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Frozen Ground

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

Words from the President

BY HANNE H. CHRISTIANSEN

Writing the opening words of Frozen Ground no. 40 is a pleasure. The IPA is doing well with increasing activity and thus with a larger influence on cryospheric studies.

Researchers and engineers from an increasing amount of backgrounds and nationalities are becoming more and more interested and involved in permafrost research. This was clearly reflected in the amount of participants and spread in session themes at the largest permafrost event of 2016, the Eleventh International Conference on Permafrost (ICOP) held in Potsdam, Germany in June (p. 3). The IPA appreciates the large efforts of the permafrost research group at the Alfred Wegener Institute for Polar and Marine Research that resulted in such a successful conference. During the ICOP, Antoni Lewkowicz ended his 4 year term as IPA President. Lothar Schrott and Hugues

Lantuit ended their 4 year terms on the Executive Committee, and Isabelle Gärtner-Roer and Chris Burn were elected as new members. The IPA is very thankful to our former President and the two former EC members for their work for the association during the last 4 years. The new Vice-Presidents are Vladimir Romanovsky and Chris Burn.

Permafrost forms a large part of my life, both as an inhabitant living on permafrost, but also as a scientist working with permafrost at the University Centre in Svalbard (UNIS) for more than 10 years. Svalbard experienced an exceptionally warm autumn in 2016, and rain storms during October and November brought large attention to how permafrost affects slope stability when active layer detachments and mudflows happened in Longyearbyen, where I live. The Research Council of Norway and UNIS have made it possible to establish the IPA Secretariat at UNIS on permafrost in Svalbard, where it is operated by our new Executive Director Sarah M. Strand. Karina Schollaen ended her term as Executive Director during autumn 2016, and the IPA appreci-



Top: IPA President, Hanne H. Christiansen, in the Svalbard landscape with Longyearbyen in the background. Bottom: The IPA Secretariat is now located at The University Centre in Svalbard (UNIS), the core institution of the Svalbard Science Centre in Longyearbyen.

ates her work and efforts operating the IPA Secretariat.

The GTN-P is improving, and the addition of young national correspondents allows the younger permafrost researchers to take a larger role with the very important collection, shared storage, and joint analyses of permafrost data (p. 12). Sever-

al action groups have very interesting permafrost activities that you can read about in this issue of Frozen Ground. With the GlobPermafrost project (p. 14) and the IPA focus on permafrost mapping, one key ambition of the IPA is to provide a new overview map of permafrost in both hemispheres in the near future.

In 2017, we look forward to the Second Asian Conference on Permafrost to be held in Sapporo, northern Japan in early July (p. 13). This regional IPA conference offers unique opportunities for field excursions to permafrost areas in Japan, Mongolia, and Kamchatka that many of us hopefully have the opportunity to attend. This conference represents an expansion of IPA

activities with a regional conference occurring the year after the ICOP. If this is successful, we might organize another regional conference in 2019, potentially in New Zealand, following the European Conference on Permafrost in Chamonix in June 2018.

Hanne H. Christiansen

IPA Executive Committee, 2016-2018



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Sarah M. Strand
Arctic Geology Department
The University Centre in Svalbard
(UNIS), Norway

The current IPA Executive Committee (EC) was elected on 19 June 2016 in Potsdam, Germany, by the IPA Council at the 11th International Conference on Permafrost. The positions held by Vladimir Romanovsky and Dmitry Sergeev are two year positions, up for election at the 5th European Conference on Permafrost in Chamonix, France in June 2018. The remainder of the positions last until 2020, when leadership will transition at the 12th International Conference on Permafrost in Lanzhou, China.

ICOP 2016: The 11th International Conference on Permafrost

BY KARINA SCHOLLAEN, CONFERENCE MANAGER



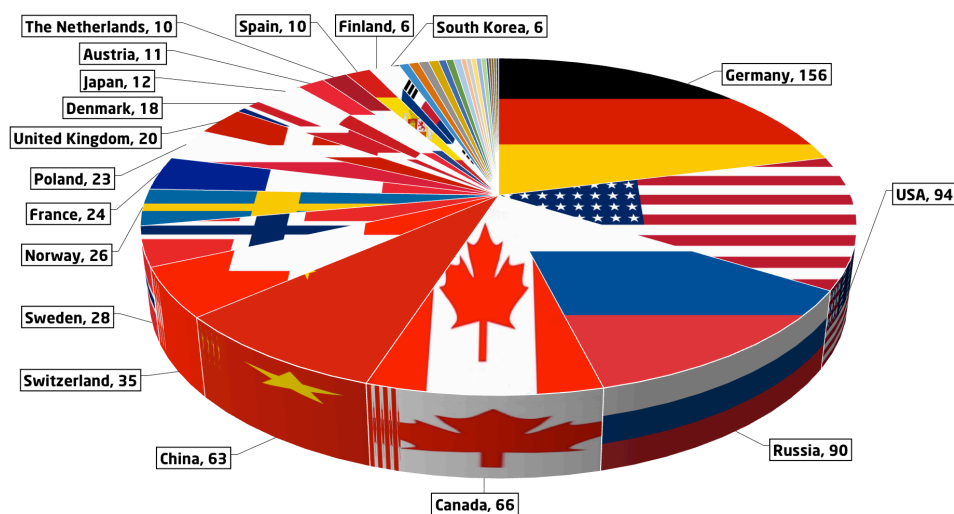
The Eleventh International Conference on Permafrost (ICOP 2016) was held from June 20-24, 2016 in Potsdam, Germany and was, by any measure, a resounding success. Nearly 740 participants from 36 countries attended the meeting, presented their latest research findings, and took the opportunity to develop new projects and collaborations in permafrost science and engineering. The focus of the ICOP, which was the first to be held in Germany, was *Exploring Permafrost in a Future Earth*.

The conference was organized and the Technical Program assembled by a Local Organizing Committee, comprising scientists from the Alfred Wegener Institute (AWI), the Technical University Munich, and other German universities. Advice was provided on several occasions in the planning phase by a distinguished group of permafrost researchers that constituted the International Scientific Committee.

CONFERENCE PRESENTATIONS AND ABSTRACT VOLUME

The weekend prior to the conference was reserved for ICOP-related business meetings, including the 25th IPA Council meeting, the Global Terrestrial Network for Permafrost (GTN-P) National Correspondents Meeting, and a 2-day young researcher workshop organized by PYRN, APECS, the young researcher representatives of the USPA, and ADAPT.

During the conference opening ceremony, the IPA Lifetime Achievement Award 2016 was presented to Hugh M. French



Number of ICOP 2016 participants by country. Countries with less than four participants have been omitted for clarity.

(Canada), in recognition of his outstanding contributions to the international permafrost community as a researcher and editor, as well as to the IPA. The conference program continued with the first plenary lecture by Torre Jorgenson (USA) as the recipient of the 2016 PPP award for Excellence in Permafrost Research.

The main part of the conference program consisted of 32 different thematic sessions with a total of 306 oral presentations and three dedicated afternoon poster sessions with 532 accepted posters. The oral talks were organized in 14 time slots with 5 to 6 parallel sessions.

Numerous resources are available on the conference website (<http://www.icop2016.org>), including video recordings of the opening and closing ceremonies, the plenary lectures, a list of conference awardees, and an extended abstract book (Günther and Morgenstern 2016). The local organizing committee of ICOP 2016 decided that an extended abstract book would be

published instead of a conference proceedings volume.

LOCAL EXCURSIONS AND FIELD TRIPS

Twelve different one-day local excursions were offered to participants in the middle of the conference week, featuring periglacial and cultural landmarks around Potsdam and in eastern Germany. Three post-conference field trips took smaller numbers of attendees to the Alps, Yakutia and Svalbard. A detailed description of the field trips appears in the final ICOP 2016 report, prepared by the Local Organizing Committee.

SOCIAL EVENTS

A series of social events throughout the week were an important part of the ICOP and created many memorable moments. For example, a Junior-meets-Senior-Lounge was open throughout the meeting. PYRN organized this as a place where the participants could relax, chat, and discuss while having refreshments in the middle of the busy conference.



Left: group photo of participants in the ICOP 2016; photo by Jan Pauls. Right: the winning team of the ICOP 2016 All-Star Football Tournament, organized by PYRN; photo by Niels Weiss.

CONTINUED FROM PAGE 3

Prior to the official start of the conference, the Young Researchers attended their own icebreaker while the IPA invited Council members and special guests to a reception on a rooftop lounge in the heart of the city. The conference started with an icebreaker at the conference venue on Sunday evening. The first conference day ended with an evening of beautiful summer weather, a barbeque, and local music from the band “Mueckenheimer”.

Two highlights of the ICOP were the the floating conference banquet and the All-Star Football Tournament. The conference banquet was attended by 400 participants and took place on two ships travelling the river Havel, revealing the cultural heritage of Potsdam by sunset. Afterwards, the main conference hall transformed to a site of late-night dancing. The football tournament, organized by PYRN, proved to be fun not only for the players but also for the spectators who listened to a spirited commentary by Hugues Lantuit.

IPA COUNCIL AND EXECUTIVE COMMITTEE AT ICOP 2016

The IPA Council and the IPA Executive Committee both met twice in association with the conference. The main topics were the outgoing President’s report including the overview of activities in relation to the IPA Strategic Plan, the IPA finances, and updates

provided by EC members, IPA Action Groups, Standing Committees and associated organizations. Another major topic was the election of the new Executive Committee. In addition, the ICOP 2020 venue was formally assigned to Lanzhou, China via a unanimous vote. Chamonix, France, is the location of the 5th EUCOP and will be the venue for the next Council meeting in 2018.

The IPA Council approved the conference resolutions, which set the stage for IPA activities over the next four years. These were presented at the closing ceremony by Prof. Chris Burn (incoming IPA Vice-President), and are printed in the box below.

FINAL WORDS

The 11th ICOP was a professional-

ly organized conference with high quality presentations. A positive and cordial atmosphere was present throughout, helping to stimulate discussions on important permafrost science and engineering questions. Attendees were certainly “Exploring Permafrost in a Future Earth” in many different ways during this week, reflecting the increasing relevance of permafrost in the global science and engineering domains.

The path taken in the past years to change the structure of the ICOPs promises many successful conferences in the future. These will undoubtedly start with the upcoming regional conferences on permafrost, and with the 12th ICOP in Lanzhou, China in 2020.

IPA RESOLUTIONS FROM THE 11TH INTERNATIONAL CONFERENCE ON PERMAFROST

First,

- Considering the growing recognition and diverse impact of permafrost on global society and climate;
- Considering the impact of permafrost on those who live or work in polar and high mountain regions;
- Considering the need to adapt engineering infrastructure to changes in the permafrost environment;
- Considering it imperative to coordinate and integrate knowledge of the carbon cycle and other biogeochemical cycles in permafrost regions;
- Recognizing that solutions to scientific questions and engineering challenges associated with permafrost require interdisciplinary teams and international collaboration; and
- Reaffirming the importance of involving members of the Permafrost Young Researchers Network (PYRN) in all of its activities,

it is resolved that over the next four years, through its collaborations with other organizations and its own Action Groups, Interest Groups, and Standing Committees, including PYRN and the Global Terrestrial Network for Permafrost (GTN-P), the International Permafrost Association will:

- Improve representation of perennially frozen ground in earth-system modelling using GTN-P products, permafrost maps, and new technologies;
- Improve understanding of hydrology, ground-ice characteristics, and permafrost-related processes associated with the vulnerability of infrastructure, ecosystems, and land use in permafrost areas, and knowledge of hazards in these environments; and
- Empower citizens concerned with the changing permafrost environment by developing education and outreach products and projects for schools, universities, professionals, and civil society.

The Yedoma Region: A Synthesis of Circum-Arctic Distribution and Thickness

BY JENS STRAUSS, WITH CONTRIBUTIONS FROM OTHER ACTION GROUP MEMBERS

Vast regions of Arctic Siberia, Alaska, and the Yukon Territory are covered by ice-rich silts penetrated by large ice wedges, resulting from syngenetic sedimentation and freezing. Because of fast incorporation of organic material into permafrost during sedimentation, Yedoma deposits include low-degraded organic matter. Moreover, ice-rich permafrost deposits like Yedoma are especially prone to degradation triggered by climate changes or human activity. When Yedoma deposits degrade, large amounts of sequestered carbon as well as other nutrients are released, which is of global significance for the climate system.

The main objective of this IPA Action Group is to provide a map showing the circum-arctic distribution and thickness of Yedoma deposits. This product is of importance for assessing infrastructure vulnerability, calculating permafrost carbon stocks, and to improve the modelling of future landscape change trajectories within these remote regions. Yedoma coverage quantification is based on the digitization of surface geological and quaternary geological maps and the analysis of remote sensing data. This information is merged with data on Yedoma thickness extracted from drilling records and outcrop observations reported in the scientific literature.

The Yedoma Action Group started its activities in early 2015 with a presentation of the Action Group's goals at the Melnikov Permafrost Institute in Yakutsk, Russia. After this we had side meetings in Flagstaff, USA (May 2015); Potsdam, Germany (November 2015); a workshop and session during the ICOP in Potsdam, Germany; and



sessions at the AGU Fall Meetings in 2015 and 2016 in San Francisco, USA.

A key milestone was reached by organising and conducting the successful session at the 11th International Conference on Permafrost. Here nine oral and fourteen poster presentations with a focus on Yedoma were given. Moreover, a hands-on workshop was organised prior to ICOP 2016 in Potsdam, where 24 scientists from 5 countries participated. At this workshop, experts evaluated, discussed, and added information to the first drafts of the regional and circum-arctic Yedoma maps. Further products like a Yedoma photo database and a first version of the Yedoma thickness database are now already published online on the Arctic Permafrost Geospatial Centre (APGC, <http://apgc.awi.de/>). In addition, a multi-author review manu-

script on the Yedoma carbon stock characteristics has been submitted. Another paper on the Yedoma coverage and thickness is in preparation. During ICOP plans have emerged to develop a special journal issue on Yedoma in the journal *Permafrost and Periglacial Processes*. These plans are currently still being further developed by a team of potential guest editors from the IPA Action Group and we hope to announce a call for manuscripts by early 2017.

GET INVOLVED

If you are interested in becoming involved in the Yedoma Action Group activities and in contributing data or sharing your ideas, please contact jens.strauss@awi.de and have a look at the Arctic Permafrost Geospatial Centre (<http://apgc.awi.de/>) to download the first products of the Yedoma Action Group.

InterFrost

BY CHRISTOPHE GRENIER

The InterFrost Action Group is concerned with the evaluation and improvement of coupled Thermo-Hydrological (TH) codes in order to match the challenges of fully realistic hydro(geo)logical natural systems as encountered in cold regions.

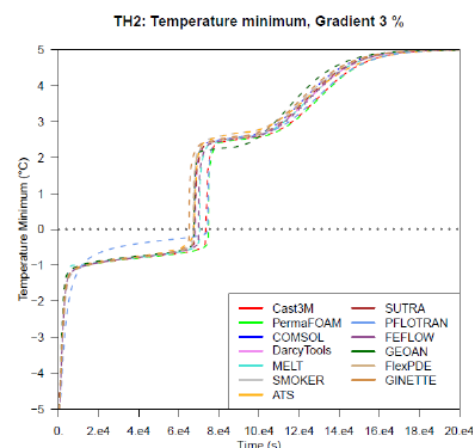
In 2016, the main results of the first phase of the benchmark exercise were obtained, discussed, and presented in international conferences (Grenier et al. at EGU 2016 and ICOP 2016), stimulating the community on such key issues. These 2D benchmark cases with full TH coupling were published on the InterFrost Benchmark web site (<http://wiki.lsce.ipsl.fr/interfrost/>). Over 20 participants from Europe and America took part in this inter-comparison with 13 coupled TH codes applied to well-defined academic test cases. The take-home message is that in spite of the numerical challenges associated with



the coupled non-linear system and the steep slopes in temperature fields resulting from phase change, a clear consensus was obtained stating the convergence of the results. Strict requirements in terms of simulation convergence were stated providing the base for a shared know-how in the field.

The follow-up step consisting of the common writing of papers for the publication of test cases and inter-comparison results has consumed more time than expected partly due to the large number of participants. This phase is not quite fulfilled yet.

The preparation of the future steps of the benchmark were started essentially to: 1) include non-saturated flow conditions in the coupled set of equations (dealing so far with saturated flow conditions), and revisit existing experiments and re-analyses from recent literature to build new benchmark cases, and



Example of inter-comparison of simulation results for Test Case TH2 (initially frozen inclusion within imposed flow conditions).

2) consider real world field cases providing the full complexity of natural media and compare modeling strategies and results. Two monitoring sites involving the common permafrost and groundwater flow conditions are contemplated so far; the first is located in Northern Québec (Canada), and the second is a river-valley system in Yakutia (Russia).

The next InterFrost workshop is contemplated in Spring 2017 to discuss and decide on topics, issues, orientations, and schedule.

Arctic Coastal Web Implementation

BY BORIS RADOSAVLJEVIC, WITH CONTRIBUTIONS FROM OTHER ACTION GROUP MEMBERS

The *Coastal Permafrost in Transition* (CPiT) side meeting held at the 11th International Conference on Permafrost (ICOP 2016) in Potsdam, Germany was the core activity of the Arctic Coastal Web Implementation Action Group in 2016. The meeting was attended by approximately 40 participants and represented the initiation of a new phase in the Arctic Coastal Dynamics (ACD) project.

The meeting program included presentations

by long-time ACD members Paul Overduin, Nicole Couture, Volker Rachold, and Don Forbes on the



project's history and development (1999-2006), and four breakout sessions led by young researchers on:

- 1) coastal monitoring,
- 2) the ACD Database 2.0,
- 3) coastal modelling, and
- 4) key sites for the ACD network.

During ICOP, the organizers of the side meeting summarized the main points for each breakout group discussion into short reports, while a full report is planned for the future. In addition, Boris Radosavlje-

vic reported to the Council and the newly elected IPA Executive Committee on the action group's activities concerning the web implementation of ACD, the CPiT meeting, and future goals. The initial results of the side meeting were also summarized and presented to a wider audience within the ICOP session S 4.3, in a talk entitled *Coastal Permafrost in Transition: The Future of Arctic Coastal Dynamics*.

The conversations started during the CPiT workshop and the ICOP

continues on the ACD website (<http://arcticcoast.info/>). Arctic coastal scientists are invited to look at and register on the ACD website to take full advantage of it. The site includes the ACD GIS with circum-Arctic data on coastal geomorphology and geochemistry, a discussion forum, a picture gallery, and an archive of Russian literature on arctic coastal dynamics. Coastal enthusiasts are encouraged to submit photos to the coastal photo gallery on Flickr (<https://www.flickr.com/photos/arcticcoast>) to help this great resource reach its full poten-

tial. You can also stay updated on Arctic coastal activities by "liking" our Facebook page which can be found here: <https://www.facebook.com/arcticcoasts/>.

A formal report on the ACD meeting is forthcoming. The International Arctic Science Committee and the International Permafrost Association supported and funded the activities of the Arctic Coastal Web Implementation Action Group in 2016.

ACTION GROUP REPORT

A Frozen-Ground Cartoon: Explaining international permafrost research using comic strips

BY FRÉDÉRIC BOUCHARD

The main goal of this scientific outreach project is to present permafrost research conducted in the field using thematic comic strips. This includes developing outreach activities in permafrost research, presenting permafrost research from the perspective of early-career scientists, providing a scientific product that is useful for educational outreach worldwide, and contributing to the recruitment of the next generation of permafrost researchers.

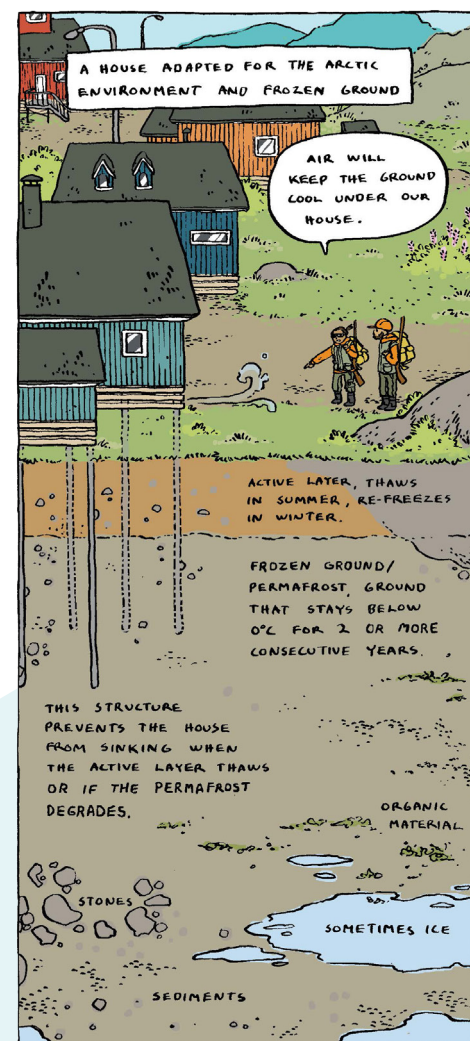
The project is led by a team of permafrost young researchers from Canada and Europe (Germany, Portugal, & Sweden). Although it officially started in February 2016, the members of the Action Group have been active since January, when the project was officially launched with an application call for artists and a short report in *Frozen Ground* (no. 39). We received 49 applications from 16 countries, out of which we selected 10 artists to submit a one-page proposal "pitch". Since the fi-

nal selection of the artists, we have been involved in coordination and draft preparation, including a full-day workshop during the ICOP in June. The final strips are completed and will be circulated in the near future.

The two selected artists come from Finland (Heta Nääs) and Canada (Noémie Ross). The coordinating members of the IPA Action Group – young researchers from Canada and Europe, members of PYRN, APECS, PAGE21, and ADAPT – helped the artists to build their stories upon sound scientific concepts. The scientists and the artists worked closely together to develop narrative elements and characters.

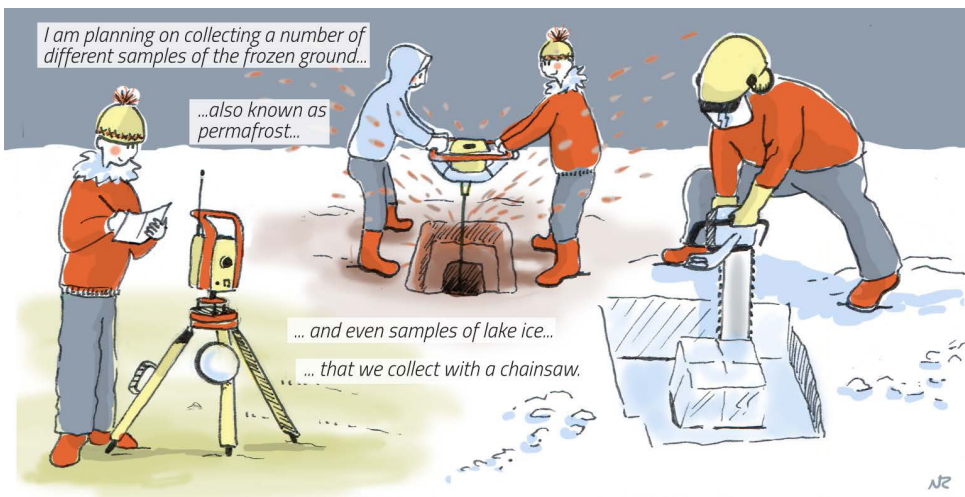
For more information & project updates: <https://www.researchgate.net/project/A-Frozen-Ground-Cartoon-Explaining-international-permafrost-research-using-comic-strips>.

Right: A segment from Heta Nääs' cartoon, "The Bumpy Road".



Contact:
frozengroundcartoon@gmail.com

Left: A segment from Noémie Ross' cartoon, "All-inclusive field vacation". Below: Detail from Heta Nääs' cartoon, "The Bumpy Road".



STANDING COMMITTEE REPORT

Education & Outreach

BY KENJI YOSHIKAWA AND EDUCATION & OUTREACH COMMITTEE MEMBERS

During the ICOP in Germany, we held well-attended Education and Outreach Sessions (poster and oral) followed by an Education & Outreach (EO) Committee Meeting on 23 June 2016. The session was organized by Inga Beck (PYRN), Anna Klene, and Ylva Sjöberg (PYRN). The committee meeting was chaired by newly elected co-chair Anna Klene, as co-chair Kenji Yoshikawa could not attend. PYRN representative Julia Stanilovskaya and APECS representative Ylva Sjöberg stepped down but remain general members, and Justine Ramage (PYRN and APECS board member) accepted a nomination to represent both organizations. New committee members include Stefanie Weege and Margaret Cysewski. The Frozen-Ground Cartoon and Permafrost and Culture Action Groups gave an update on their activities, and national representatives presented on activities within their countries. Here, recent and on-going EO activities are summarized by targeted age group.

K-12 AUDIENCES

The Global Learning and Observations to Benefit the Environment (GLOBE) Program is an international science and education program that

brings scientists, educators, and their students together in studying the earth and the environment. Over 110 countries participate in GLOBE, which engages students to do citizen science as a way of learning science and to share data with other schools. The website and activities are available in English, French, German, Spanish, and Russian, and other languages depending on the GLOBE country. The EO Committee held a workshop to refine a monitoring activity on using frost tubes to look at seasonally frozen ground and permafrost. Currently, the frost tube is being added as a GLOBE Measurement protocol to the GLOBE website so that data entry, archiving, and sharing is facilitated. Data to be archived and shared include air and soil temperatures and active layer depths. Japan already has a large network of schools running FrostTubes; 305 schools are currently participating! See Koichiro Harada's website for more information: http://www.myu.ac.jp/~haradak/frost_tube.html.

In addition, a wide variety of IPA and EO members have presented at science fairs (US, Canada, Japan), teaching conferences (Russia), and have visited individual classrooms

to engage directly with students and educators in many countries.

Five posters were presented by teachers and students in the poster sessions at the ICOP conference in Potsdam. Many national opportunities exist for teachers to partner with permafrost scientists, such as the recently funded European Union grant, EDU-ARCTIC, which will run through 2019. In addition, some of the field courses listed in the IUCP database (see p. 10) have opportunities for teachers to participate.

New classroom materials in a variety of languages are being developed by the Frozen-Ground Cartoon Action Group, and in the online books *Permafrost in Our Time* and a Russian version. These resources are useful for elementary through adult audiences, and other materials (such as a coloring page being developed by Kelsey Nyland at Michigan State University) are available. Kenji Yoshikawa is compiling a list of resources (with language availability) on the EO website. Please send him links of additional items to include.

UNDERGRADUATE AND GRADUATE STUDENTS

Our work with this group is primari-



The University of the Arctic Thematic Network on Permafrost field course in Yakutia, August 2016.

CONTINUED FROM PAGE 8

ly with field courses and developing a model graduate curriculum. Several institutions continue to run annual summer field courses open to international students, such as Lomonosov Moscow State University in Russia. Many of the field courses are available at low cost but this varies from course to course. The EO Committee maintains a database of International University Courses on Permafrost (IUCP) which continues to list all university classroom and field-based courses which we know of. Please send any new courses or changes to Kenji Yoshikawa (kyoshikawa@alaska.edu). One-time offerings, such as the field courses planned for 2017 in Russia and 2018 in Alaska with funding from George Washington University's recently funded US National Science Foundation Partnerships for International Research and Education (PIRE) grant on Arctic Sustainability (with additional Russian funding) are encouraged to be listed. The University Centre in Svalbard (UNIS), after holding two University of the Arctic's Thematic Network on Permafrost (TNP) summer field courses in Longyearbyen (2014, 2015), took over the responsibility of continuing to annually offer this field course as a true legacy of the Thematic Network on Permafrost Norwegian ac-

tivity. This course is open for bachelor geoscience students.

The third year of the TNP field school focused on permafrost and natural hazards in Yakutsk, Russia, as a collaboration between the University of the Arctic TNP and North Eastern Federal University. During the 3 week session, 14 students from 9 countries attended (India, China, Mongolia, Japan, Germany, UK, Norway, Russia, and the USA). The summer field school aims to provide students with an overview of the many different research topics related to permafrost, ranging from geoscience, engineering, and bioscience to social science. We invited 14 professors/doctors as lecturers, including Profs. Huijun Jin (China), Paul Overduin (Germany), Sven Mathiesen (Norway), Alexander Kholodov (USA), Michael Zeleznitskiy, Andrey Abramov, Julia Stanilovskaya, Alexander Fedorov, Trofim Maximov, Alexander Kononov, Vladimir Efremov, Andrey Litovko (Russia), and Atsuko Sugimoto and Tomonori Sato (Japan). We used the Central Yakutian landscape to study different landforms and to gain hands-on experience with field techniques for studying permafrost. The course was a joint course of the University of the Arctic's activities on Natural Hazards and TNP. We deeply appreciate the volunteer participation of the professors and much logistical

support from the Russian Academy of Science's Melnikov Permafrost Institute.

A field summer course on permafrost for undergraduate & graduate students was organized by the Cryolithology and Glaciology department, Faculty of Geography, Lomonosov Moscow State University in July 2016. This course was conducted under support of the Russian Centre of Arctic Development (RCAD, Salekhard). The main purpose of the course was to study landscape and permafrost conditions of the Polar Urals, lower reaches of the Ob River, and the Taz peninsula. The main instructors during the course were Drs. V. Grebenets (MSU) and V. Pushkarev (RCAD). Two new CALM sites were established near the Kharp and Gornoknyazevsk settlements respectively. These sites represent tundra conditions of the 2nd and the 3rd terraces of the Ob River.

Continuing work on a model curriculum on permafrost at the Master and Doctoral level has led to the establishment of a "Master of Permafrost" program at the University of the Arctic with University of Alaska Fairbanks (UAF). The first student, Bill Cable, graduated in July 2016, with an Interdisciplinary Master of Science in International Permafrost Ecosystem Studies. We hope additional students at UAF and elsewhere follow this path.

PERMAFROST COMMUNITIES, INDIGENOUS PEOPLES, AND THE GENERAL PUBLIC

Community outreach focused on work with northern communities to monitor air, permafrost, and ice cellar temperatures, collaborating with reindeer communities from Norway to Chukotka, and on-going development of the popular-press book *Permafrost in Our Time* into a Russian version “Мерзлота в наше время”.

Kenji Yoshikawa did a winter traverse, visiting many villages in northern Siberia (predominantly indigenous communities), establishing permafrost monitoring stations in collaboration with local governments. In Alaska, Canada, Mongolia, and Russia, monitoring of ice cellars dug into permafrost continued and expanded with individuals and local governments. A new activity is collaboration with reindeer communities from Norway to Chukotka, including several meetings in Alaska, Russia, and Norway. A collaborative summer school including reindeer husbandry and permafrost communities is possible. The Russian “Мерзлота в наше время” in development is not simply a translation of the English-language *Permafrost in Our Time*, but primarily includes examples from Siberian villages, many of which are indige-

nous communities.

ADDITIONAL ON-GOING AND FUTURE E&O ACTIVITIES

1. A series of EO sessions as well as activities for teachers and students are organized as part of the ACOP in Japan in 2017.
2. Classroom and public learning materials targeted to a range of ages continue to be developed.
3. Scholarship funding options will be explored to help fund students with limited means to participate in permafrost field courses. We will also attempt to attract students whom may not yet have decided to study permafrost to these classes.
4. We will continue to find partner institutions to host TNP field courses in new locations to facilitate participation of students from more countries.
5. The EO Committee will collaborate with APECS and PYRN to translate educational resources into additional languages. Contact us with requests and we will facilitate translational assistance.
6. The IPA Outreach Webpage and International University Courses on Permafrost list will be updated with current information. Please send us suggestions of educational materials and changes in courses to include.

USEFUL EDUCATION AND OUTREACH WEBSITES

EO Committee Website (under construction): <http://ipa.arcticportal.org/about-the-ipa/standing-committees/education-outreach>

IPA Outreach Website (under construction): <http://ipa.arcticportal.org/activities/outreach/outreach-activities>

IUCP database: <http://ipa.arcticportal.org/products/courses-iucp>

Permafrost in Our Time (English version): <https://cryoperu.files.wordpress.com/2014/12/yoshikawa-2013-permafrost-in-our-time.pdf>

GLOBE website: <http://www.globe.gov/>

Koichiro Harada's Frost Tube website (in Japanese): http://www.myu.ac.jp/~haradak/frost_tube.html

For South American activities: www.geocriologia.com.ar

Support for EO activities has come from the IPA, as well as the Russian, Norwegian, Japanese, and US governments (NASA, NSF, Belmont Forum & more). We sincerely appreciate their contributions as well as the efforts of all the IPA members.

We welcome any comments and suggestions which can be sent to any member of the Education and Outreach Standing Committee, or co-Chair Kenji Yoshikawa: kyoshikawa@alaska.edu.

PARTNER ORGANIZATION REPORT

Permafrost Young Researchers Network (PYRN)

BY ALEXEY MASLAKOV, JOSEFINE LENZ, CAROLINE COCH, JOANNE HESLOP AND SIMON DUMAIS, ON BEHALF OF THE PYRN EXECUTIVE COMMITTEE AND EXOFFICIOS

The Permafrost Young Researchers Network (PYRN), established under the patronage of the IPA, is a worldwide network of young and enthusiastic permafrost scientists and engineers. PYRN provides networking and learning opportunities by organizing meetings and workshops for which

financial support is often granted to PYRN members. PYRN also highlights the work of its most outstanding members by giving out presentation awards during IPA conferences.

All young permafrost researchers are kindly invited to register for a free PYRN membership at pyrn.arcticportal.org.



PYRN AT ICOP 2016

PYRN participated in promoting the work of Young Permafrost Researchers during the very successful 11th International Conference on Permafrost, June 20-24 2016 in Potsdam.

A Young Permafrost Researchers Workshop organized by PYRN, APECS, ADAPT, and USPA provided valuable sessions on different topics to more than 150 PYRN members prior the conference on June 18-19. Travel grants were offered by the IPA to cover the ICOP registration cost of several Young Permafrost Researchers.

Besides highly interesting scientific and engineering presentations, PYRN members were active as session co-chairs. PYRN also organized the much appreciated All-Star Football Tournament which was a great occasion for the conference participants to unwind by playing or watching the games with entertaining commentary by former PYRN President Hugues Lantuit. The Junior-meets-Senior-Lounge sponsored by PYRN provided the setting for impromptu meetings between the PYRN members and the senior members of the permafrost community.

The new PYRN Executive Committee for 2016-18 was elected at the ICOP. It is formed of 13 very motivated young career scientists and engineers from all over the world. Consult the "About Us" section of the PYRN website for more information about the new PYRN Executive Committee (pyrn.arcticportal.org/en/executive-committee-about/excom-2016-2018).

PYRN-IPA AWARDS 2016

During the 11th International Conference on Permafrost in Potsdam, PYRN honoured the best oral and poster presentations of

Young Permafrost Researchers with a PYRN-IPA Award in the categories "science" and "engineering". 275 oral and poster presentations were registered to compete for an award and more than 80 judges were involved in the evaluation process! Moreover, more than 90 FrostBytes (very short online videos promoting permafrost research and projects) were submitted and evaluated by the judging committee. All Frostbytes can be watched at vimeo.com/cryosphere.

The awards were gratefully sponsored by the IPA, the German Polar Society (DGP), and the journal *Permafrost and Periglacial Processes* published by John Wiley & Sons. The 2016 PYRN-IPA awardees received a framed certificate and a cash prize of 400€. Herewith, it is our great pleasure to announce the recipients of the PYRN-IPA Awards 2016 for the best presentations at the 11th International Conference on Permafrost:

Melissa K. Ward (McGill University) received the Troy L. Péwé Award for her oral science presentation entitled "Using a mix-methods approach to monitor thermokarst activity in the Eureka Sound Lowlands, Ellesmere Island, Nunavut".

Heather M. Brooks (Université Laval) received the Pavel I. Melnikov Award for her oral engineering presentation entitled "Quantifying probability of thaw settlement occurrence and vulnerability to climate warming – Iqaluit Airport, Nunavut".

Boris K. Biskaborn (AWI Potsdam) received the PYRN-IPA Award for his science poster presentation entitled "Modern spatial variability of limnoecology and sedimentary processes in a mountain lake at the permafrost margin of southern Yakutia (Russia)".

Anna Tolstogan (Lomonosov Moscow State University) received the PYRN-IPA Award for her engineering poster presentation entitled "Changes of the engineering geocryological conditions in the Yamburg settlement (Taz Peninsula)". Please note that changes were necessary after the conference due to a judging mistake in the evaluation process.

Svetlana Bricheva (Lomonosov Moscow State University) received the PYRN-IPA Award for the best FrostByte; hers was entitled "Ground penetrating radar detection of visible and 'hidden' ice wedges in the Chara Depression (Eastern Siberia, Russia)". Her FrostByte can be watched at vimeo.com/170138147.

PYRN would like to thank all candidates, sponsors, judges and volunteers who made the evaluation process possible. Thanks to Niels Weiss for documenting the ceremony with photographs. Once again, congratulations to all PYRN-IPA Award recipients for 2016!

FOLLOW PYRN ON FACEBOOK, TWITTER, AND INSTAGRAM!

Facebook: @PYRNofficial

Twitter: @PYRN_official

Instagram: @PYRN_official



Left: Heather Brooks (Université Laval), third from left, receiving the Pavel I. Melnikov Award from Josefine Lenz, Hanne H. Christiansen and Antoni Lewkowicz.

PYRN wants to promote photographs of its members in action! Follow us on Instagram @PYRN_official and post photographs of PYRN members conducting permafrost-related research (#PYRN). We would love to see PYRN members engaging in all

forms of research and outreach; photographs of field work, lab work, desk work, conferences, and networking are welcome!

UPCOMING ACTIVITIES

The PYRN currently is working on the organization of workshops and meetings during the following events; please sign up for the

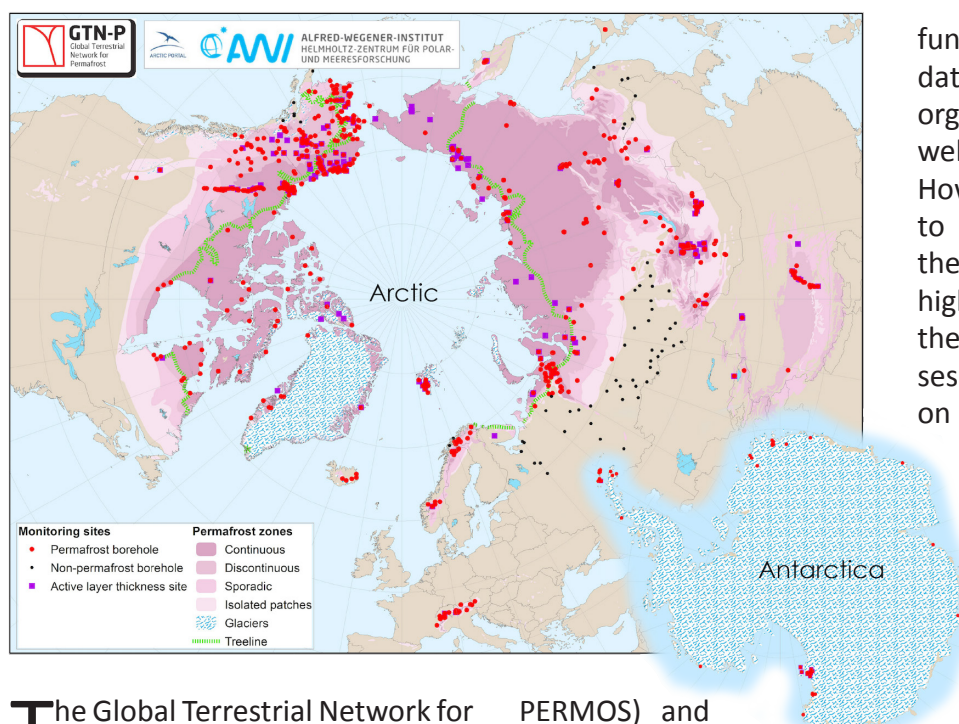
PYRN newsletter to receive regular updates:

- PYRN DACH Meeting, Einsiedeln, Switzerland, 9-11 February 2017
- 6th Iberian Conference of the IPA, Oviedo, Spain, 21-23 June 2017
- 2nd Asian Conference on Permafrost (ACOP 2017), Sapporo, Japan, 2-6 July 2017

PARTNER ORGANIZATION REPORT

The Global Terrestrial Network for Permafrost (GTN-P)

BY DMITRY STRELETSKIY AND BORIS K. BISKABORN



functioning governance structure, providing data assimilation and distribution tools, organizing workshops and publications, as well as education and outreach activities. However, more work is needed in order to ensure the stability of the GTN-P in the future. To this purpose, we will briefly highlight the most recent developments of the GTN-P: the GTN-P hosted a meeting and sessions during the International Conference on Permafrost (ICOP 2016) and established Young National Correspondent (YNC) positions; the development of a GTN-P Data Management System (DMS); the development of a permafrost snapshot; and funding from the IPA to sustain some of these efforts.

The Global Terrestrial Network for Permafrost (GTN-P, www.gtnp.org) is part of the Global Climate Observing System (GCOS) and the World Meteorological Organization (WMO) and was established in 1999 by the International Permafrost Association (IPA). The goal of the GTN-P is to promote the systematic and long-term documentation of the distribution, variability, and trends of permafrost. Permafrost is recognized as an Essential Climate Variable (ECV) by the GCOS, with permafrost temperature and active layer thickness being the most important indicators of changes in the permafrost system. The GTN-P network is operated by individual scientists, national (e.g. PERMANET,

PERMOS) and international programs (such as TSP, CALM) from 25 countries located both within and outside the Earth's permafrost regions. Together these efforts underscore the importance of permafrost monitoring not only for local and regional applications, but for understanding the global climate system as well.

Therefore, sustaining the GTN-P network is one of the important contributions of the permafrost community within the research domain of global environmental change. A great deal of work has been done in order to lay the foundation for a sustainable network future. This includes the creation of a

The GTN-P meeting organized right before the ICOP brought together 50 participants from 20 countries. The participants discussed network developments since the last workshop in Quebec (October 2015), specifically the contribution of the GTN-P community to the GCOS Implementation Plan and development of a GTN-P Strategy and Implementation Plan 2020 (SiP2020), a document that outlines network milestones and priorities for the next four years. One of the priorities towards sustainable network operation, as discussed at the workshop in Quebec, was a change to the governance structure, particularly the introduction of

Young National Correspondents (YNCs). By the time of the ICOP 2016, 15 countries had selected their YNC, and these individuals were formally introduced during the GTN-P meeting. The YNCs recently held elections, with Alexey Maslakov (Russia) being selected to represent the YNCs on the Steering Committee of the GTN-P. The GTN-P community welcomes the contributions of the YNCs and is looking forward to their new ideas.

The conference session titled “Results from GTN-P: TSP, CALM, and related environmental datasets and models” was the largest at the conference, highlighting the important role the GTN-P plays within the permafrost community. 60 abstracts were submitted for the session, with 19 being presented during four segments. The presentations were focused on various aspects of permafrost and active layer monitoring and covered a broad range of geographic scales, from local studies to global assessments of permafrost state as well as varying permafrost locations, from Arctic, to Antarctic, to mountain settings.

To address the need for permafrost data in global climate models and impact studies by various research and policy maker

groups, the GTN-P continued the development of a comprehensive Data Management System (DMS, gtnpdata.org). Hosted by the Arctic Portal, the GTN-P DMS provides a critical link between the researchers involved in field data collection and various end-users, from hard-core climate modelers, to policy makers, to the general public interested in permafrost. The DMS is constantly improving under the technical leadership of Jean-Pierre Lanckman, now allowing for user-friendly data submission, the processing and standardization of field data, and the provision of necessary tools for data-queries, visualization, and the ability to download data in various formats.

Using the capabilities of the DMS, the most recent data of the thermal state of permafrost and active layer thickness are being compiled for a new global snapshot of the permafrost system. The snapshot is intended for publication in the beginning of 2017, and will be used to evaluate changes in the global permafrost system relative to the snapshot developed for the International Polar Year (IPY, 2007–2008). Initial results, which have already been presented at the ICOP, indicate that following increases in air temperature, permafrost temperature generally increased, especially in the

Arctic areas where permafrost is relatively cold. In the subarctic, where permafrost temperatures are relatively high, the warming trend is less pronounced and at many locations current permafrost temperature is similar to that of the IPY snapshot. In alpine permafrost areas, however, most measurement sites also show significant warming compared to 2009.

Recently, the GTN-P has received unprecedented financial support from the IPA, demonstrating the IPA’s strong commitment to the GTN-P and a continuation of successful collaboration. The IPA support will be used over the next year to complete the SiP2020, which addresses the GTN-P’s long-term sustainability, and to support the GTN-P DMS at Arctic Portal, as well as the establishment of regional DMS mirrors in other countries. The GTN-P Steering Committee (SC) welcomes proposals from individuals, government and research institutions interested in hosting mirrors of the GTN-P DMS in their home countries. The GTN-P SC is also actively seeking private donations and corporate sponsors in order to secure the longevity and operability of the network. Please visit www.gtnp.org for more information about the network, data access and news updates.

CONFERENCE PREVIEW

ACOP 2017



The 2nd Asian Conference on Permafrost (ACOP 2017)

will take place in Sapporo, Japan from 2-6 July 2017. Delegates will participate in state-of-the-art presentations in the modern city of Sapporo (host of the 1972 Winter Olympics). Field trips will visit marginal and extra-zonal mountain permafrost sites that support unique geo-eco-hydrological

features. All aspects of frozen ground research will be covered, from needle ice to deep permafrost, from frozen ground engineering in cities to permafrost on volcanoes, and from links between frozen ground and ancient cultures to present-day outreach. There will be 13 sessions for oral and poster presentations, in addition to morning plenary sessions. Two half-day trips are offered for Tuesday, with longer field trips running both before and after the conference.

FIELD TRIPS

Pre-conference

- Summit area of Daisetsu Mountains in Hokkaido
- Shikaribetsu Lake in Daisetsu Mountains and Tokachi plain
- Artificial frozen soil wall using freezing pipes (Fukushima Dai-ichi nuclear power plant)

Post-conference

- Mt. Fuji trekking
- Kamchatka Peninsula
- Mongolia

For more details visit <http://acop2017.arc.hokudai.ac.jp/>

INTRODUCING

GlobPermafrost

ANNETT BARTSCH

The European Space Agency has launched the GlobPermafrost initiative (2016-2019) to develop, validate, and implement Earth Observation (EO) products to support research communities and international organisations in their work on better understanding permafrost characteristics and dynamics. Prototype product cases will cover different aspects of permafrost by integrating in situ measurements of subsurface properties and surface properties, Earth Observation, and modelling to provide a better understanding of permafrost today. The project extends local process and permafrost

monitoring to broader spatial domains, supports permafrost distribution modelling, and helps to implement permafrost landscape and feature mapping in a GIS framework. It will also complement active layer and thermal observing networks. Both lowland (latitudinal) and mountain (altitudinal) permafrost issues are addressed.

The thematic products include InSAR-based land surface deformation maps, rock glacier velocity fields, spatially distributed permafrost model outputs, land surface properties and changes, and ground-fast lake ice. Datasets will be made available in the Permafrost Information System, PerSys, which is conceptualized as an Open Access geospatial data dissemination and visualization portal. PerSys is also a core component of the Arctic Permafrost Geospatial

Centre (APGC), a geodata portal for permafrost launched within the framework of the ERC PETA-CARB project at the Alfred Wegener Institute for Polar and Marine Research.

Several workshops are organized during the course of the project in order to ensure that requirements by the research communities are met. The first took place in San Francisco during the AGU Fall Meeting in December in two parts, with 50 total participants. Further workshops are planned during EGU 2017 in Vienna, ACOP 2017 in Sapporo and at the 5th EUCOP in Chamonix, France in 2018.



www.globpermafrost.info

RELEVANT ACTIVITY

International workshop “Himalayan Permafrost under the Changing Climate”, New Delhi, India

BY RENOJ J. THAYYEN, DOROTHEA STUMM, AND STEPHAN GRUBER

A one day international workshop on “Himalayan Permafrost under the Changing Climate” was organized jointly by the National Institute of Hydrology (NIH), Roorkee and the International Centre for Integrated Mountain Development (ICIMOD) on 12 August 2016, to further the frontiers of Himalayan cryospheric research from snow and glaciers to permafrost and frozen ground. Renoj Thayyen (NIH Roorkee), Dorothea Stumm (ICIMOD), and Stephan Gruber (Carleton University) were the organizers of the workshop. Apart from NIH and ICIMOD, the workshop was supported by the Science Engineering Research Board, India (SERB) and the Indian Himalayan

Climate Adaptation Programme (IHCAP-SDC). The workshop aimed at bringing together various national and international stakeholders with a main objective of sensitizing the local government, funding agencies, research institutions, universities, and other stakeholders on various issues related to permafrost thaw and ground ice in the Himalaya, with an aim to promote permafrost research and knowledge generation in the Indian Himalayan region (IHR). This workshop was attended by 48 participants from 29 institutions in India and overseas.

The workshop has provided an overview of the permafrost research in other mountainous regions of the world as well as

some preliminary insights from the Himalayan region. Preliminary modeling results suggest that the cold-arid system of the Trans-Himalayan region has higher prevalence of permafrost and frozen ground. Some of the recent landslides and related hazards are suspected to be related to permafrost thaw in the region. It is suggested that the area under permafrost could be many times higher than the other cryospheric elements such as glaciers in certain parts of the Himalayan mountain system. However, its role in the regional hydrology and hazards is still unknown. The need for further research on frozen ground of the Himalayan region was widely appreciated by

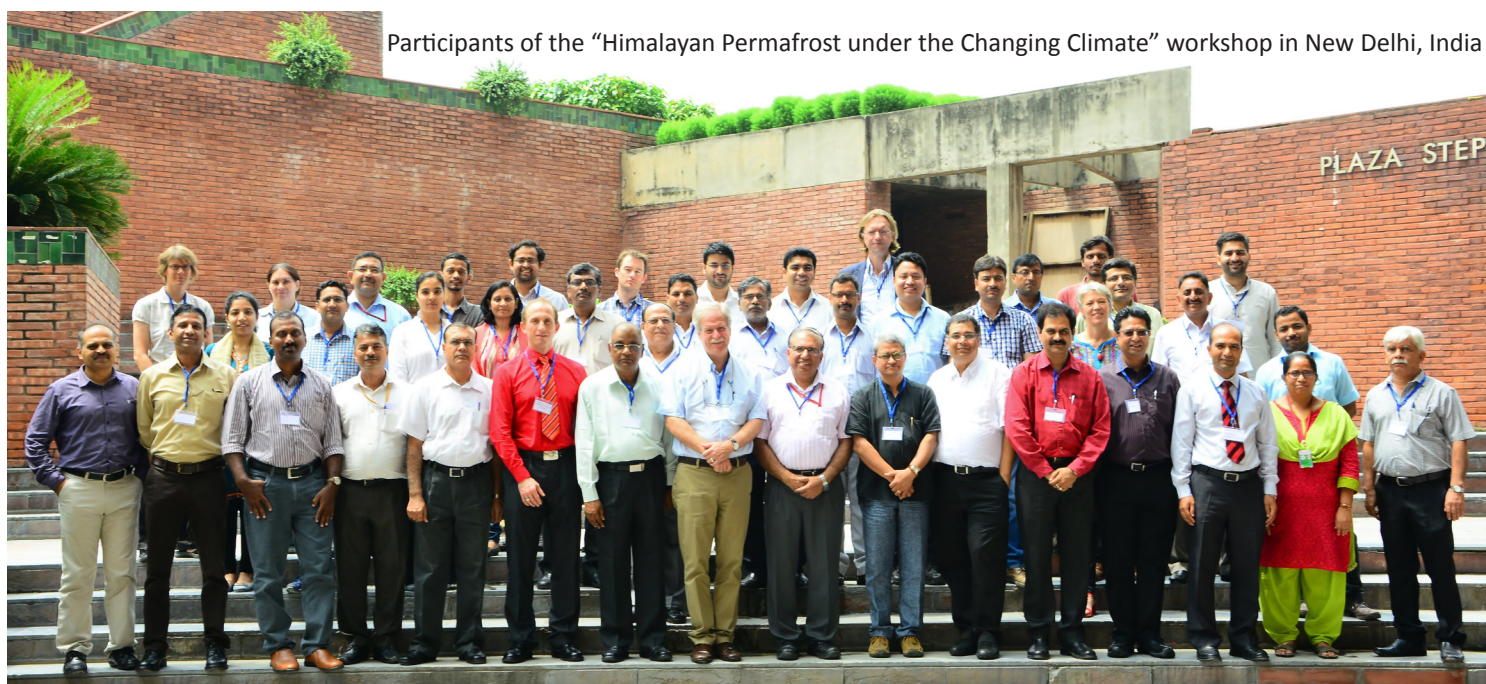
the workshop participants and they agreed to work together to strengthen permafrost research in the Indian Himalayan region by joining hands with international experts and institutions. To achieve this objective, a network of Indian researchers was formed with the name Indian Permafrost Network (IPN), and the National Institute of Hydrology was given the responsibility of coordinating the efforts. Strengthening the

research capabilities of Indian Institutions and universities by training and mentoring is identified as a first step towards stimulating permafrost research in the country. The IPN is proposed to coordinate between national and international research institutions, universities, and funding agencies for research and training. 25 participants from 15 institutions expressed their willingness to be a part of the IPN.

After the workshop a team of researchers from NIH, ICIMOD, and Carleton University undertook

fieldwork at Ganglass catchment in the Ladakh range. This catchment has been monitored by NIH for the past five years for glacier mass balance, hydrology, and mountain meteorological processes. During the fieldwork 24 soil temperature sensors were installed across the 15.8 km² experimental catchment. The data from these ground temperature sensors will be used along with data of three automatic weather stations in the catchment. The aim is to develop this catchment for future training activities.

Participants of the "Himalayan Permafrost under the Changing Climate" workshop in New Delhi, India



Upcoming Events

2017

Arctic Science Summit Week
31 March-7 April 2017
Prague, Czech Republic

EGU General Assembly
23-28 April 2017
Vienna, Austria

International Conference on
Arctic Science:
Bringing Knowledge to Action
24-27 April 2017
Reston, VA, USA

Earth's Cryosphere: Past, Present and
Future
4-8 June 2017
Pushchino, Russia

VI Congreso Ibérico de la International
Permafrost Association
21-23 June 2017
Mieres, Spain

2nd Asian Conference on Permafrost
(ACOP 2017)
2-6 July 2017
Sapporo, Japan

International Symposium on Polar Ice,
Polar Climate, and Polar Change
14-19 August 2017
Boulder, CO, USA

XI International Symposium on Permafrost
Engineering
5-8 September 2017
Magadan, Russia

AGU Fall Meeting
11-15 December 2017
New Orleans, LA, USA

2018

5th International Symposium on
Arctic Research
(ISAR-5)
15-18 January 2018
Tokyo, Japan

POLAR2018
15-27 June 2018
Davos, Switzerland

5th European Conference on
Permafrost (EUCOP 2018)
24 June-1 July 2018
Chamonix, France

THE 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 decision-makers, the general public, and educators.

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IPA Council members at the ICOP 2016, under the banner commemorating all ICOPs.



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