# Establishment of the community-based observation network of permafrost (CBON-P) in the Upper Kuskokwim region.

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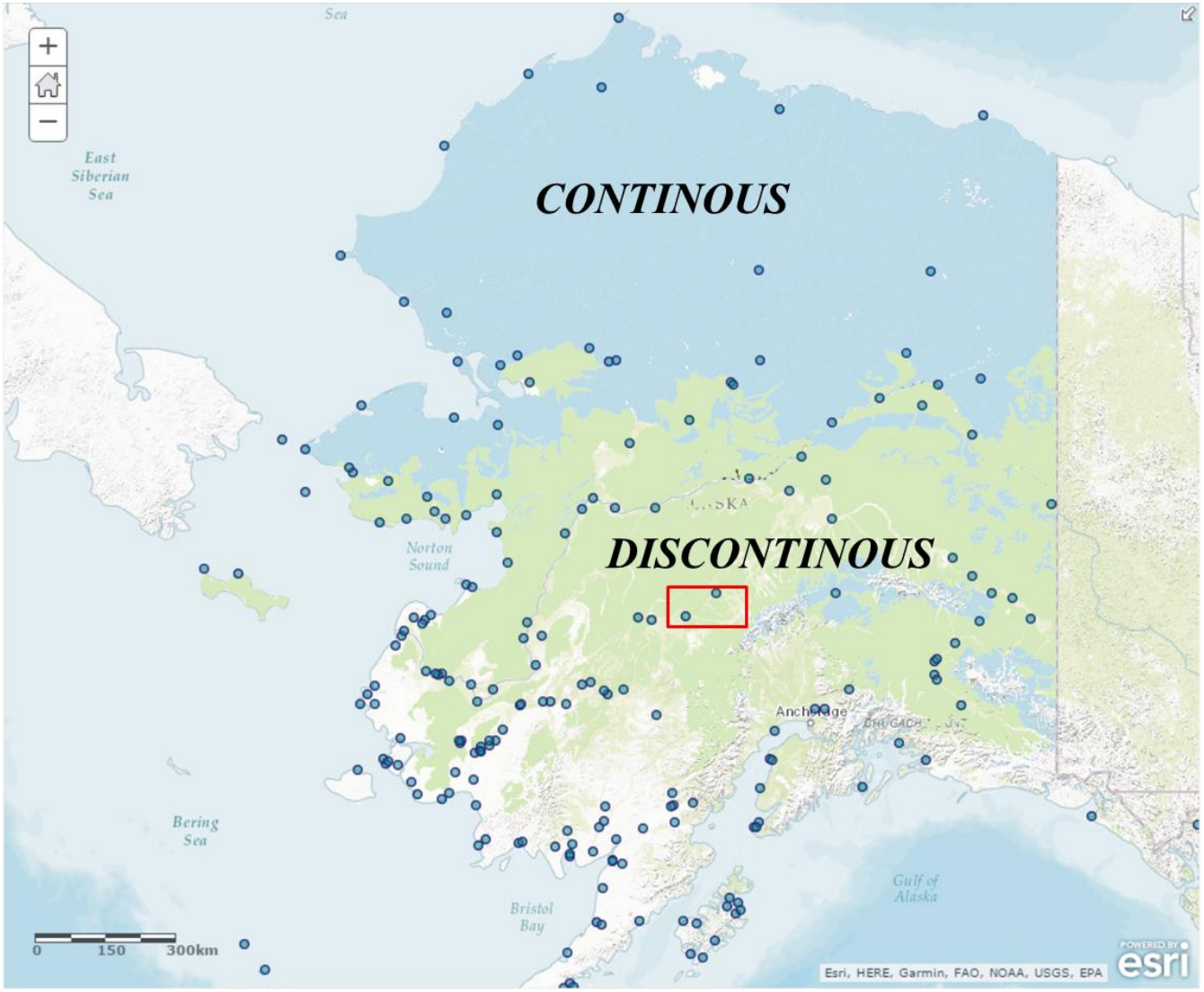
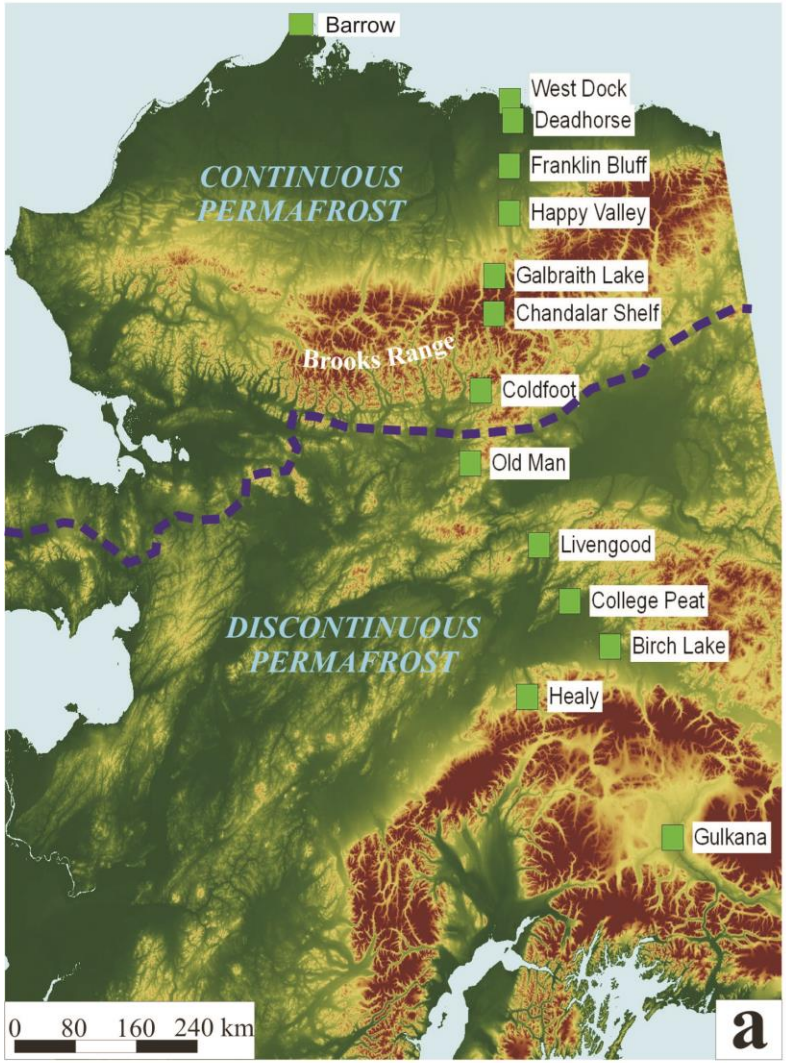
**1 – University of Alaska Fairbanks; 2 – Telida village council**

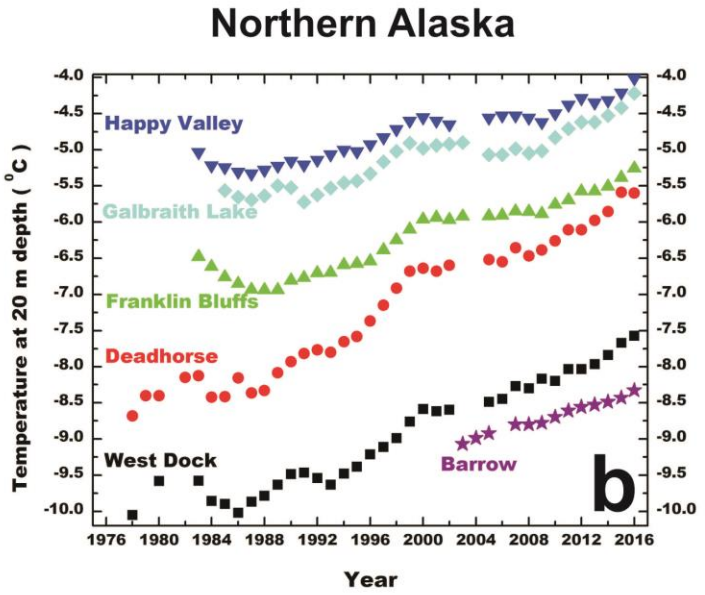
# PERMAFROST ON ALASKA

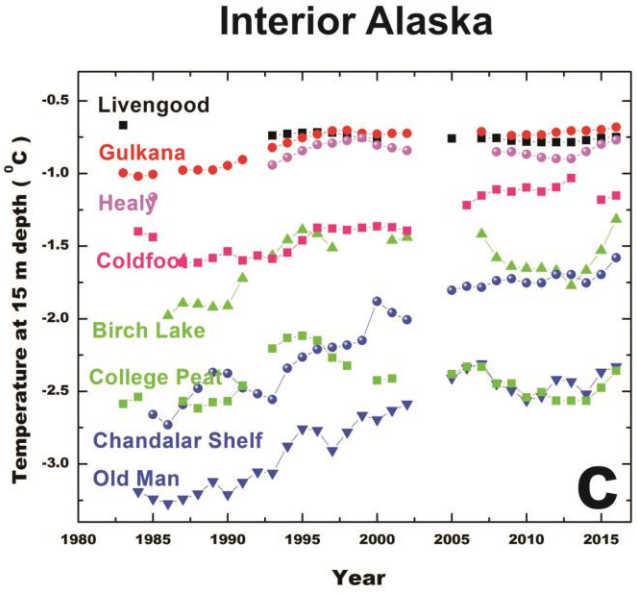


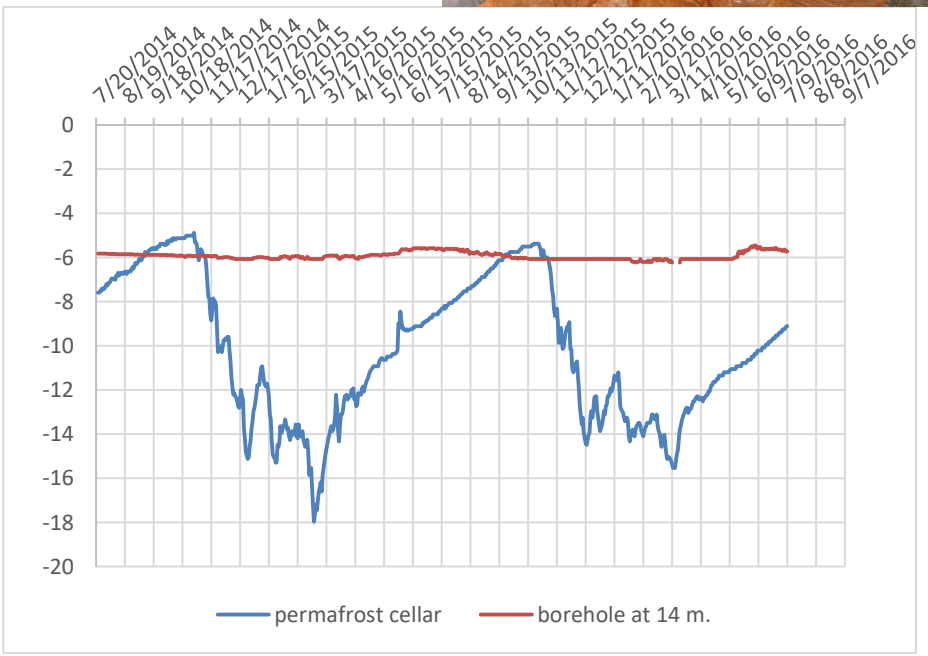

Permafrost underlies ~80% of Alaska (Jorgenson et al. 2008). Permafrost distribution can be classified as continuous (>90% of land area underlain by permafrost), discontinuous (90% – 50%),sporadic (50% – 10%), or isolated (<10%) (Ferrians 1965).

# PERMAFROST ON ALASKA

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permafrost cellar
borehole at 14 m.

# COMMUNITY BASED OBSERVATORIES

Scientific knowledge

Experience of natural observations

**Scientific community**


**Local community**

Traditional knowledge

Monitoring sustainability

Infrastructure and operation base for future potential research proposals

**NSF FUNDED PROJECT**

# Collaborative Research: Community based permafrost and climate monitoring in rural Alaska


**Main objectives:**

1. To engage traditionally-underserved tribal communities in permafrost and climate change research and advancing their natural science.

2. To build community capacity to monitor changes in local climate and permafrost by providing them training and education in purpose of informed decision making, adaptive management of subsistence resources, and planning for the future.

# Community Survey

- ***50 community members completed the survey:***
  - ***20 Women; 30 Men;***
  - ***18 respondents were 51 or older***
  - ***38 have lived more than 10 years in the village***
    - ***9 have lived their whole life in the village***

- ***Majority practice subsistence hunting, fishing, and gathering:***
  - ***Hunters: 49***
  - ***Fishers: 43***
  - ***Gatherers: 47***

# COMMUNITY SURVEY
## Results

Based on the survey results two main concerns were determined: **problems with transportation during winter season caused by the late freezup of lakes and wetlands** and **the decreasing of berries productivity**.

**Zone of discontinuous permafrost**

**Zone of continuous permafrost**

*We expect people are more concerned about* ***construction damages due to surface subsidence caused by permafrost thawing*** *and* ***limitation of ice cellar usage due to permafrost warming***

# Community Participants

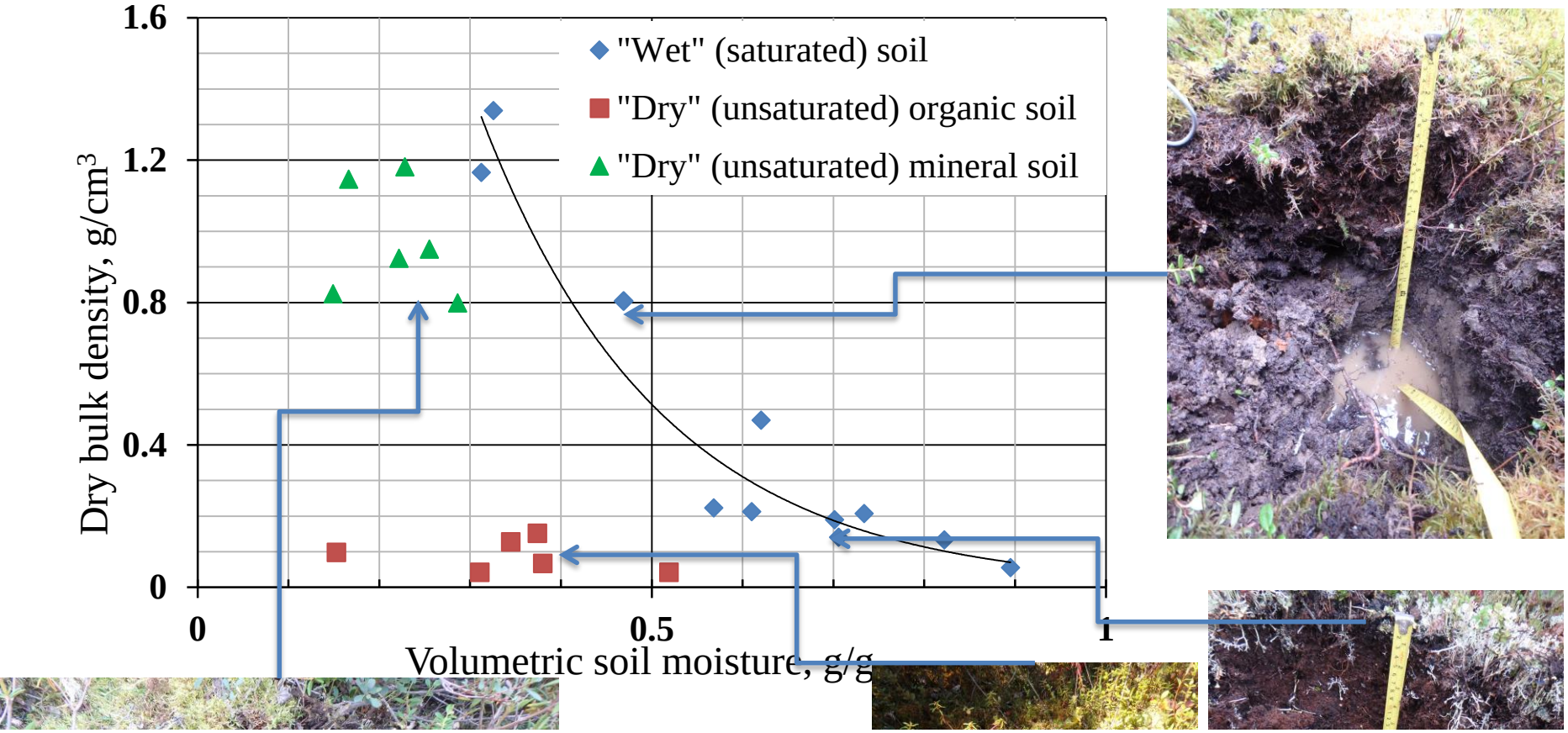
| | Fieldwork August 2016 | Fieldwork February 2017 |
|---|---|---|
| No. of participants | 5 | 3 |
| Steven Nikolai Sr. (Chief) | X | |
| Jimmy Nikolai | X | X |
| Adam Nikolai | X | X |
| Edward Ticknor | X | |
| Steven Nikolai Jr. | X | |
| Timothy Nikolai (Student) | | X |


Steven Nikolai, Sr.

Timothy Nikolai

# Community Participants

# SOIL CHARACTERISITICS





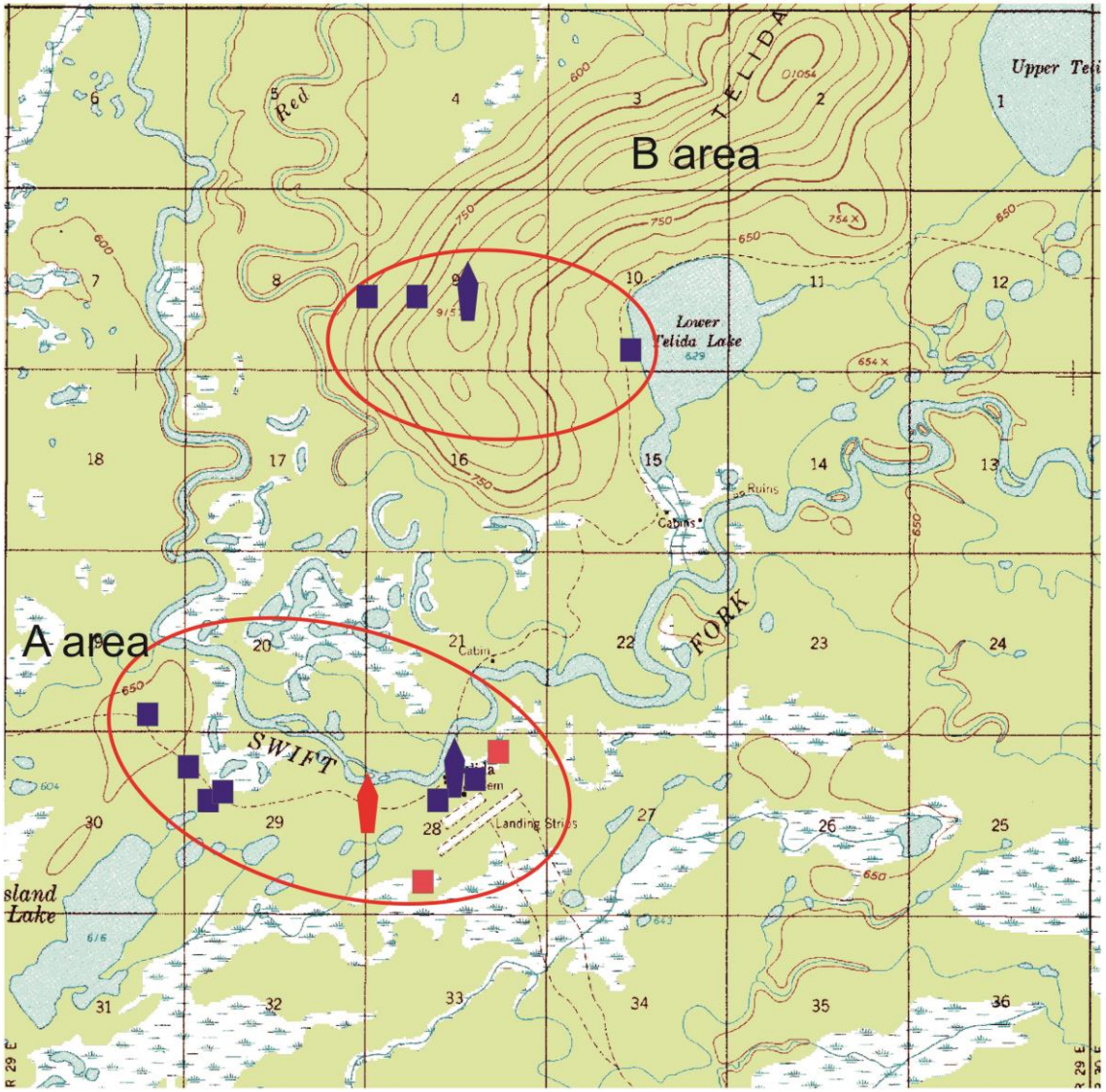







**MOST OF "WET" SOIL SAMPLES WERE TAKEN AT LOCATIONS WHERE WE HAD FOUND PERMAFROST**

# MAP OF PLANNED RESEARCH SITES AND POINTS OF INSTRUMENTATION



Totally 11 sites were instrumented at Telida village and one more at Nikolai. Six of them (5 at Telida and one at Nikolai) were located in the permafrost area.

| Site code | Ecotype | Sensors spacing | Frozen / unfrozen |
|---|---|---|---|
| N | Black spruce forest | Air; moss surface, 3 cm, 90 cm | Frozen |
| TV1 | Tall shrubs | Air (temperature/relative humidity), ground surface, 20 cm, 40 cm (both temperature and soil moisture), 135 cm | Not frozen |
| TV2 | Deciduous forest | Lichens surface, 1 cm, 20 cm, 80 cm | Not frozen |
| TV3 | Low shrubs | Moss surface, 3 cm, 20 cm, 75 cm | Frozen |
| TV4 | Mixed forest | Moss surface, 3 cm, 20 cm, 110 cm | Not frozen |
| TV5 | Black spruce forest | Moss surface, 5 cm, 20 cm, 55 cm | Frozen |
| TV6 | Black spruce forest | Moss surface, 3 cm, 27 cm, 90 cm | Not frozen |
| TV7 | White spruce forest | Air (temperature/relative humidity), 5 cm (ground surface), 25 cm, 50 cm (both temperature and soil moisture), 90 cm | Not frozen |
| TV8 | Black spruce forest | Moss surface, 8 cm, 20 cm, 58 cm | Frozen |
| TV9 | Deciduous forest | Ground surface, 3 cm, 10 cm, 100 cm | Not frozen |
| TV10 | Black spruce forest | Moss surface, 5 cm, 50 cm, 75 cm | Frozen |
| TV11 | Burned black spruce forest | Moss surface, 2 cm, 30 cm, 80 cm | Frozen |

# AIR AND GROUND TEMPERATURE DYNAMICS IN NIKOLAI DURING THE WINTER OF 2016-17

HOBOware

File Device Edit View Window Help

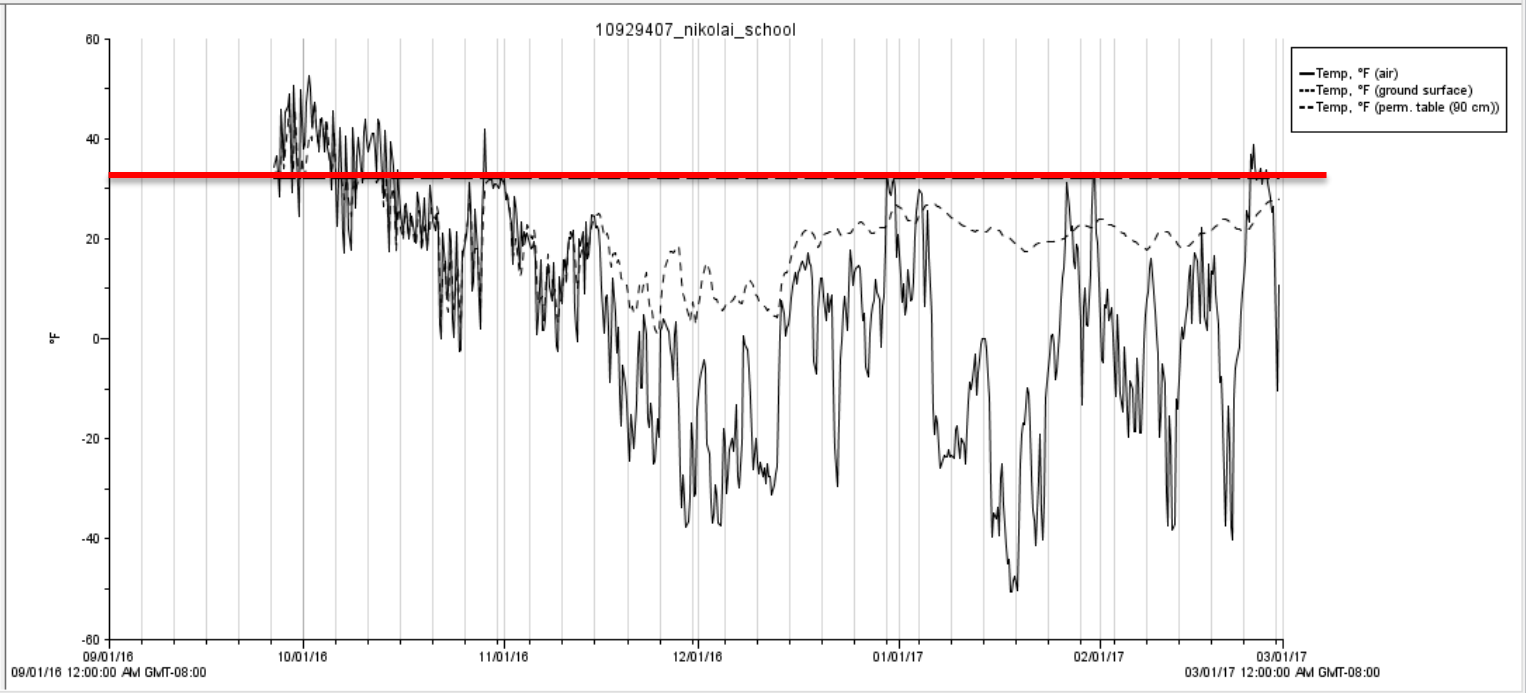
10929407_nikolai_school.hobo

| # | Time, GMT-08:00 | Temp, °F (air) | Temp, °F (ground surface) | Temp, °F (perm. table (90 cm)) |
|---|---|---|---|---|
| 27 | 10/03/16 01:25:58 AM | 42.498 | 42.811 | 31.935 |
| 28 | 10/03/16 07:25:58 AM | 37.803 | 37.458 | 31.935 |
| 29 | 10/03/16 01:25:58 PM | 43.774 | 42.940 | 31.935 |

Expand All Collapse All

Details

- Series: Temp, °F (air)
- Series: Temp, °F (ground surface)
- Series: Temp, °F (perm. table (90 cm))

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I'm Cortana. Ask me anything.

9:33 AM
3/1/2017

# ACHIVEMENTS AND FUTURE PLANS

Observation network for climate and permafrost monitoring had been established. The network covers all main ecotypes of the area.

Partners from local community have been trained to operate installed instruments.

**Important information about people's concerns in terms of ongoing natural changes had been collected.**

We will apply collected knowledge to address our research more precisely to the community needs.

Extension of observation program at the established network.

Preparation and submission of new research proposals with social component.

We also plan to involve more communities located within both discontinuous and continuous permafrost zone and make our CBO network more statewide.

**LESSON LEARNED**: Working on socially oriented projects it is NOT ENOUGH just get good scientific results!!!!

## QUESTIONS TO LOCAL COMMUNITIES:

**How can we apply our results to your concerns?**

**What products or mechanisms can make our knowledge useful for you?**

# *Summary*

- ***Sustainable monitoring of arctic change can be best done through a trusted and equal partnership with indigenous communities***

- ***True coproduction of knowledge is only possible through a broad understanding of each other's mindset, needs, and priorities***

- ***Uncertainties with mechanism of bringing scientific results back to communities was indicated as a greatest problem of community-based observations***

# Rights, Resilience, and Community-Led Relocation

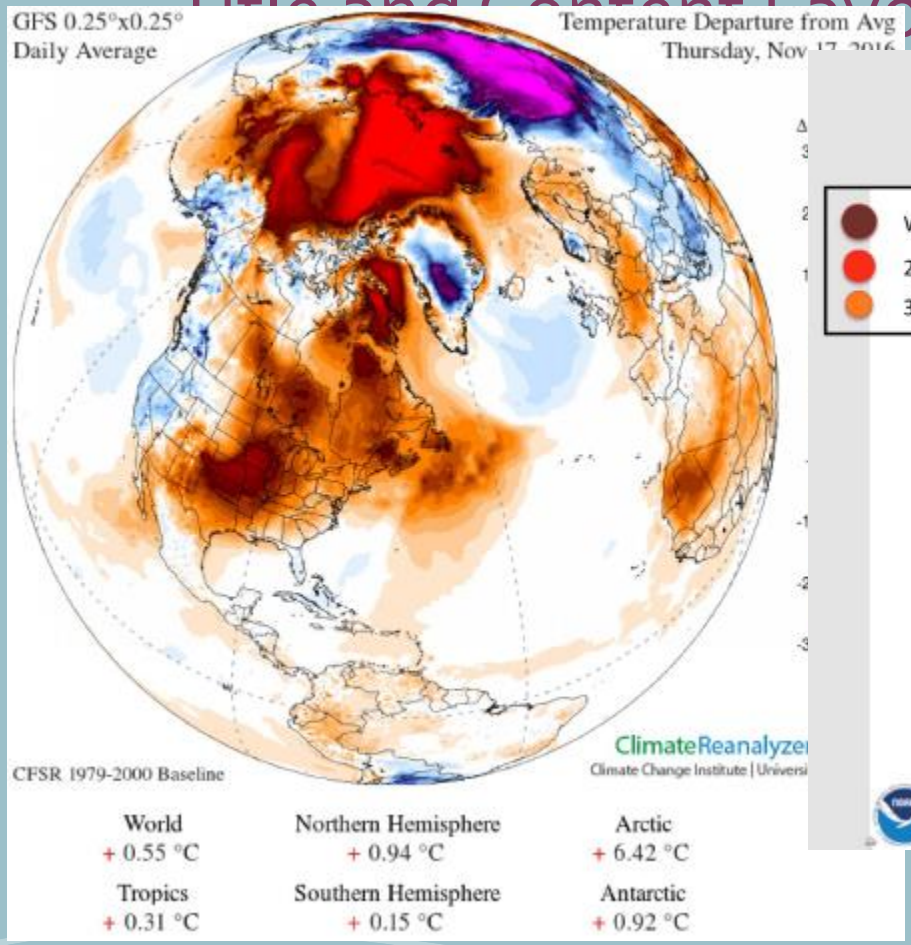
Denise Annauk Pollock, Patricia Cochran, & Robin Bronen

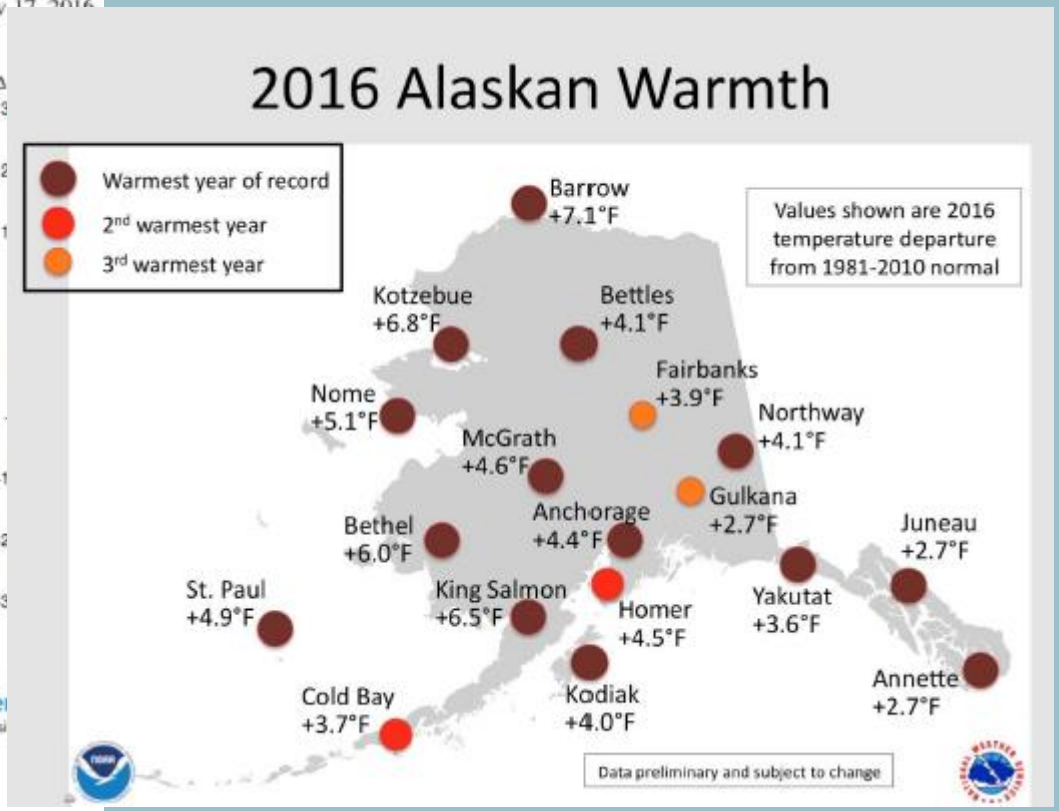
Alaska Institute for Justice
10th Year Anniversary
Promoting Justice
Empowering Survivors, & Protecting the Human Rights of all Alaskans

Alaska Native Science Commission
bringing together research and science in partnership with the Native community

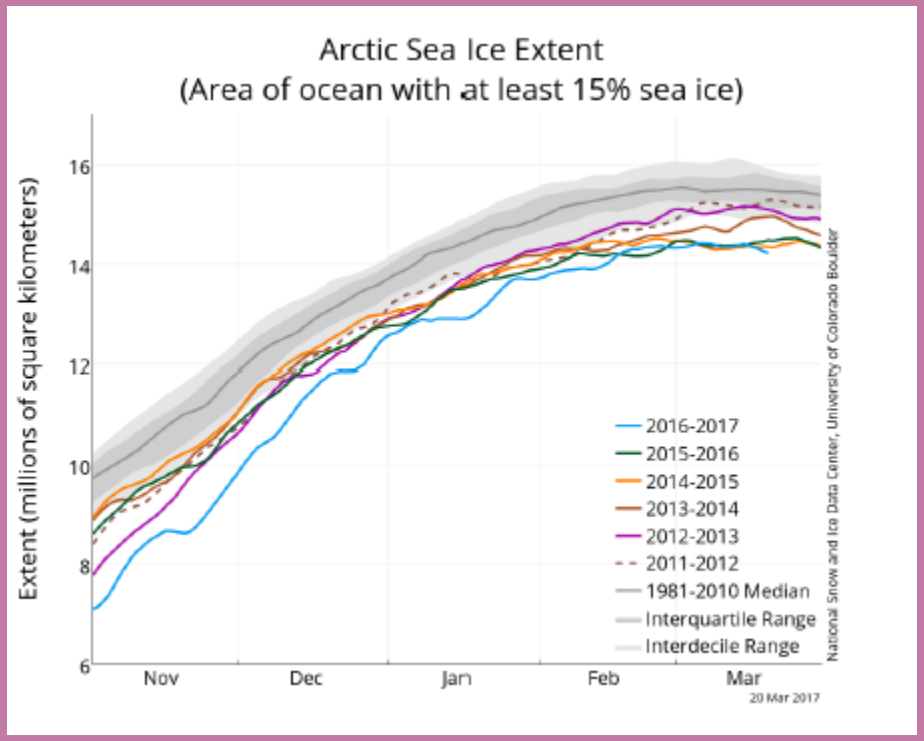
NOAA

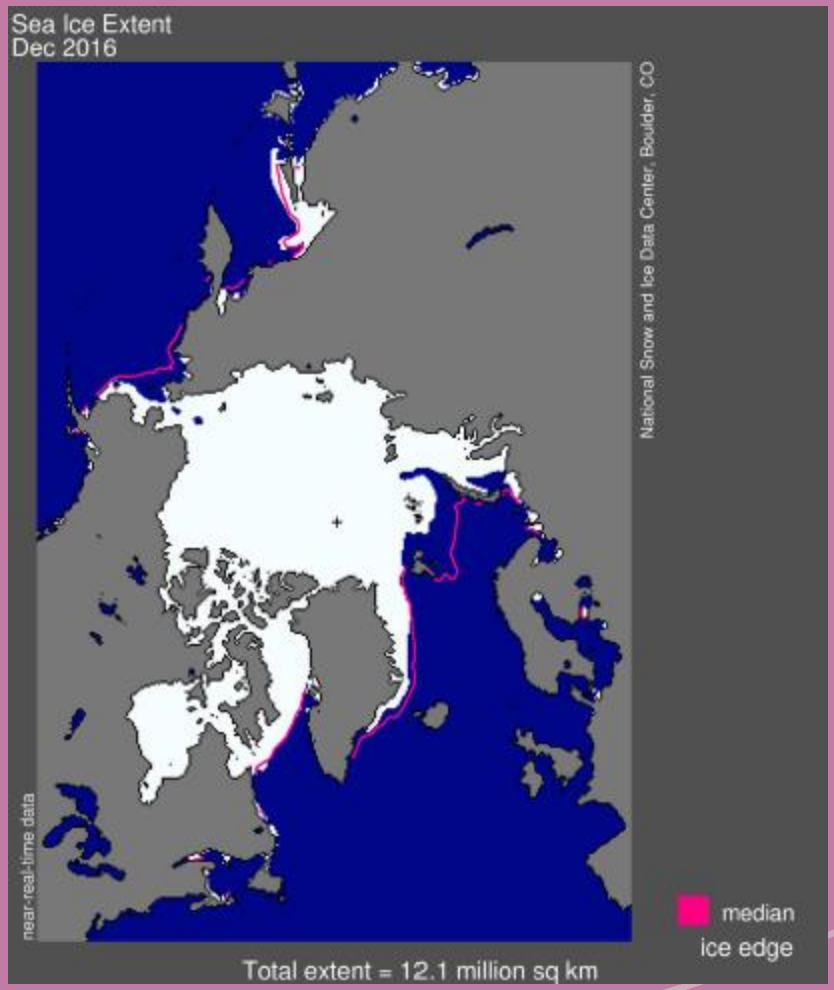
# Title and Content Layout with List



# ARCTIC SEA ICE EXTENT



# FIJI


Pacific
Ocean
Labasa
Rabi
Vanua Levu
Buca
Yasawa
Group
Savusavu
Taveuni
Nabouwalu
Koro
Ba
Levuka
Lautoka
Viti Levu
Koro
Sea
Ovalau
Nadi
Suva
Nausori
Gau
Sigatoka
Moala
Ono
Vatulele
Totoya
Fiji
Kandavu

# Relocation Principles Based in Human Rights

- Universal Declaration of Human Rights
- United Nations Declaration on the Rights of Indigenous Peoples
- International Covenant on Economic, Social, and Cultural Rights
- International Covenant on Civil and Political Rights

- RIGHTS TO
- Life
- Self-Determination
- Practice and Revitalize Cultural Traditions
- Subsistence
- Safe Drinking Water
- Improve Livelihoods
- Safe and Sanitary Housing

# ADAPTIVE RELOCATION GOVERNANCE FRAMEWORK HUMAN RIGHTS PROTECTIONS

PROTECT IN PLACE

COMMUNITY RELOCATION

PROTECT IN PLACE


Beaufort Sea
Chukchi Sea
Alaska
RUSSIA
CANADA
Kivalina
Shishmaref
Teller
Elim
Golovin
Unalakleet
Kotlik
Chevak
Nunapitchuk
Atmautluak
Bering Sea
Eyak
Kwigillingok
Quinhagak
Gulf of Alaska
Port Heiden
Nelson Lagoon
0 55 110 220 Miles

## Kotlik, AK

"In November 2013, Kotlik experienced a devastating flood caused by a storm surge in the Bering Sea. The storm surge caused an unprecedented flood event that destroyed homes, severed water and sewer lines, demolished the water system, damaged the boardwalk system and forced hundreds of people to seek shelter in the school for an extended period of time."

## Golovin, AK

"We are not looking forward to fall or winter weather. We've had high tides as late as November and December. Earlier rainy seasons during the winter and spring caused our runway to shut down, either to ice conditions, or mud and slush. Golovin Airport is the only way into and out of our community. We were concerned when airplanes couldn't come in."

**Alaska Natives know what is best for their communities**

32 Alaska Native workshop participants:

- Created workshop agenda
-Shared expertise and strategies
-Partnered with government agencies
-Designed community-based environmental tool

# Research Protocols Empowering Indigenous Peoples

http://nativescience.org/communities/code.htm

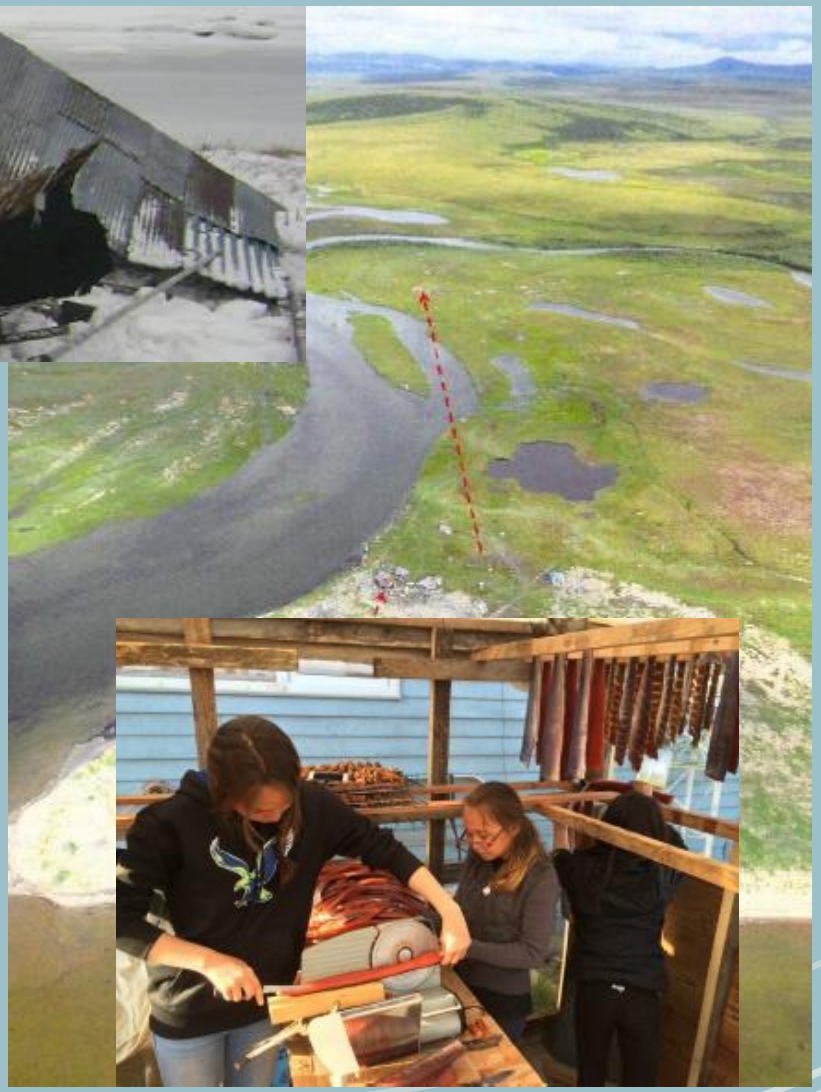
Right to self determination – Partnership – Recognition

Research process and result benefits indigenous community (materially, socially, culturally,

Traditional knowledges – languages and cultural practices honored

Indigenous partners are compensated for their work

Research materials and results are shared with indigenous community



# Traditional Food

**It takes many years to build our fish camps. Floods and ice sliding events have damaged cabins where community members teach the younger generation how to fish. Harvesting traditional foods not only nourishes the community, but it speaks to our identity and our ability to carry on traditions lasting many generations.**

**-Golovin tribal members**

# Language & climate change

- Language tied to environment
- Our people are safer when using our language while out hunting
- As our environment shifts, we see shifts in our languages

**Alliviniq** – ice under another piece of ice which may surface due to ocean currents or wake of a boat

**Apuqtinniq** – ice that has been pushed onto shore

**Asitaq** – cracked ice made by force of moving ice when it attaches to free-floating ice|

**Aunniq** – rotten ice

**Ayiupaq** – ice chipped off by ocean waves

**Iḷḷigauraq–**Ice that has begun to melt and although solid is spongy and dangerous

**Imuniq** – young ice that has been crushed by moving ice

**Muġrak/Puġrak** – slush ice

**Qaimġuq** – first shore ice in fall

**Qaiqsuaqtat** – Smooth ice between areas of rough ice

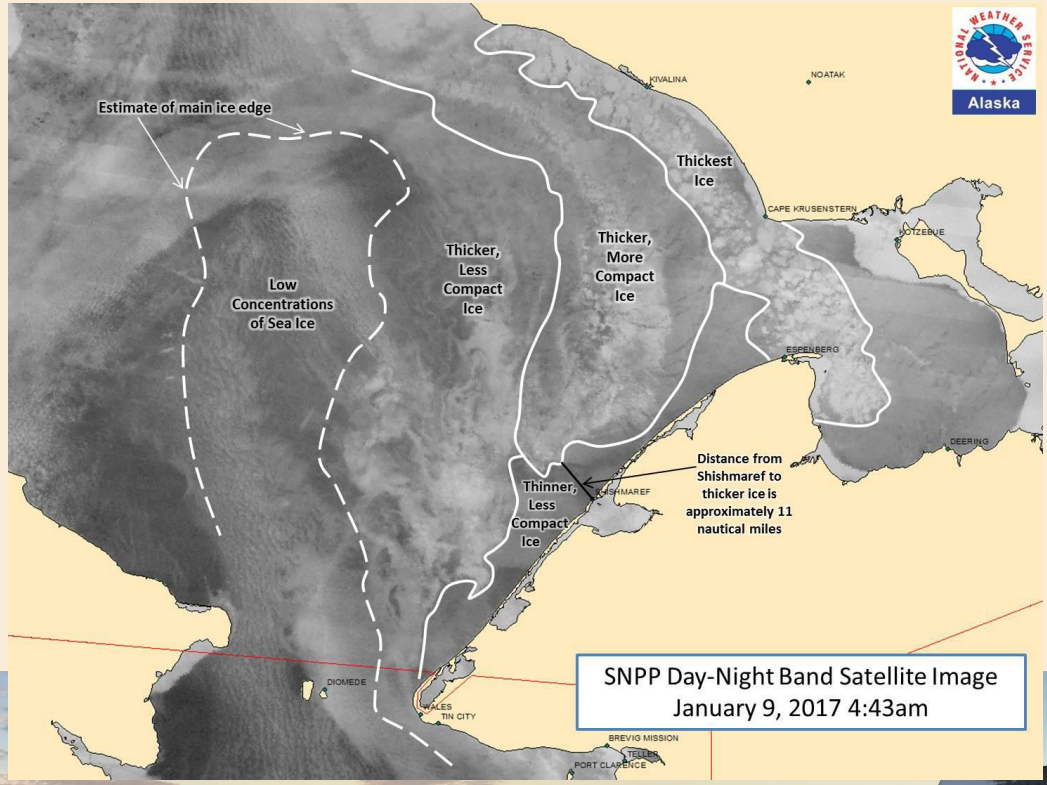
**Qimaqtinniq** – shore-fast ice that left behind when the ice is carried away by an ocean current

**Sikuliaġruaq** – ice that is about one and a half feet thick

**Sikulluataq** – freshwater ice

**Suġaiñŋuġruaq** – very large mass of pack ice

# Traditional & Western Knowledges combine to understand Shishmaref sea ice conditions



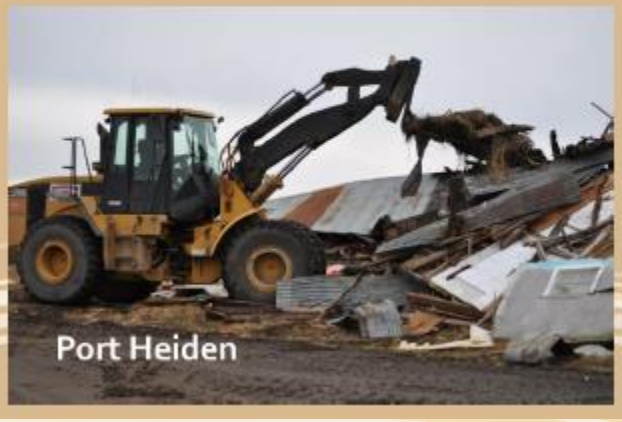

# Golovin color-indexed maps

- Native Village of Golovin
- Alaska Division of Geological Surveys
- National Weather Service


# DGGS Erosion Monitoring Programs

# Community-led Relocation & Migration


Kwigillingok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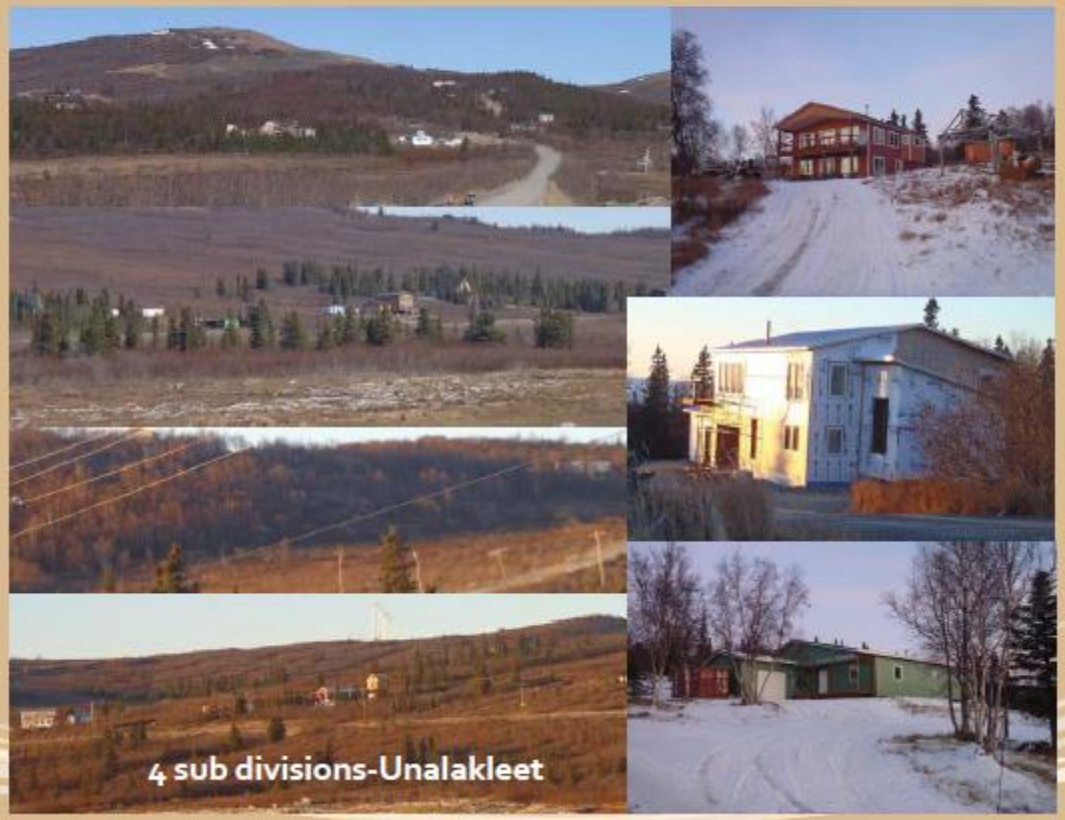
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