

**Terrestrial Multidisciplinary distributed Observatories for  
the Study of Arctic Connections**

# T-MOSAiC





# T-MOSAiC - Background

Terrestrial Multidisciplinary distributed Observatories  
for the Study of Arctic Connections



An entire year trapped in the Arctic ice

The largest Central Arctic expedition ever



600 participants

During the expedition, RV Polarstern will be resupplied by 4 icebreakers: Akademik Fedorov (RUS), Admiral Makarov (RUS), Oden (SWE), Xue Long (CHN).



The following 17 nations will participate in the expedition:





# T-MOSAiC - Background

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Terrestrial  
consequences of  
Arctic sea ice and  
climate change on:

- geosystems
- ecosystems
- human systems

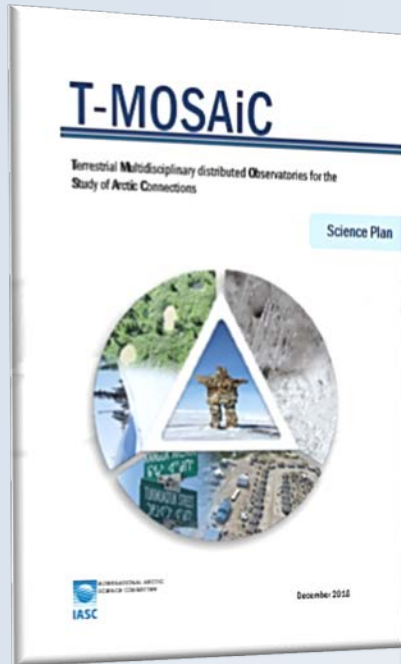


Main year for  
activities:  
**2020**  
to allow  
overlap with  
**MOSAiC**



# T-MOSAIc - Background

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Science Plan

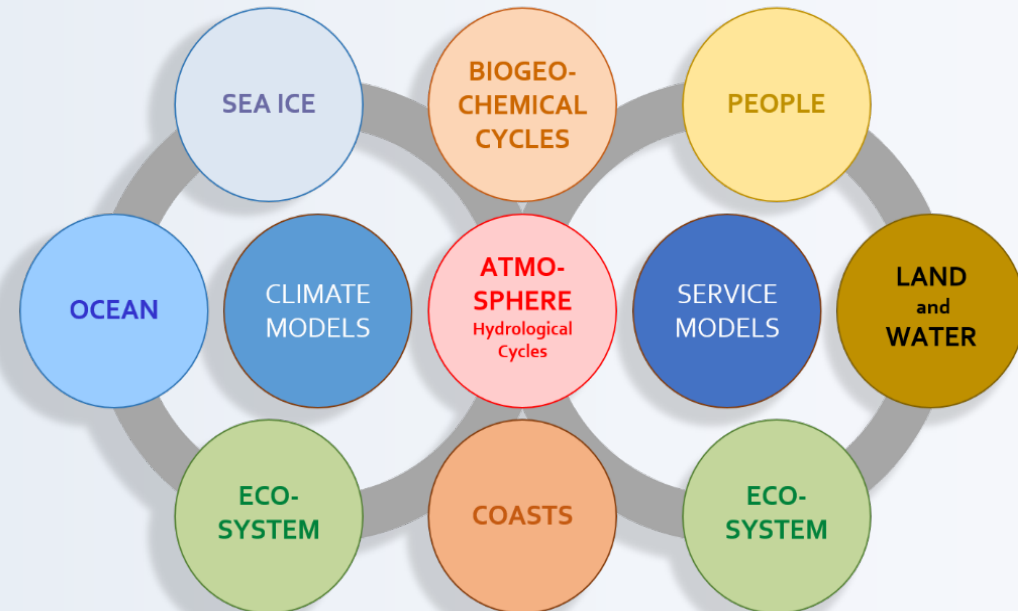
T-MOSAIc has core objectives, but is flexible to allow other projects/activities

MOSAIc

Multidisciplinary **drifting** Observatory  
for the Study of **Arctic Climate**

T-MOSAIc

Terrestrial Multidisciplinary **distributed** Observatories for  
the Study of Arctic Connections



Uttal-Rex Diagram

# T-MOSAiC Action Groups

>10 Different Action Groups

Promoting different approaches to these system-level themes;

Both ECR and Indigenous participation, along with established researchers

Collaborative outputs: data exchange and syntheses, new and ongoing measurements, methods development, modeling, synthesis papers....



# T-MOSAiC Action Groups

For example: Arctic Gas Fluxes



## Arctic Gas Fluxes AG

(Zackenberg, NE Greenland. Active thermokarst development in this valley has profound implications for trace gas exchange both in the terrestrial, downstream riverine and near coastal ecosystems (background) - Photo: Lars Holst Hansen)

### Chairs



**Torben Røjle Christense**  
Aarhus University  
Denmark  
[Contact](#)



**Sally MacIntyre**  
University of California Santa Barbara  
USA  
[Contact](#)

### Scope

The trace gas action group will focus on campaigns in terrestrial and limnic environments during 2020-2021, which will relate to studies of regional trace gas exchanges in the Arctic at a large scale thus including the ocean interactions.

It will also consider issues relating to lateral transport of terrestrial organic carbon through riverine systems to the near coastal



### Potential Activities

*Under construction*

### Members *(updated regularly)*



**Kim Wickland**  
Ecosystem Carbon Cycle  
United States  
[Contact](#)



**Thomas Friberg**  
Micrometeorology, eddy covariance fluxes  
Denmark  
[Contact](#)



**Lori Bruhwiler**  
Atmospheric Trace Gas Modelling  
United States  
[Contact](#)



**Efrén Lopez-Blanco**  
Carbon Cycling Modelling  
Denmark  
[Contact](#)



**Isabelle Laurion**  
Freshwater Ecology  
Canada  
[Contact](#)



**Robert Striegl**  
Aquatic Biogeochemistry  
Denmark  
[Contact](#)



**Patrick Crill**  
Trace Gas Biogeochemistry  
Sweden  
[Contact](#)



**Timo Vesala**  
Energy and Greenhouse Gas Flux Monitoring  
Finland  
[Contact](#)



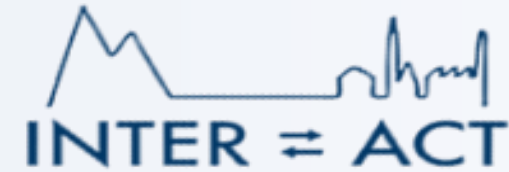
*Under construction*

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# Collaborators

## Connections:

- T-MOSAiC welcomes ideas for collaboration and new connections
- Discussion and feedback from our partners is essential.
- The work of all collaborators must be acknowledged and credited appropriately.



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# INTERACT / T-MOSAIC Collaboration

Station Managers have an opportunity to play a key role in this collaboration



Connect monitoring, data and expertise from many station sites around the Arctic

## Possible activities

- Sharing of existing data
- Key measurements during 2020
- Synthesis papers
- Collaborative sampling
- Other ideas?

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# **INTERACT / T-MOSAiC Collaboration**

**Compilation of climate data from all ground stations  
(including all INTERACT sites) for the period  
2019-2020**

**This would be valuable for terrestrial scientists as well as for  
MOSAiC modellers**

- **Example of sharing of existing data**

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# INTERACT / T-MOSAiC Collaboration

- Example of sharing of existing data



or other existing archive?

One option to discuss is compilation of data for this period in Nordicana D, an online DOI-referenced data archive series at CEN, a Canadian INTERACT partner. This has an online data entry system that includes information on instrumentation. Each station could have a DOI-referenced archive for this period, as a citable unit. These could be collected under a master DOI referenced archive jointly authored by INTERACT and T-MOSAiC.

- Resources are available now at CEN/CCADI to make this compilation
- Minimizes input work by station managers, while assuring formal attribution to the station.
- Can handle different instrumentation, protocols and standards (unlike WMO archives)

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# **INTERACT / T-MOSAiC Collaboration**

- **Examples of collaborative measurements**
  - \* **Snow measurements in 2020**
  - \* **Active layer depth measurements**
  - \* **Other essential climate variables (ECVs)**
  - \* **Other ecosystem/geosystem variables**
  - \* **Automated camera imagery**

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# INTERACT / T-MOSAIC Collaboration

- Examples of sample collection
  - \* Microbiological samples (with provided material)
  - \* Microplastics (with provided material)
  - \* Dust samples
  - \* Other biological samples – e.g. *Nostoc*

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## **INTERACT / T-MOSAiC Collaboration**

Other ideas welcome for joint panArctic activities

**What additional information would you need to collaborate with T-MOSAiC?**

# Remote Sensing AG

Chairs: Gonalo Vieira (Portugal), Annett Bartsch (Austria), Isla Meyers-Smith (United Kingdom)

The **T-MOSAiC Remote Sensing AG** is searching for interested partners from **INTERACT**, including Indigenous and local communities, for the co-design of an application to the **European Space Agency** for developing **Earth Observation derived products** that answer specific local or regional environmental issues in the Arctic, **for example:**

- Landcover mapping
- Geomorphical mapping
- Permafrost models
- Soil moisture
- Infrastructure mapping

## Contact:

T-MOSAiC Secretariat  
for further details.

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# T-MOSAiC 2020

**This timeframe is purposefully intended to overlap with the MOSAiC program**

**T-MOSAiC welcomes new participants!**

Provides a unique opportunity to collaborate, develop merged data sets, synthesis activities and circumpolar connections for a greater understanding of the fast changing Arctic.



**ASSW 2021**  
**Lisbon, Portugal**



# T-MOSAiC

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