



# Integrating Arctic Research - a Roadmap for the Future

## 3<sup>rd</sup> International Conference on Arctic Research Planning ICARP III

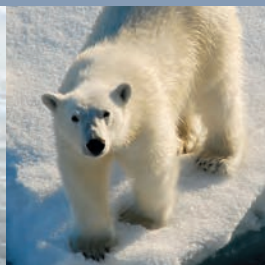




Photo: Jean-Baptiste Strobel

# The Need for an Internationally Coordinated Arctic Research Planning Effort

**R**apid transformations occurring in the Arctic are affecting the entire Earth system, its climate and weather extremes through increased temperatures and the continuing loss of sea ice cover, glacier retreat and changing snow and permafrost conditions. In addition, emerging economic and geopolitical interests in the Arctic have established the region as a larger player within the global context, with potentially significant local effects. It is important to consider the existence of 'multiple Arctics' in the context of these changes. While there are many common challenges and priorities facing the Arctic region as a whole, local contexts, including political and governance regimes, socio-economic conditions, and cultures can vary substantially within and across Arctic regions.

Changes in the Arctic are challenging our understanding and our ability to provide knowledge for decision-makers at local, regional and global levels. Understanding the consequences of these changes and their connection to global environmental, economic, societal and geopolitical factors requires improved knowledge of local, regional and global processes. These research challenges must be addressed in a coordinated and timely manner. There is a sense of urgency among decision-makers and awareness by the general public regarding the global importance of changes taking place in the Arctic. The Arctic remains a region of geopolitical stability, which is important for sustaining Arctic research.

The Third International Conference on Arctic Research Planning (ICARP III) provided a framework to further the development of cross-cutting, interdisciplinary and trans-disciplinary initiatives for advancing Arctic research cooperation and applications of Arctic knowledge. Initiated by the International Arctic Science Committee (IASC) with engagement from its partners, ICARP III was designed as a process to:

- Identify Arctic science priorities for the next decade;
- Coordinate various Arctic research agendas;
- Inform policy makers, people who live in or near the Arctic and the global community who are impacted by Arctic changes; and
- Build constructive relationships between producers and users of knowledge.

This report identifies the most important Arctic research needs and provides a roadmap for research priorities and partnerships. The primary target audience of the report includes science funders and decision-makers (traditional and non-traditional), policy makers both within the Arctic and outside of the Arctic, environmental and health authorities and governing bodies. The report is also intended for both the scientific community, including the next generation of Arctic researchers, and indigenous and local peoples in the Arctic.

The IASC Founding Articles call for IASC to host international research planning conferences periodically in order to “review the status of Arctic science, provide scientific and technical advice, and promote cooperation and links with other national and international organizations.” Ten years after ICARP II [Bowden et al. 1997] and 20 years after ICARP I [IASC 1996a and 1996b], IASC’s 25th Anniversary in 2015 presented a timely opportunity for a third ICARP [Rogne et al. 2015].

ICARP III was an open process, with the opportunity for the wider Arctic community to contribute to the overall objectives. All partners who were interested in contributing in various ways were welcomed and more than 20 international bodies, including Arctic and global scientific organizations, Arctic Council Working Groups and Permanent Participants, participated in the process. The planning and implementation of ICARP III was overseen by a Steering Group composed of one representative from each of the ICARP III partner organizations and the IASC Working Groups [see Annex 1 for the list of ICARP III partners and Steering Group members]. Secretarial support was provided by IASC.

ICARP III did not undertake the development of new science plans, but rather built on the many comprehensive science plans that already exist and complemented them with processes to identify gaps that may need attention. Considering the outcomes of ICARP II, the recent International Polar Year 2007-2008 [IPY] assessment [Krupnik et al. 2011] and other upcoming and new initiatives, ICARP III provided a process for:

- Integrating priorities for forward-looking, collaborative, interdisciplinary Arctic research and observing, and for
- Establishing an inventory of recent and current synthesis documents and major developments in Arctic research.

ICARP III was not a single conference, but rather a process that began with a launch event at Arctic Science Summit Week [ASSW] 2014 in Helsinki [Finland] and culminated in a final conference at ASSW 2015 in Toyama [Japan]. Held from 23-30 April, this final conference brought together more than 700 international scientists, students, policy makers, research managers, indigenous peoples and others interested in developing, prioritizing and coordinating plans for future Arctic research. The opening session included welcoming remarks from several dignitaries, including the Honorary Chairperson of ASSW 2015, Her Imperial Highness Princess Takamado of Japan. The symposium included 26 scientific sessions and involved scientists from 27 countries. The key issues that emerged from these discussions were presented in the Toyama Conference Statement [Annex 2].

The overall program for ICARP III included workshops, townhall meetings, outreach activities, symposia and other events during 2014/15, focusing on specific topics that contribute to the ICARP III objectives. It was structured under four themes:

- 1) Climate System and Transformations;
- 2) Societies and Ecosystems;
- 3) Observing, Technology, Logistics and Services; and
- 4) Outreach and Capacity Building.

## Developing a Roadmap for Future Arctic Research



Photo: Ilya Abramov

Each ICARP III partner contributed by organizing specific events and activities. An inventory of ICARP III activities is provided in Annex 3. Summaries of the individual activities, including reports and publications, are available on the ICARP III website <http://icarp.iasc.info>.

Working with people who live in or near the Arctic and building constructive relationships between producers and users of knowledge were key elements of ICARP III. In that respect, the involvement of indigenous participants in the ICARP III process was of particular importance. To ensure indigenous participation in ASSW and in the ICARP III Symposium, the ICARP III Steering Group worked closely with the Arctic Council Indigenous Peoples Secretariat [IPS]. Four of the Arctic Council’s Permanent Participants were represented at the ICARP III Symposium, namely the Aleut International Association [AIA], Inuit Circumpolar Council [ICC], Russian Association of Indigenous Peoples of the North [RAIPON] and Saami Council.



# Arctic Research Priorities for the Next Decade

**B**ased on an assessment and analysis of ICARP III activities and national science plans that fed into the planning [Canadian Polar Commission 2014, Japan Consortium for Arctic Environmental Research 2015] and on the discussions at the final ICARP III conference in Toyama in 2015, this report presents the key messages that emerged from the ICARP III process.

## [1] The Role of the Arctic in the Global System

The Arctic's climate system is experiencing the most rapid changes due to climate change. These accelerated changes are still not fully understood, yet they cascade throughout the entire global climate system, impacting weather and ecosystems as well as commerce and geopolitics, including in the more temperate regions. In order to address current gaps in understanding of these rapid changes and connections to other regions of the globe, we need an approach that spans disciplines, scales and diverse knowledge systems in future research activities. In particular, the physical linkages of the tightly coupled atmosphere-ocean-ice system in the Arctic and its relation to the global climate system need to be further explored. It is important to note that this coupled system also includes the interactions with ice and snow on land and permafrost. Furthermore, the interplay between the physical and ecological spheres in such a rapidly changing environment needs to be investigated in more detail to ensure societal preparedness for a transformed Arctic, both in terms of ecology and natural resources. Research priorities are:

- Assessing and understanding rapid Arctic climate change and Arctic amplification, including their impact on atmosphere and ocean circulation and connections to the global climate system;

- Focusing on the dramatically shrinking sea ice cover, understanding the origins of this change and its impact on the extra-Arctic and the global climate system;
- Improving our understanding of the physical interrelation between the Arctic and the extra-Arctic, e.g., by assessing the impact of the mid-latitudes on Arctic amplification and vice versa;
- Enhancing our understanding of the fully coupled physical climate system [atmosphere-ocean-ice] on diverse space and time scales and the physical mechanisms of Arctic amplification and its connection to mid-latitude extremes of episodic nature and the factors influencing severe weather events;
- Linking studies across all spheres: biosphere, social sphere and the physical spheres [atmosphere, hydrosphere, cryosphere, lithosphere, political and economic systems, etc.]; and
- Defining worldwide implications of a globalized Arctic within the Anthropocene.

## [2] Observing and Predicting Future Climate Dynamics and Ecosystem Responses

The magnitude of the environmental and socio-economic changes observed in the Arctic calls for a significant shift in focus towards understanding the consequences of these changes and advancing our ability to provide knowledge for decision-makers. Therefore, it is critical to anticipate changes and develop adaptation actions rather than to just respond to them. To do so, increased and sustained observations must

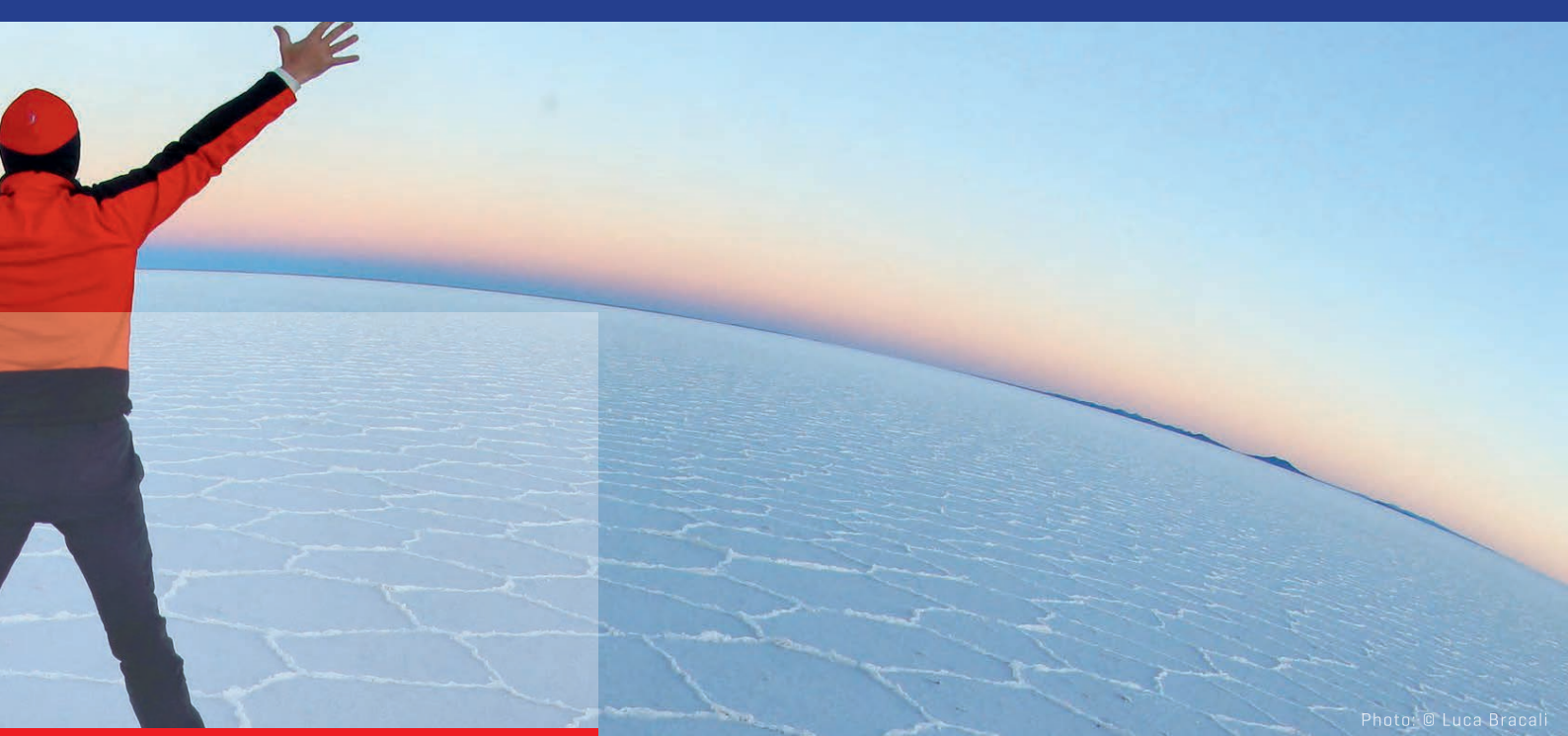


Photo: @ Luca Bracali

be made and integrated with new and innovative modeling approaches to provide more timely information to Arctic residents and policy-makers alike. The Arctic requires a collaborative, co-designed and integrated Arctic observing system of systems, relying on concerted ground observations, remote sensing, modeling and traditional and local knowledge. Examples of building blocks for this observing system of systems include the Multidisciplinary drifting Observatory for the Study of Arctic Climate Change [MOSAIC], the Circumpolar Biodiversity Monitoring Program [CBMP], the Pacific Arctic Group [PAG] Climate Observatory System and the Global Terrestrial Network for Permafrost [GTN-P]. This observing system of systems should form the foundation for renewed efforts to develop coupled environmental and socio-economic models, with a focus on predictions at the local, regional and circumpolar level. Focus should be given to:

- Establishing a robust, sustained, co-designed and participatory observing system of systems, as reflected in the ongoing efforts of Sustaining Arctic Observing Networks [SAON], relying on existing and new networks and infrastructure and innovative experiments to generate environmental and socio-economic observations to improve our ability to predict local, regional and global processes;
- Establishing flagship observatories as part of this observing system of systems to provide comprehensive measurements over the entire Arctic region;
- Developing an international agreement for standards and maintenance of key observing systems;
- Supporting international efforts to make Arctic data and metadata easily accessible, such as the SAON/ IASC Arctic Data Committee [ADC];
- Facilitating knowledge transfer between environmental, socio-economic and traditional and local knowledge, making use of platforms, such as the CryoNet component of the Global Cryosphere Watch [GCW], the International Network for Terrestrial Research and Monitoring in the Arctic [INTERACT] and the Circumpolar Arctic Coastal Communities Observatory Network [CACCON];
- Supporting the development and deployment of new technology to improve our understanding of the physical, ecological and social environments of the Arctic, including unmanned vehicles, remote sensing, autonomous systems and telemedicine, among others;
- Focusing on fully coupled modeling, i.e., air-ice-sea interactions, in order to provide reliable weather forecasts, decadal predictions and rapid prediction of extreme events as a major contribution to the Year of Polar Prediction [YOPP], allowing the development of tools required to facilitate rapid decision-making at local, regional and global scales;
- Fully integrating ice-shelf dynamics, permafrost, ecology and economics into existing modeling frameworks, including models used in the Intergovernmental Panel on Climate Change [IPCC] framework, allowing improved representation of complex processes;
- Making more effective use of traditional and local knowledge by engaging northern and indigenous communities and involving local, regional and global stakeholders in the co-design of sustained observation systems and models to help define mitigation and adaptation strategies.

### [3] Understanding the Vulnerability and Resilience of Arctic Environments and Societies and Supporting Sustainable Development

Understanding the vulnerability and resilience of Arctic environments and societies in a globalized Arctic requires increased international scientific cooperation, including contributions from non-Arctic states and organizations. New markets for Arctic resources and associated activities, including trade, tourism and transportation, will likely emerge faster than the necessary infrastructures on land and sea. Sustainable infrastructure development and innovation to strengthen the resilience of Arctic communities and ecosystems requires a collaborative approach involving scientists, including humanities scholars, communities, governments and industry, focusing on:

- Concentrating on research to harvest and manage living and non-living Arctic resources in a sustainable manner, including risk-based assessments, and to understand the consequences of continued resource development;
- Performing integrative analyses of sustainability and actionable adaptation policies and challenges for Arctic communities;
- Understanding impacts of extreme weather events that result in temporary changes, such as snow melt and have ecological and societal impacts;
- Assessing the diverse impacts of climate change and human activities on Arctic biodiversity and its consequences for ecosystem goods and services and societal impacts;
- Understanding long-term human responses to Arctic change, including in the areas of food and water security;
- Developing integrated sustainability indicators to

assess conditions and dynamics of Arctic social-ecological systems;

- Examining the role of institutions, resources, traditional and emerging economies as factors and instruments of sustainable development;
- Examining the role played by equity, agency, power and justice along key axes of difference in the Arctic, i.e., gender, age and identity;
- Examining sustainable development and infrastructure in urban areas, recognizing that with Arctic warming and greater accessibility to Arctic resources, urbanization is likely to continue.

## Overarching Messages

### Communication

Arctic science should promote collaboration across disciplines and must be communicated beyond the Arctic research community and related institutions in order to reach key stakeholders, decision-makers, the future workforce and the general public. Successful communication requires working with and leveraging the resources of professional partners. ICARP III took steps to make these scientific efforts more accessible and meaningful to a broader audience through:

- Facilitating science-policy knowledge transfer [science and traditional and local knowledge] between the research community and end-users;
- Using a variety of tools to distribute scientific knowledge;
- Creating well-defined outreach and communication efforts.

### Traditional and Local Knowledge

Indigenous peoples of the Arctic, represented through the Arctic Council's Indigenous Peoples Secretariat, understood the invitation to participate in ICARP III to be encouraging and contributed to the ICARP III process. The need for the transfer of knowledge between the scientific community and the indigenous and local peoples of the Arctic with a special focus



on traditional and local knowledge was emphasized by indigenous organizations. Recognizing the importance of this, greater effort must be made to incorporate traditional and local knowledge and to engage northern and indigenous communities in setting priorities, co-designing and co-producing research, and to disseminate this knowledge by ensuring access to research data and results.

### Capacity Building

It is essential to build long-term human capacity among researchers, decision-makers and Arctic indigenous and non-indigenous residents, to ensure relevant observations and research through training, education, effective public engagement, and the adoption of shared principles to guide research activities. The ICARP III process provided not only a platform for education and outreach activities, but also training opportunities for early career researchers and other audiences. It also provided an opportunity to analyze the effectiveness of existing capacity building activities within the science community as well as the development of a vision of Arctic research priorities from the point of view of the next generation of Arctic researchers. The results of these activities indicate several capacity building priorities for Arctic research in the next decade:

- **Developing more training, funding and networking opportunities, including connections between early career and more established researchers, as well as decision-makers and Arctic residents;**
- **Creating meaningful and longer-term involvement platforms for early career researchers and indigenous peoples in international research communities;**
- **Enabling non-Arctic countries to engage in Arctic research, helping them build their capacities and strengthen their relations with indigenous peoples and other stakeholders;**
- **Connecting and engaging researchers from different fields of science that are new to, or less represented in, Arctic research, including the humanities.**

Active participation of early career researchers and indigenous peoples is critical to the success of high-profile, interdisciplinary science, as well as public education, awareness

and engagement initiatives. In addition to strengthening existing initiatives, the international Arctic research community is therefore urged to formally establish and promote programs for meaningful and sustained engagement of early career researchers and Arctic residents.

## Concluding Remarks

While ICARP I resulted in a number of disciplinary research projects, already ICARP II highlighted that there was a “paradigm shift to a holistic and multidimensional perspective in the Arctic. This holistic perspective integrally includes the human dimension, indigenous insights, and a more complete integration of Arctic processes in the earth system”.

ICARP III encouraged participation of Arctic peoples and communities. Recognizing that Arctic science is an example to the world of the value of engaging with rights holders and stakeholders, the ICARP III process points the way to take action to help build capacity in the region and to ensure that research translates into results that will have significant local, regional and/or global impact. ICARP III concluded that the role of the Arctic in the global system, the prediction of future climate dynamics and ecosystem responses, and improved understanding of the vulnerability and resilience of Arctic environments and societies must be prioritized. Emphasis should be placed on:

- **New approaches, integrating scientific disciplines and bringing in local and regional rights holders and stakeholders in a knowledge-based dialogue through trans-disciplinarity;**
- **Co-designed, solutions-oriented science, informing policies, programs and initiatives that address major Arctic and global sustainability challenges;**
- **Comprehensive, high-quality observations of the rapidly changing Arctic.**

Such research will improve environmental risk assessments, inform mitigation strategies to address serious global threats on the fragile Arctic environment, and inform science-based guidelines for sustainable utilization of Arctic environments and resources.



Photo: Don Perovich

## References

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## List of Acronyms

<b>ADC</b>	International Arctic Science Committee/Sustaining Arctic Observing Networks Arctic Data Committee
<b>AIA</b>	Aleut International Association
<b>ASSW</b>	Arctic Science Summit Week
<b>CACCON</b>	Circumpolar Arctic Coastal Communities Observatory Network
<b>CMBP</b>	Circumpolar Biodiversity Monitoring Program
<b>GTN-P</b>	Global Terrestrial Network for Permafrost
<b>GCW</b>	Global Cryosphere Watch
<b>IASC</b>	International Arctic Science Committee
<b>ICARP</b>	International Conference on Arctic Research Planning
<b>ICC</b>	Inuit Circumpolar Council
<b>INTERACT</b>	International Network for Terrestrial Research and Monitoring in the Arctic
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IPS</b>	Arctic Council Indigenous Peoples Secretariat
<b>IPY</b>	International Polar Year 2007-2008
<b>MOSAic</b>	Multidisciplinary drifting Observatory for the Study of Arctic Climate Change
<b>PAG</b>	Pacific Arctic Group
<b>RAIPON</b>	Russian Association of Indigenous Peoples of the North
<b>SAON</b>	Sustaining Arctic Observing Networks
<b>YOPP</b>	Year Of Polar Predictions

## Annex 1: ICARP III Partners and Steering Group members

Arctic Research Consortium of the US [ARCUS]  
**Sarah Bartholow**

Arctic Council Indigenous Peoples Secretariat [IPS]  
**Carl Christian Olsen "Puju"**

Arctic Monitoring and Assessment Program [AMAP]  
**Lars-Otto Reiersen**

Association of Polar Early Career Scientists [APECS]  
**Sanna Majaneva**

Climate and Cryosphere [CliC]  
**Jenny Baeseman**

Conservation of Arctic Flora and Fauna [CAFF]  
**Tom Barry**

European Polar Board [EPB]  
**Renuka Badhe**

Forum of Arctic Research Operators [FARO]  
**Jim Drummond**

International Arctic Science Committee [IASC]  
**David Hik**  
**Volker Rachold**  
**Klaus Dethloff [Atmosphere WG]**  
**Jon Ove Hagen [Cryosphere WG]**  
**Ingibjörg Jonsdóttir [Terrestrial WG]**  
**Bert Rudels [Marine WG]**  
**Peter Schweitzer [Social and Human WG]**

International Arctic Social Sciences Association [IASSA]  
**Florian Stammer**

International Association of Cryospheric Sciences [IACS]  
**Hiroyuki Enomoto**

International Council for the Exploration of the Sea [ICES]  
**Adi Kellermann**

International Institute for Advanced Systems Analysis [IIASA]  
**Peter Lemke**

International Permafrost Association [IPA]  
**Hugues Lantuit**

International Study of Arctic Change [ISAC]  
**Peter Schlosser**

Northern Research Forum [NRF]  
**Lassi Heininen**

Ny-Ålesund Science Managers Committee [NySMAC]  
**Roland Neuber**

Pacific Arctic Group [PAG]  
**Sung-Ho Kang**

Polar Educators International [PEI]  
**Inga May**

Scientific Committee on Antarctic Research [SCAR]  
**Karin Lochte**

University of the Arctic [UARctic]  
**Chris Southcott**

ICARP I Chair  
**Oran Young**

ICARP II Chair  
**Robert Corell**

ASSW 2014 Coordinator  
**Mikko Strahlendorff**

ASSW 2015 Coordinator  
**Yuji Kodama**



## Integrating Arctic Research: A Roadmap for the Future

Arctic Science Summit Week 2015 in Toyama, Japan (23–30 April) brought together nearly 700 international scientists, students, policy makers, research managers, Indigenous Peoples and others interested in developing, prioritizing and coordinating plans for future Arctic research. The Conference was organized by the International Arctic Science Committee and the Science Council of Japan, with the support of many other international partners ([www.assw2015.org](http://www.assw2015.org)).

Several overarching messages emerged during the Conference:

- Changes in the Arctic are challenging our understanding of their consequences and our ability to provide knowledge for decision-makers.
- There needs to be a greater sense of urgency among decision-makers and awareness by the general public regarding the global importance of changes taking place in the Arctic.
- It is critical to anticipate changes in the Arctic rather than respond to them, but to do this requires sustained observations and improved understanding of local, regional and global processes. These research challenges must be addressed in a coordinated and timely manner to ensure sustainable development and resilient Arctic communities and ecosystems.
- The rapidly changing Arctic initiates changes that cascade through the global system impacting weather, commerce and ecosystems in the more temperate regions. Linkages across disciplines, scales, and diverse knowledge systems must be addressed in future research activities.
- Understanding the vulnerability and resilience of Arctic environments and societies requires increased international scientific cooperation, including contributions from non-Arctic states.
- More effective use must be made of local and traditional knowledge by engaging northern and Indigenous communities in setting priorities, the co-design and co-production of research, and the dissemination of this knowledge by ensuring appropriate access to research data and results.
- It is essential to build long-term human capacity to support relevant observations and research among scientists, decision-makers and Arctic residents, including Indigenous Peoples, through education and effective public engagement, and by adopting shared principles to guide research activities.
- New markets for Arctic resources and associated activities, including trade, tourism and transportation, will

likely emerge faster than the necessary infrastructures on land and sea. Sustainable infrastructure development and innovation to strengthen the resilience of Arctic communities requires a collaborative approach involving scientists, communities, governments, and industry.

The Toyama Conference was a critical step in an international Arctic research planning process involving hundreds of scientists from 27 countries working to improve our understanding of the consequences of changes taking place in the Arctic region, and their connection to global environmental, economic and social processes. These rapid transformations occurring in the Arctic are affecting the entire Earth system, including its climate and weather extremes, through increased temperatures and the continuing loss of ice, glaciers, snow and permafrost. New economic interests in the Arctic have established the region as a larger player in the global economy, but also with very significant local effects. In spite of rapid environmental and social change, the Arctic remains a region of geopolitical stability which is a pre-condition for sustaining Arctic research.

The Final Report from the Conference, guided by discussions and contributions from many partner organizations, will be completed later in 2015. This Report will catalyze and inform the implementation of critical, cooperative, international Arctic research programs over the next decade.



## Annex 3: Inventory of ICARP III Activities

### Theme 1: Climate System and Transformations

#### Arctic Freshwater Synthesis

Special Issue and Layman Report

Writing Team Workshops organized by IASC Network Arctic Freshwater Synthesis (AFS), Partners: Climate and Cryosphere (CliC), All IASC WGs, Arctic Monitoring and Assessment Program (AMAP)

#### Palaeo-Arctic Spatial and Temporal Gateways (PAST Gateways): a multidisciplinary, pan-Arctic network researching Arctic palaeoclimate

Trieste, Italy – 19–23 May 2014

Potsdam, Germany – 18–22 May 2015

Conferences organized by IASC Network PAST Gateways, Partners: IASC Marine, Cryosphere, Terrestrial and Atmosphere WGs, University of the Arctic, Association of Polar Early Career Scientists (APECS)

#### Emerging Questions in Geosciences

Special Publication of the Geological Society of London

organized by IASC Action Group on Geosciences, Partners: IASC Marine, Terrestrial and Social & Human WGs

#### Quantifying Albedo Feedbacks and Their Role in the Mass Balance of the Arctic Terrestrial Cryosphere

Bristol, UK – 21–23 September 2014

Workshop organized by IASC Cryosphere WG, Partners: IASC Atmosphere WG

#### Linkage between Arctic Climate Change and Mid-latitude Weather Extremes

Seattle, USA – 3–5 September 2014

Workshop organized by IASC Atmosphere WG, Partners: IASC Marine, Cryosphere and Terrestrial WGs, Climate and Cryosphere (CliC), Association of Polar Early Career Scientists (APECS)

#### Arctic snow cover changes and their consequences

Copenhagen, Denmark – 16–17 October 2014

Workshop organized by INTERACT and IASC Terrestrial WG, Partners: All IASC WGs, Climate and Cryosphere (CliC), Association of Polar Early Career Scientists (APECS)

#### Integrating spatial and temporal scales in the changing Arctic System: towards future research priorities (ISTAS)

Plouzané, France – 21–24 October 2014

Workshop organized by IASC Network Arctic in Rapid Transition (ART), Partners: All IASC WGs, Association of Polar Early Career Scientists (APECS), Permafrost Young Researchers Network (PYRN)

#### Seasonal Ice Cover in the Arctic Ocean: changes and consequences

Woods Hole, USA – 20–21 October 2014

Workshop organized by IASC Marine WG, Partners: IASC Cryosphere and Atmosphere WGs

#### Greenland Ice Sheet / Ocean Interaction

Bremerhaven, Germany – 8–9 December 2014

Workshop organized by IASC Marine WG, Partners: IASC Cryosphere and Atmosphere WGs, Ice Sheet Mass Balance and Sea Level (ISMSS)

#### Planning for MOSAiC – the Multidisciplinary drifting Observatory for the Study of Arctic Climate

Various locations – 2014/2015

Planning meetings organized by IASC Atmosphere WG, Partners: IASC Cryosphere and Marine WGs and various partner organizations

#### Permafrost Research – A Roadmap for the Future

Consultation Process organized by the International Permafrost Association (IPA)

Partners: Climate and Cryosphere Project (CliC), Scientific Committee on Antarctic Research (SCAR), United Nations Environment Program (UNEP), IASC Cryosphere WG

### Theme 2: Observing, Technology, Logistics, Services

#### 4th European Marine Board Forum Arctic 2050 – Toward ecosystem-based management in a changing Arctic Ocean

Brussels, Belgium – 12 March 2014

Symposium organized by European Marine Board / European Polar Board (EMB/EPB)

#### Technology and Innovation Session at Arctic Observing Summit

Helsinki, Finland – 10 April 2014

Session organized by Forum of Arctic Research Operators (FARO)

#### ESA-CliC Earth Observation and Arctic Science Priorities

Tromsø, Norway – 20 January 2015

Workshop organized by ESA (European Space Agency) and CliC (Climate and Cryosphere Project)

#### Collaboration and coordination within the Ny-Ålesund Atmosphere Flagship Program

Potsdam, Germany – 8–9 October 2014

Workshop organized by Ny-Ålesund Science Managers Committee (NySMAC)

#### Towards a coordinated Research and Monitoring Program for Ny-Ålesund

Tromsø, Norway – 8–9 January 2015

Workshop organized by Ny-Ålesund Science Managers Committee (NySMAC)

#### The Pacific Arctic Group Climate Observing System

Seattle, USA – 27 October 2014

Workshop organized by the Pacific Arctic Group (PAG)

#### Arctic Observing Summit

Biannual forum and workshop organized by the International Study of Arctic Change

(ISAC), IASC and Sustaining Arctic Observing Networks (SAON)

### Theme 3: Societies and Ecosystems

#### Permafrost Dynamics and Indigenous Land Use

Helsinki, Finland - 6-7 April 2014

Workshop organized by IASC Social & Human WG, Partners: IASC Cryosphere and Terrestrial WGs

#### Circumpolar Arctic Coastal Communities Observatory Network (CACCON)

Copenhagen, Denmark - 14-16 April 2014

Workshop organized by IASC Network Arctic Coastal Dynamics (ACD), Partners: All IASC WGs, Land-Ocean Interactions in the Coastal Zone (LOICZ), International Arctic Social Sciences Association (IASSA)

#### Arctic Science in Globalization: Beyond IPY 2007-2008

Reykjavik, Iceland - 31 October 2014 and Toyama, Japan - 29 April 2015

Session at Arctic Circle Conference organized by Northern Research Forum (NRF)

#### Arctic Biodiversity Congress

Trondheim, Norway, 2-4 December 2014

Congress organized by Conservation of Arctic Flora and Fauna (CAFF) Working Group of the Arctic Council

#### Culture and Arctic Climate Change - Integrating Long-Term Perspectives from Archaeology and the Environmental Sciences

San Francisco, USA - 15 December 2014

AGU Conference Session organized by IASC Social and Human WG, Partners: All IASC WGs, IASC Polar Archeology Network, Association of Polar Early Career Scientists (APECS)

#### Rapid Arctic Transitions due to Infrastructure and Climate Change (RATIC)

Ottawa, Canada - 8-12 December 2014 and Toyama, Japan - 23-30 April 2015

Workshops organized by IASC Terrestrial WG, Partners: IASC Cryosphere and Social & Human WGs

#### Community Consultation on Arctic Research Priorities

2014/2015

Consultation Process organized by the University of the Arctic

#### Understanding Sustainability in the Arctic

Charleston, USA - 6-11 February 2015

Transdisciplinary workshop organized by International Arctic Social Sciences Association (IASSA)

#### ArcticSTAR: Solution-oriented, Transdisciplinary Research for a Sustainable Arctic

Future Earth seed project organized by the International Study of Arctic Change (ISAC) and various partners.

#### Responding to Change Activities

Workshops 2012-2014 organized by the International Study of Arctic Change (ISAC)

#### Arctic Ecosystems Integrated Assessments

Various planning meetings 2015 and 2016 organized by the International Council for the Exploration of the Sea (ICES)

### Theme 4: Outreach and Capacity Building

#### Arctic Science Summit Week: Common Day ASSW 2014

Helsinki, Finland - 8 April 2014

Symposium organized by IASC and ICARP III Partner Organizations

#### Townhall at 8th International Congress of Arctic Social Sciences

Prince George, Canada - 23 May 2014

Townhall meeting organized by International Association of Social Sciences (IASSA)

#### APECS - CliC - Where are they now?

Tromsø, Norway - May/June 2014

Writing Team Workshop organized by Association of Polar Early Career Scientists (APECS), Partner: Climate and Cryosphere (CliC), IASC

#### Permafrost Young Researchers Workshop

Evora, Portugal - 18 June 2014

Workshop organized by Permafrost Young Researchers Network (PYRN), Partners: Association of Polar Early Career Scientists (APECS), International Permafrost Association (IPA), Climate and Cryosphere (CliC)

#### Townhall at 4th European Conference on Permafrost

Evora, Portugal - 19 June 2014

Townhall meeting organized by International Permafrost Association (IPA)

#### ICARP III FrostBytes - Soundbytes of Cool Research

2014/2015

Communication Activity organized by the Climate and Cryosphere (CliC) project, Partner: Association of Polar Early Career Scientists (APECS), Permafrost Young Researchers Network (PYRN), Arctic Development and Adaptation to Permafrost in Transition (ADAPT), Changing permafrost in the Arctic and its Global Effects in the 21st Century (PAGE21), IASC

#### ICARP III Survey: Arctic Early Career Researchers Support and Training Assessment

2014/2015

Capacity building activity organized by Association of Polar Early Career Scientists (APECS)

#### Goals of ICARP III - the future of Arctic research from the early career researchers' point of view

Toyama, Japan - April 2015

Workshop organized by Association of Polar Early Career Scientists (APECS), Partners: All IASC WGs, IASC Network Arctic in Rapid Transition (ART), Permafrost Young Researchers Network (PYRN)

#### ARCUS Outreach and Communication

Various activities organized by the Arctic Research Consortium of the United States

#### Arctic major future tasks in terms of polar education & outreach

Various activities organized by the Polar Educators International (PEI)



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Photo: Michael Hardwood



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