

# FROZEN GROUND



The News Bulletin of the International Permafrost Association      Number 20, December 1996



# 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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Mountain Permafrost  
Periglacial Processes and  
Environments  
Cryosols  
Foundations  
Seasonal Freezing and  
Thawing of Permafrost Areas

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*Cover: Damming of a river by two rock glaciers converging from opposite sides of the valley to form Lake Zhasyl-Kul, northern Tien Shan Mountains, Kazakstan, at 45° 52' N, 77° 08' E, 3150 meters ASL. One rock glacier begins at 3700 meters ASL on the southern slope of the Zailiyskiy Alatau Range (upper part of photograph). It is 1600 meters in length and has an average width of 150 meters; the terminus is at 3100 meters ASL. The second rock glacier begins at 3600 meters on the northern slope of the Kungey Alatau Range. It has a length of 1500 meters and an average width of 190 meters. There is no overflow from the lake, but a stream is present down-valley. See pages 5–6 for more details. (Photograph by Sergei S. Marchenko, Kazakstan Alpine Permafrost Laboratory, Almaty, Kazakstan.)*

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*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 high quality glossy prints). To submit news items or photos please contact the appropriate individual listed on page 13, 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 the Consolidated Scientific Council on Earth Cryology, Vavilov Str. 30/6, 117982 Moscow; in the United States from Jerry Brown, P.O. Box 7, Woods Hole, Massachusetts 02543-0007; and elsewhere from Council members.

# EXECUTIVE COMMITTEE REPORT

Members of the Executive Committee met several times in August. A meeting in Lanzhou during the Fifth Chinese Conference on Glaciology and Geocryology was followed by meetings in Almaty, Kazakstan, and visits to mountain permafrost stations in that country (see pages 4–6). Prior to these meetings Vice President French attended the International Geographical Congress in The Hague, and Vice President Romanovskii attended the 30th International Geological Congress in Beijing. An official agreement between IPA and IGU was reached that provides for formal exchanges and joint activities between the two organizations' periglacial groups. The Beijing meeting provided opportunities to meet and discuss mutual interests with other organizations of the International Union of Geological Sciences, the IPA parent organization.

The Executive Committee meetings resulted in agreement in principle to expand its membership from four to at least six, thus providing for wider disciplinary and regional representation. The increase in members requires a change in the Constitution, which ideally could be accomplished in time for the 1998 elections in Yellowknife. Other changes in the Constitution propose recognition of important activities and responsibilities of the working groups. The visit to Almaty resulted in recommendations to the academies of both Russia and Kazakstan for continued study of frozen ground phenomena in central Asia. We also arranged for initial documentation of the extensive long-term data records from sites in Kazakstan. The need for a uniform permafrost map of Asia was discussed in both Lanzhou and Almaty and endorsed by our Mongolian colleagues (see page 6).

The Data and Information Working Group organized a North American data workshop in Boulder in December to review progress on the Global Geocryological Database and plans to produce a CD-ROM for the Yellowknife meeting. United States and Canadian representatives of three other working groups participated. Our goal for the CD is to include relevant data sets from all 22 IPA members. Earlier in the summer, the Periglacial Processes and Environments

WG conducted a successful field excursion in the Canadian high Arctic (see page 6).

The year 1997 promises to be another busy one for frozen ground interests. Our Russian colleagues are sponsoring two meetings: the annual Earth Cryology Council meeting and technical sessions in Pushchino in April, and the Second International Conference on Cryogenic Soils in Syktyvkar in August. IPA will be represented at these meetings as well as on the pre-conference trip in the Alps and at the Fourth International Conference on Geomorphology in Bologna, Italy, later in August. The Executive Committee plans to convene an open meeting on 31 August in Bologna to review current activities (see page 11 for more information on these and other international meetings). In addition to these meetings, the working groups will be pursuing their plans for presentations at the Yellowknife conference.

In this age of electronic communication we encourage free exchange of information among all individuals via e-mail. The reduced number of pages of this issue reflects our efforts to reduce the costs of printing and mailing. A recent survey of readers in North America resulted in overwhelming support for continuation of the printed version of *Frozen Ground*. We will thus continue to pursue communication through these pages and in addition post more information regularly on the IPA Web site. We may also reduce *Frozen Ground* to a single printed issue per year.

The Canadian Organizing Committee for the Seventh International Conference on Permafrost mailed the first circular in December. Plans were announced for field trips and a technical program. Abstracts are due 1 May 1997. IPA is discussing with the organizing committee the possibility of a travel assistance program to help offset some costs for qualified participants and authors. Those and other conference details will be announced in the second ICOP circular in April or May 1997. We urge our readers to submit abstracts and explore all possible funding sources for travel to and conference support in Yellowknife.

IPA Web site:

<http://www.geodata.soton.ac.uk/ipa>

7th International Conference on Permafrost Web site:

[http://www.nrcan.gc.ca/gsc/permaf\\_e.html](http://www.nrcan.gc.ca/gsc/permaf_e.html) (English)

[http://www.nrcan.gc.ca/gsc/permaf\\_f.html](http://www.nrcan.gc.ca/gsc/permaf_f.html) (French)

## REPORTS AND NEWS

This issue reports on the activities of several working groups and on recent meetings. The regular sections *News from Members* and *Reports of Working Groups* will appear in the June 1997 issue.

### FIFTH CHINESE CONFERENCE ON GLACIOLOGY AND GEOCRYOLOGY

More than 150 participants were present at the opening ceremony held at the Yifu Scientific Palace, Lanzhou University, 18–22 August 1996. Introductory comments were made by Cheng Guodong, acting both in his capacity as Director of the Lanzhou Institute of Glaciology and Geocryology and as conference chairman. He was followed by representatives of the Chinese Geographical Society, Gansu Province, and the Tibet Highway Department. The foreign guests were Hugh French and Stu Harris (Canada), Nikolai Romanovskii (Russia), Max Brewer (United States), and D. Tumurbaatar (Mongolia).

Zhu Yuanlin, the General Secretary for the conference, was aided by numerous individuals from LIGG and Lanzhou University. The language of the conference was Chinese, but simultaneous English translation was available to the foreign participants.

The conference was well organized, with an opening reception on the evening of 17 August, a banquet on the 20th, and closing ceremonies on the 22nd. Most lectures were conducted in the main auditorium, a modern, well-

equipped theater capable of holding over 250 people. During the four days, more than 100 oral presentations were given, the vast majority in 13 plenary sessions:

- Cryosphere and global change
- Cold regions engineering
- Cold regions hydrology
- Properties of snow, ice and frozen soil (4 sessions)
- Cryosphere, global change, cold regions damage and environment (3 sessions)
- Cold regions engineering and hydrology in arid and cold areas (3 sessions)

A conference proceedings volume of 803 pages, in Chinese, was made available to all participants. All papers have English language abstracts and five are in English. A second, post-conference volume (volume 2) will contain oral presentations not published in the first volume. The titles constitute a useful overview of the state of Chinese permafrost science. In addition to an emphasis on glaciological topics, the list is convincing evidence of widespread activity in permafrost science and engineering on the part of government agencies, research organizations and universities. A new permafrost map of the Qinghai–Xizang region, scale 1:3,000,000, was presented. (See *Publications* for ordering information.)

Of particular interest to *Frozen Ground* readers is the range of permafrost problems encountered in China. Emphasis is upon frost heave, ice segregation, and hydrological studies and modeling, together with applied and theoretical studies on railways, canals, tunnels, linings and geotextiles, foundation design, wells, and pipelines. Problems associated with rapid economic growth in areas of either seasonal or



*Participants at the 5th Chinese Conference on Glaciology and Geocryology, Lanzhou, 18–22 August 1996.*

perennial frost in the last 10 to 20 years in China are now assuming greater importance. At the same time, Chinese scientists are increasingly aware of the Russian and North American permafrost literature and the remedial and mitigation measures which are possible, but which have not yet been widely adopted in China. These circumstances were explicitly recognized by many speakers. It is refreshing to see such vigorous activity in permafrost research in a country where an appreciation of permafrost problems will play such an important role in improving the economic and social well-being of its people.

Also of interest is the question of global change and permafrost. This was specifically the theme of the opening plenary session entitled Cryosphere and Global Change, in which there were three keynote presentations: impact of cryosphere variation on the environment (Cheng Guodong), glacier fluctuation (Tang Maocang), and effect of cryosphere in climate change (Li Peiji). More specific information is provided in several of the papers in the proceedings volume. For example, Li Shuxun reported that if the air temperature on the Tibet Plateau increases at a rate of  $0.04^{\circ}\text{C}/\text{yr}$ , the extent of permafrost will initially reduce by approximately 30%. In another paper, Yao Tandong, Shi Yafeng and Yang Zhihong concluded that all the ice cores obtained from western China, without exception, indicate climate warming during the 20th century, and especially since the 1950s. Several papers dealt with other aspects of permafrost and global (climate) change. One reported on  $\text{CH}_4$  and  $\text{CO}_2$  emissions on the Tibet Plateau, and several others on hydrological and glacier responses to climate change.

A third component of the conference was a concern for environmental issues in permafrost regions, or regions of deep seasonal frost, and the initiation of studies involving satellite remote sensing (e.g. Analysis of Snow Cover on the Tibet Plateau, by Li Zhen, Sun Wenxin and Zeng Qunzhu, and GIS techniques applied to permafrost data as illustrated by a poster display.

The large number of papers and oral presentations by members of the Lanzhou Institute of Glaciology and Geocryology reflects its overwhelming importance in such studies in China. However, the impressive facilities of Lanzhou University, with a student population in excess of 20,000, and the participation of academics, scientists and engineers from agencies and universities outside of Lanzhou (e.g. Peking University; Polar Research Institute of China, Shanghai; Deqing Oilfield Construction Design and Research Institute, Heilongjiang) indicate that permafrost research is widespread throughout China.

A number of papers were concerned with snow hydrology, especially in Tibet, in glacierized basins, and from King

George Island, Antarctica. But it seems likely that the greatest strength of current Chinese permafrost research lies in its theoretical studies of physical and mechanical properties. By contrast, relatively few studies described actual field data, site investigations or case studies, even from Tibet. One is left with the distinct impression that this is a weakness of current Chinese permafrost research. The impressive field investigations of permafrost conditions in north-east China and on the Qinghai–Xizang (Tibet) Plateau of the 1960s and 1970s apparently have not been continued at that level of activity, even though LIGG has had a Qinghai–Xizang Plateau Research Station at Golmud since the early 1990s.

In listening to the papers one recognizes a need for additional modern field instrumentation. Limited financial resources, and a preference for modern analytical and testing facilities, may be the underlying causes of this perceived imbalance. What are required, as is true for most other countries, are a number of long-term field data sets of either permafrost conditions or engineering performance, in this case from the Tibet Plateau and along the Qinghai–Xizang Highway.

Cheng Guodong and Zhu Yuanlin are to be congratulated for organizing such a successful conference. Future conferences would benefit from more emphasis upon field studies, site investigation, and performance monitoring, as well as field excursions.

Submitted by Hugh M. French

## PERMAFROST IN KAZAKSTAN

Immediately following the conference in Lanzhou, members of the IPA Executive Committee (Brown, French and Romanovskii) accompanied by Stu Harris met in Almaty, Kazakstan, 21–30 August 1996. The visit was arranged jointly by the Institute of Geography, Kazakstan Academy of Sciences, and the International Center of Geocology of Mountain Countries and Arid Regions (ICGM). Its purpose was observation of permafrost and seasonal frost conditions in the nearby mountains and evaluation of the potential for future research. Previous issues of *Frozen Ground* have reported on permafrost activities in Kazakstan; the publications of A.P. Gorbunov and associates are well-known.

Prior to the dissolution of the Soviet Union, permafrost research and facilities in Kazakstan were directly under the Siberian Branch of the Academy of Sciences in Yakutsk. Following independence, the Institute of Geography of the Kazakstan Academy of Sciences became the host organization for programs in permafrost, snow cover, glaciers, mudflows and avalanches, but with close operational ties for

permafrost studies with the Yakutsk Permafrost Institute. The ICGM was established in 1996 as a nongovernmental, nonprofit scientific organization. It was founded jointly by the Kazakstan Institute of Geography, the RAS Institute of Geography in Moscow, and the Permafrost Institute, Siberian Branch, RAS. Support for the ICGM is provided by both Russia and Kazakstan as well as grants from international organizations such as INTAAS and UNESCO. Igor V. Seversky is Director of the Institute of Geography and ICGM. The center consists of three laboratories: Geocryology, Glaciology, and Snow Cover and Avalanches. There are four mountain field stations near Almaty at elevations of 3500 meters ASL (glaciology), 2300 m (water resources), and 2500 and 3050 m (geocryology and geocology). The Alpine Geocryology Laboratory was founded in 1976 based on the work of the geocryological stations dating back to 1972. The former head of the Laboratory, Aldar Gorbunov, was succeeded by Eduard V. Seversky.

We visited the Alpine Laboratory for Geocryology, went on a three-day field excursion led by Igor and Eduard Seversky, A.P. Gorbunov, Sergei Titkov and Sergei Marchenko, and paid a visit to the President of the Kazakstan Academy of Sciences and Ministry of Science. The main objectives of the Alpine Laboratory have been the study of present-day frozen ground phenomena in the mountains of Central Asia and Kazakstan (Altai, Saur-Tarbagatai, Tien Shan, Pamirs) as well as the paleogeocryology of the mountains and adjacent plains. Investigations and publications include the composition, structure, thermal regime and evolution of seasonal and perennial frozen ground, distribution of frozen ground and periglacial phenomena, and mapping of permafrost and periglacial features at various scales. Over 25 years of temperature and snow cover data have been obtained at numerous sites.

During our several-day field excursions we hiked to the terminus of the Morenny rock glacier (3040 m), located 1 km from the famous Gorodetsky rock glacier, and drove up to Zhusalykezen Pass (3336 m), the location of the geocryology research station. At this location we observed widespread thermokarst development as a result of construction activities on the ice-rich permafrost. Other field sites visited illustrated seasonal frost mounds, deep borehole instrumentation, the development of permafrost in rock talus, water balance study of rock-filled lysimeters, and influence of snow cover, slope and vegetation on the formation and maintenance of permafrost.

Perhaps the most widely published studies have been on rock glaciers. Based on a recent report by Sergei Titkov, a total of 1034 rock glaciers have been recorded in the two parallel mountain ranges of the Northern Tien Shan from

45°30' to 43°30'N and 76° to 79°W. Based on morphological features 851 of these cover 90.28 km<sup>2</sup> and are considered active. The best-studied rock glaciers are found in the central part of the northern slope of the Zailiyskiy Alatau in the basins of the Bolshaya and Malaya Almatinka rivers. Based on observations at the Gorodetsky rock glacier over 71 years, the mean displacement of the central scarp was 63 m, or 0.93 m/yr. The maximum velocity of the surface movement reached 1.3 to 1.5 m/yr in the middle part of the rock glacier about 150–200 m from the front. This difference between rates of movement of surface and front results in formation on the surface of transverse ridges and furrows as well as lobes up to 8 m high. The photograph on the cover illustrates similar morphology. Movement of rock glaciers is in part the result of changes in the seasonal and long-term plastic properties of frozen ground caused by seasonal and long-term fluctuations. According to results from the Gorodetsky rock glacier, two-thirds of the displacement of the frontal lobe occurs from July to October.

Most rock glaciers of the Northern Tien Shan demonstrate an average rate of surface movement of about 0.5 to 2.5 m/yr. However, rapid or catastrophic movement may occur, as illustrated by Burkuttyy rock glacier, which increased from 4.9 m/yr during the period 1969–1979 to 13–14 m/yr in the period 1979–1984. This resulted from a downslope increase of the bed angle from 13–15 degrees to 35–38 degrees.

During the IPA visit, mechanisms were discussed for access to Alpine Laboratory data through the Global Geocryological Database. Agreement was reached to provide meta-data descriptions for representative data sets and to furnish several digital examples of the data. Several descriptions submitted to the GGD include: permafrost temperatures and active layer properties in Zhusalykezen Pass (3336 m); active layer and borehole temperatures (30 and 600 m depths) in the Kumtor River Valley (3300 to 4200 m); and seasonally frozen ground temperatures to 320 cm depth from 1600 to 3350 m. In addition, a description of data on rock glaciers and their locations is in preparation. A map of rock glaciers of the central northern Tien Shan has been compiled at 1:200,000. The general regularities of the lower limits of rock glaciers and sporadic permafrost zones as well as the distribution of different types of rock glaciers are shown.

We visited the Kazakstan Academy of Sciences and met with its President and Minister of Science, Vladimir Shkolnik. We concluded that it is essential for the permafrost investigations in Kazakstan to continue, and that we collectively promote international collaboration and access to the long-term data and observations. Following the visit, IPA letters of endorsement for the ICGM were sent to the Siberian Branch of the RAS and President Shkolnik.

The ICGM permanent buildings and facilities at the field sites and the long-term observations offer unique opportunities to develop international collaborative research with colleagues in Almaty. The field camps can also be used for short excursions and field courses in mountain geocology. For additional information contact Igor V. Seversky, Institute of Geography, ICGM, Pushkin st. 99, Almaty, 48010, Kazakstan. Fax: 7327 618102; E-mail: [ingeo@kazmail.asdc.kz](mailto:ingeo@kazmail.asdc.kz).

Submitted by Jerry Brown

## PERMAFROST IN MONGOLIA

Mongolian permafrost science has developed since 1950. The Institute of Geography and Geocryology of the Mongolian Academy of Sciences was created in 1962. Permafrost distribution has been studied by Mongolian geocryologists for the last 34 years. Monographs and papers have been published, including Permafrost of Mongolia (N. Lonjid, 1969), Basic Features of Permafrost in Mongolia (N. Sharkhuu, 1975), Seasonal Freezing and Thawing of Grounds in Mongolia (D. Tumurbaatar, 1975), Geocryological Conditions of Mongolia (V.F. Gravis et al., 1974), and Permafrost in the Kangai and Khubsugul Mountain Region (D. Lubsandavga). Permafrost maps compiled include a geocryological map of Mongolia on a scale of 1:1,500,000 based on results of the Mongolian and Russian expedition of 1971, and a permafrost engineering geological map of the Selenge River basin on a scale of 1:500,000 by N. Sharkhuu (1982).

The main task of our future permafrost research is to study in detail regional regularities of permafrost distribution and development and to provide forecast assessment of permafrost conditions in connection with climate change and management. In order to carry out this task, close contact and collaboration with foreign geocryologists is required, especially those from China, North America, Europe, Russia and Kazakstan.

It is necessary to compile a permafrost map of the Asian continent. This work should be organized by the International Permafrost Association and Mongolian geocryologists would participate.

Submitted by D. Tumurbaatar

## HIGH ARCTIC FIELD MEETING AND SYMPOSIUM

Ten participants from seven countries attended this meeting from 7–16 July 1996 on Ellesmere, Cornwallis and Axel Heiberg Islands in the Canadian Arctic. It was organized by Toni Lewkowicz (University of Ottawa) and spon-

sored by the IPA Working Group on Periglacial Processes and Environments and the IGU Commission on Frost Action Environments. Logistical support and accommodation were provided by the Polar Continental Shelf Project (Natural Resources Canada), Department of National Defence, and the Atmospheric Environment Service (Environment Canada). Four days were spent on Ellesmere Island, in the Eureka area, at Hot Weather Creek and in the Sawtooth Range. Travel was by helicopter and on foot.

Landforms and deposits observed included epigenetic ice wedges, segregated ice developed in poorly lithified bedrock, ice-wedge polygons, earth hummocks, detachment slides, debris flows, slushflows, niveo-aeolian deposits and cold-based glaciers. The effects of solifluction were observed at a site where a Rudberg column was excavated after 5 years of movement and at an experimental site where the effects of climate change were being physically modeled. Another active research project concerned the effects of detachment sliding on rates of slope wash erosion using a series of runoff plots.

Eight presentations were given at the symposium at Eureka. These discussed chemical and physical weathering in periglacial areas, landsliding on permafrost terrain, ice wedge and sand wedge casts, and periglacial conditions in southern Germany and the UK during the last glaciation. The planned visit to Expedition Fiord on Axel Heiberg Island was canceled because the landing strip was under water. An alternate site on the eastern coast at 80°45'N was visited (the farthest north point on the trip) and ice-push features examined. In the Resolute area on Cornwallis Island, Kathy Young (York University) showed sites where she is examining wetland nutrient flows over permafrost. Link Washburn (University of Washington) described his work on solifluction and patterned ground.

Considering that this was a particularly cool summer in the Queen Elizabeth Islands, the group was fortunate to experience generally good weather and to be able to see virtually all that was planned.

Submitted by Antoni Lewkowicz

## PERMAFROST DATA WORKSHOPS

Two meetings were organized by the IPA Data and Information Working Group and held at the World Data Center A for Glaciology, Boulder, Colorado, on 15–16 July and 12–13 December 1996. In July a small working group (R.G. Barry, J. Branson, J. Brown, C. Hanson and A.J. Heginbottom) reviewed the status of the Global Geocryological Database (GGD), and plans were initiated for preparation of a CD-ROM on permafrost to be distributed at the June

1998 permafrost conference. The two-day workshop in December focused on North American data sets for the GGD, the strategy and content for the CD, and the proposed data workshop and presentations at Yellowknife.

Participants in the December meeting included members of the IPA working groups on Data and Information (Roger Barry, Mike Clark), Global Change (Al Taylor, Oleg Anisimov), Terminology (Robert van Everdingen), and Cryosols (Charles Tarnocai) and representatives of the Executive Committee (Nikolai Romanovskii, Jerry Brown). Other participants were John Andrews, Martha Andrews, Patrick Black, Gary Clow, Lee Ann Gerhart, Claire Hanson, Ray Kreig, Mike Metz, Jay Moore, Ron Paetzold, David Palacios, Vladimir Romanovsky, Charles Slaughter, Ann Brennan Thomas, D.A. (Skip) Walker, Jesse Walker, Ron Weaver, and Tingjun Zhang.

The CD, tentatively called Circumpolar Active-Layer Permafrost System (CAPS), will consist of two major parts: an information-based section and a subset of the GGD. It will provide permafrost information and data to support monitoring, mapping and modeling for cold regions scientists and engineers. The CD is to include facilities to search data sets and to have a simple GIS to allow for geographical searching.

The information section will include: 1) A cumulative literature bibliography through 1996 based on the five-year bibliographies issued covering 1978–1992. 2) The Russian map bibliography of over 650 entries indexed to the 1:500,000 Russian map sheets. An effort is underway to include other non-Russian maps. 3) The glossary of permafrost and ground ice terms consisting of some 400 terms in 11 languages. Definitions in English and perhaps one other language will be included. 4) The digital version of the IPA Northern Hemisphere map of permafrost and ground ice conditions, including a data set on permafrost thickness derived from boreholes.

The data segment of the CD will contain selected data sets based on the previously established GGD priorities (see *Frozen Ground* No. 18, p. 12–13): active layer and soil thermal regimes, and shallow and deep borehole temperatures. We visualize a major use of these data as calibration and/or validation for thermal models and GCMs in support of various global change research programs and of the IPCC process. Major North American data sets identified for inclusion on the CD are the USGS borehole and near-surface stations at Alaskan and Antarctic sites; CRREL-, NSF- and USDA-supported long-term projects in Alaska; and selected geothermal and soil climate sites in Canada under the auspices of the GSC and Agriculture Canada. Considerable discussion was devoted to organizing detailed metadata

descriptions for each site and borehole. Suggested standards are being developed and will be included on the CD.

The goal is to include at least one substantial and representative data set from each IPA member; a number of countries will have multiple data sets. A letter was sent in September 1996 to all members requesting nominations of relevant data for both the GGD and CD-ROM. In addition to the United States and Canada, relevant sites and data from China, Greenland, Kazakstan, Norway, Russia, and Sweden have been identified to date for CAPS, as have data from mountainous regions in the survey conducted by the Mountain Permafrost WG. By early 1997 we expect to have a detailed list of data sets identified. Accessioning and formatting the data will be a major task.

It is proposed to continue the process of identifying data for inclusion on the CD via mail and at several meetings in Europe and Russia later in spring 1997. All accessions and formatting of information and data would be essentially completed by the end of 1997, or very early in 1998. The overall GGD process will continue as an overarching activity, with CAPS being one of its early or Phase I products.

As previously agreed, there will be a data workshop organized by Mike Clark at the Seventh International Conference on Permafrost. Topics are proposed to include status of data acquisition and management, programs for yielding long-term monitoring data, examples of modeling activities using GGD sources, and examples of mapping projects illustrated as posters. An associated publication for the session is under consideration.

Another topic at the December workshop was a discussion of a GGD strategy by Nikolai Romanovskii on behalf of his Russian colleagues. The strategy proposes the main tasks for GGD: permafrost response to climate change, mapping to establish permafrost diversity, monitoring of processes, and gathering and dissemination of information including a who's who of permafrost experts. The strategy recognizes that data availability and use differ among countries and that large amounts are still considered proprietary or in fact secret and not available. Public domain data should be the focus of GGD.

Submitted by Roger Barry, Jerry Brown,  
Mike Clark and Claire Hanson

## NEW IGU PERIGLACIAL COMMISSION

In 1996, the International Geographical Union (IGU) Commission on Frost Action Environments came to the end of its 8-year term. The commission, under the leadership of Jean-Pierre Lantieri, had been very active, with at least one scientific meeting each year. Based on almost 50 years of continuing interest in periglacial phenomena, a

new commission, Climatic Change and Periglacial Environments, was approved during the IGU Congress in The Hague in August.

During the IGU Congress the Commission on Frost Action Environments organized a one-day session, Environmental Change Under Periglacial Climatic Conditions, and a half-day joint session, Geomorphology and Environmental Change, with the IGU Commission on Geomorphological Response to Environmental Change (GERTEC). In a plenary session a state-of-the-art report on present periglacial and frost action research was presented by Jef Vandenberghe.

The new commission held its first meeting during the IGU conference. Future activities will stress more explicitly the effects of climate on the processes and landforms in periglacial regions and provide a focus for research on the significance of climate in present-day periglacial processes and the application of such research to the past record. The existing link with the IPA through its Working Group on Periglacial Processes and Environments was formalized in a signed agreement between IGU and IPA. Cooperation with the IPA Working Group on Global Change and Permafrost will also be pursued.

Forthcoming activities of the new commission include cosponsoring the April 1997 Pushchino symposium, Cryogenic Processes and Phenomena, participating in the pre-IAG Congress excursion Mountain Permafrost and Slope Stability in the Periglacial Belt of the Alps, participating in the 1998 permafrost conference, organizing a meeting/excursion in Poland and eastern Germany in 1999, and participating in the 1999 INQUA Congress.

Membership of the new commission is J. Vandenberghe (The Netherlands), Chairman, Dr. C. Harris (U.K.), Secretary, B. Francou (France), K. Hall (Canada), L. King (Germany), A. Lewkowicz (Canada), N. Matsuoka (Japan), N. Romanovskii (Russia), C. Thorn (U.S.A.), D. Trombotto (Argentina), and Cui Zhijiu (China).

Submitted by Jef Vandenberghe

## CHAPMAN CONFERENCE ON ROCK GLACIERS

The American Geophysical Union Chapman Conference on the geomorphic and climatic significance of rock glaciers was held at the Northwest College Field Station, Absaroka Mountains, near Cody, Wyoming, 23–28 August 1996. The 34 participants were from the United States (27), Italy (2), Northern Ireland (2), Scotland (1), Spain (1) and Switzerland (1). The four sessions consisted of 19 reports with abstracts covering the following topics: models of rock gla-

cier formation, Galena Creek rock glacier, paleoclimate, and dynamics. There were two one-day field trips to nearby Galena Creek rock glacier, complemented by a guidebook prepared by Noel Potter. A summary report of the conference will appear in the AGU newsletter *Eos*. A special edition of *Geografiska Annaler* is planned. The conveners were Douglas H. Clark (Indiana University/Purdue University at Indianapolis), Eric J. Steig (University of Colorado), Noel Potter, Jr. (Dickinson College), and Alan R. Gillespie (University of Washington).

## U.S. COMMITTEE FOR IPA

The newly appointed U.S. Committee for the IPA met in Denver, Colorado, on 14 December 1996. Members are Bernard Hallet, Chair, Roger Barry, Jerry Brown, David Esch, Larry Hinzman, Chris McKay, Michael Metz, Rupert Tart, and Ted Vinson. The open meeting of the committee was attended by participants of the preceding Boulder data workshop (see page 6). Don Hayley, Chair of the Canadian Organizing Committee for the Seventh International Conference on Permafrost, presented a detailed report on the planning for the conference. Mike Clark, GeoData Institute, U.K., presented plans for the 1998 data workshop in Yellowknife. Other topics discussed included changes in the IPA constitution, U.S. input to working group activities and the GGD, and improved coordination of national and international permafrost activities.

## INTERNATIONAL CONFERENCE ON COLD REGIONS ENGINEERING

The Technical Council on Cold Regions Engineering of the American Society of Civil Engineers sponsored its eighth international specialty conference at the University of Alaska Fairbanks, 13–16 August. The theme was The Cold Regions Infrastructure: An International Imperative for the 21st Century. A total of 226 registrants participated. The pre-published proceedings and the technical sessions featured 80 technical papers on a wide-ranging variety of civil engineering topics (buildings, utilities, transportation systems, materials, and environmental and geotechnical considerations). In addition, TCCRE's Design and Construction Committee introduced its new 10-chapter monograph, *Roads and Airfields in Cold Regions*. In the two days preceding the conference, 66 engineers participated in three short courses on Thermo-Syphons for Cold Regions, Restoration of House Foundations on Permafrost Terrain, and River Ice Engineering. (See page 10 for information on acquiring these publications.)

Submitted by Jon E. Zufelt

## PUBLICATIONS

# PERMAFROST AND PERIGLACIAL PROCESSES

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 7, Issue No. 3 (July-September 1996)

*Climatic and Ecological Controls on Ice Segregation and Thermokarst: The Case History of a Permafrost Plateau in Northern Quebec*, M. Allard, S. Caron and Y. Bégin

*Cryptogamic Soil Buds in the Equatorial Andes of Venezuela*, F.L. Pérez

*<sup>14</sup>C Dating of Trapped Gases in Massive Ground Ice, Western Canadian Arctic*, B.J. Moorman, F.A. Michel and A. Wilson

*Modelling and Verification of the Permafrost Distribution in the Bernese Alps (Western Switzerland)*, M. Imhof

### Short Communications

*Radiocarbon Dating by High-sensitivity Liquid Scintillation Counting of Wood From the Fox Permafrost Tunnel Near Fairbanks, Alaska*, A. Long and T.L. Péwé

*Results of Chemical Testing for Various Types of Water and Ice, Yamal Peninsula, Russia*, M.O. Leibman

*Monitoring the Evolution of Permafrost in the Tien Shan*, A.P. Gorbunov

### Volume 7, Issue No. 4 (October-December 1996)

Selected papers from *Proceedings of IPA-Sponsored Workshop, "Frozen Ground: Current Understanding and Ability to Monitor Change," 9-10 December 1995, Hanover, N.H.*

*Preface*, A.G. Lewkowicz

*Climatic Warming and the Degradation of Permafrost*, V.J. Lunardini

*Permafrost Monitoring and Detection of Climate Change*, M.W. Smith and D. Riseborough

*Measurement Interval and the Accurate Assessment of Ground Temperature Trends*, D.W. Riseborough and M.M. Burgess

*Deep-Seated Creep of Massive Ground Ice, Tuktoyaktuk, N.W.T.*, S.R. Dallimore, P.A. Egginton, F.M. Nixon, B. Ladanyi and A. Foriero

*Physical Modelling of Cryogenic Mass Wasting (Solifluction): A Review and Further Strategies*, C. Harris

### Papers:

*Origin of Rock Glaciers: Observations from Mellemfjord, Disko Island, Central West Greenland*, O. Humlum

*The Occurrence of a Holocene Rock Glacier on Mount Kenya: Some Observations and Comments*, S.W. Grab

*Sand Wedge and Ventifact Paleoenvironmental Indicators in Northwest Saskatchewan, Canada, 11 ka to 9.9 ka B.P.*, T.G. Fisher

*Formation of Miniature Sorted Patterns by Shallow Ground Freezing - A Field Experiment*, C.K. Ballantyne

# 冰川冻土

JOURNAL OF GLACIOLOGY AND GEOCRYOLOGY

### Selected Frozen Ground Titles

#### Volume 17, No. 4 (December 1995)

*Tensile Strength of Frozen Saturated Loess*, Shen Zhongyan, Peng Wanwei and Liu Yongzhi

*The Analogic Conditions of Simulation Test of Frozen Soil*, Wang Tingdong, Zhao Xishu and Wu Ziwang et al.

*Experimental Studies of Fracture Toughness  $K_{IC}$  for Frozen Soil*, Li Hongsheng, Zhang Xiaopeng and Zhu Yuanlin et al.

*Creep Failure Characteristics of Frozen Sand Under Two-Step Stress*, Sheng Yu, Wu Ziwang and Miao Lina et al.

*Torsion-Shear Strengths of Frozen Soil Under Different Test Methods*, Peng Wanwei, Zhang Changqing and Zhang Jianming

*Permafrost Change and Stability of Qinghai-Tibet Highway*, Wu Qingbai and Tong Changjiang

*Present and Development Tendency on Sinking Methods of Artificially Frozen Soils*, Ma Qinyong

### Book Review

*Mechanisms of Frost Heaving and Salt Expansion of Soils*

#### Volume 18, No. 1 (March 1996)

*A Study on Freezing Point of Wet Clay Under Loading*, Li Yi, Cui Guangxin and Lu Henglin

*The Deformation Characteristics and Calculation of Frozen Clay Shaftwalls*, Wang Renhe  
*Strength Characteristics of Frozen Soil Under Loading and Unloading*, I.E. Guryanov and Ma Wei  
*A Review of the Effect of Degradation of Glaciers and Permafrost on Railways*, Liu Tieliang  
*Measures Against Frost Damage of Hydraulic Structure in Xinjiang*, Guo Defa

**Volume 18, No. 2 (June 1996)**

*Difference of Permafrost Degeneration in the East of the Tibetan Plateau*, Zhu Linnan, Wu Ziwang and Zang Enmu et al.  
*High Resolution Record of Malan Loess in the Longxi Loess Plateau and Rapid Climate Changes During the Last Glaciation*, Chen Fahu, Ma Yuzhen and Li Jijun  
*Response of Cryosphere to Climatic Warming Since 1980 Over the Northern Hemisphere*, Ding Yongjian  
*A Progressive Yield Criteria on Creep of Frozen Soil*, Wang Zhenggui, Ma Wei and Sheng Yu et al.  
*The Uniaxial Compressive Strength of Frozen Saturated Silt Under Vibrating Load*, Shen Zhongyan and Zhang Jiayi  
*A Multi-Factor Study of Salt Expansion of Sulphate Salty Soil*, Gao Jiangping, Wu Jiahui and Deng Yuosheng et al.  
*Application of Scanning Electronic Microscope in Study of Geocryology*, Wang Jiacheng, Zhang Xuezhen and Wang Yujie

geomorphology, landscape evolution, and global warming. Available from Addison Wesley Longman <awlhe.orders@awl.co.uk>; £ 22.99

*Disturbance and Recovery in Arctic Lands: An Ecological Perspective*, Crawford, R.M.M., editor (1997). Kluwer Academic Publishers, Dordrecht, the Netherlands, 590 p. Results of NATO workshop held in Rovaniemi, Finland, September 1995, and includes a paper on IPA recommendations for monitoring, mapping, synthesis, modeling, data management and coordination by J. Brown.

*Proceedings of the Fifth Chinese Conference on Glaciology and Geocryology* (vol. 1), Gansu Culture Press, and limited quantities are available from Zhu Yuanlin, Lanzhou Institute of Glaciology and Geocryology, Academia Sinica, Lanzhou 730000, Gansu Province, China, <liggplan@ns.lzb.ac.cn>; US \$20.00. The new permafrost map of the Qinghai-Xizang region, scale 1:3,000,000, also is available (US \$10.00).

*Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change—Scientific-Technical Analyses*, R.T. Watson, MC. Zinyowera and R.H. Moss, Editors. Includes chapter on cryosphere and sections on permafrost contributed by IPA authors (see *Frozen Ground* No. 15, p. 16-26). Available from Cambridge University Press, Dept. PJJL, 40 West 20th Street, New York, NY 10011-4211. Fax: 212 691 3239. US \$95.00 (hardcover), US \$35.95 (paperback).

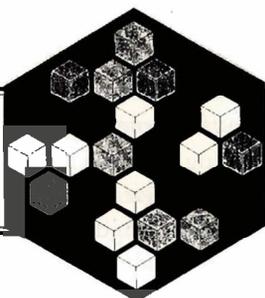
*Cold Regions Engineering, Proceedings of the 8th International Conference on Cold Regions Engineering*, edited by Robert F. Carlson, 955 p. Available from ASCE, Book Orders, PO Box 831, Somerset, NJ 08875-0831 (1 800 548 ASCE). The price is US \$80.00, or US \$60.00 for ASCE members. The associated monograph *Roads and Airfields in Cold Regions*, edited by Ted Vinson, is US \$35.00, or US \$26.25 for ASCE members.

*Arctic and Alpine Research*

*Arctic Soils and Permafrost*: special issue in memory of Kaye R. Everett edited by Marilyn D. Walker and Kathleen A. Salzborg, *Arctic and Alpine Research*, vol. 28, no. 3, August 1996, 154 p.; available for sale as a single issue or as part of an annual subscription. Single copy: Library \$27, Individuals and students \$18. Direct orders and inquiries to *Arctic and Alpine Research*, Campus Box 450, University of Colorado, Boulder, Colorado 80309-0450. Tel: 303 492 3765. Fax: 303 492 6388. E-mail Kathleen Salzborg <salzborg@spot.colorado.edu>

cold regions  
science  
and technology

published by Elsevier Science B.V.



**Selected Frozen Ground Titles**

**Volume 24, No. 2 (May 1996)**

*Electrical Freezing Potentials Measured in a Pingo Growing in the Western Canadian Arctic*, V.R. Parameswaran and J.R. Mackay

*Application of Foam Insulation for Remediation of Degraded Permafrost*, V.N. Feklistov and N.L. Rusakov

**Volume 24, No. 3 (July 1996)**

*2-D Frost Action Modeling Using the Segregation Potential of Soils*, J.-M. Konrad and M. Shen

**OTHER PUBLICATIONS**

*The Periglacial Environment, Second Edition*, French, H.M. (1996). 376 p., including 170 illustrations and 85 photographs, and new chapters on cryogenic weathering, applied

# 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.

## 1997

### ISGF-97 and FROST '97

15–17 April 1997, Luleå, Sweden

Contact: Sven G.O. Knutsson, Luleå University of Technology, S-951

87 Luleå, Sweden

Tel: 46 920 913 32; Fax: 46 920 720 75

sven.knutssun@anl.luth.se

<http://www.luth.se/depts/anl/frost97/>

### 8th ITEX Workshop

19–22 April 1997, London, United Kingdom

Contact: Phil Wookey, Department of Geography, Royal Holloway, University of London, Egham, Surrey TW20 0EX, United Kingdom

Tel: 44 1784 443571; Fax: 44 1784 472836

p.wookey@rhbnc.ac.uk

### International Conference of Problems of the Earth Cryosphere

21–25 April 1997

Contact: Vladimir P. Melnikov, Consolidated Scientific Council on Earth Cryology, Box 1230 Earth Cryosphere Institute, Russian Academy of Sciences, 625000 Tyumen, Russia

Tel: 7 345 225 1153; Fax: 7 345 222 3380

emelnikov@glas.apc.org

### ISCORD '97 International Symposium on Cold Regions Development

4–10 May 1997, Anchorage, Alaska, USA

Contact: Chairman of the Organizing Committee, The Northern Forum, 4101 University Drive, APU Garr-Gottstein Center, Suite 221, Anchorage, Alaska 99508, USA

Tel: 907 561 3280; Fax: 907 561 6645

iscord97@ccmail.orst.edu

<http://www.orst.edu/~vinson/iscord.html>

### ISOPE-97: 7th International Symposium on Offshore and Polar Engineering

25–30 May 1997, Honolulu, Hawaii, USA

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

100751.1667@compuserve.com

### AMAP International Symposium on Environmental Pollution of the Arctic and The Third International Conference on Environmental Radioactivity in the Arctic

1–5 June 1997, Tromsø, Norway

Contact: AMAP Secretariat, P.O. Box 55, N-1345 Østerås, Norway

Tel: 47 67 16 25 64; Fax: 47 67 14 54 44

### International Symposium on Physics, Chemistry, and Ecology of Seasonally Frozen Soils

10–12 June 1997, Fairbanks, Alaska, USA

Contact for meetings: Brenton Sharrat

Tel: 1 320 589 3411; Fax: 1 320 589 3787

bsharrat@mail.mrsars.usda.gov

Contact for logistics: Conferences and Special Events, University of Alaska, Fairbanks, Alaska, USA

Tel: 1 907 474 7800; Fax: 1 907 474 5592

fyci@aurora.alaska.edu

<http://www.nstl.gov/frozen/>

### Seminar/Workshop: Contaminants in Freezing Ground

14–15 July 1997, Cambridge, United Kingdom

Contact: W. Gareth Rees, Scott Polar Research Institute, Lensfield Road, Cambridge, CB2 1ER, United Kingdom

### 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

100751.1667@compuserve.com

### Cryopedology '97: Second International Conference on Cryogenic Soils—Ecology, Genesis and Classification

5–8 August 1997, Syktyvkar, Russia

Contact: Galena Mazhitova or Elena Lapteva, Institute of Biology, Komi Center, Communisticheskaya 28, 167610 Syktyvkar, Komi Republic, Russia

Tel: 7 8212 425240 (or 425715); Fax: 7 8212 420163

galena@biology.komitex.ru

### 11th Northern Research Basins Symposium and Workshop

18–22 August 1997, Fairbanks, Alaska, USA

Contact: Douglas L. Kane, Water Research Center, University of Alaska, Fairbanks, Alaska, USA

Tel: 1 907 474 7808; Fax: 1 907 474 7979

ffdllk@aurora.alaska.edu

### 4th International Conference on Geomorphology and IPA Executive Committee Meeting (31 August)

28 August–3 September 1997, Bologna, Italy

Contact: 4th International Conference on Geomorphology, Planning Congress, Via Crociali 2, 140138 Bologna, Italy

Tel: 39 51 302980; Fax: 39 51 309477

michele.galantino@planning.inet.it

### Periglacial Workshop: Periglacial Processes and Environments

16–17 December 1997, Cardiff, United Kingdom

Contact: Dr. Charles Harris, Department of Earth Sciences, University of Wales Cardiff, P.O. Box 914, Cardiff CF1 3YE, United Kingdom

harris@cardiff.ac.uk

See IPA Web site for updates on meetings:  
<http://www.geodata.soton.ac.uk/ipa>

## 1998

### ISOPE-98: 8th International Offshore and Polar Engineering Conference

24–29 May 1998, Montreal, Canada

Contact: Jin S. Chung, ISOPE, P.O. Box 1107, Golden, Colorado 80402-1107, USA

Tel: 1 303 273 3673; Fax: 1 303 420 3760

### 5th International Symposium on Mining in the Arctic

14–17 June, Yellowknife, N.W.T., Canada

Contact: Symposium Secretariat, Canadian Institute of Mining, Metallurgy and Petroleum, Xerox Tower, 1210-3400 de Maisonneuve Boulevard West, Montreal, Quebec, Canada H3Z 3B8

Tel: 1 514 939 2710; Fax: 1 514 939 2714

### 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

permafrost.conference@gsc.nrcan.gc.ca

### 16th World Soil Congress

20–26 August 1998, Montpellier, France

Contact: Agropolis-Avenue, Agropolis-34394, Montpellier, Cedex 5, France

Tel: 33 6704 7538; Fax: 33 6704 7549

## Additional Information for Forthcoming IPA Co-Convened Meetings

### International Conference on Problems of the Earth Cryosphere, 21–25 April 1997

Convened by the Consolidated Scientific Council on Earth Cryology, the IPA, the Russian National Committee for Geologists, and the IGU Commission on Climatic Change and Periglacial Environments. The main research results will be discussed within the framework of the following: 1) Periglacial processes on the shelf and land of the Arctic coasts, 2) Reliability of geotechnical systems in the cryolithozone, 3) Microbiology of permafrost: Life at negative temperatures, 4) Cryogenic processes and phenomena, conditions of their formation, paleogeographic information, 5) Physical–chemical mechanics of frozen ground, 6) Round table: Geoinformation systems, digital maps and databases in geocryology, and 7) Annual meeting of the Consolidated Scientific Council on Earth Cryology. Accommodation and meals US \$60/per day (est.). Registration US \$150 before 31 January or US \$200 later to: E.S.Melnikov, Account No: 181070980 in INCOMBANK, Branch Prospect Mira, S.W.I.F.T. INCORUM, Moscow, Russia via Bank of New York, No: 890-0056-096, or Republic National Bank of New York, No: 608 205 893. For official visa invitation send full name, the passport number and date of issue, date of birth, arrival and departure dates. Non-Russian inquiries to Evgeny Melnikov. Fax: 7 095 135 6582, <emelnikov@glas.apc.org> or <mleibman@glas.apc.org>

### Cryopedology '97, 5–8 August 1997

Preliminary scientific program includes genesis, geography, classification, ecology, monitoring and databases for cryosols. Field excursions include one-day local visit around Syktyvkar and three-day trip to Vorkuta from 9–11 August. Abstract deadline was 31 December. For visa send photocopy of foreign passport to organizers. Registration is US \$250; Vorkuta trip about US \$300 with payment by 1 March 1997. Third announcement will be mailed in early May 1997 with official invitation to those who paid fees. Contact organizers for method of payment. Send registration request to Galena Mazhitova, Fax: 7 8212 420163, <galena@biology.komitex.ru>

### International Conference on Snow Hydrology: The Integration of Physical, Chemical and Biological Systems

5–9 October 1998, Hanover, New Hampshire, USA

Contact: J. Hardy, USACRREL, 72 Lyme Road, Hanover, New Hampshire 03755-1290 USA

Fax: 1 603 646 4397

jhardy@crrel.usace.army.mil

### 17th Polar Library Colloquy

Fall 1998, Reykjavik, Iceland

Contact: Eiríkur Einarsson, Marine Research Institute, P.O. Box 1390, 121 Reykjavik, Iceland

Tel: 354 552 0240; Fax: 354 562 3790

eirikur@hafro.is

## 1999

### International Union for Quaternary Research XV International Congress

3–11 August 1999

Contact: Conference Secretariat, Conference Africa, P.O. Box 1722, Parklands, 2121, Johannesburg, South Africa

Tel: 27 11 447 8143; Fax: 27 11 447 8144

cafrica@iafrica.com

**4th International Conference on Geomorphology, 22–28 August 1997**  
Pre-conference field excursion and symposium, Mountain Permafrost and Slope Stability in the Periglacial Belt of the Alps and one-day paper session on Mountain Permafrost Monitoring and Mapping. Organized by Wilfried Haeberli and Francesco Dramis.

### Periglacial Workshop: Periglacial Processes and Environments, 16–17 December 1997

Convened by the IPA, British National Committee for Quaternary Research Association, Cryostratigraphy Research Group. Meeting will include papers and discussions on (1) cryogenic processes and cryostratigraphy, (2) process monitoring and modelling, and (3) cold room studies of modelling slope processes, rock glacier dynamics and soft sediment deformation at Caen cold room and Cardiff Geotechnical Centrifuge Centre. Abstract deadline 1 September 1997.

### 7th International Conference on Permafrost, 23–27 June 1998

See inside back cover.

### 16th World Soil Congress, 20–26 August 1998

Symposium 39, Cryosols and Their Relationship to Global Climate Change. Topics include cryosols and their changes, including changes in sources and sinks of greenhouse gases; the understanding of permafrost-affected pedologic systems; and new developments in land use and management. The symposium will comprise a three-and-one-half-hour oral session, two half-day poster sessions, and two half-day oral sessions. Proposals for papers should be a one-page summary (2500 characters) submitted to the Congress organizers by 1 May 1997 in English, French, German or Spanish with English title. Send copies to co-convenors David Gilichinsky (Fax: 7 096 7 790532, <gilinch@issp.serpukhov.su>) or Brigitte Van Vliet-Lanoe (Fax: 33 99 286100; <lanoe@univ-rennes1.fr>).



# INTERNATIONAL PERMAFROST ASSOCIATION

DECEMBER 1996

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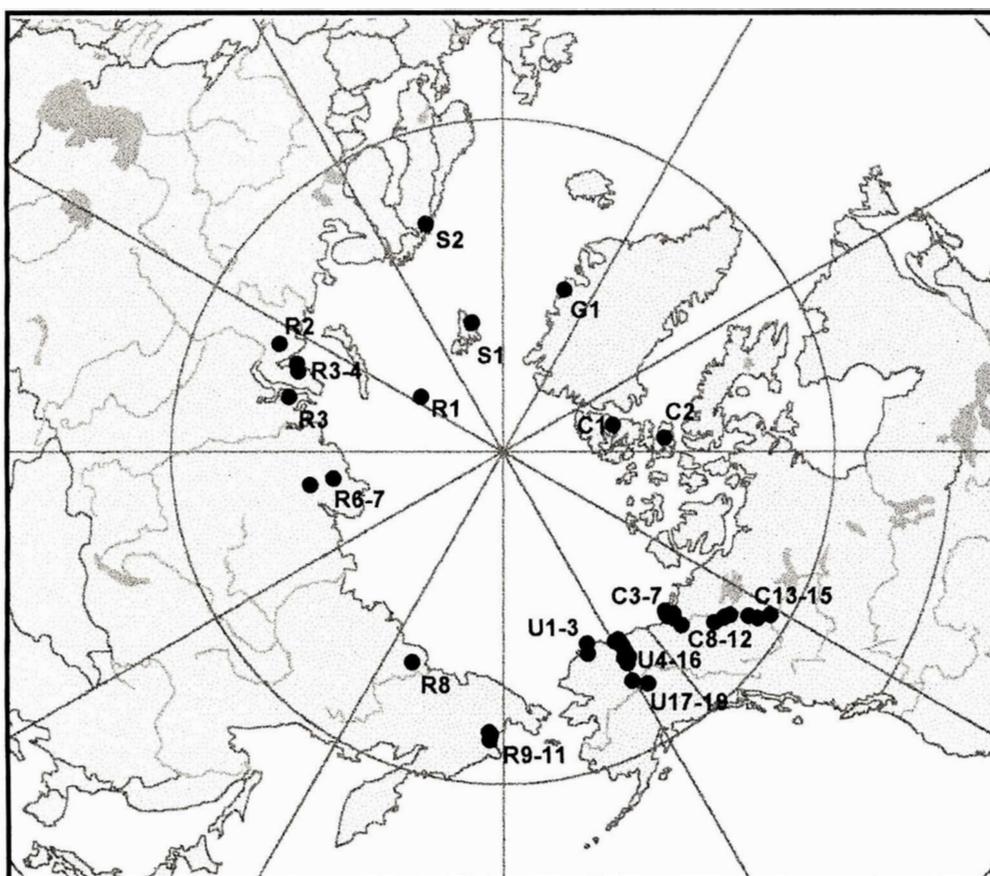
## CIRCUMPOLAR ACTIVE LAYER MONITORING (CALM)

The active layer monitoring program is now formally designated CALM, and is closely affiliated with the International Tundra Experiment (ITEX), the International Permafrost Association (IPA), and several IPA working groups. These active layer measurements are important indicators of landscape variability and provide documentation of inter-annual and decadal fluctuations. They can serve as a basis for intersite comparison of ecosystem structure and function and serve to validate site, regional and GCM models.

At present, CALM consists mainly of sites where the maximum active layer thickness is measured by physical probing on grids ranging in size from 10 meters to 1000 meters or single point data obtained by probing or reading permanently installed frost tubes. These sites include several coastal to inland transects in northern North America and

an east to west array of sites across Eurasia. For many of these and other sites, data from soil temperature recorders and, in some cases, shallow borehole temperatures are included.

The map shows the locations of the sites (several were inactive in 1996 due to funding constraints and program changes). Additional existing sites in the mid-latitude mountains and Antarctica are being identified and will be added to the network in 1997. The CALM network of sites can provide ground truth for the GTOS-GCOS program and IGBP high-latitude transects. We are using the IPA News Bulletin *Frozen Ground* and the IPA Web site to disseminate these data to participants and interested readers. Data will be archived in the IPA Global Geocryological Database (GGD).



CALM network; site information and thaw data appear on page 16. Individuals responsible for data collection are: [1] Greg Henry; [2] Larry Bliss, Warren Gold; [3] Mark Nixon, Al Taylor; [4] Charles Tarnocai, Sheila Kroetsch, David Kroetsch; [5] Hanne Christiansen; [6] Michael Gottfried, Georg Grabherr, Karl Reiter; [7] Galena Mazhitova; [8] Nataly Moskalenko, V. Dubrovin, Evgeny Melnikov; [9] Marina Leibman; [10] Martin Sommerkorn; [11] Julia Boike; [12] Vladimir Ostroumov; [13] Anatoly Kotov; [14] Volodya Razzhivin; [15] Jonas Åkerman; [16] Jerry Brown, Ken Hinkel, Larry Hinzman, Fritz Nelson, Pat Webber; [17] Tom Osterkamp, Vlad Romanovsky; [18] George Kling, Gus Shaver, Jim Laundre; [19] Les Viereck.

# CALM THAW MEASUREMENTS

Map	Site	Location	Grid size (m)	Late summer thaw (cm)					
				1991	1992	1993	1994	1995	1996
<b>Canada</b>									
C1	Alexandria Fiord [1]	79°54'N, 75°54'W	100	—	—	—	—	—	43
C2	Truelove Lowland, Devon Island [2]	75°33'N, 84°40'W	60	—	—	—	30	31	—
C3	North Head [3]	69°43'N, 134°27'W	T	61	62	63	64	62	—
C4	Taglu [3]	69°22'N, 134°57'W	T	—	111	119	118	>124	—
C5	Lousy Point [3]	69°13'N, 134°17'W	T	81	85	80	86	85	—
C6	Parsons Lake [4]	68°58'N, 133°33'W	P	80	85	84	91	91	84
C7	Reindeer Depot [3]	68°41'N, 134°08'W	T	—	127	129	132	136	—
C8	Rengleng River [3]	67°45'N, 134°05'W	T	—	102	106	111	111	—
C9	Mountain River [3]	65°40'N, 128°50'W	T	—	58	58	58	58	—
C10	Pump Station [4]	65°17'N; 126°53'W	P	66	64	58	60	60	61
C11	Norman Wells [3]	65°12'N, 126°28'W	T	—	64	63	61	61	—
C12	Great Bear River [4]	64°55'N; 125°35'W	P	72	72	72	69	69	63
C13	Ochre River [3]	63°28'N, 123°04'W	T	—	—	75	76	80	—
C14	Willowlake River [3]	62°42'N, 123°04'W	T	—	—	79	83	84	—
C15	Fort Simpson [3]	61°53'N, 121°36'W	T	—	—	95	106	123	—
<b>Greenland</b>									
G1	Zackenbergl [5]	74°28'N, 20°30'W	100	—	—	—	—	—	60
<b>Russia</b>									
R1	Franz Josef Land [6]	81°04'N, 56°18'E	100	—	—	—	—	—	21
R2	Ayach-Yakha, Vorkuta [7]	67°35'N, 64°11'E	100	—	—	—	—	—	70
R3	Maare Sale, Yamal Peninsula [8]	69°43'N, 66°45'E	1000	—	—	—	—	131	108
R4	Parisento, Gydan Peninsula [8]	70°07'N, 75°35'E	1000	—	82	91	—	94	—
R5	Vaskiny Dachy, Yamal Peninsula [9]	70°17'N, 68°54'E	100	—	86	93	86	99	92
R6	Labaz Lake, Taimyr [10]	72°23'N, 99°30'E	100	—	—	—	42	50	—
R7	Levinson Lessing Lake, Taimyr [11]	74°32'N, 98°36'E	100	—	—	—	36	42	34
R8	Bolshoy Olyer Lake, Kolyma [12]	69°28'N, 156°18'E	10	—	—	—	—	48	—
R9	Cape Rogozhny, Chukotka [13]	64°49'N, 176°50'E	100	—	—	—	43	43	49
R10	Upper Kargoplgyno River, Chukotka [13]	64°05'N, 177°04'E	100	—	59	51	56	—	—
R11	Mt. Dionisy, Chukotka [14]	64°34'N, 177°12'E	100	—	—	—	—	—	50
<b>Sweden/Svalbard</b>									
S1	Kapp Linne, Svalbard [15]	78°03'N, 13°37'E	100	89	92	113	99	97	102
S2	Abisko area [15]	68°20'N, 18°50'E	100	69	66	65	66	61	68
<b>United States (Alaska)</b>									
U1	Barrow [16]	71°19'N, 156°36'W	1000	—	22	30	35	35	36
U2	Barrow, CRREL Plots [16]	71°19'N, 156°35'W	10	23	23	29	34	34	35
U3	Atkasuk [16]	70°27'N, 157°24'W	1000	—	—	—	—	44	47
U4	West Dock [17]	70°22'N, 148°33'W	100	—	—	—	—	—	30
U5	West Dock [16]	70°22'N, 148°34'W	1000	—	—	48	55	51	55
U6	Deadhorse [17]	70°10'N, 148°28'W	100	—	—	—	—	—	64
U7	Betty Pingo [16]	70°17'N, 148°52'W	1000	—	—	52	54	55	55
U8	Franklin Bluff [17]	69°41'N, 148°43'W	100	—	—	—	—	—	63
U9	Happy Valley [17]	69°10'N, 148°50'W	100	—	—	—	—	—	36
U10	Happy Valley [16]	69°06'N, 148°30'W	1000	—	—	44	45	43	43
U11	Imnavait Creek [16]	68°30'N, 149°30'W	1000	—	56	60	60	49	46
U12	Toolik [16]	68°37'N, 149°36'W	1000	—	—	—	—	45	47
U13	Toolik LTER [18]	68°37'N, 149°36'W	Transect	28	40	46	36	43	33
U14	Galbraith Lake [17]	68°29'N, 149°30'W	100	—	—	—	—	—	51
U15	Chandalar Shelf [17]	68°04'N, 149°35'W	30	—	—	—	—	—	35
U16	Old Man [17]	66°27'N, 150°37'W	100	—	—	—	—	—	33
U17	Wickersham Dome [19]	65°16'N, 148°03'W	Transect	41	46	45	47	48	36
U18	Bonanza Creek LTER [19]	64°45'N, 148°00'W	Transect	49	50	—	55	58	45
U19	Pearl Creek [19]	64°54'N, 147°48'W	T	63	71	66	66	72	53

Data compiled by Jerry Brown; dashed line indicates no data for that year; P – single point probe; T – frost tube(s).



# 7th International Conference on Permafrost 23–27 June 1998

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