T-MOSAiC

Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Connections

T-MOSAiC
Open Workshop
at ArcticNet 2021

https://www.t-mosaic.com

Quebec City, 6 December 2021

Photocredit :
João Canario, Chair of T-MOSAiC

ArcticNet
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Sentinel North

Institut nordique du Québec
Together for the North

FCT Fundação para a Ciência e a Tecnologia

T-MOSAiC Workshop VI of VI

IASC

Sentinel North

CFN

Université Laval

U Lisboa
Universidade de Lisboa

T-MOSAiC Secretariat

FCT Fundação para a Ciência e a Tecnologia

MOSAiC → T-MOSAiC

Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Connections

IASC

International
Arctic
Science
Committee

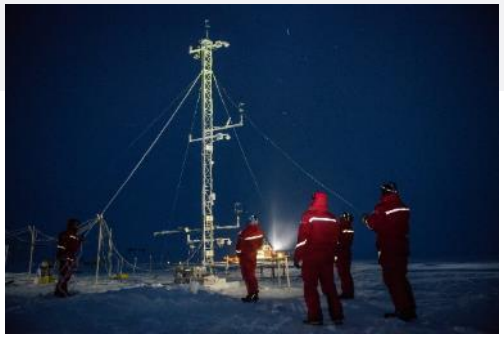
An entire year trapped in the Arctic ice

The largest Central Arctic expedition ever

AWI
ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

MOSAiC

600 participants



T-MOSAiC

Terrestrial **M**ultidisciplinary distributed **O**bservatories for the **S**tudy of **A**rcti**c** **C**onnections

Science Plan:
https://www.t-mosaic.com/science.html

Inuit stone figure at Kuujjuarapik-Whapmagoostui, Quebec, Canada. Photocredit: João Canario, Chair T-MOSAiC

T-MOSAiC

Terrestrial **M**ultidisciplinary distributed **O**bservatories for the **S**tudy of **A**rcti**c** **C**onnections

Four central objectives

1) Connect observations
2) Develop new approaches
3) Identify gaps and priorities
4) Apply system-level concepts

Science Plan:
https://www.t-mosaic.com/science.html

Inukshuk at Kuujjuarapik-Whapmagoostui, Quebec, Canada.
Photocredit: João Canario, Chair T-MOSAiC

T-MOSAiC

Terrestrial **M**ultidisciplinary distributed **O**bservatories for the **S**tudy of **A**rcti**c** **C**onnections

AGENDA

1. Welcome and workshop objectives
   (Warwick & João)
2. **Action Group (AG) reports**, highlights and wrap-up summaries (AG chairs)
3. Status of the **T-MOSAiC special issues**
   (João, Gonçalo, Anne/Jérôme & Warwick)
4. '**Beyond T-MOSAiC**' and ASSW2022
   (João)
5. Discussions and close

T-MOSAiC Action Groups

Arctic Trace Gases
Chairs: Torben Christensen (DNK) and Sally McIntyre (USA)

Arctic Microbiomes
Chairs: Anne Jungblut (GBR), Birgit Sattler (AUT) and Jérôme Comte (CAN)

Arctic Transects
Chairs: Sergey Kirpotin (RUS), Warwick Vincent (CAN) and Guido Grosse (GER)

Coastal processes
Chair: Hugues Lantuit - Germany

Remote sensing
Chairs: Gonçalo Vieira (PRT) and Annette Bartsch (AUT)

Permafrost thaw
Chairs: Julia Boike (GER), Sarah Chadburn (GBR) and Simon Zwieback (USA)

Data systems and modelling
Chair: Peter Pulsifer - Canada

Paleoclimate/ecology
Chairs: John Smol (CAN) and Bianca Perren (GBR)

Land-Water processes
Chairs: Jasmine Saros (USA) and Jorien Vonk (NLD)

Northern community issues
Chair: Maribeth Murray - Canada

Arctic infrastructure
Chairs: Donald A. Walker (USA) and Peter Schweitzer (AUT)

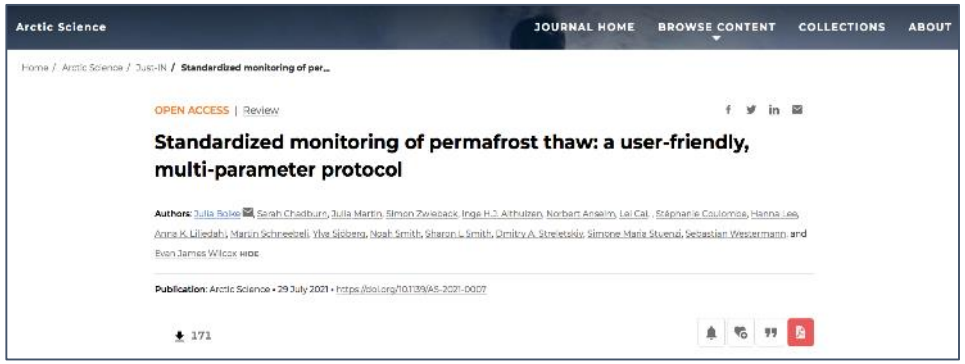
Crosscutting
Chair: Andrey Petrov - (USA)

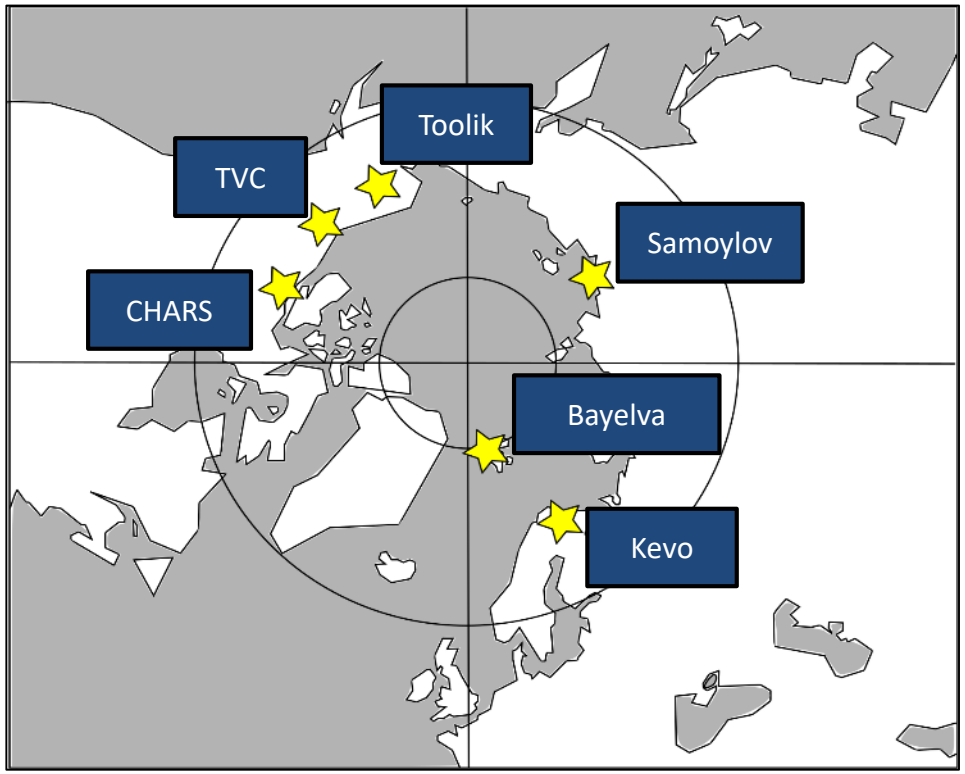
T-MOSAiC Permafrost Thaw Action Group

Julia Boike, Sarah Chadburn, Simon Zwieback and Julia Martin

Activities in 2021 included:

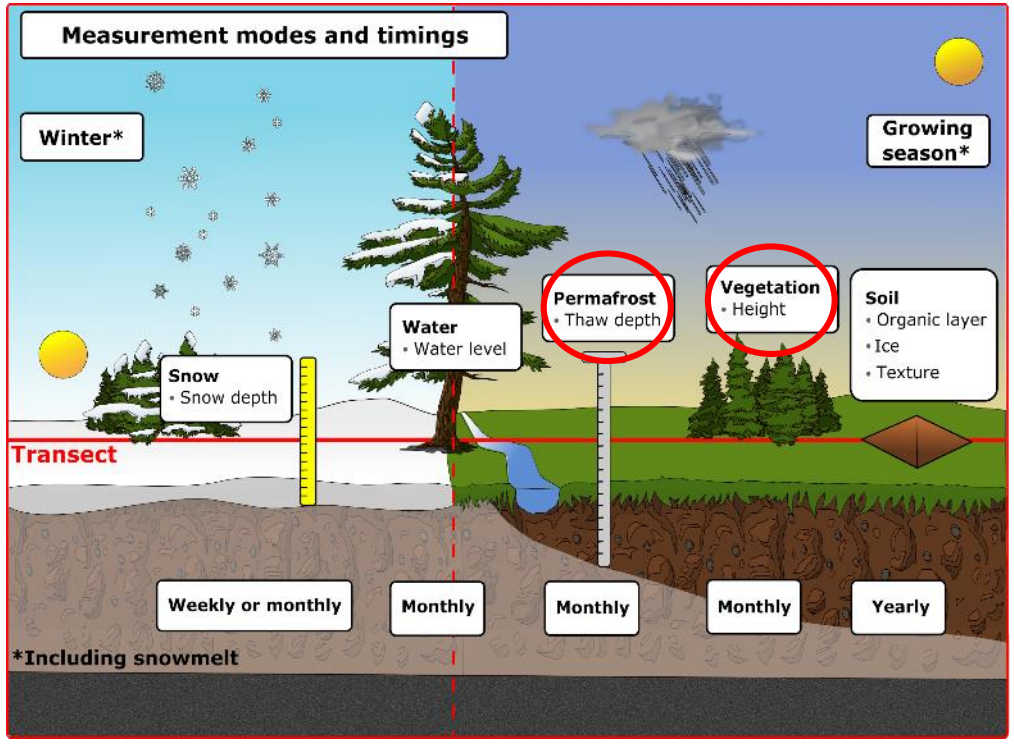
- paper and protocol
  https://cdnsciencepub.com/doi/full/10.1139/as-2021-0007
- mobile app
  https://play.google.com/store/apps/details?id=de.awi.permafrost&gl=DE
  https://apps.apple.com/us/app/mythaw/id1578278222?ign-mpt=uo%3D2
- database (7 stations so far)
  https://dashboard.awi.de/?dashboard=10738
- video tutorials
  https://www.youtube.com/watch?v=Vpgdfys-XU4
  https://www.youtube.com/watch?v=G5dbh6Pix8o
  https://www.youtube.com/watch?v=zTsk5NWmkdk
- Submitted **INTERACT remote access proposal** for Western Arctic Research Center & Spasskaya Pad (30. 11.2021)



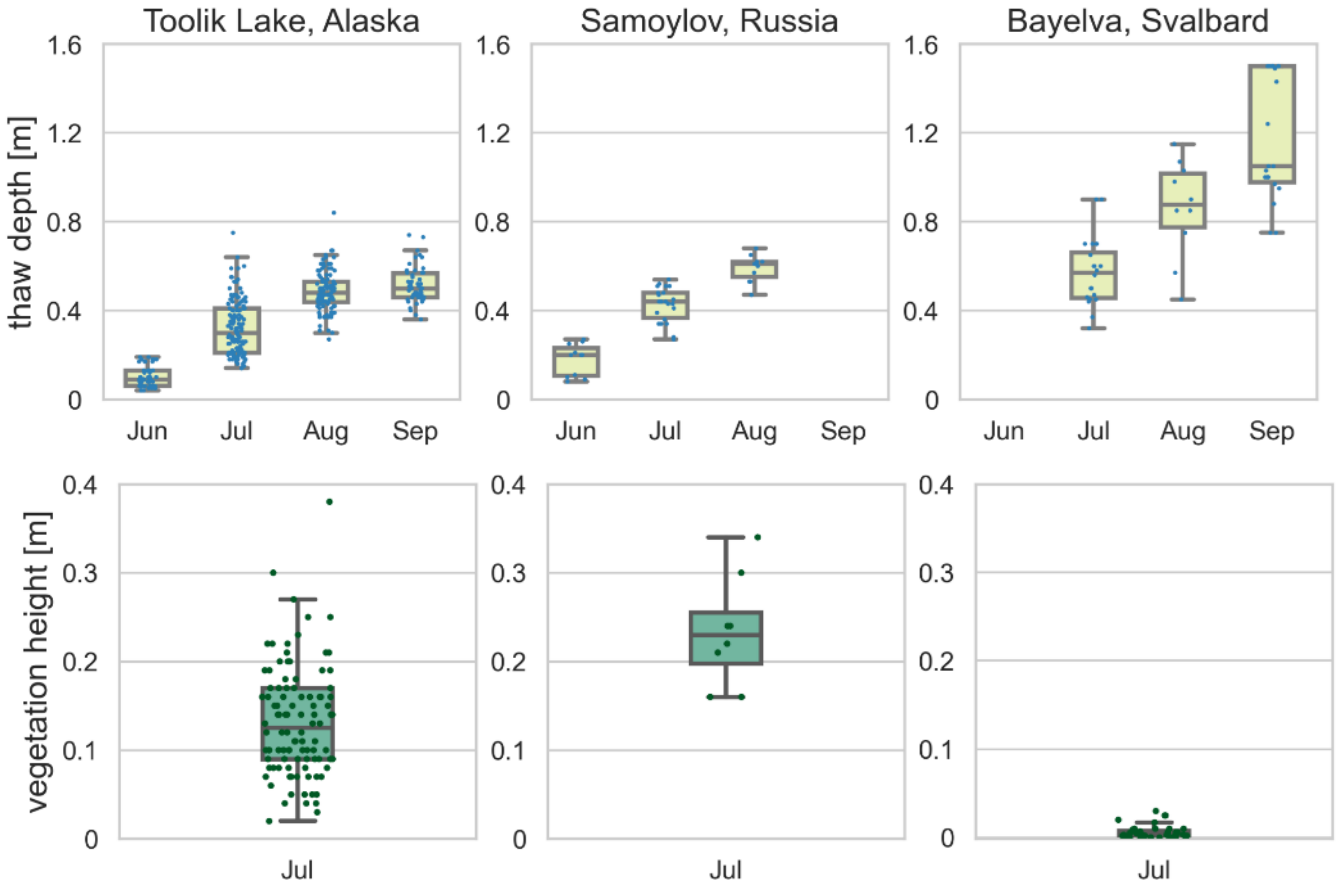


T-MOSAiC Permafrost Thaw Action Group

Julia Boike, Sarah Chadburn, Simon Zwieback and Julia Martin



Spheres with the associated parameters, measurement modes and observation timings along one transect over one seasonal cycle.



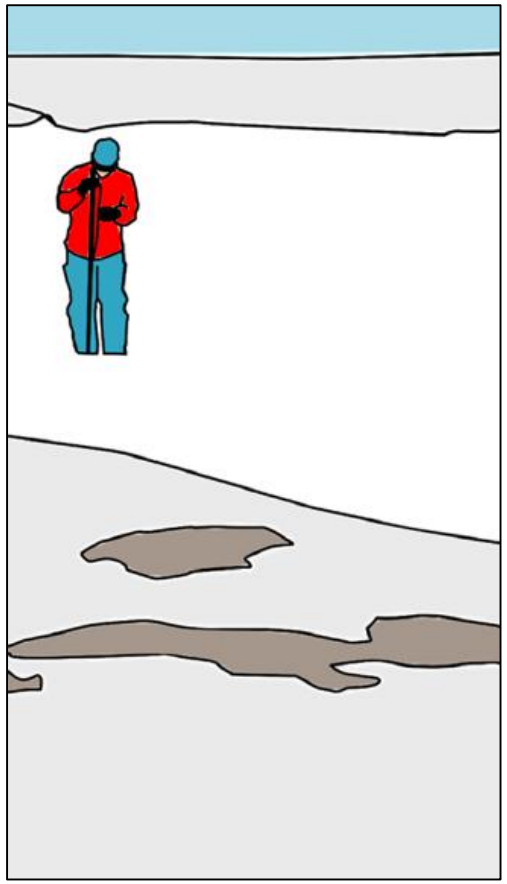
Thaw depth and vegetation height measurements on the T-MOSAiC transect for Toolik Lake (24 transect points) Samoylov (10 transect points) and Bayelva (10 transect points).

T-MOSAiC Permafrost Thaw Action Group

Julia Boike, Sarah Chadburn, Simon Zwieback and Julia Martin

Wrap-up and continued activities planned for 2022:

- Establish a webpage & blog
- Contact schools and science programs for data collection
- Contact NGOS?
- Apply for scientific funding :)



Boike, Chadburn et al. (2021)
Standardized monitoring of permafrost thaw:
a user-friendly, multiparameter protocol. *Arctic Science*
https://cdnsciencepub.com/doi/full/10.1139/as-2021-0007

T-MOSAiC Coastal Processes Action Group

Hugues Lantuit, Benjamin Jones and Dustin Whalen

NUNATARYUK

Activities in 2021 include(d):

- Session on coastal permafrost at the virtual Arctic Science Summit Week 2021
- Session at the International Arctic Social Sciences Association (ICASS) meeting, on People and Permafrost in a Changing Arctic, June 2021
- Sessions at the American Geophysical Meeting 2021 on Arctic Coastal Dynamics

T-MOSAiC Coastal Processes Action Group

Hugues Lantuit, Benjamin Jones and Dustin Whalen

Recent highlights include:

Irrgang, A.M., M. Bendixen, L.M. Farquharson, A.V. Baranskaya, L.H. Erikson, A.E. Gibbs, S.A. Ogorodov, P.P. Overduin, H. Lantuit, M.N. Grigoriev, and B.M. Jones. In press. **Arctic coasts in transition**: drivers, dynamics, impacts. Nature Reviews Earth and Environment.

Jones, B. M., A. M. Irrgang, L. M. Farquharson, H. Lantuit, D. Whalen, S. Ogorodov, M. Grigoriev, C. Tweedie, A. E. Gibbs, M. C. Strzelecki, A. Baranskaya, N. Belova, A. Sinitsyn, A. Kroon, A. Maslakov, G. Vieira, G. Grosse, P. Overduin, I. Nitze, C. Maio, J. Overbeck, M. Bendixen, P. Zagórski, and V. E. Romanovsky. 2020. **Coastal Permafrost Erosion. In: Arctic Report Card 2020**, R. L Thoman, J. Richter-Menge, and M.L. Druckenmiller, Eds.

T-MOSAiC Coastal Processes Action Group

Hugues Lantuit, Benjamin Jones and Dustin Whalen

Ongoing activities in 2022 include:

New program funded: **Earth Observation for Permafrost dominated Arctic Coasts (EO4PAC),** from 2021-2023. Annett Bartsch (b.geos, Austria), Guido Grosse (AWI, Germany), Hugues Lantuit (AWI, Germany), Julia Boike (AWI, Germany), Goncalo Vieira (IGOT, Portugal), Benjamin Jones (UAF, USA), Dustin Whalen (NRC, Canada), Isla Myers-Smith (Univ. of Edinburgh, Scotland), and Jeff Kerby (Aarhus Univ., Denmark) - grant from the European Space Agency (ESA)

T-MOSAiC/RATIC Arctic Infrastructure Action Group

Skip Walker, Peter Schweitzer, Olga Povoroznyuk, Jana Peirce

Activities in 2021

- Science sessions at Arctic Change 2020 & ASSW 2021
  Northern Roads and Railways: Social and Environmental Effects of Transport Infrastructure
- ASSW 2021 Online Community Meeting (Mar 2021)
  RATIC Meets T-MOSAiC: Sharing Best Practices in Research on Infrastructure in the Arctic
- T-MOSAiC Special Issue of Arctic Science
  Three papers in press, in prep or under review
- Arctic Infrastructure Science Talk series (Apr 2021 – present)
  Monthly cross-disciplinary presentations related to Arctic infrastructure
- Infrastructure mapping/monitoring framework work group
  4 meetings, morphed into ongoing monthly science talk series
- Boosting Indigenous/industry participation in research work group
  3 meetings, resulted in ASSW 2021 workshop proposal

T-MOSAiC/RATIC Arctic Infrastructure Action Group

Skip Walker, Peter Schweitzer, Olga Povoroznyuk, Jana Peirce

Highlights include:

ASSW 2021 Community Meeting

RATIC Meets T-MOSAiC: Sharing Best Practices in Research on Infrastructure in the Arctic

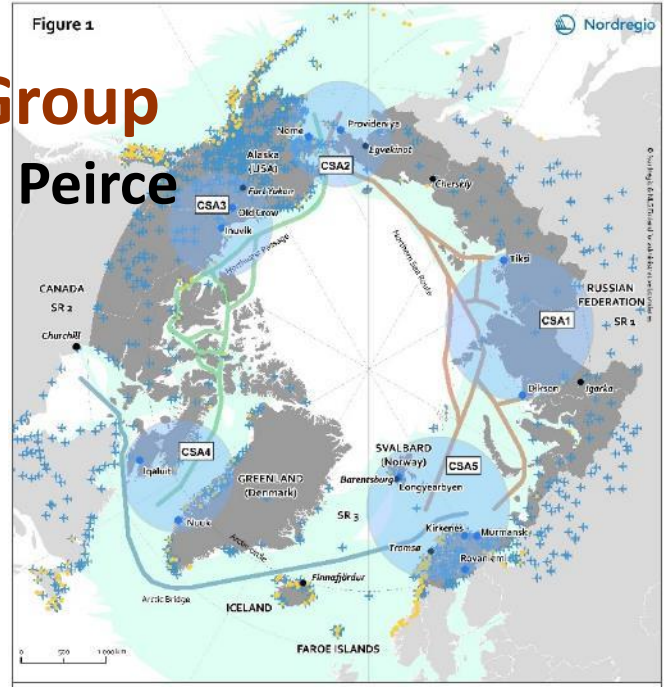
- IASC proposal initiated by Action Group members
- 9 cross-disciplinary presentations

T-MOSAiC Special Issue contributions

Synthesis paper:

Arctic roads and railways: environmental and social consequences of transport infrastructure in the Circumpolar North

Olga Povoroznyuk, Warwick F. Vincent, Peter Schweitzer, Roza Laptander, Mia Bennett, Fabrice Calmels, Dmitrii Sergeev, Christopher Arp, Bruce Forbes, Pascale Roy-Léveillée and Donald A. Walker (under review)



The shifting mosaic of ice-wedge degradation and stabilization in response to **infrastructure and climate change**, Prudhoe Bay Oilfield, Alaska

Mikhail Kanevskiy, Yuri Shur, D.A. (Skip) Walker, Torre Jorgenson, Martha K. Raynolds, Jana L. Peirce, Benjamin M. Jones, Marcel Buchhorn, Georgiy Matyshak, Helena Bergstedt, Amy L. Breen, Billy Connor, Ronald Daanen, Anna Liljedahl, Vladimir E. Romanovsky, and Emily Watson-Cook (in press)

Cumulative impacts of a gravel road and climate change in an ice-wedge polygon landscape, Prudhoe Bay, AK

Donald A. Walker, Martha K. Raynolds, Mikhail Z. Kanevskiy, Yuri S. Shur, Vladimir E. Romanovsky, Benjamin M. Jones, Marcel Buchhorn, M. Torre Jorgenson, Jozef Šibík, Amy L. Breen, Anja Kade, Emily Watson-Cook, Georgy Matyshak, Helena Bergstedt, Anna K. Liljedahl, Ronald P. Daanen, Billy Connor, Dmitry Nicolsky, Jana L. Peirce (in final revision)

T-MOSAiC/RATIC Arctic Infrastructure Action Group

Skip Walker, Peter Schweitzer, Olga Povoroznyuk, Jana Peirce

Wrap-up activities planned for 2022

- ASSW 2022 Community Meeting in Tromsø/Online
  RATIC meets T-MOSAiC: Cross-disciplinary approaches to advancing sustainable Arctic infrastructure
- IASC proposal for ASSW 2023 Vienna
  In planning
- Arctic Infrastructure Science Talks
  Ongoing - 3rd Thursdays, Sept-May
- Future of RATIC after T-MOSAiC
  Need for discussion!

T-MOSAiC Social and Crosscutting Action Group

Andrey Petrov

H-MOSAIC: the idea

- The idea of H-MOSAIC was introduced at the Spring 2021 IASC SHWG meeting
- A exploratory group was formed (chaired by Petrov)
- Two meetings took place: October and November 2021
- The concept will be further developed and a short prospectus will discussed at the February 2022 meeting
- Presentation of the concept and broad discussion will be held at the ASSW 2022

(T-MOSAiC members to be invited)

T-MOSAiC Social and Crosscutting Action Group

Andrey Petrov

H-MOSAIC: possible focal areas

- **COORDINATION**: Research coordination on selected topics in social and human-natural systems using existing resources by partnering projects
- **SYNTHESIS**: Research synthesis to develop new insights into Arctic human systems
- **INDIGENOUS KNOWLEDGE**: Promotion of Indigenous, inter/transdisciplinary and coproductive methodologies
- **KNOWLEDGE SHARING** scholars-to-scholars, scholars-to-communities and communities-to-communities
- **DATA**: Advancement of Arctic social science data initiatives
- **PRIORITIES**: Identifying community-driven priorities for **ICARP IV and IPY-5**

T-MOSAiC Social and Crosscutting Action Group

Andrey Petrov

sustainability

"Long-Term Change and Sustainability in Arctic Social-Ecological Systems“
Edited by Andrey N Petrov and Stanislav Ksenofontov

Submission deadline: 1 March 2022

Details:
https://www.mdpi.com/journal/sustainability/special_issues/Long_Term_Change_and_Sustainability_in_Arctic_Social_Ecological_Systems

T-MOSAiC Northern Community Issues Action Group

Maribeth Murray & João Canário

Activities in 2021 included:

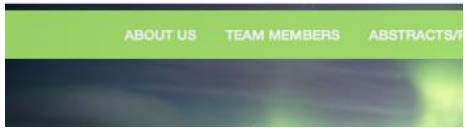
Arctic Science Summit Week 2021
IASC 19-26 March | Online, Portugal

3 Sessions on **contaminants** ; 40 communications

Fieldwork was undertaken related to **Hg biogeochemistry** in permafrost thaw lakes - PERMAMERC

Special issue of **Environmental Pollution** on Arctic Contaminants

CCADI



Data interoperability research was undertaken to advance T-MOSAiC objectives via the project **CCADI**

Planning progressed for a workshop series on Arctic **biodiversity & conservation** (Maribeth)

Upcoming Workshop – T-MOSAiC Endorsed Project: Role of Genomics in Fostering and Supporting Arctic Biodiversity

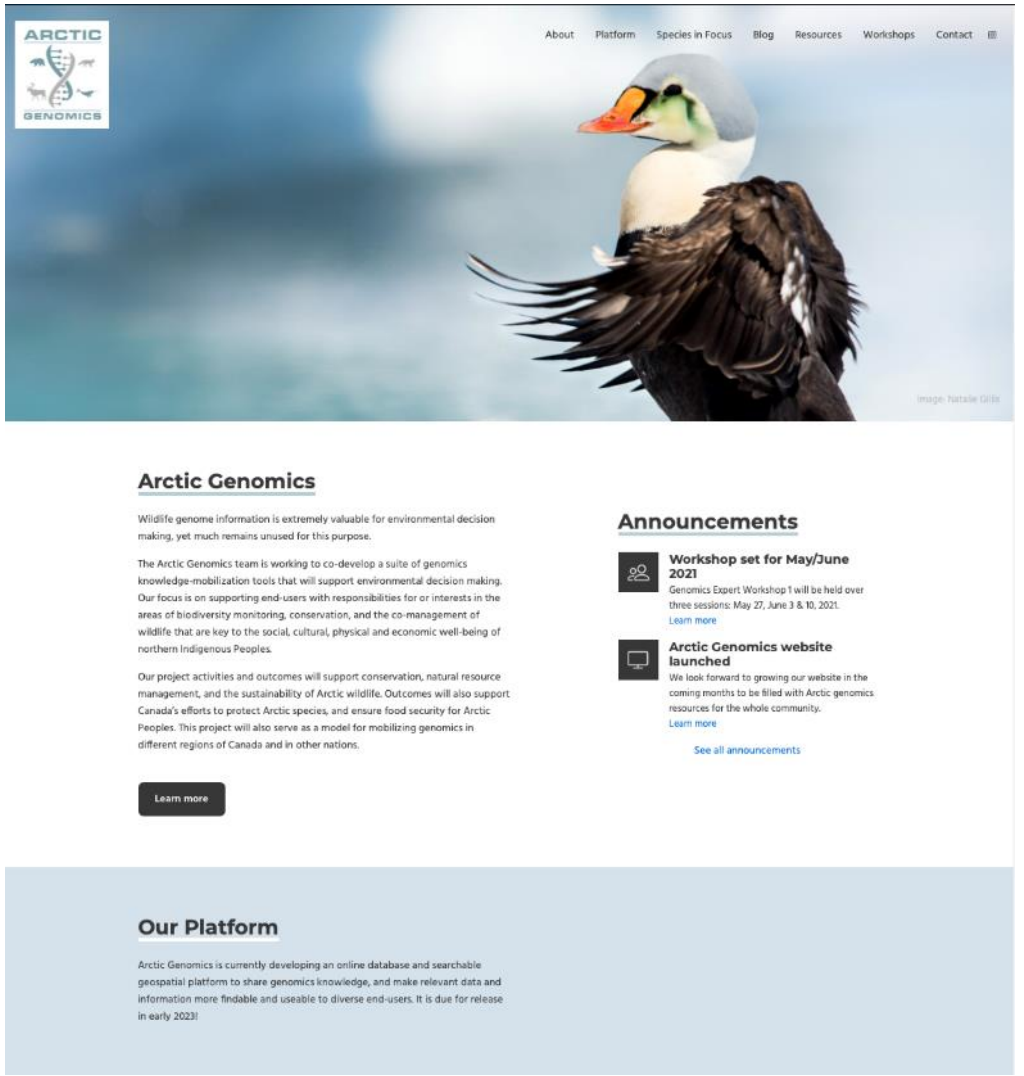
- Project is focused on mobilizing genomics information and genomics -derived tools to support **conservation and biodiversity**
- **A series of workshops** are planned to work with genomics researchers and potential end users of genomics information and tools

- **Workshop goals include**
  - identifying areas where genomics could advance research outcomes in other of Arctic research fields
  - Identification of priority species where genomics could be used to support sustainability, improved management, address threats, species for whole genome sequencing
  - Developing a pathway toward the use of genomics tools by northern organizations, communities and governments to support local and regional objectives around environmental monitoring
  - Identify needs for training and capacity building

- **First Workshop**

Victoria British Columbia 22 and 25 February 2022 (virtual and in-person participation).

Others TBD and covid dependent



https://arcticgenomics.org/

T-MOSAiC Arctic Data Systems Action Group

Peter Pulsifer and Maribeth Murray

Activities in 2021 included:

Arctic Science Summit Week 2021
IASC 19-26 March | Online, Portugal

Two sessions on northern data management

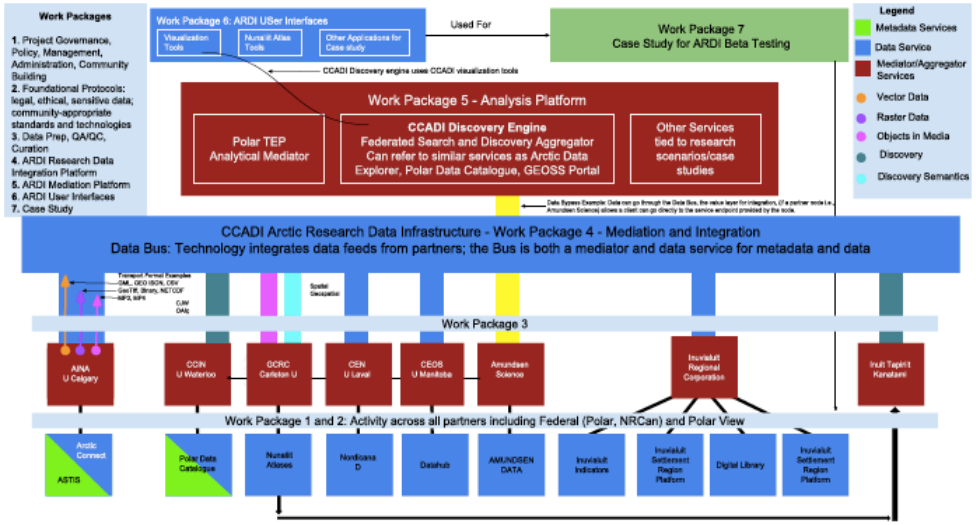
CCADI

Main activity has been the development of interoperable data systems via the project CCADI

The Canadian Consortium for Arctic Data Interoperability

What is CCADI?

An initiative to develop an integrated Canadian arctic data management system that will facilitate information discovery, establish sharing standards, enable interoperability among existing data infrastructures.

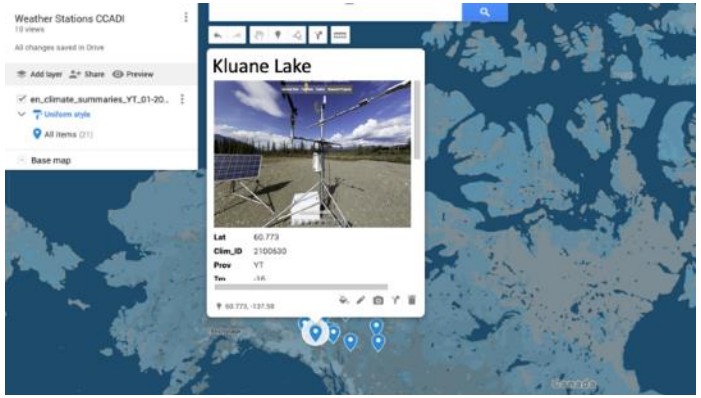


INNOVATION
Canada Foundation for Innovation
Fondation canadienne pour l'innovation

CCADI Use-Cases: Contributions to T-MOSAiC

1. Merged Observatory Data for Arctic Air Temperature Landscape Change

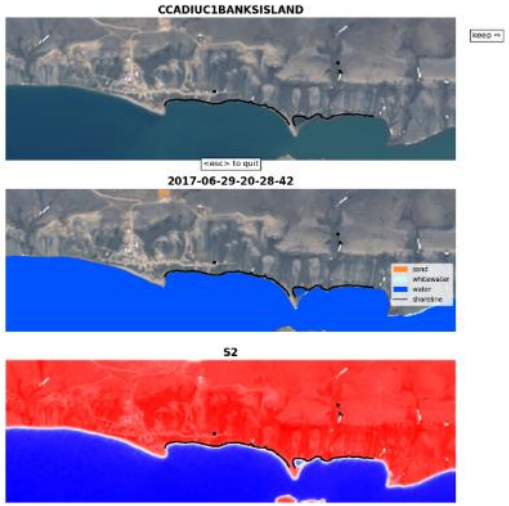
MODAAT: Merged Observatory Data for Arctic Air Temperatures



Use of pilot data sets from:

- Kluane Lake
- CEN station network
- Northern Ellesmere

2. Inuvialuit Settlement Region Coastal Erosion and Vulnerability of Archaeological Sites



SAON, the Arctic Observing Summit and T-MOSAiC

- SAON ROADS process offers an opportunity for T-MOSAiC to contribute to the definition of Essential Arctic Variables and set priorities for observation
- Can be done through engagement with AOS Working Groups, submission of short statements, participation at the Summit

Sub-Theme 1: Food Security

Sub-Theme 2: Regional to Global Observing

Sub-Theme 3: Data Sharing

Sub-Theme 4: System Integration (SAON ROADS)

Sub-Theme 5: Utility and Benefit

Sub-Theme 6: Capacity Building

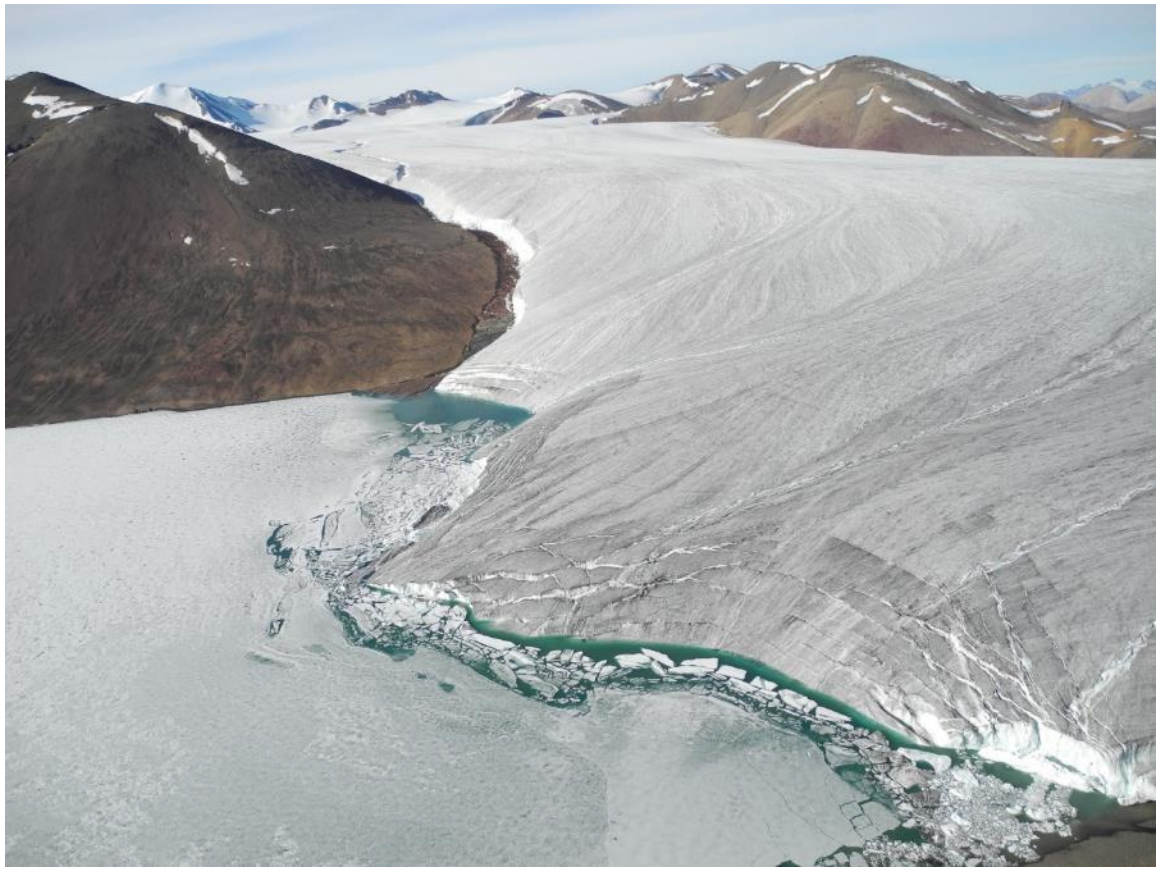
https://arcticobservingsummit.org

T-MOSAiC Land-Water Processes Action Group

Jasmine Saros, Jorien Vonk & Raoul Couture

Ongoing activities:

- **Arctic freshwater synthesis**
  -discussions and writing continue
- **Lake and river papers** - several in press and in preparation for T-MOSAiC special issues & others
- **Arctic/polar & alpine limnology session** – submitted to SIL-100, Berlin, August 2022



Thores Lake, Last Ice Margin Area, QUNP, Nunavut, Canada

T-MOSAiC Paleoclimatology/Paleoecology Action Group

Bianca Perren and John Smol

Activities in 2021

- ASSW 2021 meeting session: Past Climates and Environments of the Arctic
  - Conveners:
    - Bianca Perren (British Antarctic Survey),
    - Kwangchul Jang (Korea Polar Research Institute)
    - Joshua Evans (University of New-Brunswick)
    - Jennifer Wesselbaum (University of New-Brunswick)

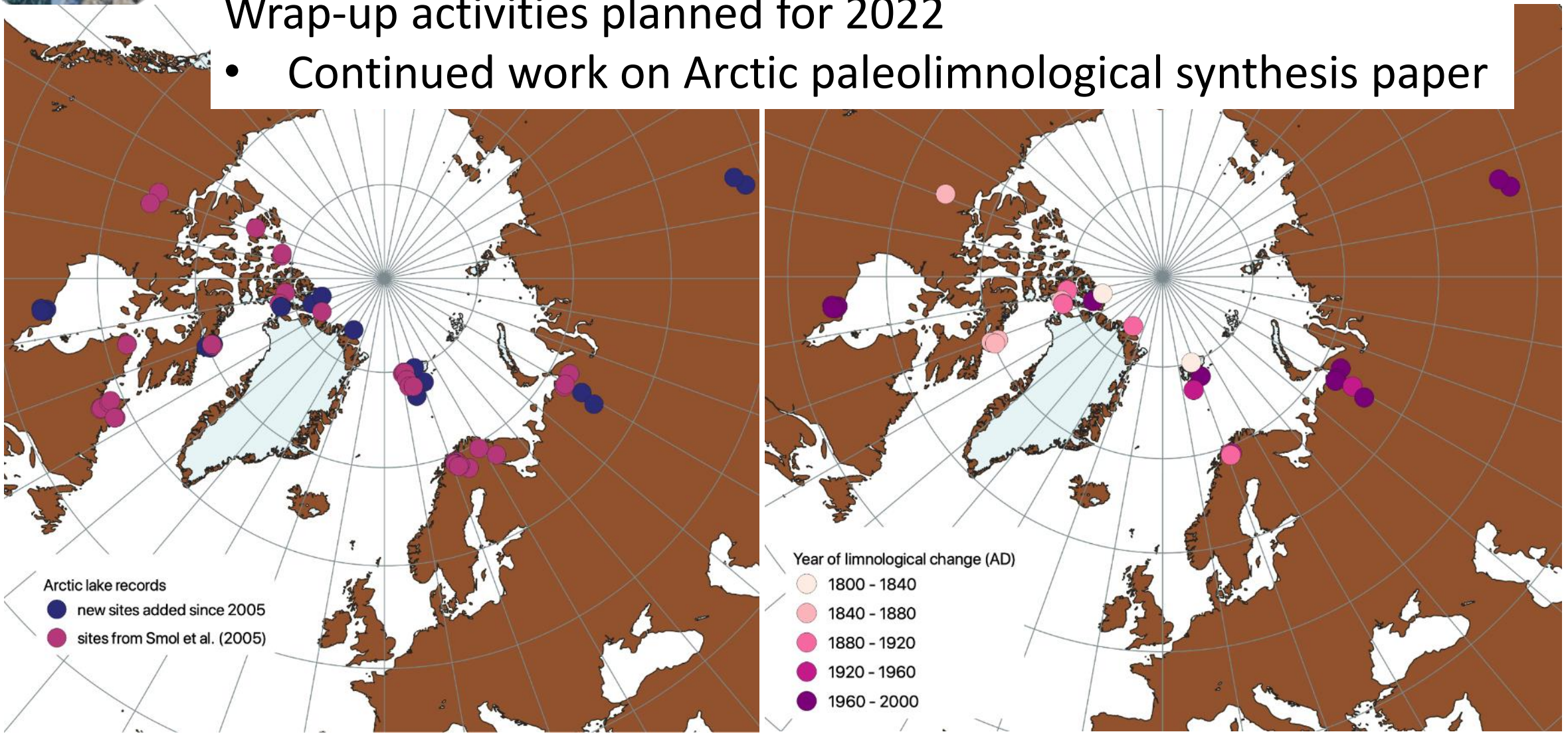
    - T-MOSAiC presentation: *« Limnological responses to climate forcing across the Arctic »* Bianca Perren, John Smol, Kathleen Rühland

T-MOSAiC Paleoclimatology/Paleoecology Action Group

Bianca Perren and John Smol

Wrap-up activities planned for 2022

- Continued work on Arctic paleolimnological synthesis paper



T-MOSAiC Arctic Microbiomes Action Group

Anne Jungblut, Birgit Sattler and Jérôme Comte

Activities in 2021 included:

- AG Microbiome led session at ASSW, March 2021, Title: Microbiomes and biogeochemical processes along geographic and environmental gradients in the cricumpolar North. Session chairs Birgit Sattler, Klemens Weisleitner (ECR), Jérôme Comte , Anne D. Jungblut (20 talks and 3 e-posters)
- Special issue: Frontiers in Microbiology, Extreme Microbiology, Research Topic: (more on this later)
- Microbiomes as sentinels of a changing Arctic, special session at ArcticNet ASM by Catherine Girard and Alexander I. Culley (AG Microbiome members)

T-MOSAiC Arctic Microbiome Action Group

Anne Jungblut, Birgit Sattler and Jérôme Comte

Activities in 2021

T-MOSAiC Newsletter special, September 2021 with contributions from:

- Alexander I Culley, Warwick F Vincent, Dermot Antoniades, Denis Boudreau, Connie Lovejoy, Raoul-Marie Couture, Jesse Greener, **Last ice microbiomes and Arctic ecosystem health**
- Lígia F. Coelho, João Canário, Rodrigo Costa, Zita Martins, **Ice microorganisms used as a tool for Astrobiology**
- Max Kortmann, Sebastian Pohl, Birgit Sattler, **Microplastic Pollution in Arctic Cryospheric Habitats: Origin, Quality and Ecological Implications**

Activities planned for 2022

- Editorial summary to be submitted by editors for Frontiers in Microbiology Research Topic: **Digitizing Frozen Earth - Revealing Microbial Diversity and Physiology in the Cryobiosphere through ´Omics´ Tools** Volume II

T-MOSAiC Arctic Microbiome Action Group

Anne Jungblut, Birgit Sattler and Jérôme Comte

Ongoing scientific programs include:

Last ice microbiomes and Arctic ecosystem health: Alexander I Culley, Warwick F Vincent, Dermot Antoniades, Denis Boudreau, Connie Lovejoy, Raoul-Marie Couture, Jesse Greener (ULaval) and partners (funded by Sentinel North)

Sentinel North

Arctic Microbiomes Cryobank project: Warwick Vincent (ULaval), Roger Bull (Canadian Museum of Nature, Ottawa), Anne Jungblut (Natural History Museum, London) et al. (Sentinel North)

Investigating the role of soil microbial processes in aquatic greenhouse gas emissions in Eastern Canadian permafrost landscapes: Peter Douglas, Cynthia Kallenbach (McGill), Isabelle Laurion, Jérôme Comte (INRS), Melissa Lafreniere (QueensU), Roxane Maranger (UdM)

T-MOSAiC Arctic Trace Gas Action Group

Torben R. Christensen and Sally MacIntyre

Activities in 2021

- Covid times: **Methods development & science activities**
  - a) UAV deployments for permafrost methane flux measurements
  - b) Transfer velocity analysis in a range of lake settings
  - c) Grazing patterns and their impacts on trace gas exchanges

- **IASC funded workshop** planning, postponed to 2022

- **INTERACT** related project activities

- **UArctic project** on PhD schools between Oulanka and Greenland

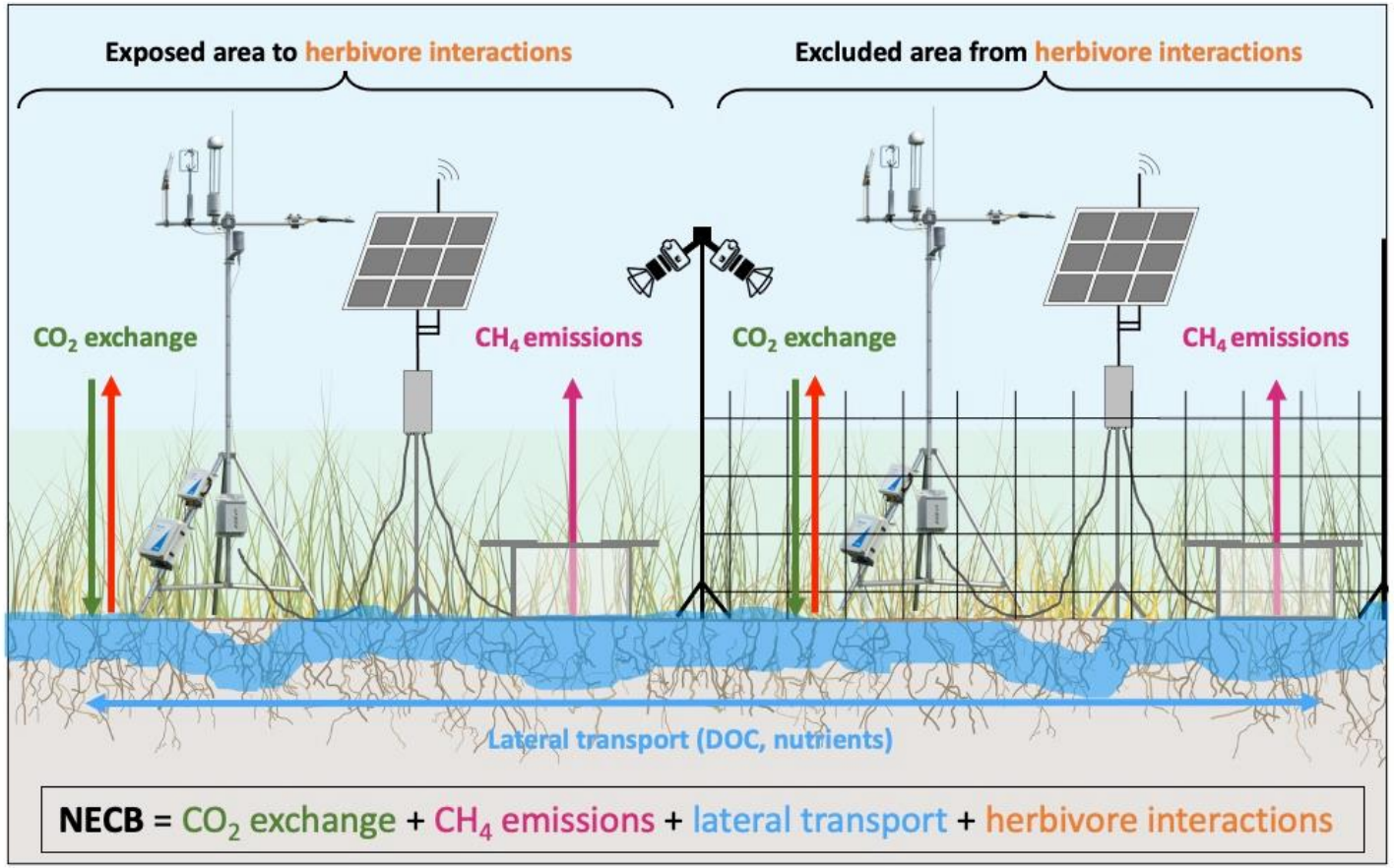
- **AMAP assessments** coming up
  - a) Ecosystems chapter of SWIPA update 2021
  - b) SLCF specific trace gas chapter on methane

T-MOSAiC Arctic Trace Gas Action Group

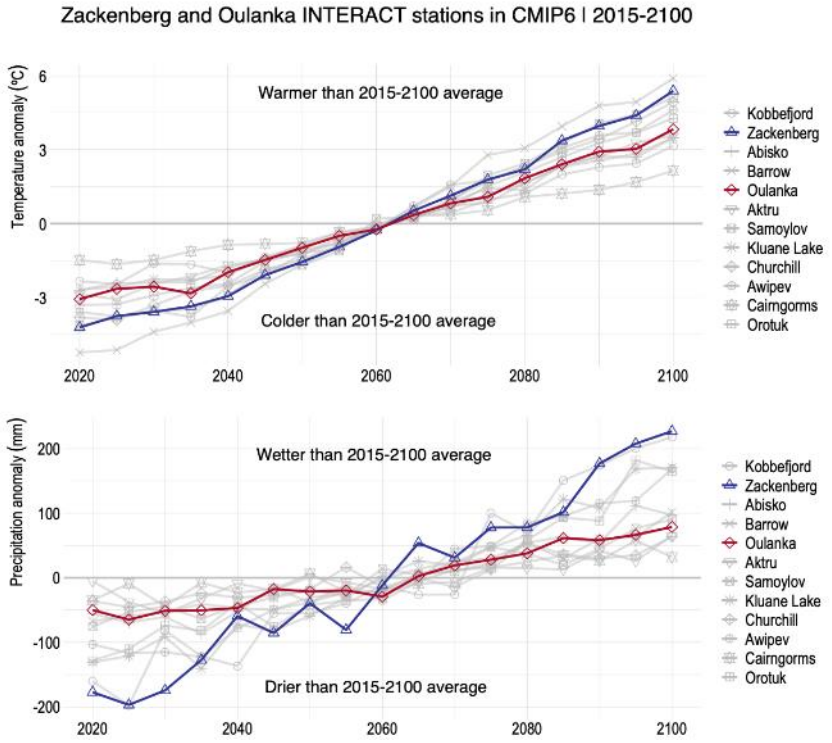
Torben R. Christensen and Sally MacIntyre

Highlighted examples:

High Latitude Carbon – hanging in the balance



Temperature & Precipitation Trends



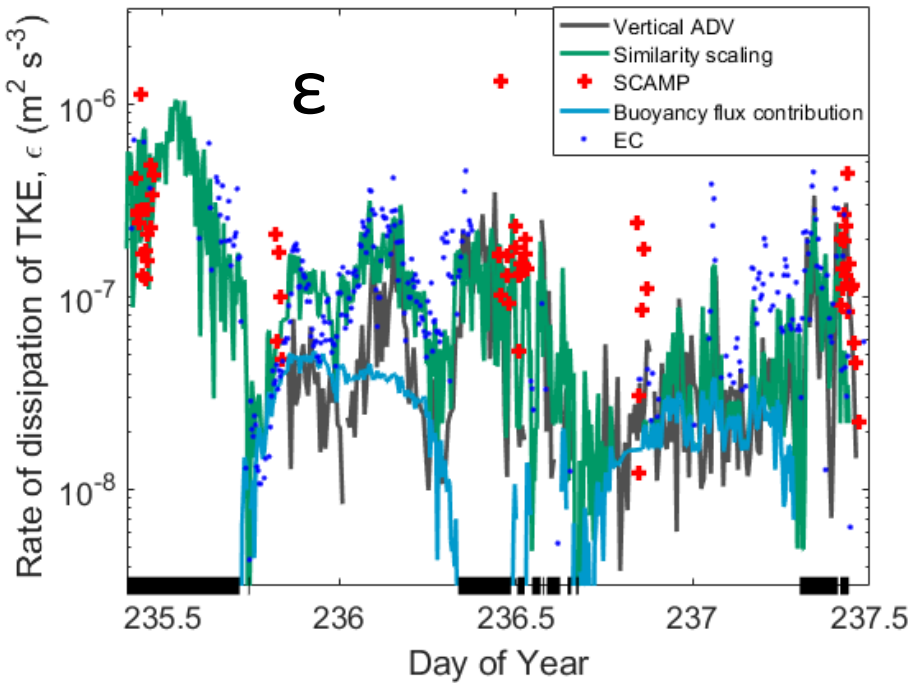
T-MOSAiC Arctic Trace Gas Action Group

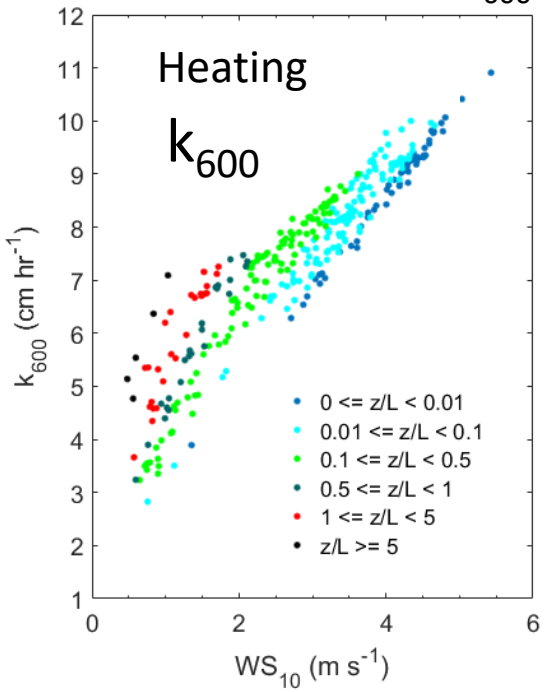
Torben R. Christensen and Sally MacIntyre

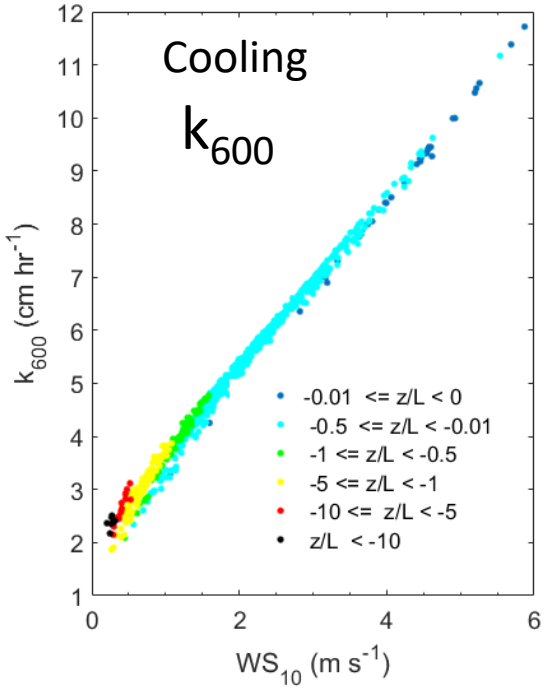
Highlighted examples:

Air-water gas exchange for lakes: turbulence (ε) & gas transfer velocity (k_{600})

ε depends on wind speed and rate of heating and cooling; k_{600} depends on $\varepsilon^{1/4}$







MacIntyre, S., D. Bastviken, L. Arneborg, A. Crowe, J. Karlsson, A. Andersson, M. Galfalk, A. Rutgersson, E. Podgrajsek, and J. Melack. 2021. Limnol. Oceanogr. 66, 2021, 827–854, doi: 10.1002/lno.11645

T-MOSAiC Arctic Trace Gas Action Group

Torben R. Christensen and Sally MacIntyre

Continued activities planned for 2022:

- Back-to-back, hands-on
  T-MOSAiC/IASC Trace Gas Workshop
  with UArctic BEFLUX PhD school
  at Oulanka, northern Finland, September 2022

- Continue networking across northern sites on
  Gas Flux Measurement Methods

- Continue observations, methods development, and modeling of fluxes of trace gases from northern lakes

T-MOSAiC Arctic Transects Action Group

Sergey Kirpotin, Guido Grosse, Warwick Vincent

Activities in 2021 included:

T-MOSAiC Bulletin 'Transect Issue' – May 2021 (6 sets of transect analyses)
https://www.t-mosaic.com/uploads/6/8/0/8/6808303/t-mosaic_nl_9.pdf

Carbon Polygon project funded and underway
Tomsk State University for carbon budget analysis in the Ob River floodplain and the Great Vasyugan Mire.

CEN's Gradient North analyses continued (CEN).

Eastern Siberian Transect Field work and analyses continued; new sites established (AWI)

PanArctic remote sensing transects
Analyses of correlations between permafrost model outputs, lake dynamics, and climate data continued for West Siberian, East Siberian, Alaskan, and East Canadian transect (AWI)

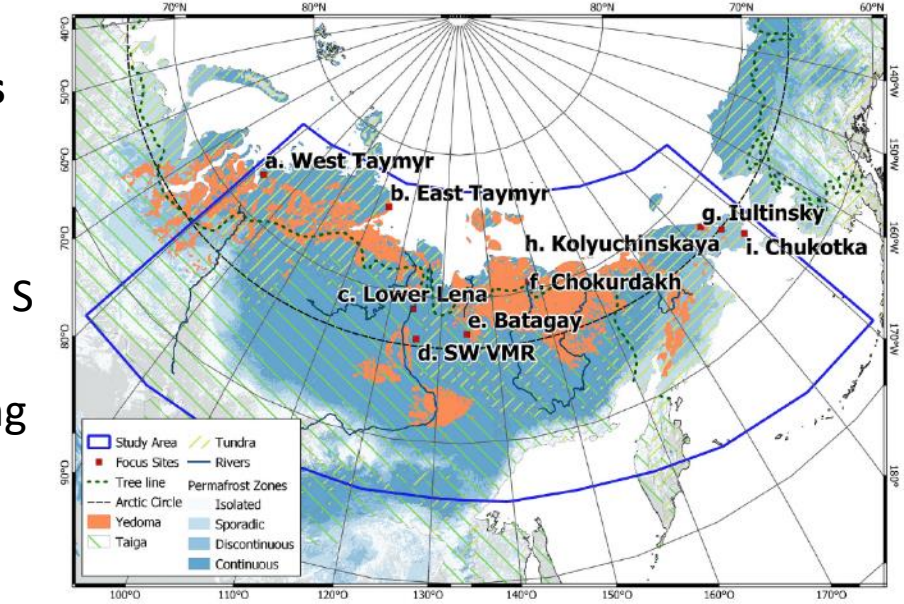
T-MOSAiC Arctic Transects Action Group

Sergey Kirpotin, Guido Grosse, Warwick Vincent

Many papers published in 2021 relevant to this theme, including:

Kirpotin S., Callaghan T.V., Peregon A.M., Babenko A.S., Berman D. I., Bulakhova N.A., Byzaakay A.A., et al. 2021. Impacts of climate change on **vegetation dynamics and biodiversity in Siberia**. Special Issue on Siberian Environmental Change. Ambio. doi: 10.1007/s13280-021-01570-6.

Runge, A. , Nitze, I. and **Grosse, G**. 2022. Remote sensing **annual dynamics of rapid permafrost thaw disturbances** with LandTrendr. Remote Sensing of Environment, 268: 112752 . doi: 10.1016/j.rse.2021.112752



Shevtsova, I., **Herzschuh, U**., **Heim, B**., Schulte, L., Stünzi, S Pestryakova, L., Zakharov, E. and Kruse, S. 2021. Recent **above-ground biomass changes in central Chukotka** using field sampling and Landsat satellite data, Biogeosciences 18,11, 3343-3366. doi:10.5194/bg-18-3343-2021

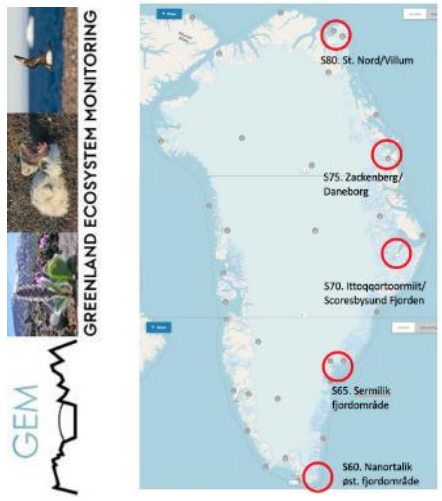
Christensen, T.R., Lund, M., Skov, K., Abermann, J., Lopez-Blanco, E., Scheller, J., Scheel, M., JackowiczKorczynski, M., Langley, K., Murphy, M.J. and Mastepanov, M. 2021. Multiple **ecosystem effects of extreme weather events** in the Arctic. Ecosystems, 24: 122-136.

T-MOSAiC Arctic Transects Action Group

Sergey Kirpotin, Guido Grosse, Warwick Vincent

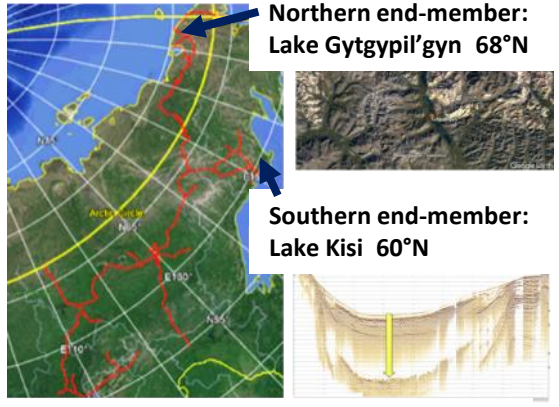
Ongoing activities planned for 2022

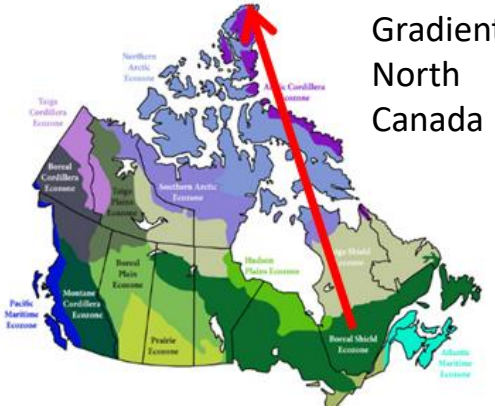
- **West-East Mega-Transect along the gradient of continental Siberia**, Tomsk State University program.
- **West-East South-North Transect along the gradient of Eastern Siberia** (Alfred Wegener Institute (DE), North Eastern Federal University (RU), Melnikov Permafrost Inst. (RU))
- **PanArctic Remote Sensing Transects** (Alfred Wegener Institute (DE) + multiple partners)
- **Greenland Integrated Observing System (GIOS, (University of Aarhus), Gradient North (CEN, Canada)** and other transect studies continuing



GIOS

Siberian lake trajectories





Gradient North Canada

T-MOSAiC Remote Sensing Action Group

Gonçalo Vieira, Annett Bartsch and Isla Myers-Smith

Activities in 2021 included:

Remote sensing Session at ASSW2021

Link with partner networks:

- Permafrost Coastal Systems Network (PerCS-NET)
- High-Latitude Drone Ecology Network (HILDEN)

Several projects associated to T-MOSAiC RS AG:

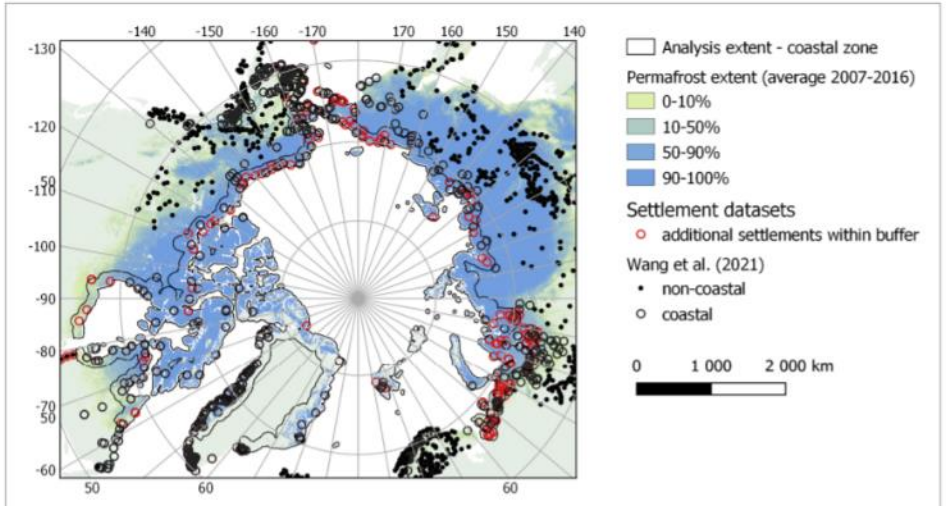
- Earth Observation for Permafrost – dominated Arctic Coasts - EO4PAC
- Land use as a modulator of land cover transitions and the ecosystem–atmosphere carbon balance - LANDMOD
- Synergistic use of remote sensing and field observations for assessing recent changes in the Beaufort Sea coast (Canada) – NUNATARYUK
- Remote sensing analysis of vegetation and thaw pond colour dynamics in the discontinuous permafrost zone – THAWPOND

Special issues on Arctic Remote Sensing

T-MOSAiC Remote Sensing Action Group

Gonçalo Vieira, Annett Bartsch and Isla Myers-Smith

Highlights include:



Environ. Res. Lett. **16** (2021) 115013 https://doi.org/10.1088/1748-9326/ac3176

ENVIRONMENTAL RESEARCH
LETTERS

LETTER

Expanding infrastructure and growing anthropogenic impacts along Arctic coasts

Annett Bartsch[1,2,*], Georg Pointner[1], Ingmar Nitze[3], Aleksandra Efimova[1], Dan Jakober[1], Sarah Ley[1], Elin Högström[1], Guido Grosse[3,4] and Peter Schweitzer[2,5]

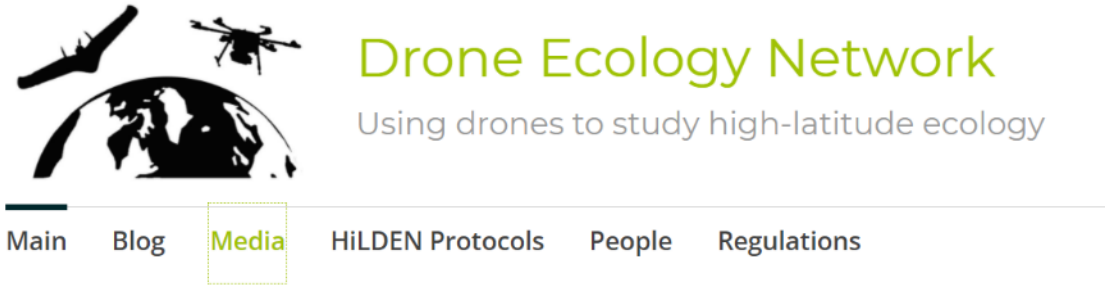
EO4PAC (Earth Observation for Permafrost – dominated Arctic Coasts) - a new project linking the T-MOSAIC action groups on remote sensing, permafrost, transects, coasts and infrastructure.

T-MOSAiC Remote Sensing Action Group

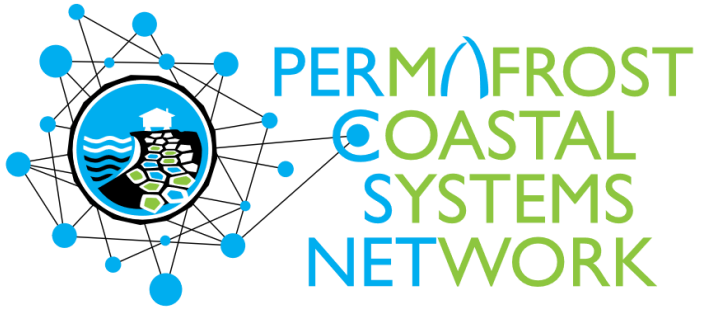
Gonçalo Vieira, Annett Bartsch and Isla Myers-Smith

Wrap-up activities planned for 2022

- Arctic Coastal Dynamics Network-to-Network Interface Workshop at ASSW2022 (28 March 2022)
- EO4PAC, HILDEN, NUNATARYUK, PERCS-NET
- Finally, a broad encompassing summer field season (!?)



https://arcticdrones.org/



https://permafrostcoasts.org

T-MOSAiC Special Issues

T-MOSAiC Special Journal Issues

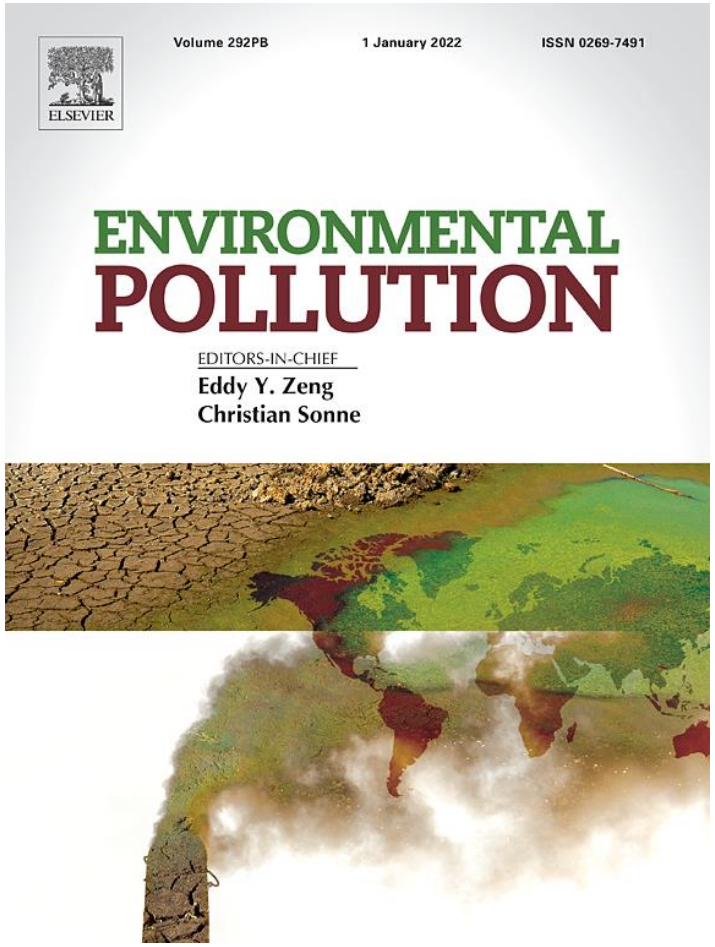
Environmental Pollution

Arctic Terrestrial Pollution

Deadline for submissions: 31 October 2021

Status: In production

Number of papers: 14 submitted



Published:

Émilie Leclerc, Jason J. Venkiteswaran, Izabela Jasiak, James V. Telford, Mackenzie D.J. Schultz, Brent B. Wolfe, Roland I. Hall, Raoul-Marie Couture, 2021. **Quantifying arsenic post-depositional mobility in lake sediments impacted by gold ore roasting in sub-arctic Canada using inverse diagenetic modelling.**

In revision:

Impact of shipping emissions on air pollution and pollutant deposition over the Barents Sea

Effects of seasonal terrestrial run-off on contaminant concentrations in Arctic littoral amphipods

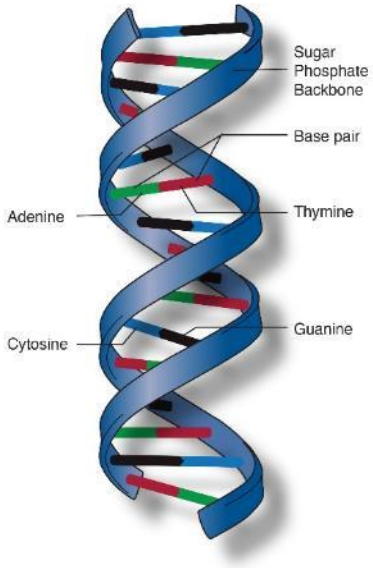
Small Arctic rivers transport legacy contaminants from thawing catchments to coastal areas in Kongsfjorden, Svalbard

T-MOSAiC Special Journal Issues

Frontiers in Microbiology, Extreme Microbiology

Digitizing Frozen Earth - Revealing Microbial Diversity and Physiology in the Cryobiosphere through ´Omics´ Tools

Deadline for submissions: 30 November 2021



Status: In production

Number of papers: 16 submitted (7 now in press)

Northern Examples

Accepted

Millar JL. Bagshaw, E, Edwards A, Poniecka E, Jungblut A.D. **Polar cryoconite associated microbiota** is dominated by hemispheric specialist genera. Frontiers in Microbiology, Accepted: 11 October 2021.

Blais M.A., Matveev A., Lovejoy C., Vincent W.F. Size-fractionated microbiome structure in **subarctic rivers and a coastal plume** across DOC and salinity gradients, Accepted: 01 December 2021.

In Review

Freshwater microbial eukaryotic core communities, open water and under ice specialists in southern **Victoria Island lakes** (Ekaluktutiak, Nunavut, Canada)

Microbial community changes in **26,500-year-old thawing permafrost**

Local habitat filtering shapes microbial community structure in four closely spaced **lakes in the High Arctic**

T-MOSAiC Special Journal Issues

3 Remote Sensing issues

- *Journal of Unmanned Vehicle Systems / Arctic Science:*

Unoccupied Vehicle Systems in Arctic Research and Monitoring
Guest Editors: Isla Myers-Smith, Jeffrey Kerb & Dustin Whalen,
Submissions closed: https://cdnsciencepub.com/topic/as-juvs

- *Remote Sensing:*

Advanced Technologies in Wetland and Vegetation Ecological Monitoring Guest Editors: Sergio Vargas Zesati & Jeremy May, 3 papers published to date.
Deadline 31 March 2022.

remote sensing
an open access journal by MDPI

- *Remote Sensing:*

Multi-Scale Analysis for Detecting the Processes, Causes, and Impacts of Permafrost Change and of Disruptive Events
Guest Editors: Michael Lim, Gonçalo Vieira & Dustin Whalen, 3 papers published to date.
Deadline 31 January 2022.

remote sensing
an open access journal by MDPI

T-MOSAiC Special Journal Issues

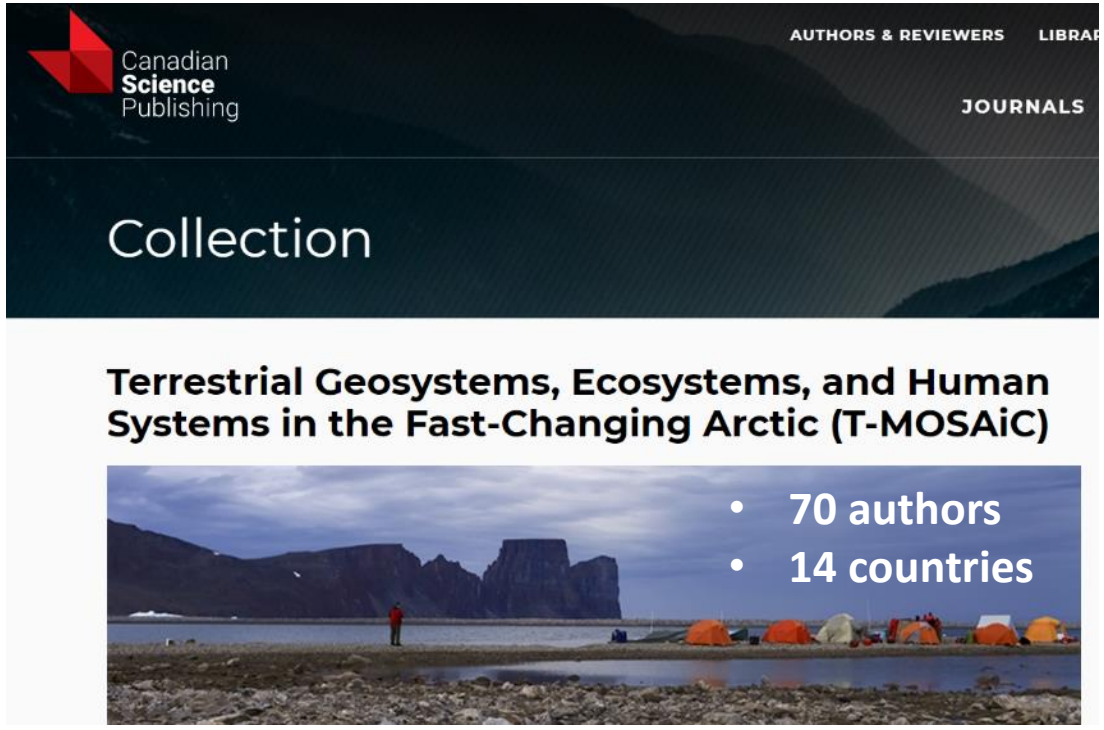
Arctic Science

Terrestrial Geosystems, Ecosystems, and Human Systems in the Fast-Changing Arctic (T-MOSAiC)

Deadline for submissions: 31 March 2022

Status: Open

Number of papers: 11 submitted to date



https://cdnsciencepub.com/topic/as-terrestrial

NRC Research Press

ARTICLE

Under-ice limnology of coastal valley lakes at the edge of the Arctic Ocean[1]

Yohanna Klanten, Katherine Triglav, Catherine Marois, and Dermot Antoniades

https://cdnsciencepub.com/doi/full/10.1139/as-2020-0038

Canadian Science Publishing

REVIEW

Standardized monitoring of permafrost thaw: a user-friendly, multiparameter protocol

Julia Boike, Sarah Chadburn, Julia Martin, Simon Zwieback, Inge H.J. Althuizen, Norbert Anselm, Lei Cai, Stéphanie Coulombe, Hanna Lee, Anna K. Liljedahl, Martin Schneebeli, Ylva Sjöberg, Noah Smith, Sharon L. Smith, Dmitry A. Streletskiy, Simone M. Stuenzi, Sebastian Westermann, and Evan J. Wilcox

https://cdnsciencepub.com/doi/full/10.1139/as-2021-0007

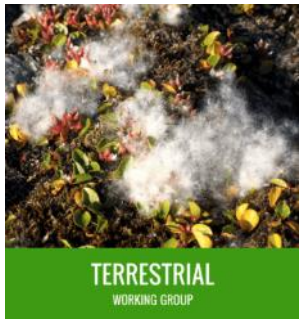
Beyond T-MOSAiC → 'T-MOSAiC 2.0' ?

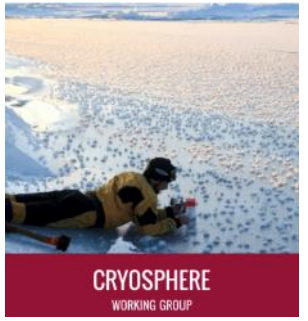
May and July 2021 – General Discussions

- Importance of having a terrestrial based program beyond 2021 under IASC
- Review the scientific goals and questions for such a program
- Build on already established scientific connections and teams
- Consider a similar multi-project approach or revise this structure
- Review and revise the governance accordingly
- Importance of seeking "global" funding for this program

November 2021 – IASC TWG EXCOM Meeting

- Reinforced the need for a coordinated terrestrial program in Arctic research





Beyond T-MOSAiC and ASSW2022 - Tromsø

ARCTIC SCIENCE SUMMIT WEEK

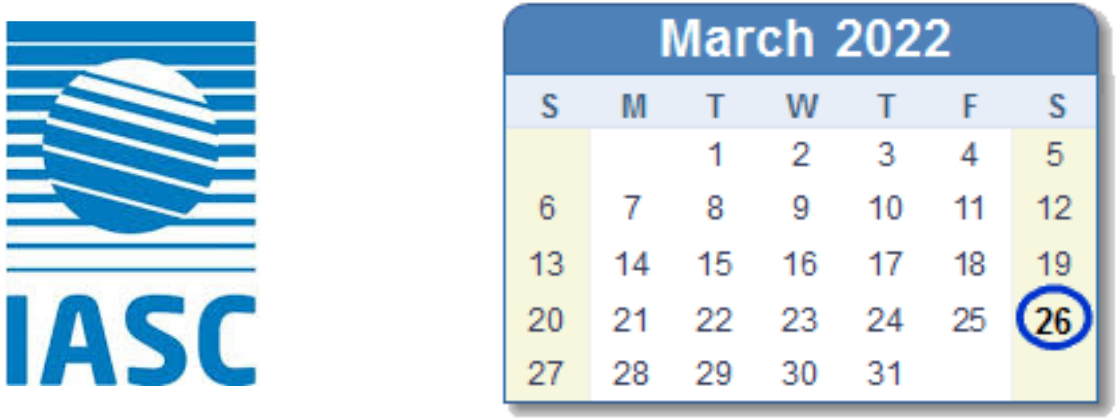
26 March – 1 April 2022
Tromsø, Norway

#ASSW2022

IASC

About | Programme | Practicalities | Registration | News | Past ASSWs

Beyond T-MOSAiC and ASSW2022 - Tromsø

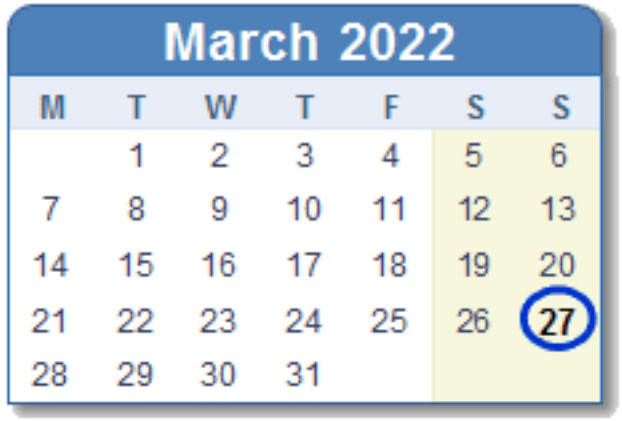


Saturday, Mar 26th 2022

9 – 12 (CET)

T-MOSAiC - Evaluation and Future Directions

Hybrid Meeting



Sunday 27th Mar 2022

11 – 16 (CET)

IASC Terrestrial Working Group meeting

T-MOSAiC

Terrestrial **M**ultidisciplinary distributed **O**bservatories for the **S**tudy of **A**rcti**c** **C**onnections

AGENDA

1. Welcome and workshop objectives
2. **Action Group (AG) reports**, highlights and wrap-up summaries
3. Status of the **T-MOSAiC special issues**
4. '**Beyond T-MOSAiC**' and ASSW2022
5. **Discussions and close**

T-MOSAiC

Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Connections

T-MOSAiC
Open Workshop
at ArcticNet 2021

https://www.t-mosaic.com

Quebec City, 6 December 2021

Photocredit :
João Canario, Chair of T-MOSAiC

ArcticNet
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Sentinel North

Institut nordique du Québec
Together for the North

FCT Fundação para a Ciência e a Tecnologia