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# Frozen Ground

THE NEWS BULLETIN OF THE INTERNATIONAL PERMAFROST ASSOCIATION  
WWW.PERMAFROST.ORG

*Almost a quarter-century after the release of the first IPA Newsletter, that later became Frozen Ground, the News Bulletin of the International Permafrost Association gets a facelift*

## WORD of the president

2011 could have allegedly been labelled as a transition year for the International Permafrost Association, after the successful Third European Conference on Permafrost in 2010 and before the Tenth International Conference on Permafrost in 2012, but it ended up to be way more than that, with the nurturing of ongoing projects, the coordination of new international partnerships and the launch of new programs and activities. The Executive Committee, now in its third year at the head of the IPA, has continued to work hard on creating and strengthening tools to create the conditions for the coordination of permafrost science and engineering projects at the international level and to engage the community in the process. Looking back at the past three years, I can say that the IPA has witnessed a level of activity unseen before in permafrost research and engineering and this gives the

Executive Committee a great sense of responsibility, pride and optimism. It will be needed to hand over a solid and efficient organisation to the next Executive Committee that will be elected in Salekhard in June 2012. In the following paragraphs, I would like to reflect on achievements on 2011 and on the situation of the IPA before the transition occurs.

2011 has seen the IPA grow in members, with the addition of South Korea in the spring. South Korea is becoming a key player in polar research, having invested massively in logistical and human resources over the past few years and reorganising its polar program around the Korean Polar Institute. Its microbiological research on permafrost is rapidly gaining momentum and I am very happy to welcome South Korea among the IPA members. Individual members to the IPA have also grown in size, now approaching 500, with new members signing every month.

The changes to the structure initiated in 2010 are progressively coming to fruition. The first call for action groups was issued in the fall of 2011 and the three first recipients of the call will start their activities in 2012 (see more on page 3). The Standing Committee on Education and Outreach, chaired by Kenji Yoshikawa, has also started its activities and will meet during the TICOP. Finally, the Global Terrestrial Network for Permafrost (GTN-P) has been able to organize a very timely workshop to lay the foundation for permafrost monitoring and secure funding for it. This is a very important step forward for the permafrost community.

In June 2012, the Yamal-Nenets Regional Government will organize the TICOP in Salekhard, Russia. The organizers have managed to attract over 700 abstracts or papers and promised to fund the travel and stay of 150 young researchers. The conference will host all the meetings of the IPA and will hopefully bring people



together for what makes these conferences very special, namely the only opportunity to meet the permafrost community in one single place every four years. I must emphasize that this conference would not have been possible without the additional support from the United States Permafrost Association, which has taken a leading role in the editing of the proceedings and the organisation of the meeting.



2011 was also the year of inception or continuation of some major permafrost projects. It is hard to focus on one more than the other, but it is important to mention here the ones that bring several organisations together and brought funding for permafrost research to another level. The recently started project from the European Union PAGE21 (Changing Permafrost in the Arctic and its Global Effects in the 21th century; page 4) funded with 9.3 M€ is one of them, as are the DEFROST project (Nordic Centres of Excellence), the Research Collaboration Network on Permafrost Carbon (National Science Foundation), The ADAPT project (National Science and Engineering Research Council of Canada), PermaNet (page 7) and the Data User Element on Permafrost (European Space Agency; page 5). There are of course many more projects out there and even more calls and applications, which shows the growing level of awareness of funding agencies for permafrost research.

There were many conferences or sessions on permafrost organized in 2011. Briefly, I should mention the 2nd International Symposium on Arid Environments (CHECK IF IT IS OK) organized in Ulaanbaatar in August, for which the IPA was an official sponsor and of course the sessions organized at the Arctic Science Summit Week in Seoul, Korea (March) at the European Geosciences Union (EGU) Annual Meeting in Vienna, Austria (April) and at the American Geophysical Union (AGU) Fall Meeting in San Francisco, USA (December). 2012 will continue on that trajectory with sessions at the International Polar Year conference in Montréal, Canada in April, at the

International Geographical Union Meeting in Cologne, Germany in August and at the EGU and AGU Meetings

I must honour the memory of two of our most brilliant colleagues that passed away in late 2011 and early 2012. Steven Solomon, former co-chair of the coastal and offshore permafrost Working Group of the IPA, as well as David Gilichinsky, co-chair of the Permafrost Astrobiology Working Group both passed away recently and the community has lost two of its most brilliant minds, but most importantly two friends for many of us. Their memories will be remembered during the TICOP in Salekhard.

To conclude this brief report, I would like to seize the opportunity of this last report in Frozen Ground to remember some of the achievements of the Executive Committee since it took office in 2008 and to provide very short elements of a vision for the future of the IPA.

Since 2008, the number of permafrost publications and media reports has gone through the roof and the major objective of the six members of the Executive Committee was to adapt the IPA to this mutation. In short, the structure and the finance model of the IPA have been changed, the Secretariat strengthened, with the funding of one full position by the Alfred Wegener Institute in Potsdam, printing of publications was faded out to shift the spending on the support of research coordination at the international level, and the communication strategy of the IPA developed to reach out to the general public. The Executive Committee also strengthened

links to international organisations including SCAR, IASC, CliC and projects of the World Meteorological Organisation (WMO), and focused on the support of emerging science fields (permafrost carbon research, microbiology, global climate modeling) and ongoing monitoring efforts through GTN-P. All of these changes, often drastic, meant a radical change of culture for the IPA, but should prepare the organisation for the twenty-first century science and engineering landscape.

Over the years to come, the IPA will need to strengthen its links to international organisations, working hand in hand with the ones involved in permafrost to tackle what are now global issues. To do so, it will not avoid drafting and publishing a “white paper” on permafrost research. This process should be inclusive and engage not only a core of geoscientists, but also the wide range of science and engineering specialties now dealing with permafrost. It should also try to frame the discussion by referring to the framework already outlined in the International Council for Science (ICSU)’s Earth System Science for Global Sustainability.

The IPA will be increasingly expected to stretch its capabilities to answer basic questions and formulate informed opinions and to tackle issues at the global level. This will be a very difficult challenge and I trust that it will only be answered through the active involvement of permafrost scientists and engineers. Without them, the IPA will have no legitimacy to act, or the capability and resources to coordinate international activities. They will be called upon to help, whether it is in the active organisation of permafrost research, or in the development of the outreach capability of the organisation. My wish is to see this pursued to avoid the duplication of efforts that could stem from the isolation of groups, countries and/or disciplines. It is also to see the community “own” the organisation and shape it to its need and to the needs of society.

**Hans-Wolfgang Hubberten**  
on behalf of the Executive Committee of the IPA.



# IPA Action Groups

by Hugues Lantuit and Inga May

*Action Groups are a new element in the IPA Structure and are meant to fund targeted groups working*

These Action Groups are working towards the production of well-defined products. Unlike the former Working Groups, Action Groups are funded on a competitive basis at up to 2500 € per year (maximum of 5000 € over the life of an Action Group). Up to 10 000 € per year of the IPA total budget will be

devoted to Action Groups. These groups have limited terms and focus on clearly defined research outputs, such as maps, science plans, or databases, that can be supported through the organization of workshops, management and technical support.

**NEXT DEADLINE  
for action group applications is the  
the 31th of October 2012**

## Assessing deep permafrost carbon pools

by Gustaf Hugelius

**P**ermafrost environments are a key component of the global carbon (C) cycle. The aim of the new IPA action group is to produce a fully digitized version of the Northern Circumpolar Soil Carbon Database (NCSCD) with updated estimates of permafrost deep C storage in soils (0-3 m depth). Soil organic C storage in this region has been estimated to 1672 Pg of which approximately 1466 Pg C, or 88%, occurs in perennially frozen soils and deposits. (Tarnocai et al., 2009, Global Biogeochemical Cycles). The estimated carbon masses for all soils in the northern circumpolar permafrost region are 496 Pg for the 0–1 m depth, and 1024 Pg for the 0–3 m depth. In addition, deeper deposits (below 3 m) of Pleistocene loess (Yedoma) and deltaic deposits contain an estimated 407 and 241 Pg C, respectively. As the base of these estimates, the NCSCD has a key role in research on permafrost and C cycling.

**E**stimates of deep (0-3 m) permafrost C pools have been identified as particularly uncertain due to the small number of soil

profiles available. The current estimates of deep permafrost C are also not available as spatially distributed datasets for use in geographic information systems (GIS). Through the efforts of a wide community of scientists new data on deep permafrost soil C storage is emerging. The intent of the new IPA action group is to make the updated GIS database available to the whole research community through open access online publication. Our intent is that the work within this action group will largely consist of networking and exchange between research groups who are currently holding data that is not yet digitized or included in the NCSCD or who will acquire new data in the coming years. Therefore we invite any researchers who feel they can contribute towards this goal to contact us so that we may discuss how your data can be integrated into the circumpolar database.

**A**ny interested individuals or organisations are asked to contact the Action group leaders for more information:

**Gustaf Hugelius**,  
(gustaf.hugelius@natgeo.su.se) or  
**Charles Tarnocai**,  
(charles.tarnocai@agr.gc.ca).



## Subsea Permafrost Mapping

by Paul Overduin

**T**he IPA has voted to support a new IPA Action Group (AG) on Subsea Permafrost Mapping, proposed by the Coastal and Offshore Permafrost Dynamics Interest Group of the IPA in the fall of 2011.

**T**he idea of the action group is based on the need "to support the development and production of maps of subsea permafrost", formulated by the Coastal and Offshore Permafrost Dynamics (COPD) Working Group at the NICOP 2008. The Action Group follows this recommendation by organizing two meetings under the auspices of the COPD Interest Group within a one-year period to assemble a core group of interested individuals and organisations. The goal of these meetings will be to evaluate and assemble meta-data for the existing data that will contribute to a subsea permafrost map. The first meeting will be a side meeting preceding the Tenth International Conference on Permafrost (TICOP) and is planned for June 24th, 2012. A second North American meeting is planned for later in the year.

**T**he primary goals of the meetings are to survey, collate and document available data potentially relevant to the mapping of subsea permafrost. As the current map of the subsea permafrost is only based on bathymetry and potential submarine permafrost extent, an evaluation will be made of the best criteria to use for developing an updated map to supersede the

current one. Vintage, archival and current data will be combined by drawing together members of the IPA community who hold or have access to or knowledge of such data. The data will be described in as much detail as possible, in terms of parameters measured or observed, uncertainties, temporal and spatial coverage, current data repository and contact persons and catalogues in geo-database form.

Furthermore this action group aims to foster the education and outreach activities within IPA: some IPA support has been dedicated to including at least one young scientist from PYRN who will be required to become involved in the creation of the map document and writing of the workshop reports.

This activity represents a core activity of the IPA and extension of the activities that led to the creation of the global permafrost map. It reflects the current interest in the Arctic shelf regions, which results from increased transportation and resource exploration in the region.

**T**he project will be undertaken by the COPD Interest Group of the IPA, with the express support of the IPA executive council. Supplementary support comes from the organizing committee of TICOP, the Geological Survey of Canada and the Alfred Wegener Institute for Polar and Marine Research.

Any interested individuals or organisations are asked to contact the co-leaders of the COPD for more information on opportunities for involvement:

**Georgy Cherkashov**  
(gcherkashov@gmail.com) or  
**Paul Overduin**  
(paul.overduin@awi.de)

# Permafrost in the Arctic - Page 21

by Hugues Lantuit

*PAGE21 will aim to understand and quantify the vulnerability of permafrost environments to a changing global climate, and to investigate the feedback mechanisms associated with increasing greenhouse gas emissions from permafrost zones*



In November of 2011, the European Union (EU) project PAGE21 (Changing permafrost in the Arctic and Its Global Effects in the 21st Century) was officially launched in Potsdam, Germany. The four-year EU project brings together field-researchers, operators of long term observatories and modellers from 18

**“ We need to improve our basic understanding of the physical and biogeochemical processes in permafrost so as to be able to provide more reliable predictions of future global climate change ”**

H.-W. HUBBERTEN, PROJECT COORDINATOR

partner institutions in the EU to answer the following question: What happens when the vast amounts of carbon in Arctic soils are released to the atmosphere?

By pooling expertise from various subjects, the scientists aim to deliver a valuable foundation for the United Nations 5th World Climate Report. The project is led by Prof. Dr. Hans-Wolfgang Hubberten of the Research Unit Potsdam of the

Alfred Wegener Institute for Polar and Marine Research. The PAGE 21 project is the largest EU project on permafrost since the PACE21 project that was initiated a decade

earlier. It has been allotted almost 10 million Euros, of which just under 7 million Euros are provided by the 7th Framework Programme of the European Union.

Field scientists will be called upon to measure permafrost temperature on Svalbard, to deploy flux chambers on the permafrost in Siberia, or to measure escaping gases with eddy towers in Greenland. In order to capture the changes in gas release over time and space, these measurements will be done repeatedly and cover larger areas as well as longer periods during the year. By standardizing measurement methods between partners, the

scientists will be able to directly compare their data. In doing this, the project partners of PAGE21 are expecting to obtain high-quality data records. These records from the permafrost are a prerequisite basis for the improvement of global climate models. “Today’s global models are frequently inaccurate because the permafrost regions, with all their feedback mechanisms, are under-represented.” says Hubberten. An urgent goal of PAGE21 is to undertake steps to improve the models, which provide the basis for future mitigation and adaptation strategies confronting society in the 21st century data records.



**GTN-P**  
Global Terrestrial  
Network for  
Permafrost

## First successful GTN-P Workshop

by Hanne H. Christiansen, Hugues Lantuit

*The IPA and the International Arctic Science Committee organized a workshop to encourage and promote the first step in the realization of the GTN-P Strategy and Implementation Plan submitted to GCOS and GTOS.*

During 10-11 November 2011 41 permafrost scientists and various users of permafrost data were gathered at the **Workshop on the Global Terrestrial Network on Permafrost (GTN-P) user requirements definition**. The workshop was held at the Alfred Wegener Institute (AWI) in Potsdam. The IPA and the International Arctic Science Committee supported the workshop. The IPA organized this workshop to define the user needs and requirements for the production, archival, storage and dissemination of the Essential Climate Variables (ECVs) in GTN-P: permafrost temperature and active layer thickness. The aim of the workshop was to encourage, facilitate and promote the first step

in the realization of the GTN-P Strategy and Implementation Plan on 1) definition of user requirements for an observing network on permafrost based on a broader stakeholder involvement and 2) the standardization of permafrost measurement methods at the international level.

We had oral presentations on the status of permafrost data organisation in each of the participating 18 IPA Adhering bodies/nations. Also a presentation of how the sister network Global Glacier Network (GTN-G) is working, and of the Global Cryosphere Watch and its expectations for GTN-P was given. Eight breakout sessions were held on various

parts of the GTN-P design, and then a final discussion ended the workshop. The direct results of this stakeholder workshop was the formation of an interim Executive Committee chaired by Vladimir Romanovsky (University of Alaska Fairbanks, USA) that in partnership with the IPA secretariat,

have worked on refining the Strategy and Implementation Plan of GTN-P and worked towards the operationalization of the network. Likewise a workshop report is very shortly to be circulated in its final form, with more details on the workshop, and will be available from the IPA Secretariat.



# DuE Permafrost project

by Georg Schwamborn

*More than 60 international participants attended the 3rd ESA-DUE Workshop that was held in February 2012 in Potsdam at the Alfred - Wegener Institut*

The final workshop of the "ESA DUE (Data User Element) Permafrost" was held between Feb 15-17 2012 at the Alfred-Wegener-Institute for Polar and Marine Research (AWI) in Potsdam. Dr. Birgit Heim (AWI) and Dr. Annett Bartsch (Technical University Vienna) jointly organized the workshop. It was the closing of a project that was funded by the European Space Agency and that lasted for three years. It brought together a multidisciplinary permafrost community working on satellite-derived data and in-situ field validation. Overall 62 participants from Austria, Canada, Finland, France, Germany, Italy, Japan, Norway, Poland, Russia, Sweden Switzerland, UK, and USA gave 22 oral presentations and 20 poster presentations.

The workshop started with a welcome by Prof. Dr. Hans-Wolfgang Hubberten, appointed IPA-President, and Dr. Frank-Martin Seifert from the ESA centre for Earth observation in Frascati, Italy. After an "Introduction into Permafrost Remote Sensing" (Dr. Claude Duguay, University of Waterloo, Canada) the workshop focussed on presenting products such as the pan-Arctic elevation model, land cover products, the thermal state and the hydrology of the North. Detailed results were related to assess surface temperature, surface soil moisture, freeze/thaw detection, a surface water inventory and terrain changes from satellite-derived data. In another presentation it was shown how the ESA products will be disseminated e.g. through the TU Vienna

web portal with downloadable products (<http://www.ipf.tuwien.ac.at/permafrost/>) or through the PANGAEA database ([pangaea.de](http://pangaea.de)), which also provides the opportunity to publish data sets.

The presentation of recent international remote sensing programs included reports on "GlobSnow", "STSE Northern Hydrology", "CoastColour", "STSE-Alanis", "EuRuCAS" and "MONARCH-A" by various speakers representing these programs. Arctic climate modellers pointed out in their presentations that permafrost land surface conditions are more and more implemented to run regional models. The modelling community is interested in surface parameters that may be extracted from satellite-derived data including roughness criteria and vegetation patterns, snow properties and land surface temperatures (e.g. MODIS or AATSR) across the North validated by in-situ surface measurements.

Projects on remote sensing in permafrost areas on various scales were presented. In addition, northern vegetation patterns are monitored using hyperspectral optical systems with refined data calibration based on in-situ surface measurements. Applications have been demonstrated for climate modelling and also ground investigations.

The discussion part pointed out the need to close the gap between satellite-derived parameters and those that can be commonly measured on the ground by field scientists. To better validate satellite-derived data for hemispheric modelling the field efforts must account for the pixel and sub-pixel scale. This includes the monitoring of permafrost properties such as the soil moisture, the land cover types, the snow, the frozen/ unfrozen surface state, and the temperature and emissivity distribution.



The Tenth International Conference on Permafrost  
**TICOP**  
will be held from  
**25-29 June 2012 in Salekhard, Russia.**  
More info at:  
[www.ticop2012.org](http://www.ticop2012.org)

# Research Coordination Network on the Vulnerability of Permafrost Carbon -RCN

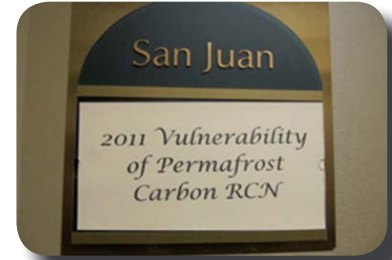
by EAG Schuur, C Schädel, AD McGuire, JP Canadell, J Harden, P Kuhry, V Romanovsky, M Turetsky

*The Vulnerability of Permafrost Carbon Research Coordination Network (RCN) is a NSF-funded synthesis project that builds on several previous synthesis efforts on the vulnerability of carbon in the permafrost conducted by the National Center for Ecological Analysis and Synthesis (NCEAS) and the programs sponsored by the IPA*

More than twice as much carbon than currently contained in the atmosphere is stored in the northern circumpolar permafrost zone (Tarnocai et al. 2009). Permafrost thaw, and the microbial decomposition of previously frozen organic carbon, is considered one of the most likely positive feedbacks from terrestrial ecosystems to the atmosphere in a warmer world (Schuur et al 2008). Yet, the rate and form of permafrost C release is highly uncertain but crucial for predicting the strength and timing of this carbon cycle feedback this century and beyond. Here we report on the development of a new research coordination network (RCN) whose objective is to link biological C cycle research with well-developed networks in the physical sciences focused on the thermal state of permafrost

The activities started with an initial workshop in June 2011 in Seattle, USA where we organized the network into five working groups focusing on 1) quantity of permafrost C pools, 2) quality of permafrost C, 3) thermokarst and thermal erosion of permafrost C, 4) anaerobic and aerobic C mineralization and 5) upscaling and modeling of permafrost C. These working groups developed priority plans for synthesis activities.. A second workshop was held in December of 2011 in conjunction with the American Geophysical Union meeting in San Francisco, USA. This brought in new members and served as an update for working groups. A third workshop was

held in May 2012 in St. Pete, USA. This smaller workshop of synthesis leaders and co-leaders was used to review initial drafts of synthesis products and to identify remaining gaps that could be addressed with new synthesis activities. Future workshops include December 2012 in conjunction with AGU and May 2013 at a location to be determined. The Permafrost Carbon network and individual working groups are open to new participants interested



in making contributions to the creation of databases and other proposed synthesis products <http://www.biology.ufl.edu/permafrostcarbon/>.



Photos of the third RCN workshop in Seattle

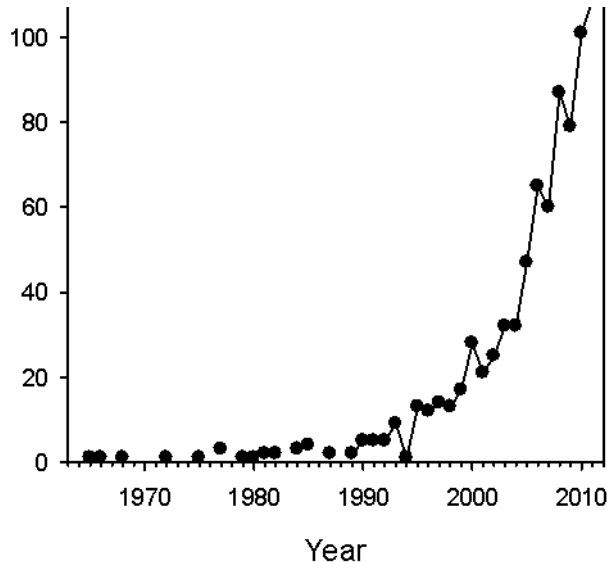
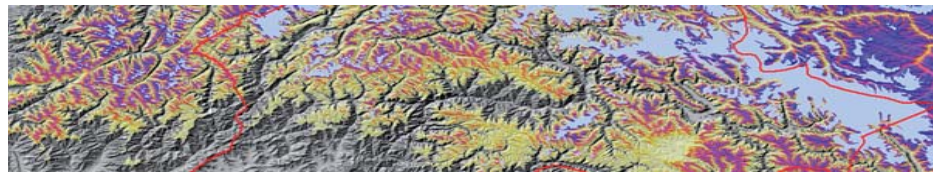


Figure 1: Development of permafrost carbon publications since 1960

Some initial synthesis products include a database and library of permafrost carbon publications (Figure 1) and a survey of experts that was conducted at the first workshop. The outcomes of the survey are published in Shuur et al. (?) and highlight the greater heat-trapping capacity of CH<sub>4</sub>. The implementation of strategies for reducing fossil fuel and deforestation emissions could have substantial benefits for permafrost C stability, keeping more of it frozen in the ground longer and thus reducing its future impact on climate.



**A new  
Global Permafrost Zontion  
Index at 30 arc second (<1km)  
resolution is available online at**

[www.geo.uzh.ch/microsite/cryodata/pf\\_global/](http://www.geo.uzh.ch/microsite/cryodata/pf_global/)

*The PermaNET project ([www.permanet-alpinespace.eu](http://www.permanet-alpinespace.eu)), part of the European Territorial Cooperation and co-funded by the European Regional Development Fund (ERDF) in the scope of the Alpine Space Programme (EU), lasted from 2009 to 2011.*



The overall objective of this project was to make a significant contribution towards the mitigation of natural hazards related to permafrost and manage their consequences, with specific regard to climate change impacts. To this end a common strategy for dealing with permafrost and related hazards under changing climatic conditions was developed collaboratively and an Alpine-wide monitoring network was established. The spatially distributed gaps of permafrost data were closed and a consistent permafrost map and database for the entire Alps elaborated. Testing

new and promising technologies and finding joint solutions for the adaptation of risk management practices, the project aimed to push the Alpine Space to be one of the leading model regions in the field of mountain permafrost research and permafrost monitoring.

The main project activities aimed to collect metadata on existing permafrost monitoring activities in the Alps, extend the existing monitoring networks and define guidelines for further installations. A handbook on permafrost detection and monitoring was elaborated.

The project also provided data about the permafrost distribution in the Alps by compiling an Alpine-wide inventory of permafrost evidence ([www.alpine-permafrost-data.eu](http://www.alpine-permafrost-data.eu)) and an Alpine-wide map of permafrost distribution ([www.geo.uzh.ch/microsite/cryodata/PF\\_map\\_explanation.html](http://www.geo.uzh.ch/microsite/cryodata/PF_map_explanation.html)). PermaNET also provided the basis for the elaboration of the common strategy for dealing with permafrost and related hazards under changing climatic conditions. Recommendations for decision-makers have been developed, based on case studies of permafrost related hazards throughout the Alps.

Finally the project also provided information about the relevance of permafrost ice for water resources management and developed recommendations for regional environmental institutions of how best to analyse the quality of the spring water with particular focus on heavy metal pollution and particles. All products are available on-line ([www.permanet-alpinespace.eu](http://www.permanet-alpinespace.eu)).

In the framework of the last Alpine Space Programme project call, a proposal dealing with the capitalisation of PermaNET project results was submitted and is currently under evaluation.

## 2nd Int. Symposium on Mountain and Arid Land Permafrost

by Jambaljav Yamkhim

*The Second International Symposium on Mountain and Arid Land Permafrost was held in August 2011 in Ulaanbaatar, Mongolia*

The Second International Symposium on Mountain and Arid Land Permafrost was organized by the Mongolian Permafrost Association (MPA) and sponsored by the Geographical Institute (Mongolian Academy of Sciences, MAS), the Mongolian Foundation for Science and Technology, and the Hokkaido University, Japan. The symposium took place in Ulaanbaatar, Mongolia, in August 2011. A number of 25 scientists from Norway, Japan, Romania, USA, China, Russia and Mongolia have participated at the symposium on mountain and arid land permafrost. Over 20 studies were presented during the 2 days. During a roundtable discussion the following were discussed:

1. The symposium recommend to:
  - a. Extend the interest group area from Central Asia to Asian countries where permafrost exists.
  - b. Organize an effective international team of experts to continue the project on mapping of mountain permafrost in Asia.
  - c. Emphasize on spatial permafrost models, at different scales.
2. The symposium recommend to:
  - a. Better document the permafrost borehole network in Asian countries
  - b. Improve the data management, data archive, data storage, and data delivery in Asian countries in the framework of the GTN-P and CALM programs.
  - c. Identify sponsors for activities of permafrost borehole network in Asian countries.



3. Especially, the Mongolian permafrost and ecological network was recognized as critical for understanding the dynamics of permafrost.

After the hall symposium all participants followed an one-day field excursion, which offered the opportunities to visit observation sites near Ulaanbaatar city (Nalaikh and Terelj sites). In the framework of a joint Japanese-Mongolian research project, permafrost and metrological parameters have been recording at this stations since 2002.

On behalf of symposium organizing committee we would like to express our deep thanks to all participants of the symposium for their fruitful presentations and useful recommendations, and to the International Permafrost Association (IPA), the Mongolian Academy of Sciences (MAS), and the Hokkaido University (HU) for their supports.

# UPCOMING EVENTS

## 2012

### **Arctic Science Summit Week 2012**

19-22 April 2012  
Montreal, Canada

### **IPY 2012 Conference**

22-27 April 2012  
Montreal, Canada

### **Tenth International Conference on Permafrost (TICOP)**

25-29 June 2012  
Salekhard, Russia

### **XXXII SCAR and Open Science Conference**

13-25 July 2012  
Portland, USA

### **34<sup>th</sup> International Geological Congress**

5- 10 August 2012  
Brisbane, Australia

### **32<sup>nd</sup> International Geographical Congress**

26-30 August 2012  
Cologne, Germany

## 2013

### **Arctic Science Summit Week 2013**

14--20 April 2013  
Krakow, Poland

### **DACA 13**

19-12 July 2013  
Davos, Switzerland

### **Regional Conference of IGU**

4-9 August 2013  
Kyoto, Japan

### **10<sup>th</sup> International Symposium on Cold Regions ISCORD 2013**

May 2013  
Anchorage, Alaska, USA

## 2014

### **EUCOP IV**

18-20 June 2014  
Portugal

# INTERNATIONAL PERMAFROST ASSOCIATION

The mission of the International Permafrost Association is to promote research in permafrost and permafrost-related fields within the global scientific and engineering communities, to support the activities of researchers in these disciplines, and to disseminate findings concerning permafrost to the decision-makers, the general public and educators.

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