

Development of a Permafrost Observing Network in Alaska and Russia

V. Romanovsky, W. Cable and A. Kholodov

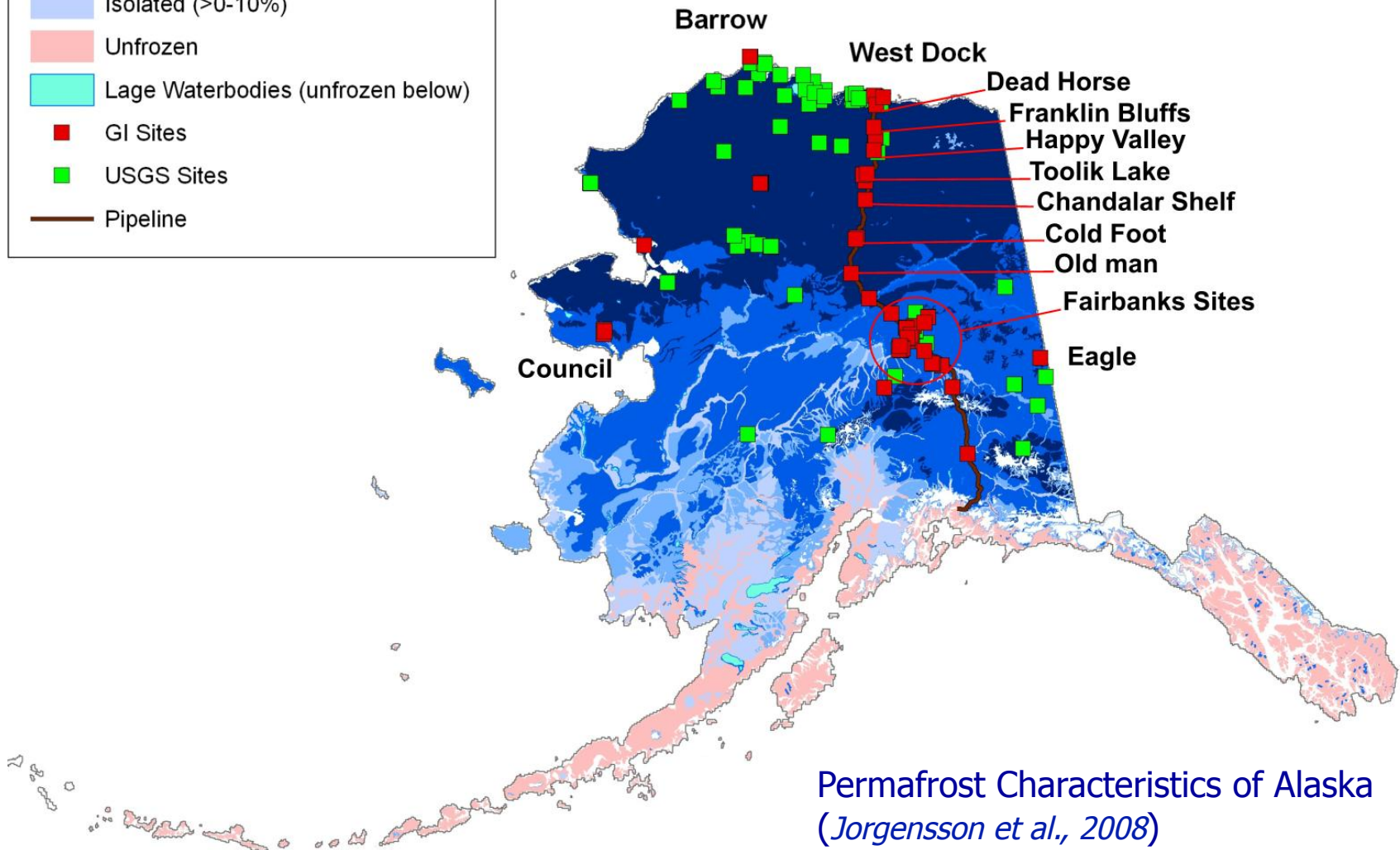
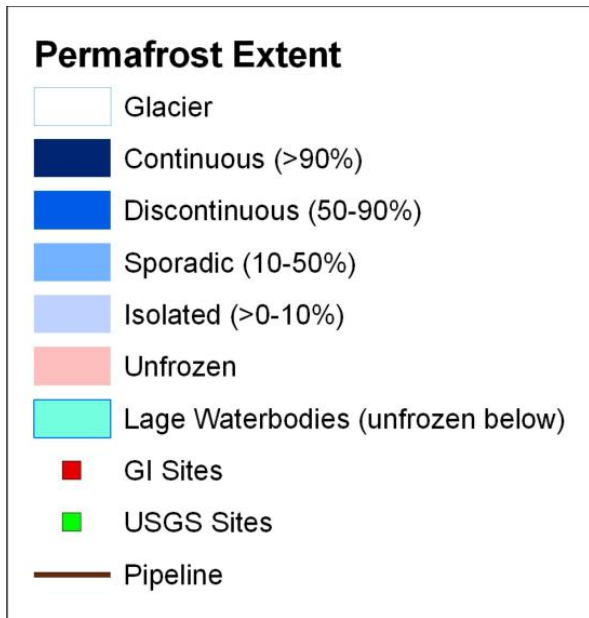
University of Alaska Fairbanks

G. Clow and F. Urban

U.S. Geological Survey, Denver, CO



Permafrost Distribution in Alaska and Permafrost Observatories Location



Permafrost Characteristics of Alaska
(Jorgenson et al., 2008)

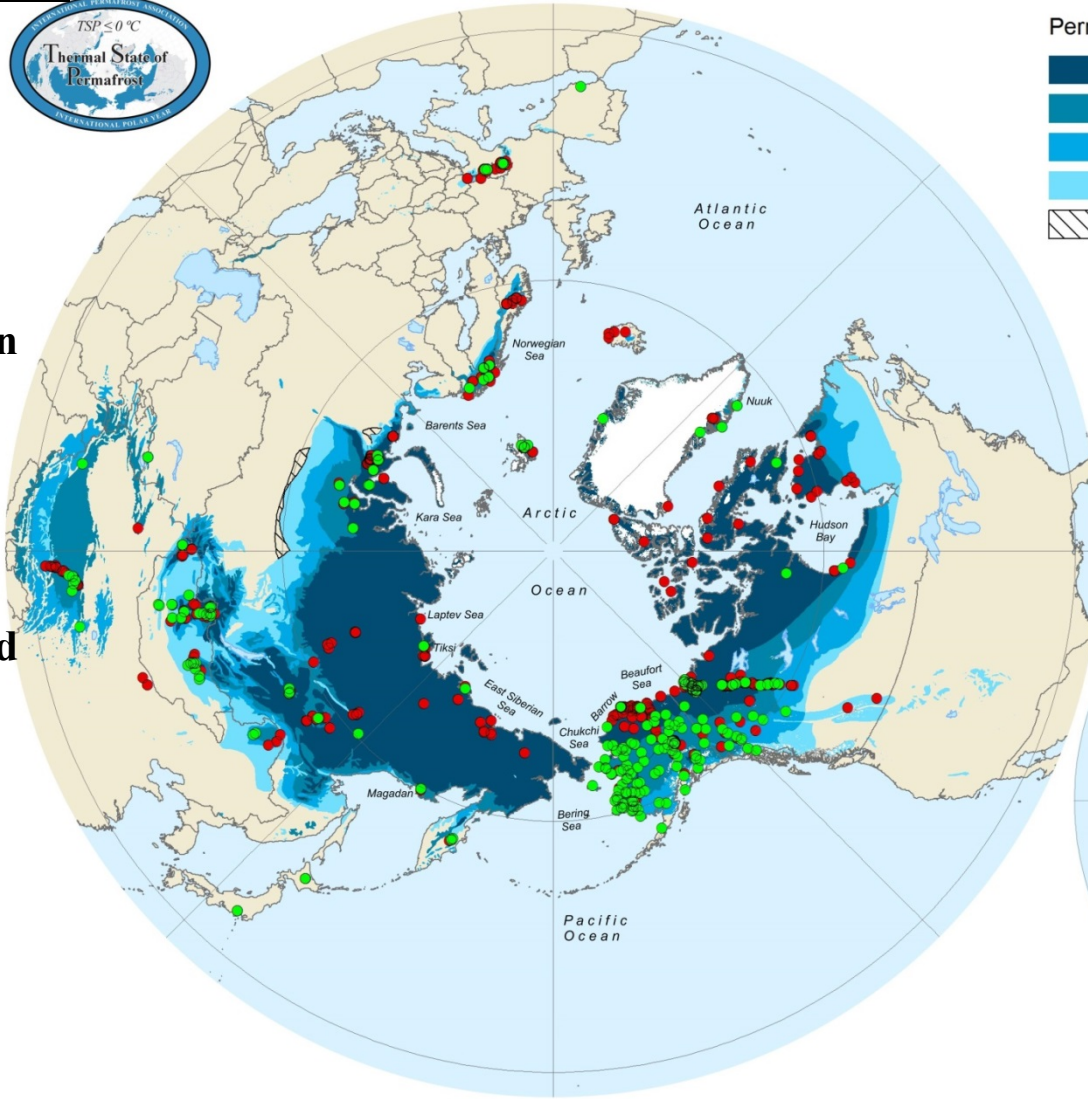


Global Terrestrial Network-Permafrost (GTN-P): Thermal State of Permafrost (TSP)

~ 850 stations

TSP Countries

- Canada
- China
- Denmark
- Germany
- Iceland
- Italy
- Kazakhstan
- Mongolia
- Norway
- Poland
- Russia
- Sweden
- Switzerland
- USA



~ 760 stations

Permafrost Distribution

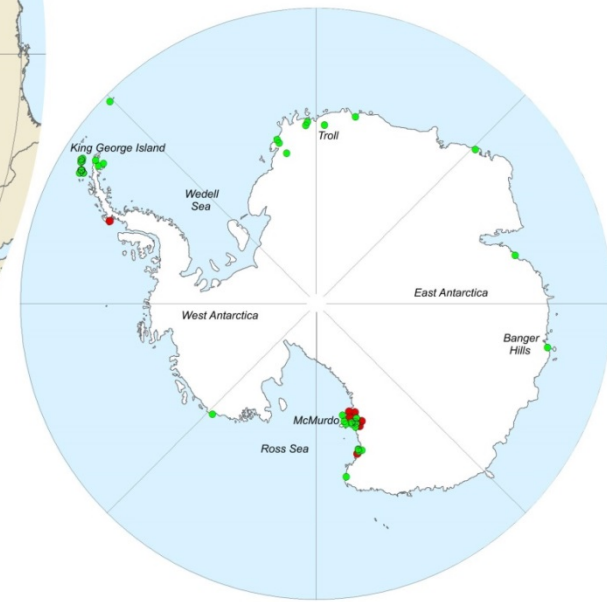
- Continuous
- Discontinuous
- Sporadic
- Isolated
- Deep Relict

TSP Borehole

- Deep (>10 m)
- Shallow (<10 m)

Southern Hemisphere

- Italy
- New Zealand
- Portugal-Spain
- Russia
- USA

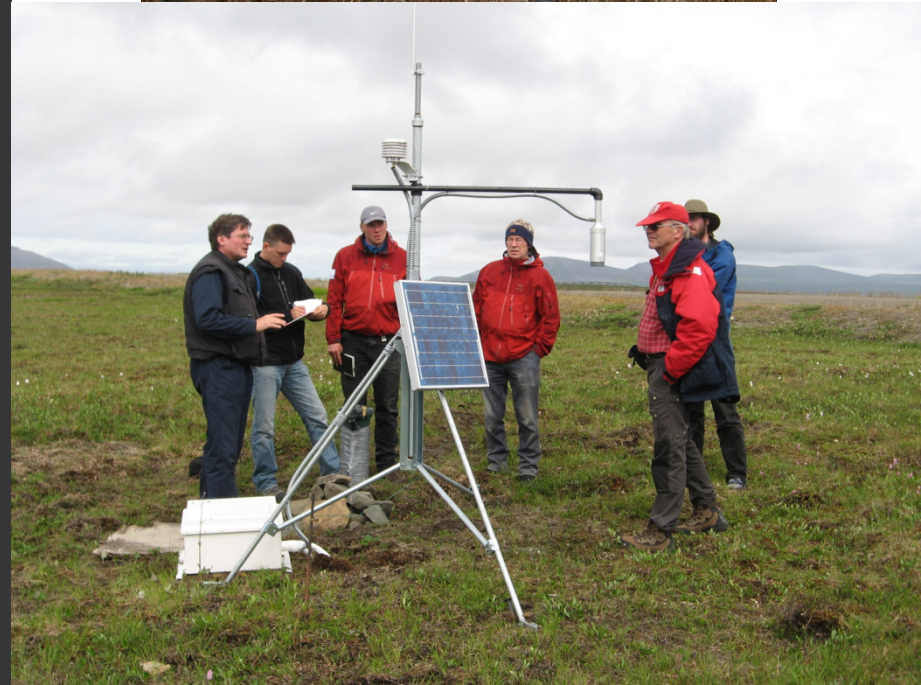


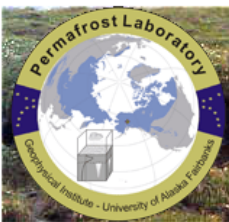
~ 90 stations



3 m ●
5 m ●
10 m ●
15 m ●
20 m ●
25 m ●
30 m ●

120 m





Permafrost Laboratory

[Login](#) | [Register](#)

- ABOUT US
- NEWS
- PEOPLE
- PUBLICATIONS
- PROJECTS
- METHODS
- GALLERIES
- DATA & MAPS
- COLLABORATORS

Home » Sites Map » Sites List » Sites Map

[Login / Register](#)

Sites Map

Click on the sites on the map to find the site you are interested in or use the site list to search for a particular site.

[Russian Sites](#) | [Alaskan Sites](#) | [Canadian Arctic and Greenland Sites](#)

[view as list](#) | [download KML for Google Earth](#)

MAP LAYERS

Base layers

- Google Maps Satellite
- Google Maps Hybrid
- Google Maps Normal
- Google Maps Physical
- OSM Mapnik

Data layers

- Kenji Yoshikawa's borehole sites
- Permafrost Extent Map
- Ground Ice

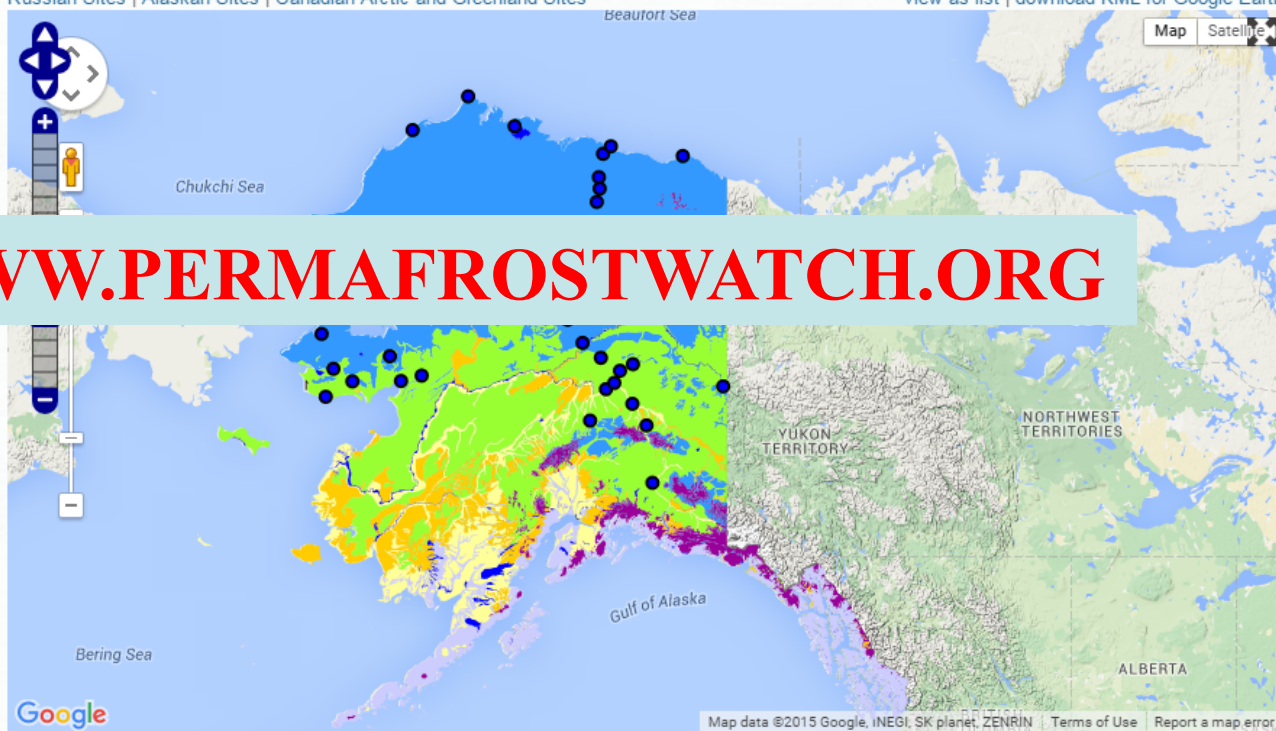
LEGEND

Permafrost Extent

- Continuous (>90%)
- Discontinuous (50-90%)
- Glacier
- Isolated (>0-10%)
- Sporadic (10-50%)
- Absent (0%)
- Large Waterbodies (unfrozen below)

Ground Ice

- Glacier
- High (>40% volume)
- Moderate (10-40% volume)
- Low (<10% volume)



Click on markers to access site pages. Zoom in and out and move around the map using the tool bar on the left. Enable full screen mode with the icon in the upper right. Change map layers using the block on the left.



USGS Home
Contact USGS
Search USGS

Climate Monitoring

Login

Project Contact

Frank Urban
Cryospheric Studies Project
[Central Region - Geology and Environmental Change Science Center](#)
furban@usgs.gov
303-236-4790

Navigation

- Climate Monitoring Home
- Alaska Region Home
- Alaska Station List
- Alaska Partners

View Station:

U.S. Geological Survey: Real-Time Permafrost and Climate Monitoring Network - Arctic Alaska



The [U.S. Geological Survey](#) Real-Time Permafrost and Climate Monitoring Network in Arctic Alaska is a collaborative effort with [The Bureau of Land Management](#), [U.S. Fish and Wildlife Service](#), private organizations and universities. Primary network operations are managed by members of the U.S. Geological Survey, [Geology and Environmental Change Science Center](#). The network was established to provide high quality real-time environmental data to aid in land management decision making. The information is also used extensively in logistics and aircraft operations.

This real-time network is a subset of a larger U.S. Geological Survey permafrost and climate monitoring research network. Many of the stations are co-located with deep boreholes, thus forming the basis for comprehensive permafrost monitoring observatories. The objectives of the larger network include climate change detection, monitoring how permafrost and vegetation respond to climate change, and acquiring improved data for current permafrost characterization and impact assessment models. Data from this network contributes to several international networks as well, primarily [GTN-P \(Global Terrestrial Network for Permafrost\)](#), part of the [WMO \(World Meteorological Organization\)](#) sponsored effort [GCOS \(Global Climate Observing System\)](#).

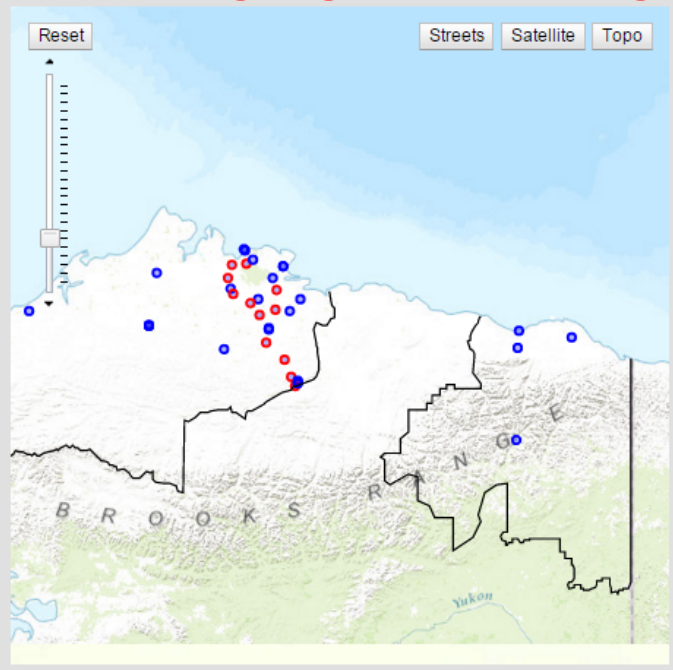
<http://data.usgs.gov/climateMonitoring/region/show?region=alaska>

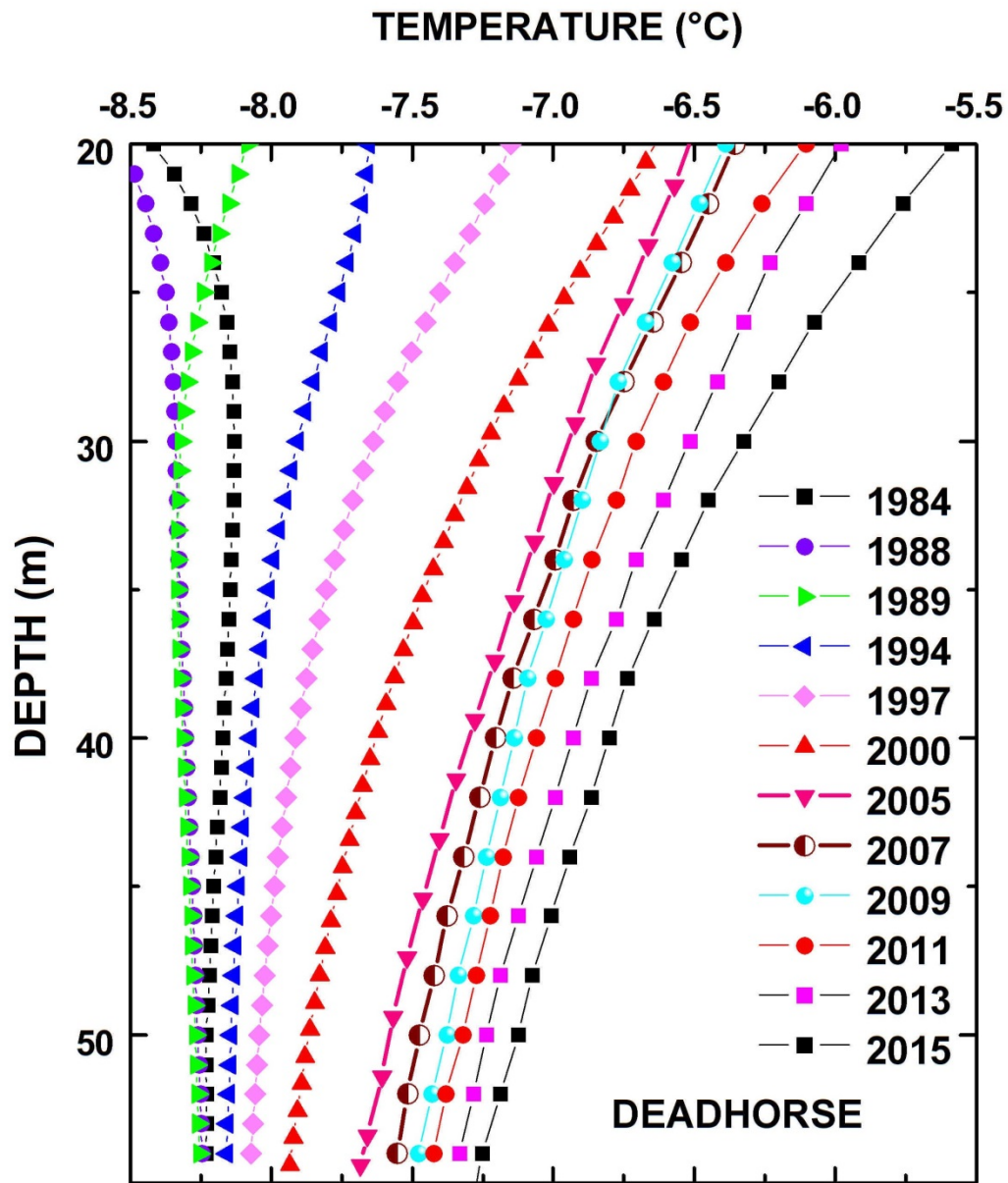
Interactive Map and Station Data Access

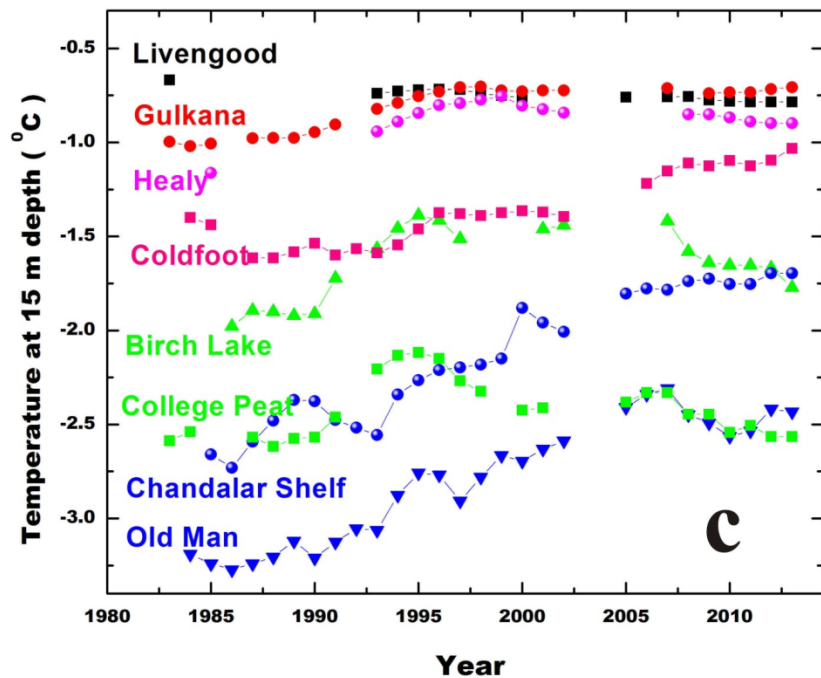
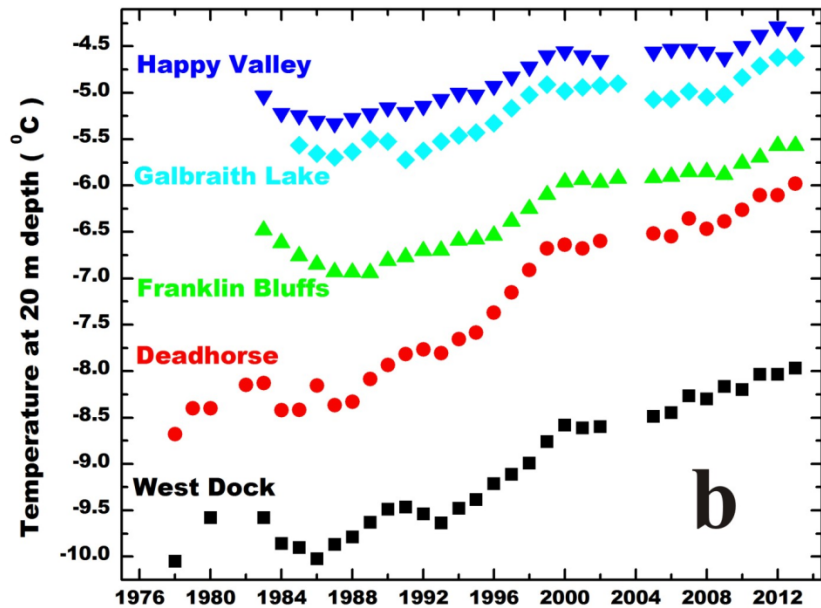
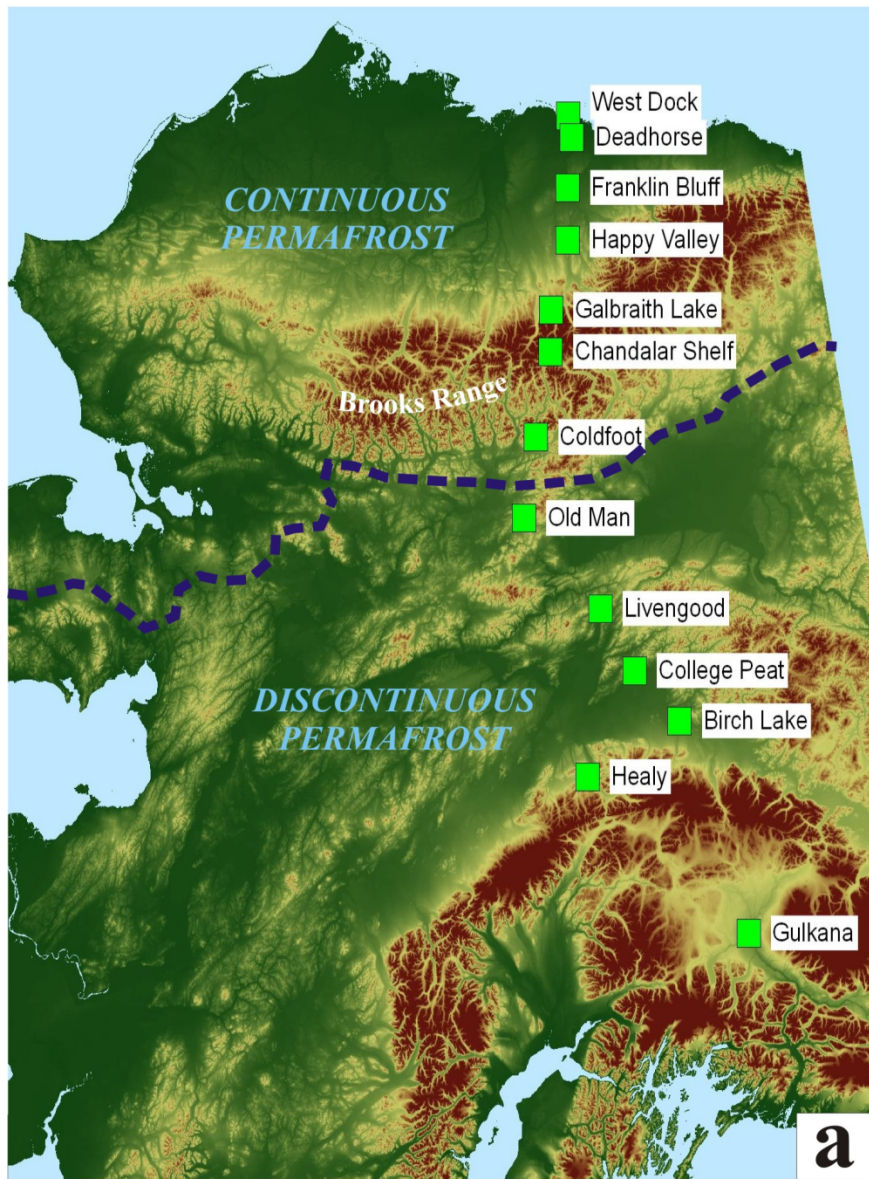
Use the slider or double-click to zoom in on a particular station. Click and drag to pan and move the map in the window.

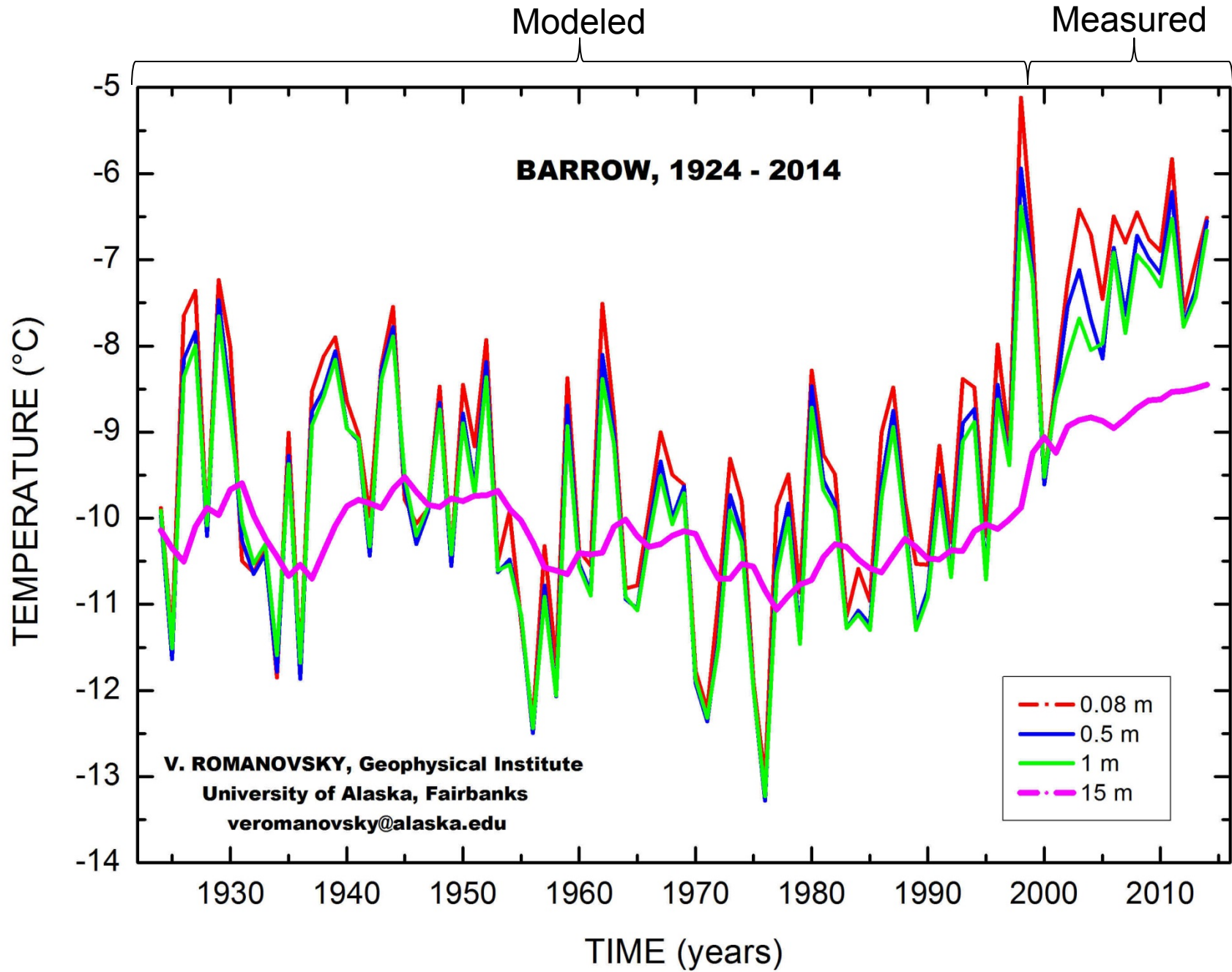
Comprehensive information from the data collection stations (blue circles) can be accessed directly from the "View Station" pull down menu at left, or by clicking on an individual station (blue circles) and then clicking the station name link in the pop-up bubble.

System diagnostic information can be accessed by clicking the "Station List" link at left.



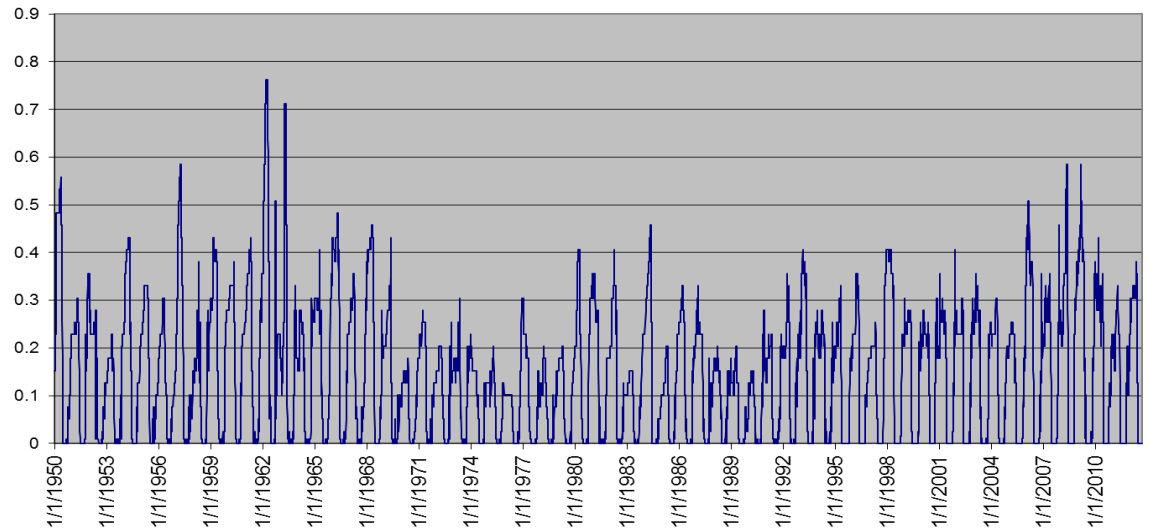




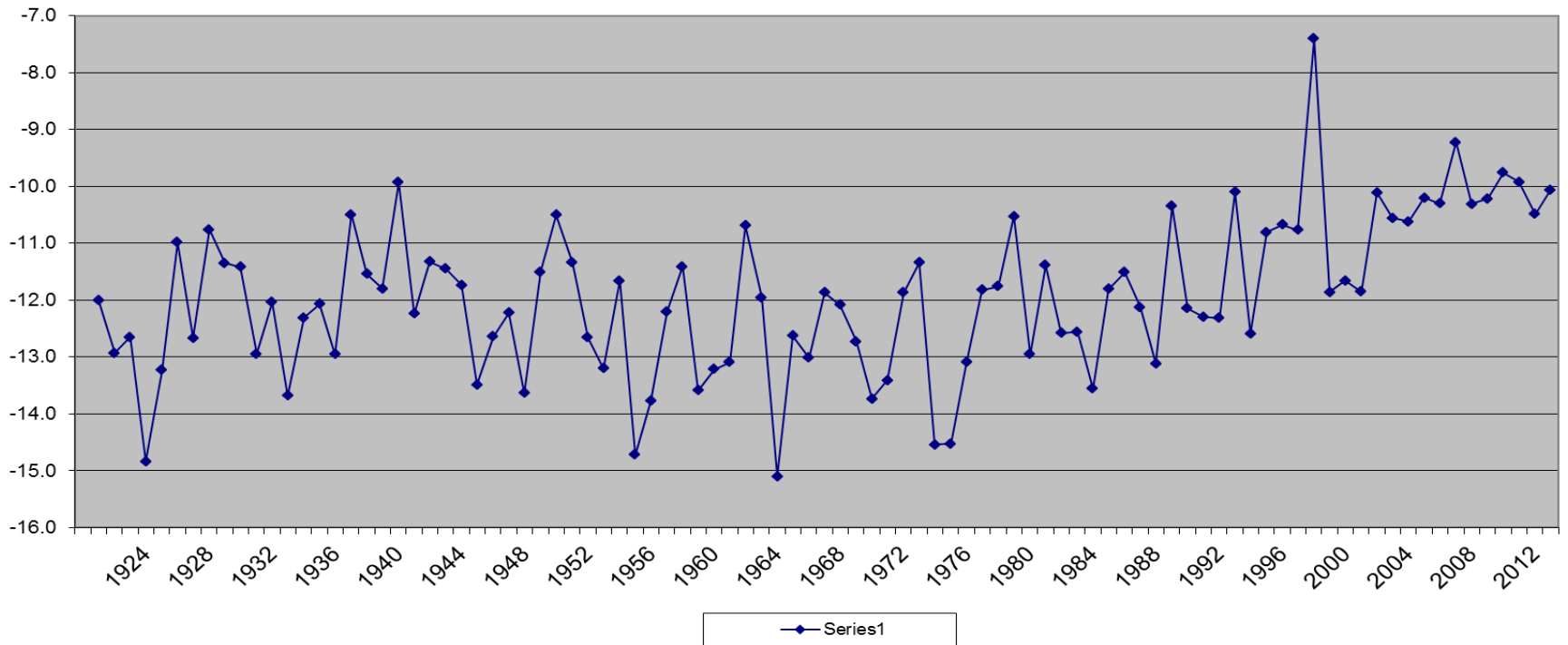


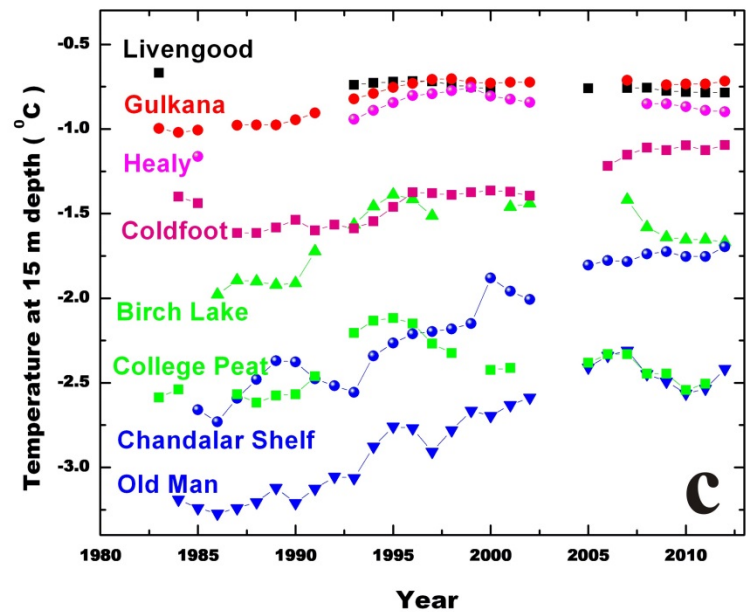
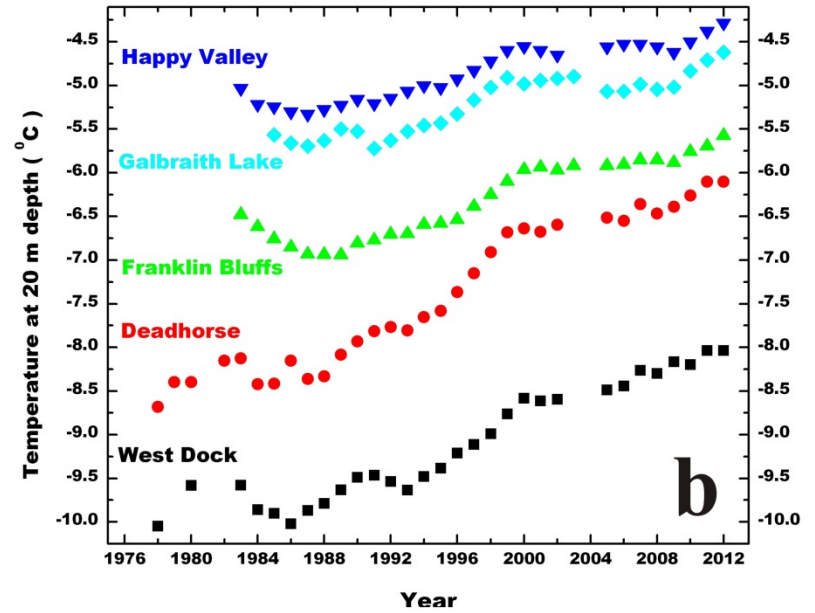
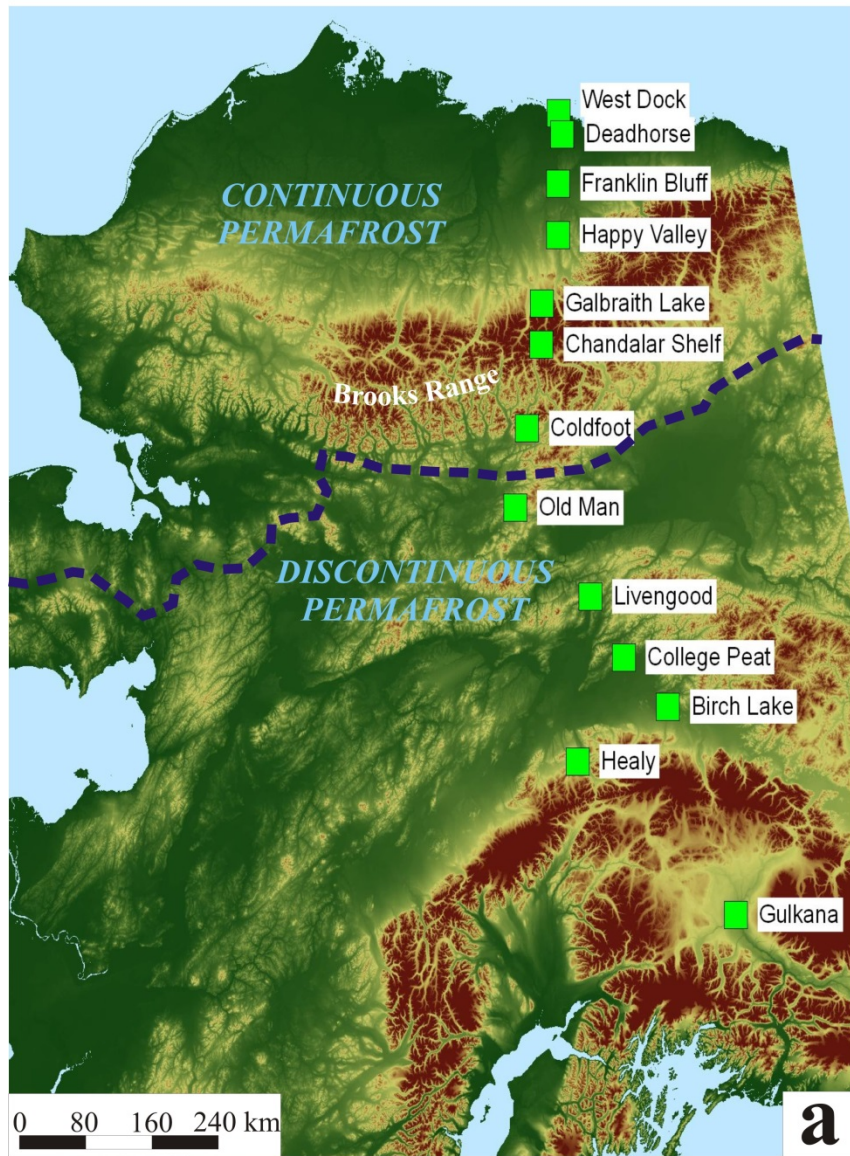
Barrow snow depth and mean annual air temperatures

Barrow Snow, 1950-2012



Barrow Mean Annual Air Temperature, 1921-2013

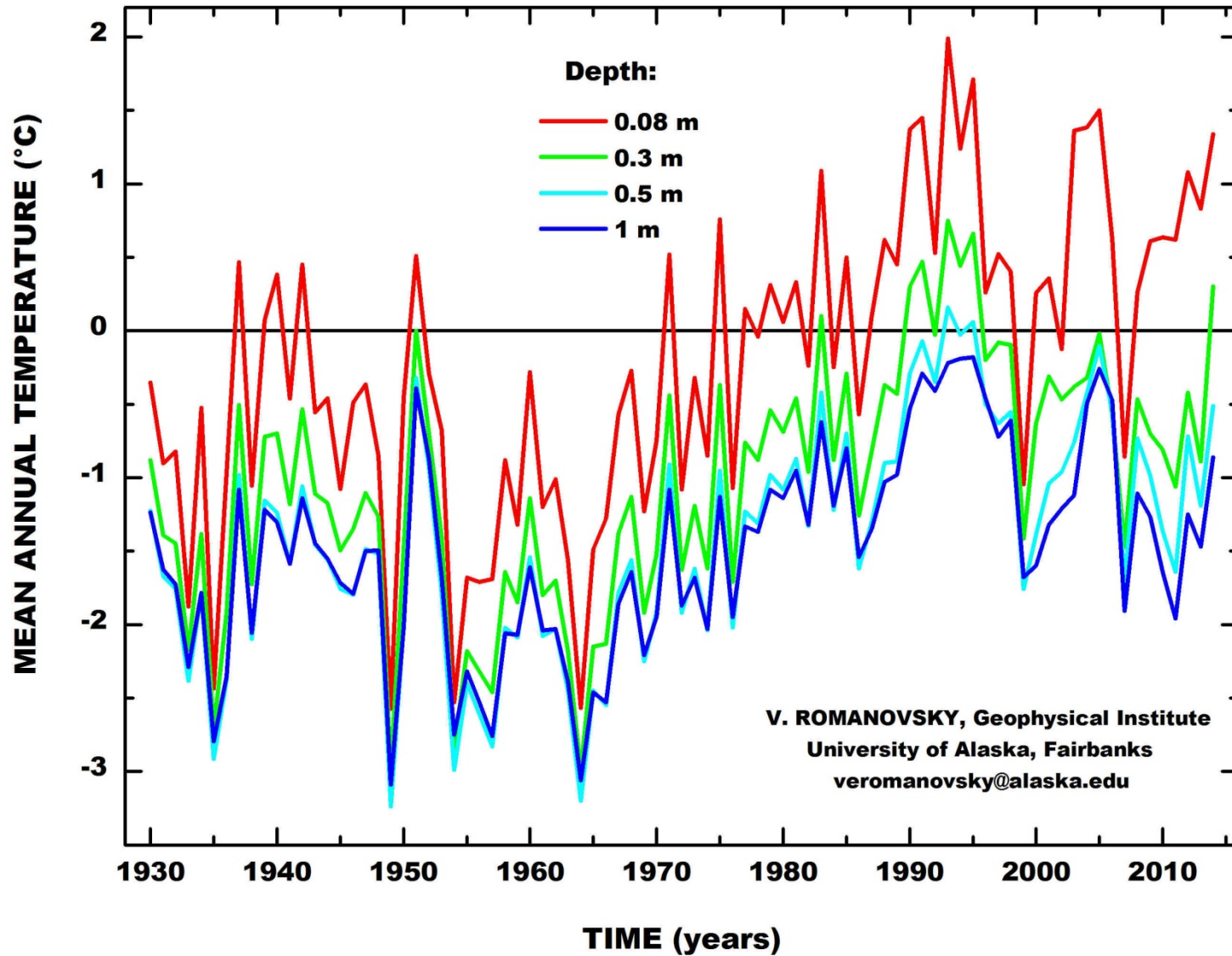




Romanovsky et al, 2013

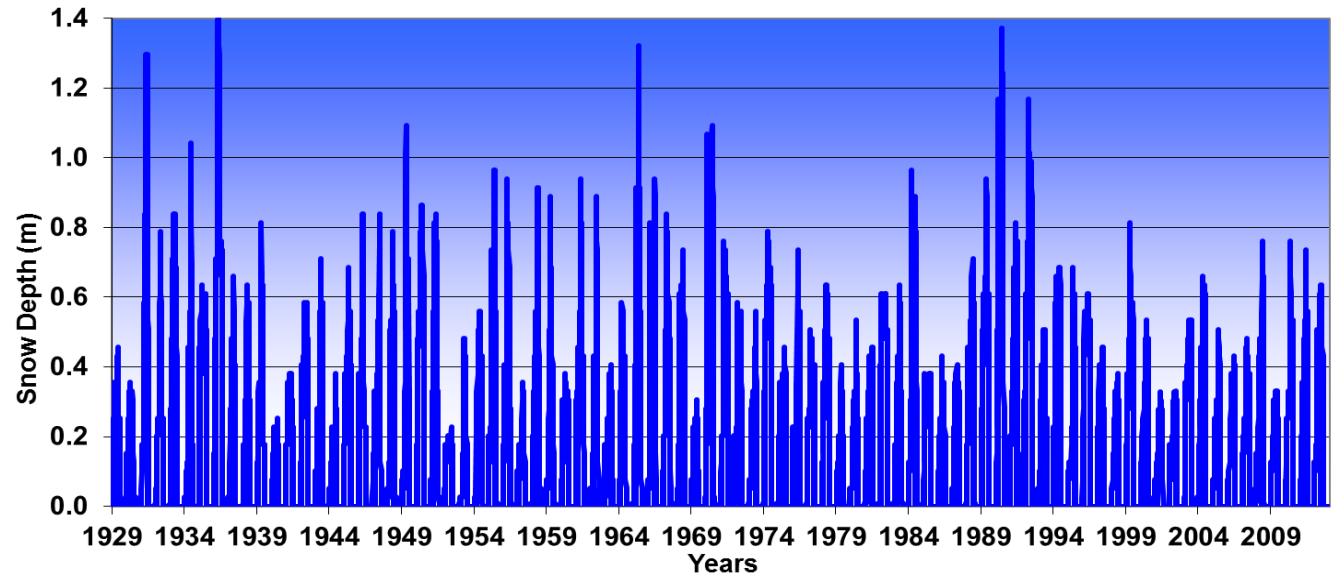
FAIRBANKS, ALASKA, 1930-2014

Mean annual ground temperatures

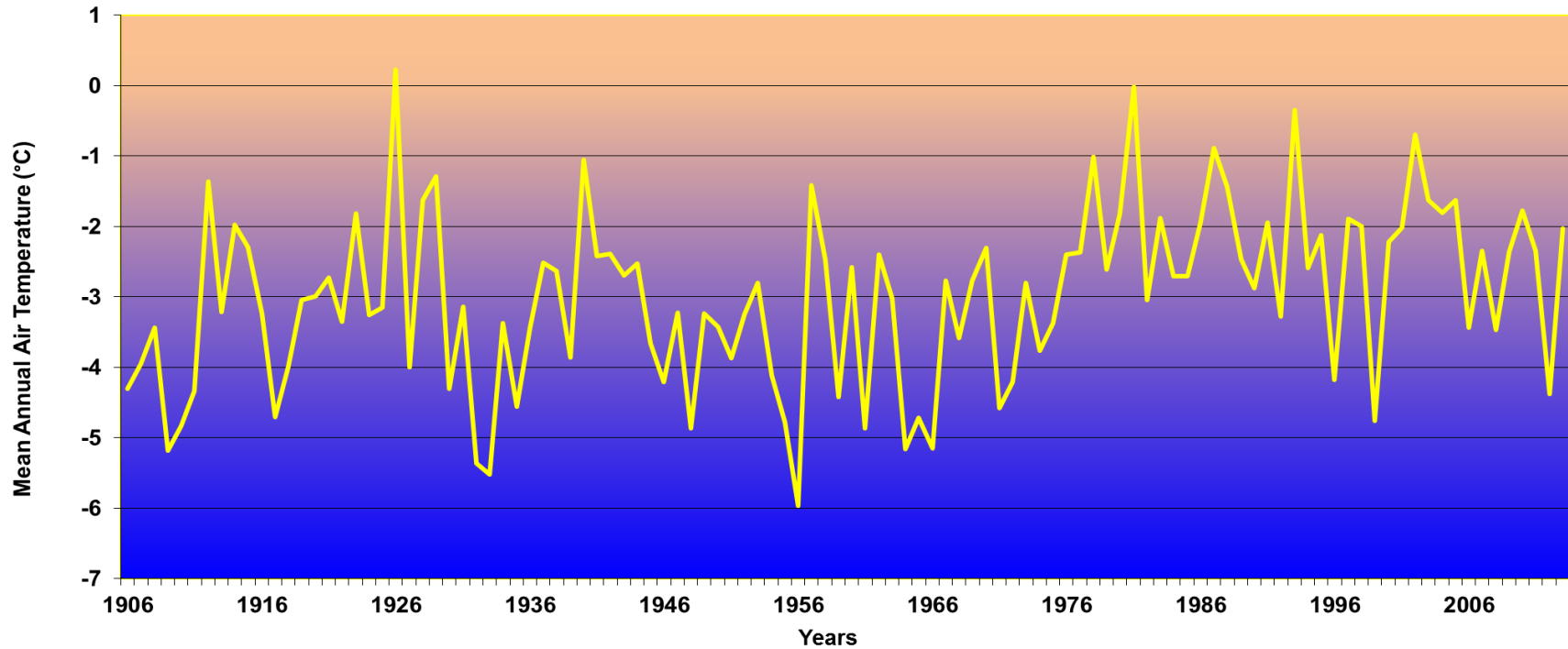




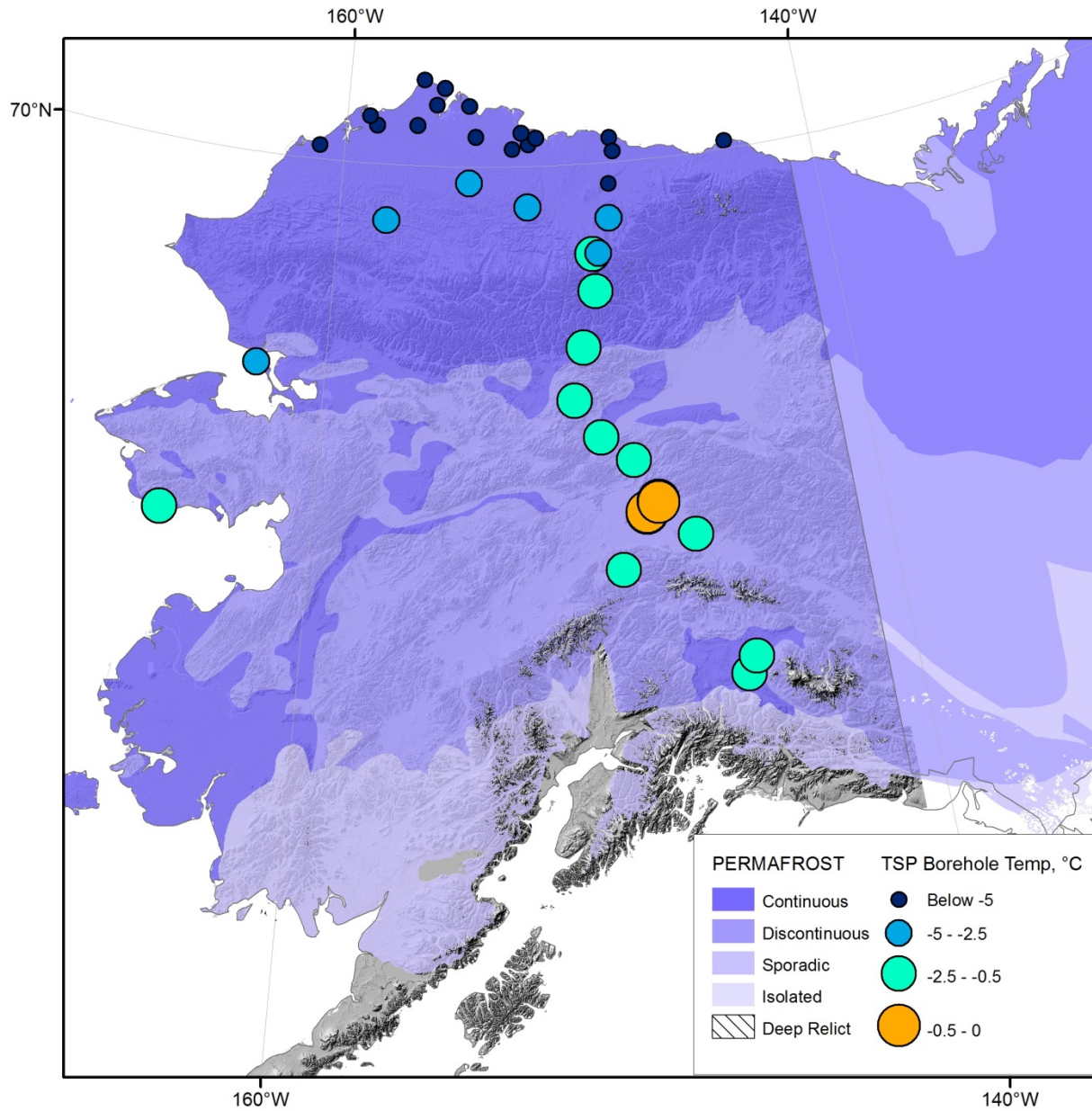
Snow on the Ground, Fairbanks 1929-2013



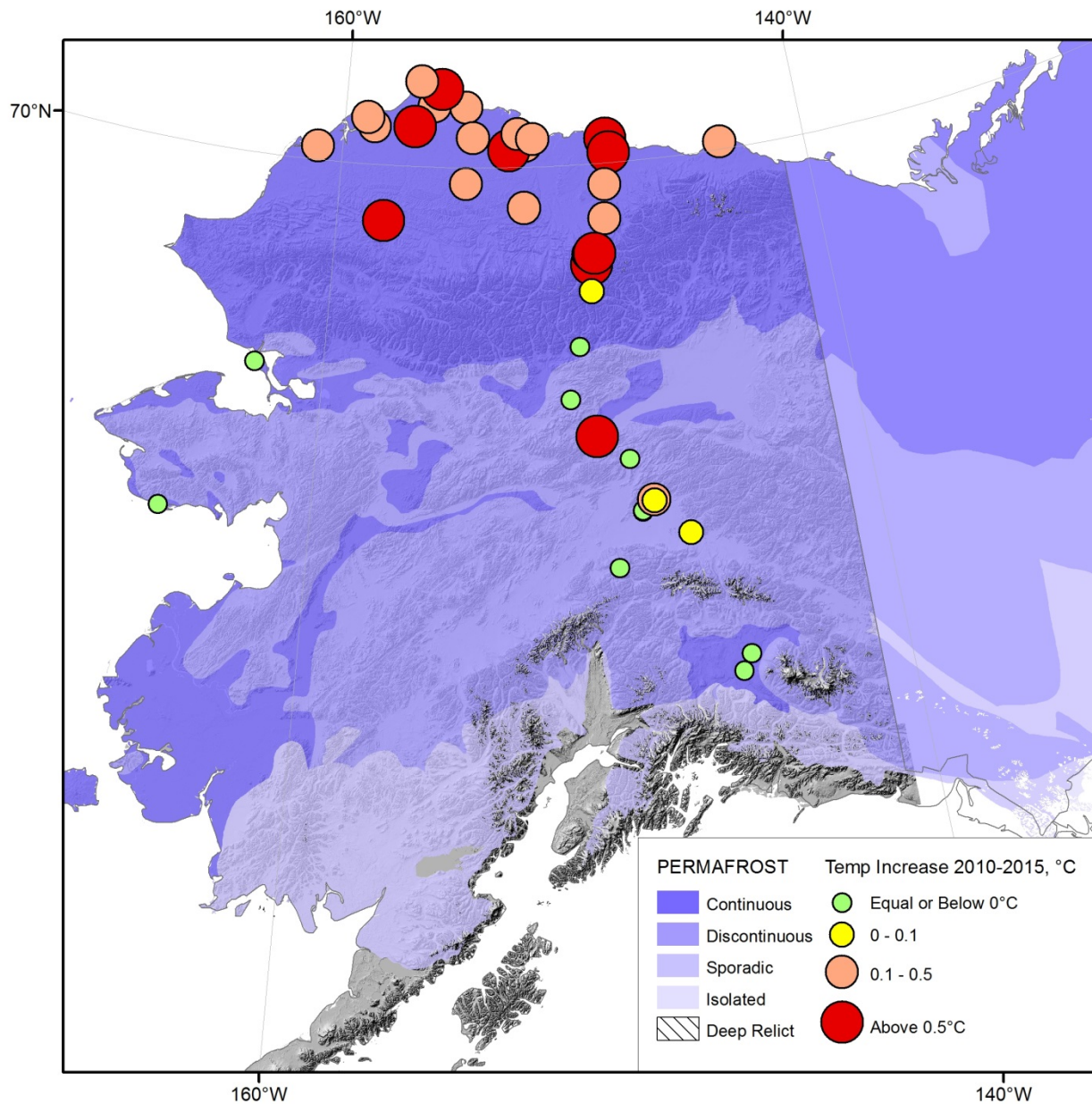
Fairbanks Mean Annual Air Temperature (°C), 1906 - 2013



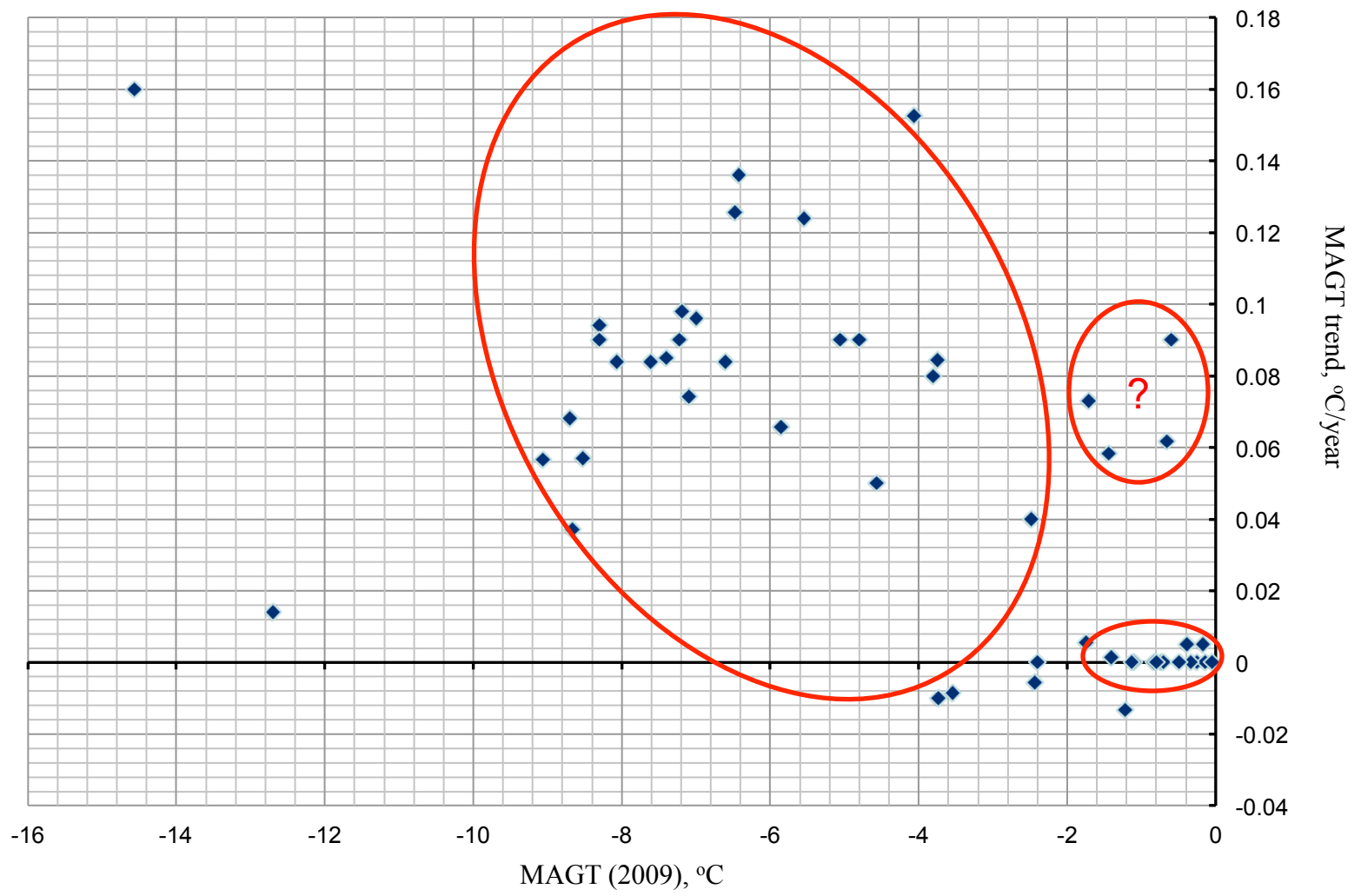
IPY TSP Snapshot 2007-2010

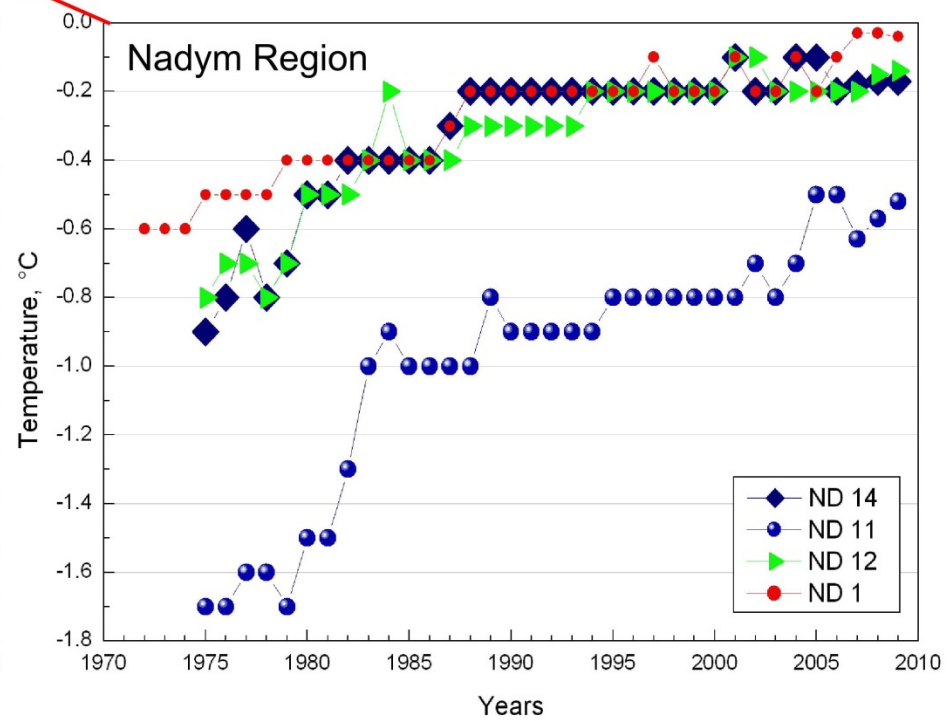
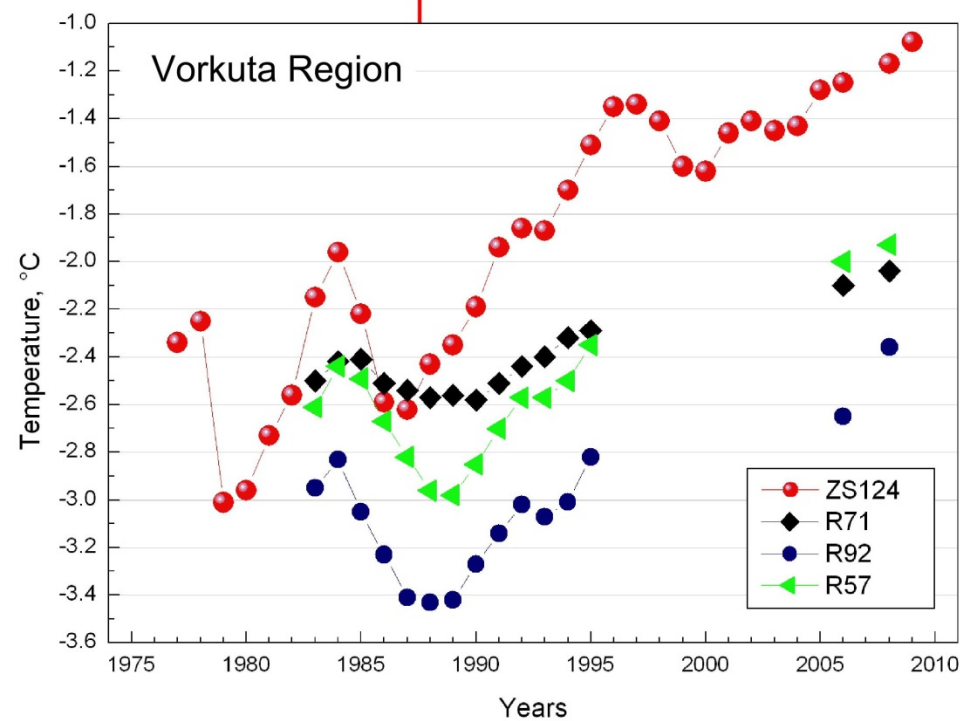
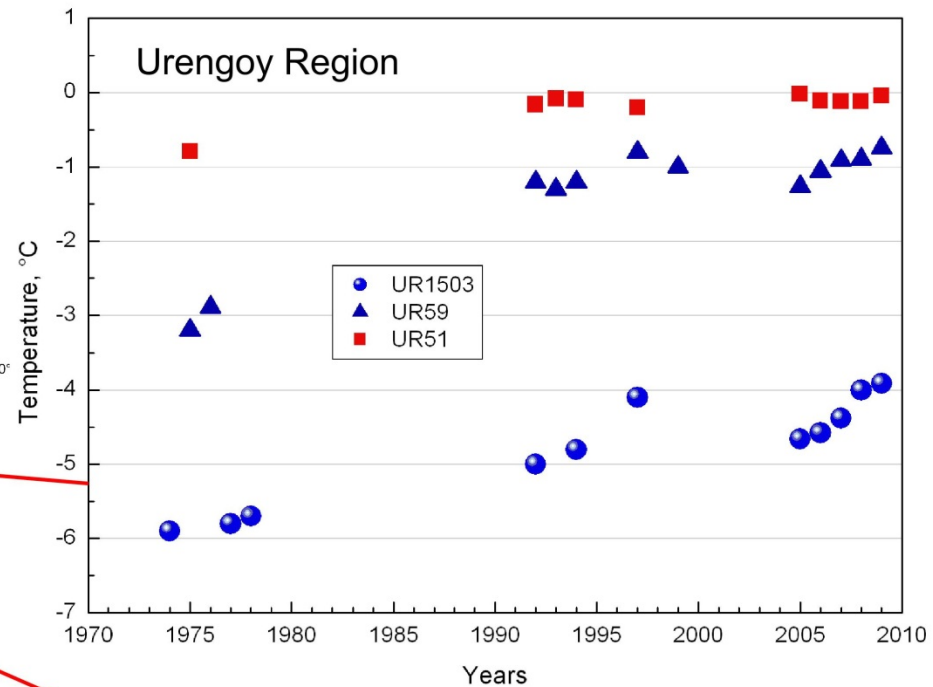
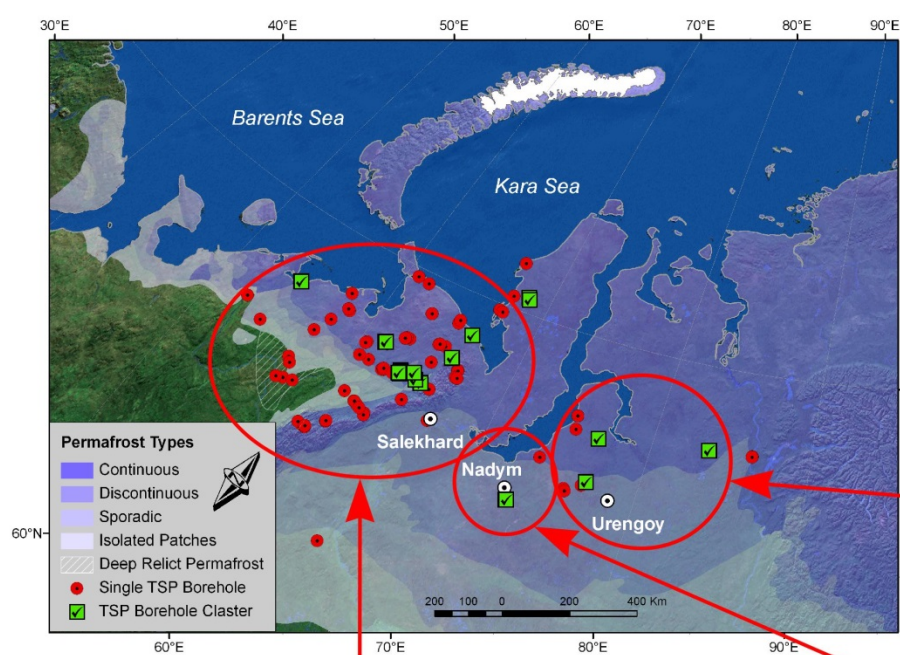


Changes of permafrost temperature during 2010-2015

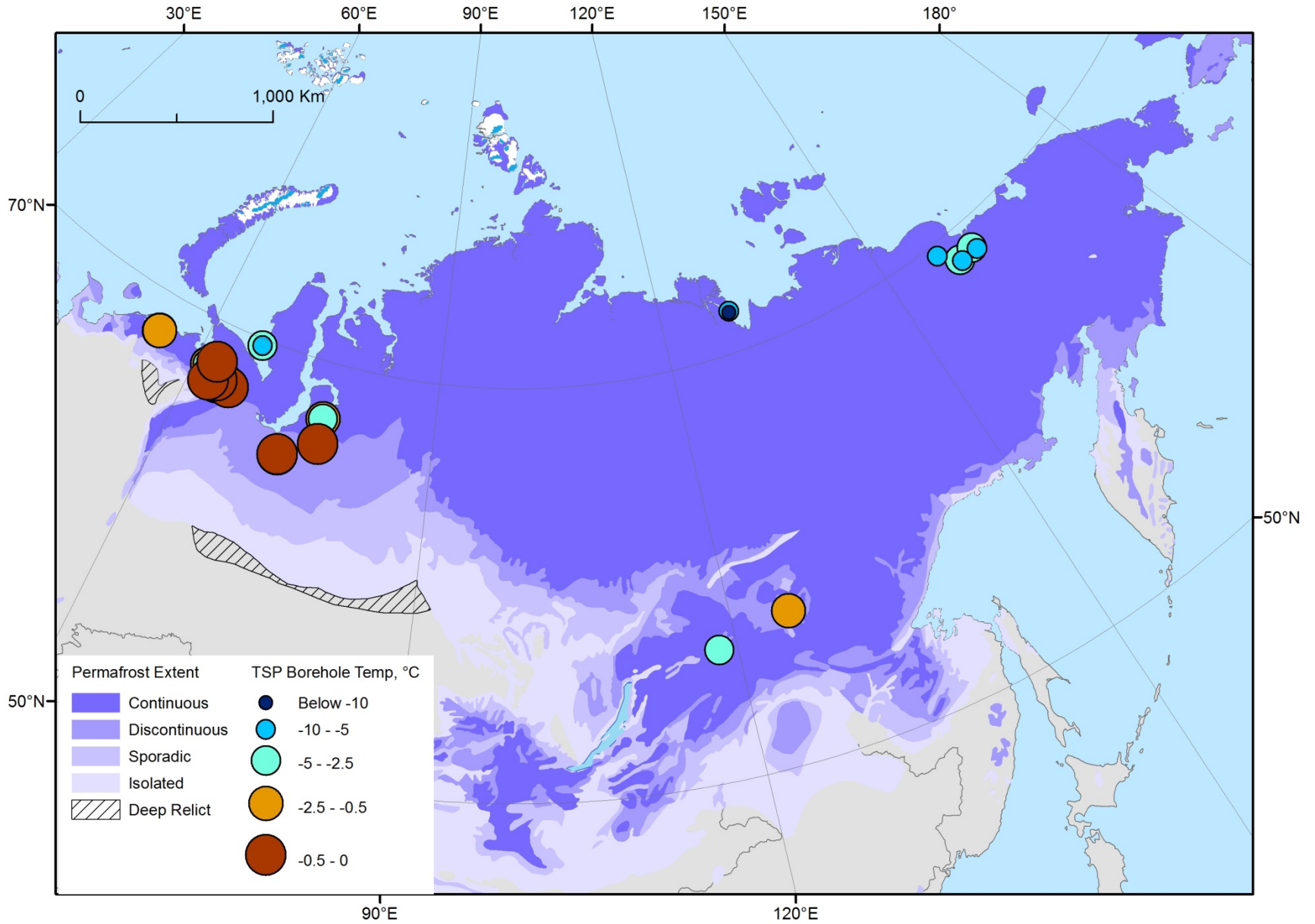


CORRELATION OF MEAN ANNUAL GROUND TEMPERATURE VALUES AND TRENDS IN ALAKSA

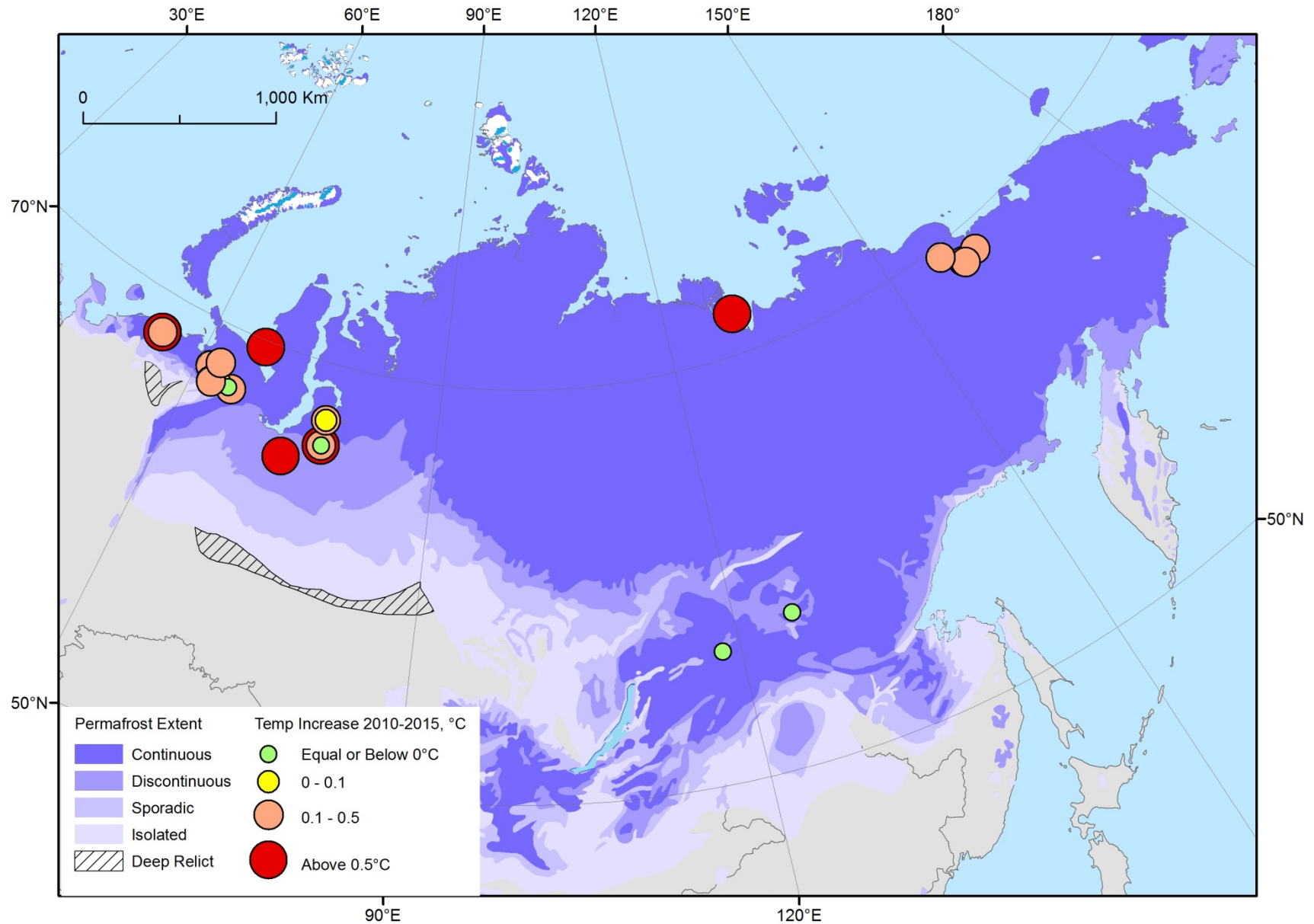




IPY TSP Snapshot 2007-2010



Changes of permafrost temperature during 2010-2015



Societal Impacts of Permafrost Degradation



Impact on Infrastructure



Changes in the ground surface





Photo provided by the Fairbanks DOT office



Photo provided by the Fairbanks DOT office

2005



2013



2013



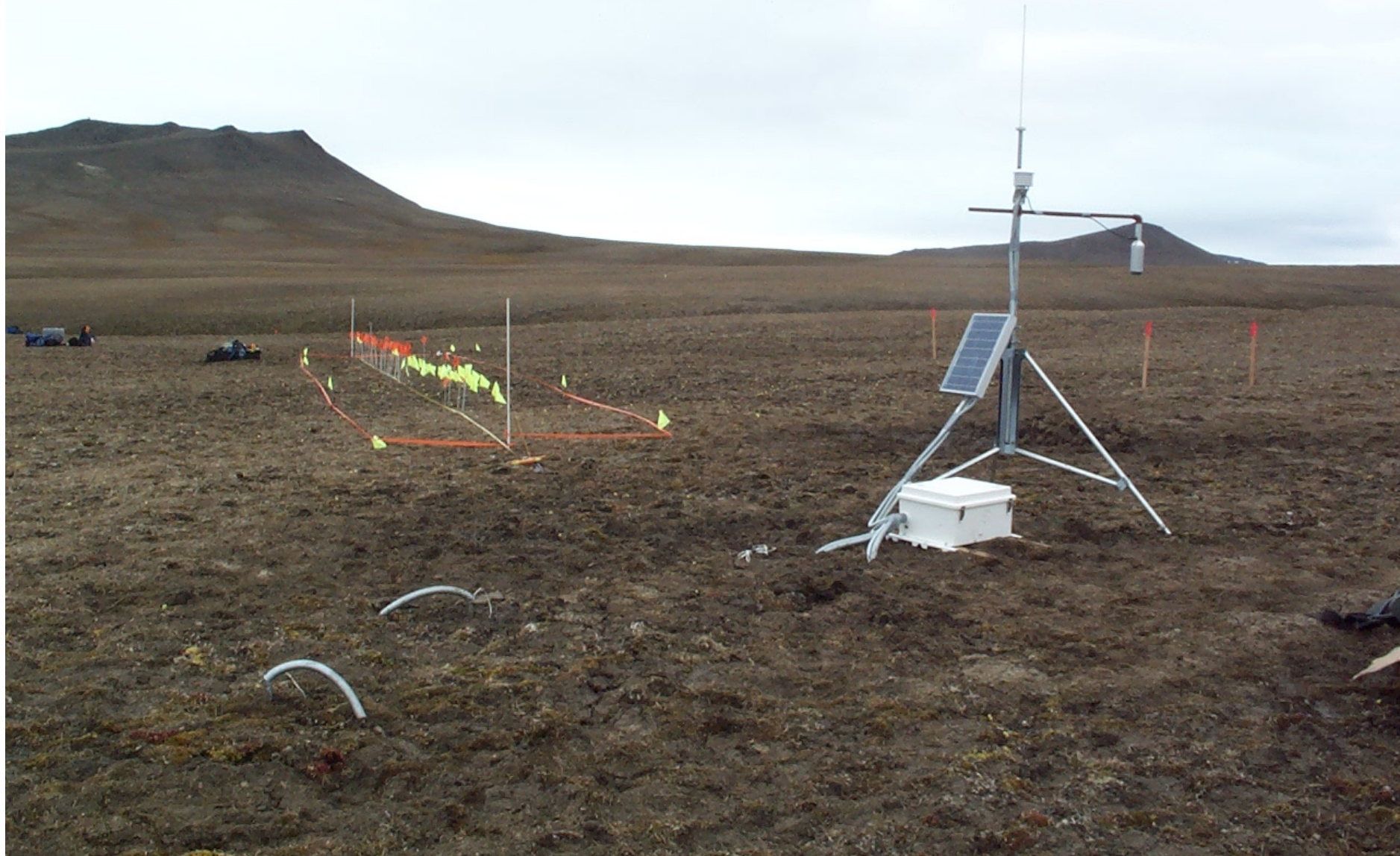
2013



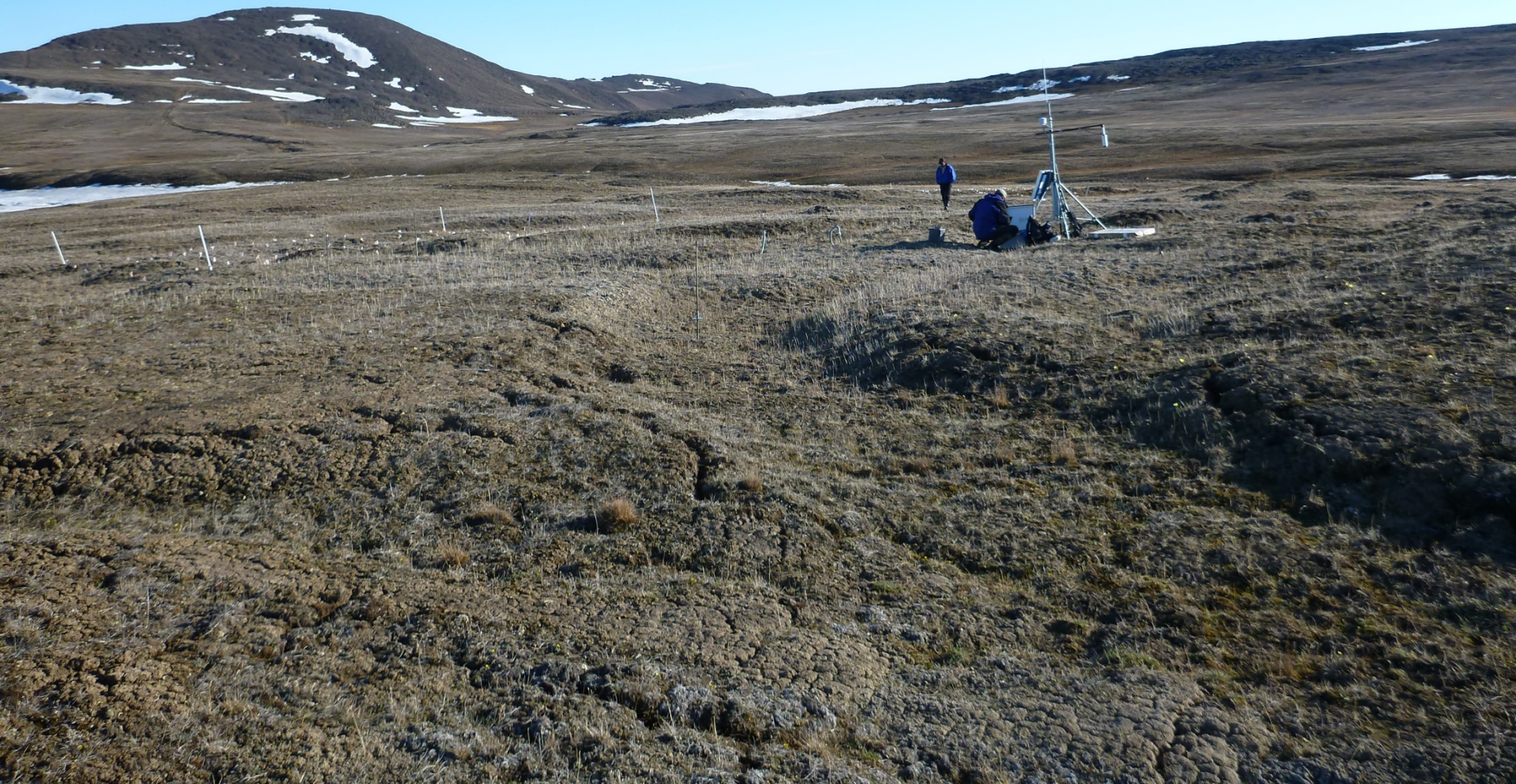
2005



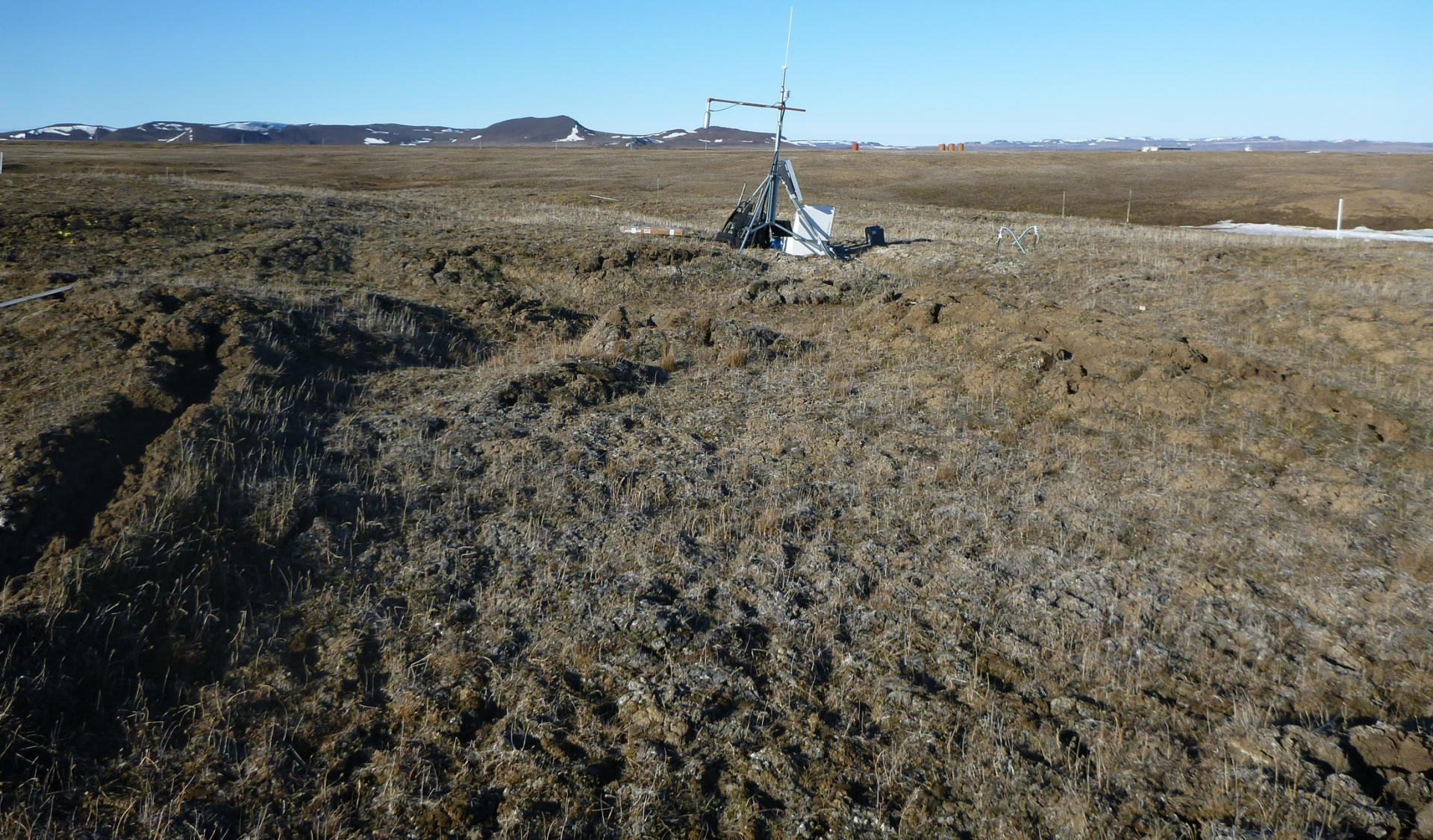
2005



2013



2013

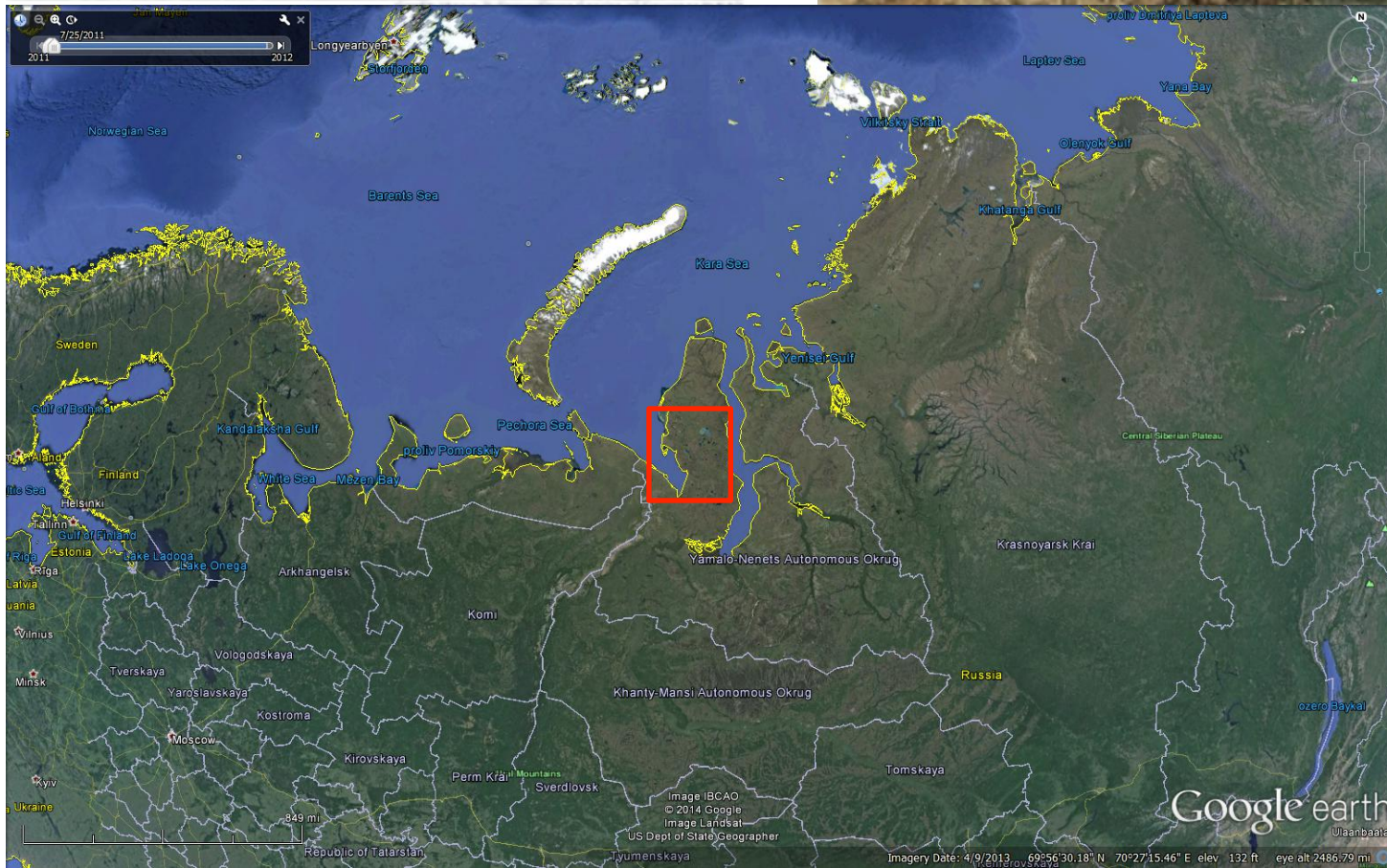


2005



2013





**A Mysterious
Holes on Yamal
Peninsula
in Russia**