Research at the intersection of the Ring of Fire & the Aurora Oval

Geophysical Institute
University of Alaska Fairbanks

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Geophysics in Alaska

Arctic is warming 3-4 times faster than the rest of the planet

Vast Natural Laboratory Drives Our Research

GEOPHYSICAL INSTITUTE OPERATIONAL PROGRAMS

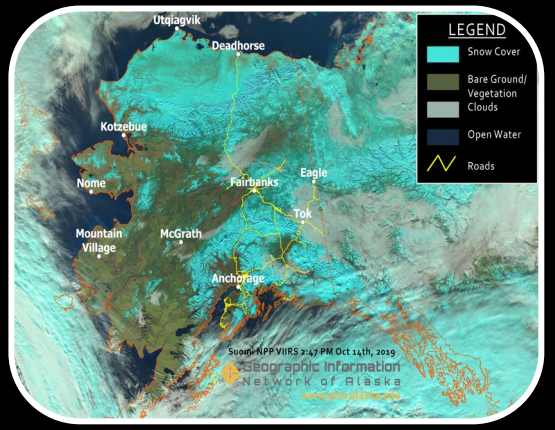
Volcano Observatory

Earthquake Center

Satellite Downlink (SAR)

PFRR Rocket Range

UAS Program & Range



GINA – NOAA JPSS

GDNP UARC

HAARP

UNCLASSIFIED

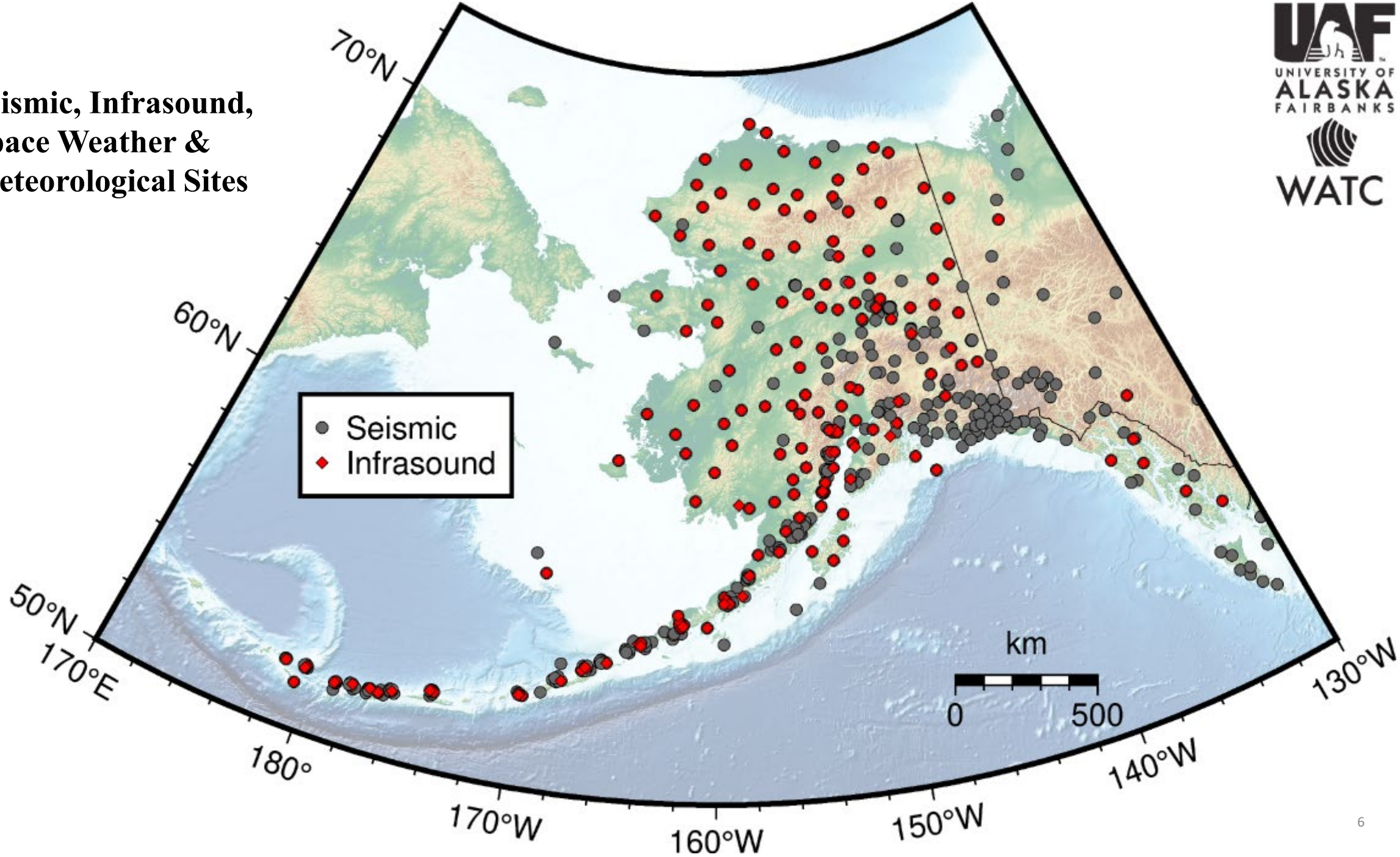
Deputy Assistant Secretary of Defense for Threat Reduction and Arms Control (DASD (TRAC))

Geophysical Detection of Nuclear Proliferation (GDNP) UARC

- RDT&E to sense, locate, characterize, and assess the threat potential of nuclear activities worldwide

Siberian permafrost holes: Gas Emission Crater (GEC)

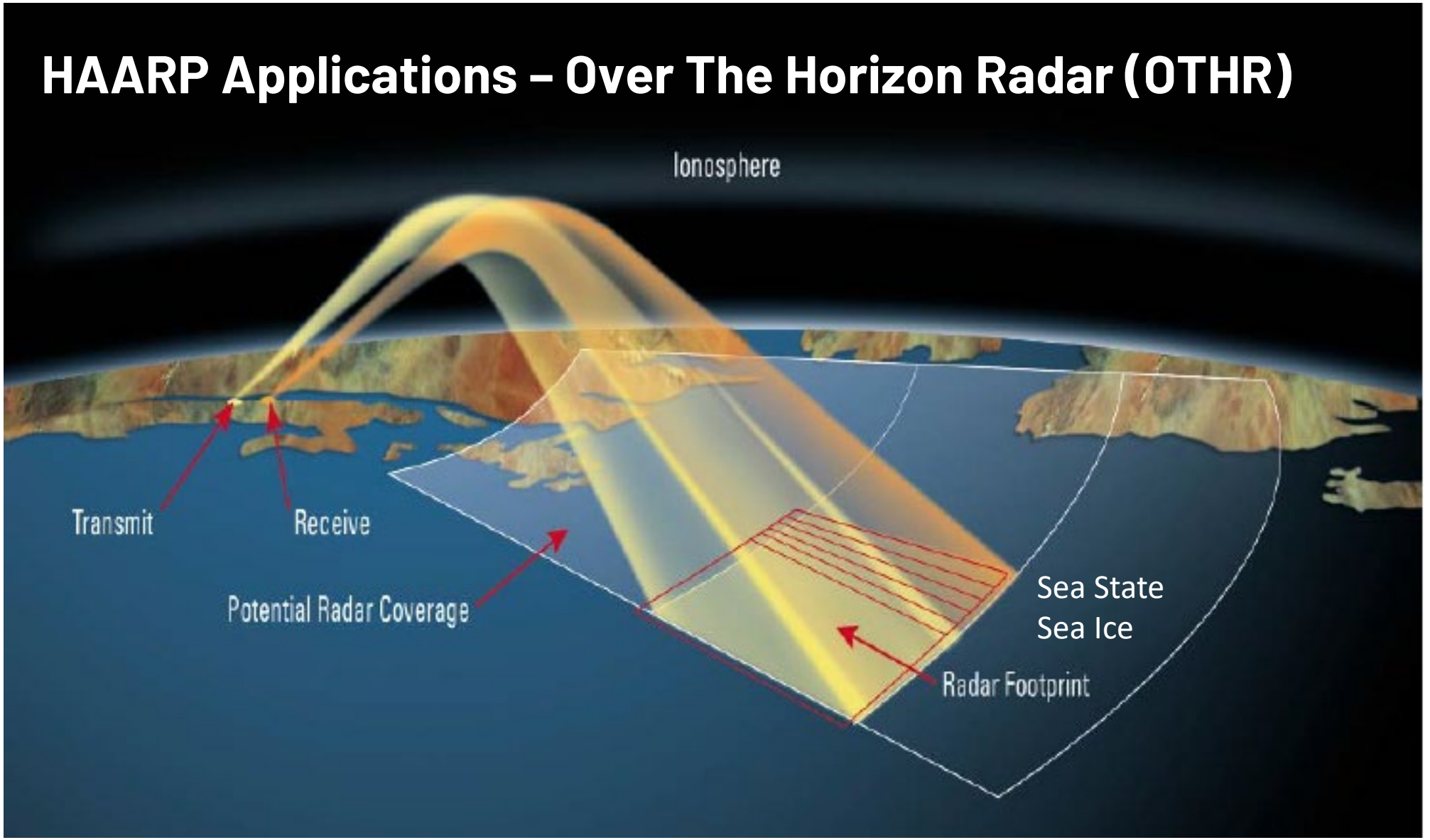
Seismic, Infrasound, Space Weather & Meteorological Sites



ROCKET LAUNCH FACILITIES IN ALASKA

ALASKA AEROSPACE

HAARP Applications – Over The Horizon Radar (OTHR)



Science Needs & Opportunities in the Time of IPY5

- **Data – Lots more data – all types – esp. higher resolution + AI**
  - Expanded satellite data (radar, optical - e.g. NISAR – 5 m, 50PB/yr)
  - Drones for Arctic observations (cargo delivery, emergency response)
  - Combine w/local observations & incorporate indigenous knowledge for coproduction
- **Opportunities from Increased Arctic Security – Dual use opportunities**
  - Sea ice monitoring & modeling
  - Better weather forecasts
  - Improved wildfire monitoring & modeling
  - Increased access to space & improved Space Weather forecasts
- **Other potential science enablers for Alaska**
  - Critical Minerals
    - Micro nuclear reactors (smelters near mines?)
  - Geological hydrogen

Exploring Key Research Topics for the Fifth International Polar Year

Alisa Alexander, MD

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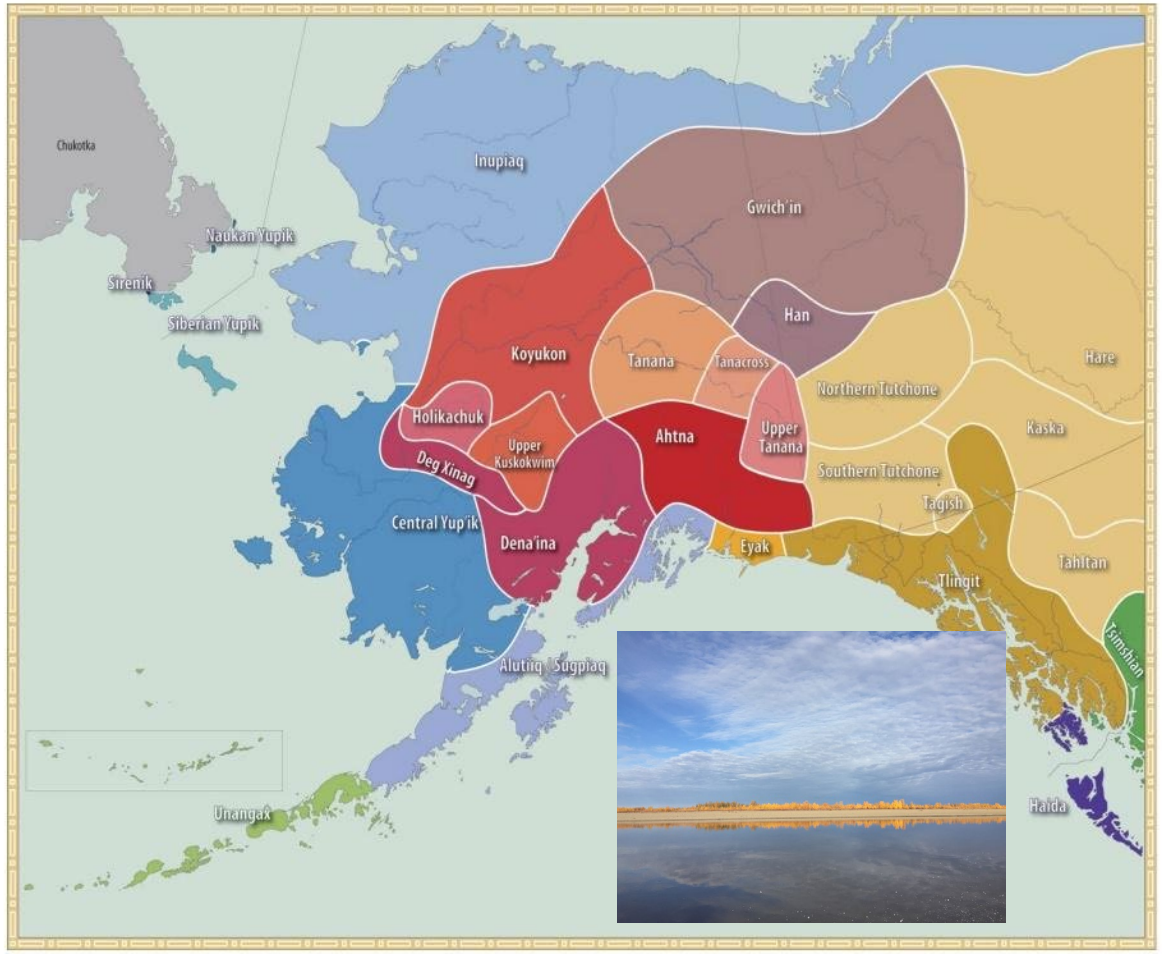
University of Alaska Fairbanks



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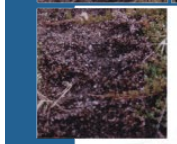
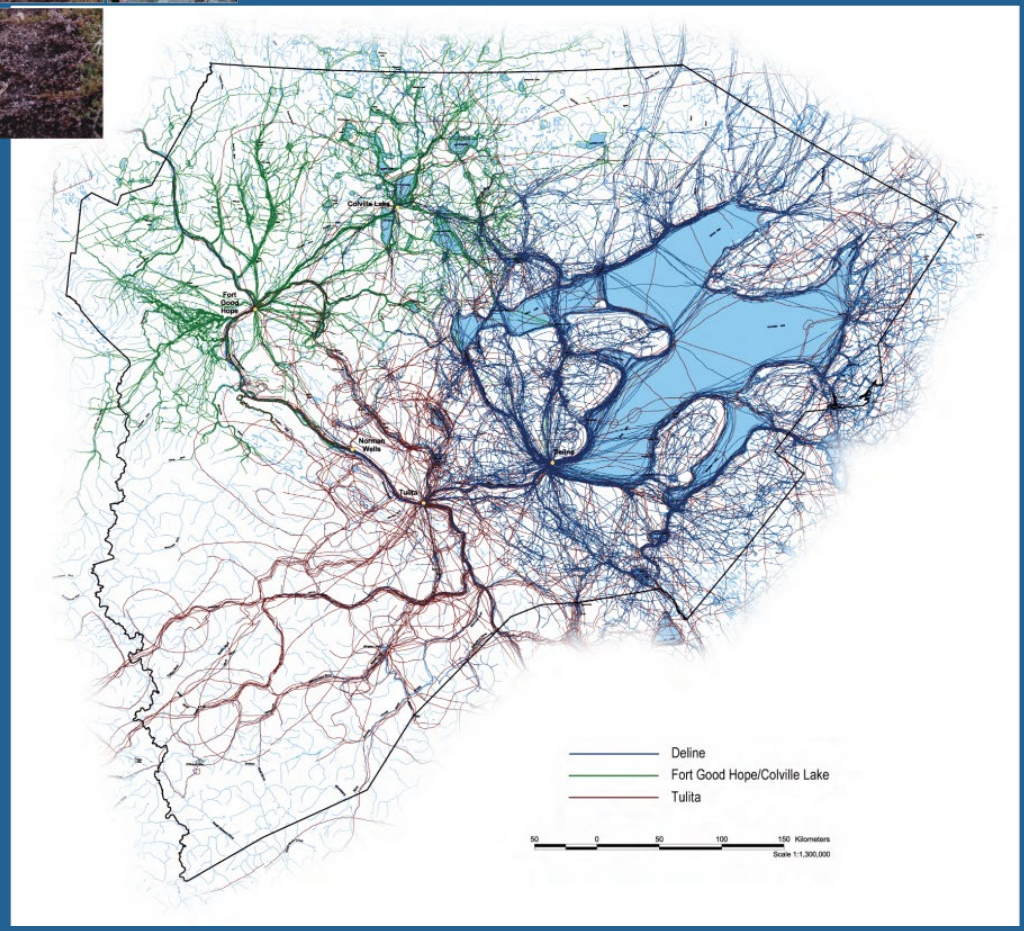
Alisa Alexander, MD
Director

ONE HEALTH
University of Alaska Fairbanks





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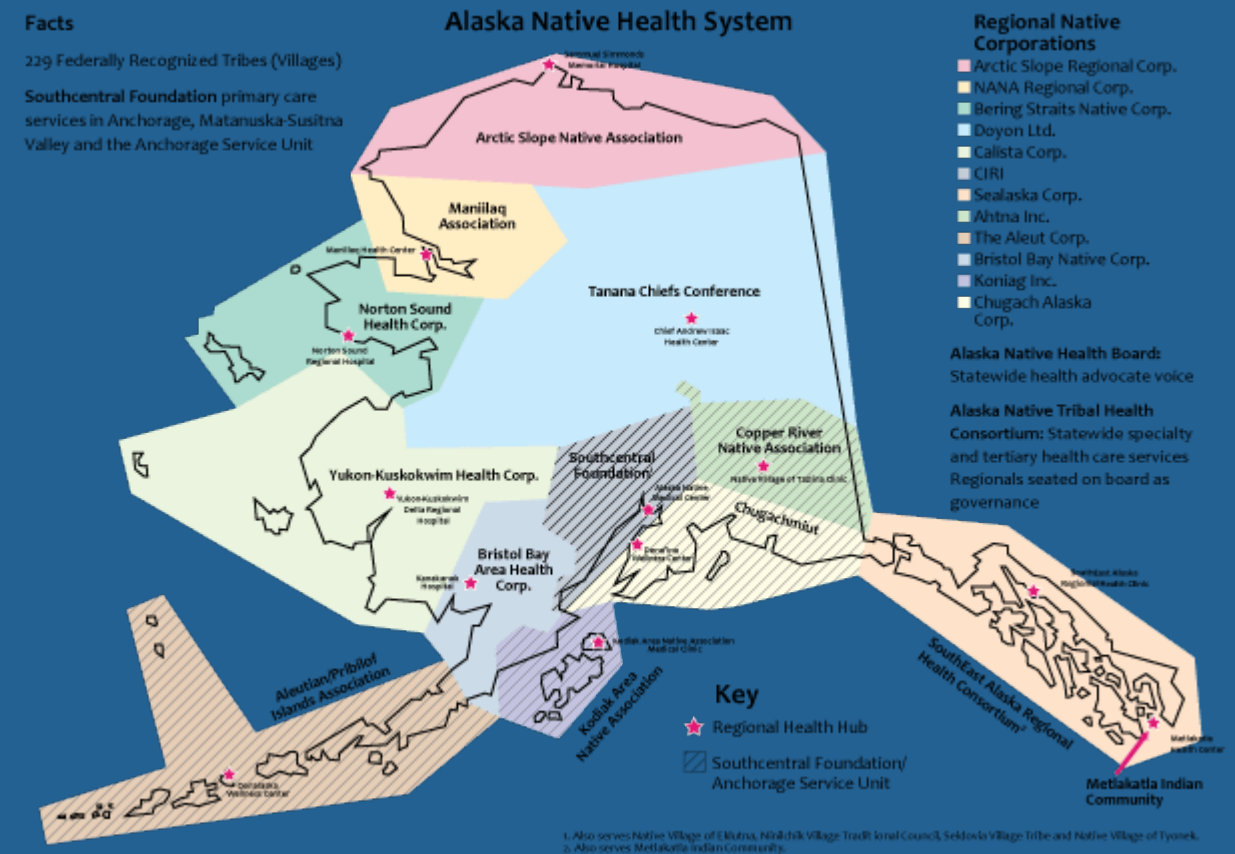
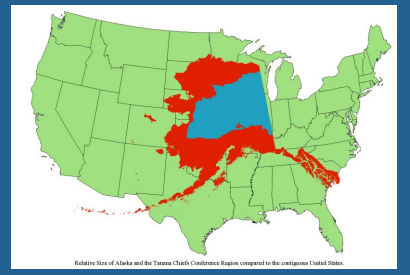
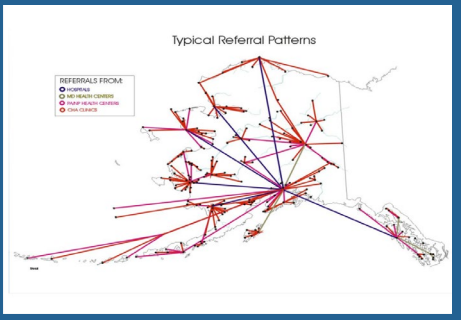
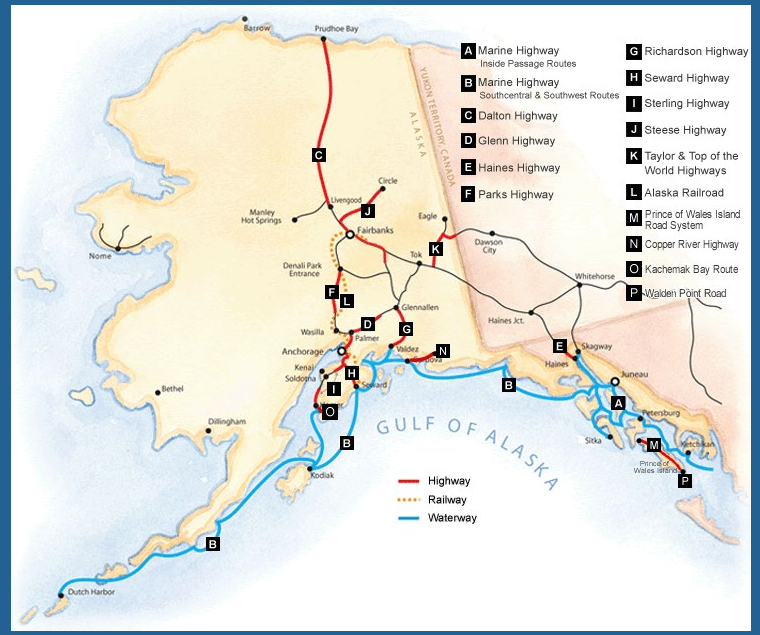
Tribal Health in Alaska









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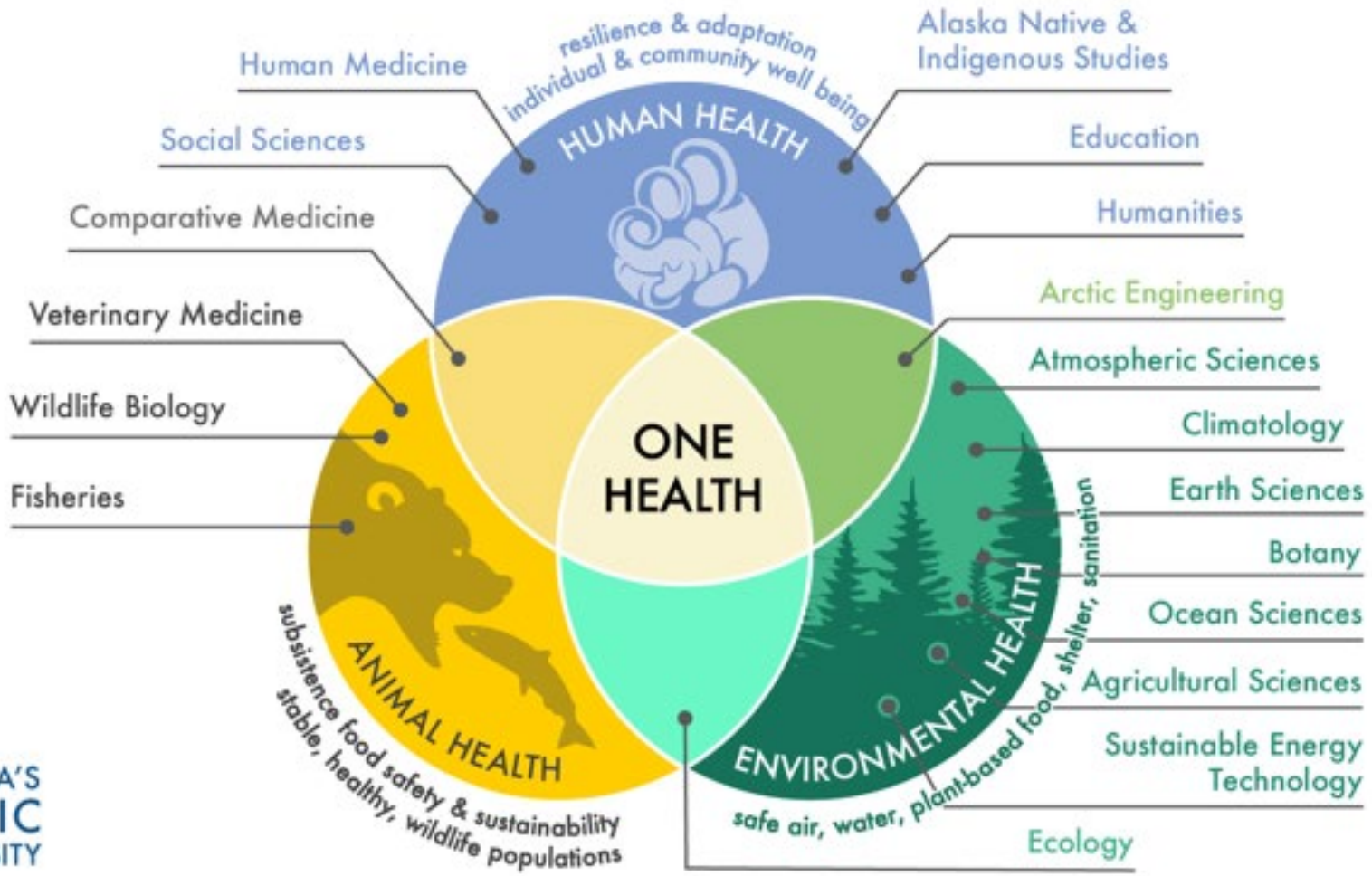
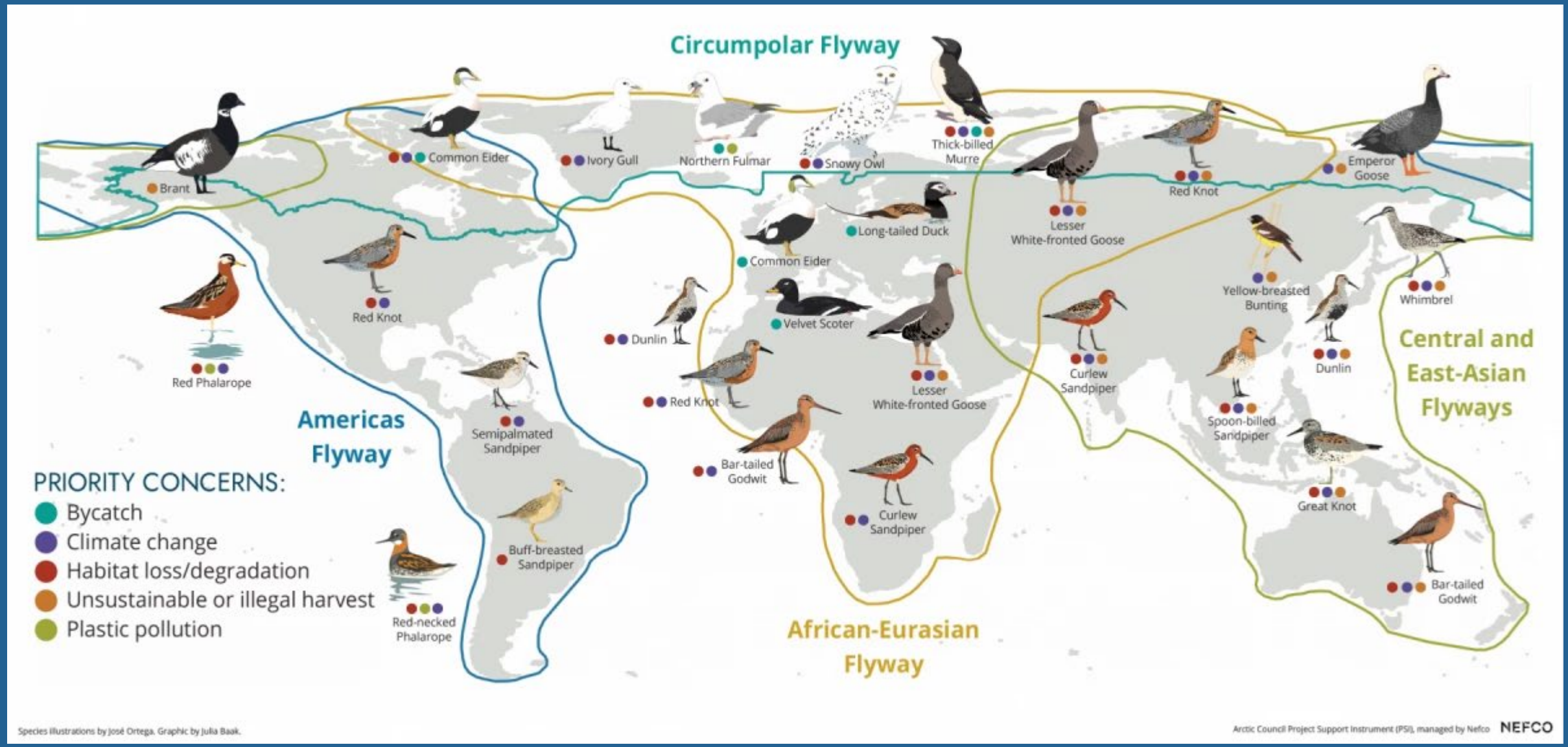
RESEARCH, TEACHING, AND OUTREACH

ONE HEALTH



AMERICA'S ARCTIC UNIVERSITY



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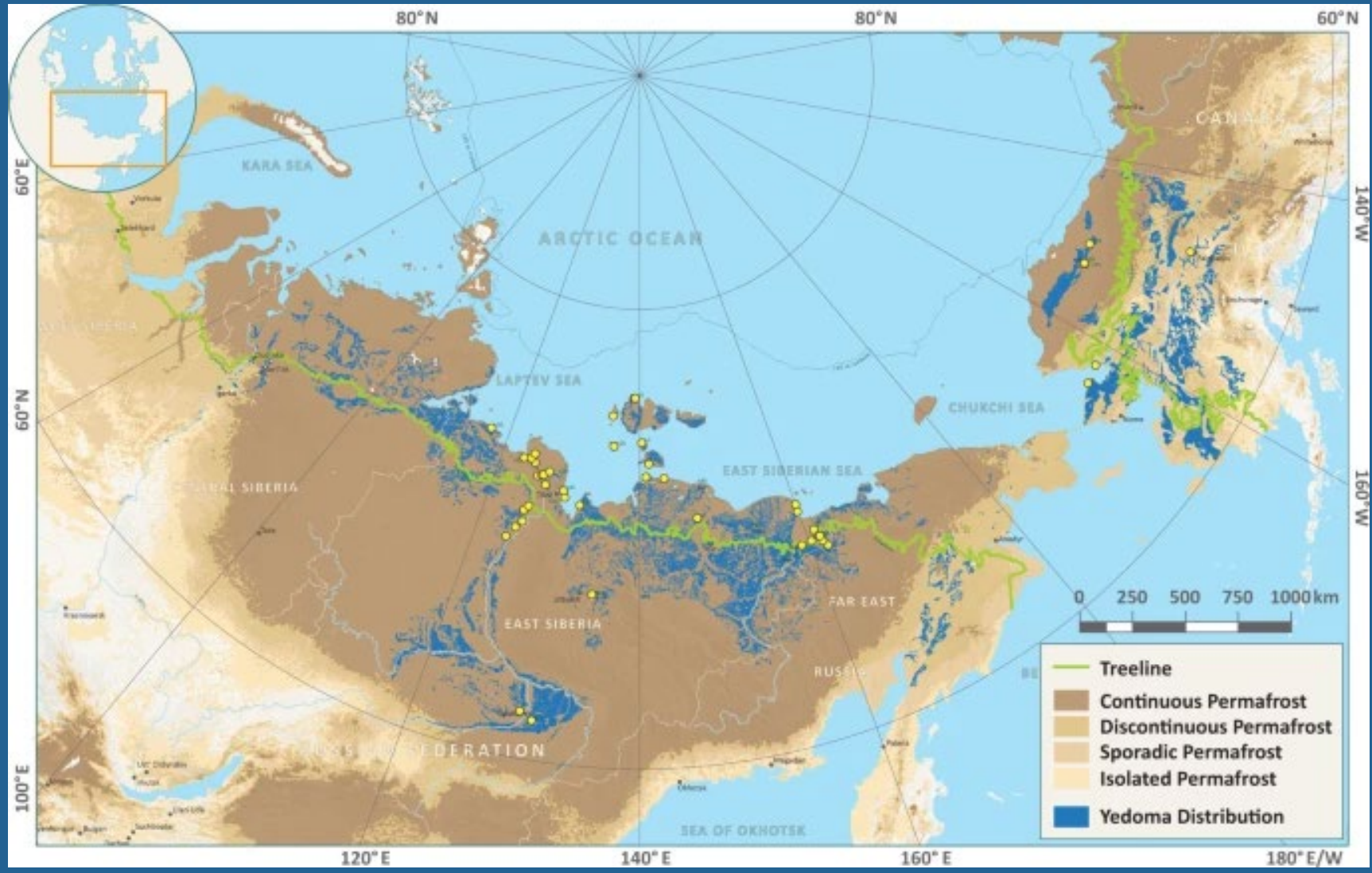

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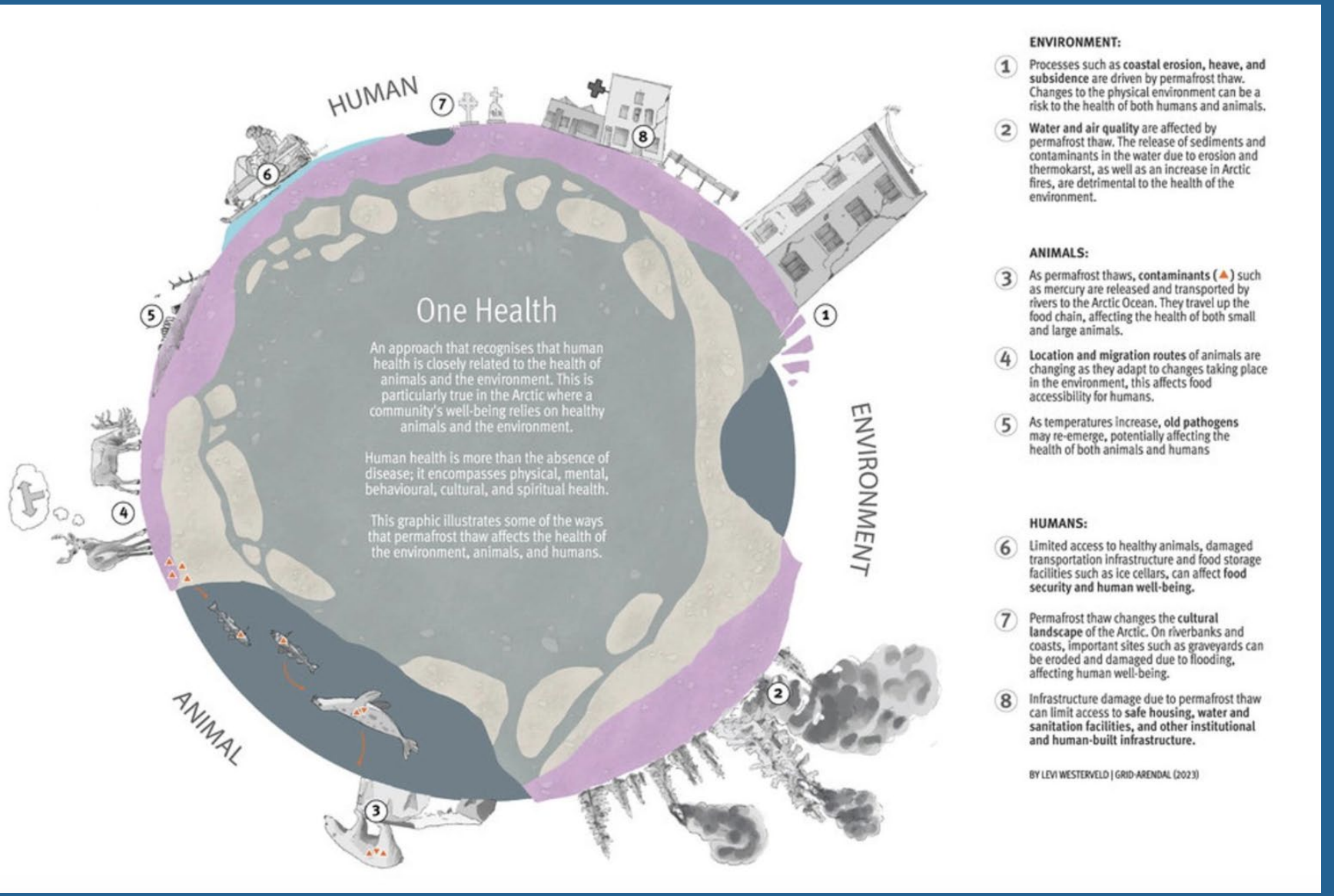

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Wildfire carbon emissions

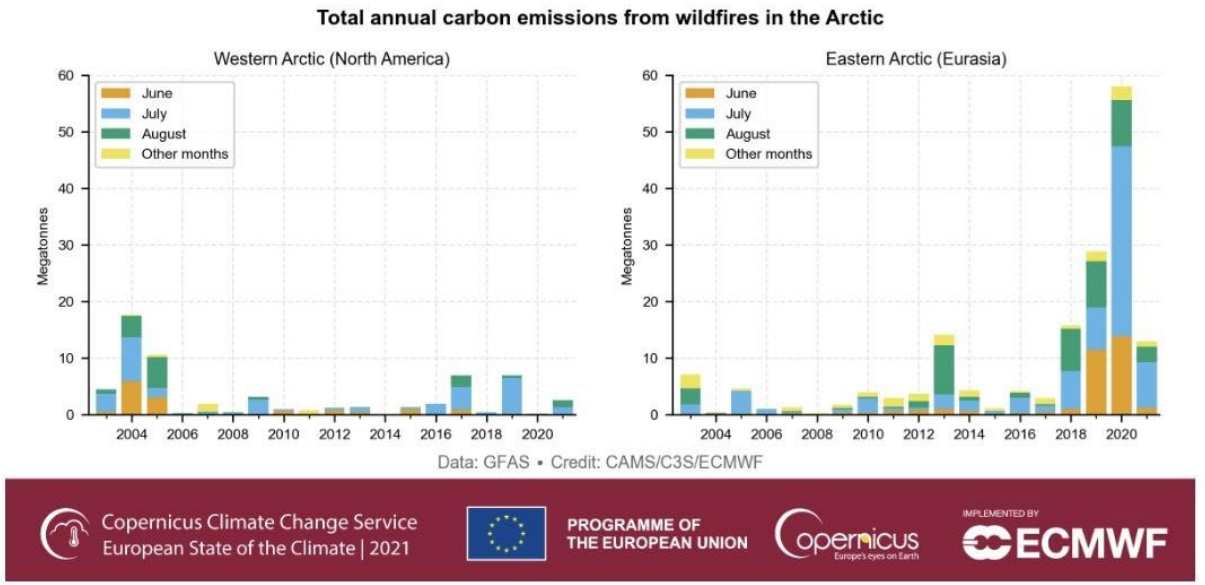
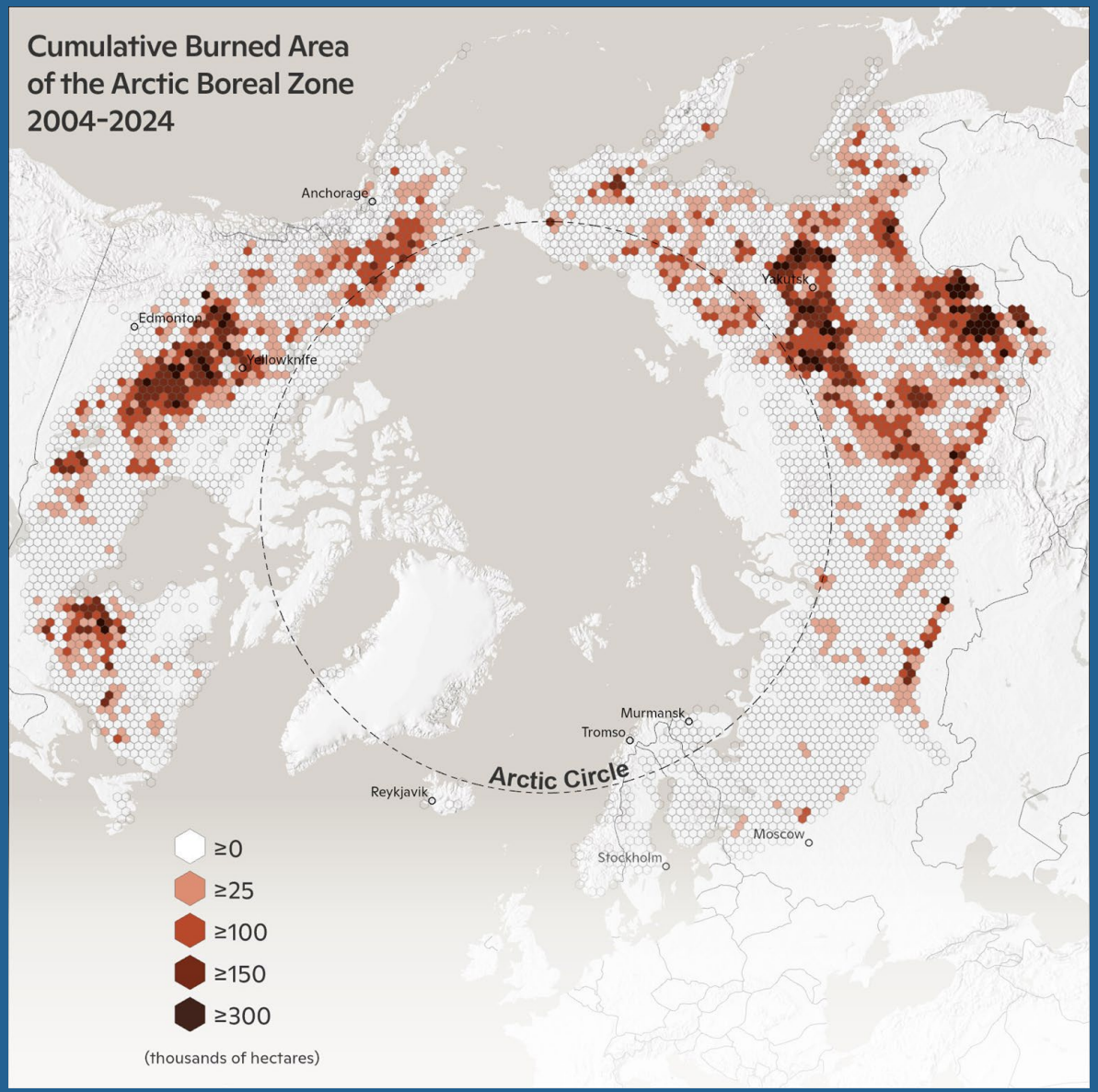
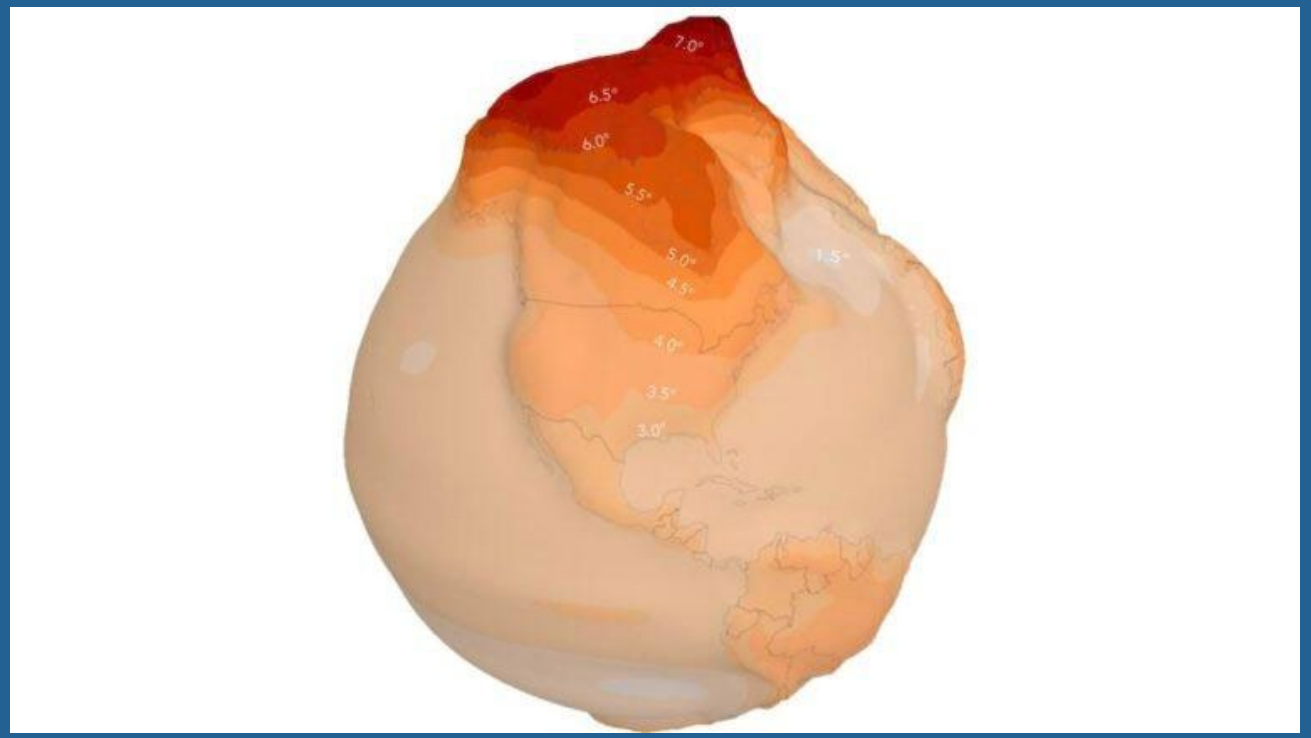


Figure 1. Estimated total annual carbon emissions (megatonnes) from wildfires in the western Arctic (left) and eastern Arctic (right) between 2003 and 2021. The colours indicate the total monthly emissions in June (orange), July (blue), August (green) and in all other months combined (yellow). Data: CAMS GFAS v2.1 wildfire data. Credit: CAMS/C3S/ECMWF.

https://climate.copernicus.eu/esotc/2021/arctic-wildfires





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UNIVERSITY OF ALASKA FAIRBANKS | ALASKA ARCTIC OBSERVATORY & KNOWLEDGE HUB

ALASKA ARCTIC OBSERVATORY AND KNOWLEDGE HUB

About ▾ Our Work ▾ Sea Ice Data and Resources News

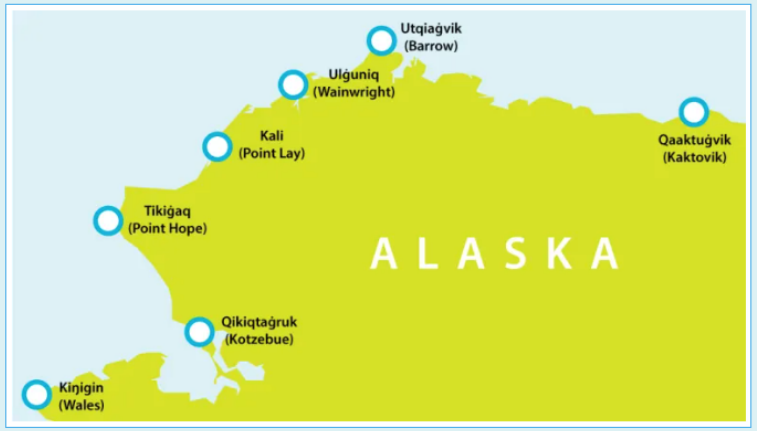
AAOKH's mission is to improve Arctic research and strengthen Indigenous self-determination through Indigenous-led stewardship of environmental observations and knowledge.

Above: Bobby Schaeffer, AAOKH Qikiqtaġruk observer, and AAOKH graduate student Mik'aq Lindley on the sea ice of Kotzebue Sound.

H

Fairbanks

Participating Communities



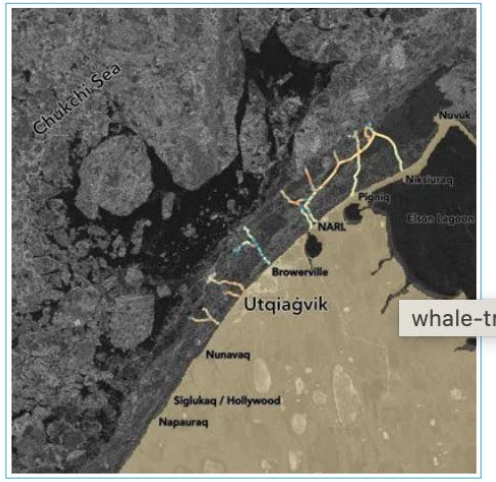
AAOKH coordinates observations from Indigenous Knowledge holders in these communities to provide a broad view of changing coastal conditions and impacts on access to traditional marine resources.

Go to the observing database

Learn more about what we do

Read our newsletters

Sea Ice and Data Products

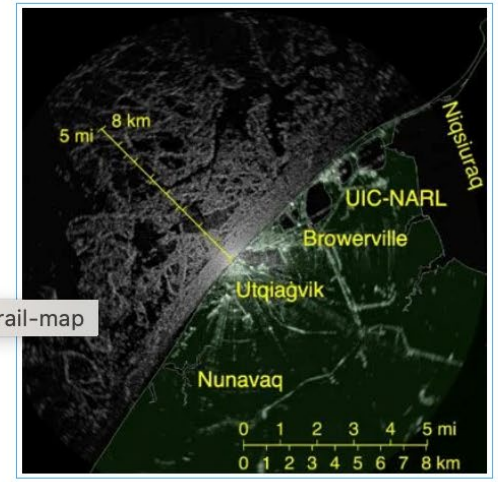


Trail maps

Each spring, Utqiaġvik hunters build trails across the shorefast sea ice to access whale hunting sites. These trails are mapped to ensure safer travel.

See all trail maps

View Trail Map Book

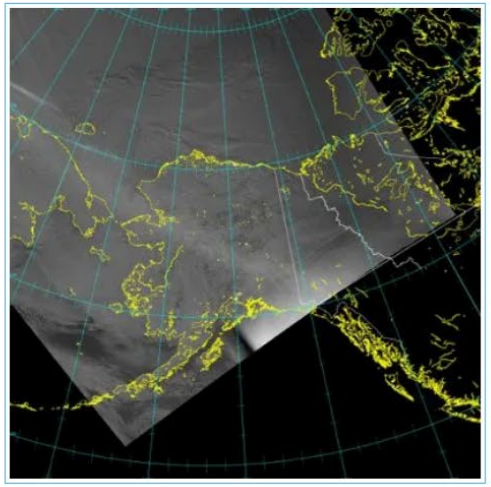


whale-trail-map

Utqiaġvik & Nome sea ice radar

Images are acquired by a marine radar positioned near the coast, and are updated every 4 minutes. Past imagery and annotations are available.

Go to radar images



Atmospheric satellite imagery

Infrared (IR) and DayNight bands available. IR is used for cloud and other atmospheric feature identification. DayNight can show clouds at night if there is enough moonlight.

See latest image

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Considerations

- Working with Indigenous peoples in the north
- Co-production of knowledge
- Wildland Fire has global implications
- Permafrost thaw has global implications
- Community Based Monitoring based in co-design and co-production can contribute significantly to understanding global and polar processes at different scales and their effect global systems

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Mahsi’ Choo

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Science and society, producing actionable science from polar research

How can polar-focused research/data/understanding inform decision making and positively impact everyday lives.

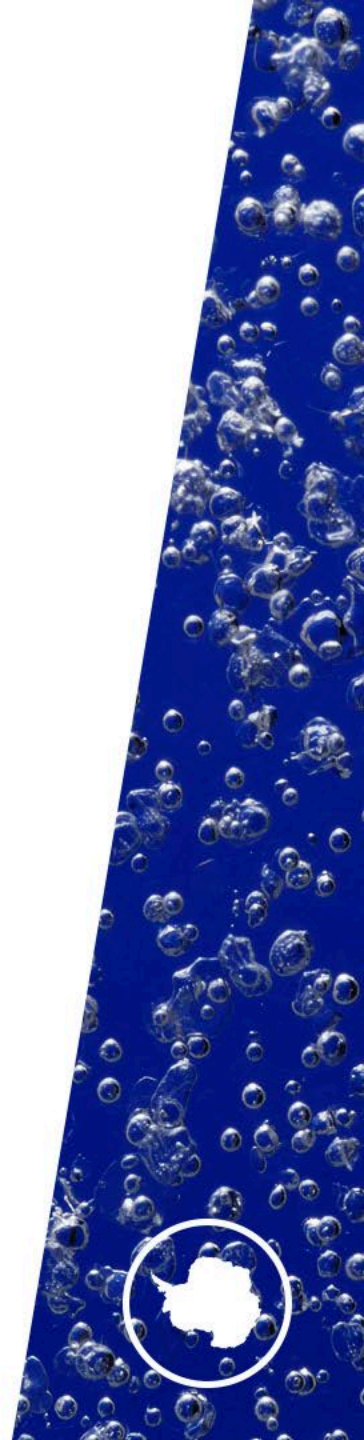
Exploring Key Research Topics for the Fifth International Polar Year- A Workshop
Tuesday, 20 May 2025

Jeremy Wilkinson

jpw28@bas.ac.uk

British Antarctic Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

POLAR SCIENCE
FOR A SUSTAINABLE PLANET



Linking science to societal needs…it is difficult

Addressing societal challenges in Polar Science generally spans several academic disciplines and involves different sectors beyond academia such as private sector, governmental agencies, Indigenous Peoples (Arctic), local communities (Arctic), local/regional/national/international decision makers…

- UK funding agencies are not best equipped to link research to societal needs. Not a prerequisite, they fund the best hypothesis-driven research. Do have occasional thematic programmes to address a particular topic. The UK Research Councils are discipline orientated e.g. physical sciences, engineering, medical etc and generally fund academics.

- On the European Union level it is very different….

Linking science to societal needs…European funding

European Union funding …

- Has evolved over many years through different frameworks and calls are generally linked to societal needs.
- Calls are defined and refined by Partner countries.
- Calls demand a multi-country and multi-sectorial approach
- Projects generally a few million Euro to a few 10s million Euro and between 5 and 50 partner organisations from different sectors.
- Falls over at the last hurdle…no clear avenue once you finish a project how your key results reach decision makers. Need to embed it within your project, as no money once project finishes.

Linking science to societal needs…IPY5

How can polar-focused research/data/understanding inform decision making and positively impact everyday lives.

IPY5

- Once in a generation funding and international collaboration opportunity
- Think big and multi-sectorial
- What are the big societal issues that polar science can help address…and can you agree on them??
- Be inclusive, other sectors need to be involved in the discussions, two-way dialogue, they should help project co-design, and be funded.
- Bring policy-makers into your project…white papers, sessions for Members of Parliament, policy briefs etc
- Not clear if there will be an international pot of money for projects, or national funding only…