

FROZEN GROUND



The News Bulletin of the International Permafrost Association

Number 32, December 2008



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 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 1995 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, in Zurich, Switzerland, 2003, and in Fairbanks, Alaska, in 2008. The Tenth conference will be in Tyumen, Russia, in 2012. Field excursions are an integral part of each Conference, and are organised by the host

Executive Committee 2008-2012

Professor Hans-W. Hubberten, President, Germany
Dr. Hanne H. Christiansen, Vice President, Norway
Dr. Antoni G. Lewkowicz, Vice President, Canada
Dr. Dmitry Drozdov, Member, Russia
Professor Vladimir Romanovsky, Member, U.S.A.
Dr. Ma Wei, Member, China

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Academician Pavel I. Melnikov, Russia (1983-1988)
Professor Troy L. Péwé, U.S.A. (1988-1993)
Academician Cheng Goudong, China (1993-1998)
Professor Hugh M. French, Canada (1998-2003)
Dr. Jerry Brown, U.S.A. (2003-2008)

International Secretariat

Dr. Hugues Lantuit, Germany

Standing Committees

Data, Information and Communication
International Advisory Committee for ICOP

Working Groups and Subgroups

Antarctic Permafrost and Periglacial Environments
Cryosol
Coastal and Offshore Permafrost Dynamics
Glacier and Permafrost Hazards in High Mountain Slopes
Isotopes and Geochemistry of Permafrost
Periglacial Landforms, Processes, and Climate
Permafrost and Climate
 Modeling and Mapping Subgroups
Planetary Permafrost and Astrobiology
Permafrost Engineering
 Engineering Geology for Development in Permafrost Regions Subgroup

Task Forces

Remote Sensing
Subglacial Permafrost

Permafrost Young Researchers Network (PYRN)

Council Members

Argentina
Austria
Belgium
Canada
China
Denmark
Finland
France
Germany
Iceland
Italy
Japan
Kazakhstan
Mongolia
The Netherlands
New Zealand
Norway
Poland
Portugal
Romania
Russia
Spain
Sweden
Switzerland
United Kingdom
United States of America

Cover: View of 20,320 ft-high (6194 m) Mt. McKinley (also called Denali) from milepost 72 on the Denali National Park road. In the valley foreground is the ice-cored moraine of Muldrow Glacier and the outwash plain of the McKinley River. Photograph provided by Phil F. Brease, National Park Service, and from the cover of the NICOP Field Trip Guidebook on the geology and glacial history of Denali National Park and vicinity.

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THE NEWS BULLETIN OF THE
INTERNATIONAL PERMAFROST ASSOCIATION
NUMBER 32 • DECEMBER 2008

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

The IPA is a non-governmental association of national organisations 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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All issues of *Frozen Ground* are also available as PDF files on the IPA web site (www.ipa-permafrost.org).

This issue of *Frozen Ground* was compiled and edited by Hugues Lantuit, Jerry Brown and Hans-Wolfgang Hubberten.

The IPA Secretariat is supported by the Alfred Wegener Institute for Polar and Marine Research

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EXECUTIVE COMMITTEE REPORT

This year was highlighted by the occurrence of the Ninth International Conference on Permafrost (NICOP) and the continuation of the IPA participation in the International Polar Year (IPY). The IPA Council, the Executive Committee and Working Parties met during the NICOP. The following pages of Frozen Ground contain reports of these activities.

From June 29 to July 3, 2008 approximately 700 participants representing 31 countries convened at the University of Alaska Fairbanks (UAF) for the NICOP. NICOP marked the 25th anniversary of the formation of the International Permafrost Association and the Fourth ICOP (1983), both having taken place at the UAF. A special 40-page publication commemorating the 25th anniversary was prepared and distributed, and a limited number of CDs containing over 200 photographs of participants from past conferences were presented and distributed at a special anniversary lunch that was attended by 200 invited guests. The structure of the conference attempted to follow in the footsteps of previous conferences with a blend of activities from plenary and technical sessions to short courses (3), extended and local field trips (25 or more), workshops (5) and evening social activities. There were five plenary sessions (20 presentations), 40 concurrent oral sessions (approximately 200 presentations), and three, all-day poster sessions (306 posters formally scheduled) were presented over the five days. Publications included a two-volume set of 358 papers (2140 pages), an enclosed CD-ROM of the papers, and a volume of 184 extended abstracts and IPA reports (372 pages). A DVD containing papers of all nine proceedings was produced and distributed to all delegates. A special issue of the journal *Permafrost and Periglacial Processes* (PPP) was produced and distributed at NICOP. It contained eight summary papers, several of which were the topic of plenary reports. Approximately 160 young investigators participated in the conference; of these, 77 received financial support for attendance at NICOP. The organising committees, editorial staff, and local workers are congratulated for organising this highly successful and informative conference.

The Council approved activities for nine working groups and several subgroups; two task forces and two standing committees (see pages 14-19 for planned activities). Working Groups (WG) were requested to undertake specific objectives and to have their progress reviewed at the next Council meeting in 2010. The Task Forces on remote sensing and subglacial permafrost are to assess the needs for future activities. The revised scope of the Engineering WG includes joint activities with the International Association of Engineering Geology and the Environment. Other international cooperation continues with the International Geographical Union (periglacial), the Climate and Cryosphere (CLiC), the International Association of Cryospheric Sciences (mountain hazards), the International Union of Soil Science (Cryosol), and the Scientific Committee for Antarctic Research (soils and periglacial).

The Council approved membership of Portugal and Romania as new IPA members, and elected the new Executive Committee for the period 2008–2012 (see memberships on inside front cover). Eight resolutions were approved related to

international activities and specifically to the International Polar Year (IPY) activities (TSP, ANTPAS, ACCOnet and CAPP) and plans for the 2007–2010 permafrost snapshot under the coordination of the Standing Committee for Data Information and Communication. Other cooperative projects include the involvement of the IPA in global observing initiatives through GTN-P and CALM (contributions to GTOS and GCOS) and in developing the Sustaining Arctic Observing Networks (SAON). The Council granted the Permafrost Young Researchers Network (PYRN) permanent observer status on the Council. PYRN currently has 620 members in 43 countries.

The Council approved the invitation from the Russia to convene the 10th International Conference on Permafrost (TICOP) in Tyumen, West Siberia, in early summer 2012. The newly appointed IPA International Advisory Committee for ICOP will work closely with the Russian organizers. The Council approved the Third Regional European Conference (EUCOP III) to be held on Svalbard in June 2010 following the Oslo IPY Open Science Conference.

The Secretariat, which was hosted for ten years by Norway and Denmark under the leadership of Dr. Hanne Christiansen will now be hosted by the Alfred Wegener Institute for Polar and Marine Research in Potsdam, Germany. The new Secretariat will be lead by Dr. Hugues Lantuit.

The next four years will be busy times for the IPA and its memberships, both for national representatives and individuals. The number of professional conferences and other activities continue to increase. We will rely on members of the Working Parties to represent the IPA, to participate in appropriate meetings, and to help plan ahead for the 2012 permafrost conference. The new Executive Committee will be looking ahead to develop mechanisms to make IPA an even more effective international organisation.

Finally, the new Executive Committee, on behalf of the IPA, extends its appreciation to those past members for their exceptional service over the years: President Jerry Brown, Vice Presidents Charles Harris and Georgy Perlishstein, and Members Don Hayley and Zhu Yuanlin.

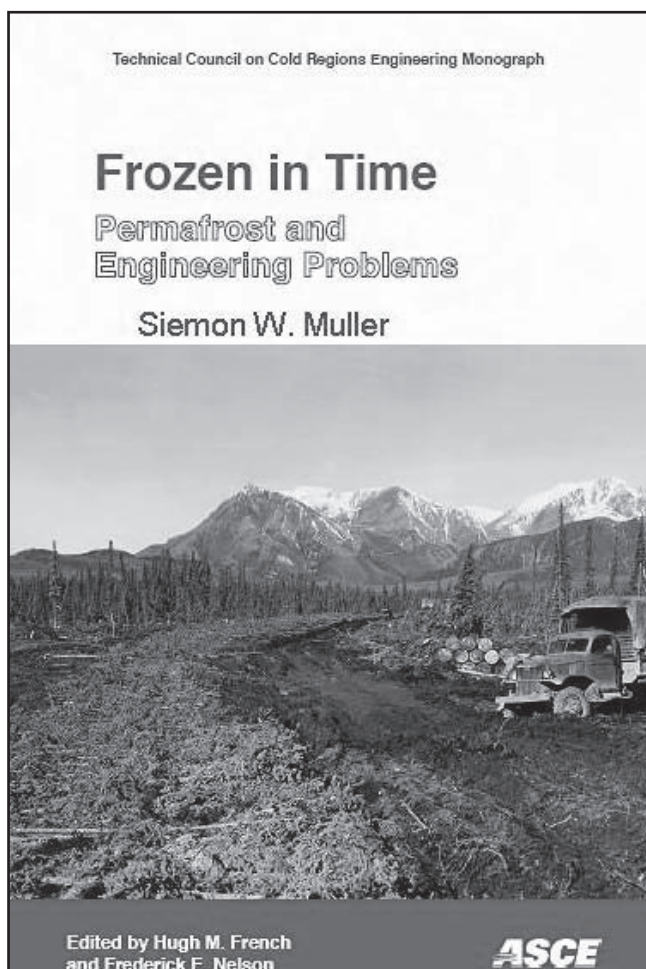


The newly elected Executive Committee during the 19th IPA Council. L-R: Dmitry Drozdov, Hanne Christiansen, Hans-Wolfgang Hubberten, Antoni Lewkowicz, Vladimir Romanovsky, Ma Wei. (Photograph provided by Jerry Brown)

A NEW OLD BOOK: FROZEN IN TIME

In the history of science, time, circumstance, and opportunity are often intimately connected. Permafrost is no exception.

Siemon W. Muller has been lionized as the “father of North American permafrost studies” in recognition of his major contribution to the subject through the book *Permafrost or Permanently Frozen Ground and Related Engineering Problems* (Muller, S.W., 1947, Ann Arbor: J.W. Edwards, Inc., 231 pp.). This work first appeared in 1943 as a classified U.S. Army manual, commissioned to alleviate problems encountered during highway and airfield construction in Alaska and northern Canada. Muller, a Professor of Geology at Stanford University in Palo Alto, California, was a leader in the fields of stratigraphy and paleontology, and did not contribute to the periodical literature of permafrost science or engineering. His involvement in permafrost studies in the early 1940s arose because of his fluency in Russian and his expertise in geological subfields useful in the study of frozen ground.



Students of permafrost, if they considered the matter at all, have usually assumed that Muller had simply returned to his paleontological work at Stanford after the close of World War II. In fact, Muller continued to teach a permafrost course at Stanford after the war, and supervised the dissertation of Troy L. Péwé, who completed doctoral studies there in 1953. Although he gave little outward indication, Muller maintained a strong interest in permafrost studies throughout the 1950s

and traveled periodically to Alaska to extend his knowledge of the subject.

A Manuscript Frozen in Time

When the renowned Canadian permafrost scientist Roger Brown died in 1980, Hank Johnston, his professional colleague at the National Research Council of Canada, invited Hugh French, then Chairman of the Permafrost Subcommittee of the Associate Committee for Geotechnical Research, to take any of Roger’s non-official papers, reports and offprints that might be useful. In these materials, Hugh found a mysterious 31 page review, written by Johnston and Brown but undated, of a hitherto unknown manuscript about permafrost, purportedly authored by Siemon Muller. Because the manuscript itself was not in Brown’s papers, the review was filed and largely forgotten.

In 1996, Troy Péwé passed to Hugh French a collection of unopened boxes containing permafrost-related papers, offprints, photographs, and books that had belonged to Siemon Muller. Apparently, Péwé had collected these materials when he cleared out Muller’s office at Stanford following his death in 1970, but had done nothing other than preserve them. Contained in these materials was a nearly complete 700+ page typed manuscript entitled “Permafrost and Engineering Problems,” written by S.W. Muller. The manuscript was clearly the “lost” manuscript that had been reviewed many years earlier by Johnston and Brown. Because of his heavy involvement in the forthcoming Yellowknife ICOP in 1998 and other commitments subsequent, the draft manuscript remained with Muller’s other materials in Hugh’s office at the University of Ottawa. When Hank Johnston died in 1997, Hugh lost the opportunity of discussing with him the background to this manuscript.

The most recent references in the book’s bibliography were from the early 1960s, indicating that work on the book had ceased shortly before the First International Permafrost Conference in 1963. Muller did attend the 1963 conference at Purdue University

Nine international conferences to publication

Following the Zurich ICOP in 2003, Hugh invited Fritz Nelson to collaborate in bringing the manuscript to publication in time for the Ninth International Conference on Permafrost (NICOP), to be held in Fairbanks in summer 2008. It was decided early in the process that the book should be treated as a historical document, with substantive changes restricted to organizational headings, factual corrections, and light editorial supervision. Using a period style manual, French and Nelson brought the manuscript to publication standards and prepared an interpretive introduction. Through the good offices of Bucky Tart of Golder Associates, it was arranged to have the book published as a volume in the American Society of Civil Engineers’ Technical Council on Cold Regions Engineering Monograph series, under the title *Frozen in Time: Permafrost and Engineering Problems* (French, H. M. and Nelson, F.E. (eds.), 2008, *Frozen in Time: Permafrost and Engineering*

Problems. New York: American Society of Civil Engineers Technical Committee on Cold Regions Engineering, 280 + xxxvix pp). The volume contains a dedication by Muller's son, Eric Muller. Its publication was announced at a NICOP ceremony in early July that featured a talk by Eric Muller.

Treating the basics of permafrost science, engineering problems, aspects of periglacial geomorphology, terminological considerations, and the physics of frozen ground, Muller's "frozen manuscript" is more comprehensive than virtually any other English-language permafrost book. In a paper presented at the Fairbanks ICOP, Hugh French and Fritz Nelson (French, H. M. and Nelson, F. E., 2008, The permafrost legacy of Siemon W. Muller. *Proceedings of the Ninth International Conference on Permafrost*. Fairbanks: University of Alaska Press, pp. 475-480) speculate that, had Muller's book been published in the early 1960s, it might have effectively promoted the growth of a unified discipline of permafrost studies in North America, namely one of geocryology, rather than the current dualism of permafrost science and permafrost engineering.

The book is well illustrated, with many of its diagrams and photographs attributable to Muller himself. It is available from ASCE for \$85.00 / Members \$63.75 (<https://www.asce.org/bookstore/book.cfm?book=8641>).

Hugh M. French, Frederick E. Nelson (fnelson@udel.edu)



A ceremony at the Ninth International Conference on Permafrost honored historically significant contributions to permafrost science and engineering, including the publication of Siemon Muller's lost manuscript. Left to right, standing: Jerry Brown (President, International Permafrost Association), Hugh French and Fritz Nelson, co-editors). Seated: Eric Muller (Siemon Muller's son), Louise and Oscar Ferriars, Sherry Muller. (Photograph provided by Fritz Nelson)

REPORT OF THE NINTH INTERNATIONAL CONFERENCE ON PERMAFROST



From June 29 to July 3, 2008 approximately 700 participants representing 31 countries convened at the University of Alaska Fairbanks for the Ninth International Conference on Permafrost (NICOP). “Permafrost on a Warming Climate: Impacts on Ecosystems, Infrastructure and Climate” was the theme

of the Conference. The structure of the Conference attempted to follow in the footsteps of previous conferences with a blend of activities from plenary and technical sessions to short courses, field trips (local and extended), and social activities. Also, many complementary workshops, fora, and professional meetings were associated with the Conference: CALM Workshop, A. L. Washburn Memorial Workshop, Permafrost Engineering Breakout Sessions, IPA Council and Working Groups meetings including the Antarctic Permafrost and Soils (ANTPAS) and Cryosol Working Groups, the Canadian National Committee, IPY Forum, U. S. Arctic Research Commission, Arctic Coastal Erosion and Model Development Workshop, and the committees of the ASCE Technical Council on Cold Regions Engineering.

A nice mix of five plenary sessions (20 presentations) and 40 concurrent oral sessions (approximately 200 presentations) and three, all-day poster sessions (306 posters formally scheduled) covering over 40 subject areas were presented during five days. Each day, four plenary presentations, chaired by a senior researcher, addressed one of the following five themes:

- Living in Alaska: A Permafrost Dominated Region
- Thermal State and Fate of Permafrost
- Engineering Challenges in the 21st Century
- Hydrology and Terrestrial Processes
- Alpine and Polar Periglacial Processes.

Participants in the opening session were University of Alaska President Hamilton, IPA President Brown, Conference co-chairs Kane and Hinzman, Chancellor Rogers, Fairbanks Borough Mayor Whitaker, U.S. Arctic Research Commission Chair Treadwell, U.S. Senator Murkowski (by video), and PYRN Coordinator Lantuit. The keynote speaker representing the Governor of Alaska was Commissioner Hartig of the Alaska Department of Environmental Conservation. In the closing ceremony, A. Lewkowicz read the names of those colleagues who had died since the 2003 conference.

Publications included a two-volume set of 358 papers (2140 pages), an enclosed CD-Rom of the papers, and a volume of 187 extended abstracts and IPA reports (372 pages). A special issue of the journal *Permafrost and Periglacial Processes* (PPP) was produced for distribution at NICOP and contained eight summary papers, several of which were the topic of plenary reports. Wiley Blackwell, publishers of PPP, sponsored a lecture on mountain permafrost hazards and remote sensing. A DVD

was produced and distributed to all participants that contained the proceedings of all nine International Conferences on Permafrost (1963 Purdue University, U.S.A.; 1973 Yakutsk, U.S.S.R.; 1978 Edmonton, Canada; 1983 Fairbanks, U.S.A.; 1988, Trondheim, Norway; 1993 Beijing, China; 1998 Yellowknife, Canada; 2003 Zurich, Switzerland; and 2008 Fairbanks, U.S.A.). An illustrated 2008–2009 NICOP monthly calendar containing photographs of ground ice and permafrost-dominated landscapes was prepared. The NICOP proceedings and abstracts volumes and calendar are available and may be ordered through <http://nicop.org>. An updated permafrost map of Alaska was prepared and distributed, and is also available in digital form.

During the conference, 17 local field trips were offered to view various campus facilities, infrastructures built on permafrost (houses, oil pipeline, road embankments, etc.), Caribou-Poker Creek Research Watershed, and local permafrost features (pingo, climate change permafrost reserve, thermokarst features, peat deposits, thawing permafrost). The U.S. Army Cold Regions Research and Engineering Laboratory’s permafrost tunnel and the Trans Alaska Pipeline System (TAPS) were on the list of most visited sites. About 115 people took advantage of the seven, extended pre- and post-conference tours with those to Denali Park area and two to the North Slope of Alaska being the most popular (see details at end of report). Draft guidebooks for the Alaskan field trips were prepared by field trip leaders and edited and produced by the Alaska Division of Geological and Geophysical Surveys. Final revised guidebooks for four of the Alaska visits will be published and available on the DGGG web site. The feedback from both the local and extended field trips was very positive.

The four permafrost related workshops/courses attracted 53 participants:

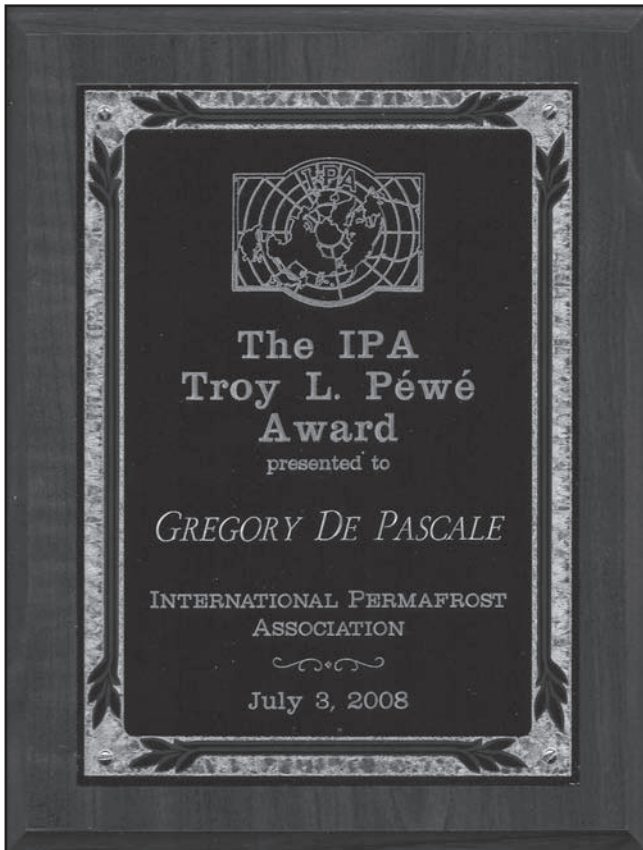
- Understanding the Role of Permafrost in a Rapidly Warming Climate (for K-12 teachers)
- Field Methods for Describing and Sampling Northern Soils (for graduate students)
- Introduction to Permafrost and Frozen Ground Engineering (for both undergraduate and graduate students)
- Foundations in Permafrost and Frost-Susceptible Soils (for practicing engineers).

Approximately 160 young investigators participated in the conference; of these, 77 received financial support while attending NICOP. The Permafrost Young Researchers Network (PYRN) sponsored three events: an evening social gathering, meeting of National Representatives, and a Mentor’s panel discussion enabling young scientists and engineers to become fully engaged in the conference. Social events for participants included a reception, ice breaker, barbeque, dinner on a riverboat, and a formal banquet. These events were made more enjoyable with a specially brewed and bottled “Permafrost Ale.”

A panel of judges evaluated papers and posters for the best

young researcher presentations. In addition to the T. L. Péwé award for the best science presentation, the new P. I. Melnikov award was presented for the best engineering presentation. The Annual PYRN awards were presented for best science and engineering posters. Recipients were:

- Péwé Award: Gregory De Pascale (USA/Canada)
- Melnikov Award: Kevin Bjella (USA)
- PYRN Science Award: Gustaf Hugelius (Sweden)
- PYRN Engineering Award: Tezera Firew Azmatch (Canada)
- PYRN Honorable Mention: Alexandra Zemskova (Russia)



The IPA Troy L. Péwé Award was presented to Gregory De Pascale. (Photograph provided by Jerry Brown)

NICOP marked the 25th anniversary of the formation of the International Permafrost Association (IPA) and the FICOP (1983), both having taken place at the University of Alaska in Fairbanks. The year 2008 is also the 50th anniversary of the International Geophysical Year (IGY), and the 125th anniversary of the First International Polar Year (IPY). All

of these anniversaries were recognized in celebration of our national and international permafrost heritage. A special 40-page publication commemorating the 25th anniversaries was prepared and distributed to all participants. A limited number of CDs containing over 200 photographs of participants in past conferences were presented and distributed at a special anniversary lunch, attended by 200 invited guests.

The Conference was jointly organized by the U.S. Permafrost Association and the University of Alaska Fairbanks (UAF). The President's Office of the University of Alaska provided direct financial support. Approximately 60 institutions, private companies and individuals, and government agencies provided financial support. Staffs of the UAF Institute of Northern Engineering (INE) and the International Arctic Research Center (IARC) and GW Scientific provided considerable in kind support. The UAF IPY office and the EPSCoR program assisted in several capacities.

Overall, both the organizers and participants of the Conference were very pleased with how the Conference proceeded. This Conference was made successful by many people who volunteered their time and those individuals, companies, and agencies that made financial contributions to support this truly international event. An additional summary report of the Conference and IPA Council meetings is published in the December 2008 issue of *Permafrost and Periglacial Processes*. The U.S. organizers also prepared a detailed report for the sponsors and the IPA.

Extended Pre-and Post-Conference NICOP Field Trips

The following field trips took place with total of 116 participants and approximately 25 field leaders. Group photographs are presented on pages 34-35

Trip A-4: Dalton Highway from Fairbanks to Prudhoe Bay, June 23–27. Began in Fairbanks and traveled north along the Dalton Highway with overnight stops in Coldfoot, Toolik, and Prudhoe Bay. Highlights included the Trans-Alaska Pipeline, Toolik Lake research sites, permafrost distribution, Quaternary and periglacial geology, frost-affected soils, and Prudhoe Bay industrial developments. Leader: Skip Walker. The trip had 36 participants and 10 leaders.

Trip A-5: Engineering Solutions on the Trans-Alaska Pipeline: Prudhoe Bay to Fairbanks, June 27–28. This trip began with a flight to Prudhoe Bay and returned by motor coach along the Dalton Highway, with an overnight in Coldfoot. The trip focused on engineering problems and solutions related to construction of the Trans-Alaska Pipeline. Leader: Ed Clarke. This trip was added late in the planning stages, and

The following distinguished colleagues have died since the 2003 conference

Canada

John Fyles

China

Guoqing Qiu

Tungsheng Liu

Hongxu Liu

Russia

Anatoly D Frolov

Vladislav Kamensky

Anatoly Kotov

Evgeny S Melnikov

Andrey Sadovsky

United States

Richard K Hogan

Albert Lincoln Washburn

Tahoe Washburn

took advantage of the bus from the A-4 trip that was heading back to Fairbanks empty. This trip had 13 participants and 3 leaders.

Trip A-6: Pogo Mine Tour, June 27. This was a one-day trip by van from Fairbanks to the Pogo mine, about 130 km south of Fairbanks. Leader: John Zarling. This trip was added later in the planning stages and was slow to fill. There were four participants and one leader plus local mine personnel.

Trip B-2: Arctic Coastal Plain from Prudhoe Bay to Barrow, July 4–9. On- and offshore oil and gas developments and construction, coastal permafrost, thaw lakes and thermokarst development, and a concluding two-day visit to the native community of Barrow and the research sites. Leader: Torre Jorgenson. This trip was full with 18 participants and several different leaders at each over night stops.

Trip B-3: Northwest Alaska (Beringia) including Nome and Seward Peninsula, July 4–8. View Quaternary geology, thermokarst and periglacial features, placer mining, and

mineral and hot springs. Leader: Jim Begét. This trip was full with 10 participants and two leaders.

Trip B-4: Central Alaska from Fairbanks to Denali National Park, July 4–6. View Quaternary geology, rock glaciers, geomorphic evidence of paleoseismic and cryogenic structures and periglacial environments. Leader: Phil Brease. Last minute arrangements were made to accommodate three extra persons with a total of 31 participants and two leaders.

Trip B-6: Front Range and San Juan Mountains (Colorado), July 4–10. Visits to the Rocky Mountain National Park, Niwot Ridge research site, including rock glaciers, and to the Mountain Studies Institute, Silverton, to observe avalanche and other mountain hazard research. Leader: Nel Caine. This trip was very much enjoyed by the four participants.

Douglas Kane, Institute of Northern Engineering, UAF
(ffdlk@uaf.edu)

Larry Hinzman, International Arctic Research Center, UAF
(ffldh@uaf.edu)

REPORTS OF THE EIGHTEENTH AND NINETEENTH IPA COUNCIL MEETINGS AND EXECUTIVE COMMITTEE MEETINGS

REPORT OF THE EIGHTEENTH IPA COUNCIL MEETING, JUNE 28, 2008

The meeting convened at 9:45 a.m. and adjourned at 5:10 p.m.

The following attended both meetings except as noted by asterisks: (Eighteenth* and Nineteenth** Council Meetings)

EXECUTIVE COMMITTEE MEMBERS

Jerry Brown (P), Charles Harris (VP), Georgy Perlshtein (VP), Don Hayley, Hans-W. Hubberten, Ma Wei.
Secretariat: Hanne H. Christiansen, Herman Farbrot

COUNCIL MEMBERS

Argentina: Dario Trombotto
Austria: Andreas Kellerer-Pirklbauer
Belgium: Irénée Heyse
Canada: Brian Moorman, Margo Burgess
China: Huijun Jin
Denmark: Niels Foged
Finland: Jan Hjort
France: Francois Costard*
Germany: Lorenz King
Italy: Mauro Guglielmin*
Japan: Kazuyuki Saito*, Koichiro Harada**

Kazakhstan: Sergei Marchenko
Mongolia: Natsagdorj Sharkuu
Netherlands: Jef Vandenberghe
New Zealand: Megan Balks*, Iain Campbell**
Norway: Kaare Flaate, Ole Humlum
Poland: Wojciech Dobinski
Portugal: Gonçalo Teles Vieira**
Romania: Petru Urdea**
Russia: Dmitriy S. Drozdov*, David Gilichinsky**
Spain: Miguel Ramos*
Sweden: Jonas Åkerman
Switzerland: Daniel Vonder Mühl
United Kingdom: Julian Murton
USA: Larry Hinzman*, Tom Krzewinski (replacing Hinzman), Frederick Nelson,
Not represented: Iceland

CO-CHAIRS AND MEMBERS OF COMMITTEES, WORKING GROUPS, TASK FORCES AND OBSERVERS

Austria: Michael Avian*
Canada: Nancy Doubleday*, Claude Duguay, Antoni Lewkowicz*, Sharon Smith, Baolin Wang**
Finland: Seppo Saarelainen*
Germany: Hugues Lantuit, Paul Overduin, Hanno Meyer**, Dirk Wagner**
The Netherlands: Eduard Koster*
Norway: Gisle Haaland, Andreas Käab

Portugal: Goncalo Vieira* (Associate Member)
Romania: Petru Urdea* (Individual Member)
Russia: Galina Mazhitova, Anna Kurchatova*, Dmitry Sergeev*
Sweden: Peter Kuhry**
Switzerland: Reynald Delaloye**
USA: Ted Vinson, Jim Bockheim*, Vladimir Romanovsky*, Jerry Brown**, Roger Barry**, Guido Grosse**, Mark Parsons**, Ronald Sletten**

1. WELCOME

President Jerry Brown officially opened the meeting. Larry Hinzman, Director, IARC on behalf of the U.S. NICOP organizers, welcomed the Council members and members of the Executive Committee.

2. INTRODUCTIONS OF MEMBERS PRESENT AND PROXIES

The official roll call indicated that 23 Members were present. Brown reminded Council that Adhering Bodies can have a second person at the Council table, but Members only have one vote.

3. REVIEW AND ACCEPTANCE OF MINUTES OF POTSDAM COUNCIL MEETINGS

The minutes of the Sixteenth and Seventeenth Council meetings in Potsdam, Germany, June 12 and 15, 2005, respectively, were reviewed. The minutes were unanimously approved (moved by Moorman and seconded by Hinzman).

4. ACCEPTANCE OF NEW ADHERING BODIES AND ASSOCIATE MEMBERS

A formal letter of request for membership in IPA was received from Professor Diogo change name to the one on letter, Director, Centre of Geographical Studies, University of Lisbon, June 23, 2008. Goncalo Vieira provided background for Portugal's request (see letter). Portugal has been an associate member since 2005. Portugal's request for full membership was accepted unanimously (moved by King and seconded by Vandenberghe). Vieira to be the Council representative and annual contribution was set at 250 USD.

Petru Urdea, University of Timisoara, provided background for Romania's request for full membership in the IPA. Urdea has been an individual member since 2005. The main research activities relates to periglacial geomorphology, in particular rock glaciers.(see list of participating organizations). Brown acknowledged Urdea's past contributions to *Frozen Ground*. Romania's request for full membership was accepted unanimously (moved by Guglielmin and seconded by Vonder Mühl). Urdea to be the Council representative and annual contribution was set at 250 USD.

5. BUSINESS RAISED BY THE PRESIDENT

Brown acknowledged the outstanding efforts by the U.S. organizers in preparation for the Ninth International Conference

on Permafrost (NICOP).. A DVD containing the proceedings of all nine International Conferences on Permafrost has been compiled and will be distributed to the NICOP participants. In connection with the conference Hugh French and Fritz Nelson have edited a recently discovered unpublished manuscript by Simon Muller based on his pioneering work in the 1940s that utilized earlier Russian knowledge. The book is published by the American Society of Civil Engineers.

Brown informed Council of plans for the 25th anniversary of the formation of the IPA and the Fourth International Conferences on Permafrost, both having taken place in Fairbanks in 1983. As part of the celebration, there will be a lunch for FICOP participants, past and present IPA Council members and working party chairs, and sponsors. The past 10 years has been a productive period for the IPA. Brown acknowledged Hanne H. Christiansen's efforts of running the IPA Secretariat during this period, beginning in Denmark and continuing in Norway. Starting in 2005 Angelique Prick held a 50 % position at the Secretariat through a grant from the Norwegian Research Council, with Herman Farbrod taking over in September 2007. Brown acknowledged many IPA efforts within the period of the International Polar Year (IPY), and others activities by the Working Groups and by Permafrost Young Researchers Network (PYRN). Ole Humlum was further acknowledged for developing the IPA website. Finally Brown encouraged the Council members to input to the preparation of Council resolutions for these 2008 meetings.

6. BUSINESS RAISED BY THE ADHERING BODIES AND ASSOCIATE MEMBERS

Brown invited short reports from Council participants to learn more about recent activities and developments in the Adhering Bodies and Associate Members (see *Frozen Ground* #31 for more details). This was followed by a brief report by others.

Hugues Lantuit informed Council about the recent developments of PYRN. The network consists of more than 500 active young permafrost researchers from 43 countries. The PYRN web site (www.pyrn.ways.org) contains membership, blogs, job postings, information about upcoming events. The PYRN bibliography, also available on the web site, now contains over 500 title of theses and dissertations from permafrost scientists and engineers. The web site had 14,000 hits since September 2007. Recent PYRN activities include a workshop in St. Petersburg November 29 – December 2, 2007, focused on PYRN TSP drilling (organized by Margareta Johansson) and an a proposed upcoming special issue of *Permafrost and Periglacial Processes* devoted to PYRN contributions. There is a need for a new leader of PYRN in the near future as Lantuit starts working on the IPA Secretariat.

Lantuit raised the concern as to how to strengthen the connection of IPA and PYRN, possibly by accepting PYRN as an Adhering Body with a vote. Brown suggested recognizing the IPA commitment to PYRN in the Council resolutions. Vonder Mühl noted that there is a danger that PYRN could be lost and that acknowledging their important contribution by accepting PYRN as an official IPA entity is a good idea. This view was supported by Vandenberghe and Lewkowicz. Brown indicated that the official status of PYRN within IPA

be discussed during the NICOP and that a decision be made at the 19th IPA Council Meeting.

7. ELECTION OF MEMBERS TO THE EXECUTIVE

COMMITTEE

Charlie Harris, chair of the Nomination Committee, reviewed the background and nominations process for the election of members to the Executive Committee (EC). Both a letter and email were sent to all Adhering Bodies in May 2007 with a request for nominations of candidates. This was followed up with a reminder email in August 2007. The deadline for nominating candidates was September 30, 2007. The Executive Committee met in December 2007 and approved the following slate of candidates:

Candidate	Nominating Adhering Body
Vladimir Romanovsky (University of Alaska)	USA
Hans-W Hubberten (AWI, Potsdam)	Norway, UK, China
Antoni Lewkowicz (Ottawa University)	Canada
Hanne H. Christiansen (UNIS)	Canada
Wei Ma (CAREERI)	China
Dmitriy S. Drozdov (Earth Cryosphere Institute)	Russia

Brown noted the need to involve more engineering. The new voting arrangement requires that the newly elected EC select the new President and the two Vice Presidents before the next Council meeting (July 3). Since the number of nominees corresponds with the number of positions in the Executive Committee, the Council was asked to vote collectively on the entire slate of candidates. The motion to accept the slate and vote on it as one ballot was made by Moorman and seconded by Vonder Mühlh. The vote was unanimous.

8. BUSINESS FROM OTHER SOURCES

A. INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGISTS

Kaare Flaate informed the Council on collaboration between IPA and the International Association for Engineering Geology and the Environment (IAEG). At the IAEG Council Meeting in Vail on June 3, 2007 it was decided that IAEG would initiate its Commission C 21: Engineering geology of permafrost regions (see background information). Members of C21 are essentially those active in IPA. Dmitry Sergeev is the technical lead person. As with other international organizations IPA could assign liaison activities to one of its working groups. The main interest is on methods for site and route selection, Drozdov noted that IAEG has a different scale of investigations and mapping than the IPA. Jin noted there are interesting topics for potential collaboration in Arctic and Subarctic areas. Brown concluded that the collaboration should encourage involvement of those countries involved in major projects in permafrost regions. The working groups should discuss and report back to Council.

B. INTERNATIONAL ASSOCIATION OF CRYOSPHERIC SCIENCES

Claude Duguay represented the newly organized International Association of Cryospheric Sciences (IACS) of the IUGG. IACS had its first official meeting April 1, 2008 in

Vienna. There are five divisions:

- Snow and Avalanches
- Glaciers and Ice-sheets
- Marine and Freshwater Ice
- Cryosphere, Atmosphere and Climate
- Planetary and other Ices of the Solar System

Currently IPA and IACS co-chair the GAPHAZ Working Group. The next meeting will be held in Montreal in July 2009. Brown noted that the new EC should follow up on future arrangements with IACS. Lewkowicz raised the question of the role of permafrost within IACS. Vonder Mühlh agreed that this may be a concern and that IPA Adhering Members maintain contact with respective IACS national level counterparts.

C. INTERNATIONAL SYMPOSIUM ON COLD REGION DEVELOPMENT

Seppo Saarelainen informed Council briefly about the 8th International Symposium on Cold Region Development (ISCORD) that took place in Tampere, Finland, September 2007. The symposium was attended by 183 participants from 14 countries, with 113 papers from 12 countries in 23 sessions. The next ISCORD will be held in Yakutsk, Russia, in the summer of 2010.

D. SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

See ANTPAS Working Group report and web site for updated information (<http://erth.waikato.ac.nz/antpas/>)

E. INTERNATIONAL UNION OF SOIL SCIENCES

Galina Mazhitova provided information on the joint IPA-IUSS Cryosol Working Group Cryosol. One objective with IUSS is to produce an international soil classification. The next Soil Congress is in Brisbane in August 2010.

F. IGU COMMISSION ON COLD REGIONS ENVIRONMENTS

Vandenbergh and Doubleday provided the status on IPA-International Geographical Union (IGU) Commission on "Cold Region Environments" (CRE). It was formed in 2004 in Glasgow and the project runs to 2011. The aim is to assess an integrated understanding of cold region geo-ecosystems, including land use and climate change issues. A second is to combine process and geo-archive information in polar environments as well as in former periglacial environments. CRE welcomes representatives from additional countries. Members of the CRE will meet in Tunis, August 2008 at the 32nd International Geographical Congress.

9. FINANCIAL STATEMENT FOR THE PRECEDING PERIOD AND THE DRAFT BUDGET FOR THE ENSUING PERIOD

Christiansen summarized the IPA financial situation. Since 2005 funds were reserved for NICOP support. The main cost for IPA is the increasing expenses related to production and distribution of *Frozen Ground*. In general, member dues on the other hand have not increased. The question is: can *Frozen Ground* be produced at a lower cost or only provide a web-version, more advertising and increase in member's annual fee are other options. For 2008 funds are for production and

distribution of the next issue of *Frozen Ground*, to complete payment of the NICOP support for stipends (15,000 USD) and other related NICOP expenses.

Guglielmin informed that Italy requests a reduction to 500 USD and Saito that Japan requested a reduction to 250 USD. Murton indicated that UK can increase its contribution to 500 USD. In addition, the new Adhering Bodies (Portugal and Romania) will contribute 250 USD each. Balks suggested modifying the proposed budget so that reserves are available. Heyse noted the considerable and variable costs associated with the bank transactions. The motion to accept the 2008-2009 budget, the requested changes in member dues and the projected IPA balance were made by Balks and seconded by Murton. The vote was unanimous.

10. RECENT AND FUTURE INTERNATIONAL

CONFERENCE AND REGIONAL CONFERENCES

A. REPORT OF IAC ICOP

Lewkowicz reported on the International Advisory Committee (IAC) related to NICOP. IAC provided suggestions such as extra sessions, but generally there was limited formal input from the committee since the NICOP Planning Groups have done such a comprehensive effort. IAC will produce a NICOP report. Lewkowicz requested feedback from Members on the Conference.

B. STATUS REPORT ON NICOP

Hinzman provided an update on NICOP. Approximately 600 participants including about 80 stipends are registered. The conference proceedings (50 USD for both volumes at the conference; approximately 100 USD later plus shipping) contain 358 papers, whereas the extended abstracts include 187 contributions. The program includes 40 sessions, five plenary sessions, one public lecture (A. Kääh), three short courses, three workshops, a special workshop to honour Link Washburn, three local field trips and six extended field trips (Dalton Highway, Trans-Alaska Pipeline, Pogo Mine (one day), Arctic Coastal Plain, Northwest Alaska, Central Alaska and Colorado Rocky Mountains). In addition there are social events every night. A special issue of *Permafrost and Periglacial Processes* consisting of series of review papers which summarise recent advances are available to NICOP delegates.

C. 31ST INTERNATIONAL GEOLOGICAL CONGRESS

Brown reported on the 31st International Geological Congress that will be held in Oslo, Norway, August 2008, and the three-session, symposium that was organized as an IPA contribution to International Year of Planet Earth (AAA-08 Permafrost on a Warming Planet), It is co-chaired by J. Brown and O. Humlum and has broad participation from IPA representatives.

E. INVITATION FOR 2012 TENTH ICOP

Drozdov formally presented the invitation for the 10th International Conference on Permafrost on behalf of the Tyumen State Oil & Gas University (TSO&GU), Tyumen, in summer 2012. TSO&GU has been an organizer of the annual conferences of the Russian permafrost community in the past. It is the youngest university in Russia and very active.

Further, Tyumen is a modern and dynamically developing city, where all necessary conditions for the Conference exist. Several interesting extended excursions are planned, e.g. to the gas fields of the Yamal-Nenetsk region, Western and Central Yakutiya. The invitation is on behalf of the Russian Academy of Science, Siberian Branch, and Academician V. P. Melnikov. A. Kurchatova, is chair of the TSO&GU Department of Geology and Petrography.

Brown indicated that extended excursions to Central and Eastern Siberian would be important. Jin raised concerns about receiving visas for Chinese participants in advance. The Proceedings for the Conference will require international review, and the International Advisory Committee can help organize the review and advise on some aspects of Conference.

F. REGIONAL CONFERENCES IN 2010

Christiansen reported on planning for the Third European Conference on Permafrost, EUCOP III, in Svalbard in June 2010. It was requested that this be the designated IPA Regional Conference. It would follow immediately after the 'Early Science' International IPY Conference, to be held in Oslo in June 13-17, 2010. EUCOP III is planned to focus on the Arctic and the IPY. In connection with the Conference, the IPA Council meetings would take place in Svalbard or in Oslo (to be decided later).

Moorman reported that the next Canadian National Permafrost Conference, as part of the Canadian Geotechnical Society annual meeting, is being planned for late 2010. This conference will focus on permafrost engineering, but will be open for all permafrost-related contributions. The Conference will probably be held in Calgary in September 2010 and aims for ~500 participants. Dedicated journals will be published in connection with the Conference.

G. 14TH INTERNATIONAL SPECIALTY CONFERENCE ON COLD REGIONS ENGINEERING

Krzewinski reported that the American Society of Civil Engineers (ASCE) 14th International Specialty Conference on Cold Regions Engineering which will be held in Duluth, Minnesota, September 2009.

11. Discussion: Future Secretariat

Christiansen reviewed the role of the Secretariat. It is responsible for the conduct of current business of the Association, for the preparation and distribution of the Agenda of the Council meetings and for the preparation and maintenance of minutes. Further, the Secretariat is responsible for running the IPA finances. The position and location shall be reviewed on a four-year basis. For the last four years the IPA Secretariat has been situated in Norway through a grant from the Norwegian Research Council. The grant ends this year.

Hubberten reported on discussions with the Director of the Alfred Wegener Institute for Polar and Marine Research (AWI). They have agreed on hosting the future IPA Secretariat in AWI Potsdam and to staff it with a postdoctoral position (Hugues Lantuit) working part-time as the IPA Secretariat. Brown welcomed this initiative. The motion to accept the future IPA Secretariat at AWI Potsdam was made by Kellerer-Pirklbauer and seconded by Foged. The vote was unanimous.

12. ITEMS SUBMITTED AFTER PREPARATION OF AGENDA, SUBJECT TO AGREEMENT OF PRESIDING EXECUTIVE COMMITTEE MEMBER

A. ORGANIZATION OF COUNCIL RESOLUTIONS FOR PRESENTATION AT CLOSING CEREMONIES

Brown requested that Council Members make suggestions for Council resolutions to be presented at the NICOP closing ceremony. These will be further discussed at the 19th IPA Council Meeting.

B. REVIEW OF CONTENT AND PRESENTATION OF INFORMATION IN FROZEN GROUND

Brown noted that the suggested review of the content of Frozen Ground should be considered by the new Executive Committee.

C. CLOSING REMARKS

Brown reminded Council that there will be four awards for best science and engineering papers and posters. The paper awards will be presented in the name of Péwé and Melinkov, former IPA presidents. The poster awards are the annual PYRN awards. The review committee is chaired by Jennifer Harden, representing the U.S. Permafrost Association.

Brown thanked members of the Executive Committee for their assistance over the past five years. He wished the new Executive Committee future successes.

13. ADJOURNMENT

Brown postponed further agenda discussions until the Nineteenth Council meeting. Moorman made the motion to adjourn and Åkerman seconded; approved unanimously.

REPORT OF THE NINETEENTH IPA COUNCIL MEETING, JULY 3, 2008

The meeting convened at 12:15 a.m. and adjourned at 2:05 p.m.

EXECUTIVE COMMITTEE MEMBERS

Hans-Wolfgang Hubberten (P), Antoni Lewkowicz (VP), Hanne H. Christiansen (VP), Dmitriy S. Drozdov, Ma Wei, Vladimir Romanovsky.
Secretariat: Herman Farbrot

I. OPENING REMARKS BY NEW PRESIDENT

The new IPA President Hubberten (AWI, Potsdam), introduced the new Executive Committee (EC). Hanne Christiansen (UNIS) and Antoni Lewkowicz (Ottawa University) are the Vice Presidents, and Dmitriy Drozdov (SB RAS), Ma Wei (CAREERI, Lanzhou) and Vladimir Romanovsky (University of Alaska) are members. Hubberten thanked members of the previous EC, and in particular Jerry Brown, for their contributions. Further, the IPA Secretariat was acknowledged.

2. APPROVAL OF 2008-2012 WORKING PARTIES AND CO-CHAIRS

The Working Groups (WGs) future plans were discussed. Reports and recommendations were presented by the co-chairs or their representatives. Council members moved for acceptance of each report after brief discussion. Pages 14-20 contain the results of the Council approvals and a list of liaison organizations and acronyms. The following is the record of the discussions and voting:

A. WORKING GROUPS

• *WG 1: Antarctic Permafrost and Periglacial Environments*
Bockheim reported on the future plans of WG 1. Near-term plans included the ANTPAS workshop at the NICOP (J. Bockheim); an informal ANTPAS workshop at the July 2008 SCAR Open Science Conference in St. Petersburg, Russia (J. Lopez-Martinez); preparation of electronic versions of soil and permafrost maps and databases of the Transantarctic Mountains and Antarctic Peninsula region; and development of a Cryosol session with an Antarctic focus for the International Union of Soil Sciences meeting in Brisbane, Australia in 2010. The motion to accept WG1 for four more years was made by Moorman and seconded by Åkerman. Unanimously approved.

• *WG 2: Coastal and Offshore Permafrost*

Overduin reported on the future plans of WG 2. This WG has been working for two, five-year periods, so the group needs to redefine its scope and name. The new name is "Coastal and Offshore Permafrost Dynamics (COPD)" and the group will have a greater focus on subsea permafrost and modelling of coastal erosion due to its increasing relevance as a result of reduced sea ice extent. The WG will continue coastal monitoring and observatories. Further, the WG plans to coordinate with the Remote Sensing Task Force. The motion to accept WG2 for four more years was made by Åkerman and seconded by Moorman. Unanimously approved.

• *WG 3: Cryosol*

Mazhitova reported on the future plans of WG 3. The Fifth International Conference on Cryopedology is scheduled for September 14-20, 2009, Ulan-Ude, Buryatia, Russia. The motion to accept the WG for four more years was made by Moorman and seconded by Jin. Unanimously approved.

• *WG 4: Glacier and Permafrost Hazards in the High Mountains*

Kääb reported on the future plans of WG 4. Since Kääb (Chair) and Etzelmüller (IPA co-chair) are now situated at the same Department (University of Oslo), Etzelmüller will be replaced by C. Hauck (Switzerland). Hauck's speciality is applied geophysics in periglacial environments, and the WG will in the future have a stronger focus on application of geophysics to permafrost hazards. IACS co-chair J. Reynolds will be replaced by C. Huggel. Kääb will be responsible for data within the WG. Kääb emphasized that the WG will not do any hazard assessments, but rather make general recommendations. There is a need to include researchers from other countries (e.g. Russia and China). The motion to accept WG 4 for four more years was made by Kellerer-Pirklbauer and seconded by King. Unanimously approved.

- WG 5: Isotopes and Geochemistry of Permafrost
Sletten reported on the future plans of WG 5. The group will be reorganized, but will continue with the same co-chairs. Sletten asked for a two-year extension to finish the work of the group with a special volume, possibly in Permafrost and Periglacial Processes. The motion to accept WG 5 for two more years was made by Trombotto and seconded by Humlum. Unanimously approved.

- WG 6: *Mapping and Modelling of Mountain Permafrost*
This WG will continue as a sub-group under WG 8. Unanimously approved.

- WG 7: *Periglacial Landforms, Processes, and Climate*
Murton reported on the future plans on WG 7. Future plans include annual meetings, production of a homepage and a workbook. The WG plans for a session at Third EUCOP in Svalbard 2010. Hubberten noted that there are three co-chairs of the WG, and that this breaks with the WG guidelines. Humlum replied that this would be changed within WG at a later stage. The motion to accept WG 7 for four more years was made by Moorman and seconded by Kellerer-Pirklbauer. Unanimously approved.

- WG 8: *Permafrost and Climate*
Nelson reported on the future plans of WG 8. The WG will continue with the same goals. In addition there will be started modelling and mapping subgroups based on the former WG 6 Mapping and Modelling of Mountain Permafrost. The motion to accept WG 8 for four more years was made by Jin and seconded by King. Unanimously approved.

Modelling Subgroup

Chair: Stephan Gruber (Switzerland)

Mapping Subgroup

Chair: Nikolia Shiklomanov (U.S.A.)

- WG 9: *Permafrost Astrobiology*
Gilichinsky reported on the future plans of WG 9. The WG will maintain its activity of developing cooperation between earth and biological sciences related to spatial and temporal limits of the deep, cold biosphere on and beyond the Earth, and focus on geomorphological and geological interpretation of space images. The motion to accept WG 9 for four more years was made by Moorman and seconded by Murton. Unanimously approved.

- WG 10: *Permafrost Engineering*
Vinson reported on the future plans of WG 10. This WG will keep up its present activities and exchange information of permafrost engineering. Further, New methodologies will be applied and PYRN engineers will be more involved. New co-chairs of the WG will be Richard Fortier and Fujun Niu, whereas Lukas Arenson will serve as a PYRN co-chair. WG or Subgroup will represent IPA with the IAEG. The motion to accept WG 10 for four more years was made by Jin and seconded by Foged. Unanimously approved.

B. NEW TASK FORCES

- Murton reported on a proposed new Task Force for two years with the name "Glacier and Permafrost Interaction". The Task Force will be chaired by Murton and have a meeting at AGU 2009. The results of such a Task Force may be a special volume, possibly in *Permafrost and*

Periglacial Processes. The motion to accept this Task Force for a two-year period was made by Urdea and seconded by Trombotto. Unanimously approved.

Chair: Julian Murton (UK)

- Grosse reported on a proposed Task Force on remote sensing focusing on lowland conditions. An initial goal for the Task Force is a review paper of applicable techniques. Grosse encouraged involvement from interested parties as the group needs more people. Although a formal vote was not made during the meeting, in subsequent discussions the Executive Committee approved the initiation of the TF in light of its potential contributions to the ESA remote sensing initiative. Those interested in the TF will meet at the 2008 AGU Fall Meeting in San Francisco.

Chair: Guido Grosse (USA)

C. STANDING COMMITTEES

See below

3. APPROVAL OF VENUE FOR 2010 AND 2012 CONFERENCES AND NEXT COUNCIL MEETINGS

A. Tenth ICOP in Tyumen, Russia, 2012

The motion to accept the invitation for the 10th International Conference on Permafrost in the Tyumen State Oil & Gas University (TSO&GU), Tyumen, Russia in summer 2012 was made by Moorman and seconded by Dobinski. The vote was unanimous.

B. THIRD EUROPEAN CONFERENCE ON PERMAFROST (EUCOP) IN SVALBARD, JUNE 2010, AS THE REGIONAL CONFERENCE

Lewkowicz noted that it is only possible to choose one regional conference and asked if there were any competing conferences to the Third EUCOP in Svalbard June 2010. Moorman replied that the Third EUCOP should be the regional conference, but hoped for IPA endorsement of the Canadian National Permafrost Conference, also in 2010. Christiansen noted that the next IPA Council Meeting could be held in Oslo following the IPY 'Early Science' Conference (June 8-12) or in Svalbard during EUCOP. This matter will be decided at a later stage. Kellerer-Pirklbauer raised the motion to accept the Third EUCOP in Svalbard as the IPA regional conference and Foged seconded the motion. The vote was unanimous.

C. CANADIAN NATIONAL PERMAFROST CONFERENCE 2010

Moorman noted that the Canadian National Permafrost Conference, as part of the Canadian Geotechnical Society annual meeting probably will be held in Calgary in September 2010. This conference will focus on permafrost engineering, but will be open for all permafrost-related contributions. Hubberten stated that this conference would be endorsed by the IPA.

4. PLANS FOR COMPLETION OF THE IPY-IPA ACTIVITIES

A. INFORMATION FROM THE STANDING COMMITTEE ON DATA, INFORMATION AND COMMUNICATION

Sharon Smith, co-chair of the Standing Committee

on Data, Information and Communication (SCDIC) informed about the ongoing work of building the IPA-IPY Data Legacy. The main focus of SCDIC is to prepare an IPY snapshot. A natural milestone is the IPY 'Early Science' Conference in June 2010. To secure the dataflow, SCDIC will organize a group of data champions from within each country who can organize the submission of data from their individual national IPY projects. Smith encouraged all current parties to undertake their part in this challenge. Roger G. Barry, former co-chair of SCDIC, was thanked for his past contributions.

B. PUBLICATION OF IPY-IPA RESEARCH RESULTS

Lewkowicz informed about the possibility for a special issue of Permafrost and Periglacial Processes concerning IPY-IPA outcome. Such an issue could include 'first results' from different countries as well as a summary report, and papers would be submitted by fall 2009. In addition there is a possibility of presenting the IPY-IPA results in the Springer series 'Pole to Pole'. Christiansen noted that this book series has a wide and flexible time line. Vonder Mühl indicated that it would be nice to have both and that the book series could include longer time series and wider analysis than the earlier PPP special issue.

5. INTERNATIONAL ADVISORY COMMITTEE

Hubberten suggested the following members of the International Advisory Committee for the Tenth ICOP in Tyumen, Russia in 2012:

Marcia Phillips (chair)

Huijun Jin

Jerry Brown

Don Hayley

PYRN Member (Isabelle Gärtner-Roer subsequently appointed)

It was agreed that the EC would select the PYRN member from the candidates that Lantuit will provide. Lewkowicz noted that there had been limited work for the International Advisory Committee concerning NICOP due to effective work of the local organizers. Involvement of the IAC in the planning for TICOP cannot wait until the next Council meeting in two years. The motion for the new membership was moved by Vonder Mühl and seconded by Humlum to approve the suggested slate of candidates. Unanimously approved.

6. INFORMATION CONCERNING FROZEN GROUND

Hubberten proposed that Frozen Ground will be produced as usual this year. Christiansen noted that the reports should be submitted by September 15, 2008, and requested all National contacts to meet this deadline to ease the job of the new IPA Secretariat.

7. APPROVAL OF RESOLUTIONS (2008-2010 AND BEYOND)

Lewkowicz read the suggested IPA resolutions. There was some discussion concerning name of organizations and their abbreviations, but the resolutions listed on page 20 were agreed to for formal Council approval. The motion to accept Resolution 1 was made by Vonder Mühl and seconded by Åkerman, whereas the motion to accept Resolution 2 was made by Gilichinsky and seconded by Urdea. Both votes were unanimous.

8. REPORT FOR CLOSING CONFERENCE CEREMONY

Hubberten reviewed the schedule for the NICOP closing ceremony. Lewkowicz reviewed the Necrology list which is presented on page 6

9. OTHER INFORMATION

Gilichinsky informed about the conference focusing on periglacial geomorphology to be held in September 2009. Jin informed about the forthcoming conference "50 Years of Geocryology in China". Wang informed about the Engineering Conference in Yellowknife in 2010. Vonder Mühl informed the Council that he plans to step down as the Swiss Council Member, probably to be replaced by Reynald Delaloye.

WORKING GROUPS, TASK FORCES AND STANDING COMMITTEES (2008-2012)

During its meetings in Fairbanks on June 28 and July 3, 2008, the IPA Council reviewed and approved activities for nine Working Groups (WG), two new Task Forces, and two Standing Committees for the period 2008 to 2012. A majority of WGs are joint activities with other international organisations including the Antarctic with SCAR; Cryosol with IUSS; Periglacial with IGU; Coastal with IASC and LOICZ; Hazards with IACS; Engineering with IUGS-IAEG. Membership on the Working Groups is open to all those interested in contributing; simply contact the Co-chairs. Individual members of the IPA Executive Committee will serve as liaison with WGs. Working Groups, Task Forces, and Standing Committees plan to meet and participate in the EUCOP III regional conference in June 2010, at which time the Council will review progress to date, and again in summer 2012 in Tyumen, Russia, during the Tenth International Conference on Permafrost (ed. note: the EUCOP III and TICOP meetings are not repeated under the follow lists of activities).

Working Groups

1. Antarctic Permafrost and Periglacial Environments

Co-chairs:

- James Bockheim, U.S.A. (bockheim@wisc.edu)
- Mauro Guglielmin, Italy (mauro.guglielmin@uninsubria.it)

Statement of Goals:

- Develop a common web-accessible repository for permafrost and soils data
- Complete thematic maps on Antarctic permafrost and soils (Transantarctic Mountains, Antarctic Peninsula region, and others)
- Establish a system of boreholes providing data on permafrost and soil properties (GTN-P), records of past environmental change, and recording permafrost responses to climate change
- Develop a well-designed monitoring system recording active layer (CALM-S) and periglacial process responses to climate change along selected environmental gradients
- Improve mobility and access to the Antarctic by permafrost researchers by means of common research activities in the Antarctic region

Activities: Participate in the IUSS Congress (2010, Australia), SCAR (2010, Argentina).

Web page: erth.waikato.ac.nz/antpas/

Liaison person with SCDIC: Mauro Guglielmin

Liaison international organizations and programs: IUSS, SCAR, ANTPAS, TSP, CALM-S, CAPP, GTN-P, GCP, PYRN

2. Cryosol

Co-chairs

- Galina Mazhitova, Russia (galina_mazhitova@mail.ru)
- Eva-Maria Pfeiffer, Germany (empfeiffer@ifb.uni-hamburg.de)

Statement of Goals:

- Link the knowledge about cryosols in both hemispheres including Arctic, Antarctic and mountain regions
- Evaluate what will happen with regional C-pools under ongoing climate and environmental changes
- Contribute knowledge about Cryosol related processes for climate, hydrology, and ecological modelling
- Teach young permafrost students/scientists about the diversity and importance of cryosols as a basic knowledge for the protection of cold ecosystems

Activities

- Organizing a bipolar CWG workshop "Climate Change and Cryosols"
- Publish a review (trend) paper on Cryosols of both hemispheres under a changing climate
- V International Conference on Cryopedology (2009, Ulan-Ude, Russia), IUSS Congress (2010, Brisbane, Australia), field trip to Antarctica on Correlation of Antarctic and Arctic soil processes (2010 or 2011)

Web page: <http://www.geowiss.uni-hamburg.de/i-boden/CWG-IPA-IUSS/index.html>

Liaison person with SCDIC: Eva-Maria Pfeiffer

Liaison international organisations and programmes: IUSS, CAPP, GCP, ANTPAS, CALM

3. Coastal and Offshore Permafrost Dynamics (COPD)

Co-Chairs

- George Cherkashov, Russia (cherkashov@mail.ru)
- Paul Overduin, Germany (Paul.Overduin@awi.de)

Statement of Goals:

- Support the development and production of maps of subsea permafrost distribution and state
- Coordinate an Arctic coastal erosion modelling effort
- Support the Remote Sensing Task Force (liaison Steve Solomon) with the collection of standardized remote sensing data products for coastal monitoring sites and the development of new tools for the detection of permafrost in the coastal zone including historical shoreline positions
- Support the establishment of coastal observatories with development of standard operating procedures for permafrost-relevant observational parameters

Activities:

- Proposed Kara Sea field expedition; ISSI workshops (Switzerland), Arctic Change (2008, Canada); Arctic Ocean workshop (2009, Netherlands), ASSW (2009, Norway), EGU session (2009), joint IPY session ACD -AOSB (2010, Norway)

Web page address: (www.arcticportal.org/acd) and (www.arcticportal.acd/acconet).

Liaison person with SCDIC: Hugues Lantuit

Liaison international organizations and programs: LOICZ (IGBP/IHDP), ACD, IASC, ACCOnet

4. Glaciers and Permafrost Hazards in High Mountain Slopes

IPA/IACS Co-chair:

- Andreas Käab, Norway (kaeab@geo.uio.no)

IPA Co-chair:

- Christian Hauck, Switzerland (christian.hauck@unifr.ch)

IACS Co-chairs:

- Jeffrey Kargel, U.S.A. (jkargel1054@earthlink.net)
- Christian Huggel, Switzerland (christian.huggel@geo.uzh.ch)

Statement of Goals:

- Continue disaster database
- Enhance outreach and dissemination including image gallery with explanations, a second special journal issue
- Increased focus on application of geophysics to permafrost hazards (co-chair Christian Hauck)
- Increase meetings with other than EGU, ICOP and EUCOP
- Collaboration with other working groups, e.g. IAVCEI/IUGG Commission on Volcano-Ice Interactions
- Improve geographical representation

Activities:

- Continue special sessions at EGU, session at IACS/IAMAS/IAPSO Joint Assembly (2009, Montreal), glacier and permafrost hazard symposium/conference (2009), NATO conference (2010), applied geophysics workshop (EUCOP III)

Web page: <http://www.geo.uio.no/remotesensing/gaphaz/>

Liaison person with SCDIC: A. Käab

Liaison with international organizations and programs: IACS, IGS, WGMS, GLIMS, and other cryospheric programs and organizations

5. Isotopes and Geochemistry of Permafrost

Co-chairs:

- Hanno Meyer, Germany (hmeyer@awi-potsdam.de)
- Ron Sletten, U.S.A. (sletten@u.washington.edu)

Statement of Goals:

- Prepare special PPP volume of contributed papers on the use of isotopes in permafrost research (2010)

Activities: prepare special issues of PPP

Liaison person with SCDIC: Ron Sletten, Hanno Meyer

Liaison with international organizations and programs: IAEA, GNIP

6. Periglacial Landforms, Processes and Climate

Co-chairs

- Julian Murton, U.K. (J.B.Murton@sussex.ac.uk)
- Norikazu Matsuoka, Japan (matsuoka@atm.geo.tsukuba.ac.jp)

- Ole Humlum, Norway (Ole.Humlum@geo.uio.no) Webmaster

Statement of Goals:

- Produce a report on the climatic significance of periglacial features to update Washburn's 1980 paper in Earth Science Reviews and provide a state-of-the-art review for researchers working on climate change and palaeoenvironmental reconstruction
- Update regularly the handbook on the methods of monitoring of periglacial processes in order to standardize field procedures
- Set up and maintain a website to promote periglacial geomorphology

Activities:

- EGU GM5.1: Periglacial Processes, Landforms and Environments (2009); symposium and workshop to celebrate Professor Charles Harris (2009, France); summer 2010 session at UNIS to include symposium on the climatic significance of periglacial features and a field workshop on monitoring of periglacial processes; continue annual EGU sessions on periglacial geomorphology

Web page: <http://www.periglacial.org>

Liaison with SCDIC: Julian Murton

Liaison with international organizations and programs: IGU as co-convenor of CRE, IAG

7. Permafrost and Climate

Co-chairs:

- Oleg A. Anisimov, Russia (oleg@OA7661.spb.edu)
- Frederick E. Nelson, U.S.A. (fnelson@udel.edu)

Statement of Goals:

- Develop and promote diverse approaches to modeling and mapping of permafrost, including both probabilistic and deterministic methodologies
- Emphasis will also be placed on integrative mapping/modeling, involving the dynamics of periglacial features and carbon fluxes from thawing permafrost
- Coordinate, in conjunction with the Standing Committee on Data Information and Communication, preparation of a biannual assessment of the state of permafrost

Activities:

- Meetings in conjunction with major conferences including the American Geophysical Union's Fall Meeting and the European Geophysical Union's annual meeting

Web page: none; see CALM web for data: www.udel.edu/Geography/calm/

Liaison with SCDIC: F. E. Nelson

Liaison with international organizations and programs: CALM, CLiC, IPCC, ITEX, TSP, WMO/GCOS and FAO/GTOS/TEMS, ICP

Modeling and Mapping Subgroup

(Modelling Spatial Dynamics of Permafrost at Diverse Scales)

Co-Chairs:

- Stephan Gruber, Switzerland (stgruber@geo.unizh.ch)
- Nikolay Shiklomanov, U.S.A. (shiklom@udel.edu)

Statement of Goals:

- Develop and evaluate theoretical and semantic aspects of modeling permafrost distribution under climatic change
- Emphasize scale (space, time, depth) and the treatment of sub-scale effects in models, model validation and map products, both in lowland and mountain environments

Activities:

- Meetings will be held as noted above, with additional working meetings scheduled as opportunities present themselves

Web page: http://www.geo.uzh.ch/~stgruber/pf_scales.html

Liaison with SCDIC: Sergey Marchenko

Liaison with international organizations and programs: see main working group

8. Planetary Permafrost and Astrobiology

Co-chairs:

- Dirk Wagner (dirk.wagner@awi.de)
- Christopher McKay (cmckay@arc.nasa.gov)

Statement of Goals:

- Investigate microbial activities and growth rates at in situ conditions (e.g. subzero temperature) in ice and permafrost, including development of aseptic drilling techniques and sampling strategies
- Conduct biological experiments in the outer space
- Conduct measurements of long-lived radioisotopes and development of modelling of their radiation in permafrost
- Interpret data obtained by space vehicles with regard to permafrost (e.g. morphology, living conditions, water)

Activities:

- EGU General Assembly (2009), COSPAR (2010, Germany), Polar and Alpine Microbiology (2011, Slovenia), AGU Fall meeting (2011)

Web page address: under construction

Liaison with SCDIC: Dirk Wagner

Liaison with international organizations and programs: European Astrobiology Network Association (EANA), NASA Astrobiology Institute (NAI), European Space Agency (ESA), Russian Space Agency, Virtual Exo/Astrobiology Institute

9. Permafrost Engineering

Co-chairs:

- Richard Fortier, Canada (richard.fortier@ggl.ulaval.ca)
- Fujun Niu, China (niufujun@ns.lzb.ac.cn)
- Lukas Arenson, Permafrost Young Researchers Network (PYRN) (arenson@igt.baug.ethz.ch)

Statement of Goals:

- Organize a technical session on engineering geophysics for the detection and characterization of thaw sensitive zones in a permafrost environment during the Canadian Conference on Permafrost (2010)
- Identify and advertise an inventory of engineering test sections in a permafrost environment
- Compile guidelines for best engineering practices in a permafrost environment
- Recruit engineers as members of the Permafrost Young Researchers Network (PYRN) engineers

Activities:

- Participate in national permafrost conferences in Canada and Russia, annual Canadian Geotechnical Conferences, ASCE Cold Regions Engineering Conferences

Web page: TBD

Liaison person with SCDIC: Richard Fortier

Liaison with international organizations and programs: ISSMGE TC8, ASCE/TCCRE, IAEG, CGS

Subgroup on Engineering Geology for Development in Permafrost Regions

Chair:

- Dmitry Sergueev (sergueevdo@mail.ru)

Statement of Goals:

- Develop new methodologies for risk assessment and geohazard evaluation of permafrost degradation in the context of climate warming integrating a probabilistic analysis in risk assessment and mapping of permafrost instability (with IAEG Commission 21)
- Recommend legends to reflect the permafrost condition parameters at different map scales
- Prepare illustrated examples of successful examples for the use of permafrost research in engineering geology practice

Activities:

- International Symposium: Geological Engineering Problems in Major Construction Projects in Combination with the 7th Asian Regional Conference of IAEG (2009, China), CGS conferences, prepare review report on methodologies

Web page: <http://www.iaeg2009.com>

Liaison with SCDIC: Dmitry Sergeev

Liaison with international organizations and programs: IUGS-IAEG Commission 21

Task Forces

1. Remote Sensing

Co-Chairs:

- Guido Grosse, U.S.A. (ggrosse@gi.alaska.edu)
- Claude Duguay, Canada (crduyguay@uwaterloo.ca)

Statement of Goals:

- Promote the use of airborne and spaceborne sensors in detection and mapping of permafrost properties and periglacial processes in the light of ongoing climate change
- Strengthen technical expertise and use of remote sensing in other IPA working groups, i.e. on coastal dynamics, periglacial landforms and processes, and permafrost mapping
- Synthesize a peer-reviewed paper on current developments in remote sensing of permafrost environments
- Establish linkages to major space and funding agencies (NASA, ESA, CSA, JAXA, DLR) to promote importance of permafrost monitoring from space

Activities:

- Oral and Poster Sessions on Remote Sensing of Changes in Terrestrial Permafrost at AGU (2008); coordinate involvement of permafrost field researchers and modelers as individual user groups in the European Space Agency Project 'Data User Element Permafrost' starting in 2009; participate at other international meetings with dedicated sessions on remote sensing of permafrost during 2009-2012

Web page: under development

Data Liaison with SCDIC: Guido Grosse

Liaison with international organizations and programs: ESA Data User Element Permafrost

2. Subglacial Permafrost

Chair:

- Julian Murton, U.K. (J.B.Murton@sussex.ac.uk)

Statement of Goals:

- To promote interdisciplinary research collaboration between permafrost scientists, glacial geologists, glaciologists and Quaternary scientists – all sharing a common interest in the coupling between Quaternary ice sheets and permafrost beneath their margins

Activities:

- AGU Session on Glacier-Permafrost Interactions (AGU 2009), session on Subglacial Permafrost at INQUA Congress (2011, Switzerland)

Web page: under development

Data Liaison with SCDIC: Julian Murton

Liaison with international organizations and programs: INQUA's Commission TERPRO.

Standing Committees

1. Data, Information and Communications

Co-chairs

- Mark Parson, U.S.A. (parsonsm@nsidc.org)
- Sharon Smith, Canada (ssmith@nrca.nrcan.gc.ca)

Statement of Goals:

- Ensure the continued collection, archiving, documentation and dissemination of permafrost/frozen ground data
- Address the improved standardization of frozen ground data collection and documentation
- Maximize the dissemination of information and value-added products about frozen ground research to international and national agencies and organizations, including the international Arctic Data Directory (ADD), and to the permafrost community through Frozen Ground
- Assist the Executive Committee with the developing responsibilities for permafrost monitoring
- Report to the GCOS/GTOS on the status of permafrost monitoring, and to identify permafrost research issues for the WCRP Climate and the Cryosphere (CLIC)
- Provide liaison with cognate data collection and monitoring programs, especially IPY permafrost projects, IPA Working

Parties and to invite such organizations to nominate a representative to SCDIC

- Oversee the contents and ensure the continuity of the IPA web site

Activities:

- Coordinate preparation of the IPA-IPY snapshot database (2010) and CAPS 3.0 (2012)

Web page address: <https://ipydis.org/wiki/doku.php?id=partners:scdic>

Liaison with international organizations and programs: CALM, TSP, IPYDIS, SAON, SCANNET, WCRP/CLiC, WDCs for Glaciology, WMO-FAO/GCOS/GTOS

2. International Advisory Committee for ICOP

Chair

- Marcia Phillips, Switzerland (phillips@slf.ch)

Statement of Goals:

- Provide advice to the organizers of the International Conferences on Permafrost, respond to questions from the IPA Executive Committee, and prepare a report following TICOP

Activities:

- confer with Russian ICOP organizers and provide advice as needed for publications and program. Meet at IPA Council meetings (2010)

Acronyms (IPA coordination and liaison)

ACD: Arctic Coastal Dynamics

ASCE: American Society of Civil Engineers

ANTPAS: Antarctic and sub-Antarctic Permafrost, Periglacial and Soil Environments

ACCONet: Arctic Circumpolar Coastal Observatory Network

AGU: American Geophysical Union

AOSB: Arctic Ocean Science Board

ASSW: Arctic Science Summit Week

CALM: Circumpolar Active Layer Monitoring

CALM-S: Circumpolar Active Layer Monitoring (South)

CAPP: Carbon Pools in Permafrost Regions

CAPS: Circumpolar Active-layer Permafrost System

CLIC: Climate and Cryosphere (WCRP)

CGS: Canadian Geotechnical Society

CRE: Commission on Cold Regions Environments (IGU)

EANA: European Astrobiology Network Association

ESA: European Space Agency

FAO: Food and Agriculture Organization of the United Nations

GCOS: Global Climate Observing System

GCP: Global Carbon Project

GLIMS: Global Land Ice Monitoring from Space

GNIP: Global Network for Isotopes in Precipitation

GTN-P: Global Terrestrial Network for Permafrost

GTOS: Global Terrestrial Observing System

IAEA: International Atomic Energy Agency

IACS: International Association of Cryospheric Sciences

IAEG: International Association of Engineering Geology and the Environment

IAG: International Association of Geomorphologists

IAMAS: International Association of Meteorology and Atmospheric Sciences

IAPSO: International Association for the Physical Sciences of the Oceans

IASC: International Arctic Science Committee

IAVCEI: International Association of Volcanology and Chemistry of the Earth's Interior

IGS: International Glaciological Society

IGBP: International Geosphere Biosphere Program

IGU: International Geographical Union

IHDP: International Human Development Program

INQUA: International Union for Quaternary Research

IPCC: Intergovernmental Panel on Climate Change
 IPY: International Polar Year
 IPYDIS: International Polar Year Data and Information Service
 ISSI: International Space Science Institute
 ISSMGE TC8: International Society of Soil Mechanics and Geotechnical Engineering: Technical Committee 8
 ITEX: International Tundra Experiment
 IUGG: International Union of Geodesy and Geophysics
 IUGS: International Union of Geological Sciences
 IUSS: International Union of Soil Science
 LOICZ: Land-Ocean Interactions in the Coastal Zone (IGBP)
 NAI: NASA Astrobiology Institute
 PAGES: Past Global Changes
 PYRN: Permafrost Young Researchers Network
 SCANNET: A Circumarctic Network of Terrestrial Field Bases
 SCAR: Scientific Committee for Antarctic Research
 SWIPA: Snow, Water, Ice, and Permafrost in the Arctic
 TCCRE: Technical Council on Cold Regions Engineering
 TEMS: Terrestrial Ecosystems Monitoring Sites
 TERPRO: Commission on Terrestrial Processes, Deposits and History (INQUA)
 UNIS: University Centre in Svalbard
 WCRP: World Climate Research Program
 WDC: World Data Centers for Glaciology
 WGMS: World Glacier Monitoring Service
 WMO: World Meteorological Organization

IPA COUNCIL RESOLUTION

FAIRBANKS, ALASKA, JULY 3, 2008

RESOLUTION 1: ACTIVITIES THAT CONTRIBUTE TO INTERNATIONAL PROGRAMS

The IPA resolves to continue coordination of pre-IPY and IPY observing programs related to active layer (CALM), thermal state of permafrost (TSP), coastal erosion (ACD/ACCO-Net), and carbon stocks (CAPP).

- IPA resolves to seek the establishment of a permanent network of permafrost observatories in cooperation with all appropriate national and international programs.
- IPA resolves to coordinate activities to produce an electronically accessible “snapshot” of IPY permafrost data and other available information according to the schedule proposed by the Standing Committee on Data Information and Communication.
- IPA, through its Working Parties or Executive Committee, resolves to continue collaboration with other appropriate international organizations.
- IPA, through individuals and national adhering bodies, resolves to provide input to climate assessments such as IPCC, ACIA and SWIPA.

RESOLUTION 2. ORGANIZATIONAL RESOLUTIONS

Be it resolved that IPA Working Parties (Working Groups, Task Forces and Standing Committees) develop short-term, achievable objectives and that progress be reviewed biannually at regional or ICOP conferences. Furthermore special attention be devoted to needs and advances in remote sensing, subglacial permafrost, modeling, geophysical techniques, and regional mapping.

Recognizing the IPA commitment to the development of the next generation of researchers, both scientist and engineers, be it resolved that the Permafrost Young Researchers Network (PYRN) be formally recognized as an official organization within the IPA (an adhering network), having permanent observer status at IPA Council meetings.

Be it resolved that wherever possible, Adhering Bodies, encourage collaboration between scientific and engineering activities and organizations.

EXECUTIVE COMMITTEE MINUTES

The following summaries of the three 2008 Executive Committee meetings are included for the record. Additional details are reported in the record of the Council meetings.

JUNE 28, 2008 (8:20 A.M. TO 9:30 A.M.)

The Executive Committee met in Fairbanks, Alaska, U.S.A. The following EC members attended: Jerry Brown, Charles Harris, Don Hayley, Hans-W. Hubberten, Georgy Perlshtein and Ma Wei. The IPA Secretariat was represented by Hanne H. Christiansen and Herman Farbrot. Additionally Hugues Lantuit was invited to attend the meeting which took place at the International Arctic Research Center, University of Alaska Fairbanks. President Jerry Brown chaired the meeting.

1. REVIEW AGENDA FOR COUNCIL MEETINGS

The suggested agendas for the 18th and 19th IPA Council Meetings were accepted.

2. BUDGET

Christiansen presented the balance of the IPA account, including payment status of the member countries, and the IPA 2008-2010 budget. Christiansen noted that the costs of Frozen Ground roughly equal the Member Countries dues. These dues have mainly been stationary in recent years, and it may be possible to ask for a voluntarily increase at the 18th IPA Council Meeting. Brown indicated that the income from the NICOP registration fee could possibly be ~6000 USD. Further, Hayley noted that the Canadian Geotechnical Society will support the distribution of the Frozen Ground in Canada. Brown requested the transfer of the final 5000 USD payment to NICOP for IPA support of stipends.. This was accepted by all EC members.

3. VOTING FOR THE NEW EXECUTIVE COMMITTEE

Brown raised the issue of how to accomplish the voting for the next Executive Committee at the 18th IPA Council Meeting. Is a secret ballot necessary? Christiansen indicated that there are no procedures for this. Hayley noted that there was really nothing to vote about since there are six seats and six candidates. Therefore the Member Countries could vote for the slate. Harris supported this view, but raised concerns about the limited influence of engineers on the slate. Christiansen noted that the new Executive Committee could appoint an additional engineer member. The suggestion of open voting for the slate was approved by all EC members.

4. ADHERING BODY REPRESENTATION

The issue of dual national membership on Council was reviewed. In Norway there are two main groups seeking representation; Frost in Ground (mainly engineers) and CRYONOR (mainly connected to universities). As is the case with the U.S.A., Hubberten suggested that Norway should be allowed two seats at the Council Meetings (one vote). Hayley noted that

the Canadian Research Council looks after its representations, and Brown noted that for the U.S.A. there has been a rotation between engineers and scientists for the U.S.A. Finland and Japan may also have a need for dual representation, and in France the periglacial community is not well represented. There was agreement to include a statement for the encouragement of engineering involvement in the IPA resolutions.

5. FUTURE SECRETARIAT

Christiansen reviewed briefly the duties of the IPA Secretariat. Hubberten reported his offer to host the future IPA Secretariat at the AWI Potsdam. Hayley suggested recommending moving the IPA Secretariat to Potsdam as an action item for the 18th IPA Council Meeting.

6. REVIEW OF FROZEN GROUND

Brown informed about Kaare Flaate's suggestion for the need to review the content of *Frozen Ground* and suggested that this should be an item for new Executive Committee.

JULY 1, 2008 (6:10 P.M. TO 7:35 P.M.)

The following newly elected Executive Committee members attended: Hanne H. Christiansen, Dmitry S. Drozdov, Hans-W. Hubberten, Antoni G. Lewkowicz, Vladimir E. Romanovsky and Ma Wei. The IPA Secretariat was represented by Herman Farbrot. Additionally Jerry Brown, Huijun Jin and Hugues Lantuit were invited to attend the meeting which took place at the Kayak room, University of Alaska Fairbanks prior to the 19th Council meeting. The Committee elected the new IPA President, reviewed matters from the previous EC and 18th Council meetings in preparation for the next Council meeting on July 3.

1. VOTING FOR THE NEW IPA PRESIDENT

The modified Constitution requires the Executive Committee to elect its new officers. Lewkowicz proposed Hubberten for President and there was unanimous agreement from the other members. Hubberten thanked the other EC members for their confidence and chaired the meeting from then on.

2. VOTING FOR THE NEW IPA VICE PRESIDENTS

Hubberten proposed Christiansen and Lewkowicz for new Vice Presidents. Huijun Jin raised the question whether there should be a Vice President from Russia since the next conference presumably will take place there. Brown noted that there is no requirement, but an EC member needs to be from the hosting country. The motion to accept Christiansen and Lewkowicz for new IPA Vice Presidents was made by Romanovsky and seconded by Drozdov. The vote was unanimous.

3. NEED FOR AN EXTRA EXECUTIVE COMMITTEE MEMBER

The concern for including more engineers on the Executive

Committee was raised. It was noted that Ma Wei is an engineer. Members agreed that the principle should be to have practicing engineers on the EC.

4. NEW INTERNATIONAL ADVISORY COMMITTEE

There is a need for a new International Advisory Committee for the Tenth ICOP in Tyumen, Russia. The old committee will continue until a new one is appointed. The following people were suggested for the new Committee: Marcia Phillips (Chair), Jerry Brown, Don Hayley and Huijun Jin. Brown and Jin accepted such positions. In addition a PYRN Member will join the committee at a later point. PYRN candidates will be suggested by Lantuit, and a member confirmed by the Executive Committee by email. Hubberten stressed that this person should not be in close contact with the EC members.

5. IPA WORKING GROUPS

There was discussion concerning the future of the IPA Working Groups. The future plans of the Working Groups will be reviewed for approval at 19th IPA Council Meeting. Christiansen suggested establishing an oversight committee to strengthen the actions of the Working Groups. Other EC members thought that it would be sufficient to follow the advice given by the IPA Working Group Reviewers.

6. FROZEN GROUND

Christiansen opened a discussion concerning the future of Frozen Ground (print or only a web-version). Hubberten noted that it was probably advisable to continue the normal concept for the first year. Farbot will send out a request for National reports. Jin suggested either cutting down on the number of copies or increasing the Member dues. Lewkowicz suggested asking the Standing Committee for advice before the next Executive Committee meeting in December.

7. PYRN REPRESENTATION

Christiansen raised the issue of strengthening the connections of IPA and PYRN. Suggestions included accepting PYRN as an Adhering Body, Standing Committee or a Working Group. Lantuit noted that PYRN is an affiliated, adoptive network and suggested that PYRN might have a permanent observer status on the Council. The motion to accept PYRN as a permanent observer at the Council was made by Lewkowicz and seconded by Christiansen. The vote was unanimous. Lewkowicz will be responsible for the direct contact between IPA Executive Committee and PYRN.

8. NICOP CLOSING CEREMONY

Lewkowicz will read a list of people from the permafrost community who have died since Eighth ICOP 2003, followed by a moment of silence. Hubberten will pass on an ICOP banner to the Tenth ICOP in Tyumen, represented by Drozdov. Further, Hubberten and Ken Hinkel will present PYRN-IPA Award winners. Hubberten will write a four pp summary of NICOP to be printed in Permafrost and Periglacial Processes.

9. NEXT EC MEETING

Next IPA EC meeting will take place before AGU in San Francisco on Sunday, December 14, 2008.

10. CONCLUDING COMMENTS

The Executive Committee members thanked Jerry Brown for his efforts and contributions during his five-year period as the IPA President.

DECEMBER 14, 2008 (9:30 A.M. TO 5:00 P.M.)

The following Executive Committee members attended: Hans-W. Hubberten, Antoni Lewkowicz, Vladimir Romanovsky, Dmitriy Drozdov, Hanne Christiansen (on telephone in the morning). Huijun Jin represented Wei Ma. The IPA Secretariat was represented by Hugues Lantuit. Additionally, Anna Kurchatova and Jerry Brown were invited to attend the meeting which took place at the Hotel 480, San Francisco prior to the AGU Fall Meeting. Larry Hinzman, Doug Kane, Tom Krzewinski and Fritz Nelson joined the meeting to report on U.S. activities.

1. TICOP

The Executive Committee discussed the planning of the 2012 ICOP, which is planned to take place in Tyumen, Russia. It was emphasized that the planning structure should be put in place over the next six months. A presentation was given by Dmitriy Drozdov presenting the infrastructure in Tyumen which has been renovated or newly created over the past few years thus offering very nice venues.

The on-site logistics planning is underway, including organisation of transfers and accommodation in Moscow. The organizers are now collecting ideas for field trips.

The Executive Committee decided to set up an international editorial group to help the local organizers with the editing process. This group, in collaboration with the International Advisory Group (IAC) will help to set up a viable infrastructure for the review, editing and the production of the proceedings. It will also collaborate with the IAC on setting up the required web infrastructure. I. Gärtner-Roer was confirmed as PYRN representative to the IAC.

2. TASK FORCES

The Executive Committee acknowledged the many activities already organized by the leaders of the Task Force on Remote Sensing and formally accepted its formation under the IPA umbrella. The task force will be lead by G. Grosse

3. OSLO IPY OPEN SCIENCE CONFERENCE AND EUCOP III

One session on IPA IPY activities and one session on coastal processes have been submitted to the IPY Open Science Conference to be held in Oslo, Norway, June 8-12, 2010. The Third European Conference on Permafrost will follow on June 13-17, 2010 on Svalbard. The Norwegian Research Council has funded the application to run the latter on Svalbard, which

should greatly facilitate the organization. Further support applications are underway.

4. REVIEW OF INTERNATIONAL AGREEMENTS

Review of several international agreements will take place over the next year.

5. REPORT ON NICOP

D. Kane and L. Hinzman were invited to present the report on NICOP. A more detailed excerpt of that report is available at pages 5-7. T. Krzewinski reported on current and planned ASCE activities and F. Nelson provided additional information on the Muller book.

EXECUTIVE COMMITTEES OF THE INTERNATIONAL PERMAFROST ASSOCIATION (1983 TO 2012)

	1983	1988	1993	1998	2003	2008
President	P.I. Melnikov U.S.S.R.	T.L. Péwé U.S.A.	G. Cheng China	H.M. French Canada	J. Brown U.S.A.	H.-W. Hubberten Germany
Vice-President	T.L. Péwé U.S.A.	G. Cheng China	N.N. Romanovskii Russia	F.E. Are Russia	C. Harris U.K.	H.H. Christiansen Norway
Vice-President	K. Flaate Norway	V.P. Melnikov U.S.S.R.	H.M. French Canada	W. Haeberli Switzerland	G. Perlshtein Russia	A.G. Lewkowicz Canada
Secretary General*	J.R. Mackay Canada	J.R. Mackay Canada	J. Brown U.S.A.	-	-	-
Ordinary Members				J. Brown U.S.A.	H.-W. Hubberten Germany	D.S. Drozdov Russia
				T. Mølmann Norway	D.W. Hayley Canada	W. Ma China
				Y. Zhu China	Y. Zhu China	V.E. Romanovsky U.S.A.

* Position discontinued in 1998.

NEWS FROM MEMBERS

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

ARGENTINA (AND SOUTH AMERICAN PARTNERS)

A. L. Ahumada, G. Ibáñez Palacios and S. Verónica Páez of the Institute of Quaternary Geology (Miguel Lillo Foundation, San Miguel de Tucumán) pursued their exploration and research of the cryogenic environment of Sierra de Aconquija with a special emphasis on fields of thufurs at 4200 m a.s.l. The same working group was the first to document talus rock glaciers of glacial origin for Cumbres Calchaquíes (Province of Tucumán), which display active fronts from 4270 m a.s.l. on upwards. Their spatial extent is constrained by the climatic characteristics of the region.

On the western edge of the Puna, at the Nevados de Catreal, in the Province of Catamarca, a preliminary inventory of talus and glaciogenic rock glaciers has been elaborated. Rock glaciers in this region are found at elevations of 4254 - 4898 m a.s.l. These newly discovered areas of rock glacier occurrence increase the knowledge about permafrost distribution of the intracontinental cryosphere in the northwest of Argentina.

During 2008, a joint research project focussing on Andean cryogenic environments was carried out in Argentina by the University of Salzburg (L. Schrott, Austria) and the Geocryology Research Unit of the IANIGLA (D. Trombotto, Mendoza). This research includes geophysical soundings with a variety of modern techniques (geoelectrics, ground penetrating radar) and were already carried out by a team of younger researchers (J. Götz, I. Hartmeyer and M. Keuschnig). In the framework of this project, research has begun at the Morenas Coloradas rock glacier and at Paso de Agua Negra (in the Province of San Juan) and students (from the National University of Cuyo, Mariano Castro and from the University of Bonn, Germany, J. H. Bloethe) have received research and professional training at the Geocryology Research Unit in Mendoza. These young researchers are working on periglacial environments in different areas of the Central Andes and are concerned with mapping new areas affected by permafrost occurrence. This mapping task was extended to the Cordillera del Tigre in the north of the Province of Mendoza. Mapping permafrost there is particularly interesting because it displays an important rock glacier pattern similar to that mentioned for the Cordón del Plata.

Areas with palaeopermafrost in the northwest of the Province of Chubut, Patagonia, are being investigated by L. Ruiz (IANIGLA, Mendoza) in order to help reconstruct the palaeoclimate of the area. This research will be part of his doctoral thesis to be presented at the University of Buenos Aires.

As part of a new cooperation, the International Center of Earth Sciences (Malargüe, Mendoza), the IANIGLA (D. Trombotto) have been monitoring the volcano-cryogenic contact zone on the active volcano Peteroa, where glaciers retreated considerably due to the high geothermal gradient

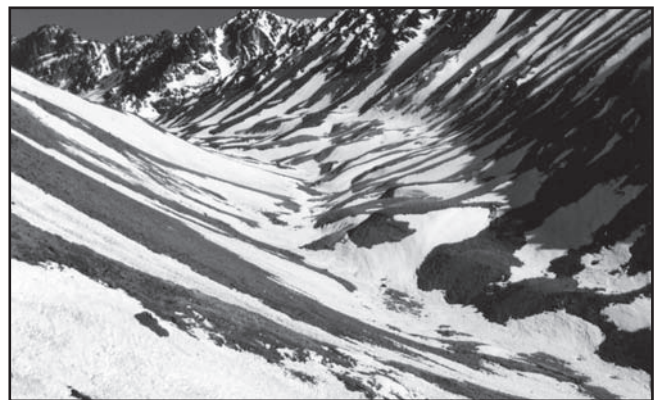
detected at the rims of the caldera. Permafrost occurrence is indicated by the presence of buried ice in numerous sites where deglaciation has taken place.



Glaciar del Tambillo, 4600 m, Cordillera del Tigre, Mendoza. (Photograph provided by Mariano Castro)

A new joint research project (J. Ruzzante ICES and IANIGLA) about the geocryology of the Peteroa Volcano has been initiated to continue studying the area, mapping permafrost and linking the local cryospheric environment to present water supplies. The project includes the characterization of specific areas according to their vulnerability to volcanic risks and the influence of volcanic activity on periglacial environment with high-ice content. The latter is the subject of a master degree at the University of Cuyo (A. Ramires) in cooperation with the IANIGLA. Future joint research projects together with Germany (Humboldt-Universität zu Berlin) and Brazil (National Observatory of Rio de Janeiro) have been presented this year. They focus on this study area in order to better understand the evolution of periglacial processes in the context of global warming and to measure permafrost or ice thickness using radar equipment.

Active layer monitoring of new sites underlain by permafrost (D. Trombotto) has been initiated in Morenas Coloradas (Balcón I Superior) where the permafrost table lies at approximately the 5.5 m depth (corroborated by GPR) and in the south of the Province of San Juan, in the valley of the river Pachón, at 31° 44'S, close to the border between Chile and the Province of Mendoza. The nearby Cerro Mercedario with a height of 6770 m a.s.l. is glaciated.



Coalescent rockglaciers, 3750 m, Cordillera del Tigre, Mendoza. (Photograph provided by Mariano Castro)

The valleys that are monitored do not exhibit glaciers, but have a great variety of subterranean types of ice associated with landforms such as rock glaciers and cryogenic sedimentary slopes with the occurrence of supersaturated gelifluction in ice.

A. Brenning (University of Waterloo, Ontario, Canada) and visiting student G. Azócar from Universidad de Chile are currently investigating the distribution and significance of rock glaciers in the dry Andes of northcentral Chile between 27° and 33°S in collaboration with F. Escobar from the Dirección General de Aguas, Santiago, Chile. The water equivalent of rock glaciers exceeds the amount of water stored in glaciers across great parts of the study area. The impact of mining on rock glaciers in the Los Pelambres mine is another issue that is being addressed. First results have been presented at the 4th Alexander von Humboldt Conference in Santiago (November 2008).

The Argentine Subcommittee of Cryospheric Sciences (ASCS) was founded during the year 2008 and D. Trombotto was nominated president. J. C. Leiva (Glaciology, IANIGLA, Mendoza) and S. Barreira (Antarctic Sea Ice, Servicio Meteorológico de la Armada Argentina, Buenos Aires) are members of the Executive Committee.

Dario Trombotto (dtrombot@lab.criicyt.edu.ar)

AUSTRIA

Comprehensive research on permafrost issues in Austria is currently carried out by nine institutions and by an increasing number of scientists: University of Innsbruck (with two research groups: K. Krainer and J. Stötter), Vienna University of Technology, University of Graz, Graz University of Technology, Joanneum Research (Graz), University of Salzburg, Geological Survey of Austria (Vienna) and by two branches of the Central Institute for Meteorology and Geodynamics (Vienna and Salzburg).

The Innsbruck group around K. Krainer in cooperation with the University of Vienna (E. Brückl, H. Hausmann, G. Blöschl), the Central Institute for Meteorology and Geodynamics in Salzburg (M. Staudinger) and the Geological Survey of Austria (A. Römer) continued working on their existing project *Permafrost in Austria*. The project consists of two different parts carried out at two different study sites as reported in the previous issue of *Frozen Ground*. At the 5 km² study area in the Kaunertal (Ötztal Alps), it is planned to study the present distribution, thickness and ice content of alpine permafrost by applying a combination of methods including mapping, study of aerial photographs, geophysical surveying, ground temperatures etc. In summer 2008 geophysical mapping (seismic refraction) were started at this study area. Profiles were selected by (a) probable and improbable areas of permafrost based on geomorphology and the previously modelled PERMAKART map and by (b) geomorphological classes for near surface materials (talus, rock glacier, moraine, etc.) and their variation in altitude. The analyses of P- and S-waves are used to detect the presence of permafrost. The geophysical indicator together with the corresponding behaviour of BTS should prove (or disprove) the existence of permafrost. At the second study area,

Sonnblick, an initial seismic tomography was applied to test the functionality of the pre-installed 15 geophones deployed in three 20 m boreholes in June 2008. Further measurements are planned for September 2008 and in summer 2009 to observe variations of the seismic signals (travel time, amplitude). The comparison of a computed velocity model (P- and S-waves) using the time-lapse inversion will be used to interpret spatial and temporal variations of the permafrost.

The University of Graz (G.K. Lieb, A. Kellerer-Pirklbauer), Graz University of Technology (M. Avian, V. Kaufmann), and Joanneum Research (A. Bauer, H. Proske) continued to work on objectives defined within the project ALPCHANGE (for details and published results see www.alpchange.at) in the Hohe Tauern and Niedere Tauern Ranges in central Austria. Most of the measurement devices installed in summer and autumn 2006 worked properly thereby collecting a whole suite of data related to permafrost and rock glacier occurrence and activity. For example, near-ground surface temperature recordings (in total more than 100 sensors) were carried out in different substrates (bedrock, coarse debris, fine debris), in different aspects as well as in different altitudes in alpine cirques in order to understand in more detail the ground temperature situation of cirques with permafrost and active rock glaciers. By combining these numeric results with remotely sensed data it is planned to model the thermal situation in the entire cirques. Other local scale activities were for example continuation of the annual geodetic measurements on the Dösen, Hinteres Langtalkar and Weissenkar rock glaciers, resurveying of the rock glacier in the Äusseres Hochebenkar (Tirol) by terrestrial photogrammetry, resurveying of the front of the highly active Hinteres Langtalkar rock glacier by terrestrial laser scanning, geomorphic field mapping, geoelectric measurements (in cooperation with E. Niesner and B. Kühnast, Leoben) and BTS measurements at various study locations in the Hohe Tauern and Niedere Tauern Ranges. At a regional scale, airborne laser scanning was carried out in summer 2008 at three ALPCHANGE study areas thereby focusing on rock glaciers, glaciers and larger-scale solifluction features in the Hohe Tauern Range. Furthermore, permafrost modelling was carried out for the Carinthian part of the Hohe Tauern Range. Model results were used as one input layer for constructing a geomorphological hazard map of the Großglockner area and will be combined with regional climate scenario models developed by the Wegener Center for Climate and Global Change, University of Graz (A. Gobiet) in Graz. The Geological Survey of Austria (A. Römer and R. Supper) launched an automatic geoelectric monitoring system in the summit area of Sonnblick, an activity which was initiated by ALPCHANGE.

The Central Institute of Meteorology and Geodynamics in Vienna (W. Schöner, Ch. Kroisleitner) continued permafrost monitoring in the Sonnblick region (project PERSON; see previous report) at two test fields (one with Southern and one with Northern aspect) of ground surface temperature measurements with miniature data loggers and additional BTS measurements in March/April each year. The monitoring was extended by a digital snow cover and snow depletion mapping activities which started in spring 2008. Additionally, monitoring of the ice dammed Pilatus Lake north of Mt. Sonnblick was started in summer 2007 thereby including measurement of

shape, discharge and ice thickness.

At the University of Salzburg the research group *Geomorphology and Environmental Systems* (L. Schrott, J.-Ch. Otto, B. Ebohon; cf. www.geomorphology.at) initiated a research project (permalp.at) about permafrost distribution in the Austrian Alps in cooperation with the national government. A major interest is to explore the permafrost distribution in the Austrian Alps, particularly with regard to potential future development and natural hazards in the densely populated mountain ranges. Thus, the first objective of permalp.at is to create a high resolution map of permafrost distribution of the Austrian Central Alps. This knowledge will significantly help to improve planning of infrastructure in high mountain regions. In the research area (Hohe Tauern) several methods will be applied. Apart from geomorphological mapping and the analysis of aerial photographs it is intended to carry out geophysical soundings, to enlarge BTS-measurement sites and to measure ground- and rockwall-temperatures at several test sites. The results will be used to create a new topo-climatic key for the Eastern Alps which can be used to simulate permafrost distribution. The project combines the knowledge of Salzburg's research group with experiences of several Austrian colleagues (e.g. research group of G. K. Lieb and A. Kellerer-Pirklbauer) and is supported by M. Phillips (SLF, Davos) and F. Keller (ETI, Academia Engiadina, Samedan) from Switzerland.



Participants of the first PermaNET-Austria meeting at the Salzburg Branch of the Central Institute of Meteorology and Geodynamics, Salzburg, August 2008. (Photograph provided by Andreas Kellerer-Pirklbauer)

Finally we want to report briefly on a new project funded by the European Union through the Alpine Space Program of the European Territorial Cooperation named *PermaNET - Permafrost long-term monitoring network* launched in mid-July 2008. The project consortium consists of 14 participating institutions. The function of the so-called "lead partner" is carried out by the Autonomous Province of Bolzano - South Tyrol, Office for Geology and Building Materials Testing, Italy (V. Mair). The four Austrian project participants are: the Central Institute for Meteorology and Geodynamics in Salzburg (M. Staudinger, C. Riedl, M. Ungersböck, G. Schauer) and Vienna (W. Schönner, Ch. Kroisleitner), the University of Innsbruck (both Innsbruck permafrost research groups: J. Stötter, M. Monreal, M. Maukisch, F. Petrini-Monteferrri and K. Krainer),

the University of Graz (A. Kellerer-Pirklbauer, G.K. Lieb) and the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management, Forest Department (H. Siegel). A first PermaNET-Austria meeting was held in August 2008 in Salzburg. For more details on this new project read the respective paragraph at the national report of Italy or visit www.permanet-alpinespace.eu.

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BELGIUM

Activities related to cold environment in Belgium can be divided in three parts:

- The building of a Polar Research station on Antarctica "The Princess Elisabeth Antarctica"
- The research of paleoenvironmental remnants of ice wedge casts and sand wedge casts
- The continuation of the archaeological research of the frozen Scythian tombs in the Altai Mountains (Siberia)

Belgium has a long history of scientific activity in Antarctica, dating back to the first over-wintering in 1897, from which the Belgian Antarctic Expedition returned with an important scientific harvest: bathymetrical and hydrological soundings, numerous botanical and zoological samples, a large amount of oceanographical, meteorological, geomagnetic, glaciological and geological observation data. Belgium next returned to the Antarctic sixty years later to build the Baudoin Station which operated until 1967. This was part of Belgium's celebrating the 1957-58 International Geophysical Year (IGY). In 2004, the Belgian government commissioned the International Polar Foundation (IPF) to design and construct a new research station in Antarctica. The result was a research station called "The Princess Elisabeth Antarctica", which exact coordinates are 71°57' S - 23°20' E. The base will be maintained and operated by the Belgian Federal Science Policy Office (BELSPO). The IPF will be involved as a privileged partner taking the lead on related public outreach and educational activities.

In 2008 Gunther Ghysels obtained his PhD (supervisor I. Heyse) with a detailed study of relict wedge phenomena in northern Belgium. Air photos revealed ephemeral network systems comparable with ice wedge casts and sand wedge casts in the present-day periglacial regions. Detailed field work and numerous excavations in combination with OSL dating proved the existence of two periglacial complex network systems that were active during the Last Glacial Maximum at about 20.000 BP and later at about 15.000 BP.

Gent University and in particular the Department of Archaeology (J. Bourgeois, W. Gheyle), the Department of Geography (R. Goossens, A. De Wulf) in collaboration with S. Marchenko (University of Alaska Fairbanks) continued to work on the frozen Scythian tombs in the Altai Mountains. A field campaign was organised in the summer of 2008. More information on this project is available in the Belgium report in *Frozen Ground* #30.

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CANADA

This Canadian year's report focuses on IPY permafrost projects. It also includes reports from select other research activities at the Geological Survey of Canada, University of Ottawa, and McGill University. Finally a special item is provided on Don Hayley, in recognition of his 40 years of service to the Canadian and broader permafrost community

Canadian IPY Activities

Thermal State of Permafrost (TSP-Canada) - A Canadian Contribution to the International Polar Year - S. Smith, A. Lewkowicz and C. Burn

A collaborative project led by S. Smith (Geological Survey of Canada -GSC), A. Lewkowicz (University of Ottawa) and C. Burn (Carleton University) was one of 44 science and research projects that were selected for funding under the Canadian Government's IPY program in March 2007. This project represents the main Canadian contribution to the International IPY project led by the IPA, Thermal State of Permafrost (TSP). A primary objective was to develop new sites to address gaps in the existing long-term permafrost monitoring network. Over 80 new boreholes were established bringing the total number to 159. Funding acquired by Canadian government departments under the Northern Energy Development Memorandum to Cabinet (between 2005 and 2007) supported the drilling and instrumentation of about 70 boreholes in the Mackenzie Valley. The IPY program, other funding sources and a number of partnerships facilitated the establishment of new monitoring sites in other regions including the Yukon Territory, northern Manitoba and communities in the Baffin region of Nunavut. Collaboration with communities, mineral exploration companies and the Yukon Geological Survey resulted in the installation of temperature cables to depths of up to 40 m in an altitudinal transect of boreholes to better understand spatial variation in mountain permafrost in the Yukon. Collaboration with the Nunavut government and communities has resulted in an enhanced monitoring network in the Baffin region. There are also plans to establish 4 to 8 sites over the next 1 to 2 years in additional Nunavut communities. Collaboration with Parks Canada resulted in establishment of monitoring sites in northern Manitoba including seven boreholes at the York Factory Heritage site.

Progress was also made on another primary objective to measure permafrost temperatures in new and existing boreholes in Canada during the IPY to provide a 'snapshot' of ground thermal conditions, and provide an improved baseline against which to measure change. Data were collected from most of the existing and many new monitoring sites during the first portion of the Polar Year. Baseline information was collected in regions for which little recent information was available, and existing time series were extended, enabling quantification of recent changes in permafrost conditions across the Canadian north. Analyses are underway and are expected to lead to a better understanding of permafrost-climate linkages and to explain variability and change in permafrost conditions. Preliminary project results were presented through posters at NICOP, including some by graduate students involved in the project.

Data collection for the entire IPY period was completed in Fall 2008 and snapshot data will be disseminated in Canadian and IPA data products at the IPY early science conference in June 2010 and through a special IPY issue of *Permafrost and Periglacial Processes*.

Tundra Ecosystems and Perennially Frozen Peatlands - C. Tarnocai

Two major collaborative IPY projects were initiated to study the impact of climate change on terrestrial ecosystems in the permafrost region of Canada. The first study, led by G. Henry (UBC), deals with Arctic tundra ecosystems and the second, led by J. Bhatti (Northern Forest Research Centre, NRCAN), deals with forest and peatland ecosystems in the Mackenzie Valley. The information obtained during the course of these projects will be published in posters and scientific journals.

The first study, entitled "Climate Impacts on Canadian Arctic Tundra Ecosystems" (CiCAT), includes a number of subprojects (approximately 32). The subproject led by C. Tarnocai (Agriculture and Agri-Food Canada) in cooperation with P. Achuff (Parks Canada), G. Broll (University of Vechta, Germany) and J. Gould (Government of Alberta) involves a long-term study of changes in the soils, permafrost, vegetation and thermal regime of High Arctic ecosystems and the effect of climate change on the carbon stored in the soils. Data collected during the July 2008 field work in the Lake Hazen and Tanquary Fiord areas of Ellesmere Island revealed the development of an unexpectedly deep thaw never before observed during the past 18 years of this study. This rapid increase in thaw depth is supported by the soil temperature data collected at the Lake Hazen soil climate site. This unprecedented deep thaw triggered retrogressive flow slides, detachment slides, and severe landscape changes resulting from the thawing of ice wedges.

The second study, entitled "Carbon source-sink and greenhouse gas emissions in forest and peatland ecosystems along the Mackenzie Valley," includes approximately five subprojects. The subproject led by C. Tarnocai (Agriculture and Agri-Food Canada) involves carbon dynamics and carbon cycles of perennially frozen peatlands. Coring of these peat deposits was carried out during the 2007 and 2008 field work at the Inuvik, Norman Wells and Fort Simpson research sites. The samples collected at these sites are being radiocarbon dated, analysed and evaluated.

Permafrost Studies on Herschel Island Linked to IPY Project 90 - W. Pollard

Activities undertaken by McGill University's project "An integrated study of permafrost conditions on Herschel Island, Yukon" are linked to the IPY Project 90: *Arctic Circumpolar Coastal Observatory Network* (ACCO-Net) and stem from the regional component of a larger endeavour originally planned as an IPY activity (Vulnerability of Ice-Cored Environments (VICE) - #376).

W. Pollard and Ph.D. candidate N. Couture brought a group of four undergraduate students to the Yukon coast to undertake fieldwork that related to establishing the extent of ground ice on Herschel Island and the impact of its thaw. Each student specialized in one topic. The first is characterizing the permafrost stratigraphy of the Pauline Cove area of Herschel

Island to help determine the thaw susceptibility of this area and gain insight into paleoenvironmental conditions. The second project uses ground penetrating radar (GPR) to assess the extent of massive ground ice deposits on Herschel Island and generate a first approximation of ice volume to provide the basis for a prediction of thermokarst. The third examines the re-vegetation and succession patterns of retrogressive thaw slumps, and the final component of the 2008 research is the development of a geographical information system (GIS) that will provide the basis for monitoring the extent and progressive changes in thermokarst and the impact of those changes. All projects make use of baseline data collected from earlier studies on the island.

The research team also included Dr. H. Lantuit and Ph.D. student M. Fritz from the Alfred Wegener Institute for Polar and Marine Research in Potsdam, Germany. The undergraduate projects complement M. Fritz's doctoral work which uses a joint approach based on sedimentary, palynological, and stable isotope records to gain insight into the island's postglacial permafrost history.

Other Activities

GSC –Atlantic and its Collaborative Nearshore Projects in the Mackenzie Delta - S. Solomon

Work on nearshore permafrost within the bottom fast ice (BFI) zone of the Mackenzie Delta continued with the successful recovery of temperature loggers from beneath the BFI for the third year. This provides an unprecedented time series illustrating extreme interannual variability due to small variations in ice thickness and the rate of ice growth. Funding for these activities is provided by the Natural Resources Canada Program for Energy Development (PERD) and by the Northern Energy Development Program. BFI development through the 2007-08 freeze-up season was monitored using synthetic aperture radar (SAR) data from a variety of sensors. The availability of fully polarized SAR data in several difference frequency bands (C, L, and X-band) is enabling new methods for BFI mapping. This work is being undertaken in collaboration with the Centre for Cold Oceans Resource Engineering. We are also investigating applications of interferometric SAR for mapping BFI and for monitoring subsidence in the Mackenzie Delta. This work is funded by the Canadian Space Agency.

Although not directly permafrost-related, new PERD-funded projects have been initiated to improve our understanding of sediment transport in the coastal regions of the southern Beaufort Sea region and the role that sea-ice may play. Observations during spring break-up indicate that BFI plays a significant role in controlling overflow over the sea ice surface during initial stages of the spring freshet. Vigorous upwelling at the edges of BFI mark the locations of overflow and small whirlpools ("strudel drains") concentrated at the seaward edges of BFI and indicate locations of drainage. Strudel scours more than 1 m deep occur in the seabed. The strudel drainage process is being modeled by an M.Eng student at the University of Alberta (M. Belanger, under the supervision of F. Hicks and M. Loewen). Dr. M. A. Hoque has joined the GSCA Arctic coastal group as a visiting post-doctoral fellow to help develop models of waves, sediment transport and coastal erosion.

D. Forbes with colleagues from the Geodetic Survey of Canada (J.C. Lavergne and M. Craymer) continued their investigation of vertical ground motion in the Mackenzie Delta region using GPS measurements. Working with B. Moorman and his students, they further examined the applications of ground penetrating radar (GPR) for examining coastal permafrost. C. Stevens (Ph.D. candidate) extended his work on the identification of thermal interfaces in the shallow nearshore region where the ground temperature data was collected. J. Bode (M.Sc. candidate) worked with D. Forbes to examine the role that ground ice may play controlling ground elevation and flooding extent. Nearshore ground temperatures and GPR results were presented at the NICOP in Fairbanks.

University of Ottawa - A. Lewkowicz

A. Lewkowicz and several graduate students undertook additional investigations of the spatial distribution and characteristics of permafrost in the Yukon. In collaboration with B. Etzelmüller (University of Oslo) and as a contribution to the IPY, DC resistivity profiling was carried out at several thin permafrost sites along the Alaska Highway where permafrost has persisted over the past 44 years. Mt McIntyre, a possible borehole site close to Whitehorse, was also surveyed using this method. To enable predictive spatial modelling, the team completed two years of BTS measurements and late-summer observations of permafrost presence in five study areas across the southern half of the Yukon. These data are currently being analysed and ways to incorporate vegetation and air temperature inversions into the models are being explored. In order to assess the impact of the inversions, air and ground surface temperatures, temperatures near the top of permafrost and snow depths are being recorded at almost 100 sites through the Territory. The potential influence is suggested by ground temperatures measured at three new IPY sites that are about 4°C warmer than would be predicted by adjusting nearby weather station data for the elevational difference. This is probably because they are unaffected by the air temperature inversions that impact the weather stations, all of which are located in valley bottoms. A database of almost 1500 rock glaciers is also under construction and will be used to calibrate the spatial model between the study areas. The project, to produce detailed predictions of permafrost probability throughout the discontinuous permafrost areas of the Yukon, is planned for completion by the end of 2009.

McGill University - W. Pollard

There were four different but complementary themes to the permafrost research activities at McGill University led by W. Pollard.

(1) An integrated study of permafrost conditions on Herschel Island, Yukon, is reported above under the Canadian IPY activities.

(2) PERD Project NP 1.2.2: Massive ground ice nature and distribution. In collaboration with R. Gowan (Federal Department of Indian and Northern Affairs) and funded by the Federal Panel on Energy Research and Development (PERD), the McGill team is also engaged in a project involving the detection and assessment of massive ground ice conditions for a range of environmentally sensitive sites related to hydrocarbon

development activities in the Mackenzie Delta region. This project builds on previous PERD funded research on massive ground ice in granular deposits. As in previous PERD work, the team is conducting geophysical surveys using ground penetrating radar (GPR) and capacitive coupled resistivity (CCR). However, this project expands the scope of the earlier work by combining these techniques with frequency domain electromagnetic sounding (FEM), by using different frequency GPR antennae to provide a more detailed view of near-surface ground ice stratigraphy, and by increasing the density of the surveys. In subsequent years, this data will be then be used to model terrain response for hydrocarbon production activities and potential long-term problems related to climate change.

(3) Nature and significance of perennial springs in cold permafrost. In 2008 fieldwork was undertaken at several groups of saline springs on Axel Heiberg Island, three periods of fieldwork (March, July and September) were undertaken to characterize the response of spring discharge phenomena to seasonal changes. This is an ongoing NSERC funded project focusing on the permafrost hydrology, surface geomorphology and geochemistry of these unique spring systems. This year a series of geophysical surveys were conducted to define the subsurface extent of flow systems. Geochemical research focused on eutectic freezing processes and the formation of hydrated minerals. This research is related to the creation of a Mars analogue site funded by the Canadian Space Agency Canadian Analogue Research Network (CARN) Program.

(4) The response of ice-rich permafrost to climate change in the high Arctic. The main focus of this research is the assessment of ground ice distribution and thaw sensitivity of massive ground ice and ice wedge systems. In July 2008 fieldwork was conducted on Axel Heiberg, Ellesmere and Devon Islands. Included were (a) Ph.D. research by T. Haltigin on ice-wedge polygon geometry and detection and (b) M.Sc. research by J. Grom on the microclimate of a retrogressive thaw slump. Haltigin's research has shown a strong predictive relationship between polygon geometry and the age, geology and ice content. Grom's research has shown that there is a positive feedback between slump shape and rate of headwall retreat. W. Pollard continued the collection of microclimate data for several sites on Axel Heiberg and Ellesmere Island as well as the annual survey of retrogressive thaw slumps in the Eureka sound Lowlands. This is an ongoing project funded by NSERC and ArcticNet

GSC-Northern Landslide Hazard Activities in the Mackenzie Valley - R. Couture

In the last three years, the Geological Survey of Canada, through the Natural Resources Canada's Earth Science Sector Secure Canadian Energy Supply Program, has been providing new geoscience information on regional landslide hazards along a new proposed pipeline corridor in the Mackenzie Valley. A series of publications has been prepared and published in 2008 through traditional Geological Survey of Canada's publications and scientific journal papers and international conferences. A GSC Open File (#5740) contains over 1800 landslides and other natural terrain hazard features (e.g. karstic sink holes, rock glacier) mapped along a proposed gas pipeline route, between Norman Wells and Inuvik, and integrated into a GIS

spatial database. A second GSC Open File (#5738) includes high-resolution orthophotos and digital elevation models for three landslide-prone areas along this corridor. These Open Files are available through the following hyperlink http://gsc.nrcan.gc.ca/bookstore/index_e.php.

Since 2006, InSAR (Interferometric Synthetic Aperture Radar) techniques have been used to monitor and better understand landslides and slope behaviour in permafrost that are otherwise difficult to analyse with usual geotechnical tools. D-InSAR (Differential Interferometry) analysis has led to preparation of guidelines for processing InSAR in permafrost environment. Two publications are in preparation for publication in early 2009. Also in 2006, the first ever a set of corner reflectors (artificial permanent scatters) was installed in Canada at various landslide sites in a permafrost environment with the objectives of monitoring active landslides and slopes using a Point Target InSAR technique, (PT-InSAR). Preparation of guidelines for PT-InSAR in permafrost environment is underway with anticipated publication in 2009.

Recognizing Don Hayley's 40 years of arctic engineering - EBA Engineering Consultants Ltd.

The staff and Board of Directors of EBA Engineering Consultants Ltd. are pleased to congratulate Mr. Don Hayley P.Eng., Director of Arctic Resource Projects for EBA's Arctic Practice, for 40 years of consulting focused on arctic engineering, primarily related to northern resource development. During this time Don has led numerous feasibility and design studies for projects such as transportation facilities over permafrost terrain, arctic pipelines, northern mining developments, and exploratory oil and gas drilling and production structures.



Don Hayley

Don is one of Canada's premiere proponents for responsible northern development. Don founded the Cold Regions Division of the Canadian Geotechnical Society and was its first Director. He is a past Chairman of the Canadian National Committee for the International Permafrost Association, and served on the CNC-IPA from 1988 to 2008. Don was a member of IPA

Executive Committee from 2003 to 2008. He was named a Fellow of the Engineering Institute of Canada (EIC) in 2002 and more recently received the prestigious Julian B. Smith Medal from EIC for "Achievement in the Development of Canada". Don graduated with a Bachelor's degree from Carleton University and an M.Sc. from the University of Alberta. He has worked with EBA, a consulting engineering and sciences company practicing in western and northern Canada since 1966, in Edmonton and Peachland throughout his 40 year career.

EBA, and indeed members of the Canadian permafrost community, are proud to have Don as a colleague and mentor.

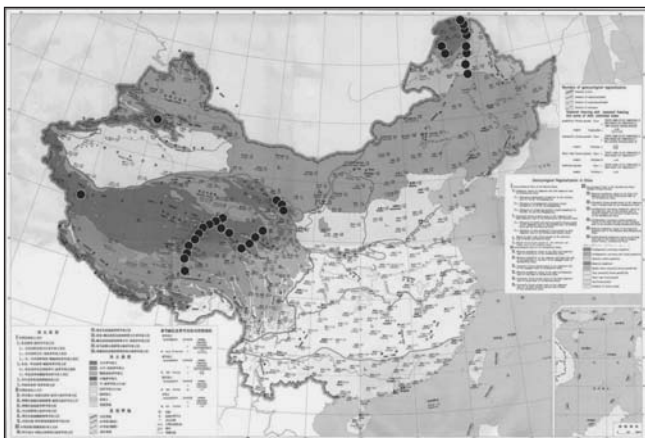
Margo Burgess (mburgess@nrca.gc.ca)

CHINA

The majority of the 2008 permafrost and cold regions engineering studies in China were associated with the construction and maintenance of high-elevation highways and railways in Southwestern China (Qinghai-Tibet Plateau) and the construction of a 1,030-km, 813mm-diameter, ambient-temperature crude oil pipeline in Northeastern China. Additional research in permafrost science was focused on augmenting and developing basic long-term data collection at established stations in both areas.

Qinghai-Tibet Plateau

Qinghai-Tibet Highway (QTH): The QTH was upgraded during 2003-2007 for hauling the large tonnages of fill and construction materials for building the Qinghai-Tibet Railway (QTR). Although the trafficability has been greatly improved, however, the thaw subsidence resulting from asphaltic pavement continues, the thaw depths have reached more than 10 m beneath the road in some segments. Permafrost temperatures were monitored at more than 100 cross-sections along the QTH.



Map of frozen ground types and the monitoring networks in China. The black dots indicate locations of major permafrost monitoring sites and stations.

Proposed Qinghai-Tibet Express Highway (QTEH): An express highway (QTEH) has been proposed paralleling the QTH and

utilizing the relatively lower relief, but high elevation, naturally occurring engineering corridor from Golmud to Lhasa. A thawed belt has been proposed, however, some designers also are considering alternative routes to avoid congestion and extensive and asymmetrical (old and new lanes) thawing of the permafrost in this relatively narrow engineering corridor.

Qinghai-Kang (Western Sichuan) Highway (QKH): The QKH on the eastern Qinghai-Tibet Plateau has required major maintenance each year because the permafrost subgrade has been thawing. Several stations, with boreholes and automatic data recording, along the route, were established at Huashixia, Zuimatan and Qingshuihe (Figure 1).

Xinjiang-Tibet Highway (XTH): The Tianshuihai Permafrost Station established in 2007, functioned well during the 2008. More than one-year of data on ground temperatures and weather conditions were obtained and some initial analysis has been done by German and Chinese scientists both in Lanzhou, China, and Heidelberg, Germany.

Qingshuihe-Budongquan Highway (QBH): The QBH is a connecting road between the QTH and the QKH. It traverses a significant amount of permafrost. The Sino-German Research Team from Heidelberg and Lanzhou worked together on surveys and investigations using geophysical methods. Two more permafrost stations were established at Quma'he and Chumar'he. Field data have been collected for two years. These data generally include ground temperatures and weather data from automatic stations.

Qinghai-Tibet Railway (QTR): The research continued on the verifications of permafrost railbed cooling configurations both along the railway and at the experimental stations. To date, the foundation soils have been performing as designed. At some segments, the cooling effects have been better than expected, and the permafrost table beneath the railbed has risen into the base of the fill.

Muli Coal Mine Railway: During 2007, large-scale development of the Muli Coal Mine in Qinghai was approved, necessitating the building of an 140-km-long coal-transport railway from Reshui to Muli. About 60% of the route is underlain by *Drilling*



for the installation of monitoring boreholes along the railway route from Muli to Reshui in the Qilian Mountains.

permafrost. The permafrost sections are largely located in wetlands on gentle slopes, with high-ice content and warm temperatures of about -1.5 to -0.5 °C. Some mitigative measures

such as block-embankments, sometimes strengthened with thermosyphons, and revegetated side protection slopes were adopted for protecting permafrost and ensuring the stability of the railway foundations. The thermal stability of permafrost foundations was monitored, studied and evaluated at six cross-sections along the railway. The railway is to be in operation in 2009.

The Qilian Mountains are located on the northeastern edge of the Qinghai-Tibet Plateau. The area is rich in mineral resources, and water resources vital for the downstream economy and social development. The evaluation and exploitation for these resources have advanced the research on permafrost in the mountains. During the 1960s, some major surveys were conducted for the development of the Muli coal mine, with some permafrost data. Surveys on permafrost along the highways during the 2004-2005 period and local railway construction during 2007 also accumulated valuable data on permafrost distribution.

Since 2007, the permafrost studies on the southern slopes in the Qilian Mountains has been revived. The presence of permafrost here is closely related to wetlands, and permafrost is ice-rich. Permafrost conditions along the upper tributaries of the Shu'le River on the northern slopes at the western section of the Qilian Mountains were investigated in 2008. The climate is dry, the surface vegetation is sparse and unlike on the southern slopes, the permafrost is generally ice-poor. Permafrost is warmer compared to that at similar elevations on the southern slopes. Three monitoring sites for ground temperatures and two automatic weather stations were installed to study the permafrost.

Northeastern China

Chinese-Russian Unheated Crude Oil Pipeline (CRUCOP): The construction of the 1030-km, 813mm-diameter, unheated (ambient-temperature) crude oil pipeline (CRUCOP) is scheduled to begin in March 2009, and to require about 18 months for completion. The section in China, 953 km, is from Mo'he to Daqing and traverses about 441 km of warm (>-1°C) permafrost. The assessment of the engineering geological conditions, and predictions of frozen foundation soils around the pipeline have been completed. The design of the pipeline construction mode, basically all conventional burial, is closely elaborated with the research results at all phases of survey and design. Environmental concerns and mitigation measures for frost hazards during the construction and operation periods were carefully identified and studied to minimize unnecessary costs to the environments and for construction, maintenance and operational safety. Some results of these studies will be published in a special issue "Pipelines in Permafrost Regions" of the journal *Cold Regions Science and Technology*.

Mo'he Airport: The other studies include a permafrost survey related to the construction of Mo'he Airport and monitoring of permafrost foundations beneath the runway. This is the first airport in the permafrost regions of China. Although the mean annual air temperature was about -5°C during the past 50 years, the permafrost is warm (>-1°C) and ice-rich. Some excavations for ice-rich permafrost and refilling with coarse blocks were used to ensure the stability of the runway foundation. Several

cross-sectional measurements of ground temperatures and deformations of foundation soils were installed in 2007. Some good data have been collected.

Gen'he-Yituli'he Permafrost Station: Eight boreholes were drilled in the Gen'he-Yituli'he area in the middle section of the Da Xing'anling (Hinggan) Mountains in June to July 2008 for measurements on the ground temperatures of various surface coverage conditions in the subarctic taiga forests and wetlands. Two automatic weather stations and soil moisture measurement fields were also established for the forested wetlands and shrub-covered wetlands in the Gen'he area. These establishments include the present permafrost station at Gen'he-Yituli'he.

The single borehole about 8 m in depth drilled in the Yituli'he town is only a few meters distance from a former borehole of about 14 m in depth. This damaged and abandoned borehole had a data series from 1981 to 2005. Inactive ice wedges groups were first identified in 1987 and they were re-excavated in 2007 for detailed analysis.

Five boreholes in the Gen'he area are located inside the China Forest Ecological Research Network Station in the Da Xing'anling Mountains, 16 km north of the Gen'he city with a pollution of about 180,000. One borehole was established inside the to-be-abandoned meteorological station in the center of the city. The meteorological station had to be abandoned because of increasing urbanization and its impacts on the representativeness of the collected data. Another borehole was established about 3 km north of the meteorological station, which is in the outskirts of the city. The eight boreholes in the Gen'he areas, two automatic weather stations, and many other setups for forestry studies are aimed at the understanding of the interactions among the boreal ecosystem, permafrost, snow cover, and human activities. In particular, the rapid urbanization has been greatly impacting the permafrost and vegetation in this area.

Other Permafrost Projects

Large-scale synchronous of satellite- and airborne and ground measurements of permafrost, vegetation and snow cover were also planned and conducted along the upper and middle tributaries of the Hei'he Watershed in the middle section of the Qilian Mountains. A transect study profile from the mountain top at elevations of 4,400 m a.s.l. to the control hydrological section at 3,200 m a.s.l. was established for the long-term study at Binggou Creek. The results will be published in a special issue "WATER" on the *Hydrological Processes*.

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FINLAND

There are about ten IPY coordinated projects in Finland. The leading projects are *Interhemispheric Conjugacy in Geospace Phenomena and their Heliospheric Drivers (ICESTAR/IHY)* and *Change and variability of Arctic Systems Nordaustlandet, Svalbard ("Kinnvika")*. The key participants in Finnish IPY research are the Arctic Centre, Finnish Meteorological Institute, University of Oulu, University of Lapland and Radiation and Nuclear Safety Authority (STUK). There are also about 20 institutions

acting as partners in international IPY projects/consortiums, e.g. University of Helsinki, Finnish Environmental Institute, Finnish Institute of Marine Research and Geological Survey of Finland. In general, Finnish researchers are engaged with about 100 international IPY projects. More information about the projects, development of research station network and education can be found from the Finnish IPY website (www.ipy-finland.fi). Related to the IPY topics, an international congress was held at the Geological Survey of Finland in Espoo, November 12-13, 2008.

In addition to the above IPY activities, several research projects and groups are working in Finland. Some of these projects started before 2008 but they have not been reported in *Frozen Ground* previously. The project *Spatial modelling of periglacial processes under environmental change* (2008–2010) (J. Hjort from the University of Helsinki, Department of Geography, and M. Luoto and M. Marmion both from the University of Oulu, Department of Geography) aims to develop and test novel approaches to model the occurrences and distributional alterations of periglacial processes in response to climate change. The ultimate goal is to make a significant step forward in combining empirical, geographic information (GI) and remote sensing (RS) data to predict and analyze complex geomorphological processes at various spatial scales. The Nordic *Permafrost Young Researchers Network's contribution to the Thermal State of Permafrost project in the Nordic countries* (PYRN – TSP, 2008–) (J. Hjort) project addresses the burning issue of impacts of increasing global temperatures on terrestrial permafrost. The project will provide young Nordic researchers with the means to conduct simple yet powerful measurements of permafrost conditions either in areas where records of prior observation exist (to establish recent trends) or in new undisturbed areas.

The project *Global change impacts on sub-arctic palsa mires and greenhouse gas feedbacks to the climate system* (PALSALARM, 2007–2008) (T.R. Carter and S. Fronzek from the Finnish Environment Institute; co-ordinating institute, and M. Luoto and M. Parviainen from the University of Oulu, Thule Institute/ Department of Geography) continued. PALSALARM brings together research groups from four institutions in the Nordic region who have hitherto worked largely independently on different aspects of palsa mires. The central aim of the study is to estimate future changes in the distribution of palsa mires in Fennoscandia, and the implications of these changes for greenhouse gas budgets and nature conservation.

Biogeochemistry research group (P. Martikainen, C. Biasi and M. Repo) of the University of Kuopio continued the greenhouse gas flux measurements initiated in 2007 in discontinuous permafrost zone in Northeast European Russia. Fluxes of CO₂, CH₄ and N₂O at the microsite level were measured from a peat plateau complex and adjacent shrub tundra areas. The studied ecosystem types include thermokarst lakes and soils affected by cryoturbation. The aim of the study is to improve our understanding of the flux dynamics and processes behind them in heterogenous Arctic landscape, characterized by the presence of permafrost and freezing and thawing processes. The flux campaigns were part of the EU-funded CARBO-North project, which aims at quantifying the carbon budget in northern Russia in past, present and future

conditions (see <http://www.carbonorth.net>).

At the Geological Survey of Finland, the projects *Development of applied geophysical techniques for mapping and monitoring permafrost* (H. Vanhala, P. Lintinen, A.E.K. Ojala, H. Hirvas and I. Suppala) and *Mapping and monitoring permafrost with geophysical techniques in the Komi Republic, Russia* (H. Vanhala, P. Lintinen and I. Suppala) continued. These projects aim to apply and develop geophysical techniques for mapping discontinuous and sporadic permafrost in Northern Finland



Electrical resistivity soundings (ERT) at the Ridnitsohkka fell, Northern Finland. (Photograph provided by Antti Ojala)

and Vorkuta, Northwest Russia. An additional objective is the longer-term monitoring of the state of permafrost in the study regions. The first project started in 2004 with a series of electrical resistivity tomography (ERT) measurements at the Ridnitsohkka fell in Northern Finland. ERT measurements have repeated 2005 and 2008. In addition to ERT, OhmMapper, GPR and gravity measurements have been used. The second project started in 2007 with a series geophysical measurements (electrical resistivity tomography, ERT and multi-frequency MaxMin Slingram).

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FRANCE

Started in 2006, the objective of the Hydro-sensor-FLOWS project (2006-2010, IPY#16) is to investigate the hydrology of the Loven-East Glacier basin (10 km², Brøgger peninsula, Svalbard) by continuous monitoring of the dynamics of the runoff, the snow cover, the ablation/accumulation limit of the glacier and the glacier itself. The project is coordinated by M. Griselin (UMR Thema, Besançon) and C. Marlin (UMR IDES, Orsay) in association with SET (Pau), FEMTO (Besançon) and AWI (Potsdam). During the 2008 field work, we gathered hydro-glacio-climatological data for a second complete hydrological year, that allows a comparison with the past year (2006-2007). The hydrological year 2007-2008 is different than last year: the winter 2007-2008 was much more snowy and the summer was colder, with less direct radiation. This provides a glaciological balance more favourable for the glacier than in 2006-2007. The volume variation of snow and ice of the glacier is known by the set-up of 30 ice stakes and the 30 snow drill holes. The

data obtained by the recorders (multi-parameters probes) set up on the catchment (outlet and two tributaries), as well as those obtained by chemical and isotopic analysis on water samples, allowed us to address the cause-effect relationships between the various parameters involved (climate, geological, hydrological) on the runoff at a daily and hourly time-scale. The data show that the runoff is more dependent on thermal conditions on the glacier than on the amount of precipitation. The flood peaks are controlled both by the amount of heat accumulated on the glaciers of the period 24 hours or 48 hours before the flood and the amount of precipitation if any. The isotopic measurements (O-18 and H-2) have been used to study the origin of water at the outlet: the separation of flows between supra-glacial meltwater at various altitudes and subglacial water is possible.

Since 2007, the CLIMAFLU ANR project is dedicated to the study of the impact of the recent global warming on the erosional process of the largest arctic fluvial system, the Lena River in Yakutia, by means of hydro-climatic data and spatial analysis of fluvial forms mobility. This project is coordinated by F. Costard (IDES laboratory, Orsay) and E. Gautier and D. Brunstein (Laboratoire de Géographie Physique, Meudon) in cooperation with Prof. F. Fedorov and P. Konstantinov from the Permafrost Institute in Yakutsk, Russia. The flood plain at the latitude of Yakutsk is dominated by outburst floods within a continuous and deep permafrost zone. On the basis of the satellite image analysis, different sites have been selected, where precise topographic and bathymetric surveys have been conducted in May and August 2008. The use of a laser theodolite on dewatered areas, will allow the elaboration of annual Digital Elevation Models. The comparison of these DEM before and after the annual flood will give precise information about the efficiency of the discharge on the spatial distribution of erosion and sedimentation. The precise topographic and bathymetric surveys are completed by sediment trapping systems. By this way, we will evaluate the annual bank retreat of channels and islands and to quantify the annual deposition. Different data loggers have been used to evaluate the evolution of the permafrost thermal regime with time for the next few years.

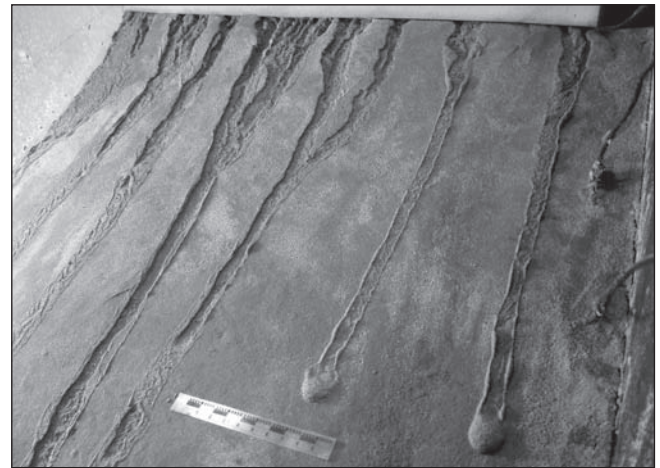


Fluvial thermal erosion of frozen river banks on the Lena River. (Photograph provided by François Costard)

Dr. . Decaulne (CNRS UMR 6042 Geolab and GDR 3062 Mutations Polaires) develops the Holocene slope activity research in subpolar areas from stratigraphical profiles analysis in Northern Iceland. Results show an increasing activity of mass movements during the last 1000 years, without pronounced

climatic signals, but with probable implication from human activity. Also, in a natural hazard and risk mitigation perspective, she pursues her work on geomorphic evidence of past- and present-day snow avalanches and debris flows, both in the direct surrounding of inhabited areas and in remote areas to recognise extreme events occurrence and magnitude. This research is carried out in partnership with Dr. Þ. Sæmundsson, director of the Natural Research Center of Northwestern Iceland, Sauðárkrúkur, Iceland. Collaboration with S. Conway, Open University, UK, took a step further with the second field season carried in Northwest Iceland on the comparison of terrestrial and Martian debris flows. Dr. Decaulne is also the Geosciences Coordinator within the group of Association of Polar Early Career Scientists.

The periglacial group of the University of Caen (UMR CNRS 6143) carried out laboratory experiments to address the genesis of Martian gullies observed on sand dunes (collaborator F. Costard, UMR CNRS 8148). Preliminary results suggest that the typical morphology of gullies observed on Mars can best be reproduced by the formation of linear debris flows related to the melting of a near-surface ground ice within silty materials. This physical modelling highlights the role of the periglacial conditions, especially the active-layer thickness during debris-flow formation.



Laboratory simulation of debris flows over frozen silty dunes within a cold chamber. (Photograph provided by Emeric Védie)

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GERMANY

The German National Science Foundation (DFG) has funded a coordinated group of projects with the title “Sensitivity of Mountain Permafrost to Climate Change – SPCC”, consisting of five collaborating individual projects. The aim is to bridge the gap between climate simulations and the analysis of surface and subsurface characteristics for an assessment of the sensitivity of mountain permafrost dynamics. The projects include: “Ground-atmosphere modelling: Strategies to combine RCM and subsurface simulations” (C. Hauck, G. Schädler, Ch. Kottmeier - University Karlsruhe); “Quantitative assessment of permafrost degradation using coupled geophysical and thermal monitoring systems” (R. Mäusbacher, C. Hilbich - University Jena); “Spatial assessment of permafrost characteristics and

IPA 2008 NICOP AND OUTREACH ACTIVITIES



NICOP opening ceremony. (Photograph provided by Doug Kane)



Seward Peninsula field trip group. (Photograph provided by Ming-ko Woo)



Dalton Highway field trip group. (Photograph provided by Edie Barbour)



Arctic Coastal Plain field trip group at Point Barrow. (Photograph provided by Leanne Lestak)



Denali Park field trip group. (Photograph provided by Phil Brease)



Pogo Mine field trip group. (Photograph provided by John Zarling)



Participants celebrating the B6 Field Trip to the Front Range and San Juan Mountains, Colorado. (Photograph provided by Go Iwahana)



Group photo of participants in Permafrost and Frozen Ground Engineering course. (Photograph provided by Yuri Shur)



CALM Workshop group. (Photograph provided by Galina Malkova)



K-12 course on Permafrost and Rapidly Warming Climate. (Photograph provided by Tohru Saito)



Participants in Cryosol Working Group meeting. (Photograph provided by Eva Maria Pfeiffer)



Participants in June 28, 2008, IPA Council meeting. (Photograph provided by Jerry Brown)



Participants of the PYRN Council Meeting. (Photograph provided by Hugues Lantuit)

dynamics in alpine periglacial environments” (C. Kneisel - University Würzburg); “Sensitivity of rock permafrost to regional climate change scenarios and implications for rock wall instability” (R. Dikau, M. Krautblatter - University, Bonn) and “Monitoring and process analysis of permafrost creep and failure in changing temperature regimes” (I. Roer - University Bonn). Main field sites include the Zugspitze (Bavarian Alps) and several stations within the PACE and PERMOS networks in Switzerland (e.g. Murtèl/Corvatsch).



Installation of an ERT-transect for permafrost monitoring in a creeping north-exposed rock wall at 3100 m a.s.l., Steintälli, Valley of Zermatt, Switzerland. (Photograph provided by Michael Krautblatter)

At the University of Bonn, the permafrost research group currently monitors three field sites in permafrost rock walls in Germany, Austria and Switzerland to detect permafrost fluctuations and resulting rock wall instabilities. Rock creep and rockfall are investigated with geodesy, extensometers, and laser scanning. Distribution and changes of rock permafrost are assessed at a stability-relevant scale with ERT (electrical resistivity tomography), P and S-wave refraction seismics and IP (induced polarization), and are referenced by temperature measurements (Krautblatter and Hauck 2007, JGR). At the Zugspitze, seasonal permafrost thaw in a steep north face was monitored monthly over the summer 2007 (M. Krautblatter and S. Verleysdonk). The subproject SORP (Sensitivity Of Rock Permafrost to regional climate change scenarios and implications for rock wall instability) based at the University of Bonn, will be supported by M. Moser and J. Rohn from the Engineering Geology Section at the University of Erlangen and by A. Kemna from the Applied Geophysics Section at the University of Bonn.

At the Department of Physical Geography, University of Würzburg, C. Kneisel is continuing surface temperature monitoring in northern Sweden along an altitudinal transect. In the Swiss Alps subsurface temperatures are monitored in the Bever Valley. Here, D. Schwindt has started his Ph.D. thesis on geophysical mapping of the extent of small permafrost lenses and evaluation of the interaction of temperature regime with surface and subsurface factors. Geoelectrical monitoring of permafrost characteristics and active layer thickness is continued in the Muragl glacier forefield.

At the University of Giessen, the permafrost research group (led by L. King) continued studies in the Matter

and Saas Valleys (Swiss Alps). O. Wild specialized on a new permafrost modelling approach, C. C. Maag studied the impact of global warming and building measurements on rock and ice temperatures at Kleinmatterhorn (3820 m a.s.l.), and L. Bödger-Mayrink focused on glacier hazards due to climate change. The Departments of Geography of Giessen and Zurich are continuing the monitoring and analysis of the PACE-data at the Stockhorn (3410 m a.s.l.).

A Chinese-German joint project investigating the Late-Quaternary landscape development on the northern Tibetan Plateau, China, is in progress at the University of Berlin (B. Wünnemann), the RWTH Aachen (F. Lehmkuhl, G. Stauch), and the AWI Potsdam (B. Diekmann), in cooperation with the University of Lanzhou, and the CAS in Lanzhou and Nanjing. Research topics comprise lake and permafrost dynamics, glacial and periglacial landforms and processes, and the reconstruction of regional climatic change, inferred from terrestrial and lacustrine sedimentary records. The studies are part of the DFG program “Tibetan Plateau: Formation, Climate, Ecosystems – TiP”.

Polar Activities

The 11th Russian-German Expedition to the research station Samoylov, Lena Delta, took place from July to October 2008. Long-term methane emission measurements of wet polygonal tundra were continued along with the study of the functional microbial ecology of methane-cycling microorganisms using stable-isotope techniques. The ongoing project is a collaboration between scientists from the Alfred Wegener Institute (AWI) (D. Wagner), the Sukachev’s Institute of Forest, Krasnoyarsk, the Permafrost Institute in Yakutsk, the ETH Zurich, and Hamburg University. The Hamburg University team also performed studies of the N-fluxes in permafrost soils and sediments (E. M. Pfeiffer). Field work on Kurungnakh Island, central Lena Delta, is aimed at understanding the interaction between ice-rich sediments (Yedomas) and morphometry and evolution of lake basins and the related landscape dynamics (A. Morgenstern, M. Ulrich).

An expedition to Seward Peninsula (“East Beringia 2008”) by scientists from the AWI Potsdam, the Senckenberg Research Institute, Weimar, and the University of Alaska Fairbanks (UAF) followed the NICOP in Fairbanks. Modern tundra vegetation, ostracod associations, sedimentary permafrost sequences including ground ice and electrical resistivity profiling were undertaken near the mouth of the Kitluk River. A second team from the AWI and the UAF (P. P. Overduin, S. Westermann, K. Yoshikawa) studied the near-shore submarine permafrost distribution in the Barrow region by means of Electrical Resistivity Tomography.

In the frame of INTAS-Project “Permafrost dating by cosmogenic ³⁶Cl and ¹⁰Be” and IPY Project “Past Permafrost”, the AWI Potsdam (S. Wetterich, L. Schirrmeister) joined the Russian expedition “Beringia” of the IPBPSS Pushchino to the Kolyma River in August 2008. The main aims were to study permafrost sequences along riverbanks and to extract palaeoenvironmental archives and modern ostracod associations and their physico-chemical living conditions. ICDP deep drillings into permafrost and lake sediments of Elgygytyn

Impact Crater, Chukotka, started in autumn 2008 (icdp-online.org). The AWI Potsdam group participated in this drilling project by studying the permafrost history reflected in frozen ground and lake sediments through a multi-proxy approach (sedimentology, mineralogy, ground ice chemical properties, bio-indicators, permafrost borehole geophysical data) (G. Schwamborn, L. Schirrmeister) and with the help of the stable oxygen isotope record from lacustrine diatoms (H. Meyer, B. Chaplignin). A new 141.5m deep borehole was drilled in the vicinity of the lake and instrumented with a permanent high temporal resolution temperature logger, which will contribute to the GTN-P network.



Instrumenting the permafrost borehole at Elgygytyn impact crater, Chukotka, northeast Russia. (Photograph provided by Georg Schwamborn)

AWI continued its collaboration with McGill University, Canada (W. Pollard, N. Couture) with the objective to better understand coastal erosion dynamics of the northern Yukon and associated geochemical fluxes. AWI also conducted an expedition in August 2008 (H. Lantuit, M. Fritz) to study the palaeoenvironmental history of the Yukon coast and to establish a time frame of the Wisconsin glaciation and ground ice history around Herschel Island.

Within the scope of the Helmholtz Research Alliance “Planetary Evolution and Life”, two new projects started in spring 2008: (1) Physics and Biology of Interfacial Water (D. Wagner), which estimates the role of under-cooled water for the offspring of life in Martian environments. Methanogenic archaea isolated from Siberian permafrost will be used as model organisms in laboratory-based studies. (2) Comparisons of Martian and terrestrial permafrost features (L. Schirrmeister) using morphometric analyses of periglacial structures in key regions on Mars and Earth. The outcome will be based on results from the field campaigns to the Lena Delta in 2008 and to Svalbard in 2009.

The AWI young investigator group SPARC (“Sensitivity of Permafrost in the ARCTic”, J. Boike) focused on field expeditions to maintain ongoing monitoring efforts. It included expeditions to sites in Siberia (Lena Delta) Spitsbergen (Ny-Ålesund), Alaska (Barrow) and Canada (Polar Bear Pass). Measurements comprise meteorological, soil and eddy covariance data, high-resolution air photography using balloons, IR thermography imagery, and ERT profiles. Next to these evaporation rates, snow properties and thickness distribution, stream flow, and

spatially distributed surface properties were assessed. DEMs and hydrological models of the investigated regions on Spitsbergen and in Siberia are in development.

A new study group on permafrost (Arbeitskreis Permafrost) has been formed within the Deutsche Gesellschaft für Polarforschung (German Society for Polar Research), aimed at scientists from German speaking countries (Germany, Switzerland, Austria). At its first annual meeting at AWI Potsdam in October 2008, a large number of ongoing studies relating to polar and mountain permafrost were presented. Follow-up meetings are planned on an annual basis.

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ITALY

In 2008, the IPA Italian community was focused on the participation in the NICOP where several Italians were present. The Italian representatives produced three papers as first author (Guglielmin et al., Cannone and Guglielmin, Pogliotti et al.) and another three papers as co-authors on topics ranging from alpine permafrost to Antarctic and Martian permafrost. In addition four extended abstracts were also presented as posters.

Antarctic research was severely hindered by national funding issues but the download of the data and the maintenance of the automatic permafrost monitoring stations at Boulder Clay and Oasi (M. Guglielmin) and of the ice-wedges monitoring thermal regime (R. Raffi) were assured. The results of previous Antarctic campaigns (in cooperation with Canadian, German and British colleagues) were nonetheless published in various international journals.

Another focal point for the Italian community has been the preparation of a new European project in the framework of the EU Alpine Space Programme 2007 - 2013: PermaNET (Permafrost Long-term Monitoring Network) that was approved and will be funded. The project aims at establishing a common strategy for dealing with permafrost analyses through the creation of an Alpine-wide monitoring network and of guidelines for the consideration of permafrost in risk and water resources management. The kick-off meeting of the project was held in Bolzano/Bozen on September 4-5. The Project includes five Italian partners: Bolzano Province, lead partner; Arpa Piemonte, Regione Valle d’Aosta (with Arpa VDA and FMS involved), Trento Province and Regione Veneto.

In the Western Alps a first project to map permafrost and correlated landforms was carried out in the framework of cooperation between Arpa Piemonte and Insubria University (M. Guglielmin). A new inventory of the rock glaciers and the protalus rampart of the whole Piemonte was finalized and a provisional permafrost map (obtained by empirical models) was obtained and used as first step to the research that Arpa Piemonte and Insubria University (as subcontractor) will continue in the framework of the PermaNET.

A. Ribolini, with his group of Pisa University, pursues the research focused on three different topics (permafrost and ground ice distribution, relationships between rock glaciers and glaciers, freeze-thaw cycles effects on alpine geomorphology) in

a marginal Mediterranean sector of the Alps as the Maritime Alps. In particular, the Vei del Bouc rock glacier in the Argentera Massif (Maritime Alps) was surveyed using a new highly transportable georadar device, equipped with a 25 MHz antenna and produced by the I.D.S. company (www.ids-spa.it). Preliminary results show a high signal penetration (about 25 m depth) and well visible reflections at various depths. Shallow ice presence seems to occur in the lodgement till above the apical part of the rock glacier.

In the Cothian Alps, Italy, the DC resistivity tomography surveys carried out on the Col de l'Agnel rock glacier represent the first step of a research program that the Universities of Pisa (A. Ribolini) and Insubria (M. Guglielmin) intend to develop in the Monviso area. Preliminary results report on a near-surface (0-10 m depth) concentration of sediments that are highly to extremely highly resistive ($> 2\text{-}6 \text{ M}\Omega\text{m}$), resting onto slightly frozen and unfrozen debris. An interaction with a glacier potentially present during the Little Ice Age is under examination. The temperature monitoring of Rocca dell'Abisso block field has continued hourly and at different depths, reaching the second year of measurements.

In June 2008 the European project 'PERMAdataROC' (INTERREG IIIA - ALCOTRA) was concluded. The Italian partners ARPA Valle d'Aosta (Arpa VDA), CNR-IRPI of Turin and Fondazione Montagna Sicura (FMS - project leader) have been involved. The project led to the development of an integrated strategy for the study and monitoring of rockwall instabilities in high-mountain areas (Mont Blanc Massif and Matterhorn) affected by permafrost degradation. The research directions were:

(1) CNR-IRPI, FMS - creation of a database of rockfalls occurred in the Mont Blanc Massif area (at elevation greater than 2000 m a.s.l.) from the past until now. The database will be updated on the basis of reports provided by Alpine Guides and huts owners specifically trained to fill a survey form describing future events.

(2) ARPA VdA - development and test of strategy for thermal monitoring of near vertical rockwalls in high-mountain environments. A total of seven sites with more than 30 temperature loggers installed have been equipped for the hourly record of: (i) rock temperature at depths of 3, 30 and 55 cm, (ii) air temperature and humidity, (iii) wind speed and direction, and (iv) incoming and outgoing shortwave and longwave radiation. Collected data series are actually used for the validation and calibrations of physical based models in collaboration with the Glaciology, Geomorphodynamics & Geocronology Group of the University of Zurich.

(3) CNRS-EDYTEM (France) FMS - development of a monitoring methodology for rockwalls morphological activities in high-mountain environments using frequently repeated LIDAR surveys and terrestrial photogrammetry (see France's report). All details about this project are available on the web. (<http://www.fondazionemontagnasicura.org/multimedia/permadataroc/>).

During the 2007 and 2008 in the Valle d'Aosta Region, Northwest Italy, a monitoring site (Cime Bianche, 3100 m a.s.l.), initiated in 2005 through collaboration between ARPA VdA and Insubria University, has been progressively implemented with new instrumentation. The set-up includes:

(i) one borehole of 41 m depth equipped with 25 temperature nodes, (ii) one borehole of 6 m depth equipped with 15 temperature nodes, (iii) one CALM grid of 40x10 meters area for soil temperature measurement at 2 and 30 cm depths, (iv) one automatic weather station (MAWS) for the measurements of standard meteorological parameters including snow depth, and (v) one system for the measurement at different depths of the temperature, heat flux and permittivity into the snow pack. Currently more than two years of continuous data series are available.

On the eastern side of Rosa Massif, Insubria University finalized a geophysical and geomorphological investigation in the area of Lago delle Locce to understand the evolution of permafrost and buried ice distribution in the last 30 years comparing the new results with what W. Haeberli and F. Epifani carried out in the 1970's.

In Upper Valtellina, Central Alps, N. Cannone continues the research on the relationship between vegetation and permafrost degradation in the Stelvio area. A new program for monitoring CO₂ emissions in permafrost and permafrost-free areas characterized by different vegetation types has been started. M. Guglielmin continues to maintain the monitoring of the Stelvio PACE borehole and two other shallower boreholes on Foscagno rock glacier where the program of monitoring relationships between snow, permafrost and vegetation is being pursued.

The monitoring activity of several rock glaciers located in the Adamello Presanella and Ortles Cevedale mountain groups (Central Italian Alps) continued also in 2008, led by R. Seppi (Pavia University) and A. Carton (University of Padova). In particular, the fourth consecutive year of data on the ground near-surface thermal regime were retrieved from ten sites located on rock glaciers. In addition, ten ground surface temperature monitoring sites were set up in the framework of a Ph.D. thesis (L. Carturan, University of Padova). The monitoring activity on the thermal characteristics of several springs discharging from rock glaciers also continued in the two mountain groups.

In collaboration with the local Geological Survey, Autonomous Province of Trento, topographic surveys on two rock glacier were repeated for the sixth year, continuing an activity started in 2001. The thermal and topographic data series were partially processed by M. Zumiani and included in his Master thesis at the University of Padova (tutors: M. Meneghel and R. Seppi).

A study on a rock glacier originating from a Little Ice Age moraine of the now vanished glacier of Cima dell'Uomo, Bocche Range, Dolomites, has just started. Monitoring of climate, ground surface temperature and geophysical investigation along with survey and mapping are planned (A. Carton, M. Meneghel and R. Seppi).

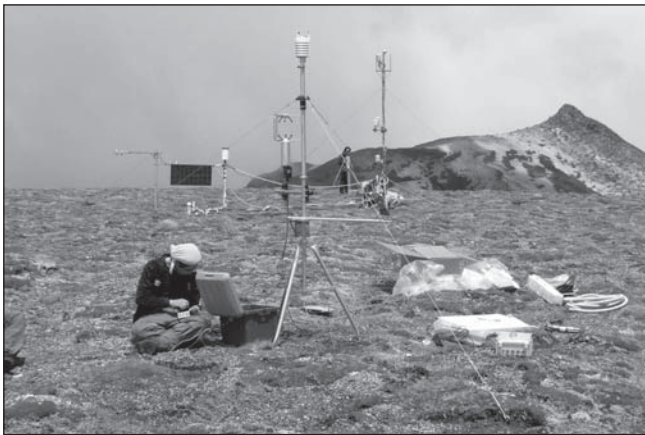
The research group led by R. Rigon of the Department of Civil and Environmental Engineering, University of Trento, started to deal with alpine cryosphere since 2004. Part of the research aims at analyzing the hydrological balance and the energy and mass exchange on glaciers (S. Endrizzi). The other branch of the research, mainly conducted through the Ph.D. of M. Dall'Amico in cooperation with S. Gruber, University of Zürich, is directed to alpine permafrost modelling and aims at simulating the thermal state of soil in high mountain

environments. This will be accomplished by the coupled thermal-hydrological model GEOTop customized for permafrost environments.

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JAPAN

In the Daisetsu Mountains, Hokkaido, northern Japan, surface energy balance observations have started during the summer 2008, aiming at physically-based understanding of mosaic-like distribution of permafrost (T. Maeda, G. Iwahana, M. Ishikawa, H. Arai and N. Matsuoka). The automatic weather systems provide concurrent data on radiation components, air temperature, rainfall, humidity and wind components (by sonic anemometer-thermometer) at permafrost and immediately adjacent to permafrost-free sites. Stable isotope analysis was also introduced to evaluate the origin of surface water on summit areas underlain by permafrost (H. Arai, M. Ishikawa, A. Sugimoto, G. Iwahana and T. Maeda). Water was sampled from seasonally and permanently frozen ground, rainfalls, snowmelts and small tributaries.



Two automatic weather systems installed on the Daisetsu Mountains. (Photograph provided by Norikazu Matsuoka)

In the northern Japanese Alps, rockfall activity and supranival debris sliding were investigated (Y. Kariya, Y. Matsunaga, Y. Miyazawa, J. Komori, M. Ishii, G. Sato, K. Tomita and S. Iwata). During the ablation period in 2007, the position, size and lithology of all fallen debris on perennial snow patches in the valley floor were measured every month, and these data were used to estimate the mode and rate of debris production. Supranival block sliding was monitored with an automatic camera. Snow ablation and bedrock thermal regimes were also monitored. In the alpine and subalpine zones of the northern Japanese Alps, geology and geomorphology of landslides were studied (Y. Kariya, G. Sato, J. Komori and K. Tomita). Sedimentological and Quaternary chronological information was newly obtained from the Mt. Shiroumadake and Mt. Chogatake areas. Collected data show that non-sorted chaotic sediments, which have previously been considered to be a glacial origin, are more likely to have originated from a large landslide and/or a debris avalanche.

Intensive field campaigns have been undertaken in the southern Japanese Alps from 2007 to 2008. One group,

composed of scientists from Meiji University and other institutions (T. Koyama, A. Amaizawa, N. Takahashi, S. Sawaguchi, M. Aoyama and Y. Sugawara), studied periglacial geomorphology of the Mt. Akaishi-dake area during the summers of 2007 and 2008. The topics include mapping of patterned ground, structural analysis and thermal monitoring of solifluction lobes, as well as thermal and chronological characteristics of rock glaciers. Another group (R. Nishii, N. Matsuoka and A. Ikeda, University of Tsukuba) continued monitoring of rock and soil slope dynamics in the Mt. Ainodake area. Newly introduced techniques are visual recording of stone movement with an automatic camera and differential GPS for monitoring annual movement of rock glaciers. Detailed monitoring of rock creep and sliding has also been undertaken on the top of a rockslide by both automatic and periodical manual observations. The data show seasonal variation in rock movement associated mainly with thawing of snow and seasonal frost, as well as with large rainfalls in summer.

A synthetic study on the permafrost of the Fuji volcano, the highest peak in Japan (3776 m asl), was started by postdocs (A. Ikeda, G. Iwahana, K. Fukui, T. Sueyoshi and Y. Sawada) with the help of senior researchers (T. Tamura, K. Harada and K. Saito), a visiting researcher (A. Kellerer-Pirklbauer) and graduate students (T. Watanabe and R. Nishii). In 2008, a 3-m deep borehole and a 2-m automatic weather station were constructed on the summit area. A monitoring network of shallow ground temperature was also set on the north- and south-facing slopes. In addition, hydrological conditions in the pyroclastic rock and lava were examined by applied geophysical methods to estimate permafrost distribution. The project is planned to be enlarged and continued for long-term monitoring of the environmental changes and studying interaction between permafrost and volcanic activity.

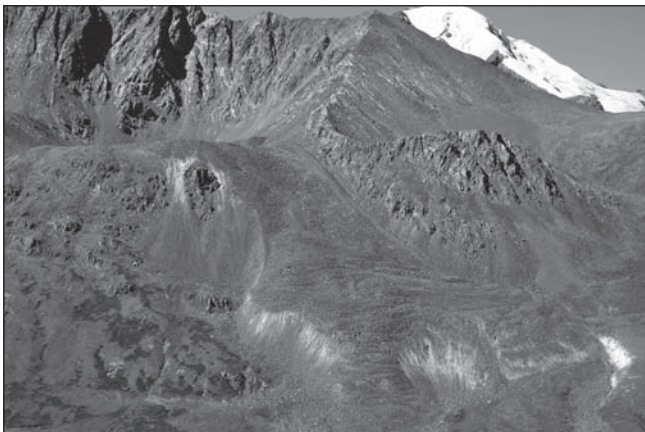
Several overseas projects are also on going. Model experimental sites established in Svalbard have provided data on thermal contraction cracking in ice- and soil-wedge polygons, rock weathering and movement of a polar rock glacier, as well as their controlling parameters, with a variety of methods (N. Matsuoka). The project is a collaboration with UNIS (H.H. Christiansen) and University of Oslo (O. Humlum) as part of the IPA periglacial group activity aiming at standardizing monitoring techniques and extending the monitoring network. Detailed geophysical sounding was applied to detect subsurface frost wedge structures under non-sorted polygons with a wide range of diameter and composed of different materials at two locations in Svalbard (T. Watanabe). In August 2008, an educational project related to IPY Project No. 50 (TSP) was conducted in Svalbard, as a part of 'International University Course on High Arctic Permafrost Landscape Dynamics in Svalbard and Greenland'. Three Japanese graduate students attended the lectures, fieldwork and laboratory analysis in UNIS, Adventdalen and Kapp Linne, guided by H.H. Christiansen, B. Elberling (Univ. Copenhagen) and N. Matsuoka.

In Alaska, the project '2004 Forest Fire Impacts to Hydrological Cycles, Permafrost and Eco Systems in Central Alaska' has continued since 2005 in order to monitor permafrost conditions after severe wildfire (K. Harada and K. Saito). In August 2008, observations including manual measurements of thaw depth were carried out at the Kougarok

site near Nome. Measurements of surface roughness were also conducted to compare with the satellite data. Since 2007 ground temperatures have been monitored with data loggers to obtain continuous data of thaw depth and ground temperature and to understand the effect of the wildfire on the permafrost condition and vegetation recovery. The study area of rock glacier research in Alaska by A. Ikeda was shifted from the Brooks Range in the Arctic to the Alaska Range in the central Alaska after the NICOP. The focus of the study was also changed from distribution characteristics of rock glaciers to the direct monitoring of processes related to debris and ice accumulation on rock glaciers.

Long-term monitoring campaigns still continue in the Swiss Alps. The monitoring focused on frost weathering, heave, creep, solifluction and permafrost creep (N. Matsuoka and A. Ikeda). Differential GPS was newly introduced to monitor annual movement of rock glaciers and solifluction lobes.

K. Fukui, National Institute of Polar Research (NIPR) undertook a permafrost research expedition in the South Chuyskiy Range, Russia Altai Mountains, in the summer of 2008. The expedition is joint research between NIPR and Altai State University (Prof. Mikhailov, Dr. Ostanin and Dr. Troshkin). They installed ground temperature sensors in ice wedge polygons in the Akkol Valley, and found a large pingo originated from the Little Ice Age moraine in the Tardura Valley (2100 m a.s.l.) and many rock glaciers in the Yelanzash Valley (2400 m a.s.l.).



Rock glacier originated from the Little Ice Age moraine in the Yelanzash Valley. (Photograph provided by Norikazu Matsuoka)

Finally, ISOP (Informal Seminar on Permafrost) hosted meetings several times in Sapporo at the Hokkaido University, aiming at exchanging information on permafrost monitoring and planning joint field campaigns.

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MONGOLIA

Over the past 12 years N.Sharkhuu (retired from Institute of Geography, MAS) individually prepared most of permafrost monitoring boreholes in Mongolia, expanding from year to year and conducting permafrost monitoring of Mongolia within the framework of international CALM and GTN-P programs in close collaboration with F. Nelson and N. Shiklomanov from

University of Delaware (with its financial and data logger support) and with V. Romanovsky and K. Yoshikawa from University of Alaska Fairbanks (who recently supplied nine HOBO U12 dataloggers). At present, there are 44 CALM and GTN-P boreholes in Mongolia. 23 boreholes are equipped with temperature data loggers.

The Mongolian IPY Expression of Intent # 1129 is the main component of CALM and GTN-P programs in Mongolia, and is part of the IPA contribution to the Thermal State of Permafrost IPY Project 50.. This year's investigations were the continuation of the activities described in *Frozen Ground* Number 31.

During three weeks in September Romanovsky, Yoshikawa, and N. Sharkhuu, conducted field investigations at almost all borehole sites in the Hovsgol, Hangai and Hentei mountainous regions. In the Hovsgol region we measured permafrost temperatures in 24 boreholes, including precise temperature measurements in three deep boreholes down to depths of 130-200 m containing 50-150 m thick permafrost. In late May Sharkhuu drilled a 16 m deep borehole on Nalayh pingo top near Ulaanbaatar and collected 100 samples of pingo ice for Yoshikawa's isotope analysis. We also plan to drill the 20 m high pingo top in the Hovsgol region, where artesian waters under 28 m thick massive ice (or at 32 m depth) was detected during borehole drilling in 1968.

In September, Y. Jambaljav, Institute of Geography, MAS, drilled nine, 10 m deep boreholes for permafrost monitoring in the Mongolian Altai and southern Hangai mountain regions. Based on N.Sharkhuu's recommendation and old data, most of the drilled boreholes were located at locations where old boreholes were drilled and investigated 24-34 years ago. Ground temperature measurements in the boreholes are planned to start in August 2009. Soil temperature measurements in a series of mainly 2-3 m deep holes at Terelj and Nalayh observation sites near Ulaanbaatar have been running for the last six years within the cooperation framework between Japanese IORGC and Mongolian Institute of Geography.

N.Sharkhuu attended the NICOP in Fairbanks and represented Mongolia at the IPA Council meetings. The main results on TSP and CALM in Mongolia were presented at NICOP sessions and the CALM workshop. N. Sharkhuu wishes to express many thanks to Professor Larry D. Hinzman, director of IARC for sponsorship to attend the NICOP.

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NETHERLANDS

In the framework of the study of the ecology of breeding and moulting geese and wader birds using the Northwest-European migration routes, expeditions focusing on permafrost have continued in 2008. In the delta of the Pyasina River investigations focused on permafrost dynamics and the understanding of the permafrost at Cape East on the Pyasina Delta, Taimyr, northern Siberia (74° 06' N, 86° 44' E). The research is carried out by Alterra Wageningen UR (B.S. Ebbinge, contact person GBM Pedrolì) and the Netherlands Institute of Ecological Research (NIOO, B. Nolet) in collaboration with Russian partners (Heritage Institute, Moscow). In 2008 the percentage of tundra

covered by snow was surveyed daily on a 2-km line transect, until snow was completely melted. The thaw depth over the permafrost was measured on the same transect at three dates during the second part of the field season. The vegetation on the transect was surveyed by recording the presence-absence of six indicative plant species.

Active layer thawing was observed to be considerably shallower in 2008 than in 2006 when it was especially intensive. This is mainly due to late spring and late snowmelt in 2008. Spatial variation in active layer thawing is correlated with the type of vegetation. Thawing is shallower where *Sphagnum*, *Eriophorum polystachum* and *Salix reptans* are present, and deeper where *Salix polaris* and *Dupontia fisheri* are present.

Research on carbon and water exchange of taiga and tundra ecosystems in eastern Siberia was performed in cooperative projects with the Institute for Biological Problems Cryolithozone (IBPC) of the Siberian Division of the Russian Academy of Sciences in Yakutsk and the Vrije Universiteit (VU) in Amsterdam, Department of Hydrology and Geo-Environmental Sciences. Recently, the University of Utrecht (paleoecology) and Wageningen University (vegetation Ecology) have been involved. This project is partly funded by the Dutch Organization of Scientific Research (NWO), the Darwin Centre for Biogeology and the NWO Dutch-Russian Scientific Cooperation Fund.

In a larch/birch forest near Yakutsk (Spasskaya Pad Field Station) and on a tundra site near Chokhurdakh in the Indigirka lowlands (Kytalyk Reserve) flux measurements have been made with eddy correlation towers. From 2004 onwards, this research has been 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.



B. Ebbinge and B. Pedroli measuring permafrost melting depth near the base camp on August 4, 2008. (Photograph provided by Pjotr Glazov)

Apart from a methane flux measurement campaign on tundra and floodplain environments and on thermokarst lakes, vegetation ecological experiments were set up and lake bottom sediments were sampled for paleoecological research. Also a site was established for long-term monitoring of active layer thickness. In the summer of 2008, for the first time eddy covariance measurements using a cavity ringdown laser system were successfully set up and operated at the tundra site.

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NEW ZEALAND

At least five New Zealanders attended the NICOP in Alaska, a highlight being the presentation of the first TransAntarctic Mountain region soil and permafrost maps as a contribution to ANTPAS (the Antarctic Permafrost and Soil Group) (Balks et al., Bockheim et al., McLeod et al., in the NICOP proceedings).

New Zealand has two Ph.D. students leading and commencing Antarctic soil and permafrost related field projects this summer. T. O'Neill, from the University of Waikato is investigating impacts of human activities on Antarctic soils and permafrost and will be travelling to the Ross Sea Region, with M. Balks. F. Shanhun, from Lincoln University, will be studying carbonates in the soils with P. Almond, S. Smith and J. Bockheim.

Two researchers at Canterbury University, S. Allen and I. Owens, have been undertaking permafrost research in the Southern Alps, in collaboration with C. Huggel of Switzerland. They are investigating the distribution of mountain permafrost, a relatively unresearched area in New Zealand.

M. Balks was invited to give the prestigious „Norm Taylor Memorial Lecture“ at the joint New Zealand and Australian Soil Science Society's conference in December this year. She will be highlighting the Antarctic and Arctic permafrost work in her lecture entitled „Footprints at the ends of the Earth; impacts and management of human activities on frozen soils“. This will be an opportunity to raise the profile of frozen ground research to the wider Australasian soils community.

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NORWAY

TSP Norway IPY project activities

The Permafrost Observatory project: A contribution to the thermal state of permafrost in Norway and Svalbard (TSP Norway) was introduced in the last issue. In the 2007-2008 winter we had a drilling campaign in Svalbard from February to May, and established 12 new boreholes, with a total of 173 m. The deepest borehole is 39 m. Eight boreholes in different landforms are located in the Longyearbyen area in central Svalbard, and three on the strandflat in the Kapp Linne area, western Svalbard and one in Ny Ålesund, NW Svalbard. All boreholes are now instrumented with thermistor strings, and two are online in the Longyearbyen area.

In the 2008 summer, fieldwork focused on downloading data from the boreholes and from periglacial landform

monitoring both in northern Norway and in Svalbard. In northern Norway geophysical investigations were carried out to delimit permafrost in collaboration with international TSP partners from Universities of Karlsruhe (C. Hauck) and Jena (C. Hilbich), Germany, and the University of Ottawa, Canada (A. Lewkowicz). Year round observations of different periglacial landforms are running intensively in the Longyearbyen area involving several students doing fieldwork, study of active layer thawing, water/ice content from resistivity measurements, ice-wedge activity, solifluction activity and rock glacier thermal processes.



Drilling in Endalen, Svalbard. (Photograph provided by Håvard Juliussen)

The 'International University Course on High Arctic Permafrost Landscape Dynamics' was run very successfully as a UNIS course with support from TSP Norway and the Nordic Council of Ministers, with 10 students obtaining more than 20m of sediment cores from the permafrost in Svalbard and Zackenberg, NE Greenland. Lecturers were H.H. Christiansen and B. Elberling (both UNIS). Japanese students participated in the Svalbard part of the course led by N. Matsuoka.

The NORPERM, the first Norwegian permafrost database, has reached its version 1.0, and is ready for the first full year of permafrost and active layer temperature data to be entered into the database during autumn 2008. The project made several presentations at AGU in December 2007, and at EGU and at NICOP in 2008 in addition to having many visitors especially in Svalbard and at our website: www.tspnorway.com. TSP Norway partners will play a strong role in organizing the Third European Conference on Permafrost (EUCOP) in Svalbard in June 2010.

Geology Department, UNIS

Permafrost and periglacial studies were carried out by a group (H.H. Christiansen, H. Juliussen, L. Kristensen, U. Neumann and M. Eckersdorfer) partly under the TSP Norway project, but also under the CRYOSLOPE Svalbard project (www.skred-svalbard.no). The CRYOSLOPE Svalbard project started data analyses after observing 332 avalanches in 1.5 years in the 40-km, most-used snow mobile tracks around Longyearbyen. Permafrost and periglacial studies at the Geology Department at UNIS (H.H. Christiansen, O. Humlum, L. Kristensen, H. Juliussen and J. Ellehauge) continued (see previous issues of *Frozen Ground* for project description).

Collaboration with N. Matsuoka, University of Tsukuba, Japan, C. Harris, University of Cardiff and A. Lewkowicz, University of Ottawa, continued on ice-wedge dynamics and solifluction in Svalbard.



Use of 3-D ground penetrating radar in Adventdalen, Svalbard. (Photograph provided by Martine Helen de Vries)

The intensive graduate course AG-330 Permafrost and Periglacial Environments was presented for the second time in April 2008 with 22 students. The PYRN, coordinated in Norway by H. Juliussen, arranged several talks and events for students at UNIS to raise the awareness of permafrost studies and research possibilities.

On August 1, and after approximately one year, H. Farbrot finished working part time for the IPA Secretariat. The Secretariat moved to the Alfred Wegener Institute starting in autumn 2008.

Technology Department UNIS, NTNU and SINTEF research collaboration

The collaboration on the use of ground penetrating radar (GPR) to effectively survey permafrost areas and locate pure ice structures within the subsoil continued (see previous issue of *Frozen Ground*). In 2007 and 2008 the Efficient Soil Investigative Methods on Permafrost (ESIMP) included several field surveys in Adventsdalen, Svalbard. This year a 3D ground penetrating radar was used to investigate potential benefits over normal 2D GPR. SINTEF's geotechnical drilling rig was used to verify the results from the GPR. The work is carried out partly by students at UNIS and SINTEF personnel.

The work connected to the Ph.D. study of F. Caline (supervised by L. Grande UNIS/NTNU) continued in 2008 mainly with registration of behaviour of the geotextile bags of different material exposed to the development of sea ice and the ice break up. This work is sponsored by a group of Norwegian and French companies and institutions and aims at developing environmental friendly coastal protection in areas with ice, waves and water currents.

Master thesis in Road Building on Permafrost in Arctic climate exposed to snow avalanches and snow drift.

In 2008 two students took their Masters degrees in Arctic-related topics at The University Centre in Svalbard. M. Bratt Pedersen studied the principles of building roads on permafrost on steep terrain, and as a practical subject she focused on a new road to Mine No. 7 in Advent Valley, 15 km southeast

of Longyearbyen. Ø. Skeie Hellum studied the principles of building roads on snow-drifted and avalanche exposed areas, and as a practical subject he focused on location and design of the new road to Mine No. 7. Their work has been of high interest to the mining company "Store Norske Spitsbergen Kullkompani" as their access road currently has problems with frequent avalanches, winter maintenance winter, and slope stability.

Their supervisor at UNIS was Associate Professor Dr. J. O. Larsen.

Physical Geography, Department of Geosciences, University of Oslo

In 2008 B. Etzelmüller, H. Farbrot and K. Lilleøren gathered the first year's data series from the various TSP-sites in Northern Norway within the TSP Norway IPY project. Some shallow boreholes were also drilled and instrumented at the Nordnes site, Troms. The new CRYOLINK-project (B. Etzelmüller, O. Humlum) funded by the Norwegian Research Council started August 1, 2008, and 15 shallow boreholes were drilled along altitudinal transects in southern Norway. At five of the new sites, automatic cameras and soil moisture logging equipment were installed.



Drilling in Jotunheimen, central Norway. (Photograph provided by Bernd Etzelmüller)

In addition, the University of Oslo in collaboration with UNIS received substantial funding for student and faculty member exchange with the University of Ottawa (A. Lewkowicz) and Carleton University (C. Burn) from SIU (Norwegian Centre for International Cooperation on Higher Education). The project covers the terrestrial cryosphere including permafrost, and was launched during a meeting in Ottawa in October 2008.

Within the EU-funded project BRAHMATWINN the mountain permafrost distribution of the Brahmaputra River basin was modelled. A rock glacier inventory was compiled using high-resolution satellite imagery over a test area in the Himalayas and compared to the modelled permafrost distribution. Roughly, the lower permafrost limit was found to be at an elevation of about 5000-5500 m a.s.l., depending on aspect. (R. Frauenfelder, A. Kääb, University of Oslo; M. Hoelzle, University of Zurich).

A new project (CORRIA) was started to develop and apply improved image processing algorithms for cross-correlation of

repeat images in order to measure displacements on, among others, rock glaciers. (A. Kääb and two Ph.D. students with funding by the Norwegian Research Council).

Research since 2004 on mountain meteorology, snow cover, vegetation, ground temperatures and the interaction between permafrost and glaciers continues (O. Humlum, H. Juliussen, K.S. Lilleøren, M. Ferbarlein); see previous issues of Frozen Ground for project description.

Norwegian Meteorological Institute, Norwegian Geological Survey and other research Institutions

In the Troms and Møre and Romsdal areas of northern and southern Norway, respectively, temperature data are collected as part of a permafrost and climate monitoring project on the instability of rock slopes in Norway. The project was established in 2001. A series of temperature data loggers were installed to monitor the temperature of the ground, the surface and the air. Exposed sites with minimal winter-snow accumulation are preferred to optimise comparability and to ensure that the thermal properties are not extensively complex (K. Isaksen, L.H. Blikra, H. Farbrot, T. Eiken and J.L. Sollid).

On Dovrefjell, southern Norway, temperature data was collected from 11 boreholes (9 m deep) along an altitudinal transect across the mountain permafrost transition zone. These boreholes were drilled and instrumented in October 2001. The objective of the study is to model the trend and variability of mean annual ground temperature (MAGT) and to evaluate the influence of the snow cover on mean annual ground surface temperature (MAGST) in a high mountain terrain. The trend and variability of MAGT and MAGST are of particular relevance in the interpretation of ground temperature measurements from just a few seasons. This work is also relevant to understand the climate/cryosphere interactions in general. An additional deep (100 m) borehole is planned to be drilled on Dovrefjell (R.S. Ødegård, K. Isaksen, T. Eiken and J.L. Sollid).

In the same field area data from temperature data loggers was collected as part of a Norwegian monitoring programme for palsa peatlands, co-ordinated by the Norwegian Institute for Nature Research (A. Hofgaard, K. Isaksen, R.S. Ødegård, T. Eiken, J.L. Sollid).

In Jotunheimen, southern Norway, temperature data from the Juvvasshøe PACE borehole (established in 1999) was collected and in Svalbard data from the Janssonhaugen PACE borehole (established in 1998) was collected. Collection of the temperature data from the PACE boreholes is organized in a long-term monitoring programme for climatic research. The programme is run by the Norwegian Meteorological Institute (K. Isaksen) and the national databases are linked to the GTN-P database.

Permafrost Young Researchers Network

In September 2008, the Permafrost Young Researchers Network's Contribution to the Thermal State of Permafrost Project in the Nordic Countries (PYRN-TSP) established two, 30m deep boreholes in debris and bedrock at Iškoras (572 m a.s.l.), in Finnmark, northern Norway. A thermistors chain connected to datalogger were installed (K. Isaksen, M. Johansson, H. Farbrot, B. Etzelmüller, H. H. Christiansen). The inner part of Finnmark (Finnmarksvidda) is a plain with

strong continentally and has the lowest mean annual air temperature (MAAT) when reduced to sea level in Norway. Finnmarksvidda has strong temperature inversions, and the permafrost and climate at elevated locations are poorly known. These activities are in close cooperation with the Norwegian funded TSP NORWAY IPY project.

Arctic Council's Cryosphere Project SWIPA (Snow, Water, Ice and Permafrost in the Arctic)

H. Christiansen and A. Instanes are Norwegian representatives in the Arctic Council's cryosphere project SWIPA (Snow, Water, Ice and Permafrost in the Arctic). The project is in many ways a continuation of the Arctic Climate Impact Assessment (ACIA) project. The main objective of the section related to permafrost is twofold: (i) Evaluation of the impacts of changes in permafrost characteristics, distribution and extent and attribution of changes, and (ii) Strategies for adaptation to changes in permafrost regions. The final report will be published in 2011.

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POLAND

In 2008, Polish studies of land cryosphere (permafrost and glaciers) were carried out in the polar regions of the Arctic on Spitsbergen and of the Western Antarctic (King George Island, Southern Shetlands) at the Polish polar stations and in the mountains areas of central and northern Europe (High Tatra Mountains and Scandinavian Mountains in the Abisko region).

The investigations in the polar regions were carried out under the fourth International Polar Year 2007/2009 in which Poland participated. On Spitsbergen, the project: "The dynamic response of Arctic glaciers to global warming" (GLACIODYN) focused on the dynamics of evolution of Arctic glaciers moving towards the sea under the conditions of climate change and sea level rise. The Polish team included the scientists representing: University of Silesia, Faculty of Earth Science, Sosnowiec; Nicholas Copernicus University, Toruń; Adam Mickiewicz University, Poznań; Maria Curie-Skłodowska University, Lublin; Institute of Geophysics, Polish Academy of Science, Warsaw; and AGH University of Science and Technology, Cracow. The project was supervised by J. Jania (University of Silesia). Field investigations as well as remote sensing and geophysical techniques were used to obtain information on glacier characteristics. A large number of data were obtained in the field to identify the mechanisms responsible for dynamic response of glaciers to climate change and to create process-based quantitative physical models as well as numerical ones for glacier response. These results will help to refine estimates on the contribution of Arctic glaciers to sea level rise.

Within the international program "Change and variability of the Arctic Systems, Nordaustlandet, Svalbard" (KINNVIKA), geophysical investigations of the structure of permafrost and the thickness of its active layer as well as deposits of late sedimentation basins in the Murchinson Fiord region began. They were supervised by P. Głowacki and carried out by an

interdisciplinary team from the Institute of Geophysics and the Institute of Geological Science, Polish Academy of Science, as well as the University of Silesia.

The interdisciplinary team headed by K. Migąła from Wrocław University carried out investigations within the international program "Fundamental causes of local climates as the basis of ecosystems differentiations and dynamics in the area of West Spitsbergen, Svalbard" (TOPOCLIM). Its aim was to determine the spatial structure of air temperature field as the identification of the driving mechanisms of periglacial ecosystems in western Spitsbergen.

Several investigations were carried out at the Polish Academy of Science stations which operates year-round in both the Arctic on Spitsbergen at the Polish Polar Station, Hornsund and in the Antarctic at the Polish Station Henryk Arctowski on King George Island, South Shetlands). During the summer season, interdisciplinary investigations of periglacial phenomena took place in the areas surrounding the stations/bases located on Spitsbergen and belonging to Polish universities.

Measurements of active permafrost layer thickness and thermal fluxes (CALM project) were also performed near Polish stations and university expedition bases: Hornsund Polish Polar Station, Calypsostranda base of Maria Curie-Skłodowska University expeditions, Kaffioyra station of Nicholas Copernicus University, and Petuniabukta base of Adam Mickiewicz University expeditions).

Grants from the Ministry of Education (No N306052 32/3405) and the EU ATANS (Fp 6506004) permitted the initiation of comparative studies on permafrost occurrence in the mountainous region of the High Tatra, in the mountains of northern Sweden in the vicinity of Abisko, as well as in the Hornsund Fiord region on Spitsbergen. The leaders of this project are: W. Dobiński and B. Gądek from the Faculty of Earth Science, University of Silesia and S. Kędzia from the Institute of Geography and Spatial Organization, Geomorphology and Hydrology of Mountains and Uplands, Polish Academy of Science, Cracow. The results of these investigations were presented at conferences (Wrocław, Madrid, Moscow and Fairbanks).

Following a suggestion from the Institute of Geophysics, Polish Academy of Science, Warsaw, a system of common investigations called "Multidisciplinary studies of polar region geocosystem" was created to bring together ten units belonging to the Polish Academy of Science and universities carrying out investigations in the Arctic. Its aim is to create the conditions for the active participation of Polish researchers in international investigations of polar regions, collaboration in scientific staff training, coordination of investigations, rational use of apparatus, help with application of new methods and control of information flow. The investigations undertaken under this framework in 2008 dealt with:

- monitoring of the environment in the European Marine Biodiversity Research, Svalbard sites;
- palaeo and contemporary marine and lake deposits as a source of information about changing climate;
- understanding of glacial and periglacial geosystems under changing climate conditions; and
- effects of research stations in polar regions on the environment in their vicinity.

Financial means for coordination, accomplishment of common investigations were provided by the Ministry of Education (Resolution No 35/E-41/BWSN-0081/2008).

Of significant importance for Polish explorers of the north and the south polar zones was the XXXII International Polar Symposium of the Polar Club of Polish Geographical Society held in Wrocław on May 23-24, 2008, under the subject "Natural Environment of Polar Regions". It was organized by the Faculty of Earth Science and Environment Formation, Wrocław University under the chairmanship of J. Pereym; a meteorologist and Spitsbergen explorer. It should be stressed that Professor A. Jahn (1915-1999), the initiator and first president of the Polar Club, the famous explorer of periglacial zone, organizer of research expeditions to Spitsbergen and Greenland, a researcher that contributed largely to the history of International Permafrost Association, was closely connected with this University. The XXXII Symposium was attended by over 150 participants from all Polish scientific centers carrying out investigations in polar regions as well as foreign scientists. One of the participants was Prof. Jon Ove Hagen from Norway who was awarded the title "Doctor Honoris Causa" at the University of Silesia in May 2008. Papers and posters were presented at the Symposium. Most of them were published in a special monograph "Natural Environment of Polar Regions". It consists of 28 papers (summaries in English) from various fields of science about the earth system (geomorphology, geology, glaciology, geodesy, hydrology, climatology) as well as biotic environment of the Arctic and the Antarctic. It should be also emphasised that the polar symposia have been held since 1974 and play an essential role as far as presentation of the latest investigations, exchange of experiences and integration of investigations in polar regions are concerned.

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PORTUGAL

The International Polar Year has provided the framework for a strong development of permafrost science in Portugal and in 2008 significant developments have been achieved:

- collaboration between permafrost research groups in the framework of the IPA;
- implementation of the PERMANTAR project (National Polar Program - ProPolar),
- Permafrost research in the Maritime Antarctic,
- Permafrost research in Arctic Canada,
- Research on the polygonal patterns of Mars,
- Education and Outreach
- full membership at the IPA.

The dynamics created by the IPY enabled contacts between different groups conducting permafrost research and their organization in the framework of IPA-Portugal. Permafrost research groups have been identified at: University of Lisbon (CEG – Monitoring, mapping, modeling, climate and CEGUL – Geophysics, climate modeling); University of Évora (CGE – ground heat flux, geophysics); IPIMAR (Chemistry, contaminants); and Technical University of Lisbon (CERENA - Polygonal networks in Mars).

The implementation of the National Polar Program took place

in early 2008 with the funding of five projects, one of which on permafrost research. The project PERMANTAR – Permafrost and Climate Change in the Maritime Antarctic, lead by Gonçalo Vieira, University of Lisbon, involves an international partnership with the Universities of Évora (Portugal), Alcalá de Henares (Spain), Buenos Aires (Argentina), Valladolid (Spain), Autonomous of Madrid (Spain), Zurich (Switzerland) and Karlsruhe (Germany), as well as with the Bulgarian Antarctic Institute. The projects focus on the implementation of a network of permafrost monitoring boreholes, CALM-S sites and geomorphological monitoring sites in Livingston and Deception Islands (Maritime Antarctic). An effort is also being conducted on the downscaling of mesoscale climate data (i.e. ERA-40, ERA-interim) and modeling (HTESSEL) of ground temperatures for comparison with borehole data in the South Shetlands. The project runs from March 2008 to March 2010 and is a partner of the Spanish funded PERMAMODEL project. PERMANTAR is included in ANTPAS and TSP.

In January and February 2008 the PERMADRILL (Portugal) - PERMAMODEL (Spain) projects lead by the Universities of Lisbon and Alcalá combined efforts for a large campaign on Livingston and Deception Islands. The Spanish, Bulgarian and Argentinean Antarctic programs were involved. Several long-term monitoring boreholes were installed in Livingston Island: Gulbenkian-Permamode (11-25m), Gulbenkian-Permamode (12-15m), Ohridski1 (6m) and Papagalo (5m). In Deception Island field work focused on geophysical surveying (ERT) of permafrost distribution, geomorphological mapping and maintenance of the CALM-S site at Crater Lake. A new 20-30m borehole at Crater Lake is being planned for early 2009 in collaboration with David Gilichinsky, Russian Academy of Sciences.



Drilling a permafrost monitoring borehole at Reina Sofia hill, Livingston Island, Antarctic. Projects PERMANTAR/PERMAMODEL. (Photograph provided by Vanessa Batista)

Arctic Canada: The research by the IPIMAR team focused on thermokarst lakes and on releases of carbon dioxide and methane gases. The role of the thawing permafrost in the trace element contaminants cycle was also of special interest due to the possible impact on the Arctic food web. IPIMAR research on permafrost focused in Northern Québec. A campaign was conducted in April 2008 in the region of Kuujuarapik, Nunavik, with the coordination of Laurier Poissant, Environment Canada. Samples of snow, ice, water and sediments were

collected in diverse aquatic and land systems such as Great Whale River, Hudson Bay and a thermokarst lake in a palsa peatland near Kuujjuarapik. Samples have been analyzed for carbon, nutrients and trace element contents. Measurements of carbon dioxide, methane and mercury gases were also made in the snow pack and permafrost. The analytical work is still in progress, but the first results indicate that the impact of permafrost thawing in the global geochemical cycles could have been underestimated.

Mars polygonal patterns: The CERENA team at Instituto Superior Técnico began a project for the automated mapping and characterization of polygonal networks on the surface of Mars, with the aim of identifying those that are of periglacial origin. During 2008, its activities included a survey of high spatial resolution images (better than 6 meters/pixel) acquired between 1998 and 2006 by NASA Mars Global Surveyor, whose centers were located above 50° of latitude (north and south). Almost 16,000 images were scrutinized, and more than 1000 polygonal networks detected; of those, however, less than 200 were deemed acceptable for the application of an automated procedure. The use of an automated method for this analysis is fully justified by the number of polygons in each network that can reach the thousands. The mapping phase consists of the segmentation of the network based on image analysis techniques. Although there are some developments yet to be implemented, the early results were good enough to advance into the characterization of the networks. This is done by the extraction of geometric and topological parameters from the identified polygons. The aim is to establish a classification scheme for the networks that could be related to their origin and dynamics. A comparative analysis with terrestrial analogues, for which field data can be obtained is planned and will surely lead to a much better understanding of this type of features.

The IPY Education and Outreach project LATITUDE60!, Coordinated by the universities of Lisbon and Algarve, included several activities relating to permafrost: lectures in schools and institutes, display of the Antarctic permafrost research film (“+ a Sul”), preparation of a new film on permafrost research, international videoconferences (IGLO), weekends with polar scientists in the mountains, publication of brochures in national newspaper, collaboration with writers with the inclusion of Antarctic permafrost research in a volume from a best-seller adventure book collection for kids, collectors agenda of the national post company with permafrost themes included weekend of polar science with ca. 7,000 visitors, visit to Svalbard with journalists with an emphasis on TSP-Norway program, and appearances on radio and TV broadcasts. The E&O



program has been a major success and has also contributed to the public understanding of the importance of implementing

the National Polar Program.

Weekend with polar scientists in the Portuguese mountains. Project LATITUDE60! (Photo provided by the project LATITUDE60!)

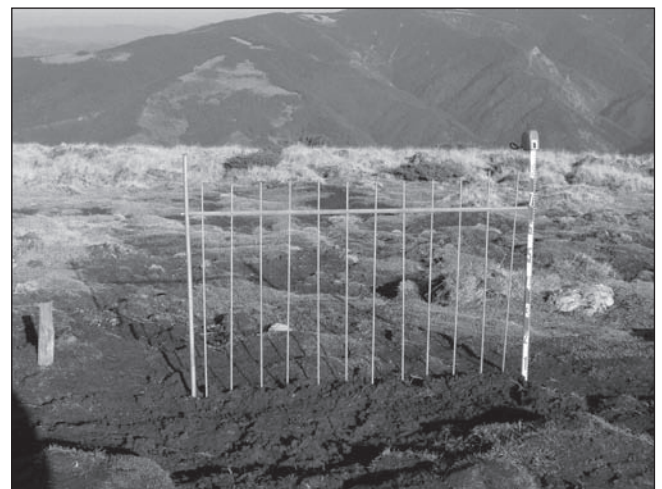
Following the strengthening of Portuguese permafrost research in the past decade, Portugal membership at the IPA has been upgraded from Associate to Full member, following a proposal by the Centre for Geographical Studies of the University of Lisbon that is the National Adhering Body to the Association.

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ROMANIA

In 2008, the activities of the members of Romanian Permafrost and Periglacial Research Group continued in all regions of the Romanian Carpathians. The projects stemming from the Research Grant provided by the CNCSIS (National Council for Superior Education Scientific Research) and entitled “The impact of the climatic changes upon the Holocene and present dynamics of the alpine environment from the Romanian Carpathians”. Implications in the risk management and landscape’s arrangement: MEDALP” led by P. Urdea, West University of Timișoara, and A. Vespremeanu-Stroie, University of Bucharest, were completed in September. Some results of this project can be viewed at <http://www.cbguvt.ro/geografie/cercetare/granturi/medalp/medalp.htm>.

Investigations also continued in the Transylvanian Alps (Retezat, Făgăraș, Godeanu and Șureanu Mountains) and in the highest area of the Eastern Carpathians (Rodnei Mountains). The application of 2D electrical resistivity tomography were performed in conjunction with measurements on rock glaciers, solifluction terraces, on moraines and thermokarst depressions in the Făgăraș Mountains, on scree slopes, moraines, thermokarst depressions and glacial overdeepening in the Godeanu Mountains, and on depression filled with postglacial sediments in the Rodnei Mountains. Core samples were also retrieved from glacial lake Lala Mare and from the thermokarst depression Știol in the Rodnei Mountains and from Șureanu Lake (Șureanu Mountains).



Frost heaving measurements on Muntele Mic. (Photograph provided by Petru Urdea)

The study of temperature regime of the ground and rocks are carried out year-round at the network of permanent sites established at high altitude in the Eastern and Southern Carpathians. Over 100 data loggers for temperatures and humidity have been installed. Concurrently, Basal Temperature of Snow (BTS) measurements and water springs temperatures were performed on rock glaciers in the Retezat Mountains.

At the Department of Geography, West University of Timișoara, P. Urdea and his team (M. Torok-Oance, M. Ardelean, F. Ardelean, A. Onaca) are continuing frost heaving and depth of frost monitoring program in the Muntele Mic area, and have implemented a program using thermal photography and infrared cameras in the investigation of periglacial forms.

A. Perșoiu and B. Onac from Department of Geology and Speological Institute "E. Racovitza" Cluj–Napoca are pursuing a multidisciplinary study of ice caves, a particular form of sporadic permafrost and/or extra-zonal permafrost, focusing on the isotope hydrological monitoring in Borțig Ice Cave (in cooperation with I. Fórizs, Z. Kern, B. Nagy, P. László, University of Budapest, Hungary), the relation between paleoclimate and perennial ice accumulations and climate changes, as observed in ice dynamics in Scărișoara Cave (Apuseni Mountains). O. Pop (Babeș-Bolyai University, Cluj-Napoca) is beginning a program of dendrochronology on debris flows in Călimani Mountains (Eastern Carpathians).

The Institute of Geography of the Romanian Academy in cooperation with six other universities (including University of Bucharest, University "Babeș-Bolyai" Cluj Napoca, West University of Timișoara, University of Oradea) organized the IAG Regional Conference on Geomorphology "Landslides, Floods and Global Environmental Change in Mountain Regions" with a separate workshop "Climate Change and Extreme Events in Mountain Regions". 150 scientists from 30 countries participated in the oral and poster sessions, and in the three field excursions. The excursion 3 "Vertical zonation of floods and mass movements in the Carpathians Mountains" was focused on the geomorphologic specificity of the central part of the Făgăraș Mountains, Bălea area. The team of West University of Timișoara presented the results of 2D electrical resistivity tomography investigation on rock glaciers, scree slopes, solifluction lobes, fossil patterned ground and glacial overdeepening depression filled with postglacial sediments in the Bălea-Capra area.

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RUSSIA

In 2008, the investigations of Russian geocryologists were carried out on a wide variety of topics, and focused on the analysis of the spatial-temporal characteristics of the cryosphere, its reaction to the global and regional climate change and to human-induced impacts.

Russian organizations implemented the monitoring of the thermal state of the permafrost and geotechnical monitoring of frozen ground. As a result, several procedures and regulations related to permafrost engineering in industrial projects for insurance purposes were implemented.

It was established that since the second half of the 1990s,

mean annual permafrost temperatures have stabilized (and in places decreased), in spite of climate warming and an increase of permafrost temperatures in the 1970-1980s. At the same time, a deepening of the active layer up to depths of 5-9 m was recorded in forest tundra. At this location, however, recent observations have not unambiguously confirmed the tendency towards permafrost degradation although evident signs of frost processes and permafrost table fluctuations are observed (Earth Cryosphere Institute, SB RAS).

Monitoring of the dynamics of the shores of the Kara Sea continued under extreme climate change conditions. Expeditions on the shores of the Yenisei Bay and the Baidoratskaya Bay of the Kara Sea provided the first data on the temperature and permafrost dynamics of contemporary accumulative formations. Unique cryogenic formations were studied in new exposures of coastal outcrops of the Kara Sea during their intensive retreat in 2008. As a result, a thoroughly revised conception of the region's cryogenesis was established (Earth Cryosphere Institute SB RAS, Lomonosov Moscow State University, All-Russian Research Institute for Geology and Mineral Resources of the World Ocean).

For the first time, the respective role of cryogenic processes (thermoabrasion, thermodenudation, thermokarst, solifluction, thermosuffosion, as well as lateral, bottom and regressive thermoerosion) in the erosion of the coast has been quantitatively substantiated (Melnikov Permafrost Institute, SB RAS).

The Institute "Fundamentproekt", together with the Stockholm University conducted geocryological research in the northern alpine part of Sweden, including the field geocryology and soil-botanical mapping, drilling, temperature investigations, thus providing a unique insight into Swedish permafrost.



Geocryological research in the northern Alpine part of Sweden (Photograph provided by Dmitry Drozdov)

In 2008, a map of the assessment of the permafrost-ecological hazard sensitivity for the oil-and-gas field territories of the Nadym-Purovskoye interfluvium (Lomonosov Moscow State University), a 1:1,000,000 hydrogeological map of Central Yakutia, and a 1:500,000 scale map of distribution of rock glaciers of the Djangarskii Alatau (Melnikov Permafrost Institute) were produced. A suite of 1:200,000 maps (of geomorphological structure, of engineering-geological

regionalization, of seismic ground conditions, etc.) of the Sakhalin- Khabarovsk-Vladivostok pipeline route was also prepared (Geological Research Institute for Construction).

The Institute of Geocology, RAS (IGE) carried out research integrating probabilistic and deterministic approaches for long-term geocryological forecast. The influence of the heterogeneity of snow cover on the thermal state of permafrost was highlighted.

Calculations of the geothermal heat flow in the discontinuous and continuous permafrost zones of the Vilyui syncline of the Siberian platform were conducted. Using these calculations, the fluctuations of the phase boundary (decrease of the permafrost thickness) were estimated and a database on heat flow was created (Melnikov Permafrost Institute, Institute of Oil-and-Gas Geology and Geophysics, SB RAS).

The regional structure of the altitudinal zonation in the mountains of the Djangarskii Alatau was studied by the Kazakhstan Alpine Geocryological Laboratory and the Melnikov Permafrost Institute, SB RAS. Permafrost is thought to underlain as much as 54, 000 km² in the area, and the volume of ground ice is estimated as 21.5 km³.

New data on degradation (dispersion, amorphization) of clay minerals during the process of cryolithogenesis was obtained by the Chair, Cryolithology and Glaciology, Department of Geography, Lomonosov Moscow State University.

An experimental set-up was tested and experiments on studying the peculiarities of ice motion inside the cavity of porous ceramics under the influence of temperature and pressure gradients of liquid were performed (Earth Cryosphere Institute, SB RAS). The effect of self-preservation of gas hydrate was studied in detail both experimentally and theoretically. The process preserves relic gas hydrates in the permafrost at the depth of 150-200m which is typically beyond the zone of its normal thermodynamical stability (Earth Cryosphere Institute, SB RAS). The mechanisms of ice accumulation and its role in the formation on the structure and the composition of cryogenic formations were examined experimentally at the Earth Cryosphere Institute, SB RAS.

The possibilities of CO₂ burial in gaseous or liquid state in the West Siberian cryolithozone was analyzed at the Institute of Oil-and-Gas Geology and Geophysics, SB RAS. Sub-permafrost reservoirs were found to be of interest especially in continuous permafrost regions (north of 65-66°N).

In all seas of the Arctic region, except for the Chuckchi Sea, it was found that the occurrence of relic gas hydrate accumulation, confined to shelf permafrost, is possible (Scientific Research Institute of Natural Gas and Gas Technologies).

Young Researchers:

In the framework of the International Youth Scientific Forum, 32 students and post-graduates participated in activities devoted to the 100th anniversary of Academician P.I. Melnikov and organized by the Melnikov Permafrost Institute SB RAS (Yakutsk), the Earth Cryosphere Institute SB RAS (Tyumen), and the Institute of Geocology RAS (Moscow). Included were observations of permafrost temperatures at 10 sites at the Mountain North-Baikal Permafrost steady-state-station (Chara).

In July, research on cryogenic processes of ground ice in

outcrops of the deposits of the 50-meter terrace of the Aldan river (Mamontova Mountain) were completed, including sampling for biochemical and microbiological analyses with the assistance of students and post-graduates of the Tyumen institute of Cryogenic resources, Tyumen Scientific Center SB RAS, Tyumen State Oil-and-Gas University, University of Hokkaido (Japan), Institute of Chemical Biology and Fundamental Medicine SB RAS (Novosibirsk), Institute of Applied Ecology of North (Yakutsk), Moscow and Yakutsk State University.

In August, a field excursion took place along the Yakutsk-Skovorodino-Chara route with the objective to revisit sites where local (Central Yakutia and Skovorodinskaya experimental-permafrost station) and regional (Lena-Aldan Plateaux, Southern Yakutia, Udokan and Kalar Mountain Ridges) geocryological research was performed during the twentieth century. Students and research assistants of the Melnikov Permafrost Institute SB RAS (Yakutsk), the Institute of Geocology (Moscow), the Institute of Cryogenic Resources (Tyumen), the Yakutsk State University, the Lomonosov Moscow State University, the Tyumen State Oil-and-Gas University, and a French university took part in the trip.



Student excursion in August 2008 (Photograph provided by Dmitriy Drozdov)

The most outstanding publications of 2008 are:
Fundamentals of Geocryology. Part 6. Geocryological prediction and ecological problems in cryolithozone./edited by Ershov E.D., MSU Publishing House, 2008, 768p.
Roman L.T., Tsernant A.A., Poleshchuck V.L., Tseva A.N., Levanov N.I. Construction on filled-up ground in cryolithozone. Edited by Roman L.T., Tsernant A.A., Economy, Construction, Transport Publishing House. 2008, 323 p.
Parmusin S.Yu. Effective nature management in cryolithozone. MSU Publishing House, 2008, 172 p.
Pavlov A.V. Monitoring of cryolithozone. Novosibirsk: Nauka Publishing House, 2008.
Shpolyanskaya N.A. Global climate change and evolution of cryolithozone. Tutorial. MSU Publishing House, 2008, 130 p.

The following conferences were convened:
International Conference: Cryogenic resources of Polar and Alpine regions. State and outlook of engineering geocryology, April 21-24, Tyumen.
Scientific-and-Practical Conference: Hydrogeology, engineering geology, geocryology and geocology of Transbaikalia and

contiguous territories, September 24-27, 2008. Chita.
Northern Social and Environmental Congress: International Polar Year in Russia, Arctic Science Summit Week, March 26-April 2, 2008, Syktyvkar, Russia
International Conference: Russian contribution to the International Polar Year, September 2-7, 2008, Sochi, Russia
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SPAIN

During the past year permafrost and periglacial research activities developed by the Spanish research teams were mainly conducted in universities of Barcelona, Complutense de Madrid, Autónoma de Madrid, Alcalá de Henares, León, Valladolid, Extremadura, Santiago de Compostela and Zaragoza. The works are concentrated on Spanish mountains, the Andes, in the Arctic and Antarctica. All of those are continuations of programs started in previous years under the National Research Programs framework and in participation with the IPY 2007-2009 (see Frozen Ground #31, p.32-33).

The Soil Thermal Monitoring Network on Iberian Peninsula Mountains initiative, founded at the beginning by Spanish Science and Technology Programme and led by A. Gómez-Ortíz (University of Barcelona) includes several research groups (University of de Barcelona, University Complutense de Madrid, University of Alcalá de Henares, University of León, University of Valladolid, University of Extremadura and University of Zaragoza) and continues its activities. This year M. Ramos (University of Alcalá de Henares), F. Salvador (University of Barcelona) and G. T. Vieira (University of Lisbon) have unified criteria on monitoring the thermal regime of soils, and studies have begun in the Sierra Nevada and Picos de Europa, Cantabrian Mountains.



Participants in the workshop fieldtrip "The maritime Sub-Antarctic as a possible analogue for the Late-Pleistocene of Galicia" in the Sierra de Ancares (Galice). (Photograph provided by Enrique Serrano)

On May 19-21, the workshop "The maritime Sub-Antarctic as a possible analogue for the Late-Pleistocene of Galicia", organised by the Department of Geography of the University of Santiago de Compostela and coordinated by Prof. A. Pérez-Alberti and Prof. H. M. French, took place in Santiago de Compostela. The workshop focused on the analysis of landforms and processes related to wet periglacial environments, focusing

on the Maritime Antarctica, Tierra del Fuego and Galicia. The meeting hosted 15 participants from Spain, Portugal, Italy, UK, and Canada and included lectures by H.M. French, K. Hall and J. Murton. Twelve communications were presented in the scientific sessions and there was a field trip to the Galician Ranges (Xistral, Meira and Ancares) led by M. Valcárcel and A. Pérez-Alberti, where the Late Pleistocene frost action, glacial landscape and sub-nival processes could be analysed.

The periglacial group of the University of Barcelona, Complutense de Madrid and Extremadura and lead by Prof. A. Gómez-Ortíz, continued its investigations in the Sierra Nevada (Southeast Iberian Peninsula, 37° N). It emphasizes monitoring the physical state of relict ice and permafrost trapped in the ancient accumulation area of Corral del Veleta (3150 m a.s.l.). The results confirm the continued degradation of ice bodies beneath the debris cover in response to the interrelationship between soil temperature, nival coverage and the subsidence of the debris body. In the area sampled the loss of volume of ice since 2001 could be around 10,000 m³.

In the Picos de Europa, the research group from the Universities of Valladolid, Extremadura, Cantabria and St Louis, supported by the Science and Technology Ministry and the Picos de Europa National Park, are researching the evolution of the last remnants of relict ice in the Cantabrian Mountains as well as the periglacial processes associated with ice bodies and the possible presence of sporadic permafrost. Along the same line of research of periglacial and nival features as geoindicators of environmental changes in the Iberian high mountains, the research group is working in the Pyrenees, where it is monitoring the dynamic of several rock glaciers and periglacial processes as well as studying the structure and dynamic of Pyrenean periglacial environments and their recent changes.

The G.I.X.A. Group of the University of Santiago de Compostela, lead by M. Valcárcel pursues its investigations of the effects of nival activity in the Sierra de Ancares. The group was involved in several activities of the periglacial community. Most of the fieldwork was carried out in Tierra del Fuego, lead by A. Pérez Alberti, where the periglacial landforms (patterned ground, rock glaciers, cryonival steps, debris slopes) were studied and mountain permafrost identified. A CALM site was established at 1050 m a.s.l. In the Andes of Mendoza new studies have been initiated to understand the thermal stress on the substrate between 3000 and 4200 m a.s.l.

The research team of the Department of Physical Geography of the University Complutense, leaded by D. Palacios, is continuing with its work on permafrost and rock glacier distribution in Stratovolcanoes of Mexico and southern Peru. Additionally, in collaboration with the Department of Vegetal Biology of the same university, it is carrying out an IPY project on lichen colonization in new areas (deglaciated or post-permafrost areas) in selected bipolar loci.

The Spanish participation in the IPY 2007-2009 takes place in Antarctica (four projects), in the Arctic (six projects) and in subantarctic environments (Andes, one project) in coordinated projects funded by the Spanish Polar Research Program. The Spanish participation in permafrost and periglacial research is intergrated in the IPY research programmes: ANTPAS (Antarctic and sub-Antarctic Permafrost), TSP (Thermal State

of Permafrost), MERGE (Microbiological and Ecological Responses to Global Environmental Changes in Polar Regions), TARANTELA (Terrestrial Ecosystems in Arctic and Antarctic) and EBA (Evolution and Biodiversity in the Antarctic). Investigations are carried out in the Maritime Antarctica by the groups of Alcalá de Henares and Autónoma de Madrid, and by the group of Santiago de Compostela in Patagonia (see *Frozen Ground* #31, p. 32-33).

The next meeting of the IPA Spanish Group, the Second Iberian Congress of IPA, will take place at Sigüenza (Guadalajara) in June 2009 and will be organized by the University of Alcalá de Henares.

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SWEDEN

H. Ridefelt and J. Boelhouwers at Uppsala University are continuing a project on spatial modeling of solifluction processes in the Abisko region, northern Sweden. A grid-based regional model outlines the occurrences of solifluction landforms and a solifluction activity map based on terrain classification was developed. A study on mountain permafrost distribution in the same region was completed during 2008 and is to be published by Ridefelt et al. in the December issue of *Norsk Geografisk Tidsskrift*. A new method of assessing long-term movement rates of solifluction on a regional scale through photo analysis is presented in a submitted manuscript (Ridefelt et al.). Jan Boelhouwers initiated a workshop on biogeomorphological processes and environments of sub-antarctic and sub-arctic ecosystems. The workshop was held at the Låktatjåkka Mountain Station in Sweden in August 2008 with Swedish participants from Uppsala University and Lund University and South African participants from Stellenbosch University, University of Pretoria and University of Fort Hare. Else Kolstrup continued researches on stone heave under boreal-temperate climate conditions.

At Stockholm University, the Ph.D. project of B. Sannel on temporal and spatial dynamics of peat plateau / thermokarst lake complexes started in August 2004 (supervisor P. Kuhry) and includes plant macrofossil studies, remote sensing and ground monitoring of peat plateau areas in Sweden, Canada and Russia. In 2008 two papers were published on Holocene permafrost stability, and variable peat accumulation and decay rates in west-central Canadian peat plateaus. The new permafrost monitoring site in a remote peat plateau / thermokarst lake complex in Tavvavuoma, northernmost Sweden, was maintained since 2005. The setup consists of a meteorological station, a camera, nine snow stakes and nine shallow boreholes (2 m). In September 2008 an additional 6 m deep borehole was drilled into the peat plateau.

M. Johansson and J. Åkerman, at the University of Lund participated in the live web event "IPY Polar Science Day" on June 18 with a presentation about the "thermal state of the Swedish permafrost". The live sessions connected kids all over the world with scientists, preferably in the field at the time, followed by time for on-line questions.

The GeoBiosphere Science Centre of the Lund University continued and expanded its activities in the Abisko area. The

"Nordic Centre for Studies of Ecosystem Carbon Exchange and its Interaction with the Climate System" (NECC) has two monitoring sites in the Stordalen area. The CARBOMONT project "Effects of land-use changes on sources, sinks and fluxes of carbon in European mountain areas" and the ELSA project "Exchange processes between the land surface and the atmosphere" have intensive and important field activities in the Abisko area, especially in and around the Stordalen bog. For these projects the status and dynamics of the active layer and the permafrost in the bogs are of great importance.

The old "IPA Abisko area active layer transect" is maintained in co-operation with the Abisko Research Station. J. Åkerman and M. Johansson are still maintaining 10 of the originally 12 CALM sites along the 100 km east-west transect. Two sites have been abandoned as all permafrost has disappeared. The three, high level (850-950 m.a.s.l.) sites have again been included and air and ground surveyed (both in 2007 and 2008). The active layer sites have now been monitored since 1978 and annual basic data is presented within the CALM reporting system.

In April 2008, five new boreholes were drilled in the Abisko area by M. Johansson through the Permafrost Young Researchers Network's (PYRN) contribution to TSP. The boreholes were between 6 and 16 meter deep and were drilled close to the old boreholes established in the 1980s by J. Åkerman. Preliminary results from the boreholes show that the permafrost thickness is decreasing from below as well as from above. The snow manipulation experiment, where future climate is simulated by adding snow on a peat mire, has been running for three years now. Data are now being analyzed and the experiment has worked well, with a clear change in the active layer thickness and vegetation observed. The snow fences are soon to be reinstalled for another season. The vegetation removal experiment was



Five new boreholes were drilled in the Abisko area, in April this year (Photograph provided by Frida Keuper).

initiated last year on a mire and will continue for another year.. The influence of removal of different vegetation types (dwarf shrubs, gramanoids and mosses) and the different vegetation types on active layer thickness and ground temperatures, are being measured.

The Arctic Council of Ministers has requested a report on the current status of various aspects of the Arctic's Cryosphere. The major sections are the Greenland Ice Sheet, Arctic Sea Ice and the Terrestrial Cryosphere, which consists of the chapters Snow, Permafrost, Glaciers and Ice Caps, Hydrology. Sweden together with Canada is coordinating the terrestrial cryosphere component and Sweden (T. Callaghan and M. Johansson) is leading the snow and permafrost chapters. The project will finish by the end of 2010.

A symposium on "Global change impacts on Nordic sub-arctic palsas mires and greenhouse gas feedbacks in the climate system" was held in Abisko on October 28-30, 2008.

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SWITZERLAND

On June 6, 2008, the Federal Council announced that the essential climate variables, among which glaciers, which are surveyed by the world glacier monitoring service in Zurich, now include permafrost. Permafrost monitoring is implemented through PERMOS (Permafrost Monitoring Switzerland) which has been set up for the last ten years through the Swiss permafrost scientists. PERMOS consists of about 20 sites where temperatures in boreholes, at the ground surface and in steep rock walls and in the air, and snow cover and ER tomography are monitored. At about 10 dynamics sites creep movements of rock glaciers are monitored; in addition, debris flows and rock falls are registered and archived. PERMOS has eventually found its place and funds within the frame of the National GCOS Office.

PERMOS has already set up its coordination office. After the pilot phase a thorough evaluation of the concept and all potential elements were accomplished and those are being implemented. PERMOS has continued its efforts towards a standardized and consolidated monitoring network. The PERMOS report for the monitoring period 2002/2003 and 2003/2004 was published. Data on kinematics were updated for the rock glaciers Gruben and Murtél by the analysis of aerial photographs of the last decade. An operational geophysical monitoring network using electrical resistivity tomography was installed and is operated by C. Hilbich, R. Delaloye and C. Hauck to monitor long-term freeze and thaw processes at four different mountain permafrost sites. In mid-September 2008, the University of Berne organized a seminar for the 20-years anniversary of the PERMOS site Furggentälti/Gemmi. Main results of the research and monitoring activities are published in the series of the Geographical Institute of the University on Berne.

Swiss Federal Institute for Snow and Avalanche Research

The Swiss Federal Institute for Snow and Avalanche Research SLF is actively involved in the new 'EXTREMES' project (Spatial extremes and environmental sustainability:

statistical methods and applications in geophysics and the environment) aiming to enhance the understanding of extreme environmental events. Data from the SLF permafrost and snow cover monitoring networks is being analyzed with advanced spatial extremal models in order to improve forecasting and risk analysis. (J. Blanchet; E. Zenklusen Mutter; M. Lehning; C. Marty, M. Phillips). Part of the EU project "Hydrosys", which aims to provide a system infrastructure using hand-held devices for the on-site monitoring of events related to permafrost degradation and infrastructure stability has just been launched at SLF. (M. Kern-Luetschg, M. Lehning). Both projects are supported by the Competence Center Environment and Sustainability of the ETH Domain.

The SLF permafrost-monitoring network is functioning well, with borehole- and surface-temperature measurements in different types of natural and artificially disturbed alpine terrain. Techniques such as 3D laser scanning, InSAR or borehole deformation measurements are being applied at several locations to investigate mass movements. A selection of the sites is part of the Swiss PERMOS network (M. Phillips, A. Rist).

Practical recommendations for the construction and maintenance of infrastructure in mountain permafrost continue to be developed and will be published in 2009. Case studies, interviews with practitioners and measurements on various types of mountain infrastructure are being carried out to develop these (C. Bommer, M. Phillips).

University of Lausanne

The Institute of Geography of the University of Lausanne (C. Lambiel, C. Scapozza) continues its researches on different permafrost-related alpine landforms. The surface velocities of about ten rock glaciers have been measured with DGPS since 2000 (for the oldest series). After the slowing down which occurred between 2004 and 2007, a small increase of the velocities could be observed. Interesting to note was the extreme values of the Tsaté-Moiry rock glacier which showed local velocities of 13 m a-1 in summer 2007. Terrestrial Laser Scanning (Lidar) was carried out on three different landforms (rock glaciers and moraine). The precision of the measurements and the different processes which could be identified (creep, sliding, thawing) showed the great potential of the method for the study of creeping permafrost.

The monitoring of the ground surface temperatures is carried out at eight sites. About 120 mini dataloggers are currently being used. In autumn 2008, boreholes were drilled in Les Attelas talus slopes (Verbier), in order to get direct information on the permafrost properties and to study the thermal regime of the slope. It will permit the calibration of the geoelectrical data (2D permanent profile), which clearly indicates the presence of permafrost in the lower third of the slope and its absence upslope.

In the frozen moraine at Col des Gentianes (2900 m a.s.l.), the ground temperature borehole monitoring is completed by geoelectrical measurements. The analysis of ground ice found in an excavation with thin sections showed that sedimentary and congelation ice is present in the moraine.

University of Fribourg

Three new faculties well known in the permafrost community of Switzerland started at the Institute for Geography, University of Fribourg in September 2008: R. Delaloye, C. Hauck and M. Hoelzle. C. Hauck and M. Hoelzle are sharing a full professorship. This is an important step that ensures the continuation of permafrost research for the next future.

University of Zurich

A number of long-term projects involving modeling, measuring, and monitoring processes of energy exchange and dynamics in mountain permafrost are carried out by the Glaciology, Geomorphodynamics and Geochronology Group at the University of Zurich. Many projects have been described in previous issues of Frozen Ground and new developments are outlined below.

Experimentation with improved transient 3D temperature modeling techniques in alpine permafrost was continued to investigate the effect of past and future climate change on subsurface temperatures in steep terrain (J. Noetzli, S. Gruber, and W. Haeberli). The permafrost distribution in the Schilthorn Ridge was investigated by combining numerical temperature modeling, ground temperature measurements, and electrical resistivity tomography. The combination of these approaches bears potential to improve modeling and validation strategies (J. Noetzli, S. Gruber, and M. Hoelzle, in collaboration with C. Hilbich, Univ. of Jena and C. Hauck).

A helicopter-borne LiDAR survey of the Monte Rosa east face was conducted in September 2007. This LiDAR data together with a time series of photogrammetric high-resolution DTMs starting in 1956 provide a basis for morphometric analyses and studies of glaciation history as well as investigations of slope instabilities in both permafrost-containing bedrock and steep glaciers (L. Fischer, C. Huggel, and W. Haeberli).

The thawing of steep bedrock induced by running water in cliff systems as well as dilation of cracks related to cryospheric processes are investigated with a new PermaSense prototype deployment on Matterhorn. PermaSense is a collaborative project developing wireless sensor networks for autonomous operation in harsh environments (A. Hasler and S. Gruber, in collaboration with ETH Zurich, University of Basel, and EPF Lausanne).

In a study carried out at the Aiguille du Midi (3842 m a.s.l., France), rock surface ages using ^{10}Be and their spectral properties in homogenous lithology were compared. Results could be a first step to place modern observations on rock fall activity on permafrost slopes into a long-term perspective by interpreting the surface color as an age proxy (R. Böhlert, S. Gruber, and others, in collaboration with the Institute for Particle Physics, ETH Zurich, and EDYTEM, Univ. Savoie).

Processes of energy exchange at the surface, in the active layer, and in the subsurface are further investigated, monitored, and modeled at the borehole sites Murtèl-Corvatsch, Schilthorn and Stockhorn (S. Gruber, W. Haeberli, A. Hasler, M. Hoelzle, J. Noetzli, and students from the Institute of Geography at the University of Zurich, in collaboration with the universities of Fribourg, Jena, and Karlsruhe and with PERMOS).

Within a NASA funded IPY project in the Copper River region (Wrangell/St. Elias national park, Alaska, USA) led by J. Kargel (University of Arizona), a rockglacier monitoring of horizontal displacements and ground surface temperatures was



Wireless sensors are being developed within the PermaSense project, an interdisciplinary cooperation between permafrost scientists and computation engineers of the Universities of Zurich and Basel, the ETH Zurich and EPF Lausanne (Photograph provided by Dani Vonder Mühl)

started in July 2008 (M. Hoelzle and I. Roer, in cooperation with R. Frauenfelder, NGI Oslo, and A. Kääh, Univ. Oslo). In addition, rock avalanche dynamics from glacierized and perennially frozen rock walls are investigated (L. Fischer and C. Huggel).

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UNITED KINGDOM

In August 2008 S. Gurney (University of Reading) conducted a pilot project in the far north of Finland based at the Kevo Sub-Arctic Research Institute with colleagues R. Mourné (University of the West of England) and J. Käyhkö (University of Turku, Finland). The project aims to investigate methane production from collapsing palsas. A palsa mire not previously investigated was identified and preliminary data obtained. The work was funded through the LAPBIAT scheme of the EU Sixth Framework Programme 'Structuring the European Research Area Specific Programme'.

Fieldwork in the Mason Bay area of the Tuktoyaktuk Coastlands, western Arctic Canada, logged and sampled the Pleistocene Kidluit Formation and examined massive-ice exposures and fluvial gravels. The Kidluit Formation is hypothesised to record the former deposits of the palaeo-Porcupine River, which flowed from the north Yukon into the Arctic Ocean until its path was blocked by the Mackenzie lobe of the Laurentide Ice Sheet during the Late Wisconsinan,

diverting it into the Yukon River system. Preliminary optical dating by M. Bateman (Sheffield) indicates an Early to Mid Wisconsinan age for the Kidluit Formation. New evidence found in 2008 indicates that the formation incorporates glacial material (faceted and striated clasts) that is older than the last, Late Wisconsinan glaciation. This glaciation now needs to be correlated with one from the Yukon. Massive-ice exposures at Crumbling Point (Summer Island) and around Mason Bay are opening up due to thaw slumping, offering ideal conditions for calibrating geophysical mapping of ice and glaciectonite, to elucidate understanding of interactions between permafrost and the Mackenzie palaeo-ice-stream.



Mason Bay research team, from left to right, R. Waller (Keele), C. Whiteman (Brighton), D. Murton (Cardiff), R. Cockney (Tuktoyaktuk), J. Murton (Sussex) and E. Pokiak (Tuktoyaktuk), Mason Bay, northeast Richards Island, NWT. (Photograph provided by Julian Murton)

Fieldwork undertaken by S. Hitchens (Sheffield) during this summer was integral to a regional study of the Late Pleistocene periglacial environment of East Anglia that had begun in the central Breckland area, around Thetford, in December 2006. This study extended north and south in the region during the summer. The central thrust of the research is to constrain the chronology for periglacial aeolian activity and patterned-ground formation using optical luminescence techniques that have only recently been directed to work in this part of the UK. Periglacial stripes were examined and sampled in trial pits in Cambridgeshire and northwest Norfolk. Currently the sediments are being prepared for optical analysis at the dating facility at Sheffield University and will contribute to the greater body of data being generated from samples collected in the Breckland area.

In August 2008 Professor Charles Harris retired from the School of Earth and Ocean Sciences at Cardiff University. Over a long and distinguished career, Charles has made many important contributions to permafrost science, periglacial geomorphology and Quaternary geology, in terms of research, teaching and administration. Highlights include his seminal research on the understanding of periglacial hillslope processes and deposits, his leadership of the European PACE project, his editorial contributions to *Permafrost and Periglacial Processes*, and his guidance as Vice-President to the IPA. In addition Charles has for many years provided excellent leadership for the UK permafrost and periglacial community. We wish him a

happy and fulfilling retirement in south Wales.

We regret to note the death of G. Larminie in October 2008. He was Alaska manager of BP Oil Corporation in the early 1970s and Director of the British Geological Survey in the late 1980s. He served on many polar advisory groups, was a supporter of interdisciplinary research, and appreciated the role of permafrost in northern petroleum exploration and development

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UNITED STATES OF AMERICA

The U.S. Permafrost Association (USPA) served as the parent organization for the Ninth International Conference on Permafrost. A U.S. National Committee was established under the USPA to assist the University of Alaska's Local Organizing Committee as a co-sponsor and co-organizer of NICOP. Approximately 700 people, including 160 young investigators, from 31 countries participated (see pp. 5-7).

The 2008 Fall Meeting of the American Geophysical Union took place in San Francisco, California, December 15–19. There were over 60 presentations dealing specifically with frozen ground amongst the 686 abstracts presented in 34 Cryosphere sessions. Additional 45 cryospheric presentations took place in four Union sessions, as well as additional presentations in other focus groups. Reports and posters covered climate change in Polar Regions, rapid Arctic change, the International Polar Year, and remote sensing, specifically including terrestrial permafrost. The U.S. Permafrost Association held its annual meeting during AGU and voted on its new Board of Directors. New officers elected were J. W. Rooney as president-elect, O. Frauenfeld as secretary, and T. Douglas as board member at-large. The USPA treasurer M. Lilly, upon his retirement, was recognized for his dedicated services and contributions to permafrost communities. J. Zarling was appointed by the USPA board to serve the remaining year of Lilly's term.

The 2008 Annual Meeting of the Association of American Geographers took place April 15–19 in Boston. The AAG's Cryosphere Specialty Group (CrSG) sponsored 15 sessions on topics including cryospheric student field work, paleoclimatology, soils, the Arctic carbon and water cycles, glaciers, hydroclimatology, and mountain environments. The annual CrSG awards were presented. The 2008 Francois Emile Matthews Award went to J. Brown, President of the International Permafrost Association in recognition of his contributions to permafrost, and cryospheric science in general. The R. S. Tarr Illustrated Student Paper Award went to Texas A&M University's J. Morris, for her presentation on "Impurities in Snow: Effects on Spectral Albedo of Prairie Snowpacks," with co-author A. Klein.

T. Krzewinski reports the Technical Council on Cold Region Engineering (TCCRE) contributed significantly to NICOP as cosponsors, paper reviewers, in field trips, and facilitating publication of the ASCE TCCRE Frozen In Time – Permafrost and Engineering Problems (see pages 3-5). Krzewinski was appointed as the U.S. Representative to the IPA. Upcoming TCCRE-related events include the ASCE's 14th International Specialty Conference on Cold Regions

Engineering in Duluth, Minnesota, September of 2009; CSCE “Circum-Polar Engineering Conference 2010” in Yellowknife in September; ISCORD 2010 in July in Yakutia, Russia, with plans for hosting ISCORD 2013 in Anchorage, Alaska; ASCE’s 15th International Specialty Conference on Cold Regions Engineering in 2011 in Quebec; and participation in TICOP in 2012. TCCRE Committee Meetings were held in Fairbanks during NICOP. TCCRE, represented by T. Krzewinski and E. Clarke, is participating in the Standards Committee, responsible for updating the Standard on Frost Protected Shallow Foundations (FPSF). TCCRE Technical and Administrative Committees are accepting new members, (contact tkrzewinski@golder.com or 907-341-6103). TCCRE, representing ASCE, is supporting a new PBS Documentary “Challenges of Transportation Infrastructure Design and Construction in Alaska,” with a focus on highways and railroads. Together with B. Connor of UAF, K. Korri of ADOT, and T. Brooks of the Alaska Railroad, T. Krzewinski is leading the efforts for ASCE. Publications include the Quarterly Journal on Cold Regions Engineering (ASCE), Proceedings of ISCORD 2007 (available on CD from RIL), and Proceedings of the 13th Conference (on CD from ASCE). The 2004 TCCRE Monograph “Thermal Analysis, Construction and Monitoring Methods for Frozen Ground” is available through ASCE, with future ones in preparation. See publications section for detailed information on these publications.

K. Hinkel (University of Cincinnati) and collaborators J. Lenters (University of Nebraska) and Y. Sheng (University of California, Los Angeles) began work on the NSF-funded project on dynamics of lakes on the Alaskan Arctic Coastal Plain. W. Eisner and C. Cuomo continued to explore the intersection of Inupiat knowledge and environmental change on the North Slope by interviewing elders from Barrow and Nuiqsuit. R. Beck and his IT group (University of Cincinnati) installed a 700 Mhz long-range (16-mile diameter) wireless Internet system at the new Barrow Arctic Research Center (BARC) to be used for NSF projects, U.S. Coast Guard ships, aircraft, and field scientists. They also developed and tested a solar and wind power system for remote monitoring sites, developed and tested a GPS-enabled real-time satellite tracking system for lake surface current monitoring, developed a TCP/IP-based geo-referenced video and high-resolution still imaging system, developed a low-cost, networked ground camera and meteorological station, installed a real-time permafrost temperature monitoring system for the BARC foundation.

N. Shiklomanov, F. Nelson, D. Streletskiy (University of Delaware Permafrost Group-UDPG), A. Klene (University of Montana), and C. Seybold (USDA Natural Resources Conservation Service) visited the main CALM sites in Alaska’s North Slope and Seward Peninsula during August and September. Ph.D. student M. Demitroff continues his paleoperiglacial studies in the Mid-Atlantic States with H. French. Demitroff and Streletskiy both gave invited lectures recently at the Smithsonian Institution in Washington DC. Nelson and Demitroff were invited attendees at the “Tough Choices” conference in Berlin during early October, where they presented on permafrost and its interrelations with land-use decisions in the U.S.A. UDPG graduate students A. Wedo, M. Schimek, and S. Cruzatt are nearing completion of their

M.S. theses dealing, respectively, with periglacial blockfields in Pennsylvania, topoclimatic effects on the active layer in northern Alaska, and the soil climate of the high Peruvian Andes. UDPG students and staff contributed to ten NICOP presentations and Proceedings papers. With assistance from Streletskiy and Nelson, Shiklomanov organized the second CALM Workshop in conjunction with NICOP (see page 7). In cooperation with the American Geographical Society, the University of Delaware is sponsoring the W.S. Carlson International Polar Year Events, a series of lectures, seminars, films, museum exhibitions, and other activities celebrating the current IPY and the University’s multiple contributions to it. The series, named for a former UD President with extensive field experience in Greenland and Alaska, was organized by Nelson.

V. Romanovsky and the UAF permafrost group at the Geophysical Institute and International Arctic Research Center (K. Yoshikawa, S. Marchenko, D. Nicolsky, R. Daanen, G. Grosse, and A. Kholodov) report continued activities on permafrost and active layer projects in Alaska, instrumentation of boreholes and acquisition of subsurface temperature data from circum-arctic permafrost regions (Thermal State of Permafrost-TSP), and permafrost modeling in Alaska, Siberia, and Greenland. Under the NSF TSP-sponsored project a network of boreholes are being instrumented for long-term temperature observations in the Russian Arctic, Antarctic, and Alaska. More than 90 new boreholes were instrumented in Russia, and more than 60 existing Alaskan permafrost observatories were continued. Marchenko, in collaboration with a team from the Kazakhstan Institute of Geography, conducted mountain permafrost research in the Northern Tien Shan Mountains. A map of permafrost temperature distribution was generated for the Altai Mountain region. A. Kholodov, in collaboration with the Institute of Physical-Chemical and Biological Problems of Soil Science RAS, participated in an expedition to Northern Yakutia where a new borehole was instrumented and 2006–2007 data from the loggers were downloaded. G. Grosse conducted fieldwork in the Seward Peninsula with colleagues from Alfred Wegener Institute for Polar and Marine Research, Germany, to study thermokarst lake dynamics and landscape processes employing GIS and multi-temporal remote sensing data. Grosse is maintaining and developing the Permafrost Young Researchers Network Thesis Bibliography (PYRN-Bib, www.pyrn.org). R. Daanen modeled the Greenland permafrost history, driven by high-resolution climate simulations, in collaboration with Danish permafrost researchers from the Technical University of Denmark, Greenland (ASIAQ) and the Danish Meteorological Institute (DMI). A new EPSCoR study to understand lobate debris flows in the Brooks Range was initiated. Work continued on the Alaska Peatland Experiment (APEX), focusing on hydrology and cold climate effects on carbon accumulation.

K. Yoshikawa (UAF Institute of Northern Engineering) and fellow researchers visited 92 native village schools in Alaska to install shallow (up to 6 meters deep) permafrost cables and active-layer frost tubes. The stations are adjacent to schools in Alaska as well as in schools in several other countries. Monitoring permafrost temperature and seasonal thaw allows students to collect, analyze, and share data. In spring 2008, 25 villages in Western Alaska (Emmonak/Kivalina) were visited

by snow machines and with a light-weight, rotary percussion drill. A movie-based permafrost education curricula and lessons are developed in the “Tunnel Man Series” (www.uaf.edu/permafrost). This outreach project is supported by the University of Alaska’s EPSCoR, NASA, and NSF IPY-TSP programs.



Kenji Yoshikawa demonstrates field methods to Alaskan village students. (Photograph provided by Kenji Yoshikawa)

Colleagues T. Zhang, O. W. Frauenfeld, R. G. Barry, K. Schaefer, and M. Parsons at the National Snow and Ice Data Center (NSIDC), University of Colorado at Boulder, continue to document changes in permafrost and seasonally frozen ground in the Siberian Arctic and Subarctic. Together with D. Gilichinsky from the Russian Academy of Sciences they have digitized and archived soil temperatures from more than 420 stations across Russia (available from the Frozen Ground Data Center). Frauenfeld and Zhang continue to study the impact of synoptic-scale circulation on the soil thermal regime and frozen ground over the Eurasian high latitudes. Zhang and Schaefer are working on soil temperature reemergence, and impacts of soil freezing and thawing processes and snow cover on carbon exchange between the land surface and the atmosphere in cold seasons/cold regions using a coupled SibCASA model. As part of an IPY project, Zhang joined N. Panikov (Dartmouth College) to investigate microbial processes in permafrost. Zhang is working closely with Q. Wu and colleagues from Lanzhou, China, on changes in permafrost along the Qinghai-Tibetan Railway. Zhang and colleagues continue work on detecting soil freeze/thaw status using passive microwave remote sensing data and ultimately developing a comprehensive frozen soil algorithm for global soil freeze/thaw studies. Zhang, with help from H. Baker (Canada) and G. Cheng (CAREERI/CAS, China), was guest editor for a special permafrost engineering issue of Cold Regions Science and Technology. Zhang and B. Sheffield developed a frozen ground outreach website entitled “All About Frozen Ground” (www.nsidc.org/frozenground). The NSIDC FGDC continues to serve permafrost and cold regions science communities, and the general public with data and information issues. Roger Barry, NSIDC Director since 1982, retired from the position in April 2008, but remains as Director, WDC for Glaciology, Boulder, and Distinguished Professor of Geography.

A sequence of IPY Polar Day activities were organized including press releases, contacts with experts in several languages, activities for teachers, on-line community participation, web-conferencing events, and links to researchers. The June 18 IPY Day focused on Land and Life, with permafrost research as a focal point. J. Brown prepared an introduction to permafrost for a general audience. Three live web events took place. The Live from IPY Event, hosted through ARCUS’ PolarTREC program, included an overall summary of the global importance of permafrost (V. Romanovsky, UAF), followed by coastal erosion (C. Wobus, University of Colorado), and information on how life can exist within permafrost and other polar terrestrial environments (J. Baeseman, McMurdo Dry Valleys LTER). In addition to these, and live events in Europe, a classroom activity was designed for teachers that demonstrate the concept of ice wedges within permafrost and how thawing permafrost can affect ecosystems. For more information on this Polar Day or to listen to the archived events and download the activity, visit: http://www.ipy.org/index.php?/ipy/detail/land_life.



Jenny Baeseman with a group of 4th graders from Lisle, IL after a presentation on the importance of learning more about Land and Life in the Polar Regions. (Photograph provided by Jenny Baeseman)

The High Alpine and Arctic Research Program (HAARP) at Texas A&M University is co-directed by J. Rick Giardino and J. Vitek. H. Zhan, R. Kaiser, and J. Degenhardt are working with HAARP, as are graduate research assistants N. Regmi, K. Zhuang, A. Lee, D. Rodosovich, and T. Brunk. Researchers continue to focus on multiscale aspects of alpine and arctic landscapes in Colorado and Alaska and on monitoring global warming impacts on rock glaciers in the San Juan Mountains. Ground penetrating radar and electromagnetic induction meters are employed to investigate internal structure and water pathways of rock glaciers in Yankee Boy Basin in the San Juan and California rock glacier, and Mount Mestas in the Sangre de Cristo mountains. HAARP is also using 3-D visualization of GPR data to model landslide movement along the slopes of Grand Mesa. Researchers continue to monitor stone polygons to extend the existing thirty-year record. Investigations also include climate change-watershed relationships and water quality issues in Bering Land Bridge National Preserve and Cape Krusenstern National Monument and mapping rock

glaciers and debris flows in the Savage River basin in Denali National Park.

N. Mölders and D. PaiMazumder (University of Alaska Fairbanks) examined the impact of ecosystem albedo changes on permafrost distribution and dynamics using the Community Climate System Model (CCSM). The albedo change data used in these investigations stem from Terrestrial Ecosystems Model (TEM) simulations provided by E. Euskirchen (UAF). Preliminary results show that the TEM-simulated albedo changes over the Pan-Arctic affect soil temperatures year-round and not only in summer when the ecosystem has a different albedo. The greatest soil temperature changes occur in fall and decrease towards spring, then increase again. Mölders and G. Kramm (UAF) also examined the performance of the Hydro-Thermodynamic Soil Vegetation Scheme (HTSVS) using data from a site in Yakutsk, Siberia.

G. Doré, (Laval University) and H. Zubeck (University of Alaska Anchorage) have co-authored a book on Cold Regions Pavement Engineering published by McGraw-Hill and ASCE Press (available from ASCE or online bookstores). See details in the publications section The Thematic Network on Arctic Engineering and Science (TN AES) has been established at the University of the Arctic. The focus of the network is to develop sustainable technologies through engineering and science that improve the quality of life and allow for natural resource development in the North. For more information, contact S. Knutsson (Sven.Knutsson@ltu.se) from Luleå University of Technology, or H. Zubeck (Hannele.Zubeck@uaa.alaska.edu). The ASTM International sub-committee D.18.19 on Frozen Soil and Rock is looking for new members, officers, and volunteers for reviewing or authoring standards (contact H. Zubeck).

J. Cherry (UAF's International Arctic Research Center and the Institute of Northern Engineering) manages the hydrometeorological station network on the Seward Peninsula, Alaska. This network was built by L. Hinzman and collaborators during the NSF-supported Arctic Transitions in the Land-Atmosphere System (ATLAS). With funding from the Alaska Experimental Program to Stimulate Competitive Research



(EPSCoR) and NSF's Arctic Research Support and Logistics program, Cherry is upgrading, recalibrating, and replacing sensors at these sites in Northwestern Alaska, and collaborating with the University of Delaware and UAF to maintain active

layer and soil temperature monitoring at sites on the Seward Peninsula.

Research Engineer Bob Busey excavates a new shallow borehole to replace soil thermistors near the Council CALM grid, Seward Peninsula. (Photograph provided by Jessie Cherry)

K. Bjella (CRREL Fairbanks) reports that an estimated 400 NICOP participants visited the Permafrost Tunnel in Fox, Alaska. At the CRREL Fairbanks Permafrost Experiment Station (FPES or Farmers Loop Site), a laterally loaded pile investigation was initiated by UAF personnel and funded by State of Alaska DOT. Bjella conducted a subsurface investigation of permafrost at Thule Air Force Base, Greenland, utilizing geophysical techniques and test pits to ascertain the distribution and depth of massive ice under the runway. B. Astley and J. Zufelt (CRREL Anchorage) are investigating permafrost at Shishmaref, as part of an erosion control study for the U.S. Army Corps of Engineers, Alaska District. Astley mapped the depth to permafrost at a groundwater contamination site on Fort Wainwright to determine local groundwater flow pathways and to test the applicability of several geophysical techniques. M. Sturm (CRREL Fairbanks) and his partners at the University of Alaska and Colorado State are studying snow cover in Barrow and Toolik Lake to understand the winter water balance. These results will be the first detailed descriptions of the winter blanket of snow on polygonal ground, and will be useful in assessing the thermal insulation value of the snow.

The U.S. permafrost community mourns the passing of USGS Geologist George Gryc on April 27, 2008; James V. Drew of the University of Alaska Fairbanks on July 9, 2008; botanist and forest ecologist Leslie "Les" A. Viereck on August 31, 2008; and Bertrand Dee Tanner of Campbell Scientific on September 16, 2008.

Oliver W. Frauenfeld (oliverf@colorado.edu); USPA Secretary

OTHER NEWS

IPY AND PERMAFROST: A VIEW FROM THE IPY INTERNATIONAL PROGRAMME OFFICE

We can summarize the IPY goals as: (a) make major advances in polar knowledge and understanding; (b) leave a legacy of new or enhanced observational systems, facilities and infrastructure; (c) excite a new generation of polar scientists and engineers, and (d) elicit exceptional interest and participation from polar residents, schoolchildren, the general public, and decision-makers, worldwide. In all these activities the permafrost community, through its research projects, its formal International Permafrost Association, and its Permafrost Young Researchers Network (PYRN), has played active and leading roles.

To achieve major advances in knowledge, IPY has entrained the intellectual resources of thousands of scientists, many more than expected, often from 'non-polar' nations, and representing an unprecedented breadth of scientific specialties; integration of those efforts across disciplines to achieve integrated system-level understanding remains a substantial challenge. Many national and international organizations prepare plans to sustain new and improved observational systems, but clear outcomes and the necessary resources remain elusive. International outreach networks gradually build breadth and strength, largely through IPY Polar Science Days and other internationally-coordinated IPY events. A new Association of Polar Early Career Scientists (APECS) devotes talent and energy to shaping the future of polar research. These activities and networks may, with time and with continued international coordination, achieve an exceptional level of interest and participation. In all areas, much work remains.

We can identify leading contributions by the permafrost community in all these areas. Permafrost research stimulates many interdisciplinary links through its connections with engineering and civil infrastructure and through its essential role in global hydrological and carbon cycles. A substantial part of the permafrost effort during IPY has focused on the upgrade and maintenance of long-term permafrost monitoring sites and systems and these will form essential components of future Arctic and Antarctic observational networks.

In attracting future generations of polar researchers, the PYRN has provided a successful example and a substantial international membership. The International Permafrost Association and many of its member countries played large roles in the recent "International Polar Day" focussing on Land and Life, including stimulating and supporting numerous individual researchers visiting schools in their local communities. Three live events occurred in time-zones around the world, connecting researchers in the Arctic with classrooms around the world, a teachers' workshop in Tasmania, and a UNEP international children's conference in Norway. As a result of these efforts, the IPY community now has active contacts in countries across South America and Africa, and permafrost research has featured in school projects around the world. K. Yoshikawa, from the University of Fairbanks, is a great example, regularly visiting local schools and communities across Alaska. No matter how great the educational materials a

teacher might have, there is no replacement for real-life contact between school students, teachers, and active researchers. In addition, on-going visits are especially beneficial to a school as the students start seeing these scientific visitors as 'real people', indeed this is often the catalyst that leads children to becoming scientists. This combination of local outreach and international networks has extended awareness of permafrost topics and research across many nations and many languages while also providing local connections and local examples of relevant and exciting science to interested students.

The permafrost community represents an important partner in the IPY legacy, particularly in the increasing recognition of permafrost as a key feature of the cryosphere, biosphere, and hydrosphere. A strengthened and expanded permafrost community will represent one of IPY's most important successes.

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SECOND CIRCUMPOLAR ACTIVE LAYER MONITORING (CALM) WORKSHOP

During the week preceding the Ninth International Conference on Permafrost, the second CALM workshop was held June 25-27, 2008 on the campus of the University of Alaska-Fairbanks (UAF). The workshop was organized by Nikolay Shiklomanov, Dmitry Streletskiy, and Fritz Nelson (University of Delaware), and Anna Klene (University of Montana). Attended by 45 researchers from nine countries, the workshop was held to assess CALM's progress during the past five years and to plan for the next five-year iteration of the program. Participants contributed presentations concerned with progress at their respective field sites, discussed problems and developments in observational and analytic techniques, and worked collaboratively on issues relating to constructing, managing, and accessing data archives. Shiklomanov and Streletskiy organized and led a field trip along the 500-mile Dalton Highway between Fairbanks and Prudhoe Bay for Russian CALM investigators.

Besides providing a comprehensive and critically important empirical record of climate-change impacts in the world's cold regions outside the domain of glaciers, data from the 168 currently operating CALM sites are used extensively to test and validate results from large-scale climate models. The CALM web site (<http://www.udel.edu/Geography/calm/>), maintained on the University of Delaware server, is used extensively by geocryologists, climate modelers, ecologists, civil engineers, and others with interests in changing conditions in polar and mountain environments.

A major accomplishment of the CALM II workshop was the formal establishment of an extensive Southern Hemisphere component in the program. Known as CALM-South (CALM-S), this rapidly developing component of the program includes sites on the Antarctic continent, on several sub-Antarctic islands, and in the southern Andes. During the workshop, J. Bockheim compiled an inventory of boreholes being used for the TSP temperature measurements. Both CALM and the TSP boreholes are part of the IPA-IPY bi-polar activities.

The first CALM Workshop, held in November 2002 at the

Viriden Center on the University of Delaware's Lewes campus (<http://www.udel.edu/PR/UDaily/01-02/arctic121002.html>), resulted in two collections of papers published as special issues of prominent scientific journals (Nelson, *Permafrost and Periglacial Processes*, vol. 15, no. 2, 2004; Nelson, *Polar Geography*, vol. 28 no. 4, 2004; several studies published in the Proceedings of the Ninth International Conference on Permafrost). The CALM II program's contribution to this summer's conference extends that output, with 35 individual papers published in the NICOP Proceedings. Among these publications was a plenary paper detailing CALM's accomplishments to the present time and published in the NICOP proceedings (Nelson et al., 2008). The early history of the program was provided in the monograph by Brown et al. (2000, *Polar Geography*).

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CARBON POOLS IN PERMAFROST REGIONS (CAPP)

The IPA CAPP Carbon Pools in Permafrost Regions (CAPP) project was started in 2005, with endorsement of the EESP Global Carbon Project and the WCRP Climate and Cryosphere Programme. CAPP is also a project of IPY (#373).

The overall aims of the IPA-CAPP Project are to assess 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. The longer-term plan of IPA-CAPP is to contribute and initiate new research activities at up to 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. Intensive study sites along transects will permit the investigation of the allocation of below-ground carbon in the landscape, and comparison of quantity and quality between different permafrost settings. An important consideration for these activities is to further evaluate the fate of 'permafrost carbon' under conditions of global warming (and permafrost thawing) and to assess climatic feedbacks from high latitude, below-ground carbon pools to global warming due to physical (ground subsidence, altered drainage, thermokarst erosion, fire, etc.) and biogeochemical (decomposition, leaching, etc.) changes.

A first CAPP related workshop was held at Stockholm University in November 2005, with support from the European Science Foundation. CAPP members participated in two workshops at the National Center for Ecological Analysis and Synthesis (Santa Barbara, California) in March and December 2006, which were supported by the U.S. NSF and UNESCO grants. An important result of these workshops was the publication of a conceptual paper that assesses the vulnerability of the permafrost carbon pool to global warming (Schuur et al., 2008, *Bioscience*, 58: 701-714).

Within the limited timeframe of IPY 2007-2008, an important objective for CAPP has been to contribute to the Northern Circumpolar Soil Carbon Database, maintained by Charles Tarnocai (Ottawa). In cooperation with the IPA Cryosol Working Group and the Global Carbon Project, a new update has now been completed and is expected to be published

soon. Furthermore, an Atlas of Northern Circumpolar Soil was produced (European Commission, 2008; eusoiils.jrc.it/library/Maps/Circumpolar). CAPP also contributed to the IPY 'Land and Life' initiative. The CAPP project was presented at NICOP in Fairbanks (June 2008) and the 33rd International Geological Congress in Oslo (August 2008).

CAPP related research is underway in Alaska, Canada, Scandinavia and Russia. New results will be discussed at a second CAPP workshop that is planned for 3-5 June 2009 in Stockholm. Furthermore, CAPP will participate in the IPA contribution to the IPY Oslo Science Conference and organize a session at the Third European Conference on Permafrost (EUCOP III) in Svalbard, June 2010.

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CLIMATE AND CRYOSPHERE (CLiC)

The CliC Project was established in March 2000 by the World Climate Research Programme to stimulate, support, and coordinate research into the processes by which the cryosphere interacts with the rest of the climate system. The CliC project's principal goal is to assess and quantify the impacts that climate variability and change have on components of the cryosphere and its overall stability, and the consequences of these impacts for the climate system. To attain its goal, CliC develops and coordinates national and international activities related to cryosphere and climate. This includes organizing conferences, workshops, scientific experiments, and model comparison studies, as well as collaboration with other groups involved in climate research. CliC promotes projects to recover, archive, and distribute historical data sets.

The International Arctic Science Committee (IASC) joined WCRP and SCAR as a cosponsor of CliC. The Memorandum of Understanding was signed in July 2008 at the SCAR-IASC Open Science Conference in Russia. The three organizations share common goals in seeking to observe, understand and predict climate variability and change in the polar regions, including the Arctic Ocean and Southern Ocean. The goals and objectives of the WCRP/IASC/SCAR CliC project fully encompass the scientific interests of IASC. CliC looks forward to contributing to the goals and objectives of all of its sponsors

Arctic observing activities cover a broad range, from individual measurement sites, systems and networks on the Earth's surface, and space-based observation of the Earth's surface. The need for a well coordinated and sustained Arctic Observing Network that meets scientific and societal needs has been identified in numerous high profile reports and at a variety of workshops and conferences. The goal of Sustaining Arctic Observing Networks is to establish a coordinated and integrated, multi-nation, pan-Arctic Observing Network. SAON Initiating Group (SAON IG) leads planning process. CliC has been a founding member of the SAON Initiating Group. CliC and the IG have worked with representatives of international organizations, agencies, and northern residents involved in research and operational and local observing to develop a set of recommendations on how to achieve long-term Arctic-wide observing activities that provide free, open, and timely access to high-quality data that will realize pan-Arctic and global value-added services and provide societal

benefits. SWIPA is the climate and Cryosphere Project of the Arctic Council. It will make major contributions to improved understanding and prediction of the changing Arctic cryosphere. CliC is very supportive of this initiative and actively participate in this effort. CliC researchers in Europe and North America serve as the lead authors of chapters.

To ensure a legacy for cryosphere observing and monitoring, not only in polar regions, but also globally, the Global Cryosphere Watch (GCW) has been proposed as a WMO initiative and welcomed by the Fifteenth World Meteorological Congress in May 2007. GCW will contribute to WMO's integrated observing and information systems and to the Global Climate Observing System network (like the Global Atmosphere Watch does). It will cover all aspects of the cryosphere and be an intergovernmental mechanism for supporting key cryospheric in-situ and remote-sensing observations, while implementing the recommendations of the IGOS Cryosphere Theme. In collaboration with other international programmes and agencies, the proposed GCW will provide reliable, comprehensive observations of the elements of the cryosphere through an integrated observing approach on global and regional scales. It will work with, and build on, existing programmes such as the Global Terrestrial Network for Glaciers and the Global Terrestrial Network for Permafrost and work with external partners such as space agencies and World Data Centers for Glaciology. A GCW goal will be to establish a one-stop portal for authoritative cryosphere data and products/information, helping existing elements to be better integrated and contributing to a global data system. If approved, GCW will provide the integrating mechanism needed to ensure better quality of data and metadata, and ensure comparison of algorithms and the evaluation of products. It will also ensure the means to provide the scientific community with good-quality data to predict the future state of the cryosphere, resulting in improved prediction of the earth system over a wide range of time and space scales, and while facilitating assessment of changes in the cryosphere and their impact on climate. GCW will use this information to aid the detection of climate change and organize assessments of changes in regional and global components of the cryosphere to support decision-making and policy development. GCW is an exciting new WMO initiative largely resulting from CliC activities, and CliC will continue its efforts to turn the GCW vision into reality.

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SUSTAINING ARCTIC OBSERVING NETWORKS (SAON)

SAON is a process that was undertaken to stimulate multinational engagement in developing sustained and coordinated pan-arctic observing and data sharing systems that serve societal needs. This goal relates to environmental system and socio-economic change in response to a request by the Arctic Council in its Salekhard Declaration:

'The circumpolar observing network should coordinate data handling and information exchange for scientific data, statistics and traditional knowledge and establish itself as a lasting legacy of the IPY and as the evolving component of the Global Earth

Observing System of Systems, (GEOSS)'

Taking into account all these statements, the Arctic Monitoring and Assessment Program (AMAP) initiated a dialogue with potential partners who in January 2007 led to forming the Sustaining Arctic Observing Network –Initiating Group (SAON-IG), consisting today of 13 international organizations (and involving the International Permafrost Association). This approach aimed at engaging all Arctic observing communities through the networks of these organizations.

The SAON-IG agreed to develop a set of recommendations on how to achieve long-term Arctic-wide observing activities that provide free, open and timely access to high quality data that will realize pan-Arctic and global added-value services and provide societal benefits.

The first step towards achieving this mission was to solicit broad community input at three workshops:

- Stockholm, Sweden (November 2007)
- Edmonton, Canada (April 2008), and
- Helsinki, Finland (October 2008)

In addition, workshops were held in St. Petersburg, Russia (July 2008) and Incheon, Korea (September 2008) for the purpose of increasing awareness of the SAON IG effort and engaging Russia and Asian countries in the future Arctic observing.

A summary of the outcome from these are available at: www.arcticobserving.org

SAON is aiming at assisting ongoing and planned observing networks, data and information systems. As such, SAON recognizes the networks coordinated by the IPA as relevant and which are already well integrated in polar observation programs. These networks include the GTN-P (Global Terrestrial Network on Permafrost) and its components CALM (Circumpolar Arctic Layer Monitoring Network) and TSP (Thermal State of Permafrost) as well as the ACCOnet (Arctic Circumpolar Coastal Observatory Network).

The integration of GTN-P into GTOS (Global Terrestrial Observing System) and of ACCOnet into C-GTOS (Coastal-GTOS) was widely acknowledged as an example of vertical and horizontal integrations into global observation systems. These networks envisioned as the cornerstone of two of the "building blocks" planned to structure SAON in the near future, namely the Cryosphere building block (GTN-P, TSP, CALM) and the Coastal building block (ACCOnet). The IPA will pursue its commitment to the SAON process and support the SAON-IG as a partner dedicated to the principles enacted by the SAON-IG

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CLIMATE CHANGE AND THE CRYOSPHERE: SNOW, WATER, ICE, AND PERMAFROST IN THE ARCTIC (SWIPA)

The Arctic Council of Ministers has requested a report on the current status of various aspects of the Arctic's Cryosphere. The objective of the project is to provide the Arctic Council with timely, up-to-date, and synthesized scientific knowledge about the present status, processes, trends, and future consequences

of changes in the Arctic. Future scenarios will be developed to determine, as far as possible, the consequences of these changes on physical processes at a local, regional, and global scale, and to determine consequences for Arctic biological systems, human societies and lifestyles. The project does not intend to initiate any new research, but will be based on recent or ongoing projects, including AMAP national implementation plans, and international activities including IPY research using ACIA, 2005 as a benchmark.

The project consists of three components:

Component 1:

Climate Change and Arctic Sea Ice. (Lead: Norway and USA)

Component 2:

Climate Change and the Greenland Ice Sheet. (Lead: Denmark)

Component 3:

Climate Change and the Terrestrial Cryosphere. (Lead: Canada and Sweden)

Module 1: Changing snow cover and its impacts.
(Lead: Sweden)

Module 2: Changing permafrost characteristics, distribution and extent and their impacts.
(Lead: Sweden)

Module 3: Mountain glaciers and ice caps.
(Lead: Canada, Russia and USA)

Module 4: River and lake ice.
(Lead: Canada, Russia and USA)

The project will be implemented by AMAP and its Climate Expert Group (CEG) in close cooperation with national organizations, international organizations (in particular, IASC, CliC, and IPY), and Arctic Council working groups and Permanent Participants. Scientific reports and an overview will be printed in 2011.

Module 2: "Changing permafrost characteristics, distribution and extent and their impacts" is lead by Sweden (T. Callaghan and M. Johansson). A core group, i.e. lead authors, for the permafrost module has been assembled and consists of S. Smith (Canada), H. H. Christiansen (Norway), A. Instanes (Norway) and O. Anisimov (Russia) and V. Romanovsky (USA). Up to date (November, 2008), 22 contributing authors have agreed to contribute to this process. Writing has just been initiated and the first draft of the report for permafrost will be compiled in April 2009.

Continuous updates on the SWIPA process will be available on AMAP's web site www.amap.no.

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PERMAFROST AND PERIGLACIAL GEOMORPHOLOGY OF WESTERN TAYMYR (PPG), RUSSIA

As part of the IPA's IPY activities a field course on Permafrost and Periglacial Geomorphology of Western Taymyr (PPG) took place along the Western Taymyr coast in July-August 2008 for students studying the North. The purpose of the course was to study different types of ground ice: ice wedges, ice complex, hydrolaccoliths, massive ice as well as to investigate the morphology and cryolithology of Western Taimyr Quaternary deposits.

The geocryology field course was jointly developed and

funded by the Faculty of the Geography Department at the Lomonosov Moscow State University, researchers from the RAS Research Institute for Geology and Mineral Resources of the Ocean (VNIIOkeangeologia), St. Petersburg and the Earth Cryosphere Institute SB RAS, Tyumen.

This 16-day course was held on board the "Sovetskaya Arctika" vessel, which sailed on the Yenisei River and in the Yeniseyskiy Bay from the town of Dudinka to the port of Dikson on the Arctic Coast of the Kara Sea. The course attracted Russian upper-level undergraduate and graduate students from Lomonosov Moscow State and St. Petersburg State Universities and the Earth Cryosphere Institute (Tyumen).



Field work on exposure of the Yenisei bank (Photograph provided by Irina Streletskaya)



Students and scientists of the field course "Permafrost and Periglacial Geomorphology of Western Taymyr (PPG)". (Photograph provided by E. Gusev)

Seven scientific-educational field trips were undertaken by the participants of the expedition. These trips focused on observations, on the collection of samples of frozen ground and ice for a set of different analyses and on field measurements (e.g. evaluation of moisture content of frozen samples). During the course Pleistocene-Holocene deposits in coastal exposures from the right bank of the Yenisei River and Yeniseyskiy Bay were studied. An interdisciplinary approach based on geological and geomorphological, cryolithological, geobotanical and landscape studies was applied to study the contemporary permafrost state, ground ice characteristics and paleogeographical reconstructions. For these purposes, samples of frozen ground, snow, and ice were collected from coastal

exposures. During the expedition students acquired field-work skills (describing boreholes and transverse sections, defining ice fraction, and collecting and archiving of samples), as well as laboratory skills on collected materials (evaluation of natural moisture content and sorting of samples). Samples of ice, snow and ground and paleofauna were collected for chemical, isotopic, microfaunistic, granulometrical, radiocarbon, paleomagnetic analysis. Contemporary cryogenic processes of Western Taymyr coastal zone were also explored, in particular coastal dynamics, ice wedges, thermokarst, etc.

The obtained data will enable an estimation of the present-day situation in Western Taimyr permafrost zone and the reconstruction of the conditions of permafrost evolution and formation in the past.

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THE INTERNATIONAL PERMAFROST FIELD COURSES TEPO-YAMBURG 2008

The Second International summer field courses with the topic “Technogenic and Environmental Permafrost Observatories (TEPO) - Yamburg” took place on Taz Peninsula, West Siberia from August 2-25, 2008. It was organized by Lomonosov Moscow State University (MSU) and Tyumen State Oil and Gas University (TSO&GU) as an IPA-IPY education initiative.

Our group consisted of Russian students from Moscow and Nadym Branch of TSO&GU and German students from the University of Hamburg. Instructors of the courses were V. Grebenets (Department of Cryolithology and Glaciology, MSU) and A. Kurchatova (Department of Geology and Petrography, TSO&GU), as well as D. Kaverin (Komi Department, Russian Academy of Science).

TEPO – Yamburg courses consisted of the field excursions during the day and theoretical classes in the evening. The main topics where:

1. Characteristics and Monitoring of Permafrost affected Soils.
2. Quaternary Geology of Taz Peninsula.
3. Cryogenic Processes.
4. Permafrost Engineering and Problems of Development in Permafrost Regions.



Students observing patterned ground in the field. (Photograph provided by Anne Zschocke)

Students learned and practised monitoring techniques relevant in arctic and subarctic regions: the characterisation of vegetation, geomorphology and soils using Russian and

International classification systems, the measuring of active layer thickness (ALT), soil temperature, moisture content and pH. The group also contributed data to the international monitoring programmes TSP and CALM. The mutual influence of climate on the recorded parameters and vice versa, also was discussed.

On the basis of Quaternary sediments the climatic, ecologic and geomorphologic history of West Siberia was explained. These sediments also provided the opportunity to study syngenetic permafrost and ice-wedge casts (pseudomorphs) that occur at thermokarst sites.

Cryogenic processes, their geomorphological forms and their soil characteristics were observed at all scales. Students learned about polygonal tundra, pingos and alases at different sites in the zones of continuous and discontinuous permafrost. Mesoscale hummocks, mudboils and cryoturbations were examined as described before. At the end results of the different sites were compared with each other.

At the settlements of Yamburg, Yubileinoe and Zapolyarnoe construction and engineering techniques at permafrost-affected sites were observed and discussed. At the three different gas exploration sites the group obtained insights into gas exploration and treatment from the staffs of GazProm Dobycha Yamburg and of GazProm Dobycha Nadym.

International Field Courses provide the valuable experience as exchange of knowledge between representatives of different national geographic schools. It can be said that TEPO – Yamburg 2008 was a successful field course, which generated young, skilled permafrost researchers and contributed to the international scientific exchange – за сотрудничество!



The group crossing the “Polar” Circle. (Photograph provided by Anne Zschocke)

The course was made possible largely through generous support from GasProm and its regional subsidiaries, the German Academic Exchange Service and the Russian office of Conoco-Phillips. The next international courses TEPO-Yamburg will be in summer 2009.

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PYRN ACTIVITIES

In 2008, PYRN started the field campaign of its PYRN-TSP project. This Nordic Council of Ministers funded project, lead by M. Johansson at Lund University, has as its aims drilling and instrumenting boreholes in under-investigated areas of Scandinavia. Several boreholes were drilled Svalbard and northern parts of Norway, Sweden, and Finland. Preliminary results based on data from these boreholes were reported at a series of conferences, including the Arctic Change conference in Quebec City in December as a keynote lecture during student day. These activities are planned to continue in 2009.



The community of PYRN members has grown steadily to now reach an impressive number of 625 members, from 43 different countries. The membership is mainly supported through the website (<http://pyrn.ways.org>), which is increasingly becoming a highly utilized resource for members and non-members alike. As part of a contest developed with Wiley, the editor of *Permafrost and Periglacial Processes*, will reward the best contributor to the website with a free subscription to the journal.

PYRN, under the supervision of T. Haltigin, initiated a special journal issue in partnership with *Permafrost and Periglacial Processes*. A large number of extended abstracts was submitted to the editorial board which selected about ten papers to be submitted to *PPP*. The papers are currently under review. This special issue, including only papers first-authored by young researchers, is the first of its kind in academia.

The PYRN bibliography, maintained by G. Grosse, was officially released together with a companion paper available at: <http://hdl.handle.net/10013/epic.31101>. The bibliography is searchable and can be exported to most popular bibliography software. It now includes over 1000 theses completed in the field of permafrost and periglacial research.

PYRN organized a series of activities at NICOP, including a social event and a panel featuring C. Harris, D. Hayley and J. Akerman aimed at providing advice, stories, and sharing their life-long experiences in permafrost research with young researchers. PYRN also helped organize awards, student stipends, and created an illustrated permafrost calendar specifically for the NICOP. On the last day of the NICOP, the PYRN core group and the national representatives met to review current activities and explore ways to improve the PYRN service to the community.

In October a new core group was selected to lead PYRN. H. Lantuit, M. Johansson, and O. Frauenfeld, who have been running PYRN since its inception in 2005, will be replaced by A. Abramov, P. Bonnaventure, S. Hachem, I. Gärtner-Roer, and A. Liljedahl. P. Bonnaventure was elected coordinator in November.

PYRN organized its annual awards in partnership with the USPA at the AGU fall meeting in San Francisco. The two awards were presented to S. Westermann and S. Panda for their remarkable posters. During their Annual Meeting the USPA announced the creation of a joint fund with PYRN

to strengthen its activities and further promote the role of young researchers in the permafrost community. A. Liljedahl was appointed PYRN representative on the USPA board of directors.

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IGU COMMISSION ON COLD REGION ENVIRONMENTS (CRE)



CRE 2008: F. Nelson (US), D. Trombotto (AR, Co-chair), J. Vandenberghe (NL), N. Doubleday (CA, Chair), N. Matsuoka (JP), O. Humlum (NO), J. Murton (GB), Regrets: T. Vlasova (RU), X. Yang (CN). (Photograph provided by Nancy Doubleday)

It has been an eventful year for all polar researchers and also for the International Geographical Union (IGU) Commission on Cold Region Environments (CRE), and its national representatives. The CRE Commission participated in the IPA Council meetings in Fairbanks, Alaska, during the Ninth International Conference on Permafrost and held two formal meetings and several working sessions that lead to the production of a detailed work plan for the next four years. The IGU works through its commissions, and CRE members were very pleased when the IGU Council voted at the 31st IGU Congress in Tunis in August 2008 to re-new the CRE for an additional four-year term. As part of this work plan, the Cryosphere Specialty Group of the Association of American Geographers (AAG) and CRE are co-sponsoring a session at AAG 2009 in Las Vegas, organized by F. Nelson (U.S.A. and N. Doubleday (Canada), titled "International Polar Year: Geographical Perspectives". This session is also sponsored by the Canadian Polar Commission. For further information about the activities of the Cold Region Environments Commission, see contacts below.

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PUBLICATIONS

Proceedings, Ninth International Conference on Permafrost. 2008. Institute of Northern Engineering, University of Alaska Fairbanks (2 Vols.) D.L. Kane and K.M. Hinkel (eds.) 2140 p., 2 v., : ill., maps ; cm. Includes bibliographical references and index. 1. Permafrost–Congresses. 2. Frozen ground–Congresses.
ISBN 978-0-9800179-2-2 (v.1), ISBN 978-0-9800179-3-9 (v.2)

The proceedings of the NICOP include a two-volume set of 358 papers (2140 pages) dealing with all aspects of permafrost research, which can now be purchased online on the site of the conference: www.nicop.org. In addition, the proceedings from all nine of the International Conferences on Permafrost that have been convened (1963 Purdue University, USA; 1973 Yakutsk, Russia; 1978 Edmonton, Canada; 1983 Fairbanks, USA; 1988, Trondheim, Norway; 1993 Beijing, China; 1998 Yellowknife, Canada; 2003 Zurich, Switzerland; and now 2008 Fairbanks, USA) are available for downloading at the same web site.

Permafrost Soils. 2009. University of Innsbruck, Austria. R. Margesin, (ed.). XIV, 348 p. 78 illus., 4 in color. (Soil Biology, Vol. 16) Hardcover. 149.95 €, \$229.00. ISBN 978-3-540-69370-3 (www.springer.com/life+sci/ecology/book/978-3-540-69370-3).

This volume summarizes recent knowledge on various aspects of permafrost and permafrost-affected soils, including typical properties of these soils, the distribution and biodiversity of permafrost microorganisms, examples for microbial activity in frozen soils and genomic and proteomic insights into cold adaptation of permafrost bacteria. The impact of global warming on microbial communities, carbon dynamics, geomorphology and frozen-ground engineering are further discussed

Frozen in Time: Permafrost and Engineering Problems. 2008. H.M. French and F.E. Nelson (eds.). New York: American Society of Civil Engineers Technical Committee on Cold Regions Engineering, 280 + xxxvix pp (cedb.asce.org/cgi/WWWdisplay.cgi?0880106).

Frozen in Time: Permafrost and Engineering Problems is a previously unpublished work by Siemon W. Muller (1900-1970), author of the first English-language book about perennially frozen ground. This book serves as a valuable historical document, and will also be useful for those seeking basic knowledge about permafrost and approximate methods for coping with associated engineering problems. See detailed article on this publication at pages 3-5.

Foundations in Permafrost. 2008. A.S. Gerasimov.

This book is divided in three parts: “Fundamental of Frozen Ground Rheology”, “Settlement and Bearing Capacity of Foundations” and “Engineering”. 73 tables, 278 illus., 566 references. (permafrost-foundations.com/index_e.html).

Contaminants in Permafrost and Freezing Ground Environmental Resource Library.

Permafrost Environmental Consulting Inc. has released a twelve-volume book set and CD-ROM, „Contaminants in Permafrost and Freezing Ground Environmental Resource Library,“ The Contaminated Arctic Soils Database provides details on the fundamental behaviour and modification of physical, chemical, and hydrological properties of freezing soils and permafrost-affected soils (Cryosols) by a wide range of organic and inorganic contaminants.
(www.permafrost.ca; white@permafrost.ca)

Atlas of Northern Circumpolar Soils, 2008. A. Jones et al. (eds.). European Commission.

The Atlas of Northern Circumpolar Soil is the first document of its kind to bringing together soil data for all the northern countries in a style designed to better understand and protect soil resources in these areas. The project aims at fostering cooperation between the European Union and several countries (Canada, U.S.A., Russia) and bridging the gap between soil science, policy makers, educators and the general public.
(eusoiils.jrc.ec.europa.eu/library/maps/Circumpolar)

Proceedings of the 8th International Symposium on Cold region Development ISCORD. 2007. Tampere, Finland, 25 - 27 Sept. 2007. Suomen Rakennusinsinöörien Liitto RIL; Int. Association for Cold Region Development Studies. (www.ril.fi)

Thermal Analysis, Construction, and Monitoring Methods for Frozen Ground (Sponsored by the Technical Council on Cold Regions Engineering), 2004. D.C. Esch, (ed.), Reston, VA: ASCE, 2004, 492 p.

This book presents the latest in design theory and engineering practice of analyzing, constructing, and monitoring foundation soils affected by permafrost soils; controlling frost heave of soils; and using artificial freezing methods for stabilizing soft or wet soils to permit excavation for foundations. The design methods, views, and practices of 20 experts in the field of frozen ground engineering are represented in this book.

Cold Regions Pavement Engineering. 2008, McGraw-Hill/American Society of Civil Engineers (ASCE Press). G. Doré and H.K. Zubeck, 432 p., ISBN0071600884 / 9780071600880

Using the latest research from the United States, Canada, and Europe, the authors supply all the information needed to make wise decisions in situations where freezing temperatures, unstable soil, precipitation, ice, and small populations are complicating factors, along with limited funding-a common problem when designing roads in cold regions. Cold Regions Pavement Engineering includes: Pavement Materials and Performance - Investigation and Testing - Calculation of Engineering Parameters - Design Considerations - Mix and Pavement Design - Maintenance and Rehabilitation - Pavements on Permafrost. Cold Regions Pavement Engineering is a long-needed resource.

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 (Hugues.Lantuit@awi.de).

2009

March 22-27, Annual Meeting of Association of American Geographers - (AAG) 2009 Las Vegas, Nevada, USA (www.aag.org/annualmeetings/2009)

March 22-28, Arctic Science Summit Week 2008, including 1st Open Science Conference, Bergen, Norway (www.imr.no/assw2009)

April 19 – 24, European Geosciences Union, General Assembly, Vienna, Austria (meetings.copernicus.org/egu2009/)

June 21-24, II Iberian Conference of the International Permafrost Association: „Periglacial environments, permafrost and climate variability“, Sigüenza, Spain (www2.uah.es/gifa/ii_ipa_ib_2009/IICIIPA-eng.html)

July 7-11, 7th International Conference on Geomorphology (ANZIAG), Melbourne, Australia (www.geomorphology2009.com)

July 8 – 11, PAGES 3rd Open Science Meeting, Oregon State University, Corvallis, Oregon, USA (www.pages-igbp.org)

July 19 – 29, MOCA-09 - IAMAS, IAPSO and IACS Joint Assembly, Montreal, Canada (iamas-iapso-iacs-2009-montreal.ca)

September, ASCE 14th International Specialty Conference on Cold Regions Engineering, Duluth, Minnesota, USA.

September 7-11, 7th Asian Regional Conference of IAEG, Chengdu, China (www.iaeg2009.com)

September 14-20, V International Conference on Cryopedology: “Diversity of frost-affected soils and their role in ecosystems”, Ulan-Ude, Buryatia, Russia (http://www.ib.komisc.ru/add/cryosol_wg)

December 14-18, American Geophysical Union Fall Meeting, San Francisco, California, U.S.A.; U.S. Permafrost Association Annual Meeting (www.uspermafrost.org)

2010

June 4-11, 4th International Workshop on Ice Caves, Obertraun, Austria (www.iwic2010.info)

June 8-12, IPY Oslo Science Conference, Oslo, Norway (www.ipy-osc.no)

June 13-17, Third European Conference on Permafrost (EUCOP III), UNIS, Longyearbyen, Svalbard, Norway (www.eucop2010.no)

June 14-18, 23rd Polar Libraries Colloquy, Bremerhaven, Germany (arcticcentre.ulapland.fi/polarweb/plc/pubs.asp)

Summer, International Symposium on Cold Region Development ISCORD 2010, Yakutsk, Republic of Sakha, Russia.

August 1-6, 19th World Congress of Soil Science, Brisbane, Queensland, Australia (www.ccm.com.au/soil/)

August, XXXI SCAR Science Week, including 4th Open Science Conference (www.scar.org/conferences)

September 12-15, 2010 Canadian Permafrost Conference, Calgary, Canada

December 13-17, American Geophysical Union Fall Meeting, San Francisco, California, U.S.A.; U.S. Permafrost Association Annual Meeting (www.uspermafrost.org)

2011

March-April, IASC Arctic Science Summit Week, including 2nd Open Science Conference

June 27- July 8, IUGG XXV General Assembly, Melbourne, Australia (www.iugg2011.com)

July 20-27, XXVIII INQUA Congress, Bern, Switzerland

December 12-16, American Geophysical Union Fall Meeting, San Francisco, California, U.S.A.; U.S. Permafrost Association Annual Meeting (www.uspermafrost.org)

2012

Early summer, Tenth International Conference on Permafrost, Tyumen, Russia

August 2-10, 34th International Geological Congress, Brisbane, Queensland, Australia (iugssecretariat.ngu.no)

August 12-25, IGU Congress, Cologne, Germany (www.igu-net.org)

XXXII SCAR Science Week, including 5th Open Science Conference (www.scar.org/conferences)



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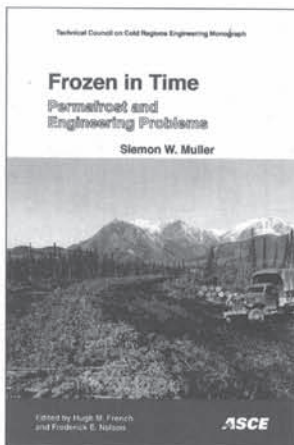
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Cold Regions Bibliography Project

Frozen in Time

Permafrost and Engineering Problems

Hugh M. French and Frederick E. Nelson, Editors



Book Information

- 2008, ASCE
- Softcover, 800 pp.
- ISBN 978-0-7844-0989-3
- Stock #40989
- List \$85
- ASCE Member \$63.75

Frozen in Time: Permafrost and Engineering Problems is a previously unpublished work by Siemon W. Muller (1900–1970), author of the first English-language book about perennially frozen ground. Professor Muller stopped working on the nearly completed manuscript in the early 1960s, and for reasons unknown set it aside about the time of the First International Conference on Permafrost in 1963. It remained “frozen” for several decades, until it was eventually discovered in his files. Upon careful reading, the manuscript was found to offer an advanced and unusually comprehensive treatment of permafrost science and associated engineering problems. Editors French and Nelson guided this landmark manuscript through the last phase of revision, provided context through an interpretive introduction, and finally brought it to the publication stage.

Intended as a comprehensive revision and update of the 1947 edition of Muller’s classic Permafrost or Permanently Frozen Ground and Related Engineering Problems, this book reads like a “how-to” manual for engineering personnel working in pioneering or primitive circumstances. Like its predecessor, the book reviews the large Russian-language body of literature devoted to permafrost, but also covers work published in English during the intervening years. It addresses topics such as basic scientific knowledge about perennially frozen ground and the engineering problems associated with it, the geography of permafrost, related elements of landscape science and ecology, periglacial geomorphology, and the physics of frozen ground. This book serves as a valuable historical document, and will also be useful for those seeking basic knowledge about permafrost and approximate methods for coping with associated engineering problems.

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www.gtnp.org



Antarctic Permafrost and Soils
earth.waikato.ac.nz/antpas



Carbon Pools in Permafrost Regions
www.geowiss.uni-hamburg.de/i-boden/capp



Arctic Circum-Polar Coastal Observatory Network
www.arcticportal.org/acd/acconet



Arctic Coastal Dynamics
www.arcticportal.org/acd



Permafrost Young Researcher Network
pyn.ways.org



Frozen Ground Data Center
nsidc.org/fgdc



Circumpolar Active Layer Monitoring
www.udel.edu/Geography/calm



Glacier and Permafrost Hazards in Mountains
jern.uio.no/remotesensing/gaphaz

**THIRD EUROPEAN CONFERENCE
 ON PERMAFROST (EUCOP III)
 JUNE 13-17, 2010, SVALBARD,
 NORWAY**



www.eucop2010.no

**September 12-15, 2010
 Canadian Permafrost Conference
 Calgary, Canada**

**Early summer 2012
 Tenth International Conference
 on Permafrost
 Tyumen, Russia**

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