International Arctic Science Committee
Terrestrial Working Group

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5 Year Work Plan – September 2017-2022

The Terrestrial Working Group (TWG) strategy has been evolving alongside the IASC Strategic Plan and ICARP III roadmap priorities since 2015, recognizing that the ICARP III priorities are adopted as IASC´s Grand Challenges for the future. Each of the TWG scientific foci map directly onto one, or more, of the ICARP III priorities, as follows:

- Improving knowledge at multiple spatial scales of the current state of Arctic terrestrial geosystems and ecosystems [directly addresses ICARP III '*Understanding the role of the Arctic in the global system*', '*Observing and predicting future climate dynamics and ecosystem responses*' and '*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'];
- Determining the net effect of the terrestrial and freshwater environmental and biospheric processes that amplify or moderate climate warming [directly addresses ICARP III '*Understanding the role of the Arctic in the global system*', and '*Observing and predicting future climate dynamics and ecosystem responses*'];
- Developing unifying concepts, fundamental theories and computer models of the interactions among species, interactions between species and their environment, and the biology of life in extreme environments [directly addresses '*Observing and predicting future climate dynamics and ecosystem responses*' and '*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'];
- Estimating past changes in Arctic geo- and biodiversity, measuring current change and predicting future changes [directly addresses ICARP III '*Understanding the role of the Arctic in the global system*', '*Observing and predicting future climate dynamics and ecosystem responses*' and '*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'];
- Developing high spatial resolution models of terrestrial geo-system and ecosystem change, and other tools that can be used by Arctic stakeholders for adaptation strategies and sustainable management of natural resources and ecosystem services [directly addresses ICARP III '*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'];
- Determining the role of connectivity in the functioning of Arctic terrestrial systems, including connections within the Arctic and the global system. [directly addresses ICARP III '*Understanding the role of the Arctic in the global system*', '*Observing and predicting future climate dynamics and ecosystem responses*' and '*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'].

These foci reflect the wide disciplinary and geographical scope of the Terrestrial Working Group. In essence, the TWG is already cross-cutting (spanning earth and environmental science, life sciences, social and Human sciences across broad spatial and temporal scales), and our challenge is to encourage thematic programmes which could become long-term actions, whilst also retaining the flexibility to support innovative community-led initiatives from a broad constituency of researcher and stake-holder communities. The TWG recognises that a balance needs to be struck between sharpening our focus and objectives, whilst not becoming restrictive. We also acknowledge that, whilst we have a broad spectrum of expertise represented by WG members, there are gaps (notably in some areas of the geosciences) and we welcome broader input. There also remain serious challenges covering the spatial and environmental variability in the Arctic terrestrial realm, and large regions which are

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substantially under-represented in research efforts. Understanding the major issues within the wide disciplinary and geographical scope of the TWG requires interaction with other WGs and we wish to find mechanisms to strengthen this. International programmes such as the EU 'INTERACT' trans-national access scheme are providing mechanisms (and infrastructure) to enable researchers to access a wide range of locations in the circum-polar north, and existing links between INTERACT and TWG members could form the basis for future coordination and collaboration.

5 Year Strategy - We require applications for IASC TWG support to reflect on how the proposal addresses ICARP III priorities and TWG foci. Scientific excellence and capacity-building remain primary criteria for funding, and the latter accords with the IASC emphasis on engagement by and involvement with Early Career Researchers (ECRs) and Arctic residents (both indigenous and non-indigenous). We are also keen to support education, communication and outreach activities (e.g. through training programs, webinars, workshops, newsletters, and via social media) and to strengthen potential science-policy linkages.

We note that Action Item V in the IASC Think-Tank Reports states:
"*IASC instruments to support science development should be simplified. Rather than supporting WG activities, cross-cutting activities and Networks, IASC should focus on promoting scientific programs (which can involve one, several or all WGs). These programs are understood as long-term actions, and should have clear goals, milestones and deliverables*."

With respect to the above, the TWG aims (a) to retain the flexibility to support excellent short-duration projects whilst (b) promoting scientific programs as long-term actions, potentially involving several WGs. In both cases, however, projects and programs must have clear goals, milestones and deliverables.

With regard to long-term actions, we seek to strengthen the dialogue among the IASC WGs in order to provide space to promote scientific programs. At present the mechanisms to achieve a stronger integration among WGs strike us as limited, and we would like to work with the IASC Secretariat, and the other WGs, to identify opportunities to work together on cross-cutting activities to tackle Grand Challenges. Closer links between IASC and other global programs (e.g. Future Earth and ICSU), in order to emphasize the role of the Arctic in the global system and increase IASC visibility, would also be beneficial, although we recognize our own role, within the TWG, in making contact with partner organisations (e.g. the CAFF working groups (CBMP and the Flora Group), and the AMAP working groups CliC and SWIPA) to maximise the 'reach' of our activities and to add value to IASC investment.

Specifically, in relation to ICARP III roadmap priority 3 ('*Understand(ing) the vulnerability and resilience of Arctic environments and societies and supporting sustainable development*'), we see opportunities for closer collaboration with the IASC Social & Human Working Group (SHWG). During ASSW 2017, TWG members identified several foci, in addition to those listed previously, which are directly relevant to Arctic residents and broader stakeholders; these concern:

- Biodiversity, land and freshwater ecosystem services;
- Natural resources and their sustainable use;
- Biotechnologies (e.g. low temperature biotechnology and biodiscovery; drinking and waste water treatment);
- Atmospheric pollutants and terrestrial and freshwater contaminants;
- Permafrost landscapes and water;

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- Landscape dynamics and disturbance regimes (of contrasting intensity, frequency and spatial scale, i.e. glacial retreat and the exposure of new land-surface; climatic extremes; wildfires; thermokarst; herbivore outbreaks);
- Permafrost and infrastructure, including the deployment of engineering expertise for adapting to change (note that engineering and infrastructure are strongly linked to ecosystem services and adaptation);
- Science-policy knowledge transfer, and co-production of knowledge (i.e. including traditional knowledge).

To advance these themes in novel and effective ways, joint programs with the SHWG, and potentially others, have the potential to add substantial value. We would also like to emphasize that the establishment of baselines, against which change and its implications can be assessed, remains of critical importance; in this regard the '3 Ms' (mapping, modeling and monitoring), for example of soils, vegetation, permafrost, freshwaters, seasonal snow and ice cover, living resources, newly-exposed land etc, remain priorities.