills Workshop**

British Antarctic Survey, Cambridge, UK  
organised by The UK Polar Network  
See <http://www.polarnetwork.org/new/>

1–4 June

## **2030 NORTH: A National Planning Conference**

Ottawa, Ontario, Canada  
See <http://www.2030north.carc.org/>

1–5 June

## **Training School on ‘Glacial Isostatic Adjustment Modelling’**

See <http://www.cost-es0701.gcparks.com/index.php/activities/training->

3 June

## **ARCUS 2009 Annual Council Forum Meeting**

Arctic Research Consortium of the United States  
See [http://www.arcus.org/annual\\_meetings/2009/](http://www.arcus.org/annual_meetings/2009/)  
Contact: Kristina Creek [creek@arcus.org]

3–5 June

## **2nd CAPP Workshop: Carbon Pools in Permafrost Regions**

Contact: Peter Kuhry  
[peter.kuhry@natgeo.su.se]

6–11 June

## **66th annual Eastern Snow Conference**

Niagara on the Lake, Ontario, Canada

6–11 June

**Mechanisms of Quaternary Climate Change: Stability of Warm Phases in the Past and in the Future**

A ESF-FWF-LFUI Conference

Obergurgl, Austria

Contact Ms Jean Kelly, Conference Officer:  
jkelly@esf.org

See <http://www.esf.org/index.php?id=5310>

8–10 June

**High mountain glaciers and challenges caused by climate change**

Tromsø, Norway

See <http://hmg.npolar.no/en/>

9–11 June

**3rd Symposium on the Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations**

US Naval Academy, Annapolis, MD

See <http://www.star.nesdis.noaa.gov/star/IceSymposium2009.php>

Contact: Pablo Clemente-Colón

[Pablo.Clemente-Colon@natic.noaa.gov], US National Ice Center

10–12 June

**16th International Symposium on Polar Sciences**

Incheon, South Korea

See <http://symposium.kopri.re.kr/>

Contact: Sung-Hyun Park

[shpark314@kopri.re.kr] or Siek Rhee  
[http://rhee@kopri.re.kr]

6–7 and 8–11 July

**PAGES (Past Global Changes) Young Scientists Meeting and Open Science Meeting**

'Retrospective views on our planet's future'

Corvallis, Oregon, USA

See <http://www.pages-osm.org/>

6–11 July

**7th International Conference on Geomorphology (ANZIAG)**

Melbourne, Australia

See <http://www.geomorphology2009.com/>

Contact: geomorphology2009@tourhosts.com.au

16–17 July

**International Collaboration in Arctic System Modeling**

University of Quebec, Montreal, Canada

See [http://www.iarc.uaf.edu/workshops/2009/arctic\\_system\\_model\\_09](http://www.iarc.uaf.edu/workshops/2009/arctic_system_model_09)

19–29 July 2009

Cryospheric sessions 20–24 July)

**'Our Warming Planet' IAMAS, IAPSO, IACS joint assembly**

Montréal, Canada

See <http://www.moca-09.org/index.asp>

Contact: montreal2009@nrc-cnrc.gc.ca

27–31 July

**\*\*International Symposium on Glaciology in the International Polar Year**

Newcastle, UK

Contact: John Woodward;

john.woodward@unn.ac.uk

Secretary General, International Glaciological Society

5–7 August

**4th Annual Meeting in The Dynamics of Complex Systems: Viewing the World from a New Perspective**

Fairbanks, AK, USA

See [http://ffden-2.phys.uaf.edu/complex\\_systems\\_center/complex\\_systems\\_2009/ComplexSystems2009.htm](http://ffden-2.phys.uaf.edu/complex_systems_center/complex_systems_2009/ComplexSystems2009.htm)

Contact: Karina Possenti [fyccss@uaf.edu]

11–14 August

**Joint Conference of the 5th International Symposium on the Tibetan Plateau and the 24th Himalaya–Karakorum–Tibet Workshop**

Beijing, China

See [http://www.itpcas.ac.cn/5istp\\_24hkt/](http://www.itpcas.ac.cn/5istp_24hkt/)

25–27 August

**Nuuk Climate Days**

**Workshop: The Arctic Freshwater Budget Workshop: Changes of the Greenland Cryosphere**

Nuuk, Greenland

Arctic Freshwater Budget workshop See <http://freshnor.dmi.dk>

Contact: Jens Hesselbjerg Christensen [jhc@dmu.dk], Danish Climate Centre

Changes of the Greenland Cryosphere workshop See <http://www.space.dtu.dk/nuuk2009>

Contact: Rene Forsberg [rf@space.dtu.dk], DTU-Space

26–28 August

**WHISPERS: 1st Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing**

Grenoble, France

See <http://www.ieee-whispers.com/2009/>

- 2–3 September  
**\*34th Annual Meeting of the British Branch of the International Glaciological Society**  
 Sheffield, UK  
 See <http://www.sheffield.ac.uk/igs2009>  
 Contact: Organising Committee at [igs2009@sheffield.ac.uk](mailto:igs2009@sheffield.ac.uk)
- 6–11 September  
**Joint International Association of Hydrological Sciences (IAHS) & International Association of Hydrogeologists (IAH) convention: 8th IAHS Scientific Assembly & 37th IAH Congress**  
 Hyderabad, India  
 See <http://www.appliedhydrology.org/iahs>
- 7–9 September  
**Symposium on Mechanics of Natural Solids (i.e. soil, rock, ice and snow)**  
 Horto, Greece  
 See <http://sg1-c813.uibk.ac.at/igt/horto2009>
- 8–19 September  
**Karthus 2009 summer course on 'Ice sheets and glaciers in the climate system'**  
 Karthus, Italy  
 See [http://www.phys.uu.nl/~wwwimau/education/summer\\_school/](http://www.phys.uu.nl/~wwwimau/education/summer_school/)
- 23 September  
**On Thin Ice – Climate Change and Arctic Security in the 21st Century**  
 Copenhagen, Denmark  
 See <http://www.difms.dk/arctic>  
 Contact: Louise Hedegaard (Tel: +45-3915-1285)
- 27 September–2 October  
**International Snow Science Workshop, ISSW**  
 Davos, Switzerland  
 See <http://www.issw.ch>
- 29 September–1 October  
**17th Annual Northern Contaminants Program Results Workshop**  
 Ottawa, Ontario, Canada  
 Contact: Manon Bedard [[Manon.Bedard@ainc-inac.gc.ca](mailto:Manon.Bedard@ainc-inac.gc.ca)], Workshop Logistics, or Simon Smith [[Simon.Smith@ainc-inac.gc.ca](mailto:Simon.Smith@ainc-inac.gc.ca)], Workshop Program
- 1–3 October  
**International Forum for Research into Ice Shelf Processes (FRISP)/**  
 West Antarctic Ice Sheet Initiative (WAIS) Joint Workshop  
 Pack Forest Conference Center, WA, USA  
 Contact: Adrian Jenkins [[ajen@bas.ac.uk](mailto:ajen@bas.ac.uk)]
- 23–24 October  
**Northwest Glaciologists' Meeting**  
 Vancouver, BC, Canada  
 Contact: Gwenn Flowers [[gflowers@sfu.ca](mailto:gflowers@sfu.ca)] or Christian Schoof [<http://cschoof@eos.ubc.ca>]
- 29–31 October  
**\*Nordic Branch meeting of the International Glaciological Society**  
 Höfn in Hornafjörður, Iceland  
 Contact: Sverrir Guðmundsson, Helgi Björnsson, Tömas Jóhannesson at [nigs2009@vedur.is](mailto:nigs2009@vedur.is)
- 10–12 November  
**Acqua Alta: International Conference and Exhibition on Consequences of Climate Change and Flood Protection**  
 Hamburg, Germany  
 See <http://www.acqua-alta.de>
- 10–13 November  
**International Workshop on Glacier Hazards, Permafrost Hazards and GLOFs in Mountain Areas: Processes, Assessment, Prevention, Mitigation**  
 Vienna, Austria  
 See <http://www.geo.uio.no/remotesensing/gaphaz/>
- 13–14 November  
**17th Arctic Conference of the Institute of Arctic and Alpine Research (INSTAAR)**  
 Boulder, CO, USA  
 See <http://instaar.colorado.edu/ArcticConference>  
 Contact: Craig Lee [[craig.lee@colorado.edu](mailto:craig.lee@colorado.edu)] or John Hoffeecker [[John.Hoffeecker@colorado.edu](mailto:John.Hoffeecker@colorado.edu)]
- 2010**
- 5–8 January  
**Quaternary Research Association (QRA) – Annual Discussion Meeting**  
 Sea-Level Changes: the Science of a Changing World  
 Durham, UK  
 See <http://www.geography.dur.ac.uk/conf/sealevelchanges>  
 Contact: Sarah Woodroffe [[s.a.woodroffe@durham.ac.uk](mailto:s.a.woodroffe@durham.ac.uk)]
- 27–29 January  
**Arctic Frontiers**  
 Tromsø, Norway  
 See <http://www.arcticfrontiers.com>
- 1–3 February  
**\*International Glaciological Conference**  
 Ice and Climate Change: a view from the south  
 Valdivia, Chile  
 See <http://www.cecs.cl/VICC2010/>

- 16–19 March  
**2010 State of the Arctic Conference**  
 Miami, Florida  
 Contact: Helen V. Wiggins [helen@arcus.org],  
 Arctic Research Consortium of the US  
 (ARCUS)
- 25–26 March  
**The 14th Alpine Glaciology Meeting**  
 Milano, Italy  
 Website to be announced
- 31 May–4 June  
**\*\*International Symposium on Sea Ice**  
 Symposium theme: The role of sea ice in the  
 physical and biogeochemical system  
 Tromsø, Norway  
 Contact: Secretary General, International  
 Glaciological Society
- 4–11 June  
**4th International Workshop on Ice Caves**  
 Obertraun, Austria  
 Workshop theme: meteorology, glaciology  
 and paleoclimatology in ice caves  
 See <http://www.iwic2010.info>  
 E-mail: [office@iwic2010.info](mailto:office@iwic2010.info)
- 21–25 June  
**\*\*International Symposium on Snow, Ice and  
 Humanity in a Changing Climate**  
 Sapporo, Japan  
 Contact: Secretary General, International  
 Glaciological Society
- 12–14 August  
**International Joint Conference by the CliC  
 and IACS**  
 Cryospheric Changes and Influence –  
 Cryospheric Issues in Regional Sustainable  
 Development  
 Lijiang, Yunnan Province, China  
 See <http://www.casnw.net>  
 Contact: Xie Aihong [xieaih@lzb.ac.cn]
- 16–20 August  
**\*\*International Symposium on Earth's  
 Disappearing Ice: Drivers, Responses and  
 Impacts**  
 A celebration of the 50th Anniversary of Byrd  
 Polar Research Center  
 Byrd Center, Ohio State University, USA  
 Contact: Secretary General, International  
 Glaciological Society
- 2011**
- 5–10 June  
**\*\*International Symposium on Interactions  
 of Ice Sheets and Glaciers with the Ocean**  
 Scripps Institution of Oceanography, La Jolla,  
 California, USA  
 Contact: Secretary General, International  
 Glaciological Society
- 27 June–8 July 2011  
**International Union of Geodesy and  
 Geophysics**  
 IUGG XXV General Assembly  
 Earth on the Edge: Science for a Sustainable  
 Planet  
 Melbourne, Australia  
 See [http://www.iugg.org/assemblies/  
 2011melbourne/](http://www.iugg.org/assemblies/2011melbourne/)  
 Contact: Regine Hock  
 ([Regine.hock@gi.alaska.edu](mailto:Regine.hock@gi.alaska.edu))
- 2012**
- \*\*International Symposium on Seasonal  
 Snow and Ice**  
 Helsinki, Finland  
 Contact: Secretary General, International  
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# International Glaciological Society

Secretary General M.M. Magnússon

	<b>Council Members</b>	<b>Concurrent service on Council, from:</b>	
President	E. Brun	2008–2011	2008
Vice-Presidents	M. Funk	2008–2011	2008
	M. Sturm	2006–2009	2006
Immediate Past President	K. Goto-Azuma	2008–2011	2008
	A. Ohmura	2008–2011	2000
Treasurer	I.C. Willis	2006–2009	2006
Elective Members	*J.L. Bamber	2006–2009	2006
	*M. Frezzotti	2008–2011	2008
	*O. Gagliardini	2007–2010	2007
	*R. Hock	2008–2011	2008
	*C.L. Hulbe	2006–2009	2006
	*C. Hvidberg	2007–2010	2006
	*F. Navarro	2007–2010	2007
	*A. Rivera	2008–2011	2008
	*P.K. Satyawali	2006–2009	2006
	S. Sokratov	2008–2011	2008
	*P. Porsteinsson	2006–2009	2006
	*N. Wang	2007–2010	2007
	CO-OPTED	R.C.A. Hindmarsh	2008
F. Pattyn		2008	2008
D.R. MacAyeal		2008	2004

\*First term of service on the Council

## IGS Committees

<i>Awards</i>	P. Langhorne (Chairman)
<i>Nominations</i>	A. Ohmura (Chairman)
<i>Publications</i>	C.L. Hulbe (Chairman)

## Correspondents

Australia	P. Heil	Netherlands	J. Oerlemans
Austria	Friedrich Obleitner	New Zealand	A. Mackintosh
Belgium	J.-L. Tison	Norway	J.C. Kohler
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China	Yao Tandong	Spain	F. Navarro
Denmark	A.P. Ahlstrøm	Sweden	V.A. Pohjola
Finland	M. Leppäranta	Switzerland	W.J. Ammann
France	C. Ritz	UK	B.P. Hubbard
Germany	H. Oerter	USA (Eastern)	D.C. Finnegan
Iceland	P. Porsteinsson	USA (Western)	H.B. Conway and
Italy	C. Smiraglia	USA (Alaska)	E.D. Waddington
Japan (Hokkaido)	T. Shiraiwa		M.A. Nolan
Japan (Honshu)	K. Nishimura		

## Seligman Crystal

## Honorary Members

1963 G. Seligman	1986 G. De Q. Robin	2000 S.C. Colbeck	G.K.C. Clarke	J.W. Glen
1967 H. Bader	1989 H. Oeschger	2001 G.S. Boulton	V.M. Kotlyakov	M.F. Meier
1969 J.F. Nye	1989 W.F. Weeks	2001 G.K.C. Clarke	W.S.B. Paterson	U. Radok
1972 J.W. Glen	1990 C.R. Bentley	2003 K. Hutter	H. Röthlisberger	Shi Yafeng
1972 B.L. Hansen	1990 A. Higashi	2005 R.B. Alley	C.W.M. Swithinbank	G. Wakahama
1974 S. Evans	1992 H. Röthlisberger	2007 L.G. Thompson	G. Østrem	
1976 W. Dansgaard	1993 L. Lliboutry			
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1982 M. De Quervain	1996 W.F. Budd			
1983 W.O. Field	1997 S.J. Johnsen	1993 H. Richardson	1999 J.A. Heap	
1983 J. Weertman	1998 C. Lorius	1997 D.R. MacAyeal	2003 C.S.L. Ommanney	
1985 M.F. Meier	1999 C.F. Raymond	1998 G.K.C. Clarke		

## Richardson Medal

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# International Glaciological Society

Scott Polar Research Institute, Lensfield Road  
Cambridge CB2 1ER, UK

## DETAILS OF MEMBERSHIP

Membership is open to all individuals who have a scientific, practical or general interest in any aspect of snow and ice. Payment covers purchase of the *Journal of Glaciology* and *ICE*.

Forms for enrolment can be obtained from the Secretary General or filled in on line at <http://www.igsoc.org/membership>. No proposer or seconder is required.

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Editor: M.M. Magnússon (Secretary General)

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