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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, THE UNIVERSITY CENTRE IN SVALBARD, NORWAY

The IPA turned 35 years old in 2018, as the organization was formally founded in July 1983. This anniversary was nicely celebrated in June with a regional conference on permafrost, the 5th European Conference on Permafrost (EUCOP5) in Chamonix-Mont-Blanc, France. The conference was attended by close to 500 scientists and engineers.

Europe has now hosted five regional conferences on permafrost (EUCOPs): 2001 in Rome, Italy; 2005 in Berlin, Germany; 2010 in Longyearbyen, Svalbard/Norway; 2014 in Evora, Portugal and then in Chamonix this year. EUCOP5 was, however, the first conference in the European Alps and in France! The successful local organizing team, consisting of alpine permafrost researchers from France, Switzerland and Italy, used the setting to allow us all to visit



Members of the IPA Council and Executive Committee after the 27th Council Meeting at EUCOP5.

the majestic eastern European Alps, and to learn how people live in this active landscape with mountaintop permafrost. Almost 500 extended abstracts of the presentations from the conference are available online at <https://eucope2018.sciencesconf.org/>.

The IPA Council met twice during EUCOP5 and elected two new members to the Executive Committee

(EC): Prof. Dr. Michael Krautblatter, Germany and Prof. Dr. Frederick 'Fritz' Nelson, USA. The new EC also met during EUCOP5, and asked Dr. Andrey Abramov of Russia to join the EC to ensure good regional balance. Prof. Dr. Chris Burn has accepted becoming the next Senior Vice President, with Dr. Isabelle Gärtner-Roer as the second Vice President; both will serve for the next two years in

these capacities. We want to thank Prof. Dr. Vladimir Romanovsky, USA, former Vice President and Dr. Dmitry Sergeev, Russia for their work in the EC through June 2018.

A main focus of the new EC is to revise the IPA Strategy Plan so that a new plan can be discussed and approved at the next Council meeting, which will take place at the

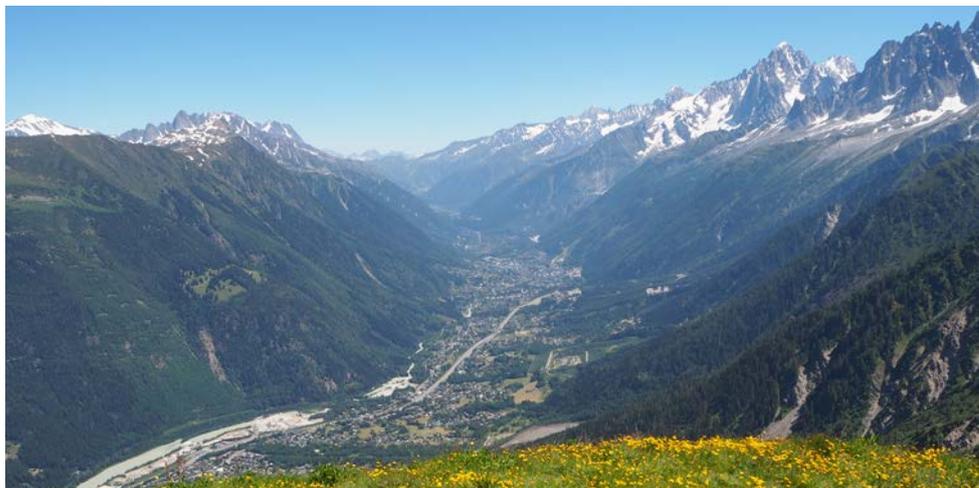
12th International Conference on Permafrost in China in June 2020. Several central IPA activities (including Standing Committees and Action Groups) were presented and discussed at the EUCOP5 Council meetings, and you can get updated on these activities in this issue of Frozen Ground.

An open call for regional conferences on permafrost in the period 2021-2023 was launched at the EU-

COP5 Council meetings, and by autumn Spain had suggested to host EUCOP6 in June 2022 in Puigcerdà, while the US suggested to host an RCOP in Boulder in July 2021. Council has voted in favor of both of these suggestions, meaning that we can look forward to annual permafrost conferences spread over multiple continents in the coming four years.

We are looking very forward to an exciting permafrost year in 2019, when the IPA will have a regional conference in the Southern Hemisphere for the first time – SouthCOP. I hope that many of you will be able to experience permafrost at altitude and latitude in the southern summer in early December, and I look forward to seeing many of you there for the conference round tour of southern New Zealand!

Hanne H. Christiansen



The Chamonix-Mont-Blanc Valley was an excellent permafrost conference location.

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The 5th European Conference on Permafrost (EUCOP5)

BY THE EUCOP5 LOCAL ORGANIZING COMMITTEE



CHAMONIX
Mont-Blanc
 23 June - 1st July 2018

The 5th European Conference on Permafrost (EUCOP5), a regional conference of the IPA, was held 23 June to 1 July 2018 in Chamonix, France, at the foot of the Mont Blanc massif. EUCOP5 attracted more than 460 participants from 29 countries to the Majestic Congress Center. 84 participants came from Russia, 57 from Germany, 45 from Canada and 33 from Switzerland. 267 oral presentations and 217 posters were presented and discussed within 25 sessions covering the most relevant and innovative topics in permafrost research, from remote sensing to palaeo-, planetary and subsea permafrost, thermokarst, peatlands, geohazards, geophysics, hydrology, monitoring, outreach, engineering and education.

For 150 young researchers, the conference week started with the PYRN icebreaker on the evening of Friday 22 June at the Chamonix Youth Hostel. It was followed by two weekend workshop days, with

one day of plenary and breakout sessions led by outstanding junior speakers. They also took a field trip to the Brévent summit to learn from local researchers about the environmental settings of the Mont Blanc massif. The PYRN General Assembly was held during the workshop to review PYRN activities over the past two years and to elect the 2018-2020 ExCom.

On Saturday and Sunday 23-24 June, several workshops and meetings of the IPA, GTN-P and IPA Action Groups took place in the Majestic Congress Center. Additional side meetings and workshops took place during the following days. On Sunday evening, many of the EUCOP5 attendees enjoyed the conference icebreaker, and attended the opening ceremony the following morning on Monday 25 June. On this occasion, the 2018 IPA Lifetime Achievement Award was presented to Wilfried Haeberli by the IPA President, Hanne Christiansen. Presentations

were given on 25, 26 and 28 June, with five parallel oral sessions followed by poster sessions at the end of each afternoon. Two of these days started with invited keynotes: one by Marcia Phillips on the 2017 Piz Cengalo event and the other by Gustaf Hugelius on the carbon cycle in the permafrost regions.

Local excursions on Wednesday and Friday, 26 and 28 June, gave the opportunity for participants to



IPA President Hanne Christiansen presents the 2018 IPA Lifetime Achievement Award to Wilfried Haeberli.



Group photo of EUCOP5 participants in downtown Chamonix, with members of the Local Organizing Committee in the foreground in maroon-colored shirts.

visit the monitored Dérochoir rock glacier at 2300 m (106 participants) or/and to enjoy the Mer de Glace glacier and the panorama of the massif from the Brévent summit at 2525 m (240 participants). The planned visit to the Aiguille du Midi was cancelled due to the technical closure of the cable car two weeks before the conference. A round-table on natural risks was organized Monday afternoon for the local French public, and a very

well attended lecture was given in French by Wilfried Haeberli on Wednesday evening about state-of-the-art mountain permafrost research. The public lecture was followed by an exhibition from the Effondrement des Alpes art project. The closing ceremony on Thursday 27 June was used to highlight the 2019 RCOP in New Zealand and the 2020 ICOP in China. The conference ended with three regional excursions during the weekend in Aosta Valley (Italy), the Valais Alps (Switzerland), and the Écrins

massif (France), with about thirty colleagues participating in total.

Participants were able to socialize during lunches in local restaurants, relaxing coffee breaks, the PYRN quiz & tartiflette evening at Gaillands Lake, and the banquet on Thursday evening. These events strongly contributed to intense and rich discussions between the participants. Lastly, the nice weather and spectacular scenery added to the success of EUCOP5 in the heart of the Alps.



Conference attendees discuss their science at one of the afternoon poster sessions.



A sunny break at the EUCOP5 venue.



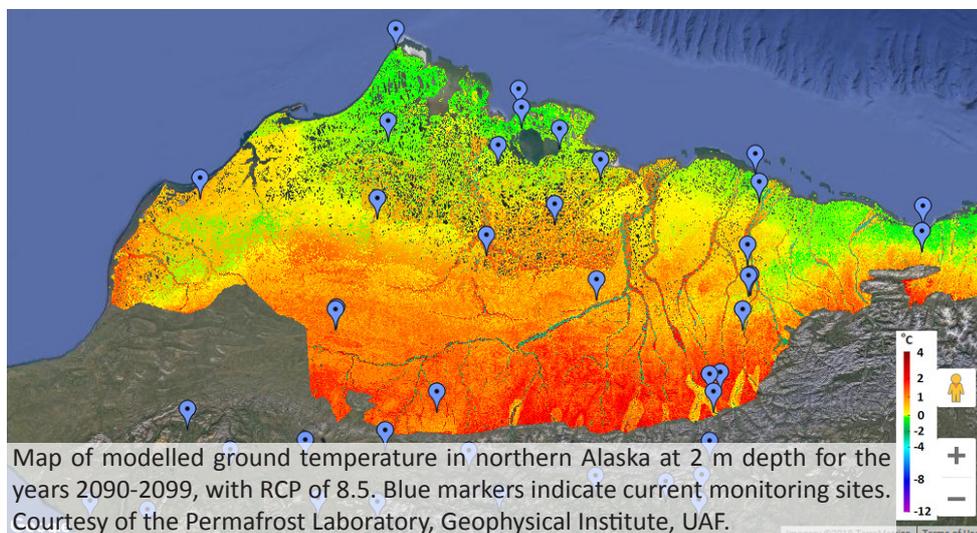
Participants in one of the local excursions hike to the Dérochoir rock glacier at 2300 m to learn about rock glacier activity and geohazards.

Permafrost engineering in a warming climate: current state and future strategy

BY ACTION GROUP LEADER, KEVIN BJELLA, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY (CRREL), USA

This IPA Action Group was funded in 2018 to assess the state of permafrost engineering, determine the significant knowledge gaps requiring immediate attention, and propose a research pathway forward in order to close those gaps. The group has conducted three meetings to discuss these issues and to gather information for a white paper report. During two bi-annual meetings of the Frozen Ground Committee, Cold Regions Engineering Division (CRED), American Society of Engineers (ASCE), this initiative was discussed to obtain a preliminary outline of ideas and topics, and to arrange for a more formal face-to-face meeting. On 13 November 2018, a roundtable discussion was conducted at the University of Alaska (UAF), consisting of over 20 professional engineers, government engineers, and academics from the U.S. and Canada. The discussion quickly split into three primary issues: 1) how to consistently and accurately forecast permafrost engineering parameters taking into account the warming climate, 2) what are the current design tool and parameter deficiencies most critical in permafrost engineering design, and 3) how does the permafrost engineering community engage upcoming young engineers into the profession. Volunteers were identified to create the white paper report, which will be published later this year through the ASCE and available via the IPA and US Permafrost Association.

A key topic for this Action Group is how to effectively and consistently account for climate warming in engineering design. It was agreed that climate scenarios provided by the Intergovernmental Panel on Cli-



mate Change (IPCC) should be consistently utilized, and the guidance must be “living”, so that updates are easily facilitated as refined modelling occurs. For Alaska, one option is to integrate with Scenarios Network for Alaska/Arctic Planning (SNAP), which develops natural systems scenarios and hosts many types of data. Additionally, high resolution ground temperature modeling, such as that conducted by the Permafrost Laboratory at the UAF Geophysical Institute, should be integrated. This group has modeled active layer depth and ground temperature at 1 m and 2 m depths for Representative Concentration Pathway (RCP) 4.5 and 8.5. These types of data integration and modelling would also be needed for Canada, Russia, and Scandinavia.

With regard to engineering tools and parameters, it was agreed that a general lack of tested frozen soil and rock properties is slowing evolution of the design process. Although data exists, it is generally only for a few soil types and is often conducted in a narrow set of temperature and moisture conditions. In particular, strength test results in warm permafrost, -2.0°C to 0°C , are needed,

as are strength test results for saline permafrost of all temperatures, soil types, and moisture contents. As more constrained properties are available, engineers and architects should have confidence to pursue more innovative design strategies.

Methods to estimate thaw consolidation, both under in-situ loads, and with addition of applied loading, were identified as needing refinement. In the case of sensitive structure design, where differential settlement tolerances must be very low, it was determined that an accurate, relatively easy to conduct, in-situ field test should be developed that incorporates depth of thaw typical with vertical and horizontal infrastructure, and their associated loading values.

Lastly, there is a shortage of qualified engineers entering the work force who have sufficient knowledge of permafrost engineering, even at the basic level of frozen ground geotechnics. Those that are qualified lack basic understanding of permafrost geomorphology, and this knowledge greatly assists the engineer in making quantifiable decisions with limited or lacking spatial field data.

Rock glacier inventories and kinematics

BY ACTION GROUP LEADER, REYNALD DELALOYE, UNIVERSITY OF FRIBOURG, SWITZERLAND

Rock glacier inventories (RGI) have been used in many regions for decades, but have been conducted without much coordination or alignment in motivations and objectives, which can vary greatly. The accessibility of existing inventories is also limited. Rock glaciers have been classically inventoried as intact (active/inactive) and relict landforms based on morphological indices. Recent developments in remote sensing technologies allow more detailed kinematic information to be integrated within rock glacier inventories, as displacement rates can be observed and outlined (e.g. GlobPermafrost project; see p. 17). Monitoring (multi-)annual rock glacier velocities provides key information on the impact of climate change in mountain regions.

This Action Group is taking the

first steps towards the organization and management of a network dedicated to rock glacier mapping and monitoring in all relevant mountain regions on Earth, and the definition of necessary standards, which can only be done through a common participative project. The Action Group expects that in the long-run, rock glacier kinematics (permafrost creep rate) could be recognized by the permafrost community and later by the WMO as another parameter used to monitor permafrost as an Essential Climate Variable (ECV).

The activities of the group were launched in Chamonix during EU-COP5. The kick-off workshop on 28 June 2018 was attended by more than 40 scientists. From the discussion, it was identified that existing rock glacier inventories are not homogenized and are split between

different platforms, when not included in a glacier inventory database. There is a need to launch a platform dedicated for rock glacier inventories specifically. A key point will be to agree on a clear definition of what is being inventoried. Therefore, it is important to define what a rock glacier is, and what the guidelines should be for mapping them. These standardized guidelines should be applicable in different geographical areas, such as the Andes and the European Alps.

The Action Group has identified three main tasks: 1) the definition of widely accepted standard guidelines for inventoring (mapping) rock glaciers in mountain permafrost regions, including indications on the activity rate, 2) the preparation of products which could serve for monitoring rock glacier kinematics as part of the permafrost ECV, 3) the operational development of a database/web platform. In the next step, the Action Group will focus primarily on task 1, with the goal to agree on the necessary definitions and guidelines in a workshop held in the second half of 2019.

Active rock glacier, Agua Negra – Olivares, Argentina, 30°S, 4600-5000 m a.s.l.
Photo by J. Wee, 2018.



Towards a permafrost thaw subsidence product within the GTN-P database

BY ACTION GROUP LEADER, FRANK GÜNTHER, AWI POTSDAM, GERMANY

One of the distinguishing features of permanently frozen ground is the presence of large volumes of ground ice. Permafrost regions are therefore vulnerable to changing environmental conditions. Permafrost as an Essential Climate Variable is being monitored using thermal conditions and active layer thickness as representative and standardized parameters at key sites of the Global Terrestrial Network for Permafrost (GTN-P). Pioneering work demonstrated that annual changes in the position of the ground surface result in different starting points for annual ALT measurements, and this effect must be taken into account. Several recent research efforts suggest that processes causing seasonal and long-term subsidence of the land surface should be given attention in the context of comprehensive permafrost monitoring.

The Action Group started its activities at EUCOP5 in June 2018. The kick-off meeting was attended by more than 20 participants from nine different countries and provided a forum for experts in the field to share knowledge, experiences, and views. The discussion focused on the distinction between local thermokarst activity and widespread, isotropic thaw subsidence in addition to the differentiation of permafrost table and land surface subsidence. This resulted in a fruitful exchange about processes causing land surface subsidence in permafrost regions and what methods can be used to measure them. Since

the distribution of lateral and vertical ground ice provides the potential for thaw subsidence, it has been suggested to initiate a survey dealing with these aspects. Potential key sites will be identified within the GTN-P network, where standardized long-term data series of subsidence monitoring will be applied first.

Another major action group activity took place during the 15th International Circumpolar Remote Sensing Symposium (ICRSS) in September 2018 in Potsdam. A conference report including a link to the proceedings has been published by the conference chairs in EOS <https://doi.org/10.1029/2018EO111159>. Out of the many oral and poster pre-

sentations by more than 100 participants, contributions dealing with thaw subsidence covered not only a wide regional range from the Arctic in North America to Siberia, but also utilized different measurement techniques such as GPS reflectometry, laser scanning, and InSAR. The latter method has been successful in recent publications in Remote Sensing by Chen et al. and Strozzi et al., where Sentinel-1 microwave satellite data was used to detect seasonal and interannual thaw subsidence. Point cloud processing and InSAR methods were also the subject of two topical hands-on ICRSS workshops. The action group invited an expert from RUS-Copernicus, who explained in detail how to quantify land surface subsidence using Sentinel-1 data within a cloud processing environment, and we are about to arrange a similar event as an online workshop to engage the GTN-P network in developing and implementing a thaw subsidence product into the database.

Right: a workshop dealing with InSAR methods and quantifying land surface subsidence at the ICRSS in Potsdam. Below: Participants at the Action Group kick-off meeting at EUCOP5 in Chamoni.



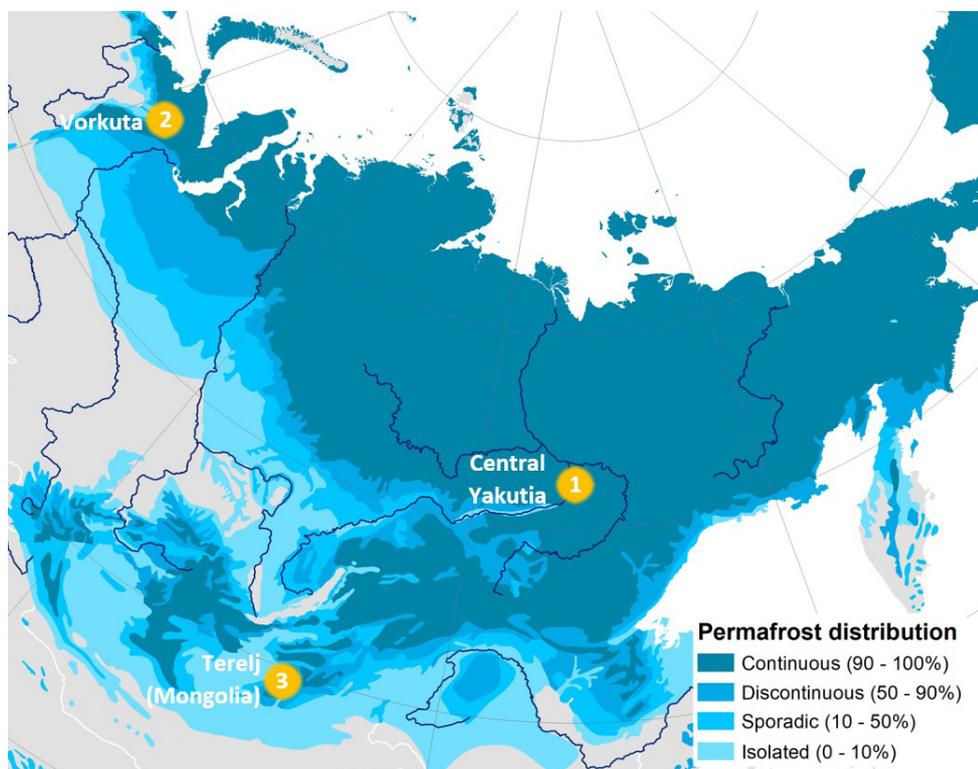
Permafrost and Culture (PaC):

BY ACTION GROUP LEADERS, JOACHIM OTTO HABECK, UNIVERSITY OF HAMBURG, GERMANY, AND MATHIAS ULRICH, LEIPZIG UNIVERSITY, GERMANY

Since the Action Group was established in 2014, it has utilized IPA and IASC support to organize workshops with the aim to investigate the links between permafrost landscape dynamics and local forms of land use in the context of socio-economic and climate change. This goal derives from the prediction that climate change will lead to permafrost degradation, thereby causing changes in environmental conditions and massively impacting indigenous peoples' livelihoods and cultural heritage. While this prediction has a high degree of plausibility, it does not account for regional differences, it neglects past implications of climate change on indigenous land use, and it does not address the possibility that pastoralism and other forms of renewable resource use impact permafrost dynamics. Thus, Action Group members have sought to identify key conditions and drivers of the permafrost/land-use interface in different parts of North Eurasia.

Currently, the Action Group is entering its third phase and region of activity. Central Yakutia was the focus in 2014-2016, and the tundra areas around the Polar Urals near Vorkuta were the focus from 2016-2018. Next is the area northeast of Ulaanbaatar, the capital of Mongolia, where a workshop will be conducted in March 2019.

In Central Yakutia, pastoral and agricultural land use affected and continues to affect permafrost landscape dynamics. These activities will be influenced by permafrost degradation (cf. *Frozen Ground*, vol. 39). In the tundras east and west of the Urals, reindeer husbandry has developed and present changes



Study sites of the “Permafrost and Culture” Action Group. Map compiled by M. Ulrich based on data from the IPA (<https://ipa.arcticportal.org/products/gtn-p/ipa-permafrost-map>).

in vegetation cover are not simply caused by climate change, but by intensive reindeer grazing. Changes in vegetation have regional effects on snow accumulation and persistence, albedo, insulation of the ground, and protection of the soil surface. Generally speaking, the expansion of shrubs and trees into tundra areas is partly set off by reindeer grazing – an observation to be further examined in different parts of North Eurasia.

At the upcoming workshop in Ulaanbaatar and the permafrost observatory at Terelj, the Action Group will examine mobile pastoralism under conditions of discontinuous and continuous permafrost. Migration routes are currently contracting and livestock are being concentrated in certain areas. Initial studies synthesizing permafrost conditions and pastoralism have been conducted in

the Khangay mountains, but need to be corroborated and complemented by research in the Khentiy range and the borderlands of Mongolia towards Russia, also taking into account appropriation of lands for agriculture (e.g., Selenge Region).

The Action Group plans to conclude the series of workshops by comparing the regional findings in detail, publishing a scientific synthesis, and presenting the key findings in a separate paper for the wider public. The group's work exemplifies the diversity of environmental and social-economic processes intersecting in land use and permafrost landscape dynamics. Action Group members are designing future projects including a comparative study in Northern Yakutia and a research project on land use under permafrost conditions in northern Mongolia.

Upcoming conferences

2019

EGU General Assembly
7-12 April 2019
Vienna, Austria

Pushchino Permafrost Conference
15-18 April 2019
Pushchino, Russia

TRANSOILCOLD 2019
Transportation Soil Engineering in Cold
Regions
20-23 May 2019
Saint Petersburg, Russia

Arctic Science Summit Week
22-30 May 2019
Arkhangelsk, Russia

XIII International Symposium on Antarctic
Earth Sciences
22-26 July 2019
Incheon, Republic of Korea

18th International Conference on Cold
Regions Engineering and 8th Canadian
Permafrost Conference
18-22 August 2019
Québec City, Canada

1st Southern Hemisphere Conference
on Permafrost (SouthCOP)
4-14 December 2019
Queenstown, New Zealand

AGU Fall Meeting
9-13 December 2019
San Francisco, USA

2020

12th International Conference on
Permafrost (ICOP 2020)
22-26 June 2020
Lanzhou, China

PARTNER ORGANIZATION REPORT

Permafrost Young Researchers Network (PYRN)

BY HELENA BERGSTEDT, JANNIK MARTENS, XIANGBING KONG, SAMUEL GAGNON, SAMUEL WEBER, DENIS FROLOV, DMITRY NEKRASOV, MATTHEW WHITLEY, JOSEFINE LENZ, INGO HARTMEYER, MATTHIAS WINKEL, AND GEORGE TANSKI ON BEHALF OF THE PYRN EXCOM AND COUNCIL

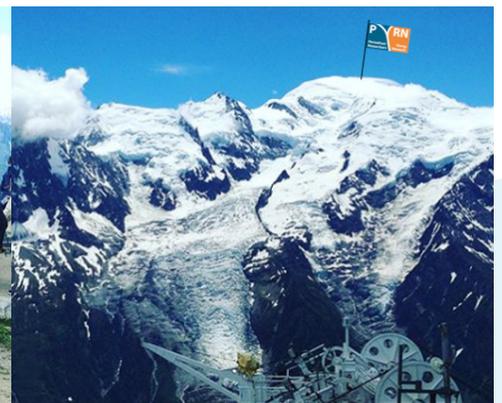
The Permafrost Young Researchers Network aims to foster collaboration and promote future generations of permafrost researchers. PYRN supports its members with travel grants and highlights the work of outstanding members with awards. If you are a young permafrost researcher we encourage you to become a member by signing up at <https://pyrn.arcticportal.org/>. Use the tag @pyrn_official or hashtag #pyrn on Twitter, Instagram and Facebook to share updates and pictures with the PYRN community.

EUCOP5

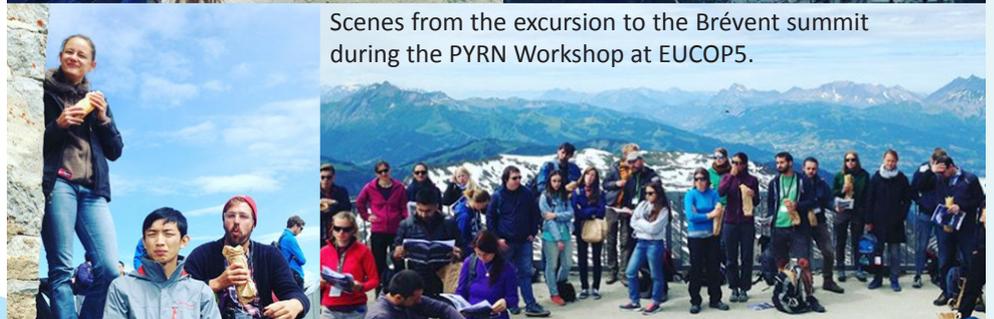
The *PYRN Workshop* during EUCOP5 was by far the largest activity PYRN organized this year with more than 150 participants. Many used this opportunity to meet other young permafrost enthusiasts and develop new connections. The workshop was also a forum for career design where senior scientists shared their experiences on topics such as mentorship, publishing and proposal writing. A highlight of the

program was a 1-day local excursion to the Brévent summit, featuring a breathtaking panorama of the Mont Blanc massif. At this event, junior and senior scientists shared their knowledge and passion about alpine mountain permafrost research in the French Alps. In conjunction with the conference, PYRN honored

two outstanding presentations held by young scientists and organized a social event with local cuisine and a pub quiz. Thanks to many generous sponsors (IPA, Université franco-allemande, International Arctic Science Committee, NUNATARYUK, Petzl Foundation, Observatoire des Sciences de l'Univers de Grenoble,



Scenes from the excursion to the Brévent summit during the PYRN Workshop at EUCOP5.





Above: Samuel Gagnon (3rd from left) and Constanza Morino (4th from left) received the PYRN-IPA Awards 2018 from IPA President Hanne Christiansen (far left), PYRN President Helena Bergstedt (2nd from left) and PYRN Vice-President Jannik Martens (far right).



Above: Members of the new PYRN 2018-2020 Executive Committee formed during EUCOP5.

CONTINUED FROM PAGE 9

and Lions International) PYRN was able to offer the workshop free of charge and granted travel support to over 60 PYRN members!

NEW PYRN LEADERSHIP

During EUCOP5, a new *PYRN Executive Committee* (2018-2020) was formed. It will manage and lead the affairs of PYRN during the next two years. Consult the “About Us” section of the PYRN website for more information about the new PYRN ExCom.

PYRN PAPER IN POLAR RECORD

A collective of PYRN members from various governing periods put together an article summarizing the development of PYRN since its establishment in 2005. The short article is titled ‘The Permafrost Young Researchers Network (PYRN) is getting older – the past, present, and future of our evolving community’ and was accepted for publication in *Polar Record*.

OTHER PYRN ACTIVITIES

PYRN Russia is usually organizing two to four events a year. The events are often a meeting or workshop at a local conference (i.e. Pushchino). The 43rd PYRN Russia meeting

on 16 November was called “How I spent this summer” and was led by PYRN Russia Coordinator Dmitry Nekrasov. Young researchers gave talks about where and what they studied during their summer fieldwork. Dmitry shared his experience of studying in Svalbard in May 2017 and explained how to apply to UNIS courses. PYRN stickers were printed and given to participants.

PYRN organized a social event in partnership with the NUNATARYUK project during the APECS Young Researcher Workshop at the first NUNATARYUK general assembly in Venice, Italy, in October 2018.

The North American branch of PYRN, *PYRN-NA*, organized activities at both the AGU Fall Meeting and the ArcticNet Annual Scientific Meeting (ASM) during December 2018. At the AGU Fall Meeting, PYRN-NA teamed up with the US Association of Polar Early Career Scientists (USAPECS) to host a panel on “Diversity and Inclusivity in the Polar Sciences”. At the ArcticNet ASM, the largest Arctic & Northern research gathering held in Canada annually, PYRN co-hosted a social night with the ArcticNet Student Association for students and early career scientists.

PYRN-DACH organized a workshop on proposal writing at the 10th

Working Group Permafrost meeting of the German Society for Polar Research in Bremerhaven (Germany). The topic was identified through a survey among the community as the topic of greatest interest. Participants learned from discussions and presentations about different funding possibilities at different career stages as well as about grant writing. The meeting also included the transfer of responsibilities as German National Representative from Josefine Lenz (since 2014) to Matthias Winkel.

We hope to see you at these upcoming events with PYRN involvement:

- 4th International Symposium on Transportation Soil Engineering in Cold Regions 2019, 20-23 May, St. Petersburg, Russia
- 18th International Conference on Cold Regions Engineering and 8th Canadian Permafrost Conference 2019, Québec City, Canada.



Website: <https://pyrn.arcticportal.org/>

Email: contact@pyrn.org

The Global Terrestrial Network for Permafrost (GTN-P)

BY STEERING COMMITTEE CHAIR, DMITRY STRELETSKIY, GEORGE WASHINGTON UNIVERSITY, USA, AND DIRECTORS OF THE SECRETARIAT, ANNA IRRGANG AND KARINA SCHOLLÄN, AWI POTSDAM, GERMANY

GTN-P SECRETARIAT CHANGES

After several years of dedicated work, Boris Biskaborn left the position of GTN-P Director. On behalf of the entire GTN-P community, we thank Boris for his leadership role and his dedicated efforts to ensure the high quality and visibility of GTN-P data and research. The new secretariat continues to operate at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, and is partially funded through the Horizon 2020 project "NUNATARYUK". Anna Irrgang is now the Executive Director, and will manage the Secretariat together with Karina Schollän, the new Vice Executive Director. Alexander Smirnov, senior data manager from Arctic Portal, is the new Database Manager.

GTN-P AT EUCOP5

GTN-P held the National Correspondent meeting prior to EUCOP5. Forty participants from 15 countries attended the workshop. Data management, development of new monitoring standards, the global permafrost snapshot and future publications were among the topics discussed. The GTN-P session at EUCOP5 entitled "Thermal state of permafrost and active layer dynamics" had 14 oral presentations and 24 posters, and was the second largest session at EUCOP5. We thank all participants for their interesting and inspiring contributions which keep our network vital and scientifically stimulating!

Development of standards for permafrost temperature monitoring within the Global Climate Observing System (GCOS):



Participants of the GTN-P National Correspondent meeting at EUCOP5.

The Terrestrial Observation Panel for Climate (TOPC), which is part of GCOS, is currently updating the definition and description of the Essential Climate Variables (ECVs), which includes permafrost. TOPC is developing monitoring standards for the ECVs, including spatial and temporal resolution requirements. GTN-P is involved in the development of these monitoring standards. GCOS is also establishing a list of climatic indicators, and permafrost is eligible to be one of these indicators. This development would require GTN-P to report on the annual global change in the state of permafrost.

Improvement of collection and archival of materials using GTN-P data: A GTN-P alert was setup and will collect all scientific outputs that mention the GTN-P network. An annual list of these items will be created which may be used for funding/proposal requests by National Correspondents and the broader GTN-P community. Please contact the Secretariat for the latest available version.

OUTLOOK

Production of GTN-P report in 2019 and Special Issue by 2020: The first annual GTN-P report will give an overview of research and observation activities by country (or by region in large countries), with the focus on metadata and

long-term averages. The report will outline: number and distribution of monitoring sites, methods and equipment used, and permafrost temperature and active layer thickness. The 2020 report is planned to be a decadal update of the GTN-P special issue which was published in PPP in 2010 as a contribution to IPY. Therefore, the focus will be on data collected from 2010 to 2020.

Improvement of our GTN-P webpage and data portal: To make the GTN-P portal and database more intuitive and user-friendly, we made a short GTN-P portal and database survey in 2018. The outcomes of this survey will be used to improve the user-friendliness of the GTN-P portal and GTN-P database. We plan to implement all of the changes during 2019.

We thank all contributors for their engagement with the network and sincerely thank the IPA, AWI, and the EU for their support. Please visit www.gtnp.org for more information about the network, data access and news updates. For any inquiries regarding GTN-P please contact the Secretariat at GTNP-Secretariat@awi.de.



Education & Outreach

BY CO-CHAIRS ANNA KLENE, UNIVERSITY OF MONTANA, USA, AND YLVA SJÖBERG, STOCKHOLM UNIVERSITY, SWEDEN

ACTIVITIES AT EUCOP5

EUCOP5 in Chamonix was a busy week for permafrost education and outreach enthusiasts. The two well-attended sessions “Educating with Permafrost: Training the next generation permafrost specialists”, and “Living with Permafrost: Culture and Communities in Research and Outreach” included both oral and poster presentations on topics related to education and outreach. The conference was also attended by visitors from the Guggenheim Museum in New York, who interviewed participants in preparation for an upcoming exhibition. The PYRN workshop included a breakout session on outreach that focused on the Frozen-Ground Cartoons. Session participants recorded video feedback on permafrost instrument designs by school children who had read the Frozen-Ground Cartoons. The committee also hosted an open lunch meeting for anyone interested in the committee’s work. We thanked our representative from Russia, Irina Streletskaya, for her time in the committee. Alexey Maslakov will replace Irina in the committee, and Xiangbing Kong is our PYRN representative. Frédéric

Bouchard, Josefine Lenz, Juliane Wolter, Louis-Philippe Roy, and Fabrice Calmel also joined the open meeting and the committee. We warmly welcome all new members.

FROZEN-GROUND CARTOONS: LATEST UPDATES

This project started as an IPA Action Group (2016-2018) and has now evolved into a multilingual outreach project called “Permafrost on All Channels”, including augmented reality material (e.g., 3D maps and sketches, videos) and a board game (under production). The team has recently been involved in a translation frenzy, producing comic versions in Swedish, French and German. Furthermore, Russian, Spanish, Chinese, Greenlandic, Danish and Hindi translations are currently being prepared. If you want to be involved in translation to another language, please contact the team, frozengroundcartoon@gmail.com.

FIELD SCHOOLS

In June 2018, the Fifth Forum for Young Permafrost Scientists was held during three weeks in Yakutsk, Russia. The forum welcomed under-

graduate and graduate students, as well as postdoctoral fellows and covered both traditional permafrost topics and emerging areas of permafrost research. In July 2018, Lomonosov Moscow State University (MSU) once again held their annual international field course on permafrost in Siberia. Additionally, the “International Bachelor Permafrost Summer Field School” is held annually in the summer by The University Centre in Svalbard; this course originally started as a Thematic Network on Permafrost summer field school in 2014.

ADDITIONAL NEWS AND RESOURCES

The frost tube activity designed for K-12 students to measure frozen ground is now available on the international [GLOBE website, listed under the soil category](#). Selecting “Frost Tube” from the menu on the left will provide links to all the materials and instructions needed for teachers and students to conduct their own research.

On our webpages (<https://ipa.arcticportal.org/about-the-ipa/standing-committees/education-outreach> and <https://ipa.arcticportal.org/activities/outreach/outreach-activities>) you can find more information about permafrost education and outreach activities with links to useful online resources. Please contact us if you want to know more about the work of the committee.



Open lunch meeting of the Education and Outreach Committee at EUCOP5. Photo: Frédéric Bouchard



Frozen-Ground Cartoons in Swedish, French, German, and English.

ANTPAS - Antarctic Permafrost, Periglacial Environments and Soils

BY CO-CHAIRS MAURO GUGLIELMIN, UNIVERSITY OF INSUBRIA, ITALY, AND MARC OLIVA, UNIVERSITY OF BARCELONA, SPAIN

During the last year, the activities of Antarctic Permafrost, Soils and Periglacial Environments (ANTPAS) were mostly focused on the POLAR2018 conference, which was held in Davos, Switzerland from 15-26 June 2018. ANTPAS co-chairs attended several official meetings concerning the role of ANTPAS within the Scientific Committee on Antarctic Research (SCAR) and organized an additional

meeting to discuss the future of ANTPAS. ANTPAS members decided that the current Expert Group will take further steps to become an official Research Programme within SCAR. To do so, several ANTPAS members met in December at the University of Barcelona to explore this possibility and to prepare a white paper on the state of permafrost research in Antarctica. In addition, ANTPAS coordinated

three sessions at POLAR2018: Permafrost landforms in the two Poles as possible Mars analogue, Life distribution and responses to environmental changes in Polar ecosystems, and Reconstructing past environmental change in the Polar Regions. These sessions were attended by hundreds of polar scientists.

ANTPAS researchers also attended and presented at EUCOP5, exposing recent findings on the state of permafrost in Antarctica. ANTPAS members are involved in the organization of several conferences that will take place in 2019, such as the 13th International Symposium on Antarctic Earth Science, 22-26 July 2019, Incheon, South Korea, and the 1st Southern Hemisphere Conference on Permafrost (SouthCOP 2019), 4-14 December 2019, Queenstown, New Zealand. ANTPAS will coordinate multiple scientific sessions at these conferences.

Mauro Guglielmin and Marc Oliva are the ANTPAS Co-Chairs. Marc Oliva replaced previous Co-Chair Gonçalo Vieira on 1 January 2018, after an election in late 2017. For more information about ANTPAS, visit <https://www.antpas.org/>.



Exposure of ice-rich permafrost on the Potter Peninsula, King George Island, South Shetland Islands, Antarctica. Photo by Marc Oliva.

NEW IPA INTEREST GROUP

Permafrost and Carbon Budgets

BY GUSTAF HUGELIUS, STOCKHOLM UNIVERSITY, AND JUSTINE RAMAGE, STOCKHOLM UNIVERSITY & NORDREGIO, SWEDEN



The IPA Permafrost and Carbon budgets Interest Group (IPaC) was approved by the IPA Council in June 2018 during EUCOP5 in Chamonix, France.

The aim of the IPaC is to create and sustain a formalized pathway for IPA permafrost experts to give feedback on the representation of permafrost in datasets used for

broad-scale carbon budgets.

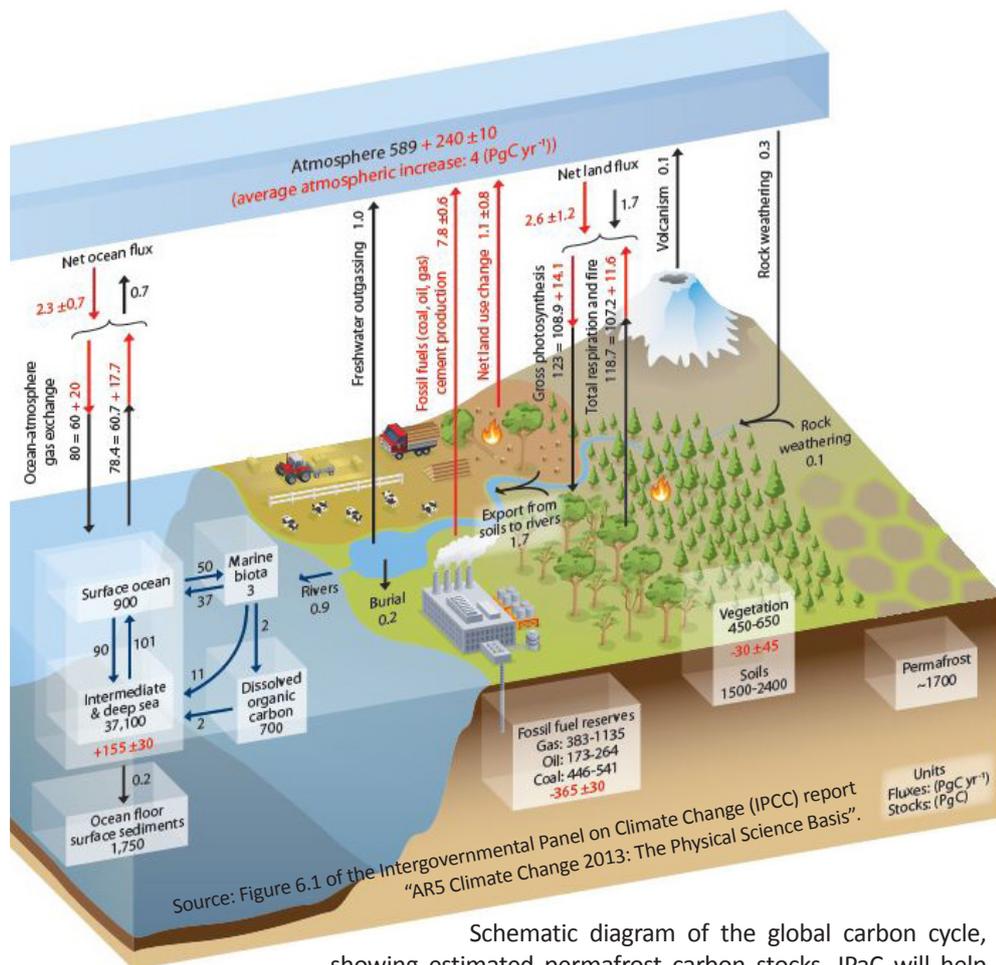
The need for an interest group was first articulated by members of the Global Carbon Project while working on the global methane budget. The Global Carbon Project is a sponsor organisation of the interest group and IPaC will act in an advisory capacity in the calculation and revision of regional

and global carbon budgets. IPaC will work in close collaboration with the Permafrost Carbon Network, which has shown great leadership in leading synthesis science related to permafrost carbon. As the need for new synthesis science is recognized through IPaC, actionable items will be pursued within the Permafrost Carbon Network.

In the fall of 2018, IPaC has established a Steering Committee composed of nine international researchers with leading and complementary expertise in this field. The Steering Committee is

chaired by Dr. Gustaf Hugelius, and the day-to-day activities of the group are coordinated by Dr. Justine Ramage. The Steering Committee members are: Christina Biasi, University of Eastern Finland, Finland, Robert B. Jackson, Stanford University, USA, Dmitry Kaverin, Komi Scientific Centre, Russia, Benjamin Poulter, NASA, USA, Christina Schädel and Ted Schuur, Northern Arizona University, USA, Jens Strauss, Alfred Wegener Institute, Germany, Merritt Turetsky, University of Guelph, Canada, and Yuanhe Yang, the Chinese Academy of Sciences, China.

The next step will be to circulate a call-of-interest to join IPaC, which we hope will reach all permafrost experts with an interest in the carbon cycle. Following this, a more exhaustive online survey will be circulated to those registered as IPaC experts. The survey will gather views from the expert community related to permafrost representation in the global carbon budgets as well as feedback on how



Schematic diagram of the global carbon cycle, showing estimated permafrost carbon stocks. IPaC will help calculate and revise regional and global carbon budgets for permafrost.

to effectively organize future IPaC actions. Through this initial survey the IPaC hopes to identify gaps in the estimation of the permafrost

carbon budget. These insights will guide the formulation of future, more targeted IPaC actions.

CONFERENCE PREVIEW

The 12th International Conference on Permafrost (ICOP 2020)

The 12th International Conference on Permafrost (ICOP 2020) will be held in Lanzhou, China, from 22-26 June 2020. The conference theme is "Permafrost environments under persistent warming: Challenges for scientific assessment and engineering practice". The conference will be held at Lanzhou University in downtown Lanzhou, a city with more than 3 million people. Lanzhou is both the geographical center and permafrost research hub of China. China is heavily involved in all aspects of the cryospheric sciences, including geocryology and cold regions engineering.

China previously hosted the 6th International Conference on Permafrost in Beijing in 1993. In the quarter-century since then, a number of major projects have been accomplished in the permafrost regions of China. These include the Qinghai-Tibet Railway, the Qinghai-Kang Expressway, the Qinghai-Tibet Power Transmission Line, the Chaidar-Muli Rail Link, and the Russia-China Crude Oil Pipeline. There are six planned conference fieldtrips which will highlight these permafrost engineering successes and the scientific research that was needed to construct them.



In addition to the extended fieldtrips, the conference will have local excursions on 24 June, a musical ceremony on 25 June, ping-pong games, PYRN activities, and other social events.

We look forward to welcoming you to ICOP 2020 in Lanzhou!

KEY DATES

- Call for sessions:*
1 December 2018 - 31 January 2019
- Short abstract submission:*
1 April - 31 July 2019
- Extended abstracts submission:*
1 October - 15 December 2019
- Early bird registration closes:*
29 February 2019

<http://icop2020.csp.escience.cn/>

NEW ASSOCIATION ANNOUNCEMENT

The official launch of the Canadian Permafrost Association (CPA)

BY CPA COMMUNICATIONS DIRECTOR, ASHLEY RUDY, GEOLOGICAL SURVEY OF CANADA



CANADIAN PERMAFROST ASSOCIATION ASSOCIATION CANADIENNE DU PERGÉLISOL

The Canadian Permafrost Association (CPA) has had a busy year! It was officially established as a non-profit organization in March 2018, had its first (and second) Board of Directors approved, and hosted its first stand-alone conference and Annual Business Meeting in Whitehorse in October.

The mission of the CPA is to bring communities, researchers, and practitioners together to advance understanding of permafrost environments. The organization is run by a board comprised of permafrost community members who were selected by a Steering Committee, and includes government and academic scientists and engineers. The current 9-member Board of Directors includes:

- President: Antoni Lewkowicz,

University of Ottawa, Ottawa

- Vice-Chair: Richard Trimble, Tetra Tech, Yellowknife
- Treasurer: Lukas Arenson, BGC Engineering, Vancouver
- Secretary: Peter Morse, Geological Survey of Canada, Ottawa
- Communications Director: Ashley Rudy, Geological Survey of Canada, Ottawa
- Early Career Representative: Carolyn Gibson, University of Guelph, Guelph
- Member-at-large: Isabelle de Grandpré, Government of the Northwest Territories, Yellowknife
- Member-at-large: Wayne Pollard, McGill University, Montreal
- Ex-officio member: Chris Burn, Carleton University, Ottawa.



Board Members present at the Whitehorse meeting in October (from left): Lukas Arenson, Peter Morse, Antoni Lewkowicz, Ashley Rudy, Wayne Pollard. Not pictured: Carolyn Gibson, Richard Trimble, Isabelle de Grandpré and Chris Burn.

Three new members of the board for 2019 were proposed by a Nominating Committee and approved by CPA members:

- President-Elect: Lukas Arenson, BGC Engineering, Vancouver
- Treasurer: Barbara Fortin, Tetra Tech, Yellowknife
- Member-at-large: Panya Lipovsky, Yukon Geological Survey, Whitehorse.

The CPA had a soft launch at the 5th European Conference on Permafrost in Chamonix, France in June. All conference delegates received information about the CPA in their registration bags and a presentation was made to inform the IPA Council. The first official event was the meeting at Yukon College from 10-12 October.

The conference started with a hands-on electrical resistivity tomography (ERT) workshop followed by two days



CPA members and Whitehorse locals enjoy a sunny day learning about permafrost conditions in the Whitehorse area.

GlobPermafrost & CCI+ Permafrost

BY PROJECT LEADER, ANNETT BARTSCH, CENTRAL INSTITUTION FOR METEOROLOGY AND GEODYNAMICS (ZAMG), AUSTRIA



www.globpermafrost.info



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<http://cci.esa.int/Permafrost>

During the final year of the GlobPermafrost initiative, the first version of the Northern Hemisphere permafrost map representing the years 2000-2016 (<https://doi.pangaea.de/10.1594/PANGAEA.888600>) was published, as well as regional datasets for trends in landcover, terrain changes, bottom fast lake ice and vegetation height. All datasets have been integrated into the WebGIS and catalogue hosted by AWI. The WebGIS also includes GTN-P sites (boreholes and CALM)

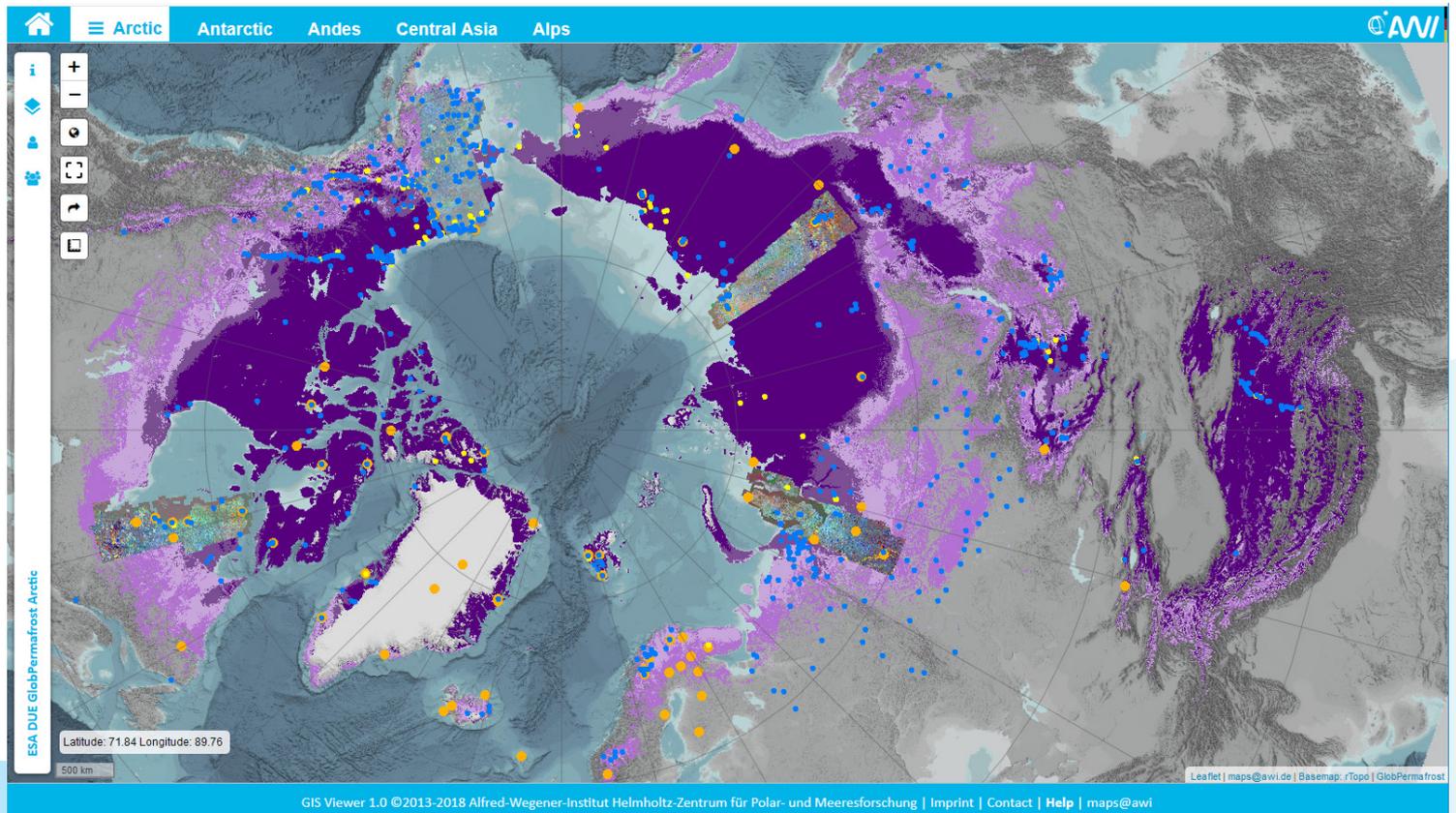
as well as INTERACT station locations and meta data.

GlobPermafrost results have been presented and discussed at EUCOP5 as well as AGU Fall Meeting in 2018. Efforts regarding permafrost modelling will be continued as part of the ESA Climate Change Initiative (CCI+; 2018-2021). The CCI+ Permafrost kick-off meeting took place during EUCOP5 in Chamonix.

The extended permafrost modelling targets mean annual ground temperature timeseries

as well as active layer thickness. This will provide the key for understanding surface feature changes identified, for example, in GlobPermafrost. Special emphasis will be placed on the evaluation and development of land surface models, to gain better understanding of the impact of climate change on permafrost and land-atmosphere exchange.

The CCI+ Permafrost team (Gamma Remote Sensing Switzerland, b.geos Austria, University of Oslo, AWI, University of Stockholm, Fribourg University, University of Timisoara, Terrasigna Romania) will liaise with the IPA and GTN-P for validation of the permafrost modelling results. This includes feedback on the utility of measurements available within the GTN-P database as well as meta data. Several user workshops are foreseen during the course of the project, including at ICOP 2020 in Lanzhou, China.



A screenshot of the WebGIS, hosted by AWI, that integrates various datasets published by GlobPermafrost. The map includes borehole and CALM sites, INTERACT research stations, and permafrost extent classes based on modelling and the Brown et al. (1997) permafrost map.

The 1st Southern Hemisphere Conference on Permafrost (SouthCOP 2019)

The 1st Southern Hemisphere Conference on Permafrost (SouthCOP 2019), a regional conference of the IPA, will be held in Queenstown, New Zealand from 4-14 December 2019.

This conference will operate in a new format, with three-day field excursions offered before and after the conference session days, allowing participants to make a round-trip on the South Island from Christchurch to Queenstown. Participants can opt for the whole roundtrip package, or choose the conference session portion and/or field excursions separate-



ly. These excursions will include visits to permafrost and glacial terrain within the South West New Zealand World Heritage Area. Discussions regarding glacial and periglacial landscape development will be integrated throughout the excursions.

The conference days in Queenstown will include plenary speakers, special and general contributed sessions, poster displays, a diverse array of exhibits, networking functions, PYRN activities, and local field trips that showcase New Zealand's unique environments and attractions. The conference theme, "Permafrost at Altitude and Latitude", reflects the geographic setting of the conference and the diverse assortment of planned scientific sessions.

Registration is already open at <https://southcop19.com/> and abstract submission closes 7 April 2019.

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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