Session 1
Remote sensing of permafrost landscapes

Conveners:
Sabine Baumann, Institute of Atmospherical and Physical Geography, Technical University of Munich, Germany
Artem Khomutov, Earth Cryosphere Institute SB RAS, Russia
Ingmar Nitze, Alfred-Wegener-Institute Helmholtz Centre for Polar and Marine Research, Potsdam, Germany (PYRN member)

A better understanding of landscape change processes over multiple spatial and temporal scales is important for predicting the impacts of climate change on permafrost terrains. For the observation of the land surface over large areas remote sensing has been proven to be a very powerful method. With ever increasing computation capacities, constantly growing archives of image data spanning several decades, and new or continued satellite constellations, completely new opportunities arise for earth observation applications. Nevertheless, until now only indicators of permafrost can be monitored from space and not the permafrost itself. Therefore, the aim of this session is to show the broad range of remote sensing applications regarding polar permafrost. Contributions on recent and upcoming advances in satellite remote sensing to different sensors and observation techniques are welcome. As the application of remote sensing on permafrost is quite a new field, we want to show the potential of this technique for permafrost monitoring. We encourage presentations on multi-platform data as well as studies using ground validation data and on remote sensing methods for observing landscape change processes in permafrost regions. This session will aim to bring together the latest development in the field of earth observation to improve the understanding of the response of highly vulnerable permafrost landscapes to rapidly changing climate conditions.

Session 2
Palaeo-permafrost reconstruction, from field to simulation

Conveners :
Pascal Bertran, INRAP / PACEA, Pessac, France
Pierre Antoine, CNRS, LGP Meudon, France
Didier Roche, CNRS, LSCE-IPSL, Gif-sur-Yvette, France
Charlotte Prud'Homme, Max Planck Institute for Chemistry, Mainz, Germany (PYRN member)

Western Europe witnessed repeated phases of southward permafrost development during the Pleistocene, which impacted severely the ground and the biosphere. Although reconstructing palaeo-permafrost with accuracy is of paramount importance for a wide range of topics, including the genesis of mid-latitude landscapes, aquifer recharge, and the distribution of glacial refugia for vegetation and animals, a debate still exists about the maximal extent during the Last Glacial since field-based approaches hardly fit with simulations provided by Global Climate Models. In the mid-latitude mountain regions, the extent of permafrost on the forelands as well as the nature of glacier-permafrost interaction during the LGM are of critical importance but difficult to constrain. Fundamental information on past climatic conditions in these areas can be gained from study of the spatial pattern of the extensive mountain permafrost during the Lateglacial and Holocene. This session will highlight improvements in field mapping, proxy analyses and climate models, as well as innovative approaches such as ground temperature reconstruction through the analysis of water oxygen isotopes and dissolved noble gases in aquifers. The chronology of permafrost development and degradation also raises a lot of questions that will be addressed during this session.

Session 3
Permafrost Engineering and Related Risks

Conveners:
Kevin Bjella, Cold Regions Research and Engineering Laboratory – CRREL, Fairbanks, Alaska, USA
Guy Dore, Université Laval, Québec, Canada
Elizaveta Makarycheva, Pipeline Transport Institute – PTI, LLC, Moscow, Russia (PYRN member)

Warming permafrost is projected to weaken foundation soils and create engineering risks previously not fully appreciated. Geocryological processes such as thermokarst, frost heaving and fracturing, icing, and thermal erosion are the source of immediate danger for the engineering structures. Economic losses during the construction and exploitation procedures in the permafrost area are linked also with the other negative processes that have the specific character in cold regions. These processes are swamping, desertification, deflation, flooding, mudflows and landslides, and can lead to common risks of unsustainable development of regions. Infrastructure longevity is influenced by climate change consequences that must be calculated in insurance procedures, and this is challenging engineers to make estimates of these impacts, and also to what level the design parameters can be adjusted to maintain an acceptable level of risk and economics. Recent advancements in the use of surface based geophysics for geotechnical characterization are demonstrating that the homogeneity of the permafrost ground-ice condition can often be exploited to the benefit of infrastructure projects. Additionally, thermal modeling techniques are becoming standard engineering tools for determining the results of innovative designs, and for projecting to the future warmed condition. Presentations are invited that provide insight into the current methods for engineering on warming permafrost, and especially those that illustrate results of altered design parameters. We encourage demonstrations of innovation for maintaining or modifying founding soil conditions, innovation on the methods for characterizing the geotechnical condition, incorporation of permafrost cryostructure and geo-cryomorphology into the applied realm, assessments of risk and costs, and improved techniques for assessing, designing and constructing on warming permafrost.

Session 4
Educating with Permafrost: Training the next generation permafrost specialists

Conveners:
Hanne Christiansen, University Centre in Svalbard (UNIS), Longyearbyen, Norway
Irina Streletskaya, Moscow State University, Moscow, Russia
Ylva Sjöberg, Stockholm University, Stockholm, Sweden (PYRN member)

Permafrost can serve as a valuable resource to teach about how scientific research is done, how the Earth system works, and about permafrost's unique impacts and challenges. It is also important and necessary to educate and train the next generation permafrost researchers and engineers, at the college level and through continuing post-graduate opportunities. For this session, the International Permafrost Association's (IPA) Standing Committee on Education and Outreach welcomes contributions on materials and activities, courses for undergraduate and graduate students, or continuing educational opportunities including the University of the Arctic (UArctic) Thematic Network on Permafrost (TNP) activities as well as the International University Courses on Permafrost (IUCP) database also in the Southern Hemisphere. A wide variety of initiatives are underway in many countries to include permafrost in the school curriculum and we encourage submissions on these efforts or on the effectiveness of these activities. We also encourage all those who are engaged in college-level activities , including those who offer a class or field course about permafrost at any university or offer international permafrost field courses, such as those organized by TNP member institutions. All those who lead post-graduate initiatives are also encouraged to contribute, such as the Permafrost Young Researchers Network (PYRN) among others.

Session 5
Interdisciplinary approaches to conceptualize changes and feedbacks in permafrost landscapes

Conveners:
Thomas A. Douglas, U.S. Army Cold Regions Research and Engineering Laboratory, Alaska USA
Benjamin W. Abbott, Brigham Young University, USA (PYRN member)
Yuanchao Fan, Uni Research Climate and Bjerknes Centre for Climate Research, Bergen, Norway (PYRN member)

Climate change is altering disturbance regimes in permafrost landscapes. Dramatic shifts have been observed or are projected in the timing and severity of wildfire, hydrogeology, and permafrost degradation including active-layer deepening and thermokarst development. These changes may provide significant feedbacks to the Earth system on local to global scales that can shape future climate.

Biogeophysical and biogeochemical processes of permafrost have complex interplays with other ecosystem elements such as vegetation, microorganisms, and hydrological properties. Multiple approaches and disciplines are therefore needed to make meaningful predictions about what permafrost landscapes will look like in the future at decadal to century timescales. Progress is being made toward understanding ecosystem function under historical and current disturbance regimes using remote sensing, pattern and change detection, and chronosequence approaches. Mechanistic and empirical modelling efforts are integrating this understanding to project these trajectories into the future. These approaches often vary between upland, wetland, and lake systems, limiting our ability to project potential future states at landscape and regional scales or incorporate these processes into global frameworks such as Earth System Models (ESM's).

In this interdisciplinary session, we invite presentations investigating how ecosystem structure and function respond to changing disturbance regimes in permafrost landscapes. This includes studies using remote sensing, long-term or chronosequence methods, or process-oriented experiments or models. We are particularly interested in presentations addressing abrupt or nonlinear landscape change in space and time, and efforts towards global-scale assessments (including those using ESM's). A few example questions include: How to identify areas vulnerable to thermokarst based on vegetation-permafrost interactions? How will water availability and flowpaths change? What biogeochemical signals of landscape and hydrologic change can we use to quantify abrupt or nonlinear shifts? How will coupled nutrient and elemental cycles respond to physical and ecological disturbance? We specifically encourage presentations that strive to unify terrestrial and aquatic ecosystems and links with climate change at multiple spatial and temporal scales.

Session 6
Linking terrestrial and freshwater ecosystems in the Arctic: Organic matter, nutrients and pollutants and their lateral transport from permafrost-affected soils

Conveners:
Michael Fritz, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Potsdam, Germany (PYRN member)
Jorien Vonk, Faculty of Earth and Life Sciences, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
Alevtina Evgrafova, University of Koblenz-Landau, Institute of Integrated Sciences, Koblenz, Germany; University of Bern, Faculty of Science, Bern, Switzerland (PYRN member)

Permafrost soils are expected to turn from a carbon sink into a carbon source with projected climate warming. Pedogenic and hydrological processes play a crucial role in determining the rate and type of material released to the Arctic freshwater and marine ecosystems as a result of permafrost thaw. Abrupt modes of permafrost degradation (thermokarst, retrogressive thaw slumps and bank erosion of rivers, lakes and coasts) are expected to lead to higher release rates of soil organic carbon, nutrients, and toxins compared to the rates driven by gradual permafrost degradation such as active layer deepening. In this session, we welcome contributions that:

- Quantify the release of organic matter, nutrients and/or toxins from permafrost-affected soils as well as from abrupt permafrost degradation;
- Estimate permafrost-affected soil properties and environmental factors, such as soil moisture, plant productivity and species composition, that regulate SOM stabilization and degradation processes;
- Measure the bioavailability and decomposability of newly available SOM due to permafrost thaw;
- Present watershed budgets incorporating both terrestrial and aquatic organic matter fluxes;
- Assess the biogeochemical fate of thermokarst-derived carbon, nutrients and pollutants in watersheds and in the coastal zone;
- Investigate challenges pertaining to quantifying and mapping soil properties and SOM transport in permafrost regions by taking into account the spatial distribution and variability of soils.

We invite submissions that consider various biogeochemical tracers of thaw, including bulk parameters (e.g. POC, DOC, DIC), nutrients, major and trace elements, inorganic and organic pollutants, terrestrial biomarkers and isotopic compositions.

Session 7
Understanding rockglacier dynamics

Conveners:
Isabelle Gärtner-Roer, University of Zurich, Switzerland
Andreas Kellerer-Pirklbauer, University of Graz, Austria
Lea Hartl, University of Innsbruck, Austria (PYRN member)

Rockglaciers are visible indicators of mountain permafrost and reflect present and former climatic conditions (local and regional characteristics) as well as local geomorphic conditions. During the last decade a growing number of studies on rockglacier dynamics have been conducted, measuring and documenting increasing ground temperatures, decreasing ice contents, increasing rates in horizontal velocities, distinct vertical changes as well as indications for landform degradation and destabilization. Despite the limited understanding of the complex thermo-hydro-mechanical behaviour of ice-rich frozen ground, many studies address the connection between rockglacier kinematics and mean annual air temperatures as well as unfrozen water effects. Based on these observations rockglaciers have been prominently appreciated as climate change indicators only recently. We invite the rockglacier community to gather at the EUCOP in 2018 in order to present and discuss recent findings, improve the understanding of ongoing processes and assess future landform developments.

Session 8
Coupled heat transfer and fluid flow processes in permafrost regions

Conveners:
Christophe Grenier, Laboratoire des Sciences du Climat et de l'Environnement, LSCE/IPSL, CEA-CNRS-UVSQ, Université Paris-Saclay, France
Elena Kuzentsova, Department of Civil and Environmental Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway (PYRN member)
Victor Bense, Department of Environmental Sciences, Wageningen University and Research, Netherlands

Arctic and subarctic environments are particularly sensitive and susceptible to climate change effects. Key scientific questions concern the detection and evaluation of the impact of climate change on permafrost stability as well as the contribution to climate feedback through continental carbon and methane release. The role of hydrology is paramount in influencing the thermal state of permafrost landscapes.
In particular, the active layer processes, lake and river influenced zones, ground water units are the loci of such interaction. Each of these systems experience a highly complex forcing by climate resulting in water and heat redistributions involving water phase change, heat conduction and convection for saturated/non saturated conditions.
This session aims to bring together researchers focusing on theoretical and numerical modeling development, and/or laboratory and field experiments, to further our understanding of permafrost, hydrological, hydrogeological and transport processes, their interactions and evolution under the influence of climate change. Reports about the IPA Action Group InterFrost project on the inter-comparison of coupled Thermo-Hydrological models are especially welcome.

Session 9
Twenty years after the PACE-project: What do we know about the changing state of European permafrost?

Conveners:
Ketil Isaksen, Research and Development Department, The Norwegian Meteorological Institute, Oslo, Norway (PYRN member)
Christian Hauck, Department of Geosciences, University of Fribourg, Fribourg, Switzerland
Sarah Marie Strand, UNIS Arctic Geology Department, The University Centre in Svalbard (UNIS), Longyearbyen, Svalbard (PYRN member)

PACE (Permafrost and Climate in Europe), the European Fourth Framework project that commenced in 1997, was a major stimulus for permafrost research and monitoring in Europe. This session marks 20 years since the start of the PACE-project and therefore focuses on the state of knowledge and progress made during these two last decades of European permafrost research related to geothermal and geophysical monitoring and modelling. We invite reports on individual studies or larger initiatives investigating the present state and long-term evolution of permafrost in Europe. We especially encourage contributions focusing on the thermal response and sensitivity of permafrost to climate change and extreme weather events, as well as joint modelling and monitoring approaches. We hereby hope that the session may enhance collaboration between the monitoring and modelling communities.

Session 10
Thermokarst lake dynamics across multiple spatial and temporal scales

Conveners:
Josefine Lenz, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Periglacial Research Unit Potsdam, Germany; University of Alaska Fairbanks, Institute of Northern Engineering, Fairbanks, AK, USA (PYRN member)
Frederic Bouchard, Université Laval, Centre d'études nordiques, Québec, Canada (PYRN member)
Benjamin M. Jones, Alaska Science Centre, US Geological Survey, Anchorage, AK, USA

Ice-rich permafrost degradation promotes thermokarst development and may lead to thermokarst lake initiation in vast arctic and boreal lowland regions. Potential impacts and feedback mechanisms on Arctic geomorphology, hydrology, ecology, biogeochemical cycles, energy-water balance, floral and faunal change as well as human interaction are complex. As thermokarst lakes are expected to play a key role in the widely discussed permafrost-climate feedback loop, there is an urgent need (1) to enhance the understanding of limnological, biogeochemical, physical and ecological processes and (2) to discuss their influence on the Earth system. This session highlights the role of thermokarst lake dynamics on Quaternary to modern time scales from local to global perspectives. We welcome contributions from field-based studies on lake sediments, gas measurements, monitoring programs, remote sensing, modelling, data synthesis approaches, and especially interdisciplinary efforts combining natural and social sciences in thermokarst lake research.

Session 11
Mass-wasting processes in Periglacial environments

Conveners:
Costanza Morino, The Open University, Milton Keynes, UK (PYRN member)
Marta Chiarle, CNR-IRPI, Torino, Italy
Philip Deline, EDYTEM, Université Savoie Mont Blanc, CNRS, Le Bourget, France

This session aims to highlight ongoing research and new findings concerning permafrost-related mass-wasting processes. Perennially frozen ground is widespread in different glacial and periglacial environments, and can affect the evolution of hillslope systems in various environments, from high arctic to alpine climates. Our understanding of slow and fast mass-wasting processes in permafrost terrains is still limited and is becoming increasingly relevant for several reasons. Slow mass-wasting processes, such as gelifluction, solifluction and frost creep, are extremely sensitive to changing climate and can reveal altering geosystem conditions in cold regions. Rapid mass-wasting processes, including landslides (in particular rockfalls and active-layer-detachment slides) and debris flows, can be triggered by permafrost-degradation in glacial and periglacial environments and could pose at risk human activities and infrastructures.
Studies from arctic, sub-arctic, alpine, high-elevation and low-latitude mountain environments are highly welcome. We invite contributions focussing on all aspects of slope processes and instabilities in permafrost terrains, including characterization, distribution, triggering factors, dynamics and evolution, magnitude and frequency, monitoring, modelling, and assessment of hazards. Contributions using innovative or well-established methods and data analysis, including field and ground-truthing measurements, monitoring techniques, remotely sensed and GIS-based analyses, experimental and numerical modelling, and laboratory studies are all encouraged.

Session 12
Thermal state of permafrost and active layer dynamics: from local observations to a global permafrost assessments of permafrost system

Conveners:
Jeannette Nötzli, WSL Institute for Snow and Avalanche Research SLF, Davos Dorf, Switzerland
Alexey Maslakov, Moscow State University, Moscow Russia (PYRN member)
Dmitry Streletsky, The George Washington University, Washington D.C., USA (PYRN member)

This session provides a forum for presenting, discussing, assessing, and planning permafrost observational activities in both hemispheres, progress in data preservation, management and dissemination. We invite presentations addressing: (1) results of active layer and permafrost temperature monitoring at site-specific scales; (2) integration of observational data for comprehensive regional and global assessments of permafrost temperature and active layer changes; (3) use of GTN-P data for validation, modeling assimilation and reanalysis products for earth system models; (4) integration of remote sensing applications and observational data; (5) collaboration of GTN-P with other related monitoring programs. We seek contributions from those directly involved in GTN-P, as well as representatives from the broader research community who are using GTN-P data.

Session 13
Past environments in permafrost regions

Conveners:
Marc Oliva, University of Barcelona, Catalonia, Spain
Michael Fritz, Alfred Wegener Institute of Polar and Marine Research, Germany (PYRN member)
Stefanie Cable, University of Copenhagen, Denmark

Permafrost regions have undergone accelerated climate and environmental changes over the last several decades. Changing landscape dynamics are affecting ecosystem conditions and human infrastructure, namely in the Arctic, where the pronounced warming has dramatic socio-economic consequences. Climate models project higher air temperatures together with increased precipitation to continue into the coming decades.

Past climate and environmental records can provide analogues to recent and future perturbations in permafrost environments to identify ice/land/ocean/atmosphere feedbacks influencing regional and global climate conditions.

Permafrost environments host a wide range of terrestrial and aquatic records, including data for past environmental and climatic changes between short (seasonal) and very long (geological) time scales. An accurate study of these records may provide the linkage between the recently observed patterns and the natural response of terrestrial ecosystems to climate variability. Additionally, understanding the history of a permafrost region can provide information on permafrost properties, such as the spatial distribution of ground ice and carbon. We welcome abstracts from terrestrial environmental archives, such as lake sediments, periglacial deposits, tree rings, ground ice, fluvial/alluvial and coastal deposits.

The main purpose of this session is to report on the state of the art and on the latest developments on understanding past environments in permafrost regions, as well as to identify gaps and areas for future research.

Session 14
Permafrost peatlands in a changing climate – past, present and uncertain future

Conveners:
Britta Sannel, Department of Physical Geography, Stockholm University, Sweden
Ylva Sjöberg, Department of Physical Geography, Stockholm University, Sweden; USGS Alaska Science Center, Anchorage, USA (PYRN member)
Sebastian Westermann, Department of Geosciences, University of Oslo, Norway

Peatlands cover vast areas in the permafrost region and are important soil organic carbon reservoirs. Because of the characteristic thermal and hydraulic properties of peat, permafrost peatlands respond differently to ongoing and future climatic changes compared to mineral soils. Complicated feedbacks between energy, water and carbon cycles constitute a significant challenge for modelling approaches, making future projections on the fate of permafrost peatlands highly uncertain. In this session, we aim to provide an interdisciplinary platform showcasing state-of-the-art research on permaforst peatlands. We welcome presentations on a wide range of aspects and disciplines, such as landscape development and permafrost history, thermokarst features, monitoring activities, cryostratigraphy, carbon storage and cycling, numerical modelling and representation in Earth System Models.

Session 15
The furthest frontier: Planetary Permafrost

Conveners:
Antoine Séjourné, Université Paris Sud, GEOPS, France (PYRN member)
Susan Conway, Université Nantes, LPGN, France
Ernst Hauber, Institute of Planetary Research, DLR, Berlin, Germany

Over the past decade, a multitude of high-resolution data sets from space missions have provided ever increasing evidence for dynamic processes involving ice and permafrost on Mars but also on the icy satellites, asteroids and recently comet.
This session aims to give an up-to-date insight of the study of ice and permafrost and resulting landforms on planetary bodies with an emphasis on the use of cold-climate environments on Earth as analogues for studying the other planets.
Presentations will be encouraged to discuss planetary periglacial and glacial processes and/or present analogies between terrestrial and planetary permafrost environments and can include fieldwork, remote sensing and laboratory studies. Scientists who are new to planetary science are particularly welcome.

Merged Session 16 and 20

New Title: Living with Permafrost: Culture and Communities in Research and Outreach

New Conveners:
Mathias Ulrich, University of Leipzig, Institute for Geography, Leipzig, Germany (Coordinator)
Josefine Lenz, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Periglacial Research Unit Potsdam, Germany; University of Alaska Fairbanks, Institute of Northern Engineering, Fairbanks, AK, USA (PYRN member)
Ylva Sjöberg, Stockholm University, Department of Physical Geography, Stockholm, Sweden
Irina Streletskaya, Moscow State University, Moscow, Russia

New Abstract

As awareness of permafrost continues to grow, and as communities continue to live with changing permafrost and socio-economic conditions, it is crucial to improve communication and collaboration between researchers in different disciplines, Arctic stakeholders, local residents, and the global community. For this session, the International Permafrost Association's (IPA) Standing Committee on Education and Outreach, and IPA's Action Group on Permafrost and Culture (PaC) in collaboration with an International Arctic Science Committee (IASC) Cross-Cutting Initiative, welcome contributions on outreach activities designed for the general public (through a variety of media and outlets) in indigenous, rural, mountainous and urban communities. In addition, we welcome contributions about how communities and individuals live, work, and play in permafrost landscapes, many of which are changing rapidly. For instance, research on interactions of permafrost, mobile pastoralism, land use, and animal husbandry illustrates some these complex relationships. We encourage participation from permafrost scientists as well as individuals from any organization striving to improve permafrost knowledge beyond the traditional educational framework, or those working with local communities to improve their understanding of permafrost.

Session 17
Subsea Permafrost Dynamics

Conveners:
Martin Stendel, Danish Meteorological Institute, Climate and Arctic Research, Copenhagen, Denmark
Paul Overduin, Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Potsdam, Germany
Matteo Puglini, Max Planck Institute for Meteorology, Hamburg, Germany (PYRN member)

Large regions of the Arctic Shelf are underlain by permafrost. This permafrost formed during previous glacial cycles when low sea levels exposed the coastal plains. The marine transgression that followed the Last Glacial Maximum (from about 18 to 5 ka BP) resulted in the present-day coastal shelf and its relict terrestrial permafrost. These permafrost sediments contain organic carbon and greenhouse gases, some in gas hydrate form. Cold temperatures stabilize gas hydrates and limit bacterial turnover, and low diffusivities associated with frozen sediment trap gas below and within the permafrost. The warming that followed transgression and that results from ongoing climate change may therefore release large amounts of greenhouse gases to the overlying shelf sea, sea ice and atmosphere if the subsea permafrost thaws. Recent publications have broadened our knowledge of the arctic shelves and permafrost distribution, but observations are rare and unevenly distributed, and our process understanding is incomplete. Modelling of subsea permafrost and its potential degradation have produced a wide range of results.
In this session, we invite contributions that advance our understanding of the temporal evolution of subsea permafrost, both in past climates and under future climate change as well as contributions on observations of greenhouse gases and gas hydrates over the arctic shelves. Contributions are welcome that advance the development of models of subsea permafrost, including their parameterizations. New observation techniques and treatment of archive observations, measurements of gas fluxes or gas concentrations and studies of past and future climate including degradation of submarine permafrost are also welcome.

Session 18
Deep permafrost - From local to global influences

Conveners:
Jens Strauss, Periglacial Research Unit, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Potsdam, Germany (PYRN member)
Gustaf Hugelius, Department of Physical Geography & Bolin Centre of Climate Research, Stockholm University, Stockholm, Sweden
Mathias Ulrich, Institute for Geography, Leipzig University, Leipzig, Germany

Due to potential impacts and feedback mechanisms on the Earth system, deep ice-rich permafrost dynamics have become a focal point in sub-Arctic and Arctic research. For this session 'deep' includes permafrost from below the active layer down to approximately 50 m below surface. In these deposits, high ground-ice content (e.g. ice wedges and pore ice) and its associated vulnerability to surface subsidence may lead to landscape changes that impact local communities' livelihood and infrastructure. In addition to local human-permafrost interaction, large stocks of thaw-vulnerable frozen organic matter in deep permafrost deposits are expected to have a key influence on the global permafrost-climate feedback. Thus, there is an urgent need to (1) enhance the understanding of deep permafrost thawing and degradation processes, and (2) combine physical and social sciences in permafrost research. In this session, we aim to include studies about deep permafrost and its interactions with physical, ecological, and social- economic processes in a changing Arctic. This includes a variety of methods (e.g. sediment sampling, remote sensing, modelling, or community and traditional knowledge) and interdisciplinary studies on ground-ice origin, cryostratigraphy, modelling climatic sensitivity, mapping, paleopedology, and paleoclimatology for assessing local and regional impacts on northern communities, infrastructure, wildlife, as well as global influences like organic matter decomposition and release.

Session 19
Polar Coastlines in Transition: Arctic – Antarctic perspectives

Conveners:
Matt C. Strzelecki, University of Wroclaw, Poland (PYRN member)
Louise Farquharson, University of Alaska Fairbanks, USA (PYRN member)
Boris Radosavljevic, Alfred Wegener Institute, Germany (PYRN member)
Vladislav Isaev, Moscow State University, Russia (PYRN member)

Polar coastlines make up over one third of the global total and are among the most dynamic in the world. Due to climate change polar coastlines are increasingly vulnerable to rapid change. Patterns of Arctic coastal change are mostly associated with decreased sea ice cover which is leaving coasts exposed to waves and storm action for longer each year. Additional influential factors include permafrost degradation, storm-surge flooding, and intensified sediment supply from glacierised catchments. These changes have wide-ranging impacts on circum-polar Arctic coastal communities through the destruction of culturally important sites, and modern infrastructure.
In the Antarctic region accelerated deglaciation has led to the exposure of new coastlines where permafrost-related processes and fluxes of sediments from paraglacially transformed glacial landforms control coastal dynamics.
In both regions climate warming has triggered extreme processes including accelerated permafrost thermoerosion, destabilization of coastal slopes by periglacial processes or landslides leading to formation of tsunami waves that profoundly change the functioning of fragile polar coastal environments.
This session invites submissions that will improve our understanding of polar (Arctic and Antarctic) coastal dynamics on local and regional scales. We encourage submissions focusing on both sub-aerial and sub-aqueous processes driving changes to coastal morphology, and are also interested in submissions which discuss rates of change and socio-economic impacts.
The objective of our session will be to raise interest in the topic and provide a platform for discussions on various aspects of coastal change and its impact on the resilience of polar environments and societies. We particularly encourage submission of contributions from members of ACD (Arctic Coastal Dynamics) and CACOON (Circum-Arctic Coastal Communities KnOwledge Network) groups.

Merged Session 16 and 20

New Title: Living with Permafrost: Culture and Communities in Research and Outreach

New Conveners:
Mathias Ulrich, University of Leipzig, Institute for Geography, Leipzig, Germany (Coordinator)
Josefine Lenz, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Periglacial Research Unit Potsdam, Germany; University of Alaska Fairbanks, Institute of Northern Engineering, Fairbanks, AK, USA (PYRN member)
Ylva Sjöberg, Stockholm University, Department of Physical Geography, Stockholm, Sweden
Irina Streletskaya, Moscow State University, Moscow, Russia

New Abstract

As awareness of permafrost continues to grow, and as communities continue to live with changing permafrost and socio-economic conditions, it is crucial to improve communication and collaboration between researchers in different disciplines, Arctic stakeholders, local residents, and the global community. For this session, the International Permafrost Association's (IPA) Standing Committee on Education and Outreach, and IPA's Action Group on Permafrost and Culture (PaC) in collaboration with an International Arctic Science Committee (IASC) Cross-Cutting Initiative, welcome contributions on outreach activities designed for the general public (through a variety of media and outlets) in indigenous, rural, mountainous and urban communities. In addition, we welcome contributions about how communities and individuals live, work, and play in permafrost landscapes, many of which are changing rapidly. For instance, research on interactions of permafrost, mobile pastoralism, land use, and animal husbandry illustrates some these complex relationships. We encourage participation from permafrost scientists as well as individuals from any organization striving to improve permafrost knowledge beyond the traditional educational framework, or those working with local communities to improve their understanding of permafrost.

Session 21
In situ permafrost sensing and monitoring technologies

Conveners:
Anna Wagner, Cold Regions Research and Engineering Laboratory, Fairbanks, AK, USA
Nate Lindsey, University of California, Berkeley, USA (PYRN member)
Jonathan Ajo-Franklin, Lawrence Berkeley National Laboratory, Berkeley, USA

Permafrost degradation reroutes surface and groundwater flow, changes vegetation patterns, increases wildfire susceptibility, modifies topography, and releases carbon dioxide and methane to the atmosphere. The thermal, hydrological, and mechanical processes at play during degradation have been hypothesized to couple in complicated ways, but traditional single-point, ergodic, and remote sensing data collection campaigns are limited in their range and/or resolution in space and time. As a result, coupled multiphysics simulations have largely outpaced important calibration datasets. Meanwhile, recent efforts to generate in situ observations at the field-to-watershed scale using dense sensor deployments to capture transformations of permafrost are creating opportunities to test these hypotheses and numerical models. This session will explore novel advances in the field of in situ sensor technology including new sensing modalities, units, geometries, telemetry, data handling, and application domains with a focus on tracking the evolution of permafrost systems. We welcome case studies as well as relevant numerical and modeling studies used for guiding sensor design and installation.

Session 22
Frost at the margins of permafrost / Frost related phenomena in non permafrost areas

Conveners:
Reynald Delaloye, Université de Fribourg, Fribourg, Switzerland
Vincent Jomelli, LGP, CNRS, Meudon, France
Cecile Pellet, Université de Fribourg, Fribourg, Switzerland (PYRN member)

Frost related phenomena concern not only the continuous and discontinuous permafrost zones, but also seasonal frost, freeze/thaw cycles, and patchy permafrost due to specific local conditions (like cold scree slopes, or ice caves). Periglacial geomorphology covers the whole range of frost effects. In mountain ranges, processes linked to seasonal frost and freeze/thaw cycles form what French geographers call the « infraperiglacial belt ».
All these phenomena will be affected by climate change, and seasonal frost has been defined by WMO as an Essential Climate Variable. The knowledge on the distribution, driving factors and evolution of these phenomena is however very limited. Very little is known for instance on the spatial/altitudinal distribution of seasonal frost and on its recent evolution. Very few studies exist on patchy permafrost: are they relics of ancient more continuous permafrost or original spots due to local conditions? Are they very sensitive or resilient systems regarding climate change?
This session aims at promoting research and exchanges on subjects related to seasonal frost, freeze/thaw cycles, patchy permafrost, cold scree slopes, etc. It will accept contributions on monitoring, process studies, ecological studies, or modeling, in mountain as well as arctic context.

Session 23
New developments and applications of geophysical techniques in permafrost terrain

Conveners:
Hauck Christian, Department of Geosciences, Université de Fribourg, Fribourg, Switzerland
Halla Christian, Department of Geography, University of Bonn, Germany (PYRN member)
Thomas Ingeman-Nielsen, Center for Arctic Technology, Technical University of Denmark, Denmark

Geophysical methods, including e.g. electrical, electromagnetic, seismic and gravimetric techniques, are one of the standard methods in permafrost research for detecting, quantifying and monitoring frozen ground and ground ice occurrences. Recent studies show also a high potential of these methods for multi-scale approaches in combination with point-scale in-situ measurements, upscaling techniques in combination with remote sensing data and detailed process studies in combination with energy balance and thermo-hydraulic modelling.
We welcome all kind of studies focusing on new or improved approaches using geophysical techniques, their application in permafrost terrain, innovative combinations with complementary data sets and models, and studies showing the potential of using geophysical techniques for process studies and permafrost monitoring.

Session 24
Permafrost hazards in high mountains

Conveners:
Michael Krautblatter, Technical University of Munich, Germany
Christian Huggel, University of Zurich, Switzerland
Markus Keuschnig, GEORESEARCH, Austria (PYRN member)

Permafrost change in high mountains increasingly causes rock and soil slope instability, changes in the hydrological systems, enhanced debris flow and rock avalanche activity as well as widespread subsidence. These processes pose a significant risk to high mountain infrastructure, mountain communities and individuals living and travelling in high mountains.
(i) This sessions invites contributions that investigate potentially hazardous permafrost change in high mountains using observation, monitoring and modelling techniques using meteorological, geotechnical, geophysical, geological, geomorphological and geomechanical techniques.
(ii) We also welcome complementary contributions that focus on the imposed hazard and risk and assess the vulnerability of individual, communities and infrastructure.

Session 25
Open session on mountain permafrost

Conveners:
Martin Hoelzle, Department of Geosciences, Université de Fribourg, Fribourg, Switzerland
Sebastian Vivero, Institute of Earth Surface Dynamics (IDYST), University of Lausanne, Lausanne, Switzerland (PYRN member)

This session is related to permafrost as an important variable of the mountain cryosphere. We are expecting all different sorts of research contributions related to interactions of permafrost with the climate and corresponding impacts on the natural and human systems in mountain permafrost environments.
This session is thought to complement the more specific sessions proposed at the conference. We are looking forward to receive a large number of contributions reflecting different fields ranging from theory to applied approaches at diverse geographic locations. We would like to stimulate especially contributions and discussions about near surface processes, theoretical concepts, measurement technologies, monitoring strategies, different model approaches on different scales and the related uncertainties.

Session 26
Open session on permafrost hydrology

Conveners:
William L. Quinton, Cold Regions Research Centre, Wilfrid Laurier University, Waterloo, Ontario, Canada
Ryan F. Connon, Wilfrid Laurier University, Yellowknife, NT, Canada (PYRN member)
Chris Spence, Environment and Climate Change Canada, Saskatoon, SK, Canada

Permafrost hydrology seeks to understand the flux and storage of water and energy in earth systems where temperatures are at or below 0°C for at least two consecutive years. The supra-permafrost layer includes the active layer, a zone that freezes and thaws annually, and may also include a perennially thawed (i.e. talik) layer. By impounding and re-directing surface and subsurface water, permafrost influences both the nature of hydrological flowpaths and the partitioning of hydrological input into runoff and storage. Permafrost also promotes high moisture contents in the overlying layers by limiting infiltration, and by providing structural support to the overlying terrain, permafrost strongly influences the nature of the supported ecosystems, including their hydrological characteristics. Most hydrological processes and pathways occur above the permafrost, both within the supra-permafrost layer, and above the ground surface. Permafrost thaw and the resulting ground surface subsidence and ecosystem change has the potential to alter hydrological processes from local to regional scales. Understanding the interdependence of permafrost, hydrology and ecosystems is critical to understanding not just the flux and storage of water in permafrost terrains, but also how such systems might change in response to climate and anthropogenic disturbance.