Terrestrial - Multidisciplinary distributed Observatories for the Study of Arctic Climate

December 11th, 2017

Québec City Convention Centre

IASC

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

CENTRE D'ÉTUDES NORDIQUES
CEN Centre for Northern Studies

UNIVERSITÉ LAVAL

TÉCNICO LISBOA

INTERACT

Sentinel North

NUNATARYUK

2007 2017 Celebrating 10 years APECS Association of Polar Early Career Scientists

PRN Permafrost Researchers Young Network

What is T-MOSAiC?

T-MOSAiC has been proposed as a pan-Arctic, land-based program that would extend the activities that are currently in advanced planning for the IASC flagship program **MOSAiC**: 'The Multidisciplinary drifting Observatory for the Study of Arctic Climate'. MOSAiC is a multinational year-round study (2019-2020; http://www.mosaicobservatory.org/) of the central Arctic Ocean to measure the coupling between atmosphere, sea ice, ocean and ecosystem processes.

The objective of the satellite program T-MOSAiC is to coordinate complementary activities that could both aid and benefit from MOSAiC (especially the modelling components) by extending the work to the lands surrounding the Arctic Ocean and to the northern communities who live on those lands.

T-MOSAiC is relevant to many themes in all working groups of the International Arctic Science Committee (**IASC**), for example in the terrestrial sciences such as "estimating past changes in Arctic geodiversity and biodiversity, measuring current change and predicting future changes ". It is relevant to the cryosphere sciences because it includes measuring and modelling permafrost, snow and glacier mass balance across different scales, and projecting the "future state of the Arctic cryosphere ". It is highly relevant to IASC Social and Human sciences, especially "Arctic residents and change" because of the effect of changing climate on snow and permafrost that affect ecosystem services such as drinking water and country foods, and geosystem services such as the permafrost foundation that underpins buildings, pipelines and transport infrastructure.

The aims of this IASC-supported first open meeting are to discuss the science and implementation plans for T-MOSAiC, and to identify ways that researchers and northern research programs could participate.

Some of this workshop discussion items include:

- What will be T-MOSAIC objectives in the short and long term, including but not limited to coordination of existing activities and the production of syntheses?
- What overarching hypotheses and specific scientific questions will T-MOSAiC address?
- How will T-MOSAiC link with MOSAiC in terms of timing, physical process measurements (e.g., atmospheric circulation, spatial air mass transformation).
- What is the vision for funding of activities and participation, and how will different activities be coordinated relative to the MOSAiC plan of centralized interdisciplinary measurements on and around the icebreaker PolarStern in the Arctic Ocean during 2019-2020?

Potential implementation activities that will be discussed during the workshop will include:

- Land-based stations in the circumpolar Arctic have a long history of ongoing environmental measurements, include climate, cryosphere and ecological variables, and these records before, during and after MOSAiC will help place the Arctic Ocean/atmosphere observations in a longer term, pan-Arctic context for modelling and interpretation. There is therefore a need to identify relevant environmental monitoring data archives, programs and projects; e.g., INTERACT, Nunataryuk, GTN-P, Pangaea, Nordicana-D, Polar Data Catalogue, Sentinel North, Gradient North, ESA GlobPermafrost, NASA ABoVE, NSF NEON, NSF LTER, ArcticWEB, SAON, ISAC and GCW.
- The observation network 'International Arctic Systems for Observing the Atmosphere' (IASOA: https://www.esrl.noaa.gov/psd/iasoa/) is already coordinating atmospheric measurements of direct relevance to MOSAiC and will be a key element of T-MOSAiC.
- Development of conceptual models relating the vulnerability of northern infrastructure and ecosystems to sea-ice and climate change, building on the progress in RATiC to date (IASC SHWG, TWG and CWG).
- Measurements of relevant land-based state and process variables during the MOSAiC activity period should be identified, including biological data (e.g., via ITEX, Herbivory Network, ArcticWEB, NASA ABoVE, NEON, and LTER).

- MOSAiC is based on a drifting transect analysis of the Arctic Ocean, and transect analyses are underway in the terrestrial environment that could provide land-based equivalents; e.g., from the coast to continental interior, from high to lower latitudes (such as Gradient North Canada), and across East-West gradients (e.g. the Siberian Transect), to better understand the terrestrial extent of impacts caused by changes in the Arctic Ocean.
- Formulation of synthesis papers that consider the implications of Arctic sea ice change for land-based systems (including northern communities, cities, infrastructure, wildlife), and the reciprocal effects of changing landscapes, the terrestrial cryosphere and human activities on the Arctic Ocean.
- MOSAiC comes at a time of critical decision-making for global climate policies; T-MOSAiC may offer additional opportunities for public engagement and outreach.

Finally, T-MOSAiC will also be an excellent opportunity for early-career Arctic researchers to develop their expertise and network of professional contacts in a multidisciplinary, highly international context, including by way of the proposed workshop, and to be part of a major IASC initiative.

The 2018 Davos T-MOSAiC workshop will build on the progress to date and will provide the important next step in planning. Its specific aim will be to develop the cross-cutting nature of this activity involving all IASC WGs, with emphasis on the development of an Implementation Plan. This will also require some refining of the Scientific Plan to incorporate new ideas on multidisciplinary activities, and on including Indigenous perspectives and, where appropriate, research priorities.

T-MOSAiC Workshop Program

Morning (*Room 303A*)

9:00-12:00h – Steering Committee closed meeting (members listed below)

Afternoon open meeting (*Room 302B)*

1st Session – Scopus of T-MOSAiC

13:00-13:05h – Welcome (WV)

13:05-13:15h – T-MOSAiC presentation (JC)

13:15-13:35h – MOSAiC (Taneil Uttal, USA)

13:35-13:45h – Questions/Discussion

13:45-14:00h – T-MOSAiC / Human Perspectives (Gail Fondahl, Canada)

14:00-14:15h - T-MOSAiC / Cryosphere Perspectives (Gonçalo Vieira, Portugal)

14:15-14:30h - T-MOSAiC / APECS Perspectives (Gerlis Fugmann, Germany)

14:30-15:00h – Open Discussion (WV+JC+Presenters)

COFFEE BREAK

2nd Session - Opportunities for Collaboration

15:30-15:45h – INTERACT (Margareta Johanssen, Sweden)

15:45-16:00h – Siberian Mega-Transect (Sergey N. Kirpotin, Russia)

16h00-16h15 – Canadian Gradient North (Joël Bêty, Canada)

16:15-16:30h – Sentinel North (Sophie Larochelle, Canada)

16:30-16:45h – Nunataryuk (Hugues Lantuit, Germany)

16:45-17:20h – Open discussion (WV+JC+Presenters)

17:20-17:30h – Davos workshop + Closing (WV+JC)

T-MOSAiC Steering Committee (provisional)

- João Canário (Chair)

  Instituto Superior Técnico – University of Lisbon, Portugal
- Warwick Vincent (Co-chair)

  Centre for Northern Studies – University Laval, Canada
- Gail Fondahl

  University of Northern British Columbia, Canada
- Gonçalo Vieira

  IGOT – University of Lisbon, Portugal
- Greg Henry

  University of British Columbia, Canada
- Hugues Lantuit

  Alfred Wegener Institute (AWI), Potsdam, Germany
- James Drummond

  Dalhousie University, Canada
- Josef Elster

  University of South Bohemia, Czech Republic
- Julia Boike

  Alfred Wegener Institute (AWI), Potsdam, Germany
- Margareta Johanssen

  INTERACT, Sweden
- Marie-José Naud

  CEN/UQAR, Canada
- Phil Wookey

  University of Sterling, United Kingdom
- Sergey N. Kirpotin

  National Research Tomsk State University, Russia
- Vladimir Romanovsy

  University of Alaska – Fairbanks, USA
- *Taneil Uttal*

  NOAA, Boulder, Colorado, USA
- Ulrike Herzschuh

  Alfred Wegener Institute (AWI), Potsdam, Germany

APECS T-MOSAiC Committee (provisional)

- Aletvina Evgrafova

  IASC TWG Fellow, Switzerland

- Gerlis Fugmann

  APECS International

- Michel Paquette

  University of Montreal, Canada

- Pedro Freitas

  IGOT – University of Lisbon

- Scott Zolkos

  IASC TWG Fellow, Canada