

FROZEN GROUND



The News Bulletin of the International Permafrost Association

Number 29, December 2005



INTERNATIONAL PERMAFROST ASSOCIATION

The International Permafrost Association, founded in 1983, has as its objectives to foster the dissemination of knowledge concerning permafrost and to promote cooperation among persons and national or international organisations engaged in scientific investigation and engineering work on permafrost. Membership is through national Adhering Bodies and Associate Members. The IPA is governed by its officers and a Council consisting of representatives from 26 Adhering Bodies and Associates having interests in some aspect of theoretical, basic and applied frozen ground research, including permafrost, seasonal frost, artificial freezing and periglacial phenomena. Committees, Working Groups, and Task Forces organise and coordinate research activities and special projects.

The IPA became an Affiliated Organisation of the International Union of Geological Sciences (IUGS) in July 1989. Beginning in 1996 the IPA and the International Geographical Union (IGU) developed an Agreement of Cooperation, thus making IPA an affiliate of the IGU. The Association's primary responsibilities are convening International Permafrost Conferences, undertaking special projects such as preparing databases, maps, bibliographies, and glossaries, and coordinating international field programmes and networks. Conferences were held in West Lafayette, Indiana, U.S.A., 1963; in Yakutsk, Siberia, 1973; in Edmonton, Canada, 1978; in Fairbanks, Alaska, 1983; in Trondheim, Norway, 1988; in Beijing, China, 1993; in Yellowknife, Canada, 1998, and in Zurich, Switzerland, 2003. The Ninth conference will be in Fairbanks, Alaska, in 2008. Field excursions are an integral part of each Conference, and are organised by the host country.

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Cover: Offshore permafrost drilling at Cape Mamontov Klyk, Western Laptev Sea (Siberia). During the Russian-German Expedition COAST a transect consisting of five boreholes from the coast to the offshore (12 km off the coast) was drilled and cored from the sea ice. Photograph taken April 14, 2005 by Volker Rachold, Alfred Wegener Institute, Research Department Potsdam. See the Coastal and Offshore Permafrost Working Group report for more information.

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Frozen Ground, the News Bulletin of the International Permafrost Association, is published annually.

The IPA is a non-governmental association of national organisations and associates representing 26 countries. The success of the bulletin depends upon the willingness of IPA participants to supply information for publication. News items from any IPA participant or others are very welcome, as are interesting photographs. To submit news items or photos please contact:

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Frozen Ground is also available as PDF file on IPA web site (<http://www.geo.uio.no/IPA/>). This issue of *Frozen Ground* was compiled and edited by Angélique Prick.

The IPA Secretariat is supported by The Research Council of Norway and The University Centre in Svalbard, UNIS.

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EXECUTIVE COMMITTEE REPORT

A number of notably activities took place this past year. The Second European Conference on Permafrost was held in Potsdam and included meetings of the IPA Council and the Executive Committee. In addition to discussing future changes to the Constitution, the Council approved the new membership category of Associate Member. Portugal has become the first Associate Member, and congratulations to New Zealand for becoming a new Adhering Member.

Members of our international community participated in conferences including: the International Conference on Periglacial Geomorphology; the Arctic Science Summit Week; the First CliC Conference; three conferences in Russia (the International Pushchino Conference, the Third Russian Conference on Geocryology; the International Conference on Cryopedology); the Sixth International Conference on Geomorphology (IAG); the Second International Conference on Arctic Research Planning, the Fifth International Conference on Gas Hydrates; and the annual AGU and EGU meetings.

Planning for the International Polar Year (2007-2008) resulted in acceptance by the IPY Joint Committee of three coordinated permafrost projects: the Permafrost Observatory Project, the Antarctic and sub-Antarctic Permafrost, Periglacial and Soil Environments Project and the Arctic Circum-Polar Coastal Observatory Network. Representatives of many of these projects met in Copenhagen in November to develop plans for field activities, outreach, education and data management. Included were discussions of our new carbon project and participation in the International Year of Planet Earth. One IPY-IPA legacy will be to encourage the development of the next generation of permafrost researchers. The Permafrost Young Researchers Network (PYRN) is in its early development stage and it plans to encourage communications and collaborations among undergraduates and graduate students, post docs and other younger researchers and educators.

Plans for the first Asian Conference on Permafrost in Lanzhou, China, in August 2006 are well advanced. We encourage multi-disciplinary participation in the conference and field excursion. Although the abstract deadline is January 30, contact the organizers for the latest information and possible late participation (www.casnw.net/permafrost/home.html).

The coming year will be busy and critical to the future of the IPA. In addition to the conference in China, we plan to participate in other international conferences including the annual conference in Russia (Tyumen), the international soil congress, and the international cold re-

gions specialty and glaciological conferences (see calendar for permafrost-related meetings). The IPA Council is considering changing the frequency of its international conference from every five to four years with at least one official regional conference during the interim period. The method of electing the Executive Committee is also under consideration as is the rotation of its officers (see summaries of Council meetings). Coordination and collaboration of activities with other international unions and societies are continuing, including those with IUGS, IGU, CliC, IPY and the recently formed IUGG Commission on Cryospheric Sciences.

As announced earlier the Research Council of Norway awarded a grant to UNIS that enabled the employment of a half-time position in the IPA Secretariat. Angélique Prick occupies the position and is responsible for preparing *Frozen Ground*, among other duties. Hanne Christiansen continues her role of overall management of the Secretariat and is taking a lead in the IPA IPY permafrost education and outreach activities together with the University of the Arctic. The IUGS is supporting our initial efforts for planning the IPY and Planet Earth activities.

Details of many of the above-mentioned activities are presented in the following pages.



The IPA Executive Committee at the EUCOP II Conference, Potsdam.

From left to right: Vice President Prof. Charles Harris, Secretariat Leader Dr. Hanne H. Christiansen, Member Prof. Hans-W. Hubberten, President Dr. Jerry Brown, Vice President Dr. Georgy Z. Perlshtein, Secretariat Officer Dr. Angélique Prick, Member Don W. Hayley. Photograph provided by Hanne H. Christiansen.

GLOBAL AND REGIONAL ACTIVITIES



THE INTERNATIONAL POLAR YEAR: STATUS OF PLANNED PERMAFROST ACTIVITIES

Jerry Brown and Hanne H. Christiansen,

The IPA Secretariat at the University Centre in Svalbard, Longyearbyen, Norway (IPA@unis.no)

The International Polar Year (2007-2008) provides a unique opportunity for scientists and engineers along with younger researchers from around the world to increase our knowledge of permafrost occurrence and dynamics, and thus contribute to the IPY legacy. This following is the second annual report to keep our readers informed of our IPY plans and progress (see *Frozen Ground* 28, pages 3-4). In brief, the IPY is intended to attract and develop a new generation of polar researchers, engineers and logistics experts, and to engage the awareness, interest and understanding of schoolchildren, the general public and decision-makers worldwide in the purpose and value of polar research and monitoring.

During 2005 the permafrost community submitted three focused programmes to the Joint Committee for IPY. The Joint Committee approved the three activities as co-ordination projects that include approximately 150 individuals from the 26 countries represented by International Permafrost Association (see IPA and IPY web pages for details). Additional individual projects are expected to be added early in 2006. The three permafrost programmes are:

- The Permafrost Observatory Project: A Contribution to the Thermal State of Permafrost (TSP) [IPY Project no. 50]
- The Antarctic and sub-Antarctic Permafrost, Periglacial and Soil Environments Project (ANTPAS) [IPY Project no. 33]
- The Arctic Circum-Polar Coastal Observatory Network (ACCO-Net) [IPY Project no. 90]

The **Permafrost Observatory Project (TSP)**, initially coordinated by Jerry Brown, plans to develop a spatially distributed set of observations on past and present status of permafrost temperatures and active layer thicknesses. Emphasis is on permafrost temperatures since there is currently no global database that defines the thermal state of permafrost (TSP) for a specific time period (snapshot). The TSP data set will serve as a baseline for the assessment of the rate of change of permafrost temperatures and permafrost distribution, to validate climate model scenarios, and to support process research in order to improve our understanding of permafrost dynamics. TSP measurements are a field component of the WMO/GCOS Global Terrestrial Network for Permafrost (GTN-P) that also includes the Circumpolar Active Layer Monitoring (CALM) network. Depth of thaw and soil temperatures

will continue to be reported at existing CALM and other sites. Our IPY Legacy for the TSP project is to establish a permanent International Network of Permafrost Observatories (INPO). The following countries have identified projects or plans to observe and report their results: Argentina, Canada, China, Denmark, Germany, Iceland, Italy, Japan, Kazakhstan, Korea, Mongolia, New Zealand, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, United Kingdom, and the United States (www.gtnp.org).

The **Antarctic and sub-Antarctic Permafrost, Periglacial and Soil Environments Project (ANTPAS)**, coordinated by Jan Boelhouwers, is aimed at integrating existing and new data on the distribution, thickness, age, history and physical and geochemical properties of permafrost, soils and the active-layer on the Antarctic continent and sub-Antarctic islands. A monitoring network, a regional subset of GTN-P and consisting of borehole temperatures, active-layer thickness, and periglacial and soil observations, will be established along selected environmental gradients. A draft soil manual and protocol for the Southern Hemisphere CALM (S-CALM) have been prepared. A series of soils, periglacial and permafrost maps will be prepared. Countries involved include Argentina, Italy, Japan, Korea, New Zealand, Norway, Poland, Portugal, Russia, South Africa, Spain, Sweden, Switzerland, and the United States (<http://erth.waikato.ac.nz/antpas>).

The **Arctic Circum-Polar Coastal Observatory Network (ACCO-Net)**, coordinated by Volker Rachold, proposes to develop a coordinated monitoring programme incorporating diverse regions and providing site-specific, fine-scale baseline and time-series data, and to facilitate local and circum-Arctic studies. To address these issues, it is proposed that an internationally coordinated circum-Arctic network of coastal and marginal seas observatories (~20 key sites including deltas and estuaries of major Siberian and North American rivers) be established based on ecoregion representation criteria. The sites will be loci for multi-disciplinary studies and will include sensitive areas with varying degrees of human impact. Initial countries involved include Canada, Denmark, Germany, the Netherlands, Norway, Russia, and the United States (www.awi-potsdam.de/acd/acconet).

Our IPY permafrost «legacies» are to encourage the training of a new generation of researchers and to produce the «snapshot» of existing permafrost conditions as a

baseline for future change assessment. Educational, outreach and data management activities are key elements for our IPY permafrost activities. Data sharing and accessibility is an important element of the IPY and the IPA plans to adhere to these policies. Mark Parsons, co-chair of the IPY Data Management Committee, will work closely with IPA to insure preservation and access of IPA data.

In January 2005, Hanne Christiansen and colleagues submitted an Expression of Interest for an international university course on permafrost for the IPY (EoI 24), just as others have included education in the many EoIs concerning permafrost. As a first step to develop this approach, we have started cataloguing International University Courses on Permafrost (IUCP). ICUP will be a series of international courses that are offered by universities located throughout the world, conducted by international teams of permafrost researchers and educators working at the field course sites, and matriculating an international group of students. Existing and new university courses on theoretical and/or field-based permafrost science and engineering will form the core activities of IUCP. To improve the use of IUCP, a searchable web-based IUCP database is under development at and coordinated by the University Centre in Svalbard (UNIS). The website will be linked to the IPA websites and to others on IPY education and outreach. ICUP will work closely with the University of the Arctic to identify cooperation and funding possibilities for the IUCP students.

A Permafrost Young Researchers Network (PYRN) is under development to facilitate and strengthen contacts and communications among young scientists in the permafrost community and to provide information on availability of fellowships, conference travel opportunities, job opportunities, and other activities of interest. PYRN seeks to promote and publicize permafrost research undertaken by young researchers, and to provide information to the public especially to primary and secondary schools. PYRN will also promote opportunities for field experiences for students at all levels of education (www.awi-potsdam.de/pyrn).

In addition to the currently approved coordination projects with their education, outreach and data activities, several major cross-cutting projects will contribute to our IPY initiatives.

The *Carbon Pools in Permafrost Regions* (CAPP) project, coordinated by Peter Kuhry, aims at quantifying soil organic matter quantity and quality along ecoclimatic and edaphic gradients in high-latitude and high-altitude regions that are characterized by the presence of isolated to continuous permafrost terrain. CAPP includes the Northern Circumpolar Soil Carbon Database (NCSCD) that provides an improved estimate of soil organic carbon stocks for the permafrost regions of North America and Eurasia (see *Frozen Ground* 28, pages 5-7). Special attention will be given to the widespread peatlands (organic soils). CAPP

plans to contribute to new research activities along transects in the Northern Hemisphere that represent the range of ecoclimatic and permafrost regions, and complemented by two transects in the Subantarctic-Antarctic region with additional altitudinal transects in high-alpine mountains. An IPA-CAPP scoping workshop (March 2005) and an ESF-funded science planning workshop (November 2005) were held at the University of Stockholm. CAPP contributes to the Global Carbon Project (see *Frozen Ground* 28, page 52) (www.geowiss.uni-hamburg.de/i-boden/capp).

Mapping of mountain and high altitude permafrost: Although national maps exist for China, Kazakhstan, Mongolia and southern Russia, there are no consistent cartographic criteria or terminology on which to base a unified permafrost map of Central Asia for these topographically complex and diverse regions. The IPA Circum-Arctic Map of Permafrost and Ground-Ice Conditions simply applied the continental-based classification of permafrost continuity to the existing maps of Mongolia, Kazakhstan, and China. The International Symposium on Mountain and Arid Land Permafrost held in Ulaanbaatar, Mongolia, in September 2001, recommended the preparation of a new permafrost map of Central Asia. Conceptual approaches, definitions, legends, scales, and resolution still differ, however, and much work remains. Work is underway to develop a unified, international cartographic classification and derived map products to represent permafrost conditions in the high-elevation regions of Central Asia. During summer 2006 field expeditions are planned to the Tien Shans in Kazakhstan and China and to the Qinghai-Tibet Plateau. Another mapping effort is underway for the Nordic region that will estimate the lower limits of permafrost.

During the Second International Conference on Arctic Research Planning (ICARP II) in Copenhagen, Denmark, in November, the IPA President participated in a forum and presented a proposal for long-term research entitled: «Response and Role of Permafrost on a Warming Planet». The above-described IPY activities were identified as important contributors in understanding these changes. Following the ICARP several days were devoted to IPY briefings and planning. On November 14, approximately 60 participants from the three coordinated projects and related activities and invited guests attended an IPY-IPA workshop to plan our future activities. Ed de Mulder, past president IUGS, presented the status on the International Year of Planet Earth (2008). Continued planning of our IPY activities will take place at meetings and conferences in Germany (March), Russia (May), Australia (July), United States (July), and China (August) (see Planning Calendar).

The IPA continues to coordinate its research and outreach activities with the International Union of Geological Sciences (IUGS), the Scientific Committee for Antarctic Research (SCAR), the WCRP Climate and

Cryosphere (CliC), the Global Carbon Project, the Land-Ocean Interactions in the Coastal Zone (LOICZ), the International Arctic Science Committee (IASC), and the IUGG Commission on Cryospheric Sciences. The IPA

Secretariat, based in UNIS, is supported by a grant from the Research Council of Norway, and is coordinating many of the IPY-IPA activities through a planning grant from the IUGS.

SECOND EUROPEAN CONFERENCE ON PERMAFROST

Charles Harris, School of Earth Ocean and Planetary Sciences, Cardiff University, U.K. (HarrisC@cardiff.ac.uk)
Hans-W. Hubberten, Alfred Wegener Institute, Potsdam, Germany (hubbert@awi-potsdam.de)

The Second European Conference on Permafrost (EUCOP II) was held at the Alfred Wegener Institute (AWI), Potsdam, June 12-16 2005. The conference was organised by the European Science Foundation funded «Permafrost and Climate in Europe in the 21st Century» (PACE21) Network, under the auspices of the International Permafrost Association (IPA). The local organising committee was led by Hans-W. Hubberten of the AWI, Potsdam. Over 250 delegates attended the conference from 22 countries in Europe, Asia, North and South America and from New Zealand. The First European Conference on Permafrost was held in Rome in 2001.

Papers were presented orally and as posters, and a volume of abstracts was published for the meeting by the AWI (Terra Nostra Heft 2005/2, 224 p. ISSN 0946-8978). The main paper sessions are outlined below.

Permafrost Records of Past Climates. Chairs Bernhard Diekmann (Germany) and Julian Murton (UK). 13 papers discussed Pleistocene permafrost conditions in Siberia, Alaska, northern Canada and Europe, plus the evolution of arctic lake basins, lacustrine palaeoenvironmental records and modelling of Pleistocene permafrost and permafrost interactions with groundwater.

Permafrost soils and microbiology. Chairs Eliza Rivkina (Russia) and Eva-Maria Pfeiffer (Germany). 11 papers.

The keynote paper by E. Rivkina explored methane generation under subzero temperatures. Other papers discussed microbial communities in relation to permafrost organic content, methane fluxes and the carbon balance in the Arctic and in Antarctica, plus climatic and anthropogenic forcing of permafrost ecosystems, and the geocryology of arctic soils.

Periglacial landforms and cryogenic processes. Chairs Matti Seppälä (Finland) and Ole Humlum (Norway). 15 papers. The keynote by J. Murton (UK) presented physical modelling of bedrock fractured by ice segregation. Other papers presented results of laboratory physical modelling, field studies and geophysical investigations targeted at a range of periglacial processes and ground ice phenomena. Detailed seismic monitoring of Svalbard ice-wedges provided new information on cracking and wedge evolution, and the distribution of periglacial landforms in various mountain regions was described, including the relation between glacier retreat and the development of cryogenic geomorphic systems.

Permafrost as an analogue for extraterrestrial systems. Chairs Dirk Wagner (Germany) and David Gilichinsky (Russia). Eight papers. The keynote talk by D. Gilichinsky explored the possibility of water as cryopeg lenses within the permafrost on Mars. Papers were presented describing



Participants of the EUCOP II conference. Photograph provided by Hans-W. Hubberten.

the nature and origin of Martian permafrost including surface polygonal patterns. A second theme was microbiology at low temperatures, including resistance of terrestrial bacteria to solar UV and desiccation in the context of potential extra terrestrial life forms.

Hydrology and sediment fluxes in permafrost regions. Chairs Achim Beylich (Norway) and Bernd Etzelmüller (Norway). Eight papers. The sensitivity of the arctic land surface to climate forcing was discussed, with papers focusing on the effects of permafrost degradation on soils, hydrology and ecosystems together with glacier-permafrost interactions and the nature, formation and present-day dynamics of rock glaciers.

Permafrost geochemistry. Chairs Hanno Meyer (Germany) and Ron Sletten (U.S.A.). Seven papers included presentations on geochemical investigations of Antarctic ice wedges, tabular ground ice and coastal sediments in Siberia, cosmogenic dating of permafrost and a new glacial oxygen isotope record from the Italian Alps.

Permafrost modelling in the context of climate change. Chairs Charles Harris (UK) and Lorenz King (Germany). 23 papers. The keynote paper by Martin Hoelzle (Switzerland) discussed recent progress in modelling mountain permafrost distribution. Papers discussed borehole and active-layer monitoring in North America, Europe, Siberia and the Tibetan Plateau, and impacts of climate, including extreme events, on permafrost thermal conditions and slope stability. Papers also described ground-ice and related landform investigations, and geophysical surveys in both continuous and discontinuous permafrost.

Coastal and offshore permafrost. Chairs Volker Rachold (Germany) and Mikhail Grigoriev (Russia). Seven papers included presentations on climate fluctuation and coastal dynamics, application of GIS techniques, seismic investigations of sub-sea permafrost, complex coastal ground ice sequences and the dynamics of gas hydrate systems.

Engineering, geohazards and land-use planning in permafrost regions. Chairs Michael Davies (UK), Andreas Kääh (Switzerland) and Martin Gude (Germany). 14 papers.

The theme of the keynote talk by Don Hayley (Canada) was «Guidelines for construction in permafrost». Papers discussed monitoring and modelling of permafrost stability in northern Russia, Qinghai-Tibet Plateau, the Mackenzie Valley Canada, and the south-western Barents Sea, the role of permafrost in avalanche initiation and laboratory physical modelling of soil-structure interactions and the stability of scree slopes.

Poster sessions were an important feature of the conference, and generated much lively discussion. 20 posters were presented on permafrost palaeoenvironments, 19 posters on permafrost soils and microbiology, 32 posters on periglacial landforms and cryogenic processes, 6 posters on permafrost geochemistry, 16 posters on coastal and offshore permafrost, 11 posters on hydrology and sediment fluxes, 44 on permafrost monitoring and modelling in the context of global change and 33 posters on permafrost engineering and geohazards. In order to recognize the best contributions by young researchers, the poster sessions were judged and a total of six awards were presented in the closing plenary session.

A one-day, post-conference field trip guided by Johannes Schröder and Gerda Schirrmeyer (Germany) lead to the key-locality for the European glaciation theory by Otto Torrell (1875). The large quarry of Rüdersdorf opens a 250 m thick sequence of rocks of Middle Triassic age, surrounded by glacial sediments covering almost the entire state of Brandenburg.

In addition to the excellent science presented at the conference, the local organisers provided an exceptional social programme that was thoroughly enjoyed by delegates. Professor Hubberten and his team at the Alfred Wegener Institute are to be congratulated on the outstanding success of the conference.

During the conference two IPA Council meetings were held to discuss constitutional changes, and to inform delegates on planning for the Ninth International Conference on Permafrost to be held in Fairbanks, Alaska in 2008.

SUMMARY REPORTS OF THE SIXTEENTH AND SEVENTEENTH IPA COUNCIL

The following attended both Council meetings except as noted by asterisks (present at Sixteenth* or Seventeenth** meetings):

EXECUTIVE COMMITTEE

Jerry Brown (P), Charles Harris (VP), Georgy Perlshtein (VP), Don Hayley, Hans-W. Hubberten. EC member not present: Zhu Yuanlin
Secretariat: Hanne H. Christiansen, Angélique Prick

COUNCIL MEMBERS REPRESENTATIVES

Argentina: Dario Trombotto**
Austria: Andreas Kellerer-Pirklbauer
Belgium: Irénée Heyse
Canada: Brian Moorman, Margo Burgess
China: Huijun Jin**
Denmark: Niels Foged, Ole Humlum**
Finland: Matti Seppälä*
France: Brigitte Van Vliet-Lanoë**
Germany: Lorenz King, Eva-Maria Pfeiffer*

Italy: Francesco Dramis*, Mauro Guglielmin*
 Japan: Norikazu Matsuoka*, Mamoru Ishikawa*, Koichiro Harada**
 Netherlands: Jef Vandenberghe
 New Zealand: Megan Balks*, Ian Campbell
 Norway: Kaare Flaate*, Ole Humlum
 Poland: Kazimierz Pekala
 Portugal (Associate Member): Gonçalo Teles Vieira
 Russia: Vladimir P. Melnikov
 South Africa (Associate Member): Jan Boelhouwers
 Spain: Miguel Ramos*, Enrique Serrano**
 Sweden: Margareta Johansson**
 Switzerland: Daniel Vonder Mühl
 United Kingdom: Michael C.R. Davies, Julian Murton**
 USA: Frederick Nelson, Vladimir Romanovsky**
 Adhering Bodies not represented: Iceland, Kazakhstan, Mongolia

OTHERS

Canada: Antoni Lewkowicz, Sharon Smith
 Germany: Martin Gude**
 Italy: Nicoletta Cannone*
 Korea: Uk Han**
 Poland: Wojciech Dobinski*
 Switzerland: Andreas Käab**, Stephan Gruber**

SIXTEENTH COUNCIL MEETING, JUNE 12, 2005

The meeting convened at 2:00 p.m. and adjourned at 5:00 p.m.

The main purpose of the two Council meetings was to consider changes in the Constitution in response to the mandate of the last Council meeting in Zurich. The minutes of the Fourteenth and Fifteenth Council meetings were unanimously approved (motion moved by D. Vonder Mühl and seconded by A. Kellerer-Pirklbauer).

Brown reported that the IPA Secretariat, located at the University Centre in Svalbard (UNIS) received financial support from the Research Council of Norway for the period 2005-08 in order to administer the Secretariat and cover the costs of a half-time administrative position.

Hanne Christiansen informed members on the status of IPA finances. Annual contributions remain the main source of income and it was suggested that some Members might voluntarily increase their number of units. The budget was approved by the Council (motion moved by M. Davies and seconded by M. Seppälä). The IUGS had recently approved a grant to the IPA in support of IPY activities that will mostly cover travel costs. Christiansen briefly reviewed the 2004 IUGS Annual Report. The question of supporting partially the IPA finances through a fee from the International Permafrost Conferences (ICOP) was raised.

New Zealand's formal request for membership submitted by Dean Peterson, Antarctica New Zealand, was unanimously approved (motion moved by B. Moorman and seconded by J. Boelhouwers). Brown indicated that New Zealand voluntarily paid a one-unit membership fee in 2004. This level of membership fee for New Zealand was unanimously approved (motion moved by F. Nelson and seconded by M. Seppälä).

Constitutional changes were proposed by the United Kingdom and circulated to Council Members on March 8, 2005. Council members discussed the main suggested changes, which are: (1) the establishment of Regional Groups (RG) for the purpose of improved coordination among IPA members; (2) the establishment of a category of Associate Members for countries that do not have Adhering Bodies; (3) a suspension of voting privileges for Member in arrears of the annual fee payment by more than two years, and a one-time forgiveness of delinquent



Members attending the Council Meetings in Potsdam. Photograph provided by Hanne H. Christiansen.

payments; (4) a change in the balloting for Conference (ICOP) location when there is more than one invitation by allowing for proportional voting; and (5) an enlargement of the Nominating Committee (currently three) to take into account regional interests, and to include the out-going President either as an advisor or a full member. The proposed changes to the IPA Constitution were approved by the Council (motion moved by M. Davies and seconded by F. Nelson).

A formal request for membership in IPA was received from Gonçalo Teles Vieira, University of Lisbon, Portugal, in April 2005. The membership of Portugal as an Associate Member was approved by the Council (motion moved by J. Boelhouwers and seconded by F. Dramis).

Kaare Flaate, current Chair of International Advisory Committee (IAC) for ICOP, introduced the new nominees for membership in the IAC for the period 2005-2010: Antoni G. Lewkowicz (Chair, Canada), David Gilichinsky (Russia), Huijun Jin (China), Truls Mølmann (Norway), and Marcia Phillips (Switzerland). The nominations were approved unanimously by the Council (motion moved by K. Flaate and seconded by B. Moorman).

Flaate reported on the new temporary Committee on Frost in Ground that is affiliated to the Norwegian Geotechnical Society and acting as the Norwegian Adhering Body of the IPA. This Committee is producing a new publication *Frost i jord / Frost in Ground* (Editor: Øystein Myhre).

Brown invited a discussion on the additional changes to the Constitution that were proposed by Germany and endorsed by Canada and the U.S.A. (cf. Seventeenth Council Meeting minutes). A small group of Council and EC members consisting of Burgess, Harris, Hayley, Moorman, Perlshtein agreed to prepare a revised set of changes for discussion at the next Council meeting (with Prick as a member from the Secretariat). Brown invited Council members to reflect on the suggested changes to the IPA constitution and postponed further discussions until the Seventeenth Council meeting.

A meeting to discuss Working Groups activities was held between the two Council meetings, on June 14, attended by IPA President and Vice Presidents, 15 co-chairs of Working Groups and 25 members and observers. The purpose of the meeting was to discuss international activities and common topics for future collaboration.

SEVENTEENTH COUNCIL MEETING JUNE 15, 2005

The meeting convened at 3 p.m. and adjourned at 5 p.m.

Boelhouwers, following email consultation with Ian Meiklejohn, requested formally a change of membership status for Southern Africa from Adhering Body to Associate Member. This Associate Membership under the name of *South Africa* (not *Southern Africa* as previously) was approved by the Council (motion moved by King and seconded by Moorman).

Uk Han (member of the Council for Arctic and Antarctic Research in South Korea) presented a brief report on the increasing involvement of South Korea in permafrost research. Han expressed his wishes for an involvement of Korea in IPA activities, with Korea ultimately becoming an IPA member.

Brown reopened the discussion on pro-rated conference fees as a source of financing for the IPA. After discussion, the Council approved the motion proposed by Davies and seconded by Vonder Mühll, i.e. that: Conferences organizers should allocate a percentage of the registration fees from all those registered as a contribution to the IPA; this fee should follow a regressive rate, from ICOP to smaller conferences; the rate would be decided by negotiation between the organizers and the IPA and would not apply to student registration fees.

Hayley presented the further suggested changes to the IPA constitution that were discussed at the Sixteenth Council meeting and reformulated by the appointed group. The key elements of these constitutional changes are:

(1) ICOP will be held on a four years cycle;

(2) Changes to the EC membership: EC Members are elected for four years (no restriction on being re-elected); President serves a four-year term from ICOP to ICOP; roughly half of EC Members are replaced every two years; a Senior Vice-President is selected by the EC two years before the end of the President's term; Senior Vice-President becomes President at the next ICOP; EC will select another Vice-President from their members; EC can appoint (by unanimous consent) a seventh EC member to provide regional or disciplinary balance to the EC, or to ensure there is a member from the country hosting ICOP; appointed EC member's term is until the next election;

(3) Changes to the Nominating Committee (NC): EC selects a NC one year before the ICOP; NC serves for a four-year term to provide continuity for the interim election; NC solicits nominations from the Adhering Bodies of full members; Adhering Bodies can propose up to two candidates; NC screens all nominations for a list of proposed candidates and can add candidates in addition to those proposed by the Adhering Bodies.

Hayley detailed the implementation schedule: the proposed draft changes as revised at the current Council meeting be circulated to Council members; written comments from the Council are expected by October 2005; the EC will meet before end of 2005 to finalize; a mail ballot will then be sent to Council members in early 2006; results of the ballot are expected by April 2006; a new Nominating Committee is set up in June 2006 or 2007; the new structure would be in full effect at ICOP 2008.

Brown reminded the Council of the IPA Long-term Plan (2005-2013) that was sent to Members in March 2005; this plan will have to be modified to reflect the new constitutional changes.

Margareta Johansson announced that a formal Swed-

ish IPA group will be instituted and an interim committee has been established. A website will function as a communication portal with a list of research projects, contact details, bibliography and a photo archive. Brown congratulated Sweden on this positive development and encouraged all countries to have an IPA national website.

Kääb, co-chair of the IPA WG on Glacier and Permafrost Hazards in High Mountains, is representing the new IUGG Commission on Cryospheric Sciences. Kääb discussed the links between this Commission and the IPA; Brown agreed and indicated there are many contacts between the permafrost community and the snow and ice researchers. Vonder Mühl underlined that some IPA members should attend the August 2006 International joint CliC/IGS/ICSI Symposium on Cryospheric Indicators of Global Climate Change, in Cambridge, U.K.

The IGU (International Geographical Union) and the IPA agreed to renew their 1996 commitment of coopera-

tion. The agreement provides for the IPA to be an affiliate of the IGU. During the International Geographical Congress in Glasgow in August 2004, the IGU renewed its focus on periglacial topics by approving the new Commission on Cold Region Environments (see *Frozen Ground* 28, pages 48-49).

Peter Kuhry (University of Stockholm) had briefed the participants of the Working Groups meeting on the new CAPP (Carbon Pools in Permafrost Regions) project. Brown summarized to the Council members a CAPP position paper (March 24, 2005). There were no objections to CAPP being an IPA project, particularly as part of the IPY.

Brown congratulated the present members of New Zealand, Portugal and South Africa for their new status within the IPA. He thanked Christiansen and Prick for IPA Secretariat support in the Council meetings organisation.

EXECUTIVE COMMITTEE SUMMARIES

The following summaries of the two Executive Committee meetings are included for the record. Additional details are reported in the Council meetings.

JUNE 11, 2005

The Executive Committee (EC) met at the Hotel Mercure, Potsdam. Members present were: Jerry Brown (President), Georgy Perlishstein (Vice President), Don Hayley, Hans-W. Hubberten. Not present: Charles Harris (Vice President), Zhu Yuanlin. The IPA Secretariat was represented by Hanne H. Christiansen and Angélique Prick. The main purpose of the meeting was to discuss agenda items for the Sixteenth and Seventeenth Council meetings, in particular the proposed constitutional changes. The agenda was approved as previously circulated by email. The EC discussed the following topics:

1. Proposed constitutional changes to be voted by Council at the Sixteenth Council meeting; in particular: the organization of regional conferences, the elaboration of Regional Groups.
2. Long-term Plan updates
3. Further constitutional changes and procedures (including mail ballot options)
4. Budget review
5. Membership of the new International Advisory Committee for the International Conference on Permafrost
6. The CAPP project: Carbon Pools in Permafrost Regions

7. Planning for the International Polar Year (IPY)

8. Concluding remarks: It was agreed that it was not necessary to review Working Group progress at the present EC and Council meetings.

JUNE 15, 2005

The Executive Committee (EC) met directly after the Seventeenth Council meeting at the Alfred Wegener Institute. Members present were: Jerry Brown, Charles Harris, Georgy Perlishstein, Don Hayley, Hans-W. Hubberten. Zhu Yuanlin was not present, but was represented by Huijun Jin. The IPA Secretariat was represented by Hanne H. Christiansen and Angélique Prick.

1. Possible replacement of an Executive Member: The question of replacing a member of the Executive Committee between Council meetings was reviewed. Lacking a formal constitutional procedure the Executive Committee will consult Council when such circumstances arise.
2. Next EC meetings: AGU San Francisco meeting in December 2005, and possibly during the Asian Conference on Permafrost, August 2006.

WORKING GROUPS AND STANDING COMMITTEE REPORTS

The following are brief summaries of Working Parties activities for the past year. See *Frozen Ground 27* for goals and other annual reports on the IPA web.

1. ANTARCTIC PERMAFROST AND PERIGLACIAL ENVIRONMENTS

Co-chairs

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Jim Bockheim, USA (bockheim@wisc.edu)

Activities of the working group are jointly sponsored by IPA and the Expert Group on Permafrost and Periglacial Environments (EGPPE) of the SCAR Standing Scientific Group on Geosciences. Following the Madison workshop in November 2004 (reported in *Frozen Ground 28*, p. 12), the following sub-groups were established (leaders in brackets): Database development and management (Beata Csatho, Cheryl Hallam); Permafrost (Ron Sletten); Soils and geomorphology (Jim Bockheim); Permafrost borehole and active-layer monitoring (Mauro Guglielmin).

One outcome of the Madison workshop was to develop a project as a contribution to the International Polar Year (IPY). The Antarctic and sub-Antarctic Permafrost, Periglacial and Soils Environments (ANTPAS) proposal was submitted and received approval from the IPY Joint Committee.

Main goals of the ANTPAS activities are:

- Integrate existing datasets on permafrost, ground ice, active-layer dynamics and soils into a common, web-accessible, database system, and managed in compliance to the IPY data policy.
- Produce a set of thematic maps, at different scales and levels of detail, on Antarctic permafrost and soils as models of our current scientific understanding of the region, including models of subglacial permafrost.
- Utilize non-invasive imaging methods including remote sensing / photogrammetry / GIS, as well as imaging sub-surface conditions with geophysical methods to map soils, bedrock and potential ground ice conditions and surface moisture.
- Develop new techniques for permafrost dating. Searching, mapping and sampling the Earth's ancient permafrost.
- Implement a borehole, active-layer and periglacial process and soils observation and monitoring network along selected environmental gradients using common protocols. This forms the Antarctic component of the IPA-IPY Permafrost Observatory

Project 50. The new active-layer and periglacial process monitoring network extends the Circumpolar Active Layer Monitoring program to the Antarctic region (CALM-S). Soils observations will include contributions to the *Carbon Pools in Permafrost Regions* (CAPP) project.

- Regional studies on the archived records of climate change in past and present permafrost environments.
- Develop the plan for deep borehole drilling, sampling and analyses in the ice-free areas on the Antarctic continent.

The second workshop was held during the EUCOP II conference in Potsdam and was attended by 23 participants from 13 countries. The main goal of the workshop was to discuss progress on the sub-group activities and prepare the final IPY proposal submission. Main outcomes can be summarized as follows:

- Megan Balks has established the ANTPAS website at Waikato University (<http://erth.waikato.ac.nz/antpas/>). The website presents Working Group and related reports, forthcoming meetings, ongoing projects and bibliography updates. One can also sign up to the ANTPAS mail list through the website.
- Database development. A number of important database centres have been identified, notably USGS, Landcare NZ, Gateway Antarctica, and NSIDC. The project requires a central website and database manager that links to these existing databases and needs to be coordinated with IPY data activities and policy. Permafrost and soil mapping approaches require an inventory of existing data and maps. Enrique Serrano and Carlos Schaefer have agreed to lead this inventory.
- An important issue in regards to permafrost and soils monitoring and mapping in the Antarctic region is the fragmented spatial coverage. In order to stimulate the extension of regional coverage measurement protocols are being drafted on soils data collection (M. Balks, J. Bockheim and M. McCleod), permafrost borehole and active-layer monitoring (M. Guglielmin, F. Nelson, G. Vieira) and active-layer process monitoring (J. Boelhouwers and N. Matsuoka). Draft documents will be posted on the ANTPAS website.
- Forthcoming Working Group meetings: July 12-14, 2006, 29th SCAR Open Science Conference, Hobart, Tasmania; August 26 – September 1, 2007, SCAR ISAES Santa Barbara, California; June 23-27, 2008, NICOP, Fairbanks, Alaska.

Contributions on project information and publications are invited and should be submitted to Megan Balks (m.balks@waikato.ac.nz).

2. COASTAL AND OFFSHORE PERMAFROST

Co-chairs

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Nikolai Romanovskii, Russia (nromanovsky@online.ru)

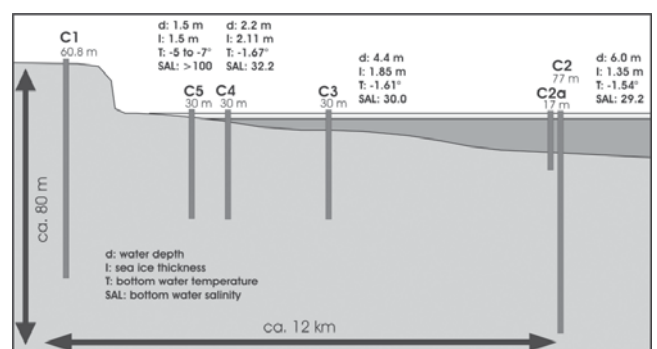
A related activity of the Coastal and Offshore Permafrost (COP) Working Group was an offshore permafrost drilling campaign performed in the Western Laptev Sea in April 2005 by the Research Unit Potsdam of the Alfred Wegener Institute, the Permafrost Institute (Yakutsk), the Arctic and Antarctic Research Institute (St. Petersburg) and the Geoscience Institute of Bremen University within the expedition COAST. Mathematical modelling has been applied in several studies on the offshore permafrost distribution during the last decade and the model results indicate that presently the entire Laptev and East Siberian shelves are characterized by the occurrence of subsea permafrost. Within former river channels (Lena and Yana Rivers) open taliks exist. In the onshore coastal areas, according to these models, the permafrost thickness varies between 400 and 1000 m. However, despite the large number of indirect evidences for the existence of subsea permafrost and its evolution and characteristics, its distribution in the nearshore zone is still poorly understood. During the expedition COAST a transect consisting of five boreholes from the coast to the offshore zone (12 km off the coast) was drilled and cored down to approximately 80 m below sea-level in order to trace the permafrost table in the offshore zone. The methodology included measurements on the temperature and salinity regime in the boreholes, the sedimentological and geocryological composition of the sediments and the chemical characteristics of

the pore water / pore ice. The first results clearly show that relict subsea permafrost exists in the nearshore zone of the Laptev Sea. All boreholes encountered frozen terrestrial permafrost deposits. At 12-km distance from the coast, in a water depth of ca. six meters, the subsea permafrost table is located at approximately 30 m below seabed.

The scientific results of the Arctic Coastal Dynamics (ACD) project developed to the present time were summarized in a special issue (*Geo-Marine Letters*, Volume 25, Number 2-3, June 2005) edited by V. Rachold, F.E. Are, D.E. Atkinson, G. Cherkashov and S.M. Solomon. The report of the 5th International Workshop of the ACD project held in Montreal, October 13-16, 2004, was published in the journal *Reports on Polar and Marine Research* (Volume 506) edited by V. Rachold, H. Lantuit, N. Couture, and W. Pollard. The current focus of ACD is on developing a circum-Arctic coastal GeoInformation System (GIS), which includes a coastal classification and relevant environmental and climate forcing data. The GIS will be made available through an internet-map-server (ARC-IMS) and published on CD-Rom. A first version is presented at the Second International Conference on Arctic Research Planning (ICARP II) in Copenhagen (Denmark), November 10-12, 2005. The Arctic Circum-Polar Coastal Observatory Network (ACCO-Net) was endorsed by the IPY Joint Committee (see page 3). Site selection will be coordinated with the circum-Arctic coastal key sites established within the IASC/IPA/IGBP-LOICZ project Arctic Coastal Dynamics, the river monitoring stations installed at down-stream locations on the six largest rivers draining the pan-Arctic watershed (Yenisey, Lena, Ob, Kolyma, Yukon, Mackenzie) as part of the NSF-ARCSS Freshwater Initiative (FWI), and the pilot version of the Hudson Bay Complex Observatory (MERICA).



The COAST expedition on their drilling campaign.
Photograph by Ralf Junker.



3. CRYOSOL

Co-chairs

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In 2005, the Cryosol Working Group (CWG), an international platform of the IPA and IUSS, continued and intensified scientific exchange on permafrost-soil related topics at various international meetings. In Stockholm, February 3-5, 2005, Eva-Maria Pfeiffer, as a member of the CWG, was asked to be one of chairpersons of the CAPP project. At the EUCOP II conference in June, a CWG-meeting was held where the current and future CWG plans were discussed. Furthermore a one-day excursion with focus on periglacial features of the last three glaciations was organized to the open, brown coal mining area of the Leipzig lowlands.

The highlight of 2005 was the IV International Conference on Cryopedology «Cryosols: Genesis, Ecology and Management» in Arkhangelsk and Pinega, Russia, August 1-8. The meeting was hosted by the Institute of Ecological Problems of the North Ural Branch of RAS, Arkhangelsk. The lead organizer of the conference was S.V. Goryachkin (Institute of Geography, Russian Academy of Sciences, Moscow); assisted by E.-M. Pfeiffer (University of Hamburg). Several groups were active in the organization and sponsoring of the conference besides

CWG: the Commission of Palaeopedology of IUSS and INQUA; the Dokuchaev Soil Science Society; the Institute of Physico-Chemical and Biological Problems of Soil Science, Pushchino; the State Reserve Pinezhsky, Arkhangelsk Region; the Russian Foundation of Academic Research; the Presidium of Russian Academy of Sciences; the German Research Community; and the University of Hamburg (Germany). Over 60 participants from eight different countries, all with an active interest in cryopedology, represented many different areas of soil science. The first four days in Arkhangelsk were formal sessions where 40 papers were presented as well as 15 posters dealing with all aspects of cryosols. There was a very active discussion of the papers and recommendations were made by the group for changes to how cryosols are handled in the WRB.

Three days were then spent on an interesting field trip to the Pinega Region. The field trip focused on «Soils and Perennial Underground Ice of Glaciated and Karst Landscapes in Northern European Russia», in a region characterised by gypsum karst and a large variety of soils. The genesis and classification of several profiles were discussed, including in the perspective of comparing different soil classifications and mapping systems. The group visited the Pinega State Reserve and the very informative Museum of Karst. A large number of young scientists took part in the discussions and made several very interesting presentations; this was of significant importance to many of the CWG founders (founded 1992) as interest in cryosol research has the ability to develop further in the future.



Participants in the IV International Conference on Cryopedology «Cryosols: Genesis, Ecology and Management» in Arkhangelsk, Russia, August 2005. Photograph provided by John Kimble.

Participants warmly thanked the organizer, Sergey Goryachkin, and his helpers, for their excellent job. This report of the Cryopedology conference was prepared by John Kimble who recently retired from a long career in the U.S. Natural Resources Conservation Service.

During the Russian-German Expedition Lena 2005, methane fluxes in permafrost sediments and lakes of the Lena Delta were studied by the University of Hamburg in cooperation with AWI Potsdam (cf. News from Members: Germany). Within a research and education co-operative project between the University of Tyumen (Gas & Oil) and the University of Hamburg (Department of Geo-Science), a field trip to the Nadym and Yamal regions of West Siberia was realized in September 2005. Representative sites were chosen for the planned 2006 student excursion on soil problems and management of the North and for the future research programme between the two institutions.

CWG members participated in the ESF workshop of CAPP in November. They plan to organize a special session during the IUSS, Philadelphia, July, 9-16, 2006. For more details, see the CWG web page: <http://igras.geonet.ru/cwg>

4. GLACIER AND PERMAFROST HAZARDS IN MOUNTAINS

Joint IPA and Commission for the Cryospheric Sciences (CCS)

Chair

Andreas Käab, Norway
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IPA Vice-chair

Bernd Etzelmüller, Norway
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CCS Vice-chairs

Jeffrey S. Kargel, U.S.A. (kargel@hwr.arizona.edu)
John Reynolds, United Kingdom (rgsl@geologyuk.com)

The joint Working Group on Glacier and Permafrost Hazards in Mountains (GAPHAZ) of the IPA and the Commission on Cryospheric Sciences (CCS) organized a second scientific session «Global change: new challenges for assessing glacier and permafrost hazards» within the European Geosciences Union (EGU) General Assembly 2005 held in Vienna. Six speakers presented at the oral session, six at the poster presentation. Further information and the abstracts can be found on: <http://meetings.copernicus.org/egu2005/annotation.html> (Cryospheric Sciences, session CR14). A similar session is planned for the EGU General Assembly 2006.

At the EUCOP II Conference in Potsdam, in June 2005, the Working Group held a meeting where a first draft was discussed concerning international recommendations by GAPHAZ for assessing glacier and permafrost hazards in mountains.

Currently the Working Group is in an advanced stage of compiling a special issue for the journal *Global and Planetary Change* on «Climate change impacts on mountain glaciers and permafrost», and where related hazards play a major role. 13 papers have been submitted and most of the review process was completed by October 2005 (<http://www.geo.unizh.ch/gaphaz/gpc>). Publication is foreseen for early 2006.

For further information see: <http://www.geo.unizh.ch/gaphaz>

5. ISOTOPES AND GEOCHEMISTRY OF PERMAFROST

Co-chairs

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The Working Group met during the Second European Conference on Permafrost. The meeting was attended by H. Meyer, R. Sletten, E.M. Pfeiffer, B. Stenni, I. Streletskaia, K. Yoshikawa, E. Korobeva. The need to establish standard methods and a geochemical database for ground ice was reiterated. The implementation of this database will require input from the WG members and others. It was proposed that a literature database be established on the website with relevant publications on isotopes and geochemistry of permafrost.

A special, well-attended session was held at EUCOP II titled «Mineralogy, geochemistry and isotopes in permafrost research». The strong interest in this session resulted in seven posters and seven oral presentations and indicates that similar sessions should be held at future permafrost meetings. These sessions bring together researchers actively involved in diverse studies of isotopes and geochemistry of ground ice, and foster further cooperation.

Within the framework of the WG, one of the main achievements is the extensive new collaborations that have been established among its various members. Examples of these collaborations include: the study of oxygen isotopes in lacustrine diatoms of Greenland (Alfred Wegener Institute and University of Washington); and ground ice studies in the permafrost tunnels in Fairbanks and Barrow, Alaska (University of Alaska-Fairbanks, and Alfred Wegener Institute). The first results of these cooperative efforts were presented at EUCOP II.

A circum-Arctic network for the sampling of precipitation has been initiated based on the GNIP (Global Net-

work of Isotopes in Precipitation) protocol provided by the IAEA-WMO program (www.iaea.org): «Routine sampling and analytical protocol for stable oxygen and hydrogen isotope in precipitation in the Arctic regions». Stations in this network have been installed in Yakutsk and Tiksi. Stations in Svalbard, Barrow, and Yamal are planned. Individuals or groups sampling arctic precipitation on a regular basis are invited to join this network and should contact Hanno Meyer or Ron Sletten.

We encourage interested individuals to become members of the Working Group and to fill out the questionnaire (<http://www.awi-potsdam.de/www-pot/geo/isochem-wg.html>) and to join the email list server (isochem-wg@awi-potsdam.de). Instructions for joining are on the web site. The next planned meeting of the WG is at the Asian Conference on Permafrost to be held in Lanzhou, China, August 2006. Other informal meetings may be held at AGU, EGU, Russia, and other venues prior to the meeting in Lanzhou.

6. MAPPING AND MODELLING OF MOUNTAIN PERMAFROST

Co-chairs

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During the First CliC International Science Conference in Beijing in April 2005 several members of the WG met to continue the discussion on establishing a uniform classification for Central Asian permafrost. Later, during the International Conference in Pushchino in May 2005 discussions on classification and uniform legend of the Central Asian permafrost map were continued together with Russian colleagues. Several draft legends for the proposed Central Asian map includes innovations in the classification and permafrost distribution description. N. Sharkhuu demonstrated a highly comprehensive legend and sample of the permafrost map of the Hovsgol Mountain region (scale 1:1,000,000). There has been an effort to combine different approaches to permafrost mapping including geomorphologic and landscape mapping for permafrost modelling validation.

Because Central Asian permafrost exists both within the mountains and in relatively low relief areas, a first step toward classification was accepted to distinguish the two major classes of permafrost based on altitude factor: lowland (latitudinal) permafrost and highland (altitudinal) permafrost. The lowland permafrost distribution can be delineated using areal percentage and classified as presented

on the IPA permafrost map. It was suggested to distinguish plateau and mountain permafrost within the class of altitudinal permafrost. The high topographic complexity of mountain terrain further complicates the distribution patterns. Distribution depends on various factors and does not conform to conventional «continuous», «discontinuous», and «sporadic permafrost» within the high-mountain area. Most likely, mountain permafrost distribution would be modelled and mapped by its lower altitudinal limit.

We also appreciate the assistance of Alan Heginbottom and Bernd Etzelmüller with their useful ideas and participation in the electronic discussion on Central Asian permafrost classification. Some results of the above activities will be presented at the conferences in Russia (May 2006) and Lanzhou, China at the Asian Conference on Permafrost (August 2006) and where future WG activities will be discussed. Members of the WG plan to visit permafrost regions in Kazakhstan and the Tien Shans prior to the Lanzhou conference and participate on the Plateau excursion.

7. PERIGLACIAL LANDFORMS, PROCESSES AND CLIMATE

Co-chairs

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Subgroup Chair, Spatial Variability

Achim A. Beylich, Norway (Achim.Beylich@ngu.no)

The Working Group addresses periglacial processes and their coupling to climate, and new methodologies to investigate and monitor such geomorphic processes. The WG will contribute towards a better understanding of the periglacial geomorphic effects of climatic variations, past, present and future. This is carried out on the modern background of increasingly awareness of a series of modes of variability within the global climate system, which operate over a range of temporal and spatial scales.

A project on «Global network for monitoring periglacial processes and associated environmental parameters» was started in 2004. The first step is to construct model experimental sites in Adventdalen, Svalbard, which will allow us to standardize the monitoring techniques and promote the activity effectively. In the summer of 2004, an ice-wedge site was instrumented with sensors for recording horizontal and vertical ground movements, crack generation, soil moisture and temperature and snow depth. A rockwall site was also constructed to monitor rock-joint widening, moisture and near-surface temperature. In the summer of 2005, the first data from the two

sites were collected. Furthermore, a new 15-m deep borehole was drilled into a rock glacier and instrumented with temperature sensors and three inclinometers that monitor permafrost creep.

A multi-authored field manual has been in preparation over the past several years and can be downloaded from the IPA web site. This field manual continues to receive new contributions and updates.

During 2005 the following periglacial meetings were held:

- The Second SEDIFLUX meeting, «Shifting Lands. New insights into periglacial geomorphology», Clermont-Ferrand, France, January 20-22.
- EUCOP II, Potsdam, Germany. Sessions on Periglacial landforms and cryogenic processes and Hydrology and sediment fluxes in permafrost regions.
- PACE21, coordination group meeting, Cardiff, U.K., December 13.

During the year, liaison with the new International Geographical Union (IGU) *Commission on Cold Region Environments* continued. The IGU commission is co-chaired by Martin Gude (Germany) and Christer Jonasson (Sweden).

8. PERMAFROST AND CLIMATE

Co-chairs

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Frederick Nelson U.S.A. (fnelson@udel.edu)

Subgroup Chairs

Model Inter-comparison: V. Romanovsky, U.S.A.

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Monitoring: S. Smith, Canada (SSmith@NRCan.gc.ca)

The overall goal is to investigate interactions between permafrost and climate: past present and future. Working Group activities continue on a variety of fronts, several of them connected with international commissions and bodies concerned with climate change and its impacts. The Intergovernmental Panel on Climate Change (IPCC) continues work on its Fourth Assessment Report (FAR), which in late 2005 underwent review of its First-Order Draft. Tingjun Zhang is Lead Author on Chapter 4 of the IPCC Working Group I chapter concerned with changes in snow, ice and frozen ground. Oleg Anisimov is Coordinating Lead Author of the IPCC Working Group II chapter on the polar regions. The Arctic Climate Impacts Assessment released its report in 2005; permafrost and related climate-change issues are discussed in Chapter 6, «Cryosphere and Hydrology», of which Anisimov was a co-author.

Preliminary results from the permafrost-model intercomparison project, described briefly in *Frozen Ground* 28, p. 19 and funded by the U.S. National Sci-

ence Foundation, were presented at international conferences in Pushchino, Potsdam, and San Francisco during 2005. Co-principal investigators on the project are Nikolia Shiklomanov (University of Delaware), Tingjun Zhang (University of Colorado), Vladimir Romanovsky (University of Alaska-Fairbanks) and Oleg Anisimov (Russian State Hydrological Institute). Another spatially oriented project, tentatively titled «Permafrost in Central Asia», is concerned with mapping, monitoring, and modelling permafrost in mountainous regions of Kazakhstan, China, and Russia. A proposal to the National Geographic Society for support of this work is pending; participants include several Working Group members.

The IPA Permafrost and Climate Working Group is closely involved with many of the permafrost-oriented International Polar Year activities described elsewhere in this issue, primarily through the IPY projects designated *Thermal State of Permafrost* and *Antarctic and sub-Antarctic Permafrost, Periglacial and Soils Environments*. A protocol for borehole instrumentation and data collection under the *Thermal State of Permafrost* (TSP) component of GTN-P I is being developed. As part of GTN-P, Vladimir Romanovsky and Sergei Marchenko prepared a preliminary map showing the adequacy of the existing borehole network. Similar analytic treatment is planned in 2006 to assess the spatial coverage of the CALM network.

Permafrost is treated in several of the ICARP II draft report's chapters, most extensively in Chapter 7, *Cryosphere and Hydrologic Processes and Systems*. Lively discussions attended the presentation of a preliminary version of the report's contents and more information about permafrost and related phenomena is to be included in the finalized version. Three open forum presentations were made in a plenary session at ICARP II to address subjects not represented adequately in the main report. One of these presentations, made by Jerry Brown and titled «Response and Role of Permafrost on a Warming Planet» demonstrated the importance of permafrost in both the natural and human-impacts aspects of climate-change science.

The International Geographical Union's Commission on Cold Regions Environments primary aim is to develop and disseminate information about sustainable land use in changing cold environments. The hazards associated with thawing permafrost are a central concern of this work. The Commission's long-term activities and plans were described in presentations at the EUCOP II in Potsdam in June and discussed at the ICARP II meeting in Copenhagen in November.

Permafrost continues to be a major focus at the Fall Meeting of the American Geophysical Union. The 2005 meeting in San Francisco featured nearly 50 presentations under the heading «Permafrost and Seasonally Frozen Ground in a Changing Climate», organized by Stephan Gruber, Tingjun Zhang, and F. E. Nelson. A special issue of the Earth Surface section of *Journal of Geophysical Research* based on conference presentations is currently in preparation.

9. PERMAFROST ASTROBIOLOGY

Co-chairs

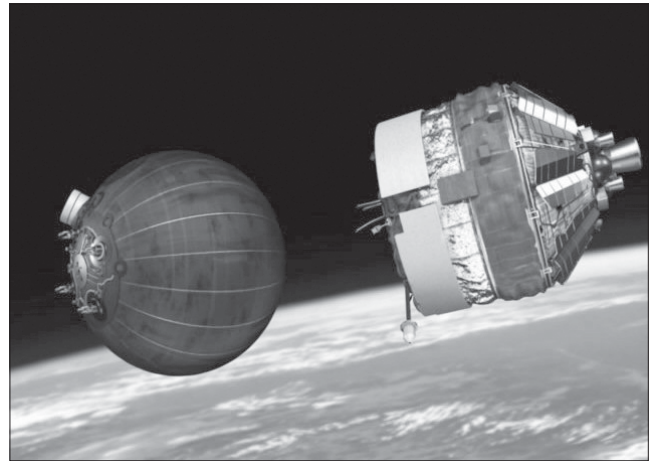
David Gilichinsky, Russia (gilichin@online.stack.net)

Christopher P. McKay, U.S.A. (cmckay@arc.nasa.gov)

The first permafrost samples were sent into space on board the «Foton» satellite from May 31 - June 14, 2005. The experiment «PERMAFROST» started from the Baikonur base within the European Space Agency «BIOPAN» project and was prepared by scientists and students of Soil Cryology Laboratory (Institute for Physico-chemical and Biological Problems in Soil Science, Russian Academy of Sciences, Pushchino). The idea behind the BIOPAN PERMAFROST experiment was to expose permafrost samples of different ages with known communities of viable palaeomicroorganisms to the space environment. When the samples returned to the Earth, knowing the environmental parameters of travel, the microbial characteristics were examined (number of viable cells, biodiversity, DNA structure and metabolic activity in frozen / thawed state). These data will help to understand if such a travel is lethal for microorganisms preserved within frozen ground, and finally, to confirm (or not) panspermia, i.e. the possibility to transport the organisms within the cryogenic meteorites to the Earth. Astrobiology became a cross-cutting theme that broadly defines research on the origins and evolution of life on Earth, and technologies and instruments to detect life on other planets such as Europa and Mars.



Drilling sites on permanently frozen volcanic deposits of the Klyuchevskaya volcano group as a model of Martian ecosystem. Photograph provided by David Gilichinsky.



The FOTON satellite with the experimental facility mounted on the outside of the carrier satellite, allowing the experiments to be exposed to the vacuum and the full spectrum of radiation environment of the outer space. Photograph provided by David Gilichinsky.

Permafrost Astrobiology related meetings in 2005 include: «Planetary Cryology» (at the International Conference on «Priorities in Earth Cryosphere Research», Pushchino), «Cryology of planets» (at the Third Conference of Russian Geocryology, Moscow), «Permafrost as an analog for extraterrestrial systems» (EUCOP II, Potsdam), and «Mars Exploration: Earth Analogies» (AGU meeting, San Francisco).

An interdisciplinary field expedition with astrobiology interest is planned in summer 2006 by the NASA Astrobiology Institute together with the Russian Astrobiology Centre. Activities will include: studying the thermophilic microbial community in frozen volcanic deposits of the Klyuchevskaya volcano group (Kamchatka peninsula) as a model of Martian ecosystem; sampling for microbiologic analyses of frozen volcanic deposits; measuring temperature and ground radiation, structure and contents of gas components, ice content, chemical and grain composition, organic carbon content; and developing isolation bacteria cultures from frozen samples in order to study their biodiversity. For more information contact: Rosalind A. Grymes or Patricia Gregory and see: <http://nai.arc.nasa.gov>

The study «Utilization of fluorescent microspheres and a green fluorescent protein-marked strain for assessment of microbiological contamination of permafrost and ground ice core samples from the Canadian High Arctic» was published in *Applied and Environmental Microbiology* (2005, v. 71, N 2). Permafrost astrobiology related chapters were also published in the monograph «Life in Ancient Ice» (eds.: J. Castello, S. Rogers, Princeton University Press, 2005).

STANDING COMMITTEE ON DATA, INFORMATION AND COMMUNICATIONS

Co-chairs

Roger G. Barry, U.S.A. (rbarry@nsidc.org)

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The Frozen Ground Data Center (FGDC) at NSIDC recently released a digital version of «Geocryology and Geocryological Zonation of Mongolia», which includes maps of general geocryological regions based on factors such as elevation, mean annual air temperature, and freeze/thaw depth. Locations of specific cryogenic phenomena are also included. The maps are available as ESRI shapefiles. They were digitized from two plates in the 1990 National Atlas of Mongolia (Sodnom and Yanshin, 1990). One source map was at a scale of 1:4,500,000 and the other at 1:12,000,000. Data are available at: <http://nsidc.org/data/ggd648.html>

Through the ICSU-WMO Joint Committee for the IPY, an IPY Data Policy and Management Subcommittee has been established. This group, co-chaired by Mark Parsons, NSIDC, will assist and guide IPY data management. The NSIDC IPY Expression of Intent Data and Information Service (DIS) for Distributed Data Management was approved. To begin the implementation, NSIDC received two awards: «Development of a Strategy and Architecture for an IPY Data and Information Service: A Planning Proposal» from NSF-OPP. The main element of this will be a workshop to be held in early 2006 at the British Antarctic Survey (BAS), Cambridge. NSIDC has also been informed that the NASA-ACCESS program will support a project: «Discovery, Access, and Delivery of Data for the International Polar Year (IPY) (DADDI)». The focus is on the Arctic coastal zone data that will support a wide community of users.

A brief meeting of SCDIC chaired by S. Smith was held during the EUCOP II in June 2005. Status reports on GTN-P and FGDC were provided. Much of the discussion was related to future plans including data management activities associated with IPY. It was suggested that a CD which contains the «data snapshot» such as that collected as part of the TSP project could be produced. This would be in addition to a CAPS3 CD that would be released in 2008 at the NICOP in Fairbanks. A number of suggestions were made regarding the contents of CAPS3 and there was support for including previous ICOP proceedings on the CD.

R. Barry was co-chair of the Scientific Organizing Committee of the CliC First Science Conference (see re-

port in Other News). The first IGOS (Integrated Global Observing Strategy) Cryosphere Theme workshop was held in Calgary, Alberta, in March 2005. S. Smith led the permafrost writing team and attended the workshop. A draft of the Cryosphere theme document is under review and revision.

Other activities include participation in the 2005 Fall AGU and the 2005 meeting of the Association of American Geographers in Denver, Colorado (www.geography.hunter.cuny.edu/AAG_CrSG).

Recent publications include:

Barry, R.G. (Contributor) 2004. Implementation Plan for the Global Observing System for Climate in support of the UNFCCC. GCOS 92 (WMO/TD No. 1219), Geneva.

Zhang, T., Barry, R.G. and Armstrong, R.L. 2004. Application of satellite remote sensing techniques to frozen ground studies. *Polar Geography* 28(3): 163-196.

Data Products:

Smith, S.L., Burgess, M.M., Chartrand, J. and Lawrence, D.E., 2005, Digital borehole geotechnical database for the Mackenzie Valley/Delta region, Geological Survey of Canada Open File 4924, 1 CD ROM.

INTERNATIONAL ADVISORY COMMITTEE FOR THE INTERNATIONAL CONFERENCE ON PERMAFROST

Chair

Antoni G. Lewkowicz, Canada (alewkowi@uottawa.ca)

The mandate of the IAC is to provide continuity in maintaining policies for the International Permafrost Conferences (ICOP) and to provide advice in other matters as requested by the hosting member or the Executive Committee of the IPA. Membership in the new IAC was ratified at the Potsdam IPA Council Meeting. The new Chair, Antoni Lewkowicz (Canada), was a member of the previous IAC and was in charge of the Technical Program at the 1998 Yellowknife Conference. The other members are all well-known figures in the permafrost community and attendees of multiple ICOPs: David Gilichinsky (Russia), Huijun Jin (China), Truls Mølmann (Norway), and Marcia Phillips (Switzerland) who handled the review and publication of papers for the Eighth ICOP. The IAC is about to start its work providing feedback and suggestions to the NICOP organizers.

NEWS FROM MEMBERS

Members are encouraged to submit periodic updates of activities for posting on the IPA Web site.

AUSTRIA

Most of the permafrost research in Austria is carried out by the research groups in Innsbruck and in Graz. The Innsbruck group (K. Krainer) is continuing rock glacier monitoring in the western Stubai and Oetztal Alps (hydrogeology, ground temperature, surface velocities). Furthermore investigations on active rock glaciers in South Tyrol (Central Alps and eastern Dolomites) started with similar thematic focus using georadar information.



A multiunit or polymorphic relict rock glacier from Late-Glacial times in the Niedere Tauern Range, Austria. Photograph by A. Kellerer-Pirklbauer.

The Graz group focuses on active rock glaciers in the central Alps of Austria. The Institute of Remote Sensing and Photogrammetry (Graz University of Technology) continued annual geodetic measurements on Doesen, Hinteres Langtalkar and Weissenkar rock glaciers and presented a final report on the applicability of differential SAR interferometry using ERS-1/2 data for measuring surface deformation of glaciers and active rock glaciers. In a case study, ground-based photogrammetric methods were used successfully for deriving metric information on surface deformation and flow velocity.

Since 2000 the front of the highly active Hinteres Langtalkar rock glacier has been monitored by terrestrial laser scanning (Riegl LPM-2k Long Range Laser Scanner and the software GeoScanner) by Joanneum Research in order to better understand rock glacier front processes with high temporal and spatial resolution. More recently, studies on geomorphic processes were emphasized to improve our knowledge on processes in the nourishment areas of active rock glaciers.

Beside these activities, research also focuses on lower mountains of eastern Austria. The Niedere Tauern range

(Styria) is of particular interest because of widespread occurrence of multi-unit relict rock glaciers, possibly attributed to different stages of the Late-Glacial period. Thus in this mountain area, palaeo-permafrost investigations will give information on permafrost distribution at its spatial limits and on glacial and periglacial landscape evolution.

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CANADA

At the University of Ottawa, Antoni Lewkowicz and his graduate students are undertaking permafrost research in the mountains of northwest Canada (supported by the Yukon Geological Survey, YGS and the Geological Survey of Canada, GSC as well as NSERC) and on Ellesmere Island (with PCSP support). One project is to test the BTS method to map permafrost probability in extreme northwestern British Columbia (Haines Road) and in the southwest Yukon (Ruby Range), where one of the steepest precipitation gradients in Canada occurs. Preliminary results suggest that the BTS method can be applied successfully and that the lower limits of permafrost rise by about 200 m between the two sites. A second project is focused on the effects of forest fire on landsliding over permafrost in the area around Dawson (Yukon) where numerous fires occurred in 2004. Shallow landslides developed immediately following the fires but more were predicted for 2005 and indeed occurred. A third project examined thermokarst development in ice-rich terrain within a mid-elevation valley near Whitehorse (Yukon). Degradation has been considerable in the past 50 years but it appears that this is only the latest event during the late-Holocene in formation and degradation of permafrost in the area. In an adjacent valley, the contemporary dynamics of a palsa field that is influenced by drainage changes is being monitored.

Numerous new detachment failures occurred on the Fosheim Peninsula (Ellesmere Island) as a result of the warm and sunny conditions in August 2005. Frost tubes installed by the GSC suggest that the summer of 2005 was one of the warmest in the last 10-15 years. Some detachment failures were observed to develop in one or two hours, while others continued to enlarge for several days.

Current research activities at the University of Alberta Geotechnical Centre focused on the micro structural processes during the freezing and thawing of fine- and coarse-grained soils (Lukas Arenson, Dave Segó). Initially, the freezing process was observed under different temperature boundary conditions and pore water salinities. Animations of one-dimensional freezing tests can be downloaded from: <http://www.engineering.ualberta.ca/geotechnical/frozenSoils.cfm>. Subsequent investigations are focused on ice lens formations, frozen fringe development and frost heave within frost susceptible fine grained samples.

Permafrost research at the University of Calgary is concentrated in the Departments of Civil Engineering, Geology & Geophysics and Geography. Jocelyn Grozic and her team have developed a laboratory for modelling the properties of gas hydrates including being able to create and decompose them under controlled conditions. Brian Moorman's team is currently focusing on the development of new geophysical techniques for imaging permafrost and glacier hydrology, studying the interaction between shallow sea water, floating and bottom fast ice and sediment deposition and the impact on the thermal regime and structure of permafrost in outer the Mackenzie Delta. One of Masaki Hayashi's foci is cold region hydrology investigations including studying water and energy cycles in the discontinuous permafrost region, hydraulic properties of peat, and snowmelt infiltration. With the increase in hydrocarbon exploration and development in the Mackenzie Delta, the CREWES group has been working on seismic imaging in permafrost zones. Increased interest in manned exploration of Mars has lead to research by a team lead by Rob Stewart to investigate the best way to explore for subsurface ice on Mars using shallow geophysical methods. This is being undertaken by using Mars analogues in the permafrost areas of northern Canada.

Benoit Beauchamp was recently appointed as the director of Arctic Institute of North America (University of Calgary).

An on-going study of massive ground ice in coarse-grained deposits and its implications for granular resource inventories is being conducted in the Mackenzie Delta and Tuktoyaktuk Coastlands by Wayne Pollard and researchers from McGill University in collaboration with Robert Gowan, Canadian Department of Indian Affairs and Northern Development. Supported by PERD and DIAND, this study addresses questions about the nature, origin, distribution, and significance of massive ground ice in deposits identified as potential sand and gravel borrow sites. In 2004-05 fieldwork focused on capacitive coupled resistivity surveys at sites including the Ya-Ya Esker borrow site (Richard's Island), the Tuktoyaktuk local granular sites (E of Tuktoyaktuk Harbour), and the massive ice at Peninsula Point (SW of Tuktoyaktuk). This research formed the basis of an MSc thesis by Greg De Pascale (McGill University).

The McGill team lead by W. Pollard is also involved in a project concerned with the sensitivity and rates of erosion of ice-rich coasts in the southern Beaufort Sea. This project is funded by NSERC, NRCan and ARCTICNET and is part of the Arctic Coastal Dynamics project. This study involves a combination of geophysical surveys, shallow coring, mapping of coastal sections, remote sensing and modelling. Soil organic carbon content measurement and carbon isotope analyses are used to assess potential climate change feedbacks (Nicole Couture, Hugues Lantuit, Greg De Pascale, Tim Haltigin, and M.D. Azhural Hoque).

Permafrost research at Carleton University has been rejuvenated through the NSERC Northern Chair Program in Permafrost (Chris Burn) in the Yukon and Northwest Territories. Currently, eleven graduate students in physical geography are working in this area, and two new faculty members were appointed in association with Chair activities: Sean Carey, with expertise in hydrology, and Elyn Humphries, with interests in surface energy and mass fluxes. Sivan Parameswaran, who has a long-term interest in the electrophysics of freezing soil is an adjunct member of the Department. A large proportion of the research conducted under the Chair program has been in the Mackenzie delta area and along Canada's western Arctic coast. Some of this is a contribution to the IPA's GTN-P IPY project, providing temperature profiles in permafrost to depths of 50 m at Garry Island, Illisarvik, and Paulatuk (Northwest Territories), and Herschel Island, Old Crow, Mayo and near Whitehorse (Yukon). This lead to several papers on ground ice conditions in the Mackenzie delta area (with our former Postdoctoral Fellow Steve Kokelj), and on the thermal regime of tundra and boreal lakes. The program is in collaboration with J.R. Mackay. The September 2005 issue of the *Canadian Journal of Earth Sciences* published a joint publication summarizing over 50 years of observations on some of the best developed ventifacts in Canada, found near Paulatuk. Joint investigations continue at Garry Island and Illisarvik each year on the development of ice-wedge polygons, the response of permafrost to climate change, especially changes in snow conditions, and the behaviour of sub-permafrost pore water during permafrost aggradation.

At Carleton University, the current graduate-student projects in permafrost are largely conducted in partnership with northern agencies, particularly the Department of Indian Affairs and Northern Development, the Yukon Department of Environment, and the Ekati diamond mine. Kumari Karunaratne (PhD) is working on permafrost conditions in the Slave Province, north of Yellowknife, with an interest in permafrost aggradation into saturated mine tailings. Peter Morse (PhD) is examining snow depth variation in the outer Mackenzie delta and its association with changes in permafrost conditions. Mike Palmer (MSc) has completed fieldwork on factors controlling changes in ground temperature across tree line near the western Arctic coast. Julian Kanigan (MSc) and Thai Nguyen (MSc) expect to work next summer on permafrost conditions in the Mackenzie delta, particularly recent response to climate warming and the spatial distribution of unfrozen ground within the delta. Pascale Roy-Léveillé (MSc) is studying the spatial distribution of snow in the Ogilvie Mountains, and its relationship with plant distributions and permafrost. Celina Ziegler (MSc) has started a project on the use of isotopes for hydrograph separation in a small drainage basin near Whitehorse.

The Geological Survey of Canada (GSC), with support from the Government of Canada's (GoC) Northern

Energy Development (NED) Program, has initiated a detailed inventory of landslides in the Mackenzie Valley between Inuvik and Tulita (Réjean Couture, Simon Riopel). This new study initiative contributes to providing geoscience information for hydrocarbon exploration and development in the Beaufort Sea, Mackenzie River Delta, and Mackenzie Valley. To date, over 1800 landslides and other natural terrain hazard features (e.g. karst sink holes, rock glaciers) were mapped in the study area and integrated into a GIS platform. At present, about 40% of the study area was mapped using over 650 air photos acquired in 2004. The completion of the landslide mapping is expected by the end of 2006.

As part of the NED Program, the GSC has also initiated a geotechnical project to investigate slope failure mechanisms associated with landslides in the Mackenzie Valley (Baolin Wang, Susan Nichol, Xueqing Su). The objective of this project is to improve understanding of factors causing slope failure and landslide processes. Initial site reconnaissance and preliminary site investigations have been conducted along the northern half of the Mackenzie Valley. More focused drilling, sampling and testing activities are planned.

Field investigations continued in 2005 with investigations of coastal permafrost in the vicinity of the Mackenzie Delta (Steve Solomon, Gavin Manson). Thermistor cables were installed in 10 m boreholes along an onshore-offshore transect. Ground penetrating radar (B. Moorman and C. Stevens, University of Calgary) and electrical resistivity (W. Pollard and G. De Pascale) surveys revealed dramatic changes in the thickness and extent of ice-bonded sediments. GPR surveys were also used to validate synthetic aperture radar interpretations of the extent of bottomfast ice. Summer surveys included shallow boreholes to investigate sediment stratigraphy and pore water geochemistry in areas of extensive dead vegetation. One logger provided a unique record of nearshore temperatures from April to August. Surveys were also undertaken in Tuktoyaktuk to monitor coastal erosion and in



Fresh detachment failure developed due to rapid thaw on the Fosheim Peninsula, Ellesmere Island, August 2005. Photograph by Antoni Lewkowicz.

the Pingo Canadian Landmark to ascertain the elevation of Ibyuk Pingo.

J.D. Mollard and Associates located and terrain mapped three alternative road routes, all originating in Rankin Inlet, Nunavut, with three destinations in northern Manitoba. All routings traverse the continuous and widespread continuous permafrost zones.

EBA Engineering Consultants Ltd. (EBA) was retained to support Natural Resources Canada's (NRCan) Reducing Canada's Vulnerability to Climate Change Program within a study on «Sensitivity to Climate Change in Northwest Territories Communities». Analyses were undertaken to estimate the approximate timeframes when remediation/adaptation of infrastructure might be required, and the associated approximate costs. The building foundations in communities in the Inuvik region are, as a group, the most sensitive to climate change impacts. This area is characterized by continuous, but warm permafrost. The small communities in the southern Northwest Territories generally exhibit relatively low sensitivity because permafrost is generally sporadically present in this area.

A detail permafrost map at a scale of 1:10,000 of Imperial Oil's TAGLU site located on Richards Island in the Mackenzie Delta was compiled for the Mackenzie Gas Project by V. Roujanski of EBA Engineering based on available geological, geotechnical and geophysical field data (gathered over a period of 30 years by EBA, R.M. HARDY, GSC and IORL), ground temperature monitoring and aerial photography interpretation. The compiled permafrost map synthesizes the collected data and shows the interpreted spatial distribution of mean annual ground temperatures, lithology, ground ice content, surficial geology and permafrost-related landforms.

In March 2005, Don Hayley, Principal Engineer and Senior Vice President of EBA Engineering Consultants Ltd, member of the Canadian National Committee for the IPA and member of the IPA Executive Committee, was awarded the Julian C. Smith Medal by the Engineering Institute of Canada. The award, the second most senior award of the Institute which represents all the learned engineering societies in Canada, recognized Don's contributions to the «development of Canada's North». For further details and the full citation of the award, see: www.eic-ici.ca/english/tour/haf2

The application and environmental impact studies for the proposed Mackenzie Gas Project were filed in October 2004 triggering the regulatory review process. The project will involve the development of three onshore natural gas fields in the Mackenzie Delta, and the transport of natural gas and natural gas liquids via buried pipelines south through the continuous and discontinuous permafrost regions of the Mackenzie valley to NW Alberta. Many permafrost scientists and engineers, from government, universities and the private sector, were actively involved this last year either in the technical aspects of the project investigations and design, or its Environmental Assess-

ment review under a Joint Review Panel (JRP). For further information, see: www.ngps.nt.ca.

In September 2005, the Government of Canada announced that it will provide \$150 million in new funding over six years to support innovative, interdisciplinary research for the International Polar Year (IPY). The targeted science and research program will focus on two of Canada's most important challenges for its northern regions: climate change impacts and adaptation, and the health and well-being of northern communities. Funds will be allocated, through a competitive, peer-review process, to academic, government and private sector researchers. For additional information on IPY in Canada, see: www.ipy-pi.ca and www.ualberta.ca/~ipy (Canadian Secretariat).

As part of the APEGGA annual conference, a two-day workshop «Permafrost Geophysics: A Workshop on Hydrocarbon Exploration in the Arctic» brought together in April 2005 over 150 geoscientists interested in exploration in permafrost areas. Much of the workshop was dedicated to improving our abilities at imaging the hydrocarbon structures in permafrost regions, however shallow geophysics for geotechnical and environmental applications was also discussed. The workshop received such an overwhelming response, a CD of the presentations and other material is currently being compiled for release in 2006.

The University of British Columbia will host on February 17, 2006 a celebration and colloquium to mark the legacy and continuing achievements of J. Ross Mackay in commemoration of his 90th birthday. Six short lectures, chosen to represent various aspects of J. Ross Mackay's career, will be delivered during the day, and other contributions will be presented in a poster session. There will be a dinner following the colloquium. The celebration is sponsored by the Department of Geography at UBC, the NSERC Northern Chair in Permafrost in the Yukon and Northwest Territories, and the Canadian National Committee for the IPA. All are invited to attend and participate in this celebration, but are advised to register before February 1, 2006. Full details are available at www.geog.ubc.ca/mackay2006

The CNC-IPA is co-sponsoring a permafrost session at the upcoming Geological Association of Canada annual meeting scheduled for May 2007 in Yellowknife, NWT. This conference represents an opportunity for the Canadian permafrost community to get together prior to the Ninth International Conference on Permafrost in Fairbanks. For further information, see: www.nwtgeoscience.ca/gac_mac

The semi-annual Coastal Zone Canada conference will be held in Tuktoyaktuk in August 2006. The venue will focus coastal investigators and managers on Arctic issues. A session on Arctic coastal processes and infrastructures is being planned along with a field trip to the Tuktoyaktuk area. For further information, see: www.czc06.ca

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CHINA

Permafrost research in China focused in 2005 on the construction of the Qinghai-Tibet Railway which will be completed by October 2005. The Cold and Arid Regions Environmental and Engineering Research Institute (CAREERI), Chinese Academy of Sciences (CAS), was involved in revisions of the pavement design for ordinary embankment, as well as for viaducts on ice-rich, warm permafrost, at an estimated cost of 1.7 billion Yuan (about 200 millions USD). This research focuses mainly on field and laboratory observations, in combination with numerical simulations; it takes into account climatic warming scenarios. This research programme will come to an end in 2006, but monitoring the interactions of permafrost and the railway will continue. Moreover, another important research programme supported by the Railway Ministry, «Installation of long-term monitoring systems along Qinghai-Tibet Railroad», just started, with an estimated cost of 60 millions Yuan (about 7 millions USD). It involves soil temperature monitoring and foundation deformation at 76 railway cross-sections.

Some engineering investigations along highways on the Qinghai-Tibet Plateau and in northeastern China were carried out to reduce problems linked to frost heaving and thaw settlement. A part of the oil pipeline from Russia was also discussed, with some preliminary permafrost investigation along the proposed routes in northeastern China. A preliminary survey of frost heaving of foundation soils, along the ambient temperature product oil pipeline from Golmud to Lhasa, was conducted jointly by the Corps of Engineers of the People's Republic of China and CAREERI.

The Institute of Tibetan Plateau (ITP), CAS, was established in 2004, with its headquarters in Lhasa, Tibet, two branch offices in Beijing and Kunming, and a faculty body of about 30 that is undergoing rapid growth. The ITP focuses on terrestrial processes, including the geophysics of the Qinghai-Tibet Plateau, land-surface processes, biodiversity and endangered species. Three field stations were established in the Namcuo Lake (for lacustrine processes), Linzhi (for forest ecosystems), and Dingri (for alpine tundra) near Mount Everest. Alpine permafrost is found above 5800 m in the Namcuo Lake and Dingri areas; it will be studied within research projects linked to the long-term programmes and the recently granted National 973 Key Program «Cryosphere and Global Change on the Qinghai-Tibet Plateau». The programme «Evolution of the QTP since the Holocene and its Relationship with Ecosystems» also includes some permafrost research projects focusing on active layer processes, carbon pools in permafrost and greenhouse gases emissions.

The CAS Institute of Geology and Geophysics in Beijing, the Institute of Earth Environment in Xi'an, CAREERI, and Lanzhou University are conducting research on lacustrine sediments and aeolian deposits on

the Qinghai-Tibet Plateau near Qinghai Lake, Qidam Basin, and in the western part of the QTP. The desertification processes and wind erosion, as well as erosion linked to frost and thawing processes, are some of the dominant processes in Tibet, which is the third largest desertic province (autonomous region of China).

The Harbin Institute of Technology, Transportation Research and Hydraulic Science Research established in 2005 a new geotechnical engineering laboratory dedicated to frozen soil mechanics and engineering. A field station on seasonally frozen ground was also established in Harbin for hydraulic and road engineering purposes in northeastern China. The observations collected will be quite important for the proposed and presently in-design Daqing to Shenyang Express Highway, which requires «no heave or settlement».

The First Asian Conference on Permafrost is in preparation and will include some major activities. Guodong Cheng, Jerry Brown, Hans Hubberten, Michael Davies and many other local and international organizers have met to plan the Conference, while attending the April CliC Conference in Beijing, during the EUCOP II conference in Potsdam, and in Lanzhou. Several workshops and excursions will focus on the classification of permafrost of Central Asia and the contributions of borehole measurements to the International Polar Year.

A meeting on ecological and sustainable development of the sources of the Yellow and Yangtze River was organized in Xining, Qinghai Province; with permafrost as one of the major topics, had large success. The Chinese government is indeed spending 7.5 billions Yuan (about 1 billion USD) in ecological mitigation in order to solve the problem of overgrazed grasslands. The Conference on High Elevation Glaciers and Climatic Change was successfully held September 5-9, 2005. Another conference on the Qinghai-Tibet Plateau was held in Guilin, Guangxi Zhuang Autonomous Region in October 2005.

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DENMARK

The Society of Arctic Technology (SAT) arranged meetings with Danish and Greenlandic and foreign experts related to technologies adapted to the special climatic, geological and social relations in Polar Regions. In 2004-2005 climate change and permafrost was addressed at a number of meetings. SAT is the national contact for Denmark to the IPA.

A pilot project «Permafrost degradation and infrastructural consequences in West Greenland» was initiated in 2004 by the Danish Meteorological Institute (DMI represented by Jens H. Christensen), the Danish Technical University, Center for Arctic Technology (ARTEK-DTU, Niels Foged) and the Greenland Survey (ASIAQ, Keld H. Svendsen) and is partly supported by

KVUG (The Commission for Scientific Investigations in Greenland). Climate models are predicting a pronounced increase in air temperatures along the coasts of Greenland due to global warming. Here in towns like Sisimiut and Ilulissat, located in discontinuous permafrost areas, the subsurface will respond with a degradation of permafrost affecting conditions for town planning and foundation of existing and future buildings, roads, sewers, etc. The project is presently being extended to cover «Recent and future permafrost variability, retreat and degradation in Greenland and Alaska» in an integrated approach together with the University of Alaska Fairbanks (Vladimir Romanovsky and John Walsh).

The University of Copenhagen, Institute of Geography, maintains two automatic meteorological stations on the west coast of Disko Island (Greenland): one close to the Arctic Station (Godhavn), the other in Mellemsfjord. Meteorological data are available since 1998 from: http://www.nat.ku.dk/as/ny_homepage/engelskudgave/framesetuk/as_mainuk.htm

The National Environmental Research Institute, the Danish Polar Center and the Institute of Geography, University of Copenhagen are continuing their detailed monitoring at Zackenberg Ecological Research Station in high Arctic Northeast Greenland. This database is dedicated to snow, permafrost, soil temperatures in the active layer, soil water and carbon dioxide content, etc. Data are available at Geobasis, Zackenberg for the period 1995-2004: <http://www.dmu.dk/International/Arctic/Climate+change/ZackenbergDB>

The Geological Survey of Denmark and Greenland (GEUS) carried out permafrost studies in the Mestervig area of East Greenland.

Studies of the ice cores from the Greenlandic Ice Sheet (Dorte Dahl Jensen) were carried out within various international research programmes. Information is available at: <http://www.ncdc.noaa.gov/paleo/icecore/greenland>

«Snow and temperature control of biogeochemical oxidation processes in natural and managed High Arctic ecosystems» is a research project funded by the Danish Natural Science Research Council (2004-2006), led by Bo Elberling, Institute of Geography, University of Copenhagen. The project focuses on management of heat generating coal mining waste and dispersal of contaminants in a permafrost area near Longyearbyen, Svalbard. This project runs in co-operation with UNIS and the local coal company, Store Norske.

In 2005 preparations for the International Polar Year (IPY) were very much in focus. The Danish National Committee consists of 15 members from all relevant polar research areas in Denmark, the Faroe Islands and Greenland. It has recommended focusing on the following three themes: 1) Arctic Climate – variability, changes and effects, 2) Greenland Inland Ice – a key to knowledge and 3) People, Nature and Arctic Societies. Permafrost topics will be covered by several projects in the first theme.

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FRANCE

In Caen (team CNRS-UMR 6143), a new programme funded by the INSU/CNRS (Programme National «Relief de la Terre» 2004) studies the role of debris flows on slope degradation in periglacial environments (J.L. Lagarde, M. Font, J.P. Laustridou and E. Védié). A physical model was developed and data from experimental freeze-thaw cycles prove the efficiency of periglacial processes as controls on both erosion and scarp morphology changes. The experimental results are consistent with field data acquired in northwest France, and show that periglacial erosion processes in moist conditions could lead to underestimation of Plio-Quaternary deformations at mid-latitudes. A new experiment will address Martian gullies in cooperation with F. Costard (UMR8148 IDES, CNRS - Université Paris XI). The objective is to simulate debris flows over sand dunes similar to the ones observed on Mars.

A programme from the Cardiff group (Charles Harris) aims at the physical modelling of mass-movement processes on permafrost slopes. Both full-scale (Caen refrigerated tanks) and small-scale physical modelling (Cardiff geotechnical centrifuge) should be developed to investigate mass movement processes in clay-rich soils and at steeper gradients.

The Hydro-sensor-FLOWS project (2006-2009), endorsed by the IPY Joint Committee, aims at investigating the hydrology of the Austre Lovénbreen Glacier basin (Svalbard) by continuous monitoring using new information and communication technologies. The project is coordinated by Madeleine Griselin (UMR Thema CNRS - Université de Franche-Comté) and Christelle Marlin (UMR8148 IDES CNRS - Université Paris-Sud 11). Liquid and solid fluxes will be measured on a typical polar hydrological system with a sensor web (both remote and in situ sensing). Space and time dynamics over a four-year period will also be monitored to better understand the system reaction to contemporary climatic fluctuations.

The second meeting of the European Science Foundation Network SEDIFLUX was organized by the polar team of the Research Group CNRS UMR 6042 GEOLAB in Clermont-Ferrand in January 2005. The international conference «Shifting lands. New insights into periglacial geomorphology» welcomed more than 80 participants from 20 countries, and included five plenary lectures by Hugh French, Colin Ballantyne, John Dixon, Colin Thorn and Kevin Hall. Special issues of the journals *Geomorphology* (edited by Denis Mercier and Samuel Etienne) and *Géomorphologie* (edited by S. Etienne) will be dedicated to this meeting.

A new program was launched in southern Iceland in summer 2005 to study the evolution of the proglacial floodplains (sandurs) of the Solheimajökull, Morsarjökull and Brokarjökull (Marie-Françoise André, Samuel Etienne, Denis Mercier, Raphaël Paris and PhD student Erwan Roussel).

Brigitte Van Vliet-Lanoë (University Lille-1) analysed permafrost and topographic changes in the period 1994-2005 at her field sites in Adventdalen and in the surrounding region of Ny-Ålesund (Svalbard) in the context of recent climatic investigation, with financial support from IPEV (Institut Polaire Français). B. Van Vliet-Lanoë (Brigitte.Van-Vliet-Lanoë@univ-lille1.fr) also published «La Planète des Glaces» (Publisher Vuibert, 488 p., ISBN: 2-7117-5377-8), a reference book in French about cold environments. On the basis of her 30-years long interdisciplinary research in the Arctic and in high mountain environments, she summarizes the characteristics of past and present cold environments in a wide range of fields: geology, glaciology, geomorphology, permafrost research, soil sciences, climatology, biology and ecology. Many figures and pictures illustrate this book; it presents a glossary and a bibliography where an international audience can obtain an interesting insight in French natural science publications.

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GERMANY

One of the most prominent German permafrost activities in 2005 was the Second European Conference on Permafrost (EUCOP II) hosted by the Alfred Wegener Institute (AWI) for Polar and Marine Research in Potsdam (see report in Global and Regional Activities).

Field activities organized by the Periglacial Research section of the AWI Potsdam mainly focused in 2005 on Siberia (6 expeditions), Alaska (1) and Antarctica (1).

An offshore permafrost drilling campaign was performed in the Western Laptev Sea in April 2005 by the AWI Potsdam, the Permafrost Institute (Yakutsk), the Arctic and Antarctic Research Institute (St. Petersburg) and the Geoscience Institute of Bremen University in the expedition COAST.

The expedition «Lena Delta 2005» took place from July to September in cooperation between the Institute of Soil Science (Hamburg University), the Permafrost Institute in Yakutsk, the Lena Delta Reserve, the Geological Faculty of Moscow State University, the Arctic and Antarctic Research Institute and the State University of St. Petersburg. A group led by D. Wagner and E.-M. Pfeiffer pursued the long-term measurements of energy, water balance and greenhouse gas emissions in tundra soils on Samoylov Island including eddy-covariance instruments, closed chamber gas flux measurements and gas chromatography. Additionally, a main focus of this group was to document the relationship between the carbon budget and the structure and function of microbial live communities in permafrost soils. A second group investigated permafrost sequences in sediment cores and exposures for palaeo-environmental archives and conducted studies of thermokarst-affected landscapes (M.N. Grigoriev, L.

Schirrmeister). Objectives included understanding the Quaternary history of Arga Island, a large sand complex characterized by the presence of numerous oriented lakes, and collection of surface properties and corresponding spectral signatures by field spectrometry. These data sets will be further related to remotely sensed data, to develop automatic analytical methods for arctic periglacial landscape analyses. A further goal was to reconstruct the environmental conditions during the deposition of the first Lena River terrace (mid to late Holocene).

A Russian-German joint project on palaeolimnology in Yakutia is currently in progress at AWI Potsdam (B. Diekmann, U. Herzschuh) with partners from the Ecological Institute, University of Yakutsk (L. Pstryakova) and the Limnological Institute, Russian Academy of Science, St. Petersburg (D. Subetto). During the field campaign in spring 2005, several sediment cores of late Pleistocene to Holocene age were recovered from Lake Billyakh in the Verkhoyansk Mountains. In addition, limnoecological studies were carried out during the summer 2005 in thermokarst lakes in the vicinity of Yakutsk (Central Yakutia) and in lakes in the Momekii region (Northeast Yakutia). Studies on the recent ecology of terrestrial vegetation in Central and Northeast Yakutia were conducted by AWI-Potsdam (F. Kienast) in cooperation with the chair of Geobotany of the Yakutsk State University (P.A. Gogoleva) to better interpret the occurrence of botanical fossils in Quaternary permafrost deposits. Furthermore, recent seeds, fruits, and herbarium material were collected to provide a reference for the identification of plant fossils. Those were primarily associated with steppes and alpine communities, although aquatic, riparian, and wetland vegetation were also included.

Low altitude remote sensing and permafrost hydrological work was carried out in the Northern Foothills of the Brooks Range (Toolik Field Station, Alaska) in August 2005, as part of the continued cooperation between AWI Potsdam and the Water and Environment Research Center, University of Alaska, Fairbanks.

Following a Bulgarian initiative, the expedition «Livingston 2005» took place on Livingston Island, mari-

time Antarctica, in early 2005 and included permafrost research. The evolution, ecology and survival of microbial communities were studied by D. Wagner. The main objectives were the genotypic and phenotypic characterization of the microbial communities in time and space, including cultivation-independent methods and the isolation and characterization of keystone organisms from different habitats for studying their physiology, adaptation strategies, and survival in extreme environments. Sedimentary permafrost was surveyed on Hurd Peninsula in the vicinity of the Bulgarian base (St. Kliment Okhridski). The area has been ice-free only for some decades. Ground penetrating radar (GPR) and sedimentologic verification were used by G. Schwamborn for profiling the transition from unfrozen to frozen ground. Permafrost generally occurs at altitudes higher than 30 m asl.

Studies on permafrost distribution, sensitivity and significance in the Turtmann Valley (Valais, Switzerland) are continued by the group of R. Dikau (University of Bonn). Within the DFG Research Training Group «Landform - a structured and variable boundary layer» (Graduiertenkolleg 437), two Ph.D. theses were presented in 2005 (see: http://hss.ulb.uni-bonn.de/diss_online): one by I. Roer entitled «Rockglacier kinematics in a high mountain geosystem» and the other one by M. Nyenhuis dealing with permafrost distribution mapping and modelling in connection to sediment budget aspects. J.-C. Otto is continuing his investigations on sediment storage quantification and visualization in the periglacial zone of the Turtmann Valley. M. Krautblatter started his thesis entitled «Changes in permafrost distribution in alpine rock walls and their implications for mass movements and sediment budgets». I. Roer started to compile in collaboration with colleagues from Switzerland (A. Käab, R. Delaloye, C. Lambiel), France (X. Bodin, E. Thibert), Austria (M. Avian, V. Kaufmann) and Germany (B. Damm, M. Langer), an inventory of European Alps rock glaciers, which show increased surface velocities.

The Department of Physical Geography, University of Würzburg (C. Kneisel) is assessing changes in active layer and permafrost thickness by geoelectrical techniques in the Swiss Alps. Geoelectrical and temperature monitoring continues at a discontinuous and a sporadic permafrost site in the Upper Engadin. Geophysical and geomorphological permafrost investigations in a subarctic alpine environment in northern Sweden also continued.

Investigation of permafrost distribution and characteristics in the Vernagt- and Guslarferner area (Ötztal, Austria) started in collaboration with the Commission for Glaciology of the Bavarian Academy of Sciences and Humanities in Munich (L. Braun).

In collaboration with T. Saemundsson (Natural Research Centre of Northwestern Iceland, Saudárkrokur), investigation of mountain permafrost occurrences and characteristics began at different sites in Iceland.

At the Institute for Meteorology and Climate Research,



Participants of the Black Forest meeting.
Photograph by Christof Kneisel.

University of Karlsruhe, Forschungszentrum Karlsruhe (C. Hauck), geophysical monitoring approaches (using electrical resistivity tomography and refraction seismic tomography) are developed to detect climate induced permafrost thaw in high mountain areas. By combining repeated electrical and seismic measurements, changes in ground ice content can be detected. Field studies are conducted at various permafrost sites in the Swiss Alps in collaboration with the Universities of Würzburg, Jena, Bonn, Giessen and Zürich. In the future, the geophysical monitoring approach will be tested and implemented within the Permafrost Monitoring of Switzerland (PERMOS) programme.

The group of L. King (University of Giessen) finished the DFG-sponsored project «Periglazial Mattertal», which investigated the influence of surface types typical for high mountain environments on the ground thermal regime. Major outcome was the prominent role of cover layers consisting of coarse material. Turbulent air fluxes in the block layer through mainly free convection could be identified as the most important single process, which caused a surface offset in a range of -2 to -3.5° C at instrumented test sites (S. Philippi, T. Herz). The consideration of this effect in an empirical-statistical model led to a further improvement in the estimation of permafrost distribution for the test areas Zermatt-Gornergrat and Grächen-Seetalhorn (R. Hof).

J. Völkel, M. Leopold and T. Raab from the group Landscape Ecology and Soil Science (University of Regensburg) were invited by D. Dethier (Williams College at Williamstown, Massachusetts, U.S.A.) together with N. Caine (University of Colorado at Boulder, U.S.A.), to do field studies in the Rocky Mountains Front Ranges in Colorado. While staying at the Mountain Research Station of the Institute of Arctic and Alpine Research (INSTAAR) in July 2005, the group collected subsurface data using ground penetrating radar and seismic methods. The study areas are located at Niwot Ridge, which is the long-term monitoring site of INSTAAR. All areas are above 3300 m and offer climatic conditions prone to permafrost occurrence. Field work concentrated on patchy permafrost of a lobe on top of Niwot Ridge. Rock glaciers were studied at Green Lake and Valley 4th of July, with more than 1.5 km of GPR-lines and several Refraction Seismic lines.

A mountain permafrost workshop took place in the Black Forest, October 15-16, 2005, coordinated by C. Kneisel, C. Hauck and I. Roer. Scientists from the universities of Bonn, Giessen, Karlsruhe, Würzburg and Graz reported on their actual research activities and agreed on joint field work in summer 2006. Direct enquiries to: C. Hauck (hauck@imk.fzk.de).

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ITALY

The activities of the Italian IPA group include different topics: mainly relict periglacial features in the Apennines; permafrost distribution and monitoring, and periglacial features in the Alps. Moreover, Italian researchers are deeply involved in the Italian Antarctic Research Project.

A project lead by Mauro Guglielmin (Insubria University) about permafrost, ecosystems and climate change is running until the 2006/2007 Antarctic season with four main research goals: permafrost and active layer monitoring, active layer and vegetation relationships, ground ice distribution and ice wedges dynamics, granite weathering processes. Some results of these research have already been published, and presented at conferences. During the last Antarctic campaign, a new CALM grid and an automatic active layer monitoring station were established on Signy Island in cooperation with the British Antarctic Survey, very close to the site where Chambers in the 1960s studied periglacial features and measured the active layer. During the 2005/06 summer, a drilling and coring program is planned in cooperation with New Zealand researchers (Megan Balks and Jackie Aislabie) at Marble Point and Bull Pass (Dry Valleys) to enlarge the Antarctic permafrost monitoring network within the ANTPAS framework.

In Italy, the project «Cryoalp», led by M. Guglielmin and supported by the Italian Institute of Mountain Research, started last year and aims at studying permafrost ground ice (as a potential palaeoclimate archive) and the hydrology of high mountain permafrost areas. Within «Cryoalp», three new boreholes ranging between 15 and 24 m deep were equipped with automatic permafrost monitoring stations and the Stelvio PACE borehole equipment was improved.

In the Aosta Valley (NW Italy), the Insubria University and ARPA continued collaboration leading to the instrumentation of a CALM grid and two boreholes (6 and 43 m deep) close to Cervinia, and to the set-up of rock temperature monitoring on the south face of Matterhorn, to better understand the high rock fall frequency that has characterized this rock face for the last four years, and particularly in the summer of 2003.

Adriano Ribolini continued monitoring the active layer of some rock glaciers in the Maritime Alps. His geophysical studies of the internal structure of rock glaciers of that area, such as the Schiantala rock glacier, will allow him to define the relationships between rock glacier and glacier evolution in the Maritime Alps.

Marco Firpo and Cristiano Queirolo are studying relict block streams and block fields around Mont Beigua (Genova area), describing the surface morphology using high-resolution systems and analysing the relationships between the local geology and the distribution pattern of these block accumulations.

The AIGEO group on Periglacial Relict Features has finished its experimentation of a new systematic

sedimentological and morphological approach to periglacial deposits in the Apennines. Fabio Scarciglia and others analysed granite weathering in Calabria and proved the influence of some periglacial processes on soil formations in the Southern Italian Apennines.

In cooperation with the Stelvio National Park, Nicoletta Cannone pursued her research on the relationships between periglacial features such as polygons, rock glacier, solifluction lobes and vegetation colonization, especially in the Central Italian Alps. Moreover, she continues a long-term monitoring of scree slopes dynamics and vegetation colonization within the permafrost belt.

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JAPAN

In Alaska, a project on «2004 Forest Fire Impacts to Hydrological Cycles, Permafrost and Ecosystems in Central Alaska» started in 2005 to monitor permafrost conditions after the severe wildfires of 2004 (K. Harada, Miyagi University; Y. Sawada and J. Mori, Hokkaido University). Observations were carried out at Poker Flat near Fairbanks in May and August. Further observations were conducted in July at Kougarok near Nome, Seward Peninsula, where wildfires occurred in 1997 and 2002. Geophysical sounding was undertaken to investigate permafrost distributions and conditions. Measurements also involved thermal and water conditions in the active layer and ground surface levels. These observations will be continued for three years to obtain data on the variations of permafrost conditions after the wildfires.

A study on rock glaciers also continues in the Brooks Range and Alaska Range (A. Ikeda and K. Yoshikawa). The distribution, structure and thermal conditions of rock glaciers were investigated in the arid part of Alaska, to compare the long-term dynamics of the rock glaciers with that in relatively warm and humid mountains. Preliminary results indicate that snow cover thickness and duration control the supersaturation of ice in rock glaciers.

In eastern Tibet, research continues on «Permafrost Hydrology in the Source Area of Yellow River» (N. Matsuoka, A. Ikeda, T. Sueyoshi, T. Ishii and Y. Uchida). In the fourth year of the 5-year project, year-round data on frozen ground were collected from the observatory at Madoi (4273 m asl) established in 2004. On the Tibetan Plateau, one-dimensional geoelectrical survey was conducted at a number of localities with different altitudes (3200 - 4700 m asl). The data, combined with seismic and ground surface temperature data, suggest that permafrost is lacking or sporadically remaining at depth as relict below 4300 m asl, although previous maps have characterised the region as having continuous permafrost.

The Japanese-Norwegian joint project on «Constructing model experimental sites for periglacial processes» started in 2004 and continues in Svalbard. In 2005, in addition to collecting the first-year data at an ice-wedge

site, a 15 m deep borehole was drilled into a rock glacier in the Longyear valley and instrumented with thermal cables and inclinometers (N. Matsuoka, M. Ishikawa, Y. Fukai, T. Watanabe, H.H. Christiansen, O. Humlum and L. Kristensen). Subsurface environment below periglacial topography was also explored by two-dimensional geoelectrical sounding and soil-moisture profiling.

The inter-college study group «Colloquium of Cold Region Geomorphology» has continued over 30 years. Managed by young scientists and students, the activity involves regular and special meetings, field schools and publications of trade books. Professor Takashi Koaze, who was one of the founders of this group and has long led glacial and periglacial geomorphology in Japan, officially retired from Meiji University in March 2005. In honour of Takashi, his former students have organized a book in Japanese, entitled «Learning from Mountains», beautifully designed with a large number of colour photographs of mountain landscapes (published from Kokon-shoin, Tokyo).

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KAZAKHSTAN

The book *The Treasures of Frozen Burial Mounds of the Kazakh Altai* by A. Gorbunov, Z. Samashev and E. Seversky was published in 2005 in English. The first geocryological map of Kazakhstan (scale 1: 5,000,000) was compiled by A.P. Gorbunov and E.V. Seversky.

The study of how permafrost and unfrozen ground react to rapid glacier retreat has been undertaken in the Northern Tien Shan by researchers from the Kazakhstan Alpine Permafrost Laboratory (KAPL). This team continues its study of cryogenic processes and slope evolution in the Zailiysky Alatau Range (Northern Tien Shan Mountains), the KAPL also continues the thermal monitoring of permafrost and seasonally frozen ground.

In cooperation with University of Alaska Fairbanks, a composite digital permafrost map of part of the Central Asian regions was compiled, based on the existing IPA map, Chinese maps and computer-based models for Mongolia, Russian and the four Central-Asian Republics (Kazakhstan, Kirgizstan, Tajikistan and Uzbekistan). The map includes the mountain territory of the Central-Asian Republics (Pamir, Tien Shan and Altai Mountains, Djungar Alatau and Saur). The map shows the permafrost extent based both on empirical evidence and on modelling estimates. The modelling approach takes into account the most important environmental controls of permafrost distribution in Central Asia: air temperature, amount of short-wave solar radiation, snow cover, vegetation, and soil properties. The map was presented at the First CliC Conference in Beijing, April 2005. This presentation was aimed at continuing a discussion within the international permafrost community concerning the de-

velopment of a uniform mapping legend and approach for the Central Asian. Moreover, the following question should be raised: can this mapping approach and legend be applied to other mountain regions of the world, or is it unique to Central Asia?

In 2004, research on thermal regime and ice formation dynamics within a coarse blocky material was activated again in the Zailiysky Alatau Range (Northern Tien Shan). The first results indicate that ice formation linked to infiltration shows a peak in March-April when air temperature above the blocky material crosses the zero threshold, and while temperature is still negative inside the blocky material. During this period, the increase in ice thickness reaches 50 - 100 cm.

In June 2005, two boreholes at 3000 m asl were equipped with new dataloggers with the support from the CALM program. This elevation can be considered as a lower limit of short-term permafrost formation within the fine-grained soils in the Northern Tien Shan Mountains. A vegetation cover such as juniper has a large influence on the ground thermal regime. Sometimes the difference in ground temperature at a depth of three meters under juniper shrub can be 2-3° C lower than in a meadow area. Previous research shows that the permafrost can exist during the summer under these conditions at a depth of 3.5-5.0 m. The formation of a frozen layer depends also on snow cover and air temperature.

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MONGOLIA

The Hovsgol GEF (Global Environment Facility) project including permafrost studies continues for the fourth year in the six valleys entering the eastern shore of Lake Hovsgol. Within the framework of this project, N. Sharkhuu and Sh. Anarmaa obtained the following data this year: year-round datalogger recording of ground temperatures in 14 shallow (5-10 m deep) boreholes; summer and autumn measurements of ground temperatures in more than 20 shallow boreholes; year-round datalogger recording of soil surface temperatures at seven sites with different vegetation covers; experimental observation of the thermal impact of cutting dense grass cover on permafrost; spring and autumn levelling measurements of frost heaving and thaw settlement of pingos and active layers at eight sites; and winter observations of spring icing dynamics and snow covers at 15 sites. In August 2005, Bernd Etzelmuller (University of Oslo, Norway) carried out within the project area resistivity tomography measurements at about 20 sites with different elevations, topographic aspect, vegetation cover and soil moisture. We collected more detailed observations on permafrost along the study transect in Dalbay valley. The young researcher Sh. Anarmaa visited the University of Oslo for four weeks

in order to prepare an annual report on Hovsgol permafrost studies under B. Etzelmuller's consultation. She spent five weeks at the University of Delaware under the supervision of F. Nelson and N. Shiklomanov to learn CALM techniques for analysing Mongolian CALM and GTN-P data. She made a presentation entitled «Monitoring of Permafrost in the Hovsgol Mountain Region, Mongolia» at the Annual Meeting of the American Geophysical Union in San Francisco. We extend our gratitude to the Netherlands Government for financial support of the Hovsgol GEF project.

The Japanese and Mongolian ERONIAR project continued for its fourth year in the Nalaikh and Terelj areas near Ulaanbaatar. In collaboration with M. Ishikawa and T. Katoda, N. Sharkhuu and Battogtokh downloaded every month temperature data from two automatic weather stations and carried out levelling measurements at several shallow boreholes in order to study spring icing dynamics and snow cover in the Terelj study area. In addition at the Nalaikh site, 7-m deep boreholes were monitored monthly in order to assess frozen ground hydrology.

N. Sharkhuu continued permafrost monitoring in Mongolia. In May 2005, he extended the observations in four boreholes located in the Darkhad depression near Lake Hovsgol. A new 15-m deep borehole was drilled at the site of the one used in 1989. Two 5-m deep boreholes were drilled for monitoring the active layer, frost heaving and thaw settlement. In addition, an 85-m deep active borehole was located and instrumented for the CALM and GTN-P observations. There are currently 35 CALM and GTN-P boreholes in Mongolia. Sixteen boreholes are instrumented with temperature dataloggers. In addition, the dynamics of cryogenic processes and seasonal frost are monitored at some sites.

Within the framework of the project on Central Asian permafrost mapping, N. Sharkhuu is developing initial data for compiling a permafrost map of Mongolia. In September 2005, he obtained year-round datalogger recordings of soil surface temperatures at elevations between 2000 and 3400 m asl on the Tsambagarav Mountain, in the Altai region and at elevations between 1300 and 2250 m asl on the Bogd Mountain near Ulaanbaatar. These observations are continued in the Khangai and Khentii mountains.

N. Sharkhuu plans to participate in the IPA-IPY Permafrost Observatory Projects titled «Thermal State of Permafrost» and «Trans-North-Eastern Siberian Permafrost Observations» (M. Ishikawa, Japan).

We regret to announce that Dr. D. Tumurbaatar died in October 2005 at an age of 65 years. He worked as a permafrost researcher at the Institute of Geography, MAS, since 1967, after graduating from Moscow State University (PhD in 1990). He was the head of the permafrost laboratory at the Institute for the period 1979 to 2003 and president of the Mongolian Permafrost Association since 1995. D. Tumurbaatar was the author of several

books and a number of publications on permafrost studies in Mongolia. Some of his publications are in Russian and English.

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THE NETHERLANDS

During the Alterra (Wageningen) expedition to Taimyr (northern Siberia) by Bart Ebbinge, the depth of active layer was investigated. On August 13 to 15, 200 depth measurements were made with a simple steel probe at 10-m intervals over a straight 2-km long N-S transect on nearly level tundra at Cape East (Wostochny), Taimyr, northern Siberia (74° 06' N, 86° 44' E). Due to stoniness in the soil at some places, the frozen soil was not always reached. The following preliminary conclusions can be drawn:

- Different vegetation revealed different depth of the frozen soil but on average the thawing front was at 45 cm under the level surface;
- In micropolygons with bare clay surface the soil was thawed deeper (up to 55 cm) than around those with *Dryas* and *Cassiopea*;
- In wet places thawing was deeper (45 cm) under the grassy vegetation than under the moss hummocks (*Sphagnum*) spread over these places (less than 40 cm).

This project is carried out by Roeland Bom & Bas Pedroli.

The Vrije Universiteit in Amsterdam (Department of Hydrology and Geo-Environmental Sciences) investigates carbon and water exchange of taiga and tundra ecosystems in eastern Siberia, in collaboration with the Institute for Biological Problems of the Cryolithozone, Siberian Division of the Russian Academy of Sciences in Yakutsk. Measurements are using eddy correlation systems and soil flux chambers in a larch / birch forest near Yakutsk (Spasskaya Pad Field Station) and on a tundra site near Chokhurdakh in the Indigyrka lowlands (Kytalyk reserve). In 2004 and 2005, this research was extended with flux chamber measurements of methane fluxes and a survey of active layer thickness and temperature. The aim is to estimate the annual exchange rates and their interannual variability, and to determine the sensitivity to environmental factors of the fluxes. The present flux data show considerable inter-annual variability. In the tundra site, summer 2005 was a relatively dry year with lower methane fluxes than in 2004.

The 2005 campaign has been funded by the Vrije Universiteit and NWO (Dutch Organisation of Scientific Research) and is a continuation of research in the EU TCOS (Terrestrial Carbon Observation System) project. The methane flux measurements will also be used in a modelling study on last glacial climate and permafrost

changes at rapid climate transitions, also funded by NWO. The later project is scheduled to start at the end of 2005. Direct enquiries to: J. van Huissteden (ko.van.huissteden@geo.falw.vu.nl)

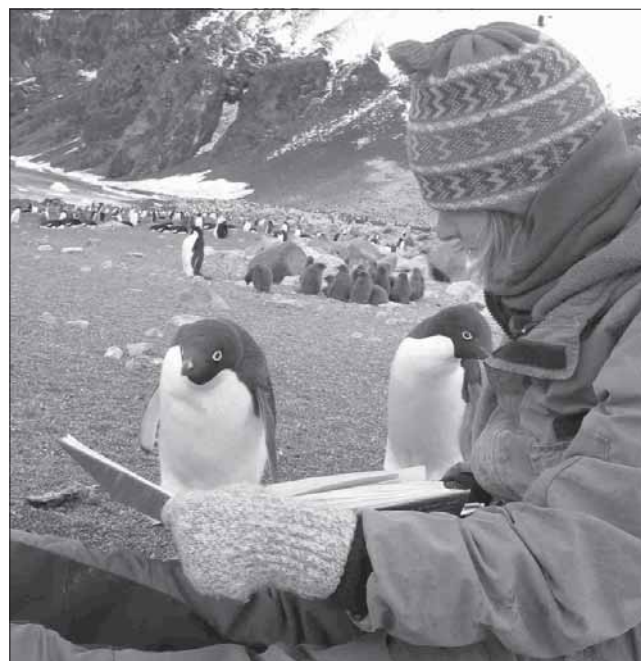
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NEW ZEALAND

New Zealand was delighted to be accepted as a full member of the IPA at the council meeting held at the EUCOP II. We thank Antarctic New Zealand for the financial support that made this possible. Ian Campbell and Megan Balks from New Zealand attended the meeting and appreciated the warm welcome from the IPA.

In order to standardise our approach to soil description across Antarctica, Malcolm McLeod (Landcare Research, New Zealand) and Megan Balks have been working with Jim Bockheim (U.S.A.) to develop a minimum data set and manual for describing Antarctic soils as part of the ANTPAS project. A draft of the manual is currently out for comment among the ANTPAS members. We have also developed the ANTPAS website which is being hosted by the University of Waikato (<http://erth.waikato.ac.nz/antpas/>).

Erica Hofstee (Earth Sciences, University of Waikato) is currently completing a soil map of the Seabee Hook area of Cape Hallett in the Ross Sea Region of Antarctica as part of her MSc study. This will be the first published Antarctic soil map that we know of since that of JD McCraw for the Taylor Valley published in 1968. This Austral summer Malcolm McLeod and Jim Bockheim plan



Erica Hofstee watched by inquisitive locals as she makes notes during her soil and permafrost studies at Cape Hallett, Antarctica. Photograph by Megan Balks.

to continue their soil mapping work in the Wright Valley and Megan Balks will be working with Mauro Guglielmin (see Italian report) to drill and instrument two boreholes for permafrost temperature monitoring at existing soil climate monitoring sites at Marble Point and in the Wright Valley in the Ross Sea Region of Antarctica.

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NORWAY

The Norwegian Geotechnical Society has established a Committee on Frost in Ground chaired by Ivar Horvli (Norwegian University of Science and Technology), with members from the scientific and the engineering community. The committee is in contact with institutions within research, education and practical applications. The focus is on «Science and technology in cold regions» covering permafrost and seasonal frost. Planned activities include lectures, short courses, conferences and to issue an annual publication. The first publication *Frost in Ground* 2005 was printed with support from the Norwegian Public Road Administration. It contains 11 articles mainly in Norwegian with English summaries. The committee acts as the Norwegian adhering body to the IPA.

Cryosphere scientists in Norwegian universities have initiated the organisation CRYONOR, to cooperate and exchange data relating to research and education on themes ranging from permafrost and periglacial geomorphology to glaciology and Quaternary geology. CRYONOR was presented to the IPA Council at EUCOP II in Potsdam, and has since established contacts with cryosphere scientists in other Nordic countries. CRYONOR organises an annual workshop on permafrost and other cryospheric themes in Norway, and will be involved in the Norwegian IPA presentation together with *Frost in Ground*.

The International Permafrost Associations Secretariat at the University Centre in Svalbard, UNIS has received funding from the Research Council of Norway, and Angélique Prick is hired on part-time basis to operate the Secretariat, which is led by Hanne H. Christiansen.

The Geological Survey of Norway organises permafrost and climate monitoring as part of its activities on unstable rock slopes in Norway (L.H. Blikra). In Møre and Romsdal, southern Norway, and in Troms and Finnmark, northern Norway, temperature data are collected in cooperation with the Norwegian Meteorological Institute (K. Isaksen). A series of temperature data loggers are installed to monitor ground, surface and air temperatures on exposed sites with minimal snow accumulation. In Troms, the first temperature data from two 30-m deep boreholes were collected in September 2005 and indicated the presence of permafrost. The national databases are linked to the GTN-P database. Differential GPS measurements of the unstable rock slope in Troms are carried out in cooperation with the University of Oslo (T. Eiken). In 2005 mini shock loggers were installed on unstable rock slopes in Troms and in Møre and Romsdal for im-

proved registering of timing of movement. This was done in cooperation with UNIS (H.H. Christiansen).

The Geological Survey of Norway also continues long-term research on mass transfer, denudation, sediment budget and relief development in four catchments in sub-arctic and arctic environments in Iceland and Lapland (A. Beylich). Research is focussed on an integrated study of source-to-sink-sediment fluxes, including monitoring of surface processes, analysis of sinks, permafrost analysis, analyses of surface processes and vegetation cover. A new monitoring programme is started in Erdalen, Norway. A. Beylich is coordinating the ESF Network SEDIFLUX (see: www.ngu.no/sediflux).

In Jotunheimen, southern Norway, temperature data from the Juvvasshøe PACE borehole (established in 1999) are collected, and on Dovrefjell, southern Norway, temperature data are collected along a transect through the permafrost transition zone, from 11 boreholes drilled and instrumented in October 2001 in cooperation between the Norwegian Meteorological Institute and the University of Oslo (K. Isaksen, R.S. Ødegård, T. Eiken and J.L. Sollid). Borehole temperature data are collected within a long-term climatic monitoring programme run by the Norwegian Meteorological Institute (K. Isaksen). In August 2004, six temperature data loggers were established on Dovrefjell in connection with a Norwegian monitoring programme of palsa peatlands, co-ordinated by the Norwegian Institute for Nature Research (A. Hofgaard, K. Isaksen and J.L. Sollid).

In Svalbard data from the Janssonhaugen PACE borehole (established in 1998) are collected in cooperation between the Norwegian Meteorological Institute (K. Isaksen), University of Oslo (O. Humlum) and UNIS (H.H. Christiansen). Data from a shallow 2-m deep borehole on Janssonhaugen (established in October 2003) are analysed and compared with the PACE borehole data from the same site (S. Hansson and K. Isaksen).

Permafrost and periglacial activities at the University Centre in Svalbard (UNIS) focus at collecting various types of field data for research and education (H.H. Christiansen, O. Humlum and L. Kristensen). This basic monitoring goes on in the area around UNIS, in the valleys of Longyeardalen and Adventdalen, and in the surrounding mountains. Two mountain meteorological stations are operated at 260 m asl. at Janssonhaugen, and at 470 m asl. at Gruvefjellet. Snow cover thickness, geomorphic activity and active layer temperatures are monitored at various sites. Active layer thaw progression data have been collected for six years at the UNISCALM site, where shallow borehole (10 m) permafrost temperatures are also recorded. Avalanche research in the permafrost environment around Longyearbyen is carried out to determine the meteorological control on snow avalanching, and for improved geomorphologic process understanding.

The monitoring program was extended in 2005 to the Kapp Linné area, at the west coast of Spitsbergen, well-

known from the work of Jonas Åkerman. This is integrated into a new UNIS course AG-327 «Holocene and recent climatic change in the high arctic Svalbard landscape», which ran for the first time in summer 2005. By this, similarities and contrasts between the more continental setting at Longyearbyen and the maritime setting at Kapp Linné will be investigated especially with regard to ground temperatures and permafrost.

H.H. Christiansen is conducting studies of ice-wedge dynamics in collaboration with Norikazu Matsuoka (University of Tsukuba, Japan), with additional field instrumentation installed in summer 2005. A 15-m borehole in a rock glacier in Longyeardalen was established and instrumented by N. Matsuoka during summer 2005 to measure ground temperature and deformation, in collaboration with O. Humlum and L. Kristensen. Collaboration with Charles Harris (University of Cardiff) on solifluction process measurements was initiated by H. H. Christiansen, and in the late summer 2005 a new solifluction monitoring station was established in Adventdalen (see photograph in the UK report). Thermal conditions of the ice-cored moraines deposited by late-Holocene surges of the glacier Paulabreen are studied by L. Kristensen, by means of several boreholes. A. Prick has continued her research on rock temperature monitoring and weathering processes both on Svalbard and across Troms, in cooperation with UNIS.

In southern Norway, the research initiated in 2004 on mountain meteorology, snow cover and ground temperatures were extended to a number of new research sites, making use of automatic digital cameras and data loggers (O. Humlum, H. Juliussen, University of Oslo). The project covers a transect from the humid west coast (Sognefjorden - Ålesund) to the more continental regions at the Swedish border to the east (Femunden - Trysil). About 80 data loggers are placed at individual sites. In addition to investigating the modern environmental conditions also past conditions are investigated. The detailed deglaciation and dynamic behaviour of the last remnants of the Scandinavian Ice Sheet is studied to reconstruct the occurrence of permafrost in the Norwegian mountains during the early Holocene. The ground surface thermal regime above and below the natural tree limit is being studied to obtain information on the influence of past and future tree line changes on permafrost distribution.

In northern Norway, extensive ground surface temperature measurements and DC resistivity soundings were carried out in the Lakselv region, Finnmark (H. Farbrot, B. Etzelmüller, University of Oslo), as part of a larger survey of permafrost distribution in Finnmark in collaboration with the Norwegian Meteorological Institute (K. Isaksen).

In Iceland, the University of Oslo (B. Etzelmüller, H. Farbrot, T. Eiken) works in collaboration with A. Gudmundsson (Jardfræðistofan EHF, Iceland) and the University of Iceland (H. Björnsson) on permafrost dis-

tribution and slope dynamics in the permafrost zone. Four shallow boreholes are equipped with temperature dataloggers, and ground surface temperatures are measured at approximately 40 sites in northern and eastern Iceland. Velocity, mass flux and age estimates are obtained for rock glaciers in northern Iceland (B. Wangensteen).

The University of Oslo (B. Etzelmüller) continued its cooperation in northern Mongolia with the GEF/World Bank financed Hövsgöl project (C. Goulden, B. Mendee, N. Sharkhuu), aiming to assess the relationship between permafrost thermal dynamics, vegetation pattern and nomadic pasturals. This year's field visit aimed at obtaining DC resistivity tomograms describing permafrost and land cover transitions in the area. In addition further ground temperature measurements and modelling is carried out in cooperation with the Mongolian Academy of Sciences (N. Sharkhuu) and its Institute of Geocology.

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POLAND

The project «Structure, Evolution and Dynamics of the Lithosphere, Cryosphere and Biosphere in the Antarctic and the European Arctic» started at the beginning of 2005 within the Committee for Scientific Research (No. PBZ-KBN-108/P04/2004). The project realization is based on interdisciplinary research which is partly included in the research network connected with IPY 2007/2008 and the internationally coordinated CALM programme. One of the main research topics is the response of continental cryosphere to climate global warming. As in the previous years, Polish polar research focused in two regions:

- Arctic: Polish Polar Station of Institute of Geophysics, Polish Academy of Sciences in Hornsund; working year-round and with university stations active only in the summer season;
- Antarctic: Henryk Arctowski Station on King George Island, South Shetlands; Department of Antarctic Biology, Polish Academy of Sciences, yearly cycle.

Arctic research is carried out mostly in earth sciences while biological sciences are predominant in Antarctic activities.

In the summer of 2005, research on permafrost was carried out in the following Svalbard regions: at the Polish Polar Station in Hornsund (K. Migala, J. Klementowski); at Calypsostranda in Recherchefjorden (northwest of Wedel Jarlsberg Land), in Calypsobyen, the base of Maria Curie-Skłodowska University in Lublin (K. Pekala, J. Repelewska-Pekalowa); on the Kaffioyra plain (Oscar II Land), at the station of Nicholas Copernicus University in Torun (M. Grzes); in the Billefjorden region (Petuniabukta), in the research area of Adam Mickiewicz University in Poznan (A. Kostrzewski, G. Rachlewicz).

Logistic problems were solved through a scientific cooperation with the Gdynia Maritime University (A.A. Marsz, A. Styszynska) whose research ship «Horyzont II» was used for transport between Gdynia and Spitsbergen and for research on the waters around Svalbard. Glaciological investigations mainly on glacier mass balance in Spitsbergen started in the early spring and were partly continued in the summer (J. Jania, Silesia University).

In 2005, two conferences allowed direct contacts between researchers, prompt publication of the latest results and an improved information flow. Polish and foreign polar researchers met September 2005 in Kielce, at the XXXI International Polar Symposium organized by the Jan Kochanowski University in Kielce, the Polar Club of the Polish Geographical Society and the Committee on Polar Research of the Polish Academy of Sciences. A plenary session allowed the presentation of interdisciplinary results on periglacial geocoecosystems in the Arctic and the Antarctic. The conference of the Polish Geomorphologists Association was held in Krakow September 19-22, 2005; periglacial research was one of the conference topics.

Polish researchers took part to the EUCOP II Conference in Potsdam. They presented seven papers. The topics include: rock glaciers, permafrost distribution and its thermal conditions in High Tatra Mountains, pingos on Spitsbergen, geophysical evidence of permafrost occurrence in Northeast Poland as well as measurements of electrical resistivity of contemporary glacial and fluvio-glacial deposits on Spitsbergen.

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RUSSIA

In 2005, Russian research covered all important topics of modern-day permafrost science and engineering.

At the Department of Geocryology, Moscow State University, a genetic interpretation was found for the thick deposit series of coastal lowlands in Northeast Russia that include ice-rich complex formed from the Eopleistocene up to the Holocene (V. Zaitsev and L. Maximova). For the Bolshezemelskaya tundra in the European part of Russia, it was established that the increasing trend of the mean air annual temperature does not exceed $0.01^{\circ}\text{C}/\text{year}$. A scheme showing various zones in this territory has been worked out at a scale 1:500,000 with a particular emphasis on hazards resulting from cryogenic processes (L. Garagulia).

Under the direction of L. Khrustalev, permafrost dynamics was forecasted for some regions. With reference to the cities of Yakutsk and Salekhard, it appears that the life time of buildings foundations is reduced by 30-40 years in Yakutsk and 90-100 years in Salekhard due to climate warming.

The following patents on inventions have been obtained: V.G. Cheverev *et al.*, No. 2227194 «The frost

heave protection of the foundation» (application No. 20022127435 with priority of 14.02.2002); L.N. Khrustalev, E.D. Yershov, S. Yu. Parmuzin, No. 2242813 «Ferrocement store of radioactive waste».

The group lead by N. Romanovskii conducted in collaboration with the Alfred Wegener Institute for Polar and Marine Research (Germany) the mathematical modelling of permafrost evolution of the rift system on the Laptev Sea shelf for the last 400 000 years. This region is characterized by a highly predictable presence of oil and gas. Modelling showed that traps for gases and their hydrates could form beneath the permafrost base.

The geologic-structural map of Mars was prepared at a scale 1:50,000,000. It was estimated that permafrost thickness on Mars is of the same order as on the Earth (E. Ershov and I. Komarov).

E. Chuvilin developed experimental research methods and has obtained new data on the kinetics of disintegration of a porous methane hydrate in sandy ground under thermal effect. New experimental data were obtained for the thermal properties and strength of oil-polluted frozen soils depending on pollution type, temperature, moisture, etc. (R. Motenko, L. Roman and Yu. Zykov). On the basis of experimental studies, L. Roman, L. Shevchenko and S. Volokhov developed existing concepts of long-term strength and bearing capacity of salt-rich frozen soils. They defined the regularities of ice segregation with respect to shear in a frozen clay-rich soil.

The team of the Department of Cryolithology and Glaciology, Moscow State University, detected the cryogenic traces in the late Pleistocene loess deposits on the territories of the central Russian Plain and Middle Germany. In the Altai Mountains, it has been shown that cryogenesis plays an important part in determining the composition of soils and loose deposits; its intensity is well correlated with altitudinal zones (V. Konishchev, V. Rogov). Massive ice bodies were investigated in the Norilsk region. It is proposed that ground ice could have formed because of the interaction of marine and coastal ground waters. Ecological and geotechnical hazards in permafrost area were divided in 12-main types in the context of climate warming (V. Grebenets).

Photographs obtained by American Mars exploration rovers were analyzed at the Department of Cryolithology and Glaciology, MSU. It was concluded that cryogenic weathering processes are widely developed on Mars (V. Rogov).

Geocryological map series was prepared and included in the atlas of Yamalo-Nenetsky okrug (N. Toumel).

The Jancouat and Garabashy glaciers (Central Caucasus) have shown a positive balance during the past years. At the same time, all glacier fronts on the southern slopes have retreated. The established forecast for the next 10-20 years indicates that new disasters in the Kolka glacier cirque are unlikely to happen; a full degradation of the ice body will take more than 10 years (D. Petrakov).



Participants in the International Conference on «Priorities in Earth Cryosphere Research», Pushchino.
Photograph by Hikolay Safronov.

The Permafrost Institute (Siberian Branch of the Russian Academy of Sciences, SB RAS) determined that grain-size distributions correspond strongly to ground lithogenesis types. A new granulometric classification of frozen soils is proposed that allows predicting their physico-mechanical properties (I. Gourianov).

Conditions of construction operations were analyzed for the massifs created in Yakutsk with a hydraulic fill method. Frozen ground conservation beneath the structures prevents the interconnection between ground water of relict taliks and the Lena River channel. This worsens the drainage and enhances formation of cryopegs (N. Anisimova). Research shows that contemporary climate warming in Yakutia is within the limits of possible natural changes. The anthropogenic signal is not revealed against this background (V. Balobaev, N. Shender, Yu. Skachkov).

Unique data on relic permafrost of the Laptev Sea shelf-coastal zone was obtained and allows for the development of a new model of subsea permafrost evolution. The Arctic sea coastal dynamics were studied in collaboration with the Institute of the Earth Cryosphere (SB RAS). A mathematical model was proposed for the rapid response of coastal permafrost to natural impacts of «moderate» scale (M. Grigoriev, V. Kounitsky, S. Razumov).

The Institute of Earth Cryosphere (SB RAS) developed a GIS approach for geocryological data at global, local and elementary levels.

Long-term measurements at the Nadym polygon (Western Siberia) showed that ground temperatures rose, with a maximum in the late 1990's. This occurred in the context of a positive trend of air temperature (N. Moskalenko). A collection of small-scale electronic maps displaying the contemporary changes in air temperature has been published (A. Pavlov, G. Malkova).

The retreat rate of the Kara Sea coastline was measured, including those sites with massive ice; the volume of material entering the sea has been calculated (A. Vasiliev, M. Leibman, A. Kiziakov). The cyclic nature of cata-

strophic cryogenic processes affecting slopes was determined. Climatic and statistic models of cryogenic slump were developed and show that this process cannot be repeated more frequently than every 300 years (M. Leibman).

The maps of contemporary exogenic processes in the Russian Arctic were compiled (G. Gravis, L. Konchenko). The modelled maps were compiled for economically important regions in the north of Western Siberia; they display the current state of the permafrost and its changes due to natural and human impact (D. Drozdov, E. Melnikov).

A thermodynamic capillary model of hydrate formation in porous media was developed and verified experimentally. It describes the influence of the main factors upon pressure and temperature conditions on hydrate formation, including equilibrium temperature depression (A. Nesterov).

Palaeo-reconstructions were performed for the Russian Arctic in accordance with different levels of the Arctic Basin. In Northwestern Siberia, some new features in the deposits cryogenic structure reflect the regional permafrost history (E. Slagoda, A. Kourchatova).

The Institute of Physicochemical and Biological Problems in Soil Science demonstrated that methane distribution in the Kolyma lowland deposits indicates an absence of diffusion from the moment of ground transfer into the frozen state. Therefore, methane distribution reflecting the situation at the start of the freezing process can be used for palaeo-reconstructions. The role of present-day and fossil microorganisms on greenhouse gases production was clarified. During the recession of the Arctic Ocean, the gases emission was comparable with those in present-day permafrost landscapes (E. Rivkina, D. Gilichinsky).

The Institute of Environmental Geosciences (RAS), in collaboration with the Permafrost Institute and the Institute of Natural Resources, Ecology and Geocryology (both of SB RAS), started to restore the permafrost station in northern Zabaikalie (D. Sergeev, M. Gelezhiak,

60th Anniversary of the Department of Cryolithology and Glaciology, Moscow State University

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The year 2005 marks the 60th anniversary of the founding of the Department of Cryolithology and Glaciology of the Moscow State University. The Department of the Northern Countries Geography was established in the College of Geography of the Moscow State University under the initiative of the Major Administration of the Northern Sea Route. The outstanding Russian oceanographer and geographer V.G. Bogorov became the first Head of the new department. Gradually the scope of scientific research expanded and in 1955 the name of the Department was changed to the Department of the Polar Countries.

In 1956, K.K. Markov, the Dean of the College of Geography, invited the well-known permafrost specialist A.I. Popov to join the faculty. A.I. Popov suggested that the Department train specialists in permafrost science and in cryolithology. The important stage in the history of the Department was associated with the alliance of the two scientific branches – Permafrost and Glaciology – within one department. The Glaciological direction was headed by G.K. Tushinskiy who created the school of the glaciologists at Moscow State University. The great theoretical, methodical, and organizing work of Popov and Tushinskiy resulted in transformation of the Department of the Polar Countries to the Department of Cryolithology and Glaciology (1967). The Department is presently headed by its alumnus V.N. Konishchev.

The development of the Department and of the scientific school of Cryolithology and Glaciology was based on the integration of scientific and training undertakings of faculty, students, researchers, and PhD students. The great role in training of students and the development of scientific research involved field studies with faculty and students working together. Permafrost field investigations covered many areas of Russia: Kola Peninsula, Arkhangelsk region, Bolshezemelskaya and Malozemelskaya tundras, Western Siberia (the area of the oil and gas field developments and the pipelines routes), Novosibirskie Islands, Yano-Indigirskaya and Kolymanskaya Lowlands, Central Yakutia and the Baikal region. Monitoring and study of glaciation of the Elbrus area are continuing, as are the studies of avalanche hazards in the mountains of Western Caucasus, Elbrus area, Khibiny Mountains, and along the route of the Baikal-Amur trunk line.

One of the major achievements of the Department was the development of scientific-training stations for the students' practice and long-term research in the regions of the Caucasus Mountains (Glaciological studies) and the lower course of Yenisey River (Cryolithological studies). The G.K. Tushinskiy Elbrus Scientific-Training Station for Glaciology is situated in the Azau River valley (Central Caucasus). This Station, established in 1969 by Tushinskiy, is at the present a large scientific and training centre.

The Ust-Port Scientific-Training Station for Cryolithological, established in 1972 by Popov, is situated in the lower course of Yenisey River, 100 km from Dudinka city. Recently the area of practice has enlarged sufficiently, and now it includes the Norilsk industrial area.

More than 30 years ago, the Department started the development of scientific problems of Cryosphere, connected with the ground ice origin, the formation of structure and composition of frozen sediments, the features of seasonal freezing and thawing, and the interaction of permafrost and glaciations. Other scientific directions at that time were connected with mountain glaciations based on the glaciers of Caucasus and other regions; the development of the principles of engineering glaciology and avalanche study; the experimental work on the physical and mechanical properties of snow and ice; and research concerning the environmental problems of Northern regions and mountainous areas.

The results of cryolithological researches were published in numerous papers and monographs. Faculty and staff of the Department developed a set of Permafrost and Cryolithological maps at various scale, including the unique Cryolithological maps of USSR and Northern America. For the last 60 years, more than 500 specialists have graduated from the Department, and several dozens of PhDs and ten DSc were trained. The main directions of the scientific researches of the Department are: Study of the earth cryosphere evolution during the all its history; Development of the palaeo-cryogenic reconstructions; Evolution of the mountain glaciations; Study of the snow cover and avalanche dynamics considering the influence of changing climate; and Geocology of the cryosphere and forecast of hazardous situations in the cryolithozone and mountainous areas.

At present, the Department of Cryolithology and Glaciology is a consolidated group of scientists, teachers and students, well-known all over the world for its scientific and training achievements.

D. Shesternev). In the mountains of this region, ground temperature rose 1.1° C at a depth of 19 m during the last 18 years. Modelling shows that, if the air temperature rises by 1° C (while solar radiation, snow thickness and other factors do not vary), the ground surface would only become 0.3-0.4° C warmer (G. Perlshtein, A. Pavlov, A. Bouiskih).

S. Alekseev from the Institute of the Earth Crust (SB RAS) proposed a new concept of cryo-hydrological system consisting of interconnected aquifers (aquifuges or drained deposits) which are deeply modified in response to cryogenic processes. A classification of such systems was made.

A joint group from Moscow State University and the Institutes of the Earth Crust and Earth Cryosphere (SB RAS) conducted a complex research programme on the «Frozen Yar» (steep bank) exposure in the western part of the Tojin depression (Tuva). The history of the syncryogenic deposits was reconstructed and the formation of many-tier syngenetic ice wedges was explained (S. Alekseev, L. Alekseeva, S. Arjannikov, Yu. Vaslchuk).

At the Institute of Geography (SB RAS), a genetic classification of dangerous hydrological and glacial phenomena was developed based upon the physiographic analysis of heat and moisture redistribution in both the Earth hydrosphere and cryosphere (V. Alekseev and L. Koritny). Alekseev prepared a map for the regions of Russia and contiguous countries that are prone to icings.

At the North-Eastern Interdisciplinary Institute (Far Eastern Branch RAS), the connection between wind dusting and heat exchange features on the surface of tailings area was explored. For undisturbed watercourses, the tendency of decreasing total runoff was detected against a background of climate warming (V. Glotov, L. Glotova).

The observations at the two field stations were conducted within the CALM program by the Chukotski Division (North-Eastern Interdisciplinary Institute).

Groundwater reserves were estimated at water supply points for the Chukotka region.

The Komi State Monitoring Centre continued monitoring the zones of discontinuous and also relict (Pleistocene) permafrost in the Komi Republic. The most important works were carried out at the Vorkuta permafrost station where the polygon has an area 2600 square km. Observations on the climate dynamics and permafrost parameters, groundwaters and cryogenic processes have been conducted there since 1963.

At the Institute of Oil and Gas Problems (RAS), a method for estimating and forecasting the anthropogenic component of environmental dynamics was developed based on remote sensing data. The consequences of pyrogenic impact were estimated to be the most significant factor determining the changes in cryogenic landscapes. Data from Landsat 4 and 7 satellites show that at the latest successional stages (more than 10 years) the radiation temperature of the disturbed sites surface is 1.2-1.6° C lower than within the undisturbed areas. Therefore, a cover type and its properties as heat insulation can be determined from the spectrozonal photography in visual and thermal wavelengths (S. Kornienko).

The Research and Production Enterprise «TRANSIGEM» (V.G. Kondratiev) developed some new technical decisions and recommendations concerning road building on permafrost terrain.

PNIIS compiled engineering and geocryological large-scale maps for high-priority objects with difficult permafrost conditions in the north of Western Siberia and in the Northeast European Russia. Moreover, a series of specific electronic maps was prepared for the long pipelines in Central Siberia and Zabaikalie. The dynamics of the local geocryological conditions were forecasted according to the development of the European North oil-and-gas fields.



Participants in the Third Conference of Russian Geocryologists, Moscow. Photograph by Alexander Lobus.

The Laboratory of Geocryology and Hydrates of VNIIGas Ltd. investigated the shows of gas and hydrates in permafrost deposits for the oil and gas fields of Western Siberia. This research has been supported by the INTAS (grant No. 03-51-4259 «Experimental studies of composition, structure and features of gas-hydrate formation in deposits»).

The International Conference on «Priorities in Earth Cryosphere Research» took place in Pushchino, May 24-27, 2005. It is interesting to note that besides traditional geocryological sessions, the medico-social and planetary questions were considered there. Immediately following the 3rd Conference of Russian Geocryologists was held at Moscow State University as a part of its 250th anniversary celebrations. More than 500 permafrost scientists and engineers from Russia and other countries participated in interesting discussions about the current permafrost issues. This Conference summarised Russian permafrost activity for the last four years and outlined the main goals for further investigations. Russian researchers also attended the First CliC International Science Conference (Beijing, April 2005) and the EUCOP II Conference (Potsdam, June 2005).

The defences of theses for a Doctor's degree by M. Leibman, V. Mikhailov, A. Popov, F. Rivkin and E. Slagoda were important events for the Russian permafrost community this year. The following monographs were published: Khrustalev, L.N. Fundamentals of permafrost geotechnics (Manual). M.: Edited at MSU ; Alekseev, V.R. Landscape indication of the icing phenomena. Novosibirsk, Nauka.

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SWEDEN

Several activities took place in 2005 at the GeoBiosphere Science Centre of the Lund University and in the Abisko area. The CALM-grids along the east-west transverse from Bergfors to Riksgransen were monitored as usual (Jonas Åkerman, Margaretha Johansson). The record series now covers the period 1978-2005. In two of the monitored bogs, permafrost is now more or less completely gone and the dry heath vegetation has turned into a wet Sphagnum and Carex dominated swamp. Torbjörn Johansson continues the newly established grid at Stordalen and here the mire was intensively surveyed using real-time kinematic (RTK) GPS-technique with an high accuracy. A total of approximately 10,000 points were surveyed during a two-week period over the whole mire (ca. 16 ha) with an intensified survey within the CALM grid. With these measurements we have now created opportunities to follow permafrost degradation and changes in thermokarst features on the site at a centimetre scale (point). The general resolution is approximately 10 meters. The micro-topography data is used in a carbon flux perspective to quantify «hot spots» on the mire. During

the summer months vegetation mapping within the CALM grid was completed. Implications of already observed changes for methane emissions at the landscape scale were published in 2004.

Margaretha Johansson has filled the new PhD studentship post on «Permafrost dynamics and its implications for biodiversity and ecosystem functioning» (supervisors: Torben R. Christensen, Jonas Åkerman). Installations of snow cover manipulation plots, snow cover depth, soil temperature measurements and a complete microclimatic station were initiated next to one of the old CALM grids (AL 1- Storflaket).

Research at Uppsala University continues in the field of periglacial processes (Else Kolstrup, Jan Boelhouwers, Hanna Ridefelt). E. Kolstrup continues the research on boundary constraints of geomorphological forms and processes in past and present periglacial environments. Spatial variability in solifluction process rates and environmental parameters in the Abisko mountains of northern Sweden is the topic of H. Ridefelt's Ph.D. J. Boelhouwers continues his work on soil frost processes and spatial variability on sub-Antarctic Marion Island, including a pilot study on interactions with vegetation in collaboration with ecologists from Stellenbosch University, South Africa. A coastal-inland transect of active layer temperature monitoring sites and sediment movement rates was established in Western Dronning Maud land between the Swedish Wasa and Svea stations.

At Stockholm University (Britta Sannel and Peter Kuhry) installed monitoring equipment in a peat plateau-thermokarst lake complex in Taavavuoma, northern Sweden (68°27' N, 20°58' E) in September 2005, as a part of the Ph.D. project of B. Sannel. The monitoring equipment consists of a meteorological station measuring air temperature, relative humidity and precipitation and three cables with thermistors measuring ground temperature down to depths of two meters in different parts of the peatland. A stationary digital camera taking one image a day at 1 PM was installed overlooking four stakes for snow depth measurements. This monitoring station will be test run during the winter 2005/2006. The plan for summer 2006 is to further expand monitoring with a wind speed and direction sensor, additional thermistor cables, additional snow depth stakes and possibly tilt metres along the part of the peat plateau that is collapsing into a thermokarst lake. The main objective of the project is to study local climate, permafrost and ground dynamics in a peat plateau-thermokarst lake complex to obtain a better understanding of how these permafrost peatlands respond to climate change.

Swedish permafrost researchers met in May 2005 with the aim to develop a Swedish permafrost group. Swedish permafrost researchers and all those with permafrost-related research in Sweden are invited to join this group and provide project information. For further information, see: www.eld.geo.uu.se/SPG/

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SWITZERLAND

PERMOS, the «Permafrost Monitoring Switzerland» (www.permos.ch) reached its last year within the pilot phase. There are indications that PERMOS will be established within the federal environment monitoring system. The Swiss Academy of Sciences (SAS), the Federal Office for Water and Geology (FOWG) as well as by the Swiss Agency for Environment, Forests and Landscape (SAEFL) are the official partners, which are crucial and supportive for this «docking». MeteoSwitzerland, the federal office for meteorology, will become a new PERMOS partner, with which the link to GCOS/GTOS will be strengthened in the future. PERMOS has been and will be further operated by the eight Swiss university institutes involved in permafrost research.

Initiated by the FOWG, a task force composed on SMEs (Academia Engadina, Getest and Geo7) and a scientific advisory panel published maps (1:50,000) of the entire Swiss Alps where permafrost distribution and potential zones of natural hazards are plotted.

At the University of Zurich, the permafrost distribution modelling for the North-Ossetian Caucasus initiated within the project, «High-Mountain Hazards Prevention, North Ossetia» (Swiss Agency for Development and Cooperation) was finalized. A first-order assessment of the permafrost distribution implies a lower limit of possible permafrost at a mean altitude of 2600 m asl and of probable permafrost at 2980 m asl. The lower limit of permafrost distribution is strongly dependent on aspect and was affirmed in selected locations by the occurrence of active rock glaciers (R. Frauenfelder, S. Zraggen-Oswald, C. Huggel, A. Käab, W. Haeberli). The new information primarily concerns debris-covered areas. In the near future, temperature loggers installed in several rock free faces in the area will allow acquisition and more analyses of the temperature distribution in steep rock walls (S. Gruber, R. Frauenfelder, S. Zraggen-Oswald, C. Huggel, A. Käab, W. Haeberli).

A new project was initiated, focussing on the investigation of glacier-permafrost interactions and associated features in a transect spanning from the high Arctic on Svalbard over the subarctic area of Northern Norway into the boreal mountain regions of Southern Norway (R. Frauenfelder, funding by the Swiss National Foundation).

The Swiss Federal Institute for Snow and Avalanche Research (SLF) in Davos continued to investigate the thermal and geotechnical effects of water in the active layer of steep scree slopes. Detailed measurements are collected in the field while numerous shear-box tests are carried out in the laboratory (A. Rist). Three instrumented boreholes (two vertical and one horizontal) are currently being added to the SLF network. These are particularly interesting as they are located in narrow rock ridges and will be used in the context of a new project on the mechanical behaviour of rock walls containing ice. Continuing monitoring of

16 other boreholes located in rock glaciers, scree slopes and under structures such as cable car stations or avalanche defence structures constitutes already a nine-year data set (temperature and deformation) for several of these boreholes, which partly contributes to PERMOS (M. Phillips). The SLF models SNOWPACK and ALPINE-3D are currently being adapted to simulate permafrost distribution and evolution in complex alpine terrain (M. Lehning and I. Völksch).

The Institutes of Geography at the University of Lausanne (Christophe Lambiel, Emmanuel Reynard) and Fribourg (Reynald Delaloye) carried on their close collaboration in alpine permafrost research in the western Swiss Alps. The focus is on two main aspects:

(1) Survey of surface movement of alpine permafrost features (active and inactive rock glaciers, frozen deposits in Little Ice Age glacier forefields, talus slopes) by differential GPS (E. Perruchoud) and photogrammetry (G. Fasel). After a general acceleration between 2000 and 2004, a significant decrease in surface velocities occurred in 2004 and 2005. The satellite based InSAR measurements confirm field observations and showed a kind of «surging rock glaciers» (velocities of about 5 m a^{-1}).

(2) Thermal regime and the occurrence of permafrost in talus slopes at low elevation (J. Dorthe, S. Morard) and in the belt of discontinuous alpine permafrost (K. Pieraci). In order to investigate the influence of air circulation on the thermal regime of such talus slopes, drilling and instrumentation of two shallow boreholes (5 and 15 m) were carried out in November 2004 at Combe de Dreveneuse (1550 m asl, Valais Prealps). First results indicate the predominance of a non-conductive thermal regime driven by the complex ventilation system affecting the debris accumulation.

A. Käab published in 2005 the book «Remote Sensing of Mountain Glaciers and Permafrost Creep» in the Physical Geography Series, University of Zurich (vol. 48, 266 p., ISBN 3 85543 244 9) (See: <http://folk.uio.no/kaeab/publications>). The PhD thesis of Regula Frauenfelder «Regional-scale modelling of the occurrence and dynamics of rockglaciers and the distribution of palaeopermafrost» was published in the same series (vol. 45, 70 p., ISBN 3 85543 241 4) (For ordering or PDF download: rfelder@geo.unizh.ch).

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UNITED KINGDOM

The British periglacial and permafrost community is in the process of formally developing as an association affiliated to the IPA, the British Periglacial and Permafrost Association (BPPA). Its inaugural meeting was planned for December 14, 2005 at Cardiff University, organised by Charles Harris and Julian Murton.

Full-scale modelling of gelifluction processes has been

initiated by Charles Harris, Julian Murton and Michael Davies in collaboration with Marianne Fonte and Gérard Guillemet in the cold laboratories of Laboratoire Morphodynamique Continentale et Côtière, UMR CNRS 6143 / Université de Caen, France. Two full-scale slope models have been constructed, 4 m in total length, 1.5 m in width, and constructed in identical Caen silt. Models are subject to identical air temperature freezing and thawing cycles, but a freezing plate is installed in the base of one slope, maintaining a permafrost surface beneath a 30-cm thick active layer, while the second model has a basal drainage layer and is allowed to thaw completely between freezing cycles. The research will compare solifluction processes associated with one-sided, active-layer freezing (non-permafrost) and two-sided freezing (permafrost) by measuring soil and air thermal conditions, frost heave and settlement, downslope soil movement, volumetric moisture content and pore pressures. Three, full freeze-thaw cycles have so far been completed.



Field station monitoring active-layer gelifluction processes, Endalen, Svalbard, installed in August 2005. Photograph by Charles Harris.

A second project entitled «Modelling Pre-failure Shear Strain (Solifluction) in Freezing and Thawing Soil Slopes» commenced in May 2005 at Cardiff University, with Charles Harris (Earth Sciences), Hywel Thomas and Peter Cleall (Engineering) as principal scientists, and Martina Luetschg (Earth Sciences) and Katherine Butterfield (Engineering) as Post-Doctoral Fellows. The programme will develop numerical modelling of periglacial solifluction, calibrated and validated against scaled physical modelling in the geotechnical centrifuge and field monitoring. As part of this programme a new field station was installed in Endalen, Svalbard, in collaboration with Hanne H. Christiansen of UNIS and Fraser Smith of Dundee University. The station will monitor permafrost solifluction process variables and replicate the Caen full-scale laboratory modelling experiment, measuring air and ground thermal conditions, surface frost heave and settlement,

downslope displacement, volumetric moisture content and pore pressures.

The bedrock ice-segregation experiments, funded by NERC and led by Julian Murton (Sussex University), finished in the Caen cold rooms and preliminary results were presented at the Second European Permafrost Conference in June 2005. The results are currently being analysed for publication in collaboration with Rorik Peterson (University of Alaska, Fairbanks).

Julian Murton (j.b.murton@sussex.ac.uk)

UNITED STATES OF AMERICA

The Fall Meeting of the American Geophysical Union was held in San Francisco, California, December 5-9, 2005. More than 50 oral reports and posters were presented in two special topical sessions on permafrost, seasonally frozen ground, hydrates, hydrology, and related topics. Forty-nine reports were presented in four sessions under the general heading «Permafrost and Seasonally Frozen Ground in a Changing Climate». The sessions were organized by Stephan Gruber (France), Tingjun Zhang and F.E. Nelson. A poster session consisting of eight reports on «Gas Hydrates and Their Relationship to Geohazard and Global Climate Change» was organized by Scott Dallimore (Canada) and Tim Collett.

The U.S. Permafrost Association (USPA) continues to develop and attract new members. Visits to the USPA website exceeded 4,000 «hits» during 2005 (www.uspermafrost.org). The USPA held its annual meeting and election during the AGU. Members of the 2006-2007 Board of Directors include: President: F. E. Nelson; Past President: Vladimir Romanovsky; President Elect: Jon Zufelt; Board members David Norton, Jennifer Hardin, Michael Lilly (Treasurer), Ken Hinkel (Secretary).

The U. S. National Committee for the Ninth International Conference on Permafrost met in open session prior to the AGU. Planning for the NICOP was reviewed in preparation for the mailing of the first announcement in early 2006. The Local Organizing Committee is developing the details of the conference programme and activities. Conference plans and pre-registration information are posted at: www.nicop.org

A special session on the International Polar Year was organized by Jerry Brown and Fritz Nelson for the Annual Meeting of the Association of American Geographers (AAG) to be held in Chicago in March 2006. The IPY sessions are sponsored by the AAG's Cryosphere, Geomorphology, and Climate Specialty Groups. At its annual meeting in April 2005 in Denver, Colorado, more than 50 cryosphere-related reports and posters were presented. Several awards were presented for the best poster presentation by young investigators.

Jon Zufelt provided the following report on recent and continuing activities of the American Society of Civil Engineers (ASCE) and its Technical Council on Cold Regions (TCCRE) during the year:

- Completed the TCCRE publication titled «River Ice Monograph».
- Organized and sponsored «Cold Regions Symposium» with six sessions at the ASCE World Water and Environmental Resources Congress held in Anchorage, AK, May 16-19, 2005, and presented two awards: the Can-AM Civil Engineering Amity Award to Jon Zufelt of CRREL, Anchorage, and the Harold R. Peyton Award to Norbert Morgenstern, University of Alberta, Edmonton.
- TCCRE EXCOM met in San Francisco at the AGU, participated in the meeting of the USNC for NICOP and is assisting in planning the conference.
- 100 abstracts were received for the 13th International Conference on Cold Regions Engineering at Orono, Maine, July 23-26.
- Co-sponsoring with RIL and the Finnish Society of Civil Engineers, the International Society for Cold Region Development (ISCORD) Conference in Tampere, Finland, September 25-27, 2007.
- Initiated planning for the 14th International Conference on Cold Regions Engineering in Duluth, MN in 2009.
- Continued to review manuscripts and published the quarterly Journal of Cold Regions Engineering and the preparation of new Cold Regions Monographs on Field Properties and Site Investigations in Frozen Ground, Hydraulics and Hydrology, Water Treatment in Cold Regions, Specialty Foundations in Cold Regions, and Ports and Harbors in Cold Regions.

Bucky Tart is the incoming chairman of the TCCRE Executive Committee (EXCOM). David Prusak rotates off the EXCOM and John Woodworth, a structural engineer from Duluth, MN has been elected to the EXCOM.

Vladimir Romanovsky, Geophysical Institute and International Arctic Research Center, University of Alaska Fairbanks and the permafrost research group (Kenji Yoshikawa, Sergei Marchenko, Dmitri Nicolsky, Ronald Daanen, and Valeri Groshev) continued their efforts to record active layer and permafrost dynamics at our more than 60 sites within Alaska. All sites were visited in June - September along the northern portion of Alaska and some sites within the southern portion of the Alaskan transect to collect air and ground temperatures and soil moisture data from the data loggers. Active-layer depths and other environmental characteristics were also collected. Permafrost temperatures in all deeper boreholes (60 to 80 meters) were measured within the northern portion of the transect. Generally, active layer thickness was less this year compared to the last year, but it is still greater than average for the last 15 years. Temperatures in permafrost continue to increase in northern Alaska, but with lower rate compared to the 1990s. In Interior Alaska permafrost temperatures are approaching the highest level that was recorded during the mid-1990s. At many locations mean annual temperatures at the permafrost table are within

several tenths of a degree C of the melting point of ice. A new near-surface, permafrost observatory was established at Isachsen (Ellef Ringnes Island, Canada) as a part of Walker's Biocomplexity project. This installation completed the Canadian Arctic transect of permafrost observatories (Banks Island, Mould Bay and Isachsen) and extended our Alaskan transect into the High Arctic. A new observatory is under development at the southern end of the transect at Gakona, Alaska.

Tom Osterkamp reports that after monitoring active layer and permafrost conditions at permafrost observatories along a north-south transect of Alaska for the last twenty five years, this project will now be continued by Vladimir Romanovsky. This database through 2004 is available on-line through NSIDC: <http://nsidc.org/data/arc034.html> and <http://nsidc.org/data/arc106.html>

Ken Hinkel and Wendy Eisner (University of Cincinnati) provided reports on several projects. Hinkel, Richard Beck and three graduate students were at Barrow in April to determine the elevation of the snow drift along the Cakeater Road snowfence using DGPS towed behind a snowmachine. Snow thickness was estimated by comparing these transect measurements to the high resolution IFSAR DEM. Soil warming and summer ponding has resulted in ground subsidence of about 10 cm in the past five years; the effect is maximized beneath the crest of the snow drift. In August, the team completed the Barrow Urban Heat Island study. Over four winters, the village core averaged about 3° C warmer than the tundra; on some days it was 9° C warmer. In summer, the village tends to be a bit cooler owing to the maritime effect along the coast. Wendy Eisner, Hinkel, and Chris Cuomo are involved in an interdisciplinary project studying landscape processes on the North Slope of Alaska. Native people of the North Slope have first hand knowledge of these Arctic changes. UC graduate students John Hurd and Benjamin Jones, joined the team in Barrow and Atkasuk in August. Fifteen Inupiaq Elders were interviewed and many have indicated that landscape changes are occurring at a rapid rate. They have identified lakes that have drained, areas where permafrost thaw has been extreme, and places where the sea and river bluffs are eroding. The team has been able to verify many of these observations through the use of aerial photography, satellite imagery, and radiocarbon dating. Ben Jones is now working at the U.G. Geological Survey in Anchorage.

Frederick Nelson (University of Delaware) reported that with the appointment of Hugh French as an affiliate of the University of Delaware's Center for Climatic Research, the UD Permafrost Group (UDPG) now consists of 13 students, affiliates, and faculty. With masters student Mark Demitroff, H. French is examining the landscapes of southern New Jersey and the Delmarva Peninsula for traces of Pleistocene permafrost and periglacial features. The Appalachian Mountains and Mid-Atlantic coastal plain are becoming a focus for much of UDPG's work: Mike Walegur is analyzing the lengthy records from his network of air- and ground-temperature stations in

the Appalachian Highlands. Andrea Wedo is completing her study of the Hickory Run Boulder Field in Pennsylvania, and Kim Gregg's masters thesis on blockfield distribution in the Appalachians is being readied for publication. Other news includes the arrival of Meixue Yang, a cold-regions specialist from Lanzhou China, who will be a visiting Research Associate for the next two years. Anarmaa Sharkhuu from the Mongolian Academy of Sciences spent several weeks in residence with UDPG during the fall semester of 2005. Other new UDPG personnel include masters student Melanie Schimek and doctoral student Dmitri (Dima) Streletskiy. Dima completed his masters program in geocryology at Moscow State University in June. Anna Klene defended her doctoral dissertation in May 2005 and is now Assistant Professor of Geography at the University of Montana in Missoula. Research Associate Kolia Shiklomanov spent August 2005 assessing CALM sites in Siberia. Silvia Cruzatt installed a series of stations at high elevation (~5000 m) in the Peruvian Andes in late 2004. Heath Sandall and Jon Little are completing masters theses on their CALM-related fieldwork in northern Alaska. The 2005 CALM field crew in Alaska consisted of Nelson, Klene, Streletskiy, Schimek, Sandall, and Cathy Seybold (U.S. Natural Resources Conservation Service).

Skip Walker (University of Alaska Fairbanks) reported on the fourth expedition conducted under the NSF-funded project «Biocomplexity of patterned ground». The primary goal of the project is to better understand the complex linkages between patterned ground formation, biogeochemical cycles, vegetation, disturbance, and climate across the full Arctic summer temperature gradient in order to better predict Arctic ecosystem responses to changing climate. The 2005 expedition to Isachsen, Ellef Ringnes Island in the Canadian Archipelago was logistically the most difficult because of the size of the group (25 scientists, students, and support staff), and remoteness of Ellef Ringnes Island. Isachsen is near the extreme cold end of the summer temperature gradient in Canada. It was the site of a joint U.S.-Canadian climate station from 1948 to 1971 and is characterized by very low summer temperatures and low biological diversity and productivity (mean July temperature 3° C). The Biocomplexity project now has 10 locations along an 1800-km North American Arctic (NAA) transect starting in the northern boreal forest and passing through all five Arctic bioclimate subzones of Alaska and Canada. Participants came from Canada, France, Germany, Puerto Rico, Switzerland, and the United States and included five students who participated in the Arctic Field Ecology course taught by Bill Gould and Grizelle Gonzalez through the University of Minnesota.

Chien-Lu Ping, University of Alaska Fairbanks, and Torre Jorgenson, ABR, Inc., Fairbanks, initiated their new three-year, collaborative project «Flux and transformation of organic carbon across the eroding coastline of northern Alaska» under the NSF Study of Northern Alaska Coastal Systems (SNACS) program.

The 2005 field season started at Barrow and ended on the Colville River Delta, with 24 sites along the Beaufort Sea coast studied and sampled. The sites included coastal marshes/tidal flats, and bluffs with elevation up to four meters. Community-based monitoring sites were established with schools at Barrow, Nuiqsut and Kaktovik. This year's international team consisted in addition to Ping and Jorgenson of Fugen Dou (post-doc, UAF), Sabine Fiedler, (Soil Scientist, University of Hohenheim, Germany), Mikhail Kanevskiy (UAF post-doc fellow from the Russian Earth Cryosphere Institute), Prathap Kodial (graduate student, UAF), Gary Michaelson (Palmer Research Center, UAF), Yuri Shur (Civil Engineering, UAF), Vladimir Tumskey (Moscow State University) and Jerry Brown (IPA).

Torre Jorgenson, Yuri Shur and Tom Osterkamp initiated a new NSF-project on «Effects of ground ice on the evolution of permafrost-dominated landscapes under a changing climate». The research addresses the effects of ice aggradation and degradation on terrain evolution, and the current extent and rate of thermokarst development in Alaska. Data from the first summer of field work are currently being examined.

Through a grant from the NSF EPSCoR program, University of Alaska Fairbanks (UAF) researchers are bringing permafrost studies to schools around Alaska. Kenji Yoshikawa, Yuri Shur and Douglas Goering are installing instrumented boreholes near schools in Nome, Fairbanks, Noatak, Beaver, Galena, and Barrow that will permit students to participate in installing instruments, measuring temperatures and join discussions of the role of permafrost in Alaskan ecosystems.

UAF researchers Kenji Yoshikawa, Douglas Kane, and Larry Hinzman are investigating groundwater dynamics in the continuous permafrost regions of the North Slope of Alaska by examining the physical and chemical properties of groundwater springs and aufeis fields. While some of the aufeis have very local sources of water, it appears that many springs derive their water from the south side of the Brooks Range, releasing water that is at least 2000 years old. Daniel White and Larry Hinzman are studying the degradation of permafrost on the Seward Peninsula of Alaska to understand the consequent effect to hydrological processes and communities.

Douglas Kane and Larry Hinzman continue various projects related to permafrost hydrology in the Kuparuk Watershed on the North Slope of Alaska. This research program has operated continuously since 1985, maintaining nearly continuous hydrological and meteorological observations at many stations for 20 years. These data are available via: <http://www.uaf.edu/water/projects/NorthSlope/introduction.html>

Kenji Yoshikawa collected spring water and ice core samples from frost blisters at Sukakpak Mountain (Brooks Range), North Folk Pass (Yukon, Canada) to compare with previous studies. The isotopic signals of the spring water has not changed since the 1980s. Other drilling was carried out at the Alpha pingo (near Fairbanks), Cripple Creek

pingo, Maclaren River palsa, Copper River Basin, and a broad base mound on the North Slope.

Horacio Toniolo (UAF) continues permafrost degradation and sedimentation studies at Caribou Poker Creeks Research Watershed. This research watershed was established in 1968 by CRREL and has been an active study site for numerous studies over the years. Half of this watershed was burned in a wildfire in 2004, and now presents opportunities to monitor the fire impacts. Numerous thermokarsts are now evident in CPCRW, some in response to fire, others related to a flood event, and others probably forming in response to a warming climate.

Gary Clow and Frank Urban (U.S. Geological Survey) continued development of the U.S. Department of the Interior's contribution to the GTN-P monitoring program. The primary focus during 2005 was adding radio telemetry capability to several of the active-layer monitoring stations in the eastern portion of the National Petroleum Reserve (NPRA) in northern Alaska. This is being done in collaboration with Michael Lilly (GW Scientific) and the U.S. Bureau of Land Management. The total number of stations in the DOI/GTN-P active layer network is now 15. Repairs and upgrades were made to several of the wells in the DOI/GTN-P deep borehole array in preparation for the TSP campaign. A major effort was initiated to quantify the uncertainties in TSP borehole temperature measurements. The USGS' polar temperature logging system is being upgraded in response to this analysis.

Larry Hinzman reported on «An Evolving Arctic Workshop: Hydrologic Responses to Degrading Permafrost», August 9-12, 2005, at the University of Alaska Fairbanks. The purpose of the workshop was to examine how the warming climate will impact the hydrological regime and the resulting impacts to local ecology and surface energy balance through degrading permafrost. The primary focus was upon the influence of permafrost warming and thawing to elucidate further influence through feedback processes. This workshop included local field trips in the Fairbanks area to observe and photograph evidence of permafrost degradation. Workshop attendees observed various permafrost features that characterize the interdependence among the dynamic thermal and hydrological processes. Hydrologic processes impacted by degrading permafrost include increased winter stream flows, decreased summer peak flows, changes in stream water chemistry, and other fluvial geomorphological processes. Several changes in local hydrology have already been witnessed including drying of thermokarst ponds, the increasing importance of groundwater in the local water balance, and differences in the surface energy balance. As our climate continues to change, it becomes paramount to understand and predict changes in hydrological processes. A workshop report is in preparation.

At the University of Washington, Ron Sletten, Bernard Hallet and Birgit Hagedorn completed the third year of a NSF study «Biocomplexity of Carbon Cycling in the High Arctic» at the Thule Air Base, Greenland. The multi-institutional project includes Jeff Welker and Paddy Sullivan (University of Alaska, Anchorage), Heidi Seltzer (Colo-

rado State University) and Josh Schimel (the University of California, Santa Barbara). Physical, chemical, and biological interactions and feedbacks on carbon flux, weathering, and ecosystem dynamics are being investigated. This past summer was our most extensive field season with 28 participants. In addition, we held a 3-week field course with 12 international students, two NSF-supported teachers, John Sota (U.S.) and Jane Buss Sorensen (Nuuk, Greenland). The course was designed to provide students with hands-on experience in ecology, soils, hydrology and periglacial processes. Jennifer Horwath, a PhD student, completed her final field season on soil organic carbon. Three members of our group spent 10 days in the Kangerlussuaq region to collect lake core samples that PhD student Heather Heuser is using to analyze ^{18}O in diatoms. We continued our studies of contraction crack dynamics and formation of ice-rich permafrost in the Dry Valleys. A new project to investigate salt diffusion is planned for the coming year. For further information, see: <http://depts.washington.edu/icylands>

Edwin Clarke (Soils Alaska) reported on a geotechnical investigation of a 40 acre subdivision that occupies a patchwork of thin, discontinuous permafrost consisting of silts and sands underlain by gravels. Recommendations were made as to which portion of the subdivision could be developed now and which portion should be cleared to increase the depth of thaw. We are designing structurally enhanced and adjustable foundations for use on frozen sands and gravel with excessive differential thaw strain. We also participated in the design of a 12,000 square foot building with an adjustable foundation on frozen silt.

Jack Hebert and John Davies report that the Cold Climate Housing Research Center (CCHRC, University of Alaska Fairbanks lower campus), started construction on its new Research and Test Facility (RTF) this summer. An extensive monitoring system was installed, in partnership with GW Scientific (Michael Lilly) and Campbell Scientific (Austin McHugh) to help monitor permafrost and active layer conditions, groundwater conditions on top of permafrost, and thermal and unfrozen soil-moisture conditions in the subgrade portions of the basement. The CCHRC RTF will help provide valuable information for building construction techniques in permafrost conditions (www.cchrc.org).

W. Berry Lyons (Byrd Polar Research Center, Ohio State University) reported on an investigation sub-surface seeps in Taylor Valley, Antarctica, as part of the McMurdo Dry Valleys Long-Term Ecological Research (MCM-LTER). They did a walking reconnaissance of the valley and sampled seeps for their isotopic and geochemical compositions. The work was a research project of Kate Harris (University of North Carolina at Chapel Hill) and involved collaboration with Andrew Fountain (Portland State University) and Anne Carey (Department of Geological Sciences, OSU). This investigation is part of the MCM-LTER's long-term research dealing with the overall hydrologic cycle in Taylor Valley.

Nicole Mölders (University of Alaska Fairbanks), with colleague Narapusetty evaluated the hydro-thermody-

dynamic soil-vegetation model that is used in various community-climate and weather forecast models by means of data from the BALTEX data bank, the ATLAS project, and the IARC permafrost observatory, as well as, by use of a theoretically advanced numerical scheme. Currently the soil model is being implemented into CCSM 3.0.

Patrick Webber became Professor Emeritus of Plant Biology at Michigan State University, and will complete his tenure as President of IASC (International Arctic Science Committee) in April 2006. He remains active in several projects, especially ITEX (International Tundra Experiment), BAID (Barrow Arctic Information and Data project), CEON (CircumArctic Environmental Observatories Network) and several IPY projects.

Many other projects reported in Frozen Ground 28 continued and information can be obtained directly from the investigators or from the U.S. Permafrost Association web site (www.uspermafrost.org).

Larry Hinzman (ffldh@uaf.edu) and
Lynn Everett (everett.2@osu.edu)

ASSOCIATE MEMBER : PORTUGAL

Research on periglacial processes and landforms in the Serra da Estrela is being carried out by the University of Lisbon group. Current focus is on the study of the Pleistocene permafrost and periglacial landforms, their

relationship to the glacial landforms and palaeo-environmental significance. In the Limestone Massif of Estremadura the group is studying relict stratified slope deposits. The University of Coimbra group is studying the Serra do Caramulo area with a focus on relict periglacial slope deposits.

During the past year the investigations of Antarctic permafrost by the University of Lisbon group have developed further. A collaborative project with the Universities of Alcalá de Henares (Spain) and Zurich (Switzerland) was funded by the Spanish Antarctic Programme. This project is within the framework of the International Polar Year projects on *Thermal State of Permafrost* (TSP) and *Antarctic Permafrost and Soils* (ANTPAS). Field work focusing on geophysical and geomorphological survey in order to define the sites for borehole drilling is planned for January - February 2006. A project focusing on the installation of CALM-S sites in Livingston and Deception Islands is under preparation.

A proposal for a national committee for the International Polar Year is under evaluation and permafrost is planned to be a major theme in the Portuguese IPY.

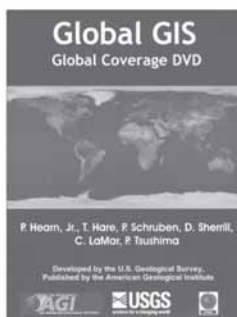
Results of Portuguese research on periglacial environments have been presented in several international meetings in 2005, namely in the EGU conference in Vienna, EUCOP II in Potsdam and IAG conference in Zaragoza.

2005 was a especially significant year with Portugal being accepted as Associate Member of the IPA.

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Cold Regions Bibliography Project

OTHER NEWS

ROMANIA

The research program entitled «Geographical risk phenomena in the alpine belt of the Southern Carpathians. Utilization of GIS technique and the achievement of maps of risk phenomena» run by the team from West University of Timisoara and led by Mircea Voiculescu will continue with the financial support of the National Council for Scientific Research in Superior Education (CNCSIS). The main monitoring program of periglacial slope processes is focused on the Parâng and Fagaras Mountains in the next season.

The papers presented at the International Workshop on Alpine Geomorphology and Mountain Hazards (September 23-26, 2004, Bălea Cascada, Fagaras Mountains) were published in English in a special issue of *Analele Universitatii de Vest din Timisoara- Geografie*.

Present-day periglacial processes, glacial and periglacial landforms, and permafrost relict features – particularly rock glaciers – are currently studied in the eastern part of the Fagaras Mountains by Petru Urdea.

Within the project «Surface exposure dating of glacial deposits from the last glacial cycle, Evidence from the East Alps, the Bavarian Forest, the Southern Carpathians and the Altai Mountains» (2003-2005), coordinated by Anne Reuther (Regensburg University), absolute age dating of glacial landforms by cosmogenic isotopes has been carried out and was also applied to some rock glaciers of the Retezat Mountains.

In order to better monitor the snow cover in mountain areas, a Laboratory of Nivo-meteorology and Avalanche Prediction, coordinated by Maria Motoiu, was created by the National Administration for Meteorology in February 2004. It is aimed at investigating the future evolution of snow cover, and the conditions prone to avalanches. This laboratory will develop an elaborated nivological balance for each winter season.

Petru Urdea (urdeap@rectorat.uvt.ro)

CARBON POOLS IN PERMAFROST REGIONS

The International Permafrost Association has started a new project entitled *Carbon Pools in Permafrost Regions*, in short the CAPP project. Planning for this initiative started at an IPA meeting on «Soil Carbon in the Cryosphere», held in Stockholm, March 2005, in close cooperation with the IPA Cryosol Working Group (CWG). The initiative was accepted as an IPA project at EUCOP II (Potsdam, June 2005), with further support from the WCRP-CliC Project and the ESSP-Global Carbon Project (see *Frozen Ground* 28, p. 52).

The CAPP project aims at quantifying below-ground organic matter quantity and quality along ecoclimatic and

edaphic gradients in high-latitude and high-altitude regions characterized by the presence of isolated to continuous permafrost. A first step is to update the existing Northern Circumarctic Soil Carbon Database (NCSCD) with additional data, including deep peat deposits, ice rich permafrost complex and non-permafrost sites in permafrost regions.



The CAPP project proposes to contribute to and initiate new research activities at ca. 10-12 high latitude transects in the Northern Hemisphere representing the range of ecoclimatic and permafrost regions, complemented by two transects in the sub-Antarctic and Antarctic regions, and additional altitudinal transects in high-alpine environments. The new transects aim to incorporate already existing key sites of other projects, and integration with other IPY projects. Intensive study sites along transects will investigate the allocation of below-ground carbon in the landscape, comparing quantity and quality between permafrost settings. Soil organic matter will be analyzed using a hierarchy of increasingly sophisticated geochemical techniques.

Protocols are being developed for the carbon database, field sampling, physico-chemical analyses and up-scaling tools. Inventory, monitoring, research and up-scaling activities of the CAPP project will result in a better understanding of total below-ground organic matter allocation and its susceptibility for decay, which will be used to evaluate the fate of this very significant carbon pool under global warming and assess feedbacks from permafrost regions to the global climate system. An important objective is to develop a carbon database that can be linked with remotely sensed classifications at global to regional scales used in climate, biome and ecosystem models. The carbon pool dataset can be used for validation existing and future modelling approaches.

The next step is a series of workshops to discuss and finalize the CAPP workplan. A first interdisciplinary meeting, supported by the ESF Program «The Role of Soils in the Terrestrial Carbon Balance», was held in Stockholm, November 24-26, 2005. About 30 researchers and young scientists with interests in cryopedology, arctic biogeochemistry, permafrost dynamics and modelling discussed data bases and knowledge gaps in high latitude soil organic matter quantity and susceptibility for decay. For future developments, see: www.geowiss.uni-hamburg.de/i-boden/capp

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THE PERMAFROST YOUNG RESEARCHERS NETWORK (PYRN)

The idea of a network to formally facilitate and strengthen contacts among young scientists in the permafrost community arose from the need for an integrated

single source of information for specific resources vital to young scientists (fellowships, conference travel funding, position opportunities, etc). Additionally the International Polar Year (IPY) prompted the need for a visible representation of the young permafrost community at the newly formed Youth Steering Committee (YSC) of the IPY.

The Permafrost Young Researchers Network (PYRN) is therefore going to be formally established within the IPA framework and will maintain means of communication among young researchers involved in permafrost research. It will report on young researchers' activities to the IPA adhering bodies and working parties and represent permafrost scientists and engineers within broader international and national organisations.

PYRN is implementing a website to report on conferences, events, jobs and graduate positions, research and other topics related to permafrost science (www.awi-potsdam.de/pyrn). It will distribute an electronic newsletter to the young researchers' communities related to the listed topics and will seek to promote and publicize research undertaken by young researchers. Thus we attempt to raise the public's attention to permafrost research and its relevance to global environmental issues. PYRN will inform young permafrost researchers of the outreach and educational activities planned by the YSC.

Although at a preliminary stage, the creation of PYRN will rely on your motivation and feedback. We are therefore looking for representatives from every country and for young researchers motivated to take part in this initiative.

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THE FIFTH INTERNATIONAL CONFERENCE ON GAS HYDRATES

Following a series started in New York and continued in Toulouse, Salt Lake City and Yokohama, the most important conference devoted solely to gas hydrate phenomena (held every 3 years), the Fifth International Conference on Gas Hydrates (ICGH 5) was held in Trondheim, Norway, June 12-16, 2005. A cooperation between Statoil, the Norwegian University of Science and Technology, SINTEF, and an international committee of prominent hydrate researchers gathered more than 300 researchers and students for presentation and discussion of about 250 papers and posters. Covering the full range of hydrate research and associated phenomena, from fundamental structure studies, through thermodynamics and kinetics, to industrial applications in the oil and gas industry, the conference also contained two full sessions on «Exploration, Resources, and Environment». Papers on specific permafrost issues like in-situ thermodynamics and kinetics, gas hydrate mapping, and production of gas from hydrates were presented. The latter issue saw much discussion of work being performed in Canada, the U.S.A. and Japan. One highlight was the conference dinner speech, presented by Scott R. Dallimore on the exciting

issues studied in the «Mallik» gas hydrate well drilled in permafrost in Canada's Northwest Territory - a study which was also the subject of several specific papers.

Proceedings from the conference may be ordered as books or in electronic format from the following link: http://www.icgh.org/order_form.pdf

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CLIMATE AND CRYOSPHERE

The Climate and Cryosphere (CliC) project of the World Climate Research programme held the second session of its Scientific Steering Group (SSG) in the Danish Polar Centre, Copenhagen, on November 6-9, 2005.

Based on an analysis of the results of a very successful First CliC International Science Conference «Cryosphere, the 'Frozen' Frontier of Climate Science: Theory, Observations, and Practical Applications» held in Beijing, China on April 11-15, 2005, CliC has finalised its Implementation Strategy (http://ipo.npolar.no/reports/archive/wcrp_inf_2005_126.pdf). During the conference approximately 250 participants from 22 countries gave 137 oral presentations and presented 125 registered posters. Many of CliC and related initiatives will be built on the momentum generated by the First CliC International Science Conference and planning of the International Polar Year 2007/2008 (IPY). CliC has solicited submission of many IPY project proposals in the area of cold climate region science, polar hydrology, Arctic and Southern Ocean, Antarctic climate, etc. An overarching proposal submitted by CliC is entitled «State and Fate of Polar Cryosphere». It suggests a comprehensive snapshot of the cryosphere during the IPY in order to deepen the insight into the climate of polar regions, obtain a coherent multidisciplinary benchmark against which past and future changes will be assessed, and to develop a system for cryospheric observations.

IPA is a close partner of CliC in many initiatives. They contribute for example to the Integrated Global Observing Strategy Theme on Cryosphere, which is expected to



Matthew Beedle receives an award for his presentation at the CliC Conference in Beijing. Photograph provided by CliC.

produce a report containing a plan of future development of cryospheric observations with a 10-15 year perspective. The idea is to produce a globally coordinated plan, which would be attractive for the interested community and feasible for observing system operators. The website of the Theme is located at: <http://stratus.ssec.wisc.edu/igos-cryo>. The IPA community is cordially invited to contribute to the Theme report. This will help to strengthen support for the permafrost networks as parts of the global cryospheric observations.

The SSG session also reviewed ongoing project and related activities, and adjusted the project structure so that it would better fit the project tasks, particularly during the period of IPY. The three IPA proposals form an integral part of the CliC Project Area (CPA) 1 «Terrestrial cryosphere and hydrometeorology of cold regions». The main idea of the CPA1 activities during the IPY is to establish additional multidisciplinary observing sites and to link their observations into a data integration system based on the principles of the WCRP Coordinated Enhanced Observing Network (CEOP, see www.ceop.net). Through this initiative, a new generation of datasets representing polar energy and water cycle should be generated. With the spectrum of CliC activities broadening, the SSG was particularly keen to ensure that all components of the project are able to harmonically contribute to the new WCRP framework «Coordinated Observation and Prediction of the Earth System» (COPES, see: <http://copes.ipsl.jussieu.fr>). The COPES main goal is to convert the wide range of WCRP achievements into practical applications of great significance for the society, such as seasonal forecasting, sea level rise, climate prediction and attribution. An example of a particularly valuable joint initiative of CliC, IPA, and the Global Carbon Project is the assessment of the carbon stocks in upper layers of permafrost and the potential of its release into the atmosphere in a warming climate.

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COMMISSION FOR THE CRYOSPHERIC SCIENCES

The ICSI (International Commission on Snow and Ice) was formally replaced by the IUGG Commission for the Cryospheric Sciences (CCS) through a decision of the IUGG (International Union of Geodesy and Geophysics) Executive Committee. This change is aimed at promoting all cryospheric sciences and to elevate the study of the cryosphere to a more prominent position within the IUGG, from a Commission within IAHS (International Association of Hydrological Sciences) to a separate Association under IUGG. A final vote on the formation of a new Association will be taken by the IUGG governing body by 2007, in conjunction with the IUGG Assembly in Perugia, Italy. A set of statutes for the new Association

is under development that will adhere to the IUGG standards for such an Association.

The former IAHS/ICSI convened a Symposium on the «Contribution from Glaciers and Snow Cover to Run-off from Mountains in Different Climates» and a workshop on «Andean Glaciology» at the IAHS General Assembly, at Foz do Iguaçu, Brazil in April 2005.

The IUGG/CCS co-organized a joint symposium on «Snow and ice covers feedback to interactions with forest, atmosphere and environment» at the IAMAS (International Association of Meteorology and Atmospheric Sciences) General Assembly in Beijing, China, in August 2005. This symposium had sessions on «Modelling forest snow processes», on «Glacier mass balance and its coupling to atmospheric circulation» and on «Mountain snow and ice cover».

A field course on «Methods of glacier observations» was held in La Paz and on Glaciar Zongo, Bolivia, August 1-11, 2005. It was co-sponsored by IUGG/CCS together with the French Institut de Recherche pour le Développement (IRD/GREATICE), the Instituto de Hidráulica e Hidrología (IHH) of Universidad Mayor de San Andrés, Bolivia, Alliance Française (AF), and IHP/UNESCO. The training course was organized to support the development of the Andean Glacier Mass Balance Network.

The CCS Bureau met in Paris on November 3-4, 2005. Among the many topics discussed were plans for the cryospheric sessions at the IUGG in Perugia, and planning for the Cambridge conference in August 2006. Jerry Brown participated in the meeting and provided information on related IPA activities including the joint CCS-IPA working group on Glacier and Permafrost Hazards in High Mountains.

For further information see: www.glaciology.su.se/ICSI

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SCANNET

The Scandinavian/ North European Network of Terrestrial Field Bases (SCANNET) is a network of terrestrial field bases, research stations managers and user groups in northern Scandinavia and Europe, that are collaborating to improve comparative observations and access to information on Environmental Change in the North. There are strong links between SCANNET and IPA as sites within SCANNET also are part of the CALM network and several have associated boreholes. A Newsletter is published twice a year and available online. It presents activities and news from the sites. For further information see: www.scannet.nu

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NORTHERN RESEARCH BASINS

The Northern Research Basins (NRB) Working Group was established in 1975 under the International Hydrological Program. The role of the working group is to encourage research on the hydrology of basins in northern latitudes where snow, ice and frozen ground play a dominant role. The 15th International Northern Research Basins Symposium and Workshop was held August 29 - September 2, 2005 in the usual NRB travelling format between Luleå and Kvikkjokk, Sweden. The conference theme was «Links between human activities and high latitude hydrological systems». This theme stepped back from the global scale of the last few meetings, and concentrated on the regional and local importance of change in the Arctic to hydrological processes. The theme stressed the increased demands placed on the water systems of cold regions over the last 30 years whether it be energy production (e.g. the oil and hydropower industries), new industries (e.g. eco-tourism) or social change within Arctic communities (e.g. urbanization and development). There were twenty-seven participants representing Canada, Denmark, Finland, Iceland, Japan, Norway, Russia, Sweden, the United Kingdom and the U.S.A. The 16th NRB is scheduled to be convened in 2007 in Petrozavodsk in the Karelia Republic, Russia. For further information see: <http://aqua.tvrl.lth.se/NRB.html>

Larry Hinzman (ffldh@uaf.edu)

EDITORSHIP OF

PERMAFROST AND PERIGLACIAL PROCESSES

Professor Emeritus Hugh French, Editor-in-Chief of the Wiley journal *Permafrost and Periglacial Processes* since he founded it some 16 years ago, will step down from his position at the end of 2005. Hugh French's founding of *PPP* gave a focused outlet to the international permafrost community at a time when other specialized journals were disappearing. *PPP*'s high impact factor demonstrates its ongoing importance to geocryology and cold regions' engineering. Hugh will remain connected to the journal as Honorary Editor and will contribute an annual review paper covering developments in different aspects of permafrost science.

The new Editor will be Antoni Lewkowicz (University of Ottawa). He has been Associate Editor at *PPP* since 1995. He was in charge of the review process for the Seventh International Conference on Permafrost in 1998. Antoni Lewkowicz will share responsibilities with Charles Harris (Cardiff University) who has agreed to continue as Associate Editor. Membership in the Editorial Board, which has representation from ten of the IPA countries, will be unchanged.

The mandate and reputation of the journal – to rapidly publish the very best international papers that advance permafrost science and engineering – will remain as Hugh French's enduring legacy.

Antoni Lewkowicz (alewkowi@uottawa.ca)

Permafrost and Periglacial Processes

Editor: Professor A.G. Lewkowicz alewkowi@uottawa.ca

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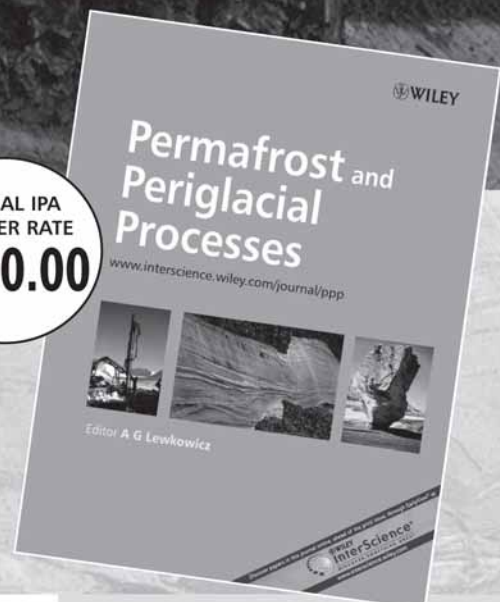
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PLANNING CALENDAR

The following meetings share common interests with the IPA Membership and Working Parties. The list is not all inclusive, but is intended to help avoid overlaps in scheduling future IPA and other international meetings. Please send corrections and additions to the IPA secretariat (IPA@unis.no). Readers are referred to web sites or individual email contacts for more information.

2006

- February 17, Ross Mackay's 90th Birthday Celebration, The University of British Columbia, Vancouver, Canada (www.geog.ubc.ca/mackay2006)
- March 16–18, The 36th Annual Arctic Workshop, INSTAAR, University of Colorado, Boulder, Colorado (<http://instaar.colorado.edu/meetings/AW2006>) (ArcticWS@colorado.edu)
- March 22–29, Arctic Science Summit Week, Potsdam, Germany (www.assw2006.de) (secretary@assw2006.de)
- March 27–30, International Conference on Alpine and Polar Microbiology, Innsbruck, Austria (www.alpine-polar-microbiology2006.at) (info@alpine-polar-microbiology2006.at)
- April 2–7, European Geosciences Union meeting, Vienna, Austria (<http://meetings.copernicus.org/egu2006>)
- April 4–6, Symposium «Climate Change: Organizing the Science in the American Cordillera» (CONCORD), Mendoza, Argentina (mri@scnat.ch)
- May 8–12, 21st Polar Libraries Colloquy, Rome, Italy (biblioteca.pnra@enea.pnra.it) (<http://arcticentre.urova.fi/polarweb/polar/plcmain.htm>)
- May 8–12, 2nd International Workshop on Ice Caves (IWIC-II), Demänovská dolina, Slovak Republic (<http://users.unimi.it/icecaves/IWIC-II>) (IWIC_II@unimi.it)
- May 21–25, 5th International Conference on Contaminants in Freezing Ground 2006, Holmenkollen Park Hotel, Oslo, Norway (www.geologi.no/cfg5)
- May 29–31, International Permafrost Conference «Estimation and Forecast of the Earth's Cryosphere State and Changes: Theory and Practice», Tyumen, West Siberia, Russia. Contact: David Gilichinsky (gilichin@online.stack.net) and Elena Spirina (lena@issp.serpukhov.su)
- June 5–10, The Sixth International Meeting «Heat flow and the structure of the lithosphere, 2006», Castle Farm Bykov, Czech Republic (www.poce.cz/heatflow)
- June 19–23, International Symposium on Earth and Planetary Ice-Volcano Interactions, Reykjavík, Iceland (www.igsoc.org/symposia/2006/iceland)
- July 9–15, 18th World Congress of Soil Science (WCSS), Philadelphia, PA, U.S.A. (www.colostate.edu/programs/IUSS/18wcss/index.html)
- July 9–17, SCAR XXIX (Scientific Committee on Antarctic Research) and COMNAP XVIII (Council of Managers of National Antarctic Programmes) combined conference, Hobart, Australia (www.scarcomnap2006.org)
- July 23–26, 13th International Conference on Cold Regions Engineering 2006, Orono, Maine, U.S.A. (www.asce.org/conferences/coldregions2006)
- August 7–16, Asian Conference on Permafrost, Lanzhou, China (Aug. 7-9) and Field Excursion along the Qinghai-Tibet Railway (Aug. 10-16). Lai Yuanming (ymlai@ns.lzb.ac.cn) (www.casnw.net/permafrost) or Jerry Brown (jerrybrown@igc.org)
- August 21–25, International Symposium on Cryospheric Indicators of Global Climate Change, joint CliC/IGS/ICSI Symposium, Cambridge, England (www.igsoc.org/symposia/2006/cambridge)
- September 14–22, 9th International Symposium on High Mountain Remote Sensing Cartography, Graz / Hohe Tauern National Park, Austria (www.kfunigraz.ac.at/geowww/hmrsc/hmrsc_9)
- December 11–15, American Geophysical Union Fall Meeting, San Francisco, California (meetinginfo@agu.org); annual meeting of U.S. Permafrost Association and U.S. National Committee for NICOP (www.uspermafrost.org) and (www.nicop.org)

2007

- April 15–20, European Geosciences Union, Vienna, Austria (www.copernicus.org/EGU)
- May, Annual Russian Permafrost Conference, Pushchino, Russia (gilichin@issp.serpukhov.su)
- July 2–13, 24th General Assembly of the International Union of Geodesy and Geophysics (IUGG), titled «Earth Our Changing Planet», Perugia, Italy (www.iugg2007perugia.it)
- July 29–August 6, XVII INQUA Congress, Cairns, Australia (johnd@geog.uwa.edu.au)
- August 26 – September 1, 10th International Symposium on Antarctic Earth Sciences (ISAES-2007), University of California, Santa Barbara, U.S.A. (<http://isaes2007.geol.ucsb.edu>)
- September 25–27, 8th International Symposium on Cold Region Development, Tampere, Finland (www.ril.fi)
- 16th Northern Research Basins International Symposium and Workshop, Petrozavodsk, Karelia Republic, Russia (<http://aqua.tvrl.lth.se/NRBsymposia/News.html>)
- December 10–14, American Geophysical Union Fall Meeting, San Francisco, California, U.S.A. (meetinginfo@agu.org); annual meeting of U.S. Permafrost Association and U.S. National Committee for NICOP (www.uspermafrost.org) and (www.nicop.org)

2008

- April, European Geosciences Union, Vienna, Austria (www.copernicus.org/EGU)
- May, Annual Russian Permafrost Conference, Pushchino, Russia (gilichin@issp.serpukhov.su)
- June 29–July 3, Ninth International Conference on Permafrost, Fairbanks, Alaska, U.S.A. (www.nicop.org)
- August 5–14, 33rd International Geological Congress, Oslo, Norway (www.33igc.org) (iugs.secretariat@ngu.no)
- August 15–20, 31st Congress of the International Geographical Union, Tunis (www.igu-net.org)
- December, American Geophysical Union Fall Meeting, San Francisco, California, U.S.A. (meetinginfo@agu.org); annual meeting of U.S. Permafrost Association



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DECEMBER 2005

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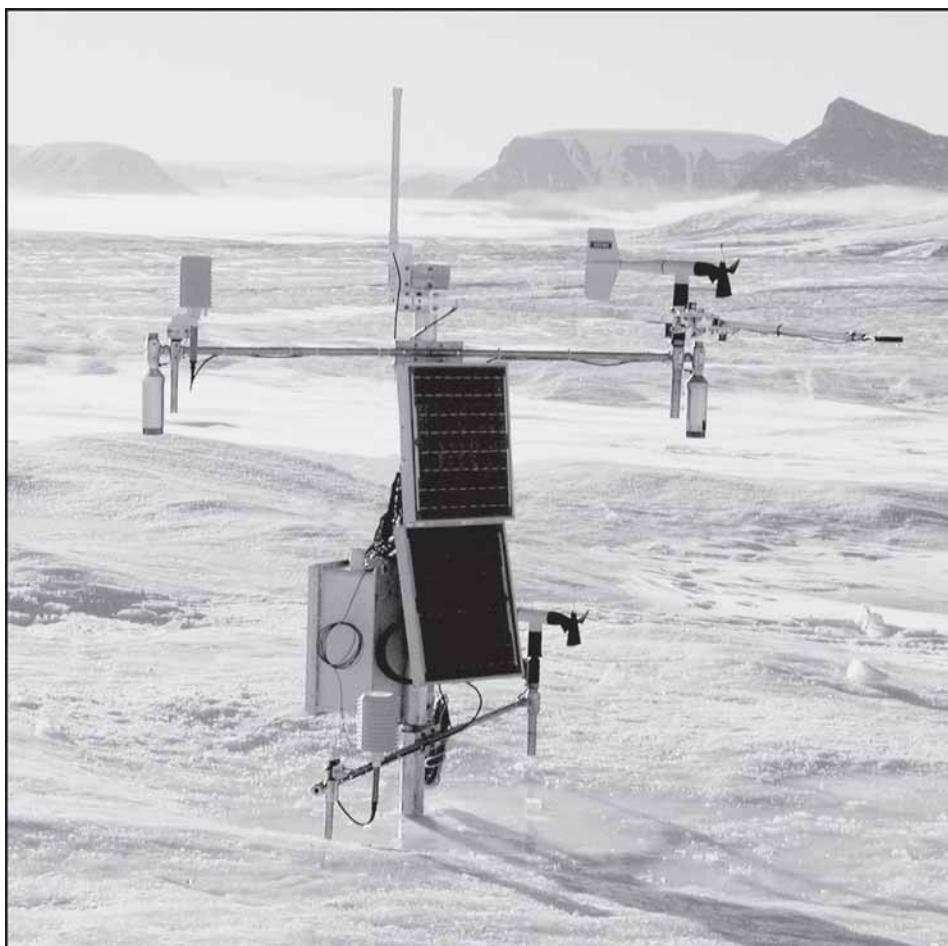
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