

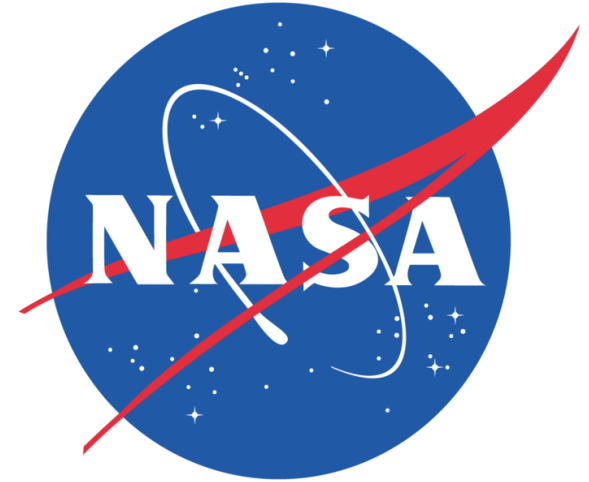
# RATIC 2019 WORKSHOP

Arkhangelsk / 26 May 2019





## Funding



**Organizing committee:** Timo Kumpula (Finland), Jana Peirce (USA),  
Olga Povoroznyuk (Austria), Vladimir Romanovsky (USA),  
Peter Schweitzer (Austria), Warwick Vincent (Canada),  
Skip Walker (USA)



# RATIC Background

Forum for developing and sharing new ideas and methods regarding sustainable development in the face of rapid Arctic development and climate change

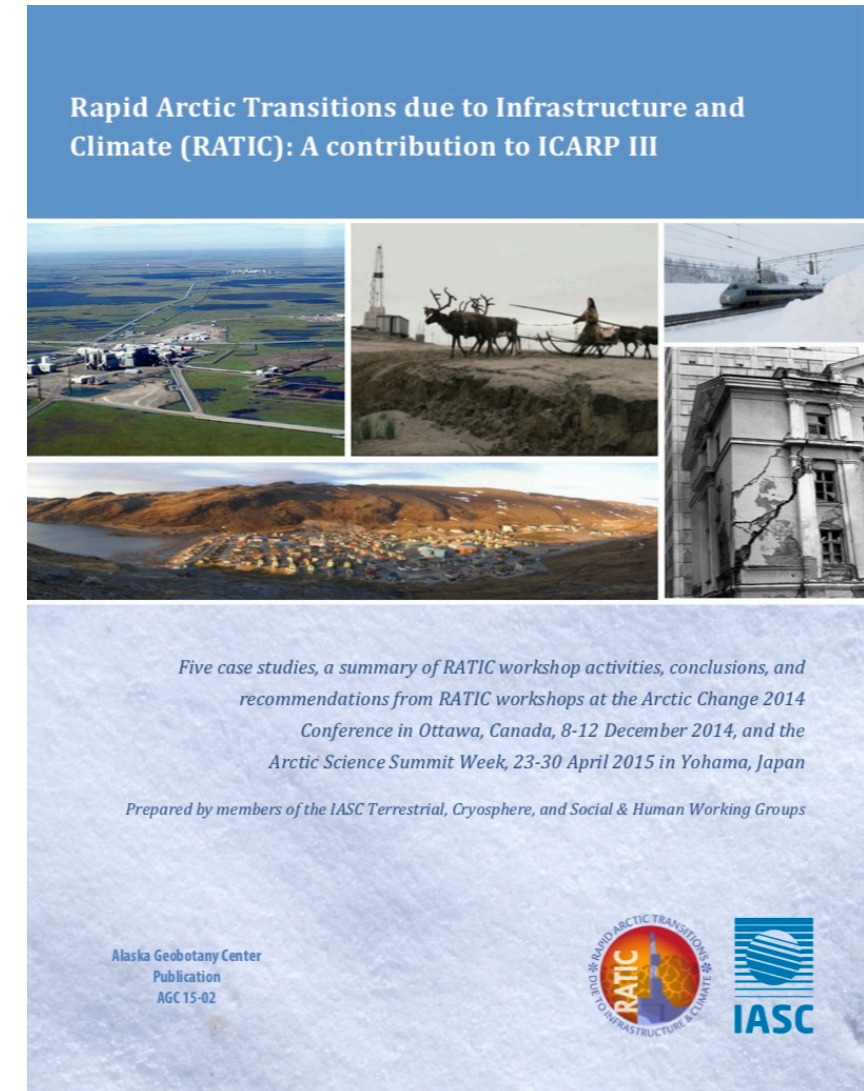
- **Workshops:**

- Arctic Change 2014, Ottawa, Canada
- ICARP III, 2015 , Yohama, Japan

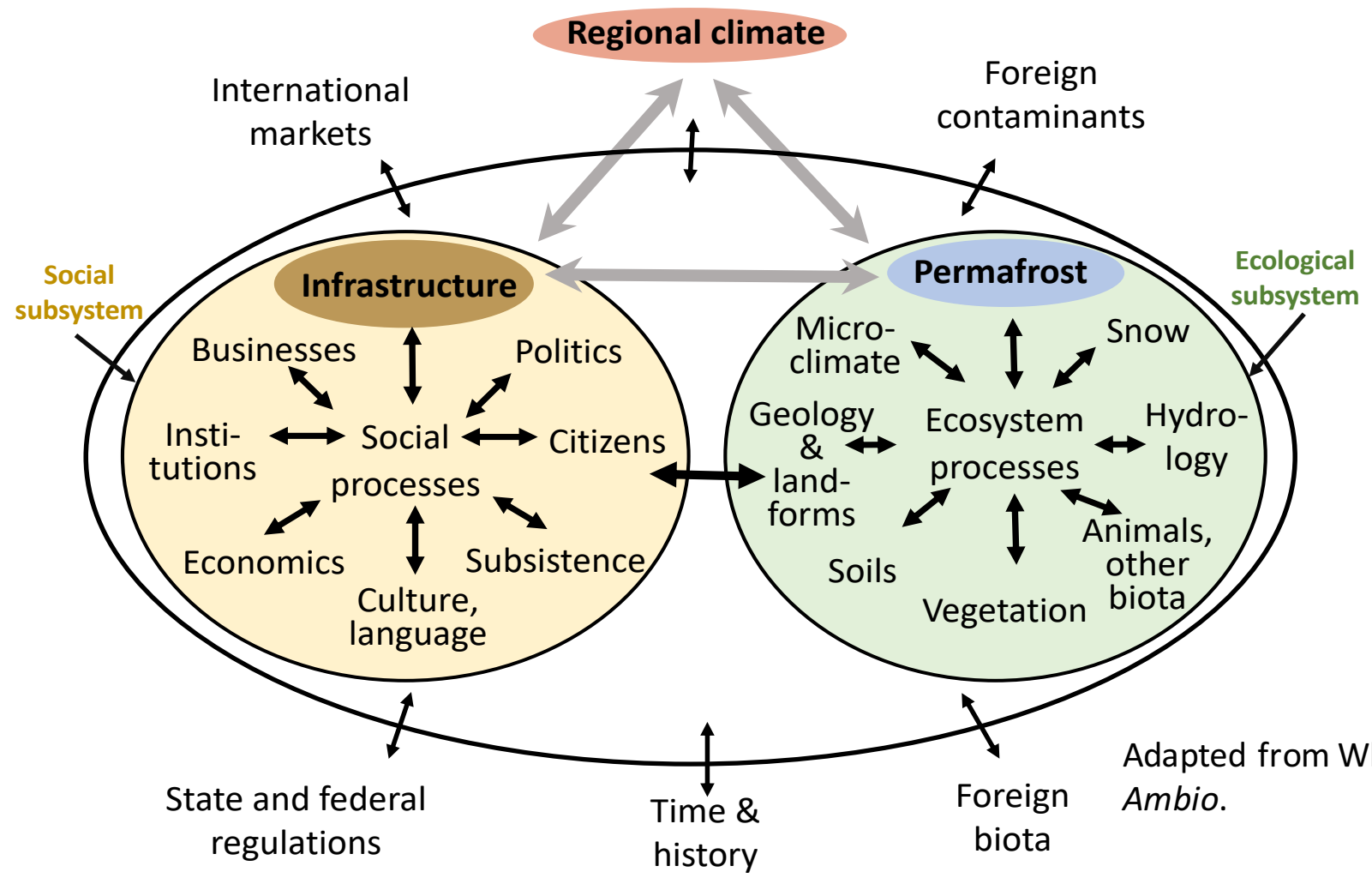


White paper with major messages and conclusions

<https://www.geobotany.uaf.edu/library/pubs/WalkerDAed2015-RATICWhitePaper-ICARPIII.pdf>



# Cumulative impacts of infrastructure and climate change in Arctic social-ecological systems (ASES)



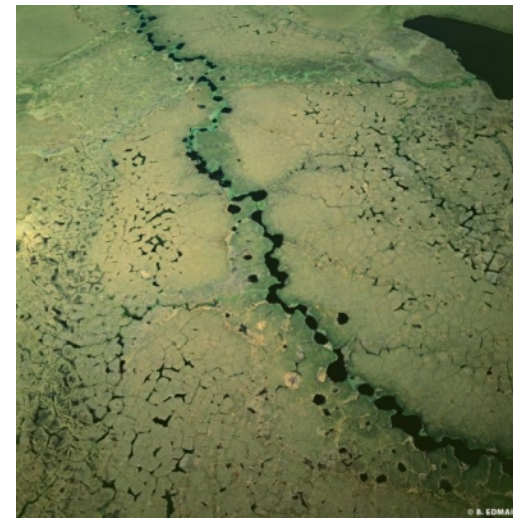
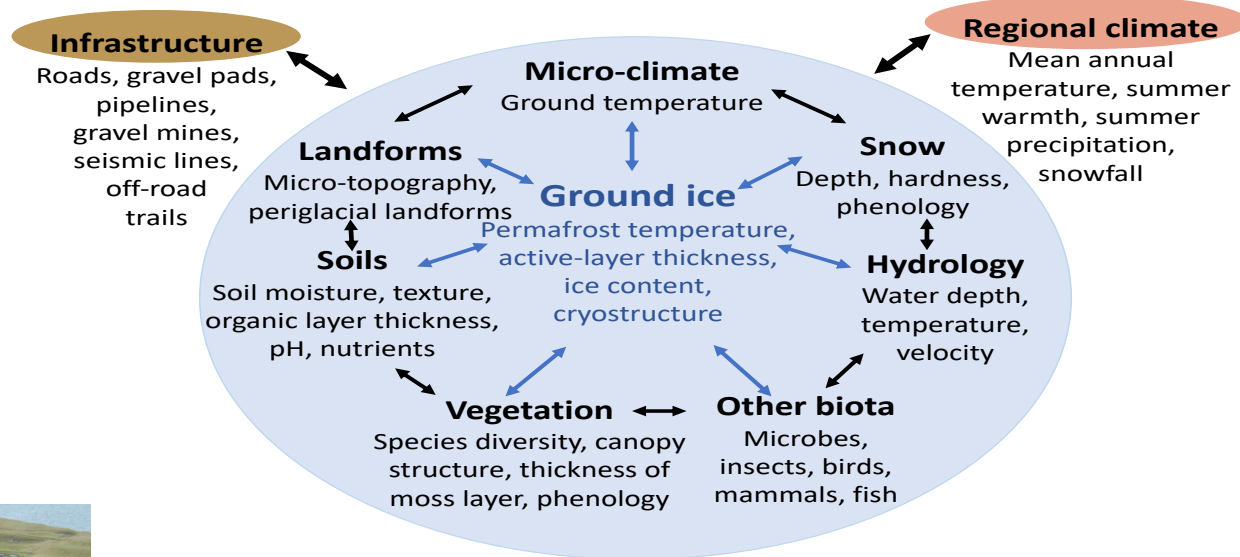
Adapted from Whiteman et al. 2004.  
*Ambio*.



# Effects of climate change and infrastructure on Ice-rich-permafrost systems (IRPS)



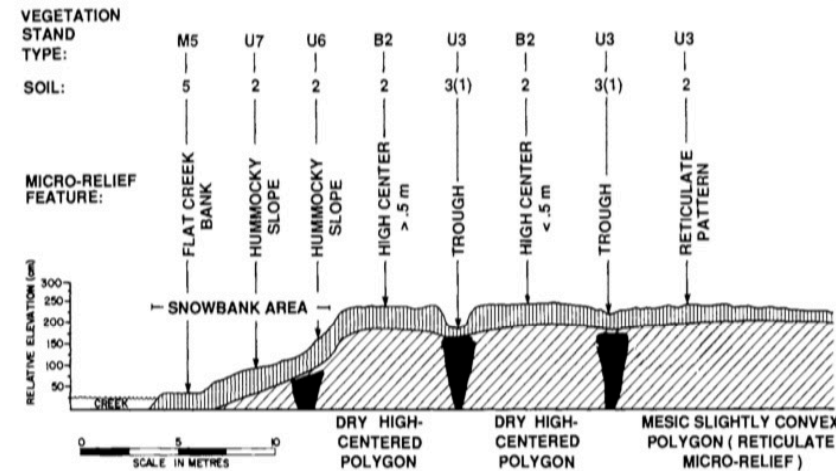
M. Kanevskiy.



TheGrapes. 2012. flickr.



M. Kanevskiy.



Walker & Everett. 1991. *Ecological Monographs*.



Walker et al. 2015. AGC 151.



# T-MOSAiC

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



- Forum for developing and sharing new ideas and methods regarding sustainable development in the face of rapid Arctic change.



.... stay connected

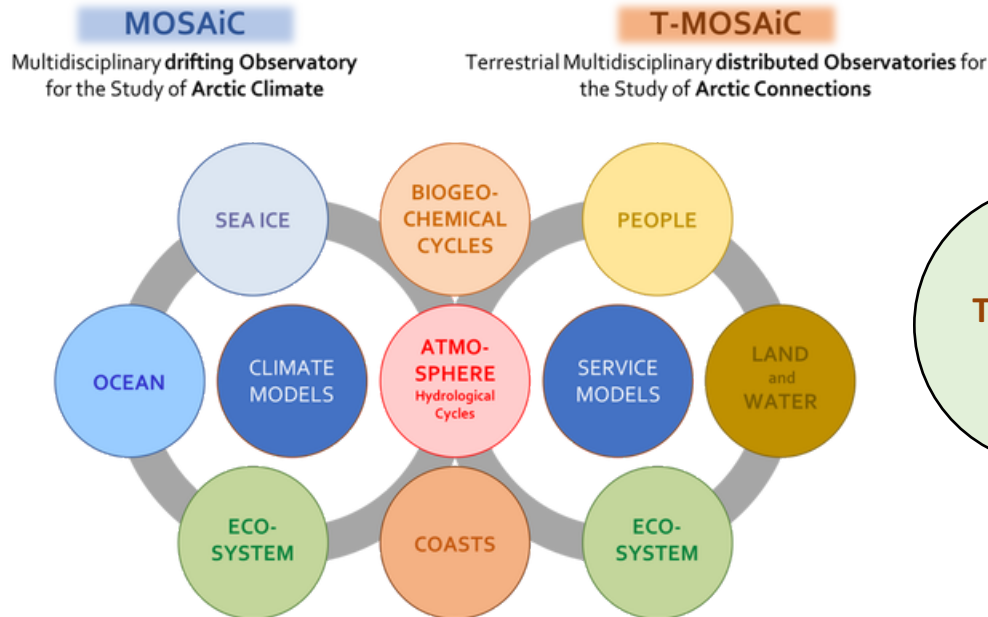
How to link RATIC  
and T-MOSAiC?



Pan-Arctic program that extends the activities of MOSAiC to the land.

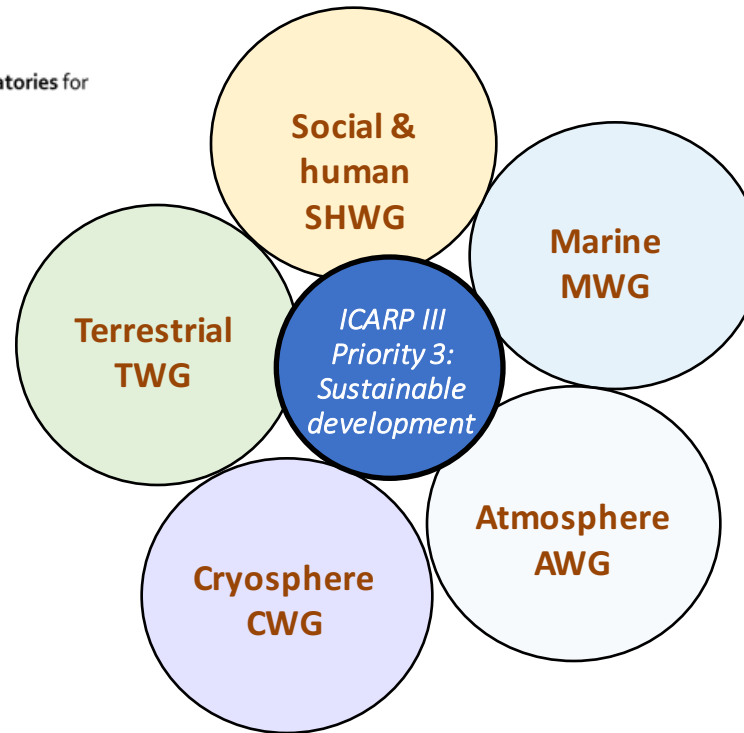
# Conceptual thematic diagrams

## T-MOSAiC–MOSAiC



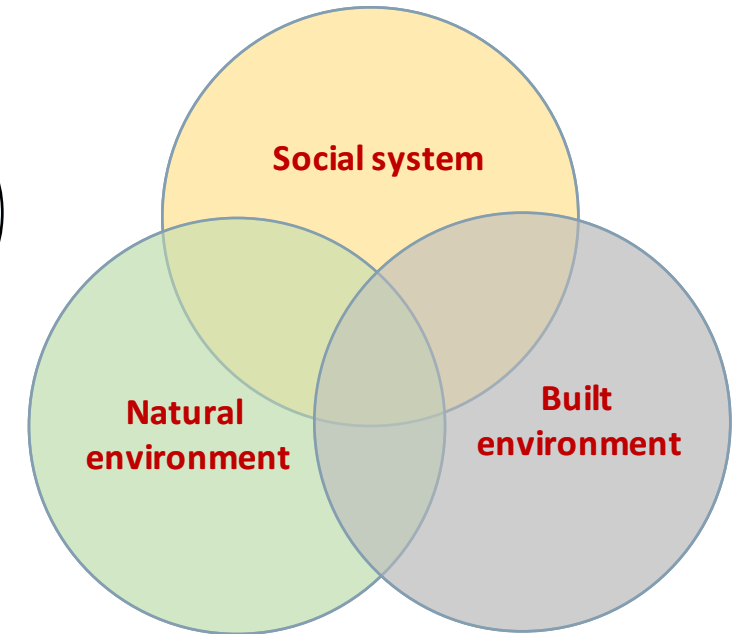
Major area of overlap is coastal environment  
Where most Arctic infrastructure is located.

## Original RATiC



Linkages are strongest between TWG,  
SHWG, and CWG

## Navigating the New Arctic (NNA)



Infrastructure and  
sustainable development  
important

## To be defined in relationship to MOSAiC and T-MOSAiC:

- **Connectivity**

- Coastal emphasis
- Synthesis of existing data and modeling
- Social-economic connections related to roads and corridors
- Observatories, IRPS roadside change during period of MOSAiC

- **Gradients**

- Thermokarst, and productivity along bioclimate gradients
- Dust and snow downwind of roads
- Moisture gradient

- **Discontinuities and thresholds**

- Subsidence, thermokarst formation
- taliks

- **Extreme events**

- Floods and underground thermokarst
- Extreme temperature triggers to induce ice-wedge degradation

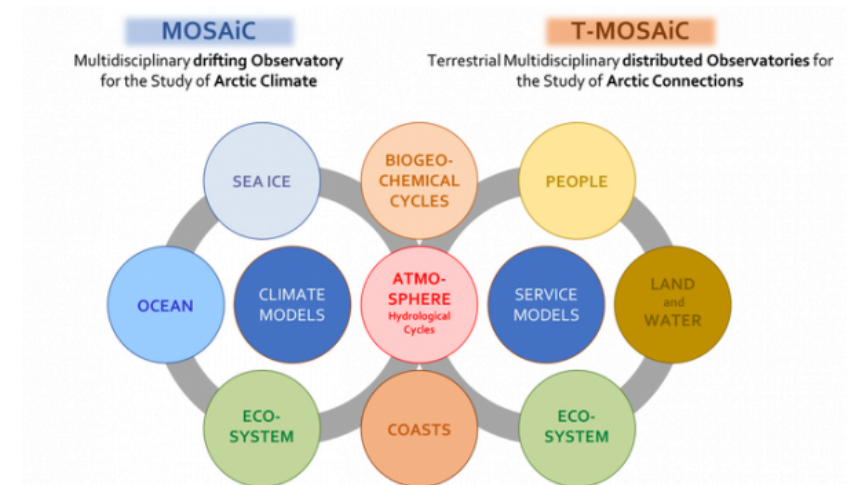
- **Emergent properties**

- New ecosystems
- New social adaptations to change

- **Specific questions that bridge sites and disciplines**

- **Timeline for implementation and tasks 2019–2021**

# T-MOSAiC



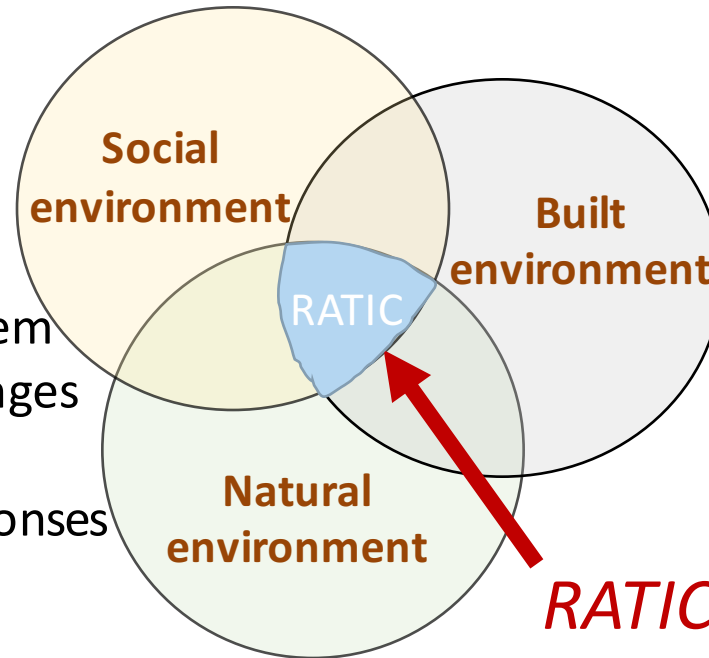
# Possible topics for themes

## Social environment

- Cumulative impacts of RATIC to subsistence and culture
- Analysis of historical indigenous infrastructure adaptations to climate change
- Social, economic, political & technological drivers of IRPS change
- Adaptive management of climate and infrastructure changes

## Natural environment

- Documenting ice-rich permafrost system response to climate warming and changes to infrastructure
- Monitoring terrestrial ecosystem responses to changes in land/air temperatures, hydrology, permafrost snow & contaminants at multiple scales
- Predictive ecosystem models of IRPS change



## Built environment

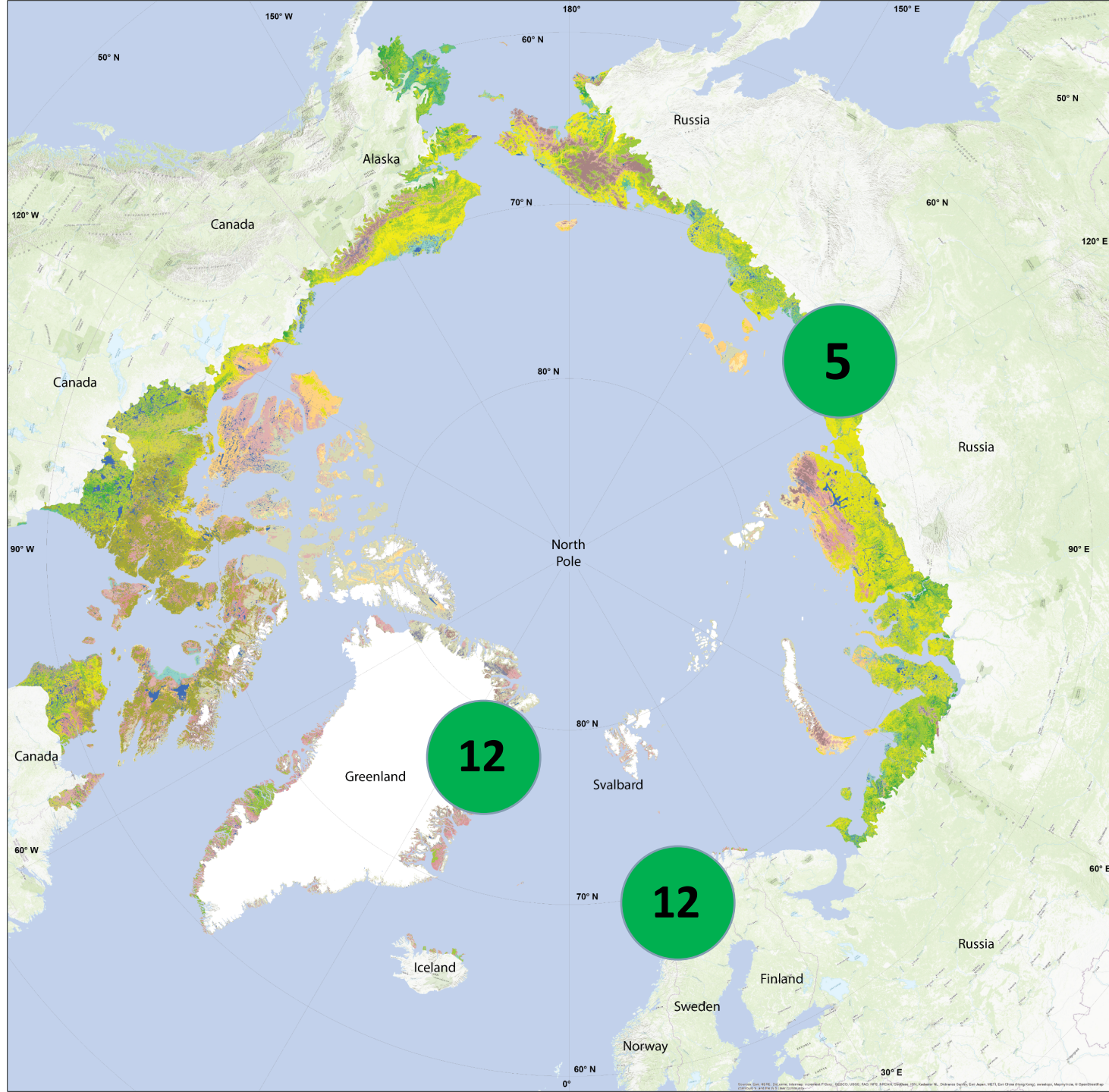
- Documenting and monitoring infrastructure response to climate warming
- Engineering solutions for infrastructure in urban nodes, remote villages, corridors
- Adaptive engineering solutions that include consideration of local culture, and indigenous knowledge

*RATIC is focused at the interface between the Social, Built, and Natural Terrestrial Environments.*





# Help Fill in our Project Map



**Project Title:**

**Principal Investigator(s):**

**Study Site(s):**

Number your project on the list and add dots to the map at your study sites with your project number written on them.



# AGENDA

- 9:00**    **Welcome and introductions**
- 9:20**    **Presentations: Impacts and interactions of climate and infrastructure in the Arctic**
- 10:30**   **Coffee and posters**
- 11:00**   **Presentations: Approaches to research and adaptation**
- 13:00**   **Lunch**
- 14:00**   **Research directions: Prague workshop synthesis**
- 14:20**   **Breakout groups: Natural and social/built environment perspectives on research needs**
- 15:30**   **Coffee and posters**
- 16:00**   **Research priorities (report from breakout groups)**
- 16:30**   **Panel & Discussion: Advancing RATIC through linkages with T-MOSAiC and other opportunities**
- 17:30**   **RATIC/T-MOSAiC: Planning the next steps**
- 18:00**   **Adjourn**



# WIFI & Website

Website: [www.geobotany.uaf.edu/ratic/workshop2019](http://www.geobotany.uaf.edu/ratic/workshop2019)

- Presentations
- Abstracts
- Etc.

WIFI:

Password:



# Breakout Group Questions

- Quick Sharing: What are the existing initiatives and projects in each sphere related to RATIC?
- What questions need to be answered before we can achieve sustainable Arctic infrastructure?
  - Which are most important?
  - Which may be answered soon?
  - Which will take longer or are unlikely to be answered in the foreseeable future?

## If time...

- What are some opportunities or strategies to address these questions?
- How can we work better together across disciplines and geographic boundaries?



# Prioritizing Science Questions

What questions need to be answered before we can achieve sustainable Arctic infrastructure?

(How important is it to answer?)

**Importance ->**


**Feasibility ->**

(How easy will it be to answer?)





## Linkages & Opportunities

- How can we advance the goal of sustainable Arctic infrastructure through participation in T-MOSAIc?
- What are some *specific* ideas for systems-level observation, monitoring and modeling related to infrastructure?
- What are the challenges or considerations from the social science perspective?
- How do we better engage indigenous communities, business and industry in this work?
- What T-MOSAIc data products can be used to answer some of the key questions identified earlier in the day?
- What are some ideas for synthesis articles or papers?
- How will you personally engage in this work?



# Possible Next Steps

## T-MOSAiC RATIC Action Group

### Volunteers

- Who is interested in participating in Action Group and continue work of RATIC on pan-Arctic scale

### Potential Activities

- Identify themes and subjects for synthesis articles
- Develop science plan (strategy & implementation plan)
- Best practices for sustainable infrastructure

### EGU 2020 (3-8 May in Vienna)

- **Science Session?** Is there interest in organizing a RATIC science session? We need a few people to volunteer as organizers.
- **Synthesis Articles:** We could propose a special issue of a peer-reviewed publication for papers presented an EGU RATIC Science Session.

### Next RATIC workshop?

- **ASSW 2021 Portugal?** We will need individuals to serve on organizing team and need to submit a proposal to IASC in 2020.

**Resolution:** Review RATIC resolution from Prague. Does it need to be updated?



# Prague sustainable infrastructure scientific research agenda

The following tasks are to be completed by RATIC in the next five years:

- Develop a RATIC strategic plan
- Promote the topic of “sustainable infrastructure development” as a key IASC research theme
- Involve scientists, local communities, governments, industry and the general public in this research
- Publish a synthesis of sustainable Arctic infrastructure research findings in peer-reviewed scientific journals
- Pursue funding to continue the RATIC initiative