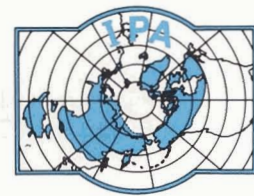
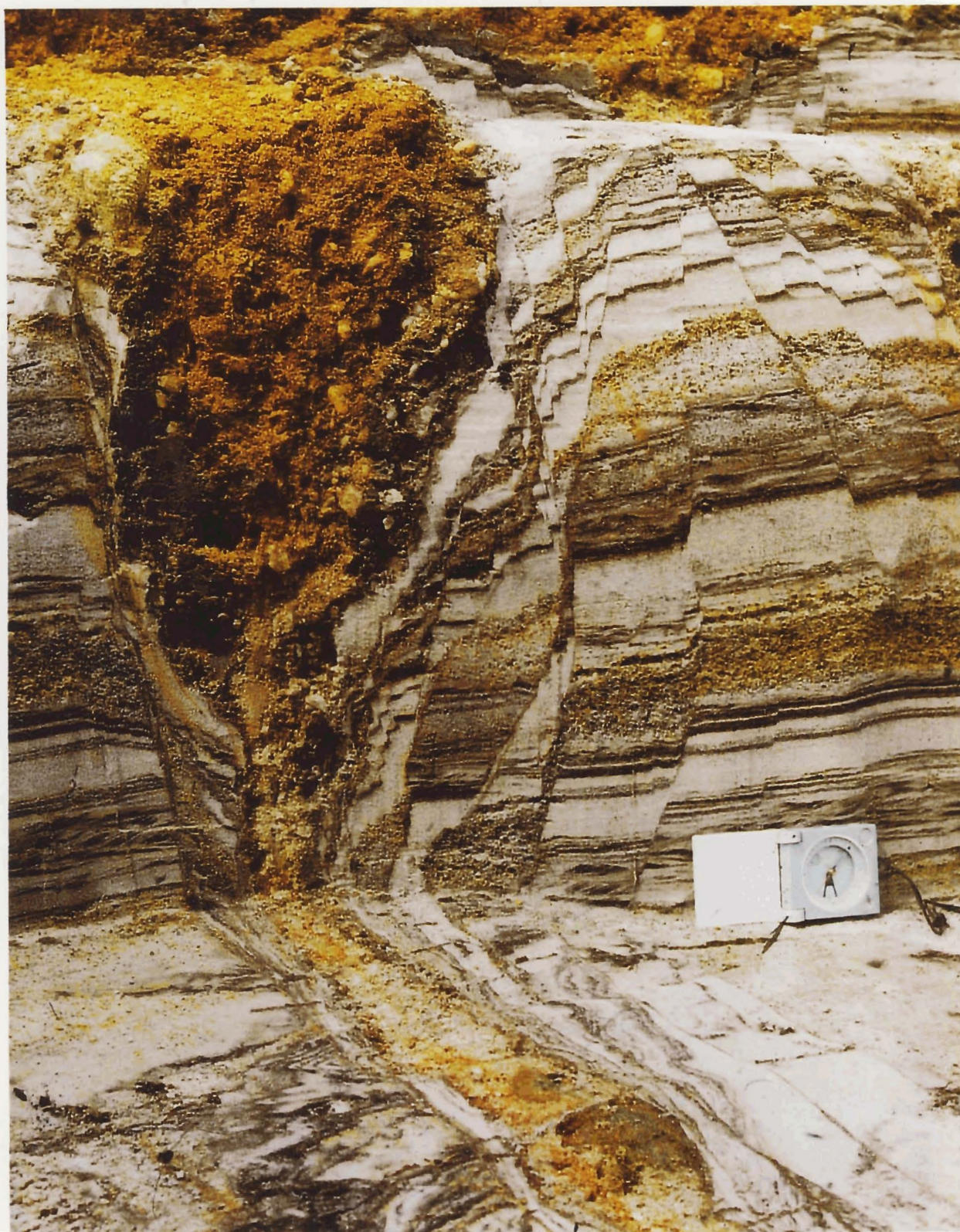


FROZEN GROUND



The News Bulletin of the International Permafrost Association

Number 18, December 1995



INTERNATIONAL PERMAFROST ASSOCIATION

The International Permafrost Association, founded in 1983, has as its objectives fostering the dissemination of knowledge concerning permafrost and promoting cooperation among persons and national or international organizations engaged in scientific investigation and engineering work on permafrost. Membership is through adhering national or multi-national organizations or as individuals in countries where no adhering body exists. The IPA is governed by its officers and a Council consisting of representatives from 22 adhering bodies having interests in some aspect of theoretical, basic and applied frozen ground research, including permafrost, seasonal frost, artificial freezing and periglacial phenomena. Working groups organize and coordinate research activities and special projects. The IPA became an Affiliated Organization of the International Union of Geological Sciences in July 1989. The association's primary responsibilities are convening international permafrost conferences and accomplishing special projects such as preparing maps, bibliographies, and glossaries. The first conference was held in West Lafayette, Indiana, USA, in 1963; the second in Yakutsk, Siberia, 1973; the third in Edmonton, Canada, 1978; the fourth in Fairbanks, Alaska, 1983; the fifth in Trondheim, Norway, 1988; the sixth in Beijing, China, 1993. The seventh is planned for Yellowknife, Canada, in 1998. Field excursions are an integral part of each conference, and are organized by the host country.

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Vice President

Hugh M. French, Canada

Vice President

Nikolai N. Romanovskii, Russia

Secretary General

Jerry Brown, United States of America

WORKING GROUPS

Data and Information

Terminology

Global Change and Permafrost

Mountain Permafrost

Periglacial Processes and
Environments

Cryosols

Foundations

Seasonal Freezing and

Thawing of Permafrost Areas

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Southern Africa

Spain

Sweden

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United States of America

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Finance Committee

Advisory Committee on Working Groups

Editorial Committee

Cover: A well-developed ice wedge cast in gravel and glaciolacustrine deposits exposed in a large open cut lignite coal mine near Leipzig, Germany. The ice wedge formed in permafrost of Saale/Riss time (Illinoian, approximately 300,000 years) when the Saale continental glacier stood a few kilometers to the north. With degrading (thawing) of permafrost and melting of ice wedges in the following interglacial time (Eemian/Sangamon, 125,000 years), sediments adjacent to the ice wedge slumped along microfaults into the void, and overlying gravel from the main Saale gravel terrace dribbled down into the opening. Photograph by R. Wimmer, from Altenburger Naturwissenschaftliche Forschungen, vol. 7, 1994; reprinted with permission. Archivist of photograph and interpreter of geologic history: Lothar Eissmann, University of Leipzig. Arrangements for use of photograph and North American geologic interpretation: Troy L. Péwé, Arizona State University (see Special Report, p. 3).

FROZEN GROUND

THE NEWS BULLETIN OF THE
INTERNATIONAL PERMAFROST ASSOCIATION
NUMBER 18 • DECEMBER 1995

Frozen Ground, the News Bulletin of the International Permafrost Association, is published semi-annually. The IPA is a non-governmental association of national organizations representing 22 countries or groups of countries. The success of the bulletin depends upon the willingness of IPA participants to supply information for publication. Submission deadlines are 1 May and 1 November. Please ensure that working group and member country reports are submitted in good time for publication. News items are also very welcome from any IPA participant or others, as are interesting photographs for the cover (please furnish 8" x 10" glossy prints). To submit news items or photos please contact the appropriate individual listed on page 27, or the Secretary General.

Frozen Ground is compiled by Jerry Brown with the assistance of Alan Heginbottom of the Editorial Committee. Production is courtesy of the Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, USA. Copies of *Frozen Ground* are available in Canada from Alan Heginbottom, Geological Survey of Canada, 601 Booth Street, Ottawa K1A 0E8; in Russia from Nikolai Grave, National Permafrost Committee, USSR Academy of Sciences, Fersman Street 11, 117312 Moscow; in the United States from Jerry Brown, P.O. Box 9200, Arlington, Virginia 22219-0200; and elsewhere from Council members.

Erratum: *Frozen Ground* No. 17, p. 6, second column, second line from bottom should read "A. Pavlov," not "A. Popov."

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EXECUTIVE COMMITTEE REPORT

The IPA Council met in Berlin, 4–5 August 1995, during the XIV INQUA Congress. The Council meetings were well attended by 16 members and many invited guests. We were privileged to have INQUA President Liu Tungsheng and Past President Nat Rutter join us during our meetings. The following are highlights of the meetings; more details are reported elsewhere in the news bulletin:

- Mongolia and Kazakhstan were elected to full membership in IPA; in addition to Estonia, a representative from Romania was welcomed as a new individual member
- Resolutions on monitoring and data recovery were approved
- Activities of the working groups were reviewed and suggestions made on future directions
- Liaison activities with many international organizations were discussed, as were specific activities and relationships with IGU, IAG, ISGF, and ISSMFE
- A Russian proposal to conduct an international permafrost school was reviewed
- A report on the current status of planning for the 7th ICOP was received

During INQUA, Vice President French convened a symposium on Cenozoic Ground Ice Stratigraphy with 10 papers and six posters. An IPA display was also presented and the draft IPA permafrost map and the recently published Canadian permafrost maps were displayed. Vice President Romanovskii reviewed the status of the paleo-permafrost project with IUGS Vice President Nicole Petit-Maire, Brigitte Van Vliet-Lanoe, and other Council participants.

In addition to the INQUA activities and meetings, a workshop was convened by the Data and Information Working Group at the nearby Alfred Wegener Institute in Potsdam. Progress and future activities in regard to the Global Geocryological Database were discussed and resolutions prepared for Council approval. The working group recommended that IPA

establish an Internet World Wide Web site, and this has now been accomplished, thanks to the efforts of Julia Branson at GeoData Institute, University of Southampton.

Many continuing and new activities are underway. Several working groups co-organized a workshop on frozen ground processes in December 1995 in Hanover, New Hampshire. This was followed by several sessions at the American Geophysical Union meetings in San Francisco. Over 50 papers and posters were presented at the two meetings. Members of the working groups on Mountain Permafrost, Periglacial Processes and Environments, and Global Change and Permafrost met in Hanover to review current and future activities. These include site selection for long-term monitoring and the handbook on recommended methods for measuring periglacial processes. Prior to the workshops, a number of permafrost specialists participated in the International Conference on Arctic Research Planning.

Other activities are planned for 1996. The IPA glossary is under review and should be widely distributed during the year, as will the IPA-published permafrost map. The International Geological Congress is being held in Beijing and the International Geographical Congress in the Hague, both in early August. IPA plans to participate in both, as well as attend the Fifth Chinese Conference on Glaciology and Geocryology in Lanzhou immediately following the IGC.

Longer term plans include completion and reporting of the working groups' planned activities at the 1998 permafrost conference in Yellowknife. Discussions are beginning as to the nature and scope of new working groups, standing committees and projects, and how best to conduct activities in concert with other international organizations. In addition to *Frozen Ground*, we will use the IPA WWW site to keep you informed of the growing number of frozen ground activities and to maintain a near-real-time exchange of information. Suggestions and information from our readers are welcomed at all times.

IPA WWW home page:
<http://www.geodata.soton.ac.uk/ipa>

SPECIAL REPORT

FEATURES OF PAST PERMAFROST IN THE LEIPZIG BASIN, GERMANY

Troy L. Péwé, Past-President, IPA
Arizona State University

A well-organized 1-day field excursion to examine periglacial and archaeological features just south of Leipzig was part of the XIV INQUA Congress held in Berlin in August 1995. Extensive ice wedge casts, diapirs, and smaller cryogenic features are widespread and well developed in early to late Pleistocene sediments in the Leipzig area of central Germany. Detailed information is available from more than 50 different layers of the Quaternary sequence from the work of Lothar Eissmann and his associates over the last 30 years. They have been able to examine closely the newly exposed sediments as they were continuously available in the ever-enlarging enormous open-cut lignite coal mines in the area.

Permafrost at least 30 to 50 m thick formed at different times in the cold periglacial environment in front of the early (Elsterian/pre-Illinoian) and middle (Saalian/Riss/Illinoian) and late (Weichselian/Wurm/Wisconsin) Pleistocene continental glaciers that advanced into central Germany from the north. There are many stratigraphic horizons of ice wedge casts (see cover photograph), mainly in the glaciofluvial and glaciolacustrine sediments of that time, indicating the former existence of well-developed ice wedges. The ice wedges melted in middle and later Pleistocene interglacial warm intervals with degrading (thawing) of ice-rich permafrost.

The most striking and unique geologic feature indicating the former existence of thick, ice-rich permafrost is the presence of impressive dislocations in the exposed, underlying Tertiary lignite beds, in the form of diapiric upwedgings. The upwedgings (diapirs) are narrow, irregularly oriented coal crests more than 100 m long, 15 m wide, and 10 m high. The structures are easily seen because of the great contrast in color between the black-brown lignite seams, 3 to 4 m thick, and the light-colored glacial till and sands and gravels.

A probable scenario for the origin of the diapiric upwedging structures is as follows: With the advent of a cooling climate and advance of continental glaciers, the sediments in the periglacial area became perennially frozen. As permafrost slowly thickened from the surface downward, ice segregations grew in the sediments. This includes pore ice and clear-ice lenses and layers. This ice is not to be confused with later ice wedge or pingo ice formation.

The amount of ice segregation depends upon the type of sediment, the availability of moisture, and the rate of downward progression of the freezing front. Few ice segregations form in sandy and gravelly sediments. Silt, especially loess, is excellent for such ice growth. The best condition for the growth of ice segregations would be slow freezing of organic-rich silt (Péwé and Paige, 1963) or peaty material, including lignitic coal, in a lowland environment (poor drainage).

For example, analyses of perennially frozen loess near Fairbanks indicate 30 to 60% moisture by dry weight; organic silt has up to 315%, and peat and peaty silt has up to 1176% by dry weight (Péwé, 1958).

Therefore, it is possible to visualize conditions in the permafrost environment of the Leipzig Plain where the sand, gravel, silt, clay, and lignite coal deposits were frozen to a greater depth than the coal seams, and the coal layers were highly charged with segregated ice. Inasmuch as the distribution of the abundant ice segregation in the coal probably was not uniform, the area of greatest ice accumulation may have been slightly uparched. Continental glacial ice of Saalian (Illinoian) age then advanced over the area, depositing till and glacial fluvial sediments and adding still more weight to the sediments overlying the coal seams.

With the retreat of the glaciers and warming of the environment, degradation (thawing) of permafrost probably occurred from the top and the bottom. With the melting of the ice segregations in the lignite beds, the coal seams were greatly over-saturated with soil moisture, moisture which could not drain downward because of the presence of some underlying still-frozen ground. As visualized by Eissmann (1981, 1994, 1995), there was a gravitative displacement upward of the thawed, now water-saturated, highly mobile lignite caused by heavy overlying fluvial gravels and till (diapirism process). Tongues of water-rich coal were slowly forced upward (probably to the surface), piercing the overlying beds. The outcropping diapirs were later eroded and covered by younger sediments.



- Eissmann, L. (1981) Periglaziäre Prozesse und Permafroststrukturen aus sechs Kaltzeiten des Quartärs. *Altenburger Naturwissenschaftliche Forschungen*, Altenburg, v. 1, 171 p.
- Eissmann, L. and T. Litt (1994) Das Quartär mitteleuropas. Ein Leitfaden und Exkursionführer. *Altenburger Naturwissenschaftliche Forschungen*, Altenburg, v. 7, 458 p.
- Eissmann, L., F.W. Junge, K. Hoffman, Th. Weber and A. Rudolph (1995) The Quaternary sequence in the southern part of the Leipzig Plain (Leipziger Tieflandsbucht): Stratigraphy, archaeology, and diapirism in the opencast mines of Zwenkau and Profen. INQUA (XIV International Congress, Berlin) Guidebook, Excursion B7, 32 p.
- Péwé, T.L. (1958) Geology of the Fairbanks D-2 quadrangle, Alaska. U.S. Geological Survey Geologic Quadrangle Map GQ-110, Scale 1:63,360, 1 sheet.
- Péwé, T.L. and R.A. Paige (1963) Frost heaving of piles with an example from the Fairbanks area, Alaska. U.S. Geological Survey Bulletin 1111-I, p. 333-407.

REPORTS OF THE TENTH AND ELEVENTH IPA COUNCIL MEETINGS

TENTH MEETING

The Tenth IPA Council meeting was held at the Freie Universität, Berlin, Germany, 4 August 1995, from 2:05 PM to 5:45 PM. Present were:

EXECUTIVE COMMITTEE

President Cheng Guodong, China
Vice President Hugh French, Canada
Vice President Nikolai Romanovskii, Russia
Secretary General Jerry Brown, USA

COUNCIL MEMBERS AND REPRESENTATIVES

Argentina: absent
Belgium: Irene Heyse
Canada: Alan Heginbottom
China: absent
Denmark: absent
Finland: Eero Slunga
France: Brigitte Van Vliet-Lanoe
Germany: Lorenz King
Italy: Francesco Dramis
Japan: Kazuomi Hirakawa
Netherlands: Eduard Koster

Norway: Kaare Flaate
Poland: Jan Gozdzik
Russia: Evgeny Melnikov, Vyacheslav Konishchev
Southern Africa: Kevin Hall
Spain: absent
Sweden: Jonas Åkerman
Switzerland: Wilfried Haerberli
United Kingdom: Mike Clark
United States: Bernard Hallet, Roger Barry

OBSERVERS AND GUESTS

Dietrich Barsch, Germany, President, International Association of Geomorphologists (IAG)
Julia Branson, UK, Corresponding Member, Data and Information WG
Julia Boike, Germany, Member, Global Change WG
Margot Bose, Germany, Secretary General, INQUA
David Gilichinsky, Russia, Chair, Cryosols WG
Johannes Karte, Germany, Member, Terminology WG
Else Kolstrup, Sweden
Branko Ladanyi, Canada, Secretary, Seasonal Freezing/Thawing WG
Rainer Lehmann, Switzerland



Participants in the IPA Council meetings, Berlin, Germany, August 1995.

Marina Leibman, Russia, Corresponding Member, Data and Information WG

Olga Lisitzyna, Russia

Brainerd Mears, USA

Julian Murton, UK

Thorsten Otto, Germany

Ron Paetzold, USA

Nicole Petit-Maire, France, Vice President, IUGS

Troy Péwé, USA, Past President, IPA

Antoine Pierre, France

Wayne Pollard, Canada

Nat Rutter, Canada, Past President, INQUA

Leszek Starkel, Poland, INQUA Commission GLOCOPH

Liu Tungsheng, China, President, INQUA

Petru Urdea, Romania, Individual Member, IPA

Rein Vaikmae, Estonia, Individual Member, IPA

1. WELCOME

President Cheng welcomed the Council and working group members and invited guests, including Troy Péwé, Past President, IPA, and Professor Dietrich Barsch, President, International Association of Geomorphologists. He noted the Council meetings were being held in conjunction with the XIV INQUA Congress. He thanked Vice President French for organizing the successful INQUA symposium on Cenozoic Ground Ice Stratigraphy, Elisabeth Schmitt as Chair, Editorial Committee, for preparing the IPA-INQUA poster, and Secretary General Jerry Brown for arranging the Council meetings and timely publication of *Frozen Ground* No. 17. Brown announced logistic arrangements for the Council meeting and related activities. It was noted during the Council meetings that Ross Mackay, Past Secretary General, sent his best wishes to the Council.

2. APPROVAL OF AGENDA

The draft agenda was reviewed and approved.

3. STATUS OF PREVIOUS MINUTES

The minutes of the eighth and ninth Council meetings held in Beijing, China, on 5 and 8 July 1993, published in *Frozen Ground* No. 14, were reviewed and approved.

4. OLD BUSINESS

Members, working group representatives and guests were asked to introduce themselves and provide short statements on current activities. Details on many of the statements are contained in the last issue of *Frozen Ground* (June 1995). Included in the introductions were remarks by Past President of INQUA Nat Rutter, who indicated the continuing interests of INQUA commissions and projects in perma-

frost and periglacial processes. INQUA President Liu Tungsheng, China, joined the Council briefly and remarked on how active IPA has been and how impressive were the publications resulting from the IPA conferences. On behalf of INQUA he wished the Council success in its deliberations. IAG President Barsch reminded the Council that IAG seeks cooperation with other international organizations and would not duplicate working group activities.

It was noted in the course of the meetings that several long-time Council members have recently completed or will soon complete their Council membership terms: Bill Lovell (USA) has been replaced by Bernard Hallet, and this was the last meeting for Eduard Koster (Netherlands), who will be replaced by Jef Vandenberghe. Special thanks are extended to Lovell and Koster for their attention to the development of IPA activities.

5. REPORTS OF STANDING COMMITTEES AND WORKING GROUPS

Finance Committee

The Secretary General presented a summary of the written financial report, which had the prior approval of the Finance Committee Chair, Ferrians. The balance as of 3 July 1995 was US \$16,914.68. Dues or annual subscriptions bring in about \$12,000 annually. Sixteen members paid dues in 1994 and 15 thus far in 1995. Approximately \$8000 is now allocated for working group activities. The meetings in Germany cost about \$10,000: \$6500 for the Data Workshop held in Potsdam prior to the Council meeting, \$1500 for the Ground Ice Symposium, and \$2500 for the Council meeting. The U.S. NSF grant to the American Geophysical Union covered additional travel and related costs. Other members are also providing in-kind support for IPA. Budget plans for 1995 and 1996-1998 were presented to the Council, based on an assumed income of \$12,000 and an annual residual balance of about \$10,000. As additional income is available for special projects, the Secretary General requested approval to use the IPA bank account in Washington, D.C., for processing these funds. Flaate suggested that information on the AGU/IPA grant should be presented in the financial report, as well as the actual costs of publishing and distributing *Frozen Ground*. Two votes on separate recommendations were both approved unanimously. The first, for the broader use of the IPA bank account, was moved by Heginbottom and seconded by Hall. The second, for acceptance and approval of the report and 1995-1998 budgets, was moved by Clark and seconded by King.

Advisory Committee on Working Groups

In the absence of Chair Lovell, committee member Haeberli

indicated that fundamental changes in working groups would be likely as we approach the next Conference. Vice President French reminded the Council that WGs were not intended to be permanent and most will soon have been in existence for ten years. The Committee needs to develop an approach for redefining the WGs and Standing Committees and their functions, including liaison responsibilities.

Editorial Committee

In the absence of Chair Schmitt, committee member Heginbottom reported that the committee had prepared a poster display for the INQUA Congress. He indicated that the committee did not have sufficient scope or focus. Some responsibilities, including an Internet WWW site and *Frozen Ground* activities, could be transferred to the committee, but the committee members were already very busy. Brown commended Heginbottom for having spent a great deal of editorial time on the IPA permafrost and ground ice map, which is scheduled for printing in late 1995 or early 1996.

Liaison Activities

Brief reports were given by a number of liaison representatives who were identified at the last Council meeting and listed in *Frozen Ground* No. 14. Highlights of the discussions are provided below, particularly where followup is required:

Dietrich Barsch, speaking on behalf of the International Association of Geomorphologists, expressed the desire for formal IAG-IPA connections. Haerberli and Dramis, working with Jesse Walker, were asked to develop approaches with IAG as part of the 1997 IAG conference in Bologna, Italy, and the associated IPA-IAG field trip and symposium.

Leszek Starkel, on behalf of the INQUA Commission GLOCOPH, stressed the importance of water storage associated with permafrost. Paleohydrology of permafrost regions could be an appropriate topic for joint sponsorship at the 1998 conference.

Kevin Hall reported that SCAR's interests emphasize solid earth geosciences and that IPA connections had not developed. Barry reminded the Council that contacts had been made on data, and that several working groups, including cryosols, had contacts with Antarctic science.

Haerberli, reviewing recent ICSI activities, recommended that IPA be more involved through ground ice topics and consider cosponsoring a session at the 1997 Bologna IAG conference. Barry attended the July 1995 ICSI meetings in Boulder, Colorado, and reported that Elizabeth Morris, British Antarctic Survey, is the new president. Haerberli reported on the World Glacier Monitoring Service and offered to start a joint monitoring activity with IPA. Input to the

IPCC assessments was mentioned; IPA is recognized as being well organized in its inputs to both mountain and continental permafrost impacts. Both Barry and Haerberli reported on recent meetings of the Global Terrestrial Observing System (GTOS) Terrestrial Observation Panel (TOP) and their input to cryosphere monitoring. Two permafrost-related parameters and methods have been proposed as terrestrial requirements for the Global Climate Observing System (GCOS) and as climatic requirements for the GTOS: active layer/permafrost and permafrost thermal state.

Heginbottom reported on contacts with the Polar Libraries Colloquy. The next meeting is in Alaska in June 1996, and IPA could present a report on current information and map activities.

Gilichinsky reported on the International Society of Soil Science and joint working group activities. The next ISSS conference is in France, following the 1998 Yellowknife permafrost conference, and a joint presentation is planned for both conferences.

Slunga reviewed activities of the International Society of Soil Mechanics and Foundation Engineers (ISSMFE), an IUGS-affiliated organization. Present plans of the Technical Committee on Frost include formal liaison functions with IPA and the International Symposium on Ground Freezing (ISGF), convening the Third International Symposium on Frost in Geotechnical Engineering and a number of field and laboratory projects (see *Frozen Ground* No. 17, pages 9-10 for details).

Ladanyi, representing the ISGF and its chair Hans Jessberger, briefly reviewed the history of ISGF. In addition to convening its symposia and publishing their proceedings, the ISGF is concerned with standardization of sampling and laboratory procedures.

Nicole Petit-Maire, Vice President of the IUGS, and the official commentator for the IPA to the IUGS Executive Committee, emphasized the global importance of permafrost regions and the significance of both the contemporary and paleo permafrost mapping projects. The IUGS is providing financial support to the IPA for assistance in compiling the paleo permafrost map (18,000 and 7,000 years BP). Petit-Maire will report on IPA activities to the IUGS in early 1996.

French reported on contacts with the International Arctic Science Committee (IASC). A number of IPA members have been invited to the International Conference on Arctic Research Planning in Hanover, New Hampshire, in December 1995, affording the opportunity to include permafrost in the long-range international research plans. Brown will attend the IASC-organized NATO workshop on impact and recovery of Arctic terrestrial ecosystems in September in Rovaniemi, Finland.

Additional liaison reports and more detailed reports will be submitted in writing for publication in *Frozen Ground* or discussed in the WG reports.

6. REPORTS OF WORKING GROUPS

See *Frozen Ground* No. 17, pages 5–10, for current status; the following reports focus on new or followup activities.

Data and Information

Barry reviewed the history of the WG and noted the publication of Glaciological Data Report GD-28, "Workshop on Permafrost Data and Access" (June 1995), summarizing the Oslo meeting of the working group, progress on and plans for the Global Geocryological Database, and results of the workshop held at the Alfred Wegener Institute, Potsdam, 1–3 August 1995. Special thanks were extended to the AWI and its staff for the excellent support of the workshop, which was attended by IPA participants. A report is presented in this issue of *Frozen Ground* (p. 12). Several resolutions were presented to Council and are discussed under new business. The WG will explore in the next several months development of an Internet Web page and plans a CD-ROM containing priority data sets and bibliographic compilations for the 1998 conference. Mike Clark agreed to organize the data workshop at the 1998 conference. Ron Weaver, NSIDC/WDC-A for Glaciology, will attend the WDC directors' meeting in October in the Netherlands and will raise the question of establishing a Russian Data Center B for permafrost similar to the one that now exists in Lanzhou, China. The WG feels its extensive scope and long-term activities may warrant establishing it as an IPA standing committee.

Terminology

Konishchev reported continued progress on both the multi-language glossary and the English–Russian dictionary containing definitions. Romanovskii had just visited Poland and received a copy of *Biuletyn Peryglacjalny* No. 32, which was devoted to translation and publication of the Canadian permafrost terminology (1974) in English, French, German, Russian and Polish. The IPA Council offered its congratulations to A. Dylikowa for renewing publication of *Biuletyn Peryglacjalny* and producing the translations (see p. 9 and 24)

Global Change and Permafrost

Brown reviewed the activities of the WG as reported in the June issue of *Frozen Ground* and introduced the new WG member, Julia Boike, from AWI in Potsdam. The need to formally establish an active layer monitoring program, sim-

ilar to the one prepared by the WGs and adopted by the International Tundra Experiment (ITEX) and also proposed to GTOS, was discussed and will be considered jointly with the Periglacial and Mountain WGs, under new business.

Mountain Permafrost

Haeberli reviewed the WG activities, which include modeling, mapping and monitoring, and plans to meet in Hanover, New Hampshire, in December 1995. The WG's inventory of current observations and projects will contribute data to the GGD during the period 1996–98. More involvement in ICSI was discussed, with the emphasis on the role of massive ice in mountains and continental lowlands proposed as a theme which should involve more glacier and ice sheet expertise. The EU proposal on mountain slope instability (see *Frozen Ground* No. 17, page 14) was discussed.

Periglacial Processes and Environments

Chair Lewkowicz was not present but submitted a written report on WG activities since 1993 and a revised outline and schedule for the handbook on recommended methods for measuring periglacial processes. A first draft is proposed for the end of 1996 and a publishable version is to be available no later than the 1998 permafrost conference. Members of the WG plan to meet in Hanover, N.H., in December. Hallet indicated the need for an active layer monitoring protocol and discussed the August 1995 meeting of the International Glaciological Society, which includes topics on permafrost.

Cryosols

Chair Gilichinsky reviewed WG activities as reported in *Frozen Ground* and the schedule of international meetings in which the WG will be actively involved. He summarized the approach to compiling long-term soil temperature and WG efforts to prepare an international soils map and classification scheme and develop a glossary of terms by 1998.

Foundations

Secretary Flaate summarized a written report presented to the Council. Only limited progress has been made on the state-of-practice report. The only report received was from the Chinese author Zhu Yuanlin. The scope and name of the WG may change and should be discussed under new business.

7. ADJOURNMENT

The Council meeting, which adjourned at 5:45 p.m., was followed by an IPA-sponsored dinner organized by Lorenz King at the nearby Alter Krug restaurant. Council members, representatives and invited guests attended.

ELEVENTH MEETING

The Eleventh IPA Council meeting was held at the Freie Universität, Berlin, Germany, 5 August 1995, from 11:20 a.m. to 4:55 p.m. Present were the same participants and observers as on 4 August, with the following changes:

Kazakhstan: newly elected (absent)

Mongolia: newly elected (absent)

Sweden: Else Kolstrup for Jonas Åkerman on Council

UK: Julia Branson for Mike Clark on Council

Romania: Petru Urdea (approved individual member)

Margot Bose, INQUA Secretary General, visited briefly during this session and welcomed the Council to the INQUA Congress.

1. REPORTS OF WORKING GROUPS

The session was continued from the previous day's meeting.

Seasonal Freezing and Thawing of Permafrost Areas

Secretary Ladanyi presented the report and indicated that the ISSMFE Technical Committee 8 was doing a good job for seasonal frost in non-permafrost areas and the IPA should undertake similar activities for permafrost, focusing on the active layer and permafrost interface. Engineering problems related to design require information on ground ice structure and migration of water and salts. Maps showing sensitivity of design parameters to climate change are required. Both this WG and the WG on Foundations agreed to prepare recommendations on future activities for the chair, which will be sent to WG members for comments.

2. NEW BUSINESS

New Council Members

President Cheng asked the Secretary General to present information on membership requests by Mongolia and Kazakhstan. Letters of request and reports of activities have been received from both the Mongolian Academy of Sciences and its Mongolian Permafrost Association and from the Academy of Sciences of the Republic of Kazakhstan and its International Center of Geocryology of Mountain Countries of Arid Regions. Individuals in these organizations are active permafrost researchers, and several have participated in prior permafrost conferences. Hallet moved for acceptance of Mongolia, seconded by Dramis. Heginbottom moved for acceptance of Kazakhstan, seconded by Koster. The 14 members present voted unanimously for acceptance of both Kazakhstan and Mongolia as members of IPA. The 14 votes were deemed the necessary two-thirds vote required for acceptance as IPA members. Since several members were represented at the time of the vote by alternates, it was agreed the Secretary General would reconfirm the vote with the official

members from Germany, Poland and France, notify the absent members of the vote, and advise the new members of their official acceptance. [Note: all actions were completed as indicated.] Both Mongolia and Kazakhstan were officially welcomed as new Council members. It was noted that New Zealand is considering a request for membership in the IPA.

New Individual Members

The Constitution provides for individual members from countries in which an adhering body does not exist. As pointed out by Koster, the Executive Committee can approve these requests. Rein Vaikmäe from Estonia had previously been accepted as an individual member based on his official letter of request. Petru Urdea of the University of Timisoara, Romania, had submitted his letter of request and his membership was accepted.

Nominating Committee

A committee is required to be appointed two years prior to election of a new Executive Committee, which will be held at the 1998 conference. Albert Pissart, Belgium, was nominated as Chair, and Hallet, USA, and Konishchev, Russia, as members. Heyse accepted on behalf of Pissart; both Hallet and Konishchev accepted the appointments.

Seventh International Conference on Permafrost

Heginbottom presented a comprehensive report on planning for the conference. Details are available elsewhere. The Canadian Organizing Committee had recently reviewed the plan to hold the conference in Yellowknife and had concluded that this is indeed the best location for both Canada and the IPA. The results of an extended discussion about presentations and publication of abstracts and papers will be referred to the Canadian committee for further consideration. A major point discussed was whether a paper could be presented with only an abstract in existence and no intent to submit the paper. Provisions to publish in special issues of journals were also discussed and referred for Canadian consideration. The IPA Editorial Committee could be asked to assist or provide advice. The IPA is represented on the Canadian Organizing Committee by Vice President French. A WWW site and e-mail address have been established for the conference:

permafrost.conference@gsc.emr.ca

http://www.emr.ca/gsc/permaf_e.html (English)

http://www.emr.ca/gsc/permaf_f.html (French)

International School of Permafrost

Romanovskii and Gilichinsky circulated a draft plan to organize an annual permafrost school in Pushchino starting in

spring 1996. A wide-ranging discussion followed, with a general consensus that there was a need for the school. But would enough participants pay the estimated US\$2000? A cautious stepwise approach was suggested by the Council to the Russian organizers, with the need for a narrower focus. *Frozen Ground* could be used to announce future plans.

Journal of Permafrost and Periglacial Processes

Vice President French, as journal editor, indicated that Wiley and Sons was agreeable to designating the journal as an official publication of the IPA and has offered all frozen ground specialists a reduced subscription rate of US\$50.00. In addition, Officers of the IPA will be members of the PPP Editorial Board. The Council agreed to accept the offer to designate the journal as an official IPA publication, agreed that abstracts in Russian should be added, and reserved the right to make the same arrangement with other journals. A formal motion was made by Canada, seconded by Hall and unanimously accepted.

3. WORKING GROUP ACTIVITIES

Data and Information

Future plans for the Global Geocryological Database are contained in an accompanying report based on the Potsdam data workshop (p. 12). Suffice to say 1) that activities of GGD will be presented in September 1995 at the GRID Arctic Data Directory meeting, 2) that Clark will organize the 1998 data workshop in Yellowknife, 3) that procedures for accessing data require further consideration, and 4) that considering the long-term nature of data activities the WG should be changed to a Standing Committee with possibly some informational activities of the Editorial Committee included. Romanovskii mentioned that a [Russian] National Geocryological Fund was in the process of being formed for the purpose of administering the funding and management of data and monitoring activities. The Council endorsed this approach and awaits further information. Barry introduced the three data resolutions (see p. 11) resulting from the Potsdam workshop. These were moved, seconded and approved unanimously as follows: 1: Hallet, Hall; 2: Haeberli, Hall; 3: Hall, Haeberli.

Terminology

On behalf of the Terminology WG, Konishchev invited a recommendation and after considerable discussion the following was agreed to:

The IPA Council commends our Polish colleagues for publishing, in a special issue of *Biuletyn Peryglacjalny* (No. 32), a translation of the 1974 Canadian permafrost terminology. Recognizing that revisions of this earlier compilation of terms continue to be made and the need to publish the definitions

in different languages, the IPA Council encourages the publishers of *Biuletyn Peryglacjalny* to continue to translate and publish a compilation of current definitions and their meanings in different languages. In order to ensure full cooperation with the IPA, the Council suggests that the Editorial Board for this compilation be expanded to include members of the IPA Terminology WG: van Everdingen (Canada) and Konishchev (Russia).

Periglacial Processes and Environments

The need for standard methods of field measurement and the establishment of a network of international sites to observe and monitor long-term changes in permafrost terrains was discussed. A resolution (see p. 11) was introduced by Hallet on behalf of the working groups on Periglacial Processes and Environments, Mountain Permafrost, and Global Change and Permafrost. It was moved by King, seconded by Haeberli and unanimously accepted.

Mountain Permafrost

On behalf of the Mountain Permafrost WG, Haeberli reminded the Council that, following 10 years of activity, the working group should terminate as the mountain aspect is now well established in the permafrost community. High mountain hazard assessment, monitoring and mapping projects should continue within new working group activities which cover permafrost in general.

Cryosols

On behalf of the Cryosols WG, Gilichinsky summarized plans for future work, including preparation of a soils database, bibliography and map, organization of the Syktyvkar cryogenic soils conference in 1997, and preparation of a plenary report for the 1998 permafrost and soils conferences.

Foundations

On behalf of the Foundations WG, Flaate reviewed the present state of geotechnical and engineering activities in frozen ground. There is some overlap in activities among IPA, ISSMFE, ISGF, ASCE and Geotechnical Engineering. It might help if the IPA WGs were redefined as Permafrost Engineering, with possible change in membership and subgroups and a larger body of corresponding members. These ideas will be circulated among the WG members and possibly discussed at the 8th International Cold Regions Engineering Conference in August 1996 in Fairbanks, Alaska.

Seasonal Freezing and Thawing

On behalf of the Seasonal Freezing and Thawing WG, Ladanyi reemphasized the suggestion that the IPA WG be concerned with the active layer-permafrost interface in the same ways ISSMFE TC 8 is concerned with seasonally frozen soils.

Slunga indicated the need to maintain IPA–ISSMFE-TC 8 liaison and cooperation. On behalf of Hans Jessberger, Chair of the International Organizing Committee of the ISGF, Ladanyi restated the desire for close IPA–ISGF cooperation, the need to name formal representatives to attend meetings, and the need to exchange working group reports and maintain awareness of each others' activities. Council member Fukuda has been the official IPA liaison to ISGF.

International Geographical Union

IGU President Herman Th. Verstappen had requested closer cooperation between IPA and IGU, notably in the field of global science programs. The IGU Executive Committee unanimously agreed that an affiliation status with IPA, similar to the one between IGU and IAG, should be the aim in order to form an adequate structural framework for scientific cooperation. It was further suggested that the matter be discussed in Moscow at the IGU meetings immediately following the IPA Council meetings in Berlin, and that a formal agreement be concluded at the 1996 IGU General Assembly. The IPA Council discussed the proposal and reached a favorable decision to pursue the IGU request. Vice President Romanovskii was asked to report these conclusions to the IGU meetings in Moscow, and Vice President French was asked to arrange with the IGU to investigate the steps necessary for formal affiliation.

3. FUTURE MEETINGS

The IPA Council and Executive Committee will meet in June 1998 during the 7th ICOP in Yellowknife. In addition, the Executive Committee plans to meet as follows: December 1995 in Hanover to follow up on actions from the Berlin Council meetings; August 1996 in Lanzhou, China, with a possible visit to Kazakhstan; and August 1997 in Bologna. The Chinese Society of Glaciology and Geocryology will hold the Fifth National Conference on Glaciers and Geocryology in August 1996 in Lanzhou. Announcements and invitations will be mailed soon (see p. 25).

The WGs on Mountain Permafrost, Global Change, and Periglacial Processes plan to meet during the December meetings in Hanover and again in Bologna. Representatives of other working groups are welcome to join the Hanover meetings. The Data working group may meet in Vic-

toria, BC, in association with the International Glaciological Society meeting, 12-15 August 1996. The Cryosols WG plans to meet in Syktyvkar in August 1997.

Haerberli reported a positive response to a proposal from European countries (Belgium, France, Germany, Italy, The Netherlands) and the Swiss Academy of Sciences to convene in 2003 the 8th International Conference on Permafrost. The focus for field trips would be on Quaternary and mountain permafrost. Preparations will continue to issue an official invitation at Yellowknife in 1998. To facilitate initial planning for the 8th ICOP, it was requested that Haerberli be invited to attend some of the Canadian 7th ICOP planning meetings.

4. OTHER BUSINESS

Vice President Romanovskii and David Gilichinsky, Chair, Cryosols WG, had circulated a draft proposal focusing on global warming and permafrost degradation and the need to publicize concerns and impacts associated with potential degradation. The Intergovernmental Panel on Climate Change (IPCC) has addressed some of these concerns and gaps in knowledge. Since time was not available to adequately discuss this subject, further discussions should be held in December 1995 in Hanover as part of both the IASC and IPA meetings and results reported by working groups and others in *Frozen Ground*.

Recognizing the continuing need to avoid conflicts in the scheduling of related scientific and engineering meetings, conferences, and workshops with the permafrost conference, a resolution was proposed by Heginbottom, seconded by Hallet and unanimously accepted (see p. 11).

Secretary General Brown reminded the Council that many permafrost specialists will meet in Hanover in December 1995 for the IASC conference on arctic research planning and the IPA workshop and working group meetings. Recommendations for long-term permafrost research and monitoring should be submitted for those meetings.

5. ADJOURNMENT

Past President Péwé moved that the Council meeting be adjourned. The motion was accepted by President Cheng Guodong, who thanked everyone for their hard work and productive discussions and declared the Council meeting adjourned at 4:45 p.m.

IPA COUNCIL RESOLUTIONS, BERLIN, 5 AUGUST 1995

DATA RESOLUTION 1

Acknowledging the importance of permafrost data for scientific and engineering study of current environments, together with the detection and prediction of future environmental change and its impacts;

The Council of the IPA requests member countries to:

1. encourage active participation in the Global Geocryological Database project (GGD);
2. seek financial support for associated national and international activities; and
3. facilitate open access to data holdings;

in support of these objectives.

DATA RESOLUTION 2

Noting increasing recognition of the need for cryosphere information within international science programs such as:

- Global Climate Observing System (GCOS) and Global Terrestrial Observing System (GTOS);
- Intergovernmental Panel on Climate Change (IPCC) assessments;
- International Geosphere Biosphere Program (IGBP);
- International Tundra Experiment (ITEX); and
- other similar, current and future endeavors;

The IPA pledges its support for such initiatives and, through the activities of its working groups, seeks to play an active role in their planning and coordination.

DATA RESOLUTION 3

Recognizing the grave risks of irrecoverable losses of permafrost data and related information as a result of the conclusion, change of direction, or termination of projects, organizations or individual careers:

The IPA strongly encourages national and international efforts to prevent such losses; and offers to provide expert advice to ensure the continuing survival and accessibility of orphaned data and information.

MONITORING RESOLUTION

Considering the importance of documenting and understanding long-term change in permafrost terrain, and noting the efforts of the Global Climate Observing System (GCOS) and the Global Terrestrial Observing System (GTOS) to provide a framework for monitoring the permafrost thermal state and the permafrost active layer as key environmental variables, the IPA recommends: 1) the establishment of an international network for long-term monitoring of the thermal state of the permafrost and active layer in both hemispheres; and 2) the standardization of methods for measurement and site selection, to be finalized at the upcoming December 1995 workshop in Hanover, New Hampshire, USA.

MEETINGS RESOLUTION

In order to involve maximum engineering and scientific participation in the international permafrost conferences held once every five years, all members and working groups are urged to encourage societies and professional organizations to coordinate the scheduling of their meetings, workshops and field trips within the 12-month period prior to and following the permafrost conferences. Following the June 1998 conference in Yellowknife, Canada, the next conference is provisionally scheduled for summer 2003 in Europe.

REPORTS OF IPA WORKSHOPS

DATA WORKSHOP

The Data and Information Working Group held another in its series of workshops to develop and support the IPA's Global Geocryological Database (GGD). This third workshop was held in Potsdam, Germany, 1-3 August 1995, immediately prior to the IPA Council meeting in nearby Berlin. The workshop, hosted by the Potsdam Research Unit of the Alfred Wegener Institute for Polar and Marine Research, was attended by 24 participants from 11 countries. The participants included nine full and corresponding members of the Data WG, members of six other IPA WGs (Mountain Permafrost, Cryosols, Global Change, Periglacial Processes, Foundations, and Seasonal Freezing and Thawing), and three members of the IPA Executive.

The results of the earlier meetings of the working group in Southampton, UK, June/July 1994 and Oslo, Norway, November 1994 have been reported in the two previous issues of *Frozen Ground*. In addition, a lengthy report on the Oslo meeting has now been published in the Glaciological Data Report series (GD-28) by the World Data Center-A for Glaciology (Snow and Ice), University of Colorado, Boulder, Colorado. In addition to the workshop report, that volume includes, as appendices, an inventory of 375 Russian permafrost maps and a listing of "Institutions in Russia and the C.I.S. Involved in Studies of Permafrost and Seasonally Frozen Ground."

The main objectives of the latest meeting were to review progress on setting up the GGD, both internationally and nationally, to develop recommendations on future data collection activities for the IPA and its various WGs, and to see where the GGD activity and the Data WG could contribute to other international science thrusts.

The workshop heard a detailed presentation from the Russian participants on the status of Russian contributions to the GGD and on the creation of a Russian NGD (National Geocryological Database). Much of the information on Russian contributions to the GGD had been reported previously in *Frozen Ground* No. 17 (June 1995) and the results published in GD-28, as described above. To further the development of a Russian NGD, there now is a proposal to set up a Russian Geocryological Fund as a non-profit organization. Its objectives will be to finance Russian NGD work, promote the collection of information about data sets in Russian organizations, develop a meta-database, assist in preparing data and data sets in proper formats for exchange, and assist in disseminating information about Russian geocryological data. Other workshop participants

Summary of Global Geocryological Database submissions.

Country	Forms/Data Sets	Country	Forms/Data Sets
Argentina	1	Norway	1
Bolivia	1	Poland	4
Canada	11	Romania	1
China	6	Russia	167
France	2	Spain	3
Germany	4	Switzerland	3
Italy	1	Sweden	14
Netherlands	1	USA	29
New Zealand	1	Total	250

gave brief reports on the status of geocryological data and GGD-related activities in several countries. Reports were received from Canada, China, Estonia, Germany, Romania, Sweden, and the USA. The participants from China and Sweden brought information on 6 and 13 new data sets, respectively, for inclusion in the GGD. Since the workshop, information has been received on several more data sets, either directly by the GGD or through the surveys being conducted by the Mountain Permafrost WG and Global Change and Permafrost WG. As of the end of November, the total number of data sets in the inventory is 250 [see table above].

At its previous workshop, the Data WG had developed a set of priorities for data collection and archiving, in terms of key applications of geocryological data. This was published, in tabular form, in *Frozen Ground* No. 16 (December 1994) and in GD-28. These priorities were reviewed, in light of comments received in response to the publication of this table, and some revisions made. In particular, permafrost thickness was subdivided into deep and shallow, with the local depth of zero annual amplitude as the dividing point, to bring this into line with the temperature parameters. The various parameters under the heading "Composition and Properties" were also modified extensively, on the basis of input from the Foundations and Global Change WGs. A revised data priority table is presented here.

There was much general discussion of the structure and organization of the GGD, of its function as an archive of permafrost information versus its role in promoting monitoring of the state of the cryosphere, and of the need to identify research questions to be addressed by the GGD. Research questions, if well framed, could be used to justify seeking financial support from granting agencies for the support of the GGD, as well as addressing the research

Revised priorities for GGD—Potsdam, Germany, August 1995.

PARAMETER*	APPLICATIONS				
	Process understanding	Engineering design	GCM validation	Change detection	Impact evaluation
Geometry					
Permafrost extent	M	H	H	H	M
Permafrost thickness (shallow†)	H	H	H	H	H
Permafrost thickness (deep†)	M	M	L	H	L
Active layer thickness	H	H	M	H	H
Ground ice extent	H	H	M	M	H
Lateral /vertical displacement	H	H	L	H	H
Thermal State					
Temperature (shallow†)	H	H	H	H	H
Temperature (deep †)	M	M	M	H	L
Properties (Soil/Rock)					
Moisture content (water/ice)	H	H	M	H	H
Bulk density	H	H	H	L	L
Texture	H	H	L	M	M
Chemistry (water/ice)	M	M	L	M	M
Trace gases	H	L	H	M	M
<p>* Site descriptions include location, geology, geotechnical properties, vegetation, etc. Metadata includes techniques, equipment, precision, post-processing, data ownership, etc. † For permafrost thickness and temperature, the demarcation between “shallow” and “deep” is taken as the local depth of zero annual amplitude. H, M, L = High, moderate, or low priority.</p>					

itself. In addition to use by IPA WGs for programs to monitor the effects of climate change on permafrost, several major international science initiatives, underway or planned, are potential users of the GGD for research purposes. IPA users include, in particular, the Mountain Permafrost and the Global Change and Permafrost WGs. International users include the Global Climate Observing System/Global Terrestrial Observing System (GCOS/GTOS) of the World Meteorological Organization, the Circumpolar Active Layer Monitoring program (CALM) of the International Tundra Experiment (ITEX), the International Geosphere–Biosphere

Program (IGBP), future assessments by the Intergovernmental Panel on Climate Change (IPCC), and the International Arctic Science Committee (IASC). The workshop heard presentations on the application of GGD to the work of the IPA Mountain Permafrost WGs, GCOS/GTOS, and ITEX.

The workshop concluded by developing three resolutions on permafrost data policies for presentation to the IPA Council Meeting. The final approved wording of these is given on page 11.

Submitted by J.A. Heginbottom

FROZEN GROUND WORKSHOP

The IPA workshop "Our Current Understanding of Processes and Ability to Detect Change" was held in Hanover, New Hampshire, 9-11 December 1995. The workshop was co-hosted by Dartmouth College and the Cold Regions Research and Engineering Laboratory, and was organized by Bernard Hallet, University of Washington, and Patrick Black, CRREL, under the auspices of the IPA WGs on Periglacial Processes and Environments, Mountain Permafrost, and Global Change and Permafrost. The idea to convene this workshop arose from discussions of working groups' members during the 6th ICOP post-conference field trip to Tibet and Lhasa.

Approximately 50 participants from Argentina, Canada, Finland, Germany, Japan, Kazakhstan, Norway, Russia, Sweden, Switzerland, the United Kingdom and the United States attended. Presentations consisted of keynote addresses, papers and posters, according to the following themes:

- Unfrozen Water / Frost Heave
- Soil Displacement Processes on Slopes and Patterned Ground

- Soil Hydrology, Biogeochemistry and Gas Exchange
- Monitoring and Evolution of Mountain Permafrost
- Permafrost Temperature and Data
- Permafrost Landscapes

Abstracts of the 46 presentations are available on the IPA Web site. Short reports of invited papers are proposed for publication in *Permafrost and Periglacial Processes*. Several of the convening WGs met to review progress on their ongoing activities, including compilation of results from the mountain permafrost and global change inventories, monitoring sites, and the field guide for periglacial measurements. Summaries of workshop discussions and conclusions will appear in future reports of WGs and in other media.

Following the workshop, approximately 10 participants proceeded to the AGU Fall Meetings in San Francisco, California. Two paper and poster sessions, again organized by Hallet and Black, on Frozen Ground Processes consisted of 25 presentations.

Submitted by Jerry Brown



Participants of the IPA frozen ground workshop in Hanover, N.H., visit the CRREL Frost Effects Research Facility (U.S. Army photo, P. Keene).

NEWS FROM MEMBERS

Recent reports (*Frozen Ground* No. 16 and No. 17) can be accessed through the IPA WWW home page:
<http://www.geodata.soton.ac.uk/ipa>

ARGENTINA

The new "Grupo Argentino de Geomorfólogos" (GAG) was founded in 1994 and has now affiliated with the International Association of Geomorphologists. The GAG has 13 different research fields, among them Periglacial Geomorphology. The GAG will organize the First Argentine Meeting of Geomorphology in 1996 in the city of Salta (NOA, Argentine Northwest). The host will be the National University of Salta (F. Rivelli). The GAG meeting, which coincides with the 6th meeting of the Argentine Association for Permafrost (AAP), will discuss different topics, advance geocryology in Argentina, and address financial problems for research projects, because of the continuing economic difficulties.

D. Trombotto moved from Patagonia to IANIGLA, where he will be in charge of its Geocryology Group and represent the AAP in the IPA. The Mendoza-based group is working on the following topics:

- Fossil cryogenic studies in the Precordillera of Mendoza (A. Corte and E. Buk)
- Fossil permafrost in Patagonia (D. Trombotto)
- Periglacial hydrology (E. Buk)
- Soil studies with seasonal freezing (C. Regairaz)
- Maps of freezing index and frequency

Arturo Corte continues his studies in relation to the deposition of carbonates in cold environments connected with the Lanzhou Institute of China (Chen Xiaobai) and with Strasbourg University, France (Thea Vogt).

Dario Trombotto finished the first short inventory of cryogenic forms and structures in southern South America (in print in *Heidelberger Geographische Arbeiten*). It includes a chronology of cryogenic events and identifies two important events in southern Argentina (Patagonia). He resumed studies on the behavior of snow patches, which are decreasing at 4300 m a.s.l. in the Cordón del Plata (33°S), Mendoza. He also began new cryogenic studies and inventories in the protected Provincial Natural Area of Laguna del Diamante (34°S).

Enrique Buk marked the new limits of the 0° isotherm at 32°54'S at 3860 m a.s.l. in the Central Andes, Cordón del Plata, the rock glaciers in the Morenas Coloradas, in areas with active rock glaciers at 3600 m a.s.l. He associated the variation with recent climatic changes.

Cecilia Regairaz is working on dating of till deposits up to 2400 m a.s.l. in the Cordillera Frontal, based on soil

profile weathering. The Mendoza Group hosted Prof. Kazuo Shimokawa of Sapporo University for a year in Argentina and received a German student, Martin Raithelhuber of Heidelberg University, for three months. Future topics for the Mendoza Group are:

- Remeasuring creep in rock glaciers and solifluction lobes (D. Trombotto and E. Buk)
- New cryogenic studies in the region of the Laguna del Diamante (D. Trombotto)

Among other AAP members, A.-L. Ahumada (National University of Tucuman, NOA) continued her minero-cryogenic research on heavy minerals from the Central Andes and the Antarctic.

A. Igarzabal (Salta University) presented work on cryoplanation surfaces in Puerta de Tastil (Salta). H. Schobinger (Mendoza) finished editing a book with contributions from many authors about the mummy of Aconcagua that was preserved in a cryogenic environment. S. Grosso (La Pampa) is working with fossil features in northern Patagonia. G. Martinez and others of the Centro de Geología de Costas y del Cuaternario (Mar del Plata) worked on fossil debris slopes of the Sierra de los Padres, Tandil and Olavarría (Province of Buenos Aires). The Mendoza group has contributed to IPA working groups on Terminology (A. Corte, D. Trombotto and E. Buk) and Mountain Permafrost (D. Trombotto).

Submitted by Arturo Corte and Dario Trombotto

CANADA

The Canadian National Committee (CNC) for the IPA held its annual meeting in Ottawa, at the Geological Survey of Canada (GSC), on 24 June 1995. The business of the meeting was devoted largely to the planning of the 7th International Conference on Permafrost, to be held in Canada in June 1998. In particular, the committee completed a thorough review of the decision to hold the conference in Yellowknife, NWT. Concern had been expressed over the high cost of travel to Yellowknife and over the implications of cutbacks in the federal and territorial governments for the success of this conference. The CNC heard strong statements of support from the GSC and from the representative of the Science Institute of the NWT/Aurora College. In conclusion, the CNC confirmed that Yellowknife is indeed an appropriate place to hold the conference, and that there is a strong local commitment to its success, by all sectors of the community. In response to institutional changes within the federal public service, the Science Institute of the NWT has resumed the lead role in supporting the conference Local Arrangements Committee, replacing the Yellowknife office of the GSC (scheduled to close in December 1995). The

Technical Program Committee is now in place and the Field Trips Plan is well on its way to completion.

The Canadian Geotechnical Society's 48th annual conference, held in Vancouver in September, included a session on Permafrost/Engineering Geology, organized by the Cold Regions Division. The papers presented addressed such diverse topics as natural piping failures in permafrost; effects of forest fires on ice-rich, fine-grained permafrost slopes; use of georadar for geotechnical study of insulated permafrost slopes; modeling of diesel fuel leaks in permafrost; and creep deformation of massive ground ice. Dr. Elisabeth Hivon, of EBA Engineering Consultants Ltd, Edmonton, will take over the chair of the Cold Regions Division in January 1996; the three other members of the division's executive will be chosen in due course. The 1995 Roger J.E. Brown Award is being shared by A.J. Hanna, J.M. Oswell, E.C. McRoberts, J.D. Smith and T.W. Fridel for authoring a paper entitled "Initial Performance of Slopes: Norman Wells Pipeline Project, Canada," presented at the 7th International Cold Regions Engineering conference in Edmonton in March 1994. The 49th Canadian Geotechnical Conference will be in St. John's, Newfoundland, in September 1996 (see p. 25).

Submitted by J.A. Heginbottom, Secretary, CNC-IPA

CHINA

As reported in *Frozen Ground* No. 17, the Conference on the Cryosphere and Global Change was held in Lanzhou in May 1995. The proceedings are being published by Science Press and include, among others, the following topics: responses of the cryosphere to climate change in the high elevations of Asia and impacts on adjacent regions; monitoring of cryospheric changes; responses of glaciers, snow cover and permafrost to climate change; changes in vegetation and depositional and hydrological processes; use of remote sensing techniques; and establishment of databases in cryospheric research.

As reported elsewhere (p. 21) the Fifth National Conference on Glaciology and Geocryology will be held in August 1996 in Lanzhou. The first annual issue of the English language journal *Cryosphere* will be published by the end of 1995. Ordering information is available from Zhu Yuanlin, Lanzhou Institute of Glaciology and Geocryology.

Report presented by Cheng Guodong
at the Berlin Council meetings

FRANCE

J. Aguirre-Puente, President of the French IPA association, participated in a meeting (May 1995) of the International Institute of Refrigeration (IIR). The institute wishes

to establish a link with the IPA, the common theme being global change. The IIR has a commission to study the environmental problems caused by CFCs. The next international conference of the IIR will be held at the Hague 20–25 August 1996. The IIR contact is L. Lucas, Director, 117 Boulevard Maleshebes, 75017 Paris, France.

There is an active periglacial commission of the National Committee of Geography that includes French geomorphologists who work on fossil and active processes (Alps, Andes, Arctic, Antarctic). They conduct a field trip and hold a two-day symposium each year and results are published. M. Fort, Secretary, Geography, University Paris may be contacted for details. One discussion concerned the extent and depth of Weichselian permafrost; several papers addressed modeling and comparisons with field evidence. This also relates to studies in the EEC Program on paleoclimatic evolution during the Weichselian (in loess) with classic dating and other measurements (^{14}C , ^{13}C , ^{18}O), and new techniques compared with the Vostok core. Many papers concerning fossil frost processes in relation to paleoclimate and paleogeography have been published.

Submitted by J.-P. Lauthridou

KAZAKHSTAN

In 1995 the Laboratory of Geocryology of the International Centre of Geoecology of Mountain Countries in Arid Regions (ICGM) continued and extended the regular observations on the program of geocryological monitoring. Main attention was focused on the thermal regime of permafrost and seasonal freezing–thawing under different natural conditions of the Northern Tien Shan (Zailiysky Alatau). Climate changes result in permafrost "warming," increased seasonal thawing depth, reduction of thickness, and disappearance of the "pereletoks" at the lower boundary. Despite considerable year-to-year fluctuation there is a general trend of rising mean annual temperature and reduction of the layer of seasonal freezing.

Investigations of the influence of climate and permafrost warming on the dynamics of rock glaciers, solifluction and thermokarst processes, frost heaving, and glacial mud-flow continue. The active rock glaciers of the Northern Tien Shan were classified and a map of their distribution (1:200,000) was compiled. Fluctuations of the movement velocity of the rock glacier Gorodetsky (Zailiysky Alatau) since 1923 were evaluated. On the northeastern part of the Ketmen and Karatau Ranges, research was begun into the unique cryogenic feature of the Tien Shan forest solifluction. On the basis of the map of cryogenic features (scale 1:25,000) of the Bolshava Almatinka basin using special methods, evaluation of permafrost and ground ice volumes

was carried out. Using temperature data from deep boreholes and simulation methods, variations of permafrost temperatures in the Holocene were estimated.

The Laboratory of Snow Cover and Avalanches (ICGM) carried out observations of snow cover and avalanche activity monitoring on the northern slope of Zailiysky Alatau. Data on the duration of snow cover and the depth and water content on slopes of different exposures and altitudinal zones were obtained. The volumes of the avalanches were mapped and measured. A database of multi-year snow cover observations in the mountains of Kazakhstan was prepared. Spatial-temporal variability of the snow parameters was analyzed. A map of maximum snow storage and its variability (1:500,000) was drawn for the territory of Zailiysky Alatau, Kungei Alatau, Ketmen and Dzhungarsky Alatau.

The ICGM proposed a 50-year forecast of glacial evolution in the Northern Tien Shan and the Pjungar (or Dzhungarsky) Alatau.

Submitted by A.P. Gorbunov and I.V. Seversky

THE NETHERLANDS

Within the framework of a Dutch-Russian treaty for scientific cooperation, the Willem Barentz field station has been opened at the eastern valley side of the lower Yenisei River, Russia, near its mouth in the North Polar Sea at Dickson (west Taimyr, c. 73°N). This field station has been set up by biologists, but will also be open for other scientists. There are places for 10-20 persons. The station is accessible by sea and air (by plane to Dickson and then 10 minutes by helicopter). At present, there is a "managing committee." The contact person for The Netherlands is B. Ebbinge, Afdeling Aquatische Ecologie, Instituut voor Bos- en Natuuronderzoek (IBM-DLO), P.B. 6700 AA Wageningen, The Netherlands. Tel: 31 3434 55204.

Submitted by Jef Vandenberghe

ROMANIA

In recent years, research on permafrost and periglacial phenomena has been undertaken by several Romanian geomorphologists. Under the coordination of Petru Urdea, a team from the University of Timisoara carried out summer temperature measurements of springs situated at the base of rock glaciers, and talus cones in the Retezat and Făgăras Mountains, and used BTS measurements to map periglacial forms from the Surianu (L. Drăgut), Lotrului (C. Ancuta) and Tarcu Mountains (C. Gruia), where the temperature of the springwater suggests the possibility of permafrost. In September and October 1994, together with Jocopo Pas-

soti (University of Milan), measurements were made of soil temperature from the high zone of the Făgăras and Retezat Mountains.

D. Călin (Bucarest) and M. Florea (Brasov) have prepared a Geomorphological Risk Map of the Negoiu Zone (Făgăras Mountains).

A data bank covering quantitative and qualitative characteristics of permafrost, periglacial processes and landforms in the Romanian Carpathians, as well as monitoring of the permafrost, has been initiated as part of the IPA/GGD.

Submitted by Petru Urdea

RUSSIA

A special session on "Monitoring in the Cryolithozone" was included in the annual meeting of the Scientific Council on Earth Cryology in Pushchino (near Moscow) 24-28 April 1995 (see *Frozen Ground* 17, p. 3-4). Seven papers were presented at the special session devoted to the monitoring problem. In addition, some papers connected with the problem were discussed at the other special sessions.

An overview paper, "Monitoring of Global Changes in the Permafrost Zone," was presented by A. Pavlov. He predicted that by 2020 the temperature of the ground surface would increase by about 2.5°C. Seasonal thawing would be deeper by 15-25%. An expected warming of global climate would reduce temperature contrasts in the permafrost. An interrelationship between climate warming and the intensity of cryogenic processes (thermo-abrasion, rapid solifluction) was noted. Pavlov proposed to create a unified system of circumpolar monitoring of the Northern Hemisphere using automated measuring means and computer-aided technologies of collection, storage and processing of information. This information should be used for prediction of changes in frozen ground properties to improve construction projects.

A scenario of climate warming and prediction of changes of the West Siberian cryolithozone in the 21st century were discussed by V. Balobayev, using a computerized model of warming and thawing in accordance with the tables and maps of increasing temperatures of the ground surface during the 21st century for all West Siberia. Relict permafrost will continue to degrade. The southern border of permafrost will retreat 50-80 km by 2020 and 200 km by 2050. By the end of the 21st century frozen ground will only occur north of Yamal and Gydan.

In his paper "A Necessity to Take Into Account Global Climate Warming When Projecting Construction on Permafrost," L. Khrustalev stated that 54% to 100% of the buildings in the settlement of Tiksi would be destroyed by 2030 because of the expected climate warming. Monitor-

ing of the permafrost zone in the Urengoi gas field (northern West Siberia) during 1975, 1976, 1980 and 1992–1994 (paper by D. Drozdov and others from VSEGIN-GEO titled “The Change of Engineering–Geocryological Conditions in Urengoi Mineral Deposits”) showed that the more significant changes in the temperature of frozen ground were found in sites close to construction. Near pipeline embankments after 1975, the temperature of permafrost rose 2°–3°C and now is near 0°C. Along roads with undisturbed surfaces, the temperature of the ground rose up to 1.5°–2.0°C. Cryogenic processes there were also activated.

Dynamics of the littoral zone of Arctic seas and the present state-of-the-art and goals were presented in a paper by F. Are. Monitoring of the coastal zone dynamics and calculations showed rates of constant thermoabrasion of Arctic sea shores are conditioned mainly by a hydromechanical transfer of suspended sediments during strong storms. American investigators believe that sea ice is the principal agent of shelf erosion. Are believes that the drift ice in the Laptev Sea does not substantially influence the dynamics of the shoreline. The sludge ice, which is formed in large amounts during the winter storms, is a more effective agent of transfer than suspended sediment in the Laptev Sea. F. Are proposed to create a 1:50,000 scale map of the coastal dynamics, which will show eroded areas and land formation during the recent decades, rates of coastline movement, and magnitude of coastal erosion and sediment accumulation in the littoral zone.

Monitoring of the coastline at 60 points in the area of polar station Mare Saale (Yamal Peninsula, West Siberia) over 16 years showed that the mean rate of retreat of the shore is about 2 meters per year and 10 meters where the shores are composed of ice-rich sediments (“Thermoabrasion of the West Yamal Seacoast,” V. Vassiliev.) Monitoring of the coastline in the area of the Lena River delta over 14 years (1981–1994) showed that during the last 10–20 years the rate of shoreline retreat was 10–25% less than the rates obtained by previous investigators during the preceding decades.

Adequate monitoring in the cryolithozone was emphasized in the paper “Remote Sounding for the Geocryological Substantiation of the Transcontinental Railway Project” (Siberia, Alaska), by V. Rasbegin and others. Forecasting the impact on the environment and permafrost conditions and working out relevant recommendations can be solved by means of research and monitoring the cryolithozone.

Monitoring of permafrost begun in 1980 is carried out in five physiogeographical regions of Central Yakutia, as discussed in a paper by P. Skryabin and others entitled “Monitoring of the Ground Thermal Regime in Central

Yakutia.” The last decade is characterized by a rise in air temperature of 0.7°C and by an increase in the thickness of the snow cover. The changes in the mean temperature of the ground at the top of permafrost are connected mostly with the variations of the air temperatures and the depth of summer thaw, with summer precipitation and a sum of air temperatures above 0°C.

As reported by A. Federov, the monitoring data obtained in Central Yakutia show an increase of ground temperature at the 3.2 m depth of 15%. During the last 15–20 years we can see a significant rise in ground temperature because of climate warming.

The expected climate warming will give rise to thermo-karst phenomena in central Yakutia, at sites where ice wedges occur. The depth of alasses may be 15–20 m as reported in papers by N. Bosikov, “The Stability of Technogenic Landscapes in Central Yakutia,” and T. Botulu, “The Evaluation of Modern Conditions of the Landscapes with Ice Wedges and Reaction to Climate Warming.”

“Changes in Frozen Ground by Thermodenudation” was presented by V. Ostroumov. Physical and physicochemical properties of frozen ground in the oxidation zone near thermoabrasion benches and alass formations in the Kolyma–Indigirka lowlands were studied. Stationary oxidation zones are formed on stable slopes over 150–200 years. When characterizing the relationship of the oxidative transformation of the ground and thermodenudation intensity, it is assumed a linear character of transformation with time. The resulting relationship can be used to determine the rate of thermodenudation. The proposed approach makes it possible to determine the rates of thermoabrasion and the river bank regression by the data of a single determination of ground parameters in the oxidation zone.

The evaluation and control of icings in connection with global environmental climate changes were presented in a paper by V. Alekseev. The process of icing formation is important for engineering, prospecting and construction. To predict the evolution of icings one should make a modern cartographic evaluation of icing danger, determine the dependence of icing parameters on specific environmental and geocryohydrological conditions, and find methodological approaches to forecasting events in connection with the natural and man-affected evolution of the geocryogenic systems. Results of the investigations should be small-scale maps of the icing-rich area. The monitoring of icings should be organized to determine the changes in the ice field characteristics during the past 200–300 years. An international program for monitoring icing danger in the cryolithozone was proposed.

Prepared and submitted by Nikolai A. Grave

SOUTHERN AFRICA

Stefan Grab examined active and relict periglacial features on Mt. Kenya during July 1995 and is ascertaining the implications of such landforms on equatorial climatic change. In September 1995, he visited Mt. Inyangani (the highest summit in Zimbabwe) to determine the occurrence of relict periglacial landforms near the summit area. Stefan is continuing with his detailed analysis on the high Drakensberg periglacial environment. Colin Lewis presented a paper at the INQUA meeting in Berlin on evidence for Quaternary glaciation in the Eastern Cape Drakensberg mountains; his research in the area is ongoing.

Circulars for the IVth Southern African Association of Geomorphologists (SAAG) Biennial Conference, to be hosted by the University of the Western Cape in Cape Town, South Africa, from 8 to 10 July 1996, have been circulated. The Southern African Permafrost Group (SAPG) is an affiliate member of SAAG and there will be a "SAPG session" at the conference.

The conference will be followed by a two-day technical workshop titled: Design and Instrumentation for Soil and Water Loss Estimations on Plot, Slope and Catchment Scales. Contact: Theo Scheepers at The Department of Earth Sciences, University of the Western Cape, P/Bag X17, 7535 Belville, South Africa.

Tel: +27-21-959 2995/2223, Fax: +27-21-959 2266

E-mail:scheepers@earth.uwc.ac.za

Submitted by Ian Meiklejohn

UNITED STATES

The U.S. National Research Council has appointed Bernard Hallet as Chair of the U.S. Committee for the International Permafrost Association (USC/IPA) for the period July 1995 through July 2000. He replaces Bill Lovell who served in this position for the previous five years. Hallet, formerly Vice Chair of the USC/IPA, is the Director, Periglacial Laboratory of the Quaternary Research Center at the University of Washington, a position formerly held by QRC founder Linc Washburn. The USC/IPA is a subunit of the U.S. National Committee on Geology (USNC/Geology), which in turn is under the Commission on Geosciences, Environment and Resources. Other new members of the USC/IPA are in the process of being appointed.

Jon Zufelt, CRREL, reports that the ASCE Technical Council on Cold Regions Engineering (TCCRE) met in San Diego on 21–22 October 1995. Some highlights from those meetings follow. TCCRE's Frozen Ground Committee continues its efforts in the technology transfer arena. The committee has developed two short courses which will be offered at the ASCE's 8th International Cold Regions Engineering Specialty Conference in Fairbanks on 12–17 August 1996. The first is "Computer-Aided Analysis of Frost Heave Using the CRREL FROST Program." The second course is on thermosyphon design. In other news, the committee is developing sessions on Anti-Icing Technology for Roads. The sessions are planned for the ASCE National Convention, to be held in Minneapolis in the fall of 1997. The committee has finalized contributions to the ASCE Monograph "Roadways and Airfields in Cold Regions." The existing Monograph, "Thermal Design Considerations," is currently being reviewed and updated. Jim McDougall of North of 60 Engineering, Ltd. in Calgary, Canada, was named as the new committee chair.

Jesse Walker reports that the April 1996 annual meeting of the Association of American Geographers in Charlotte, North Carolina, will have four sessions related to the cryosphere: 1) snow cover, 2) active layer, 3) glaciers and permafrost, and 4) periglacial. The proposed AAG Cryosphere Specialty Group is likely to be formed in 1996.

Ron Paetzold of the USDA Natural Resources Conservation Service (NRCS) in Lincoln, Nebraska, reports on several soil climate projects in the northern United States. The Soil Moisture/Soil Temperature Pilot Project (SM/ST) is a feasibility study for the establishment of a network of soil climate data collection stations to monitor temperature and moisture to depths of 2 meters. A second project is the Wisconsin Dense Till project (WDT), which consists of 28 instrumented sites in northern and central Wisconsin for monitoring soil moisture and temperature. A report by the NRCS Soil Climate Team entitled "Distribution of Soil Climate Stations for the United States" provides an inventory of reporting stations and data. This report is available from NRCS, Federal Building, Room 152, 100 Centennial Mall North, Lincoln, Nebraska 68508-3866.

Submitted by Jerry Brown

OTHER NEWS

PERMAFROST AND THE IPCC SECOND ASSESSMENT REPORT

In 1994, the IPA undertook to assist the Intergovernmental Panel on Climate Change (IPCC) in the preparation of its Second Assessment Report (SAR), by providing up-to-date information on permafrost and climate change. The IPA contribution was published in the June 1994 issue of *Frozen Ground* (No. 15), with an introduction by Martin Beniston about the IPCC and the challenges that face it. The IPA contribution, based on material provided by several IPA working groups, was prepared for inclusion in a chapter on the Cryosphere, along with information on glaciers and ice caps, snow cover, sea ice, and lake and river ice. The convening lead author for this chapter is Blair Fitzharris, of New Zealand; the lead authors and other contributors include several active members of IPA working groups: O. Anisimov, J. Brown, R.G. Barry, F. Dramis, W. Haerberli, A.G. Lewkowicz, F.E. Nelson, and A.E. Taylor. This cryosphere chapter is part of the work of IPCC Working Group II, on Impacts, Adaptation and Mitigation Strategies. The two other IPCC working groups are WG-I, on Scientific Assessment of Climate Change, and WG-III, on Economic and Cross-Sectoral Issues.

The IPCC WG-II held its third plenary meeting in Montreal, Canada, in October 1995. The purpose of this meeting was to gain the approval of participating governments on the wording of the executive summary of the WG-II report. Participating in the plenary meeting were WG-II staff and delegates from UN member countries and UN agencies.

The session had before it the final version of the WG-II contribution to the IPCC Second Assessment Report. This comprised, in draft, about 2000 pages (double sided and single spaced) organized into a technical summary, 2 introductory chapters, 28 thematic chapters and a number of technical and methodological appendices. Also before the session was a 20-page draft of the overall Summary for Policymakers for this compendium. The purpose of the meeting was to agree on the precise and final wording of this summary, on a line-by-line basis. The 2000-page main contribution report was not open for modification; its final form had been agreed on earlier in the year by the convening lead authors and the IPCC WG-II chairs and secretariat.

This final version of the WG-II report, along with similar reports from WG-I and WG-III, were discussed at an overall IPCC plenary meeting in Rome in December 1995. At this meeting, an overall synthesis report based on the

reports of all three WGs was approved. Following this all the reports, summaries and syntheses will be published.

How successful was all this? The Montreal plenary session did indeed agree on a final text for the Summary for Policymakers which was consistent with the underlying scientific reports and which fairly synthesized recent advances in the science of global climate change. The mandate of WG-II is "Impacts, *Adaptation*, and Mitigation Options" (emphasis added), however, and, while the report deals effectively with the current state of knowledge concerning impacts and potential mitigation measures, the question of adaptation is less explicitly handled. Discussion on this is spread throughout the report, but it is not really drawn together in a manner helpful to policymakers. There is considerable concern that policymakers may feel that adaptation is something which can wait for the future, whereas many scientists believe that this is where some consideration of policy options should be focused. Many scientists believe that global warming can already be detected and therefore may be taken as having arrived. Even if human society could agree on and implement immediate and drastic action to reduce CFC emissions, the residence times of many gases already in the atmosphere are such that global warming and sea level rises will continue for a period of decades to centuries. Thus society has to adapt to this new reality. Perhaps this should be the focus for the next phase of IPCC, before a new round of full scale assessment begins in 1998.

Report and comments by J.A. Heginbottom, Canada

WORKSHOP ON FROZEN SOIL

On 22–23 March 1994, 36 scientists, scholars, engineers, and administrators met for a workshop on frozen soils. The workshop, which was sponsored by USDA's Agricultural Research Service, was held at the University of Minnesota's West Central Agricultural Research Station at Morris, Minnesota. It was fitting that this conference was held in Minnesota. Except for Alaska, Minnesota and the Dakotas experience the longest duration and intensity of soil freezing in the U.S. Freezing of soils to depths of 1.0 to 1.5 meters is a common feature of the natural landscape.

Much has been learned about soil freezing over the decades, but this subject still receives only scant attention from scholars and scientists. The fact that land management affects both the duration and depth of frost penetration makes this an appropriate subject of study from biological, agricultural, and environmental quality perspectives. An entire array of biological organisms living in the soil has been large-

ly ignored, and relatively little is known of their life cycles and the impact that various human activities have had on entire populations.

The workshop proceedings were published in the *Journal of the Minnesota Academy of Sciences*. For more information contact Alan Olness, Science Editor, *Minnesota Academy of Science Journal*, Room 583, 350 N. Robert St., St. Paul, Minnesota 55101. E-mail: aolness@mail.mrsars.usda.gov.

WATER MOVEMENT IN FROZEN GROUND

At the 10th Northern Research Basin Symposium (NRBS) and Workshop in Svalbard in 1994, the General Assembly decided to form a new working group on "Water Movement in Frozen Ground," with particular reference to ground-water movement. The group is preparing a state-of-the-art report, possibly to be published as a special permafrost groundwater volume of *Nordic Hydrology*. A report of these activities will be presented at the 11th NRBS in Fairbanks, Alaska, in August 1997. For more information, contact the group leader, Sylvi Haldorsen, Department of Soil and Water Sciences, NLH, Norway. E-mail: sylvi.haldorsen@ijvf.nih.no

28TH INTERNATIONAL GEOGRAPHICAL CONGRESS

The IGU Congress to be held in The Netherlands (5–10 August 1996) will be composed of general sessions, symposia, state-of-the-art lectures and commission sessions. The IGU Commission on Frost Action Environments will take part with a lecture, commission session (Environmental Change Under Periglacial Conditions, coordinator J. Vandenberghe), a joint session with the Commission on Geomorphological Response to Environmental Change (GERTEC) (Methods of Investigating Environmental Change), and an excursion of five days after the Congress, also jointly with GERTEC, in Belgium and The Netherlands (coordinators J. Vandenberghe and A. Pissart).

COLD REGIONS ENGINEERING

The ASCE Technical Committee on Cold Regions Engineering will hold its Eighth International Specialty Conference on Cold Regions 12–17 August 1996. The conference will focus on cold regions infrastructure requirements needed into the next century. Several mini-symposia and workshops are planned for special interest areas. Both technical and general interest tours will be conducted before, during and after the conference.

The conference will include presentations on:

Buildings Railroads Highways

Frozen soils Airports River ice
Communications Environment Pipelines
Permafrost Utilities

Contact Larry Bennett, School of Engineering, University of Alaska, P.O. Box 755900, Fairbanks, Alaska 99775-5900.

COLD REGIONS ENGINEERING SYMPOSIUM

The Heilongjiang Provincial Low Temperature Construction Research Institute and the Permafrost Institute of the Russian Academy of Sciences will convene an International Symposium on Cold Regions Engineering in early September 1996, at the Heilongjiang Institute in Harbin, China.

The symposium program will include four sessions:

Engineering structures
Bearing soils, foundations and soil mechanics
Engineering technologies
Environmental protection in cold regions during construction

For further information contact the Permafrost Institute, Yakutsk 18, 677018 Russia. Tel: 4 46 34, 5 38 56, 5 39 12
Fax: 095 230 2919 (Yakutsk, Merzlota)
E-mail: lans@imzran.yacc.yakutia.su

FIFTH CHINESE CONFERENCE ON GLACIOLOGY AND GEOCRYOLOGY

Since the last Chinese Conference on Glaciology and Geocryology in 1988 in Lanzhou, great progress and achievements in fundamental and applied research on glaciers and frozen ground and in cold regions engineering have been made in China. The objective of this conference is to provide researchers and engineers working on snow, ice and frozen ground an opportunity to discuss and exchange their achievements and experience in cold regions and technology.

The conference will be held at the Lanzhou Institute of Glaciology and Geocryology (LIGG) 18–22 August 1996 under the auspices of the Chinese Society of Glaciology and Geocryology and will be organized by LIGG, Chinese Academy of Sciences, with the collaboration of its State Key Laboratory of Frozen Soil Engineering and the new Laboratory of Ice Core and Cold Regions Environment.

Conference themes:

1. Cryosphere and global change, including glacier movement, mass balance, permafrost change, prediction of the distribution of glaciers and permafrost, and their interaction with climate change.

2. Physical, mechanical, chemical and biochemical properties and processes and their variation with regard to snow, ice (including sea ice) and frozen ground.

3. Environment, ecology, resources and disasters in cold regions and the re-formation and utilization of snow, ice and frozen ground.

4. Water resources in cold regions, including distribution, prediction of variation, rational utilization and development.

5. Frozen soil engineering and ice engineering, including site investigation, design, construction, operation and maintenance, monitoring, model and case engineering experiments and treatment of frost damage of various kinds, permafrost engineering, ice engineering and artificially frozen ground engineering.

6. Measuring and testing techniques, including methods and techniques for laboratory and in-situ tests, surveying and remote sensing, and development of test instruments.

Prospective authors are invited to submit abstracts (not exceeding 500 words) of papers which have not yet been published elsewhere as soon as possible to Zhu Yuanlin, Lanzhou Institute of Glaciology and Geocryology, Lanzhou 730000, China.

Tel: 86 931 884 1490 (office) or 884 1298 (home).

Fax: 86 931 888 5241;

E-mail: ggcheng@bepc2.ihep.ac.cn

Post-conference field excursion route: Lanzhou-Zhangyi-Jiuquan("7.1" Glacier)-Jiayuguan-Dunhuang-Lanzhou by bus. Duration: 7 days.

SEASONALLY FROZEN SOILS SYMPOSIUM

An international Symposium on Physics, Chemistry and Ecology of Seasonally Frozen Soils will be held in Fairbanks, Alaska, 10–12 June 1997. Freezing and thawing can have a profound impact on the stability, hydrology and ecology of soils at high latitudes and elevations worldwide. These phenomena influence our ability to adapt engineering technologies and manage ecosystems. Recent advancements in the detection and prediction of physical and biological processes in frozen soils afford an opportunity to document and discuss these findings within a symposium format. An important contribution of this symposium will be identifying knowledge gaps and research needs in the physics, chemistry and biology of frozen soils that will promote wise use and better management of lands in the future.

Scientists, engineers and conservationists are invited to present papers related to the occurrence, measurement and prediction of physical and biological processes in frozen soils. Topics of specific interest are those related to the climatology, physics, chemistry and ecology of seasonally frozen soils:

- Duration/distribution of frozen soils
- Measurement techniques
- Modeling processes

- Artificial soil freezing/thawing
- Bioremediation
- Soil physical properties and processes
- Adaptation/survival of organisms
- Snow properties/dynamics
- Land management impacts on soil freezing
- Fate and transformation of chemicals/gases

Plenary and poster sessions are planned for the three-day symposium. Following the symposium, a one-day tour will allow attendees to visit field research projects and to view natural frozen soil features in the Fairbanks area.

Those intending to offer a paper/poster are required to submit an abstract (in English) of no more than one page by 1 April 1996. All submissions will be editorially reviewed and published in the symposium proceedings.

Abstracts should include (in this order): authors, title, text, corresponding author's address and telephone number. Submit to: Pieter Groenevelt, Program Chair, Department of Land Resource Science, University of Guelph, Guelph, Ontario N1G 2W1, Canada.

SECOND INTERNATIONAL CONFERENCE ON CRYOGENIC SOILS: ECOLOGY, GENESIS AND CLASSIFICATION

The conference will be held on 5–8 August 1997 in Syktyvkar, Komi Republic, Russia.

Program

Ecological aspects of cryogenic soils

- Ecological functions of cryogenic soils • Productivity • Biochemical cycles • Gas exchange • Global climate change and cryogenic soils • Effect of anthropogenic factors on cryogenic soils • Contamination and remediation of cryogenic soils

Genesis and geography of cryogenic soils

- Soil-forming processes in cryogenic soils • Evolution and age of cryogenic soils • Cryogenic soils geography • Soil mapping and geographic information systems of polar and boreal regions • Methods of cryogenic soils study, including soil micromorphology, characterization of humus materials, etc. • Classification and databases of cryogenic soils and soil regimes and patterns

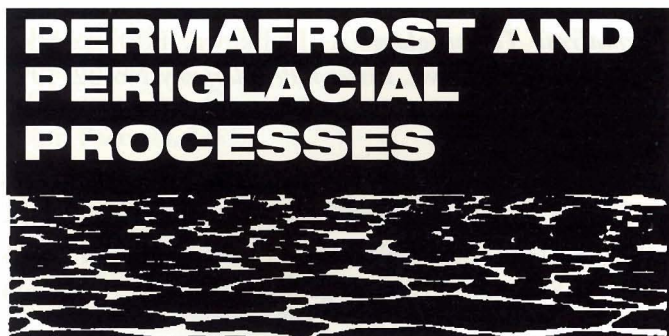
Round table discussion on international environmental monitoring activities in permafrost regions

Field excursions

1. One-day mid-conference excursion in Syktyvkar area—soils of European Russia boreal forests, natural forests and ancient alluvial sands
2. Two-day post-conference field trip to southern part of tundra zone near Vorkuta—treeline fluctuations, relict Podzolic features, productive agriculture in tundra zone.

Contact: see inside back cover.

PUBLICATIONS



John Wiley and Sons Ltd., publishers of *Permafrost and Periglacial Processes*, has agreed to offer reduced individual subscription rates of \$50.00 (U.S.) to those individuals who can demonstrate a professional interest in permafrost and other forms of frozen ground. Recipients of *Frozen Ground* and participants in the international permafrost and related periglacial conferences can qualify for this reduced subscription rate. Those interested in obtaining more information should contact: Subscriptions Department, John Wiley and Sons Ltd., Baffins Lane, Chichester, West Sussex, PO19 1UD, England.

Volume 6, Issue No. 3 (July–September 1995)

Ventifacts as Palaeo-Wind Indicators in Southern Scandinavia, P. Schlyter

Recent Climatic Trend and Thermal Response of Permafrost in Salluit Northern Quebec, Canada, B. Wang and M. Allard

The Chronology of Upper Pleistocene Stratified Slope-Waste Deposits in Central Italy, M. Coltorti and F. Dramis

Microbial Life in Permafrost—A Historical Review, D. Gilichinsky and S. Wagener

A Note on Rock Glaciers in the Albanian Alps, G. Palmentola, K. Baboci, Gh. Gruda and G. Zito

Cryogenic Landslides on the Yamal Peninsula, Russia: Preliminary Observations, M.O. Leibman

Gelifluction in the Alpine Periglacial Environment of the Tianshan Mountains, China, Liu Gengnian, Yong Heigang and Cui Zhijui

Ice Wedge Formation in Northern Asia During the Holocene, Y.K. Vasil'chuk and A.C. Vasil'chuk

Volume 6, Issue No. 4 (October–December 1995)

Permafrost Biology, D.A. Gilichinsky, S. Wagener and T.A. Vishnevetskaya

Laboratory Simulation of Periglacial Solifluction: Significance of Porewater Pressures, Moisture Contents and Undrained Shear Strength During Soil Thawing, C. Harris, M.C.R. Davis and J.-P. Coutard

Inter-Annual Variations of the Thermal Regime of the Active Layer and Near-Surface Permafrost in Northern Alaska, V.E. Romanovsky and J.E. Osterkamp

The Geochemical Paradox of Ice-Complex Sediment of North Siberia, V.N. Konishchev and I.R. Plakht

Rockslide Processes on the North Slope of Popocatepetl Volcano, Mexico, D. Palaços

Observations on Nearshore Pingo Growth, Adventdalen, Spitzbergen, K. Yoshikawa and K. Harada

Short Communication

A Field Survey of Late-Summer Depth to Frozen Ground at Two Study Areas Near Mayo, Yukon Territory, Canada, D. Leverington

冰川冻土

JOURNAL OF GLACIOLOGY AND GEOCRYOLOGY

Selected Frozen Ground Titles

Volume 16, No. 4 (December 1994)

Essential Types of Heave Development for Soil Freezing, Xu Xiaozu, Zhang Lixin and Wang Jiacheng

Primary Study on Model for Coupled Heat–Moisture–Salt Transfer in Soil During Freezing–Thawing Processes, Yue Hansen

Fractal Structure Features of Granulometric Composition in Frozen Soil and Its Significance, Yi Shunmin and Tang Huiming

Study on the Freezing Point of Wet Sand Under Loads, Cui Guangxin and Li Yi

The Effect of Length of Specimen on the Results in Radial Splitting Test, Shen Zhongyan, Peng Wanwei and Liu Yongzhi

The Climatic Features of Tianshan Urumqi River Valley, Zhang Yinsheng, Kang Ersi and Liu Chaohai

Circulation Features of China Corresponding to Abnormal Snow Cover in the Northern Hemisphere, Wang Guangyu and Zheng Zunzhu

An Application of PD-1/2 Special Automatic Control Pipette in Grain-Size Analysis of Glacial Deposits, Sun Weizhen

Milankovitch Theory is Upset or Verified, Li Peiji

The Research History and Present Situation of Younger Dryas Event in the Last Deglaciation, Dang Jianmin and Zhong Wei

Volume 17, No. 1 (March 1995)

Experimental Study of Influence of Soil Type on Ice Formation and Cryogenic Structure of Freezing Soils, Wang Jiacheng, Xu Xiaozu, Zhang Lixin, et al.

A Study on the Geomorphological Characteristics and Glaciations in the Palco-Daocheng Ice Cap, Western Sichuan, Zheng Benxing and Ma Qihua

Preliminary Research on Axial Splitting Method for Determining Tensile Strength of Frozen Soil, Shen Zhongyan, Peng Wanwei, Liu Yongzhi, et al.

Strain Rate Sensitivity Analysis of Compression Strength of Frozen Soil, Li Hongsheng, Yang Haitian, Chang Cheng et al.

Study on the General Thermal Parameters of Frozen NaCl Soil, Zhang Lixin, Tao Zhaoxiang and Gu Tongxin

Selection and Evaluation of Water Supply Sources in Permafrost Areas, Bai Yuanxu

Study of Calculation Method of Soil Frost Depth in the Forest Zone, Ai Jun, Liu Baozhong, Zhang Haitao, et al.

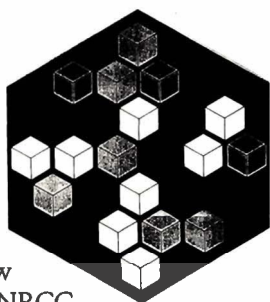
Tungsheng, Roger M. Slatt and Li Bingyuan. U.S. Geological Survey Professional Paper 1549, 55 pp.

Permafrost Terminology (A. Dylikowa, Ed.). Lodzkie Towarzystwo Naukowe, *Biuletyn Peryglacjalny*, No. 32, 1995 (PL ISSN 0067-9038).

Workshop on Permafrost Data Rescue and Access by Roger G. Barry, J. Alan Heginbottom and Jerry Brown. Glaciological Data GD28 (June 1995). World Data Center for Glaciology, CIRES, University of Colorado, Boulder, Colorado 80309-0449. Fax: 1 303 492 2468
E-mail: nsidc@kryos.colorado.edu

cold regions
science
and technology

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George Ashton of CRREL is the new editor, replacing Robert Frederking, NRCC. Manuscripts on all aspects of frozen ground are welcome.

Selected Frozen Ground Titles

Volume 23, No. 4 (August 1995)

Detection of Heat-Mass Transfer Regime Transitions in the Active Layer Using Fractal Geometric Parameters, K.M. Hinkel and S.I. Outcalt

Estimating Soil Temperatures and Frost in the Lake Effect Snowbelt Region, Michigan, USA, S.A. Isard and R.J. Schaetzl

Considerations in Determining Thermal Diffusivity from Temperature Time Series Using Finite Difference Methods, T. Zhang and T.E. Osterkamp

OTHER PUBLICATIONS

Long-Term Evaluations of Insulated Roads and Airfields in Alaska, by David C. Esch, in *Transportation Research Record*, number 1481, p. 56-74.

Origin and Character of Loesslike Silt in the Southern Qinghai-Xizang (Tibet) Plateau, China, by Troy L. Péwé, Liu

The Periglaciation of Great Britain, by Colin K. Ballantyne and Charles Harris, Cambridge University Press, 344 pp. Paperback \$39.95; Hardback \$99.95. The effects of periglaciation on the British landscape are synthesized in this reference text for undergraduates. Topics include:

Quaternary environmental change in Great Britain

Periglacial environments

Ice wedge casts and relict tundra polygons

Ground ice depressions and related phenomena

Periglacial mass-wasting and slope evolution in lowland Britain

Lowland landscape modification by fluvial and aeolian processes

Frost weathering and mountain-top detritus

Patterned ground on British mountains

Solifluction landforms in upland Britain

Talus slopes and related landforms

Nival, fluvial, aeolian and coastal features

Past and present periglacial environments

ICE. The news bulletin of the International Glaciological Society is issued to members of the IGS and is published three times a year. The first issue of 1995 contains 16 summaries of frozen ground related to mountain permafrost and rock glaciers. For information on *ICE*, membership and IGS publications, contact C.S.L. Ommanney (Secretary General), International Glaciological Society, Lensfield Road, Cambridge CB2 1ER, UK. Fax: 44 1223 336543.

FORTHCOMING MEETINGS

Resolution of IPA Council, 5 August 1995

In order to involve maximum engineering and scientific participation in the international permafrost conferences held once every five years, all members and working groups are urged to encourage societies and professional organizations to coordinate the scheduling of their meetings, workshops and field trips within the 12-month period prior to and following the permafrost conferences. Following the June 1998 conference in Yellowknife, Canada, the next conference is provisionally scheduled for summer 2003 in Europe.

1996

75th Annual Meeting, Transportation Research Board Committee on Frost Action

9 January 1996, Washington, D.C., USA

Contact: G.P. Jayaprakash, TRB, National Research Council, 2101 Constitution Avenue NW, Washington, D.C. 20418, USA
Tel: 1 202 334 2952

26th Arctic Workshop

14–16 March 1996, Boulder, Colorado, USA

Contact: John Andrews, Campus Box 450, University of Colorado, Boulder, Colorado 80309
E-mail: andrewsj@spot.colorado.edu

First International Conference on Restoration Ecology and Sustainable Development

27–29 March 1996, Zurich, Switzerland

Contact: Restoration Conference Secretariat, c/o Geobotanical Institute SFIT Zurich, Zurichbergstrasse 38, CH-8044, Zurich, Switzerland
Fax: 41 1 632 12 15

7th International Tundra Experiment (ITEX) Workshop

26–29 April 1996, Copenhagen, Denmark

Contact: Danish Polar Center, Strandgade 100H, DK-1401, Copenhagen, Denmark
Fax: 45 3288 0101
E-mail: tbb@pops.dpc.min.dk

ISOPE '96–Offshore and Polar Engineering Conference

26–31 May 1996, Los Angeles, California, USA

Contact: Jin S. Chung, Chairman, ISOPE-96, Box 1107, Golden, Colorado 80402-1107, USA
Tel: 1 303 273 3673; Fax: 1 303 420 3760

2nd International Conference on Natural Gas Hydrates, 1996

2–6 June 1996, Toulouse, France

Contact: PROGEP.NGH'96, 18 chemin de la loge, 31078 Toulouse Cedex, France
Tel: 33 62 252380; Fax: 33 62 262318
E-mail: jeanpierre.monfort@ensigct.fr

16th Polar Colloquy

16–21 June 1996, Anchorage, Alaska USA

Contact: 16th PLC Planning Committee, Consortium Library, University of Alaska, Anchorage, Alaska 99508-8176 USA Tel: 1 907 786 1825; Fax: 1 907 786 6065 Email: anwct@orion.alaska.edu

Changing Glaciers: Revisiting Themes and Field Sites of Classical Glaciology

24–26 June 1996, Fjarland, Sognefjord, Norway

Contact: E. Isaksson, Norwegian Polar Institute, Brekontoret, P.O. Box 5072, Majorstua, N-0301 Oslo, Norway
Tel: 47 22 95 95 00; Fax: 47 22 85 95 01
E-mail: elli@npolar.no

Carbon Sequestration in Soil: An International Symposium

22–26 July 1996, Columbus, Ohio

Contact: L. Everett, School of Natural Resources, 2021 Coffey Road, Ohio State University, Columbus, Ohio 43210
Tel: 1 614 292 9909; Fax: 1 614 292 7432
E-mail: leverett@magnus.acs.ohio-state.edu

30th International Geological Congress

4–14 August 1996, Beijing, China

Contact: Professor Zhao Xun, 30th International Geological Congress, P.O. Box 823, Beijing 100037, China
Tel: 86 10 8327772; Fax: 86 10 8328928
E-mail: zhaox@bepc2.ihep.ac.cn

28th International Geographical Congress, International Geographical Union

5–10 August 1996, The Hague, The Netherlands

Contact: Congress Secretariat 28th IGC, Faculteit Ruimtelijke Wetenschappen Universiteit Utrecht, P.B. 80.115, 3508 TC Utrecht, The Netherlands
Tel: 31 30 532044; Fax: 31 30 540604
E-mail: r.vanderlinden@frw.ruu.nl

International Symposium on Representation of Cryosphere in Climate and Hydrological Models

12–15 August 1996, Victoria, British Columbia, Canada

Contact: Secretary General, International Glaciological Society, Lensfield Road, Cambridge CB2 1ER, United Kingdom
Tel: 44 223 355974; Fax 44 223 336543

8th International Specialty Conference on Cold Regions Engineering

12–17 August 1996, Fairbanks, Alaska, USA

Contact: Larry Bennett, School of Engineering, University of Alaska, P.O. Box 755900, Fairbanks, Alaska 99775, USA
Tel: 1 907 474 6121; Fax: 1 907 474 6087
E-mail: fyasce@aurora.alaska.edu

5th Chinese Conference on Glaciology and Geocryology

18–22 August 1996, Lanzhou, China

Contact: Zhu Yuanlin, Lanzhou Institute of Glaciology and Geocryology, Lanzhou 730000, China
Tel: 86 931 8841490; Fax: 86 931 8885241
E-mail: ggcheng@bepc2.ihep.ca.cn

See IPA WWW home page for updates on meetings:
<http://www.geodata.soton.ac.uk/ipa>

International Symposium on Cold Regions Engineering
11–14 September 1996, Harbin, People's Republic of China
Contact: Permafrost Institute, Yakutsk 18, 677018 Russia
Tel: 4 46 34, 5 38 56, 5 39 12; Fax: 095 230 2919 (Yakutsk, Merzlota)
E-mail: lans@imzran.yacc.yakutia.su

49th Canadian Geotechnical Conference
23–25 September 1996, St. John's, Newfoundland, Canada
Contact: Dr. Jack Clark, C-CORE, Memorial University of
Newfoundland, St. John's, Newfoundland, Canada A1B 3X5
Tel: 1 709 737 8350; Fax: 1 709 737 4706
E-mail: jclark@kean.ocs.mun.ca

1997

**8th International Symposium on Ground Freezing and 3rd
International Symposium on Frost in Geotechnical Engineering**
14–17 April 1997, Luleå, Sweden
Contact: Sven G.O. Knutsson, University of Luleå, Division of Soil
Mechanics, S-951 87 Luleå, Sweden
Tel: 46 920 91332; Fax: 46 920 91468

**ISOPE-97: 7th International Offshore and Polar Engineering
Conference**
25–30 May 1997, Honolulu, Hawaii
Contact: Jin S. Chung, ISOPE, P.O. Box 1107, Golden, Colorado
80402-1107, USA
Tel: 1 303 273 3673; Fax: 1 303 420 3760

International Symposium on Snow and Avalanches
26–30 May 1997, Chamonix Mont Blanc, France
Contact: Secretary General, International Glaciological Society,
Lensfield Road, Cambridge CB2 1ER, United Kingdom
Tel: 44 1223 355974; Fax: 44 1223 336543
E-mail: 100751.1667@compuserve.com

**International Symposium on Physics, Chemistry, and Ecology of
Seasonally Frozen Soils**
10–12 June 1997, Fairbanks, Alaska, USA
Contact for meetings: Brenton Sharrat
Tel: 1 612 589 3411
E-mail: bsharrat@mail.mrsars.usda.gov
Contact for logistics: Conferences and Special Events
Tel: 1 907 474 7800
E-mail: fyci@aurora.alaska.edu

**ISCORD 1997 International Symposium on Cold Regions
Development**
16–19 June 1997, Anchorage, Alaska, USA
Contact: Ted Vinson, Department of Civil Engineering, Oregon State

University, Corvallis, Oregon 97331-2302, USA
Tel: 1 503 753 0725; Fax: 1 503 753 3052
E-mail: vinsont@ccmail.orst.edu

International Symposium on Antarctica and Global Change
14–18 July 1997, Hobart, Australia
Contact: Secretary General, International Glaciological Society,
Lensfield Road, Cambridge CB2 1ER, United Kingdom
Tel: 44 1223 355974; Fax: 44 1223 336543
E-mail: 100751.1667@compuserve.com

Second International Conference on Cryogenic Soils
5–8 August 1997, Syktyvkar, Russia
Contact: Prof. I.V. Zaboeva, Institute of Biology, Komi Center,
Russian Academy of Sciences, 167610 Syktyvkar, Komi Republic,
Russia
Tel: 7 821 22 25213; Fax: 7 821 22 25231
E-mail: gilichin@issp.serpukhov.su

11th Northern Research Basin Symposium and Workshop
August 1997, Fairbanks, Alaska
Contact: Sylvi Haldorsen, Agricultural University of Norway,
Department of Soil and Water Sciences, P.O. Box 5028, N-1432 Aas,
Norway
Tel: 47 64 94 8252; Fax: 47 64 94 8211
E-mail: sylvi.haldorsen@ijvf.nih.no

**IV International Geomorphology Conference
and IPA Executive Committee Meeting**
28 August–3 September 1997, Bologna, Italy
Includes pre- and post-conference permafrost excursions
Contact: M. Panizza, Università Degli Studi di Modena, 59-41100
Modena, Italy
Tel: 059 23 0394; Fax: 059 21 8326

1998

**7th International Conference on Permafrost
and IPA Council Meeting**
23–27 June 1998, Yellowknife, N.W.T., Canada
Contact: J.A. Heginbottom, Geological Survey of Canada,
601 Booth Street, Ottawa, Ontario K1A 0E8, Canada
Tel: 1 613 992 7813; Fax: 1 613 992 2468
E-mail: heginbottom@gsc.emr.ca
Conference e-mail: permafrost.conference@gsc.emr.ca

**International Society of Soil Science Congress
Cryosols Session**
8–17 July 1998, Montpellier, France
Contact for Cryosols: David Gilichinsky, Institute of Soil Science and
Photosynthesis, Russian Academy of Sciences, 124292 Pushchino,
Moscow Region, Russia
Tel: 7 095 923 3558 (Moscow); Tel: 7 095 923 1887 (Pushchino)
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INTERNATIONAL PERMAFROST ASSOCIATION

DECEMBER 1995

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Russian Academy of Sciences
124292 Pushchino
Moscow Region
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Secretary: Dr. Kaare Flaate

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N 0033 Oslo
Norway
Tel: 47 22 073 900
Fax: 47 22 073 444

Seasonal Freezing and Thawing of Permafrost Areas

Chair: Dr. Arvind Phukan

Phukan Consulting Engineers and Associates, Inc.
2702 Gambell St.
Anchorage, Alaska 99503
USA
Tel: 1 907 786 1970
Fax: 1 907 786 1079

Secretary: Dr. Branko Ladanyi

Dept de Genie Civil
Ecole Polytechnique
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(from countries for which no adhering bodies exist)

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Petru E. Urdea
Universitatea Timisoara
Catedra De Geografie
Str. Pestalozzi Nr 16
1900 Timisoara
Romania
Fax: 40 056 190 377
40 506 190 333

IPA Meetings

5–8 August 1997

**Second International Conference on Cryogenic Soils
Ecology, Genesis and Classification
Syktyvkar, Komi Republic, Russia**

Includes pre- and post-conference permafrost excursions.

Registration fees about \$250 or \$300 U.S. including Vorkuta trip

Notice of intent should be sent no later than April 1996 (name, address, phone, fax, E-mail, title of presentation, participation in excursion to Vorkuta)

Contact: Prof. I.V. Zaboeva, Institute of Biology, Komi Center, Russian Academy
of Sciences, 167610 Syktyvkar, Komi Republic, Russia
Tel: 7 821 22 25213 Fax: 7 821 22 25231
E-mail: gilichin@issp.serpukhov.su

28 August–3 September 1997

**IV International Geomorphology Conference
Bologna, Italy**

**Joint Meeting of the IPA Executive Committee and the
International Association of Geomorphology**

Includes pre- and post-conference permafrost excursions
and symposium on mountain permafrost

Contact: M. Panizza, Universita Degli Studi di Moden
59-4110 Modena, Italy
Tel: 39 59 23 0394 • Fax: 39 59 21 8326

23–27 June 1998

**7th International Conference on Permafrost
Yellowknife, Northwest Territories, Canada**

Sponsors: IPA • National Research Council of Canada • Geological Survey of Canada
Canadian Geotechnical Society • Science Institute of the Northwest Territories

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