IPA Action Group Application

Title of proposed Action Group:
Provide a short and descriptive title for the Action Group.

Standardized methods across Permafrost Landscapes: from Arctic Soils to Hydrosystems (SPLASH)

Action Group Contact:
Name, email, telephone number, title, and institution/affiliation.

Frédéric Bouchard, frederic.bouchard@u-psud.fr, +33 169154861.
Researcher, Géosciences Paris Sud (GEOPS), Université Paris Saclay, Orsay, France.

Objectives and scope of the Action Group:
Provide here a description of the project in less than 750 words. Keep the background section brief and focus on the definition of clear and targeted objectives. This section will be used to advertise your project to IPA members and the wider public, so please ensure that you address the following points:

a. Why is this activity significant and how does it relate to the objectives of the IPA?
b. Who will undertake the project and what steps will be taken to ensure that its objectives are met?
c. How will it benefit IPA members, the scientific or engineering communities, policy-makers or the general public?

With active-layer thickening, ground-ice melt and soil erosion across high-latitude regions, permafrost landscapes are currently undergoing rapid changes, including the mobilization of particulate and dissolved elements from terrestrial to aquatic ecosystems. These ecosystems are either gradually transforming or abruptly changing following catastrophic events (e.g., thaw slumps, lake drainage). Permafrost-affected landscapes are highly diverse in terms of geology, soil type, ground-ice content, vegetation, hydrology, and climate, and this drives the way thawed materials are transported and transformed through periglacial catchments (Tank et al., in review; Vonk and Gustafsson, 2013). This spatial complexity must be taken into account in addition to seasonal trends (Natali et al., 2019) when assessing the global impact...
of permafrost thaw, and spans a range of disciplines from limnology to river chemistry and geomorphology. Hence, the characterization of processes induced by permafrost degradation and element mobilization from terrestrial to aquatic ecosystems should be conducted in different areas across the Arctic. Moreover, efficient sharing of field data, well-preserved sampled material, and sampling documentation among the different research disciplines is also needed. Only in this way can we improve our understanding of ecosystems.

The main objective of this Action Group is to provide to the permafrost community a suite of standardized field approaches for sampling soil, sediment, and water across different types of permafrost landscapes (e.g., palsa peatlands, shrub tundra, boreal forest), spanning disciplinary boundaries. Standardized protocols are vital for robust spatio-temporal comparisons, and to our knowledge, they have been developed and published up to now in only a few fields of permafrost research, such as pedology (Ping et al., 2013) and aquatic biogeochemistry (Ma et al., 2019; Vonk et al., 2015). The proposed standardized field sampling methods will be specific to permafrost environments, although they will allow for the comparison with studies conducted in non-permafrost (or seasonally frozen ground) environments in the long term. Therefore, the SPLASH Action Group has two aims: (1) defining and putting forward standardized approaches for soil, sediment, and water sampling for subsequent organic and inorganic analyses; (2) establishing and strengthening cooperation among researchers of different countries, career stages, and backgrounds from the permafrost community and other disciplines.

While an integrative understanding of the processes involved in permafrost thaw is crucial in order to appraise the multiple feedback loops, designing sampling schemes that combine state-of-the-art microbiological and geochemical analyses associated with hydrological and geomorphological investigations is difficult. This task is challenging due to time and cost constraints in remote environments, but also because performing analyses on both organic and inorganic phases on the same samples using consistent techniques on soil and water from heterogeneous environments is very complex. The SPLASH Action Group will compile and assess the materials and methods currently used to investigate the mobilization of particulate and solute constituents from permafrost soils to aquatic ecosystems. By gathering experts from different disciplines among the permafrost community, we aim to discuss site selection (e.g., functional and geographical representative environments, process-based investigation), replication protocols (e.g., number of samples, spatial vs. temporal replicates), sample collection (e.g., volume, when, where, how, documentation), and preservation (e.g., type of vials or bags, acidification, storage temperature, duration before analyses).

The project will be conducted by a diverse group of permafrost scientists with different expertise, who are conducting research across the Arctic and are based in different countries of Europe, Asia, and North America. Researchers from different career stages will be involved, although a coordinating committee exclusively composed of early-career researchers (ECRs) will assume leadership.

The SPLASH project has a clearly defined output: publication of standardized field methods (review paper), based on transparent and publicly available data. It will benefit the whole permafrost research community in several ways. It will ensure the next generation of data is of a quality high enough to answer the complex research questions that lie ahead. Standardized methods will allow aggregation of data across permafrost regions and facilitate mapping/modeling of key properties and processes (e.g., thermokarst). Proper sample
treatment and storage will allow other researchers to re-use the samples for further analysis. SPLASH will provide IPA members with guidelines for sampling, ensure that collected samples can be aggregated in databases, increase data quality, and contribute to solving local and global scale questions regarding the transformation of the permafrost region and its impacts.

**Timeline:**
Include here the major milestones of the project as well as the dates envisioned for the delivery of products. Please note that Action Groups can be proposed for a maximum duration of two years. This call is intended for Action Groups operating in 2020 and 2021.

This project will run from the beginning of 2020 to the end of 2021 (two years). The main actions are summarized below. Even though we do not specifically ask for funding for fieldwork sampling, we include fieldwork campaigns (summers of 2020 and 2021) as they will be essential for testing the proposed standardized methods through an iterative process.

<table>
<thead>
<tr>
<th>Task</th>
<th>2020</th>
<th>2021</th>
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</thead>
<tbody>
<tr>
<td>Preliminary data compilation. First discussions (Skype).</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>Online survey: « How do you sample in the field? ».</td>
<td>W</td>
<td>Sp</td>
</tr>
<tr>
<td>First round of method summary. Inter-lab comparison.</td>
<td>W</td>
<td>Su</td>
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<tr>
<td>Networking at ICOP 2020, recruitment.</td>
<td>W</td>
<td>Sp</td>
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<tr>
<td>*(Fieldwork season #1. Sampling across Arctic sites.)</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>*(Back from the field. Sample storage/treatment, lab analyses.)</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>Coordinating Committee meeting. Manuscript writing plan.</td>
<td>W</td>
<td>Su</td>
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<tr>
<td>Web conference (whole group). Feedback from field season #1.</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>Data compilation, protocol evaluation, strategy adjustments.</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>Workshop or targeted meeting at EGU. Manuscript outline.</td>
<td>W</td>
<td>Su</td>
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<tr>
<td>*(Fieldwork season #2. Reviewed protocols).</td>
<td>W</td>
<td>Su</td>
</tr>
<tr>
<td>Project wrap-up, manuscript writing.</td>
<td>W</td>
<td>Su</td>
</tr>
</tbody>
</table>

W= Winter; Sp= Spring; Su= Summer; F= Fall.
* Activity not funded by this IPA Action Group.
Deliverables:
List here the deliverables of the project (less than 250 words). Try to provide a realistic view of what can be achieved within the time span of the Action Group and include education and outreach deliverables.

The main deliverable will be a review paper presenting the standardized field methods: sampling tools and techniques, replicates (definition depending on the question, number), locations, extraction methods, time of the year/season (hydrology period), storage. These methods will aim to follow element (particulate and dissolved) mobilization from soils to freshwater ecosystems. The results of the online survey (spring/summer 2020) will be integrated in this effort. The overarching idea will be to provide a big-picture overview of the ‘ground-to-streams-to-lakes’ continuum, providing a legacy for long-term monitoring of the permafrost system.

Other Action Group Members:
List here the names of the individuals to be involved in the Action Group. Include name, email, telephone number, and institution. Try to provide a size realistically adapted to the size of the project. The individuals making up the Action Group should stem from at least three different IPA member countries. Explain how country balance and involvement of young researchers (PYRN) will be taken into account when allocation of funds is decided.

The project brings together 37 people from 11 different countries. Six early-career researchers (ECRs) will be more actively involved in coordination, each member being responsible for a specific discipline or aspect (e.g., soils, aquatic geochemistry, datasets).

Coordinating Committee (ECRs):

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**International dimension:**
The IPA is associated with several other international organizations (these can be viewed at https://ipa.arcticportal.org/about-the-ipa/external-relations) and encourages collaborative activities. Please indicate here if there are ties with other organisations and the nature of the collaboration (less than 250 words). If you will collaborate with other IPA Action Groups or Standing Groups, that should also be indicated here.
We already contacted and received official support (letters) from the following organizations:

- Permafrost Carbon Network
- NUNATARYUK
- T-MOSAiC
- IPaC

We also plan on collaborating actively (e.g., information exchange, co-funding of ECR travels, advertisement, manuscript writing) with these organizations:

- PYRN (Permafrost Young Researchers Network)
- APECS (Association of Polar Early Career Scientists)
- IASC (International Arctic Science Committee): Terrestrial and Cryosphere WGs
- IUSS (International Union of Soil Sciences)
- PAGES’ C-PEAT (Carbon in Peat on EArth through Time) Working Group
- Global Terrestrial Network for Permafrost (GTN-P)
- International Tundra Experiment (ITEX)
- PermafrostNet (project based in Canada but with several international collaborators)
- Permafrost Coastal Systems Network (PerCS-Net)

**Budget:**

Provide a short description of the budget and the amount requested from the IPA (max. 2500 € per year; maximum of 5000 € over the Action Group duration). Mention other funding sources, even if not confirmed yet. If funding is awarded from the IPA, only the first year’s budget will be confirmed. Awards in subsequent years will be made subject to receipt of an acceptable progress report from the Action Group and in relation to the IPA’s priorities and financial status.

**Year 1 (2020):**

Meeting of the Coord. Committee (Europe), travel support for ECRs 2500 €

**Year 2 (2021):**

Meeting/workshop (e.g., EGU 2021), travel support for ECRs 1000 €

Publication costs (open access) for one synthesis paper 1500 €

**Total**

5000 €

(no other funding sources)

**Secretarial support:**

Will the action group need secretarial support from the IPA in the form of organisation of conference calls, production of documents, etc. Please described here the level of support requested (less than 250 words).

1. Production of documents: help with writing a report to IPA at the end of the project.
2. Web conference (fall 2020): help for IT support and organizing.
3. Advertisement: help with sharing information about the review paper.
Cited references:


Please submit a PDF with these fields completed to the IPA Secretariat email at contact@ipa-permafrost.org.

Applications must be submitted on or before November 1, 2019.

Frédéric Bouchard, Action Group contact

Paris, October 31st, 2019
Support for the « SPLASH » Action Group proposal

IPA Secretariat,

I hereby support the IPA Action Group proposal called « Standardized methods across Permafrost Landscapes: from Arctic Soils to Hydrosystems (SPLASH) ».

The Permafrost Carbon Network produces new knowledge through research synthesis to quantify the role of permafrost carbon in driving future climate change. The network organizes workshops and meetings each year which would be an ideal opportunity to connect with the SPLASH project.

With the main objective of providing to the permafrost research community a suite of standardized field approaches for sampling soil, sediment, and water across different types of permafrost landscapes, the SPLASH project is a highly relevant initiative that will be beneficial to the whole community, including the numerous members of the Permafrost Carbon Network (> 400 members from 130 research institutions located in 21 countries). Moreover, the SPLASH project will also aim at establishing and strengthening cooperation among researchers of different countries, career stages, and backgrounds from the permafrost community and other disciplines. We also strongly support the fact that the project will be led by a core group of early-career researchers from different expertises (e.g., geomorphology, hydrology, biogeochemistry, limnology).

Yours sincerely,

Christina Schädel

Assistant Research Professor
Northern Arizona University
Center for Ecosystem Science and Society
Flagstaff, Arizona
Support for the « SPLASH » Action Group proposal

To whom it may concern,

As the coordinator of the EU H2020 project NUNATARYUK, I hereby support the IPA Action Group proposal called « Standardized methods across Permafrost Landscapes: from Arctic Soils to Hydrosystems (SPLASH) ».

NUNATARYUK brings together world-leading specialists in natural science and socio-economics aiming at 1) determining the impacts of thawing permafrost on the global climate and on humans in the Arctic, and 2) developing targeted and co-designed adaptation and mitigation strategies. Permafrost thaw is the core focus of NUNATARYUK and is used as the common thread for early consultations with community representatives and other stakeholders at the local and global level.

Hence, the SPLASH initiative is highly complementary with our mission and objectives. The main objective of SPLASH is to provide to the permafrost research community a suite of standardized field approaches for sampling soil, sediment, and water across different types of thawing permafrost landscapes. It is a highly relevant initiative that will be beneficial to the whole community, including NUNATARYUK members and partners. The SPLASH project will also aim at establishing and strengthening cooperation among researchers of different countries, career stages, and backgrounds from the permafrost community and other disciplines. It is worth noting that the project will be led by a core group of early-career researchers from different expertises (e.g., geomorphology, hydrology, biogeochemistry, limnology), which will fuel momentum to the extended group of participants.

With a transdisciplinary vision and a diverse team of international emergent and senior scientists, SPLASH is a timely initiative that has our full support.

Kind regards,

PD Dr. Hugues Lantuit
Frédéric Bouchard,
Géosciences Paris Sud (GEOPS),
Université Paris Saclay, 91405 Orsay,
France
frederic.bouchard@u-psud.fr

Dear Professor Bouchard,

Your application to the IASC project T-MOSAiC for endorsement of your project proposal entitled Standardized methods across Permafrost Landscapes: from Arctic Soils to Hydrosystems (SPLASH) has now been examined by the members of our Executive Committee relative to the criteria of field site locations, relevance to the Arctic system goals of T-MOSAiC, plans for collaboration, and data management.

I am pleased to inform you that the committee has judged that your project meets all of these criteria and is hereby fully endorsed as an internationally recognized project within T-MOSAiC.

Thank you for your involvement. We look forward to ongoing exchange with you and your team, and we wish you full success in your research.

Sincerely,

João Canário, PhD
Chair, T-MOSAiC Executive Committee

Warwick F. Vincent, PhD
Co-Chair, T-MOSAiC Executive Committee
October 29th, 2019

Letter in support of SPLASH action group

I wish to extend my full support to the IPA Action Group proposal entitled Standardized methods across Permafrost Landscapes: from Arctic Soils to Hydrosystems (SPLASH) led by Dr. Frédéric Bouchard.

Achieving the SPLASH objectives to better harmonize and standardize research methods in permafrost science has the potential to positively affect the quality and impact of permafrost science. It also targets two aspects that are central to the IPA: bridging permafrost knowledge across national and political borders as well as between engineering and natural science. In addition, SPLASH includes an outstanding involvement of early career permafrost scientists.

As the founding chair of the IPA Permafrost and Carbon Budgets Interest Group (IPaC) I see much added value in the development of standardized methods in permafrost science. Not in the least given the fact that research into permafrost carbon has attracted the interest of many researchers from various fields and backgrounds, there is an urgent need to ensure that the data we collect is comparable and reliable.

Sincerely

Dr. Gustaf Hugelius
Senior university lecturer
Chair of IPaC