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Perceived Risks and Responses Related to Permafrost Thaw in three Arctic Focal Areas

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AGU FALL
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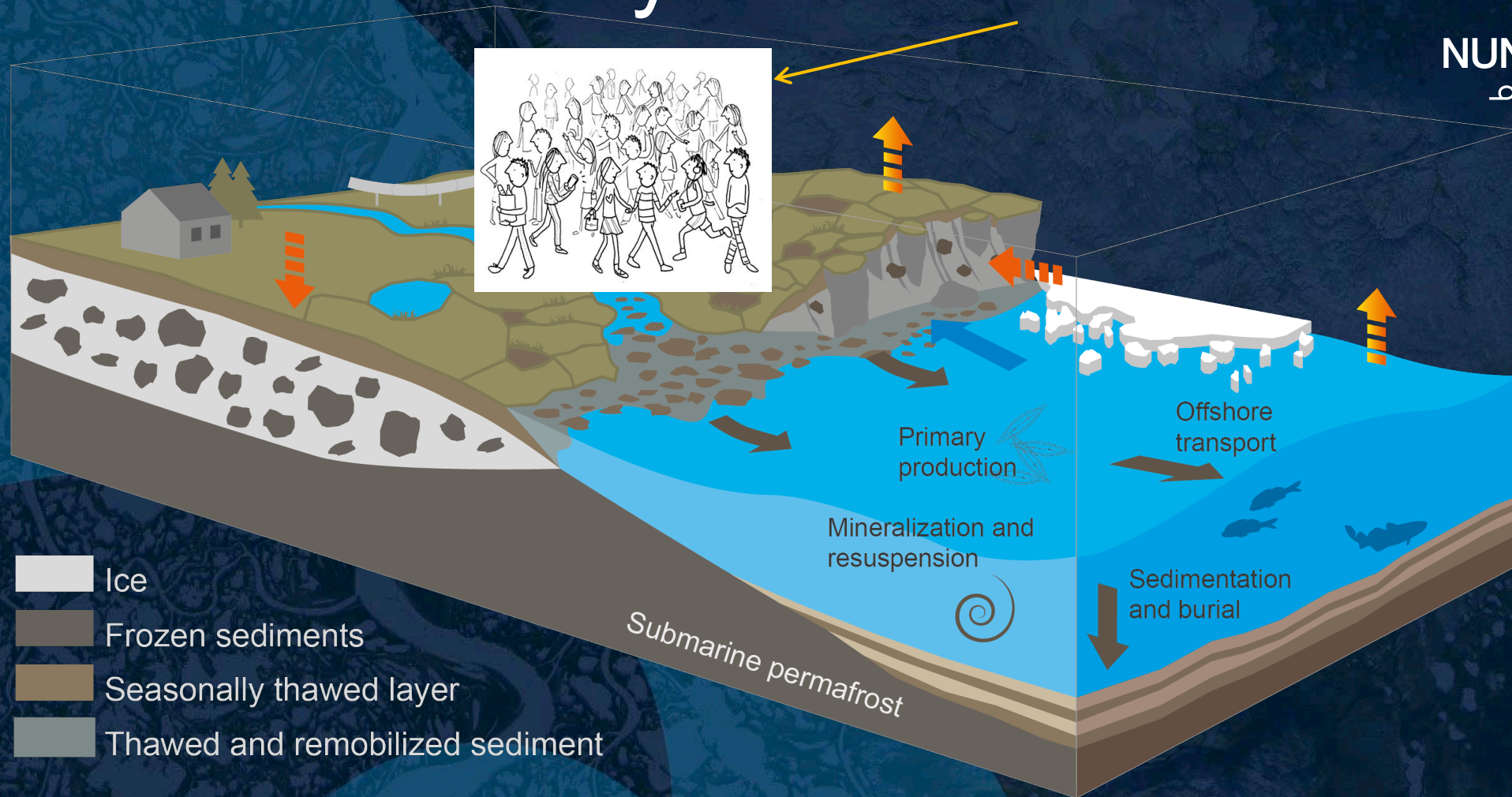
Permafrost?



Permafrost coastal system



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- Ice
- Frozen sediments
- Seasonally thawed layer
- Thawed and remobilized sediment

Permafrost degradation due to climate warming

Vertical flux to atmosphere

Thermal erosion and undercutting by waves

Sediment, carbon and nutrient transport

Geographical focal areas

- Beaufort sea area
 - Inuvik, Aklavik
 - Tuktoyaktuk
- Nordic Area
 - Ilullissat
 - Qaanaq
 - Qeqertarsuaq
 - Longyearbyen
- East Siberian area
 - Tiksi
 - Bykovskiy





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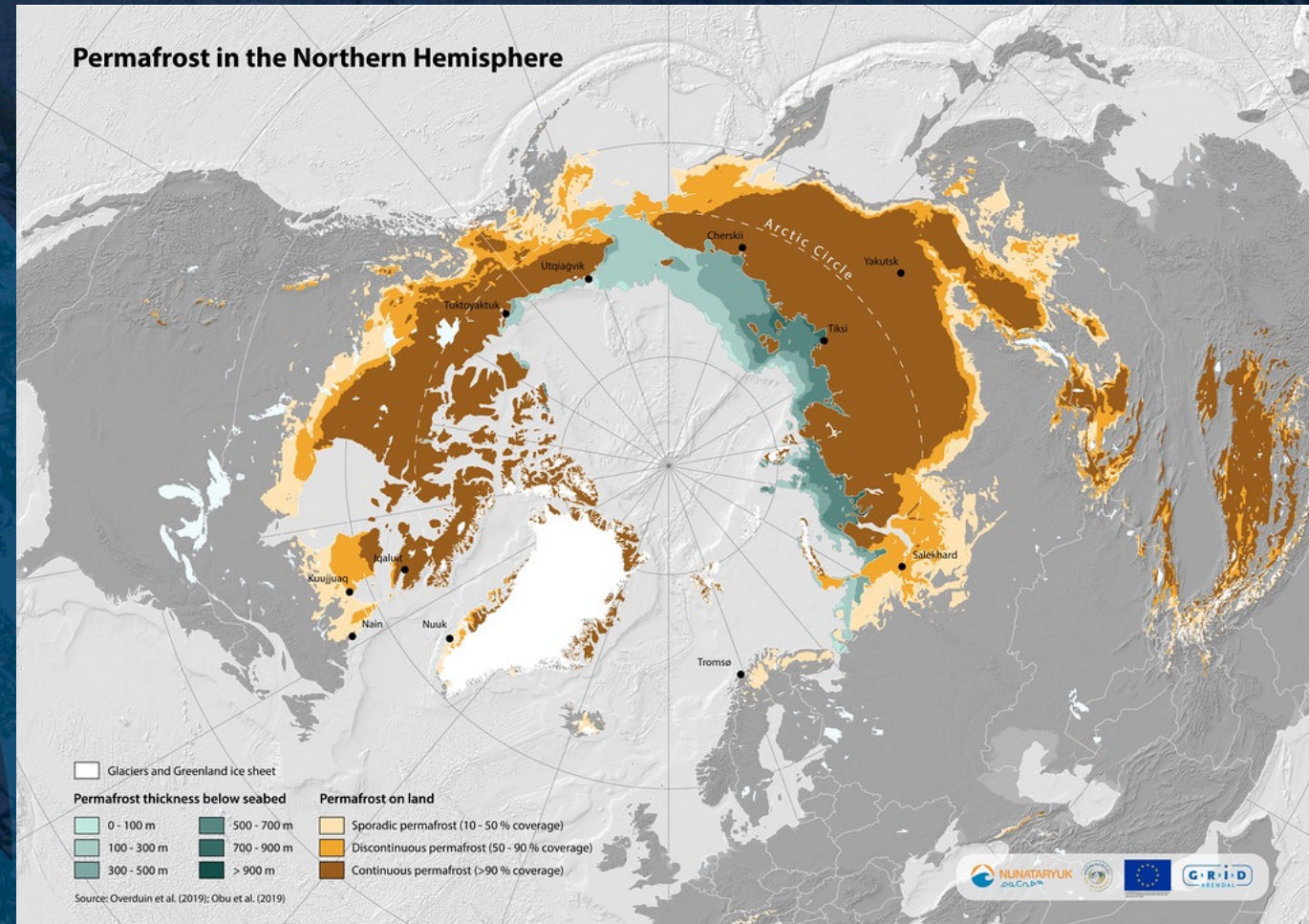
Methods & Methodology

- Methodology adapted to local circumstances, including collaborative, participatory, Indigenous research methodologies
- Mixed Methods Approach (2018-2020): Quantitative survey (on impact of permafrost thaw on subsistence activities), qualitative and expert interviews, informal conversations, community workshops, focus groups





- Permafrost coasts in the whole Arctic represent 34% of the world's coasts (Lantuit et al., 2012) and a key interface for human-environmental interactions
- Climate change is affecting this fragile environment by triggering coastal landscape instability and increased hazard exposure (Forbes et al., 2011).
- Permafrost thaw in combination with increasing sea level and changing sea-ice cover expose the Arctic coastal and nearshore areas to rapid changes (Fritz et al. 2017).

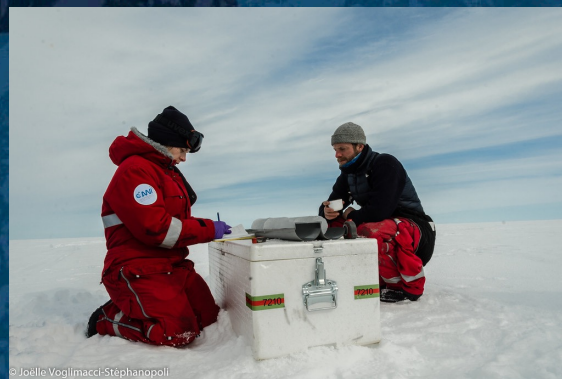


CIRCUMPOLAR, QUANTITATIVE, SURVEY BASED QUANTITATIVE APPROACH: RESULTS IN A NUTSHELL



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- 3 study sites :Permafrost thaw was perceived as a cause of problems in the daily lives of 40% of the respondents. The answers varied between sites. In Aklavik, 76% of the respondents had problems related to permafrost thaw whereas it affected 46% of the respondents in Longyearbyen. In Qeqertarsuaq, 21% of the respondents perceived permafrost thaw as a cause of problems.
- In Aklavik and Qeqertarsuaq, most of the respondents use of their natural environment for hunting, fishing, mushroom, and berry picking while the respondents in Longyearbyen mostly use their environment for recreational activities.



Northern Yakutiya

- The growing effects of climate change are publicly discussed only in cases of major economic losses
- Coastal erosion is especially evident in Bykovskiy – destabilizing housing, an eroding cemetery - perceived anger of reappearance of viral infections
- Drainage of tundra lakes causes loss of fish resources, changing landscapes
- The exposure of mammoth tusks leads to economic opportunities for some but also entails the destruction of landscapes and traditional knowledge
- Social instability and economic risks caused by Post-Soviet transformations are typically prioritized over environmental risks

Beaufort Sea area

- local (indigenous) organizations engage actively in the monitoring of and adaptation to the changes
- holistic understanding of socio-cultural vitality, which depends on an intact environment to provide sustenance for the local populations, concerns include environmental effects and loss of intangible heritage
- Identified risks relate to: Housing, Coastal Erosion, Transportation, Costs, Water security, Food security, fishing and hunting, vegetation
- Example: Travelling routes are getting longer and more unpredictable, making traditional hunting grounds harder to get to. As active PFT layer grows deeper willows get thicker and longer, providing better cover for Moose.

Disco Bay and North West Greenland

- Major concern for airports, roads and houses built on sediments
- People often experience that the floor starts slanting, or the door or window can't close, and it also happens the window glass cracks due to changes in the ground changing the structure in the house.
- The local population is highly dependent on subsistence activities and the changing environment also entail a shift in catches.
- The local authorities are aware of the permafrost thaw; however, they are not seen as a major issue compared to expanding local water facilities and improving local waste system.

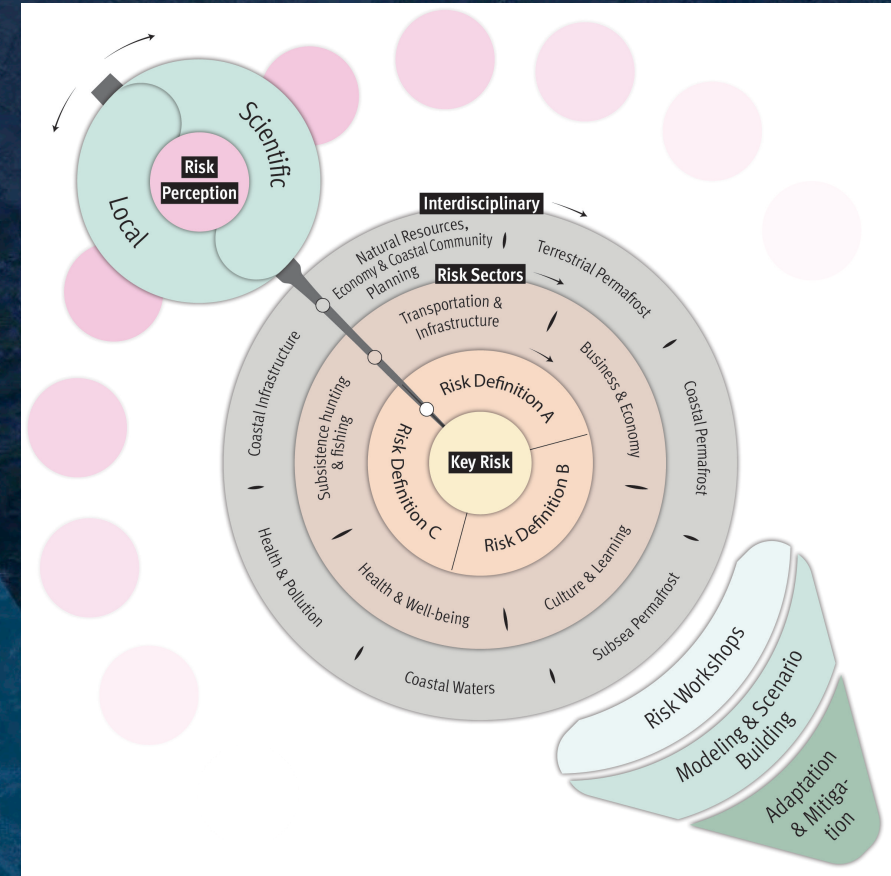
Longyearbyen, Svalbard

- non-indigenous community, PFT is a major concern.
- public perception of PFT and its impacts is high, but not always corresponds to the view of local engineers and scientists, who give a nuanced picture of the causes and effects of PFT.
- Perceived risks are mainly related to the built environment, while other aspects of society, such as health or culture, are not considered affected.
- Climate change and PFT are high up on the agenda of local and national policies, and adaptation is seen as a technical issue and entirely feasible, provided that sufficient resources are available.

Risk Analysis & Compass Model

One possible classification of identified risks according to the following categories (IRC 2020):

- 🌊 Infrastructure & Transportation
- 🌊 Health & Wellbeing
- 🌊 Subsistence Hunting & Fishing
- 🌊 Economy & Business
- 🌊 Culture & Learning



Nymand Larsen, Schweitzer et al. forthc. A Framework for Studying Risks from Global Change in Arctic Communities
Thawing permafrost in Arctic coastal communities: A framework for studying coastal risks from climate change.

Human security approach (for Russian case study, adapted from D7.4, p. 68)

Permafrost thaw influences human security in many dimensions

- *Economic safety*: the loss of dwellings, roads and other local infrastructure is among the biggest concern for all case study sites.
- *Environmental safety*: environmental security in the Arctic regions include the disappearance of endemic species, pollution and (de)salinization, landslides, sinking earth, and melting ground.
- *Community safety – Cultural vitality*: traditional knowledge . Language and culture, loss of local heritage sites
- *Food safety*: subsistence activities impacted by PFT
- *Health safety*: water sanitation as a challenge in certain communities.
- *Personal safety, Financial safety*: landslides, travelling, loss of certain income sources.

Overarching themes in all study sites

Built Environment, including heritage sites. Infrastructure as critical link mediating between physical processes and social impacts

Being on the Land/Subsistence (linked to health, food security and cultural vitality) : all except Longyearbyen, but even there

Focus on adaptation in all study sites instead of mitigation: Not much can be done by locals to lessen greenhouse gas emission

- Perceptions of risks and adaptation strategies in different field sites vary depending on their socio-economic situations and available resources, **including colonial histories** and other factors

What is perception of PFT influenced by?

- ❖ Transience/Rootedness/Sense of place
- ❖ Livelihood, Occupation
- ❖ Culture/Ethnicity
- ❖ Socio-economic situation
- ❖ Environmental consciousness
- ❖ Governance structures
- ❖ Actual impact and extent of PFT
- ❖ Personal (religious, political etc.) beliefs
- ❖ Knowledge Base and Transfer, integration of different types of knowledge

Perception of PFT skewed because

- a) Hard to distinguish between PFT caused by seasonal thaw and increased PFT due to climate change;
- b) Climate change/PFT as a reason for “everything”



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