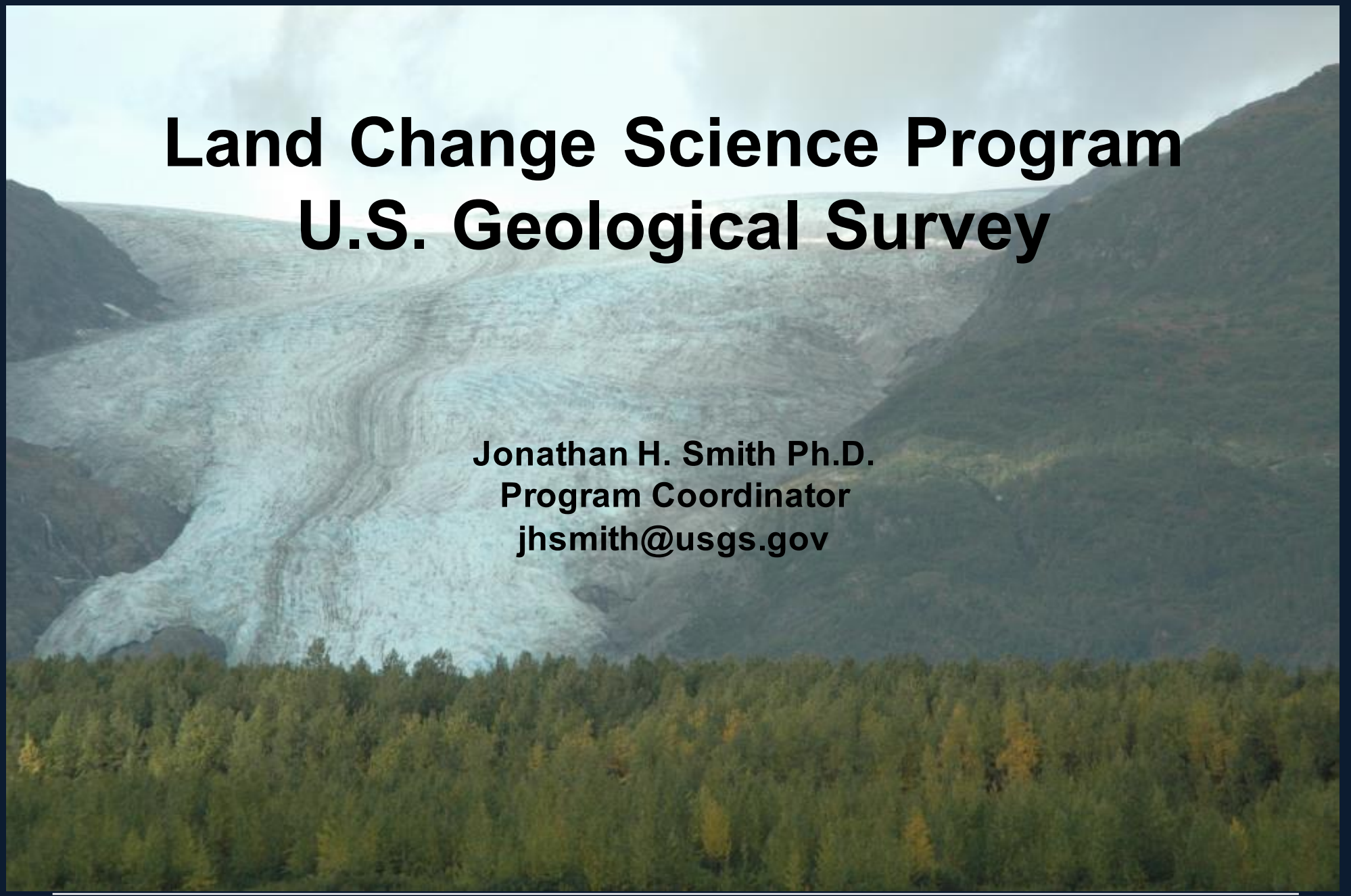


Land Change Science Program
U.S. Geological Survey

Jonathan H. Smith Ph.D.
Program Coordinator
jhsmith@usgs.gov

Land Change Science Program

Program Objective

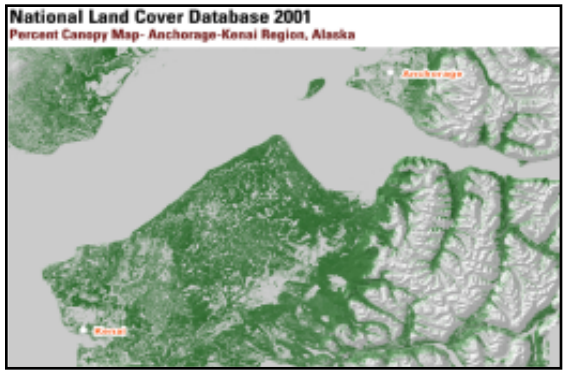
Conducts long-term studies of the land cover and disturbance histories of the United States and selected overseas areas in order to determine the reasons for and the impacts of land-surface change.

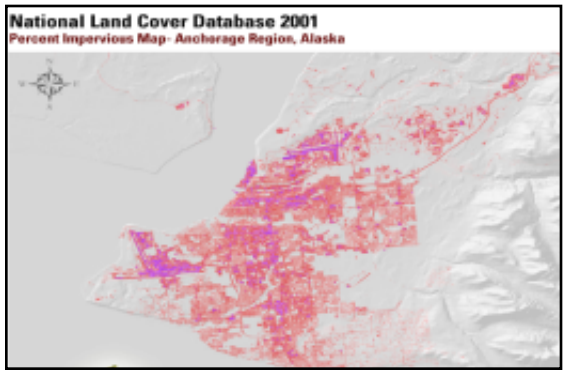
Seeks to answer:

- What kinds of changes are occurring and why?
- What are the impacts of these changes on the environment and society?
- How can LCS research findings best be used for making decisions on resource use and allocation, as well as in reducing risk and vulnerability to natural hazards?

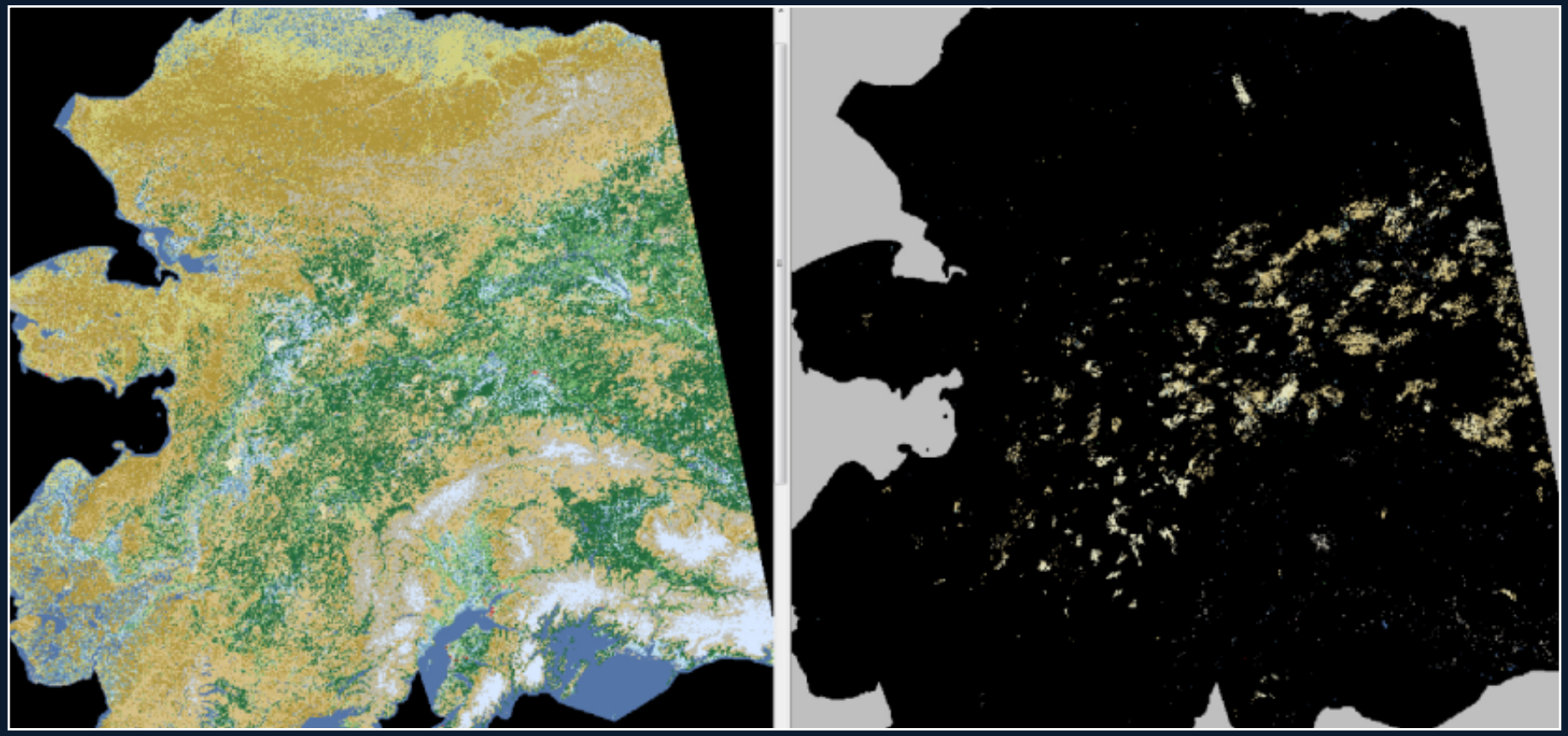
USGS

National Land Cover Database (NLCD)
AK mapped 2001 and 2011





Alaska NLCD 2001 - 2011 Change: Interior Wildfires

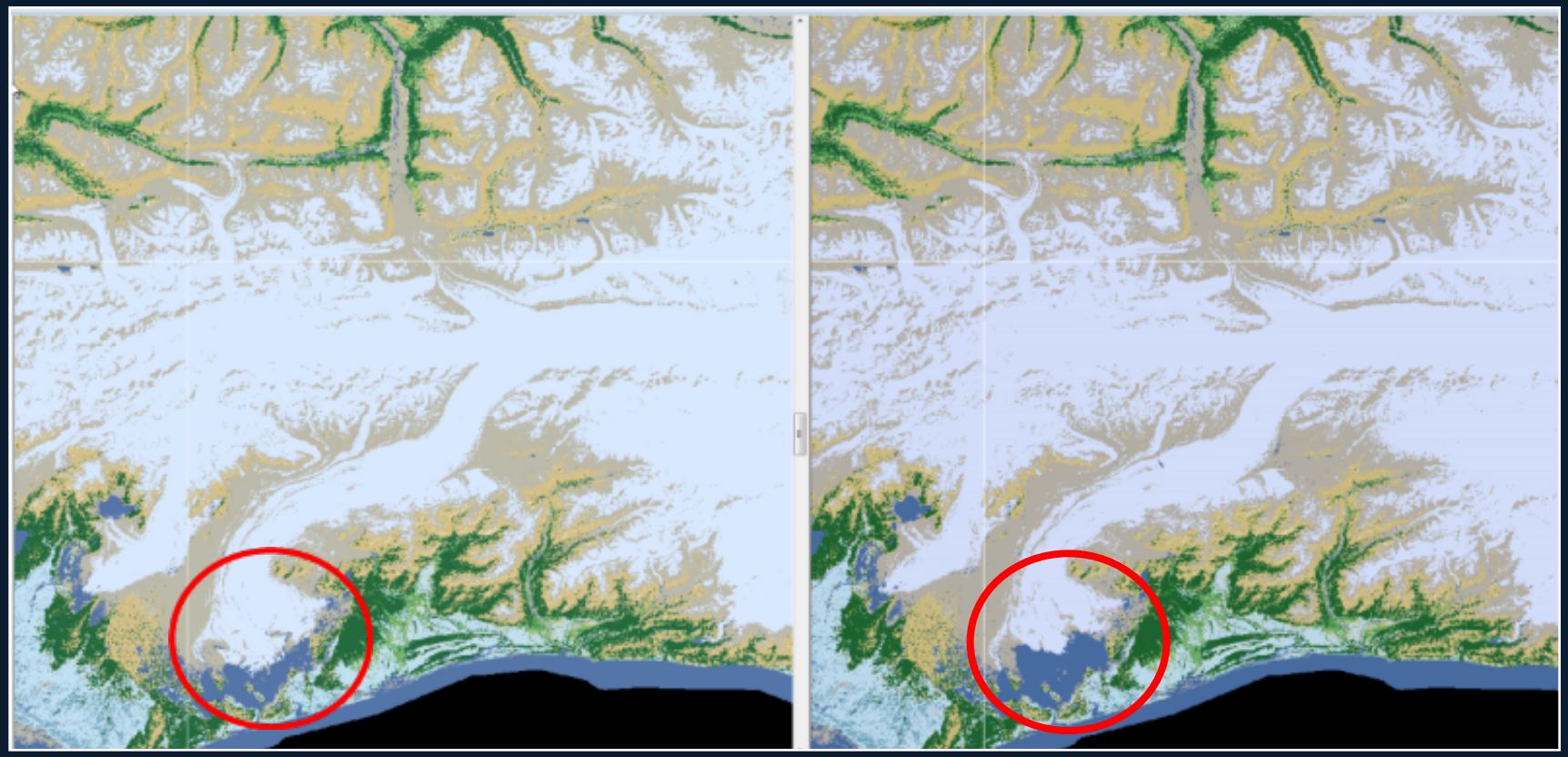


2011 Land Cover

New Shrub Areas

USGS

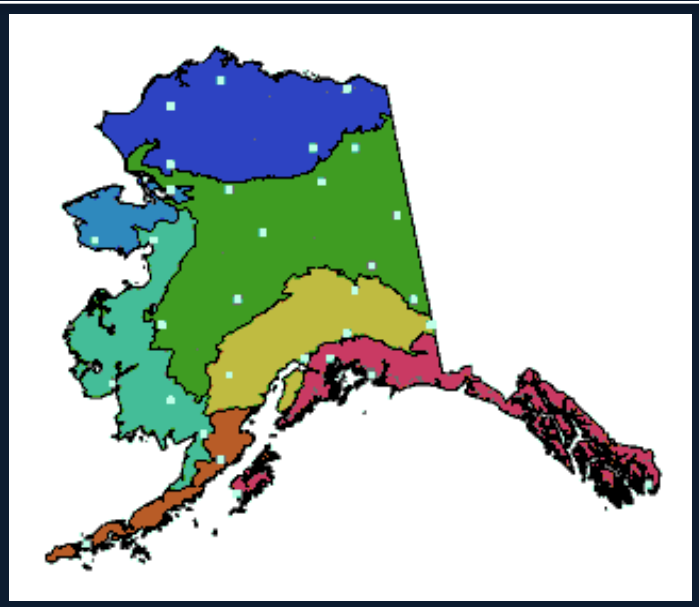
Alaska NLCD 2011: Snow/Ice Change

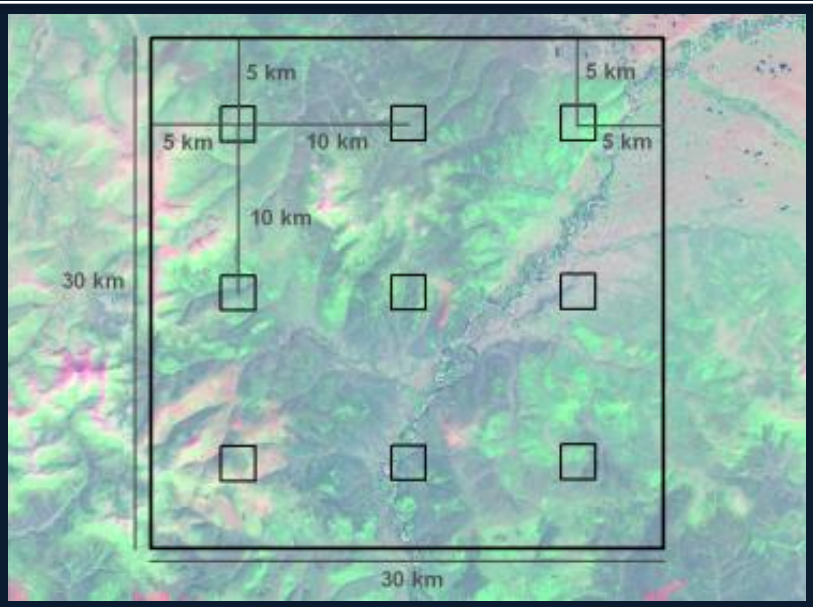


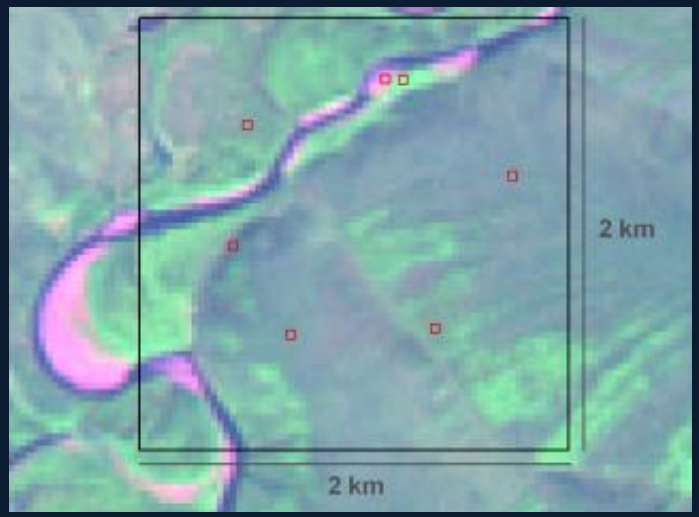
Receding Glacier

USGS

AK NLCD Rigorous Accuracy Assessment







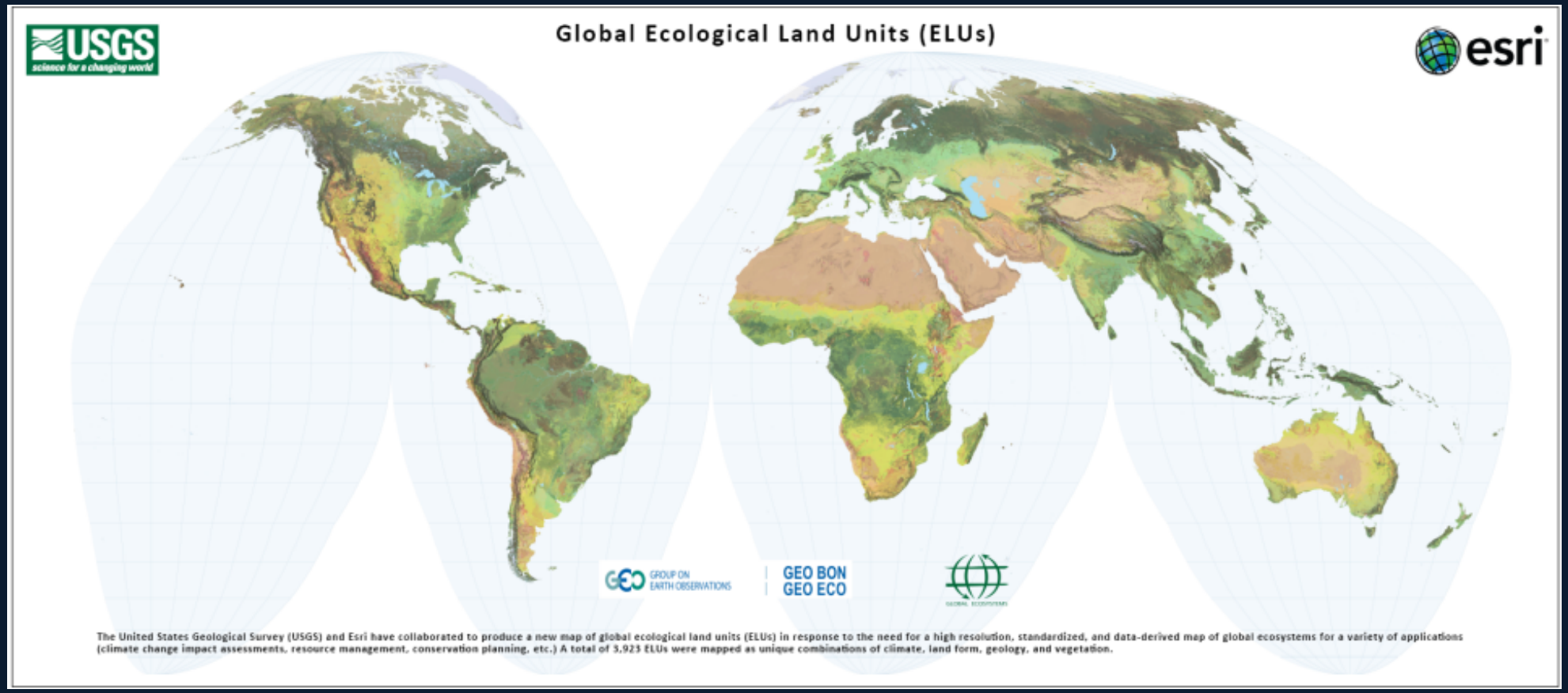
USGS

North American Land Change Monitoring System (NALCMS)

- Tri-national collaboration of five federal government institutions and Commission of Environmental Cooperation
- Launched in 2006
- Long-term goal: develop an operational system for monitoring land cover change for the continent

USGS

Global Ecosystem Mapping



USGS

AK LandCarbon Project
Biological Carbon Sequestration

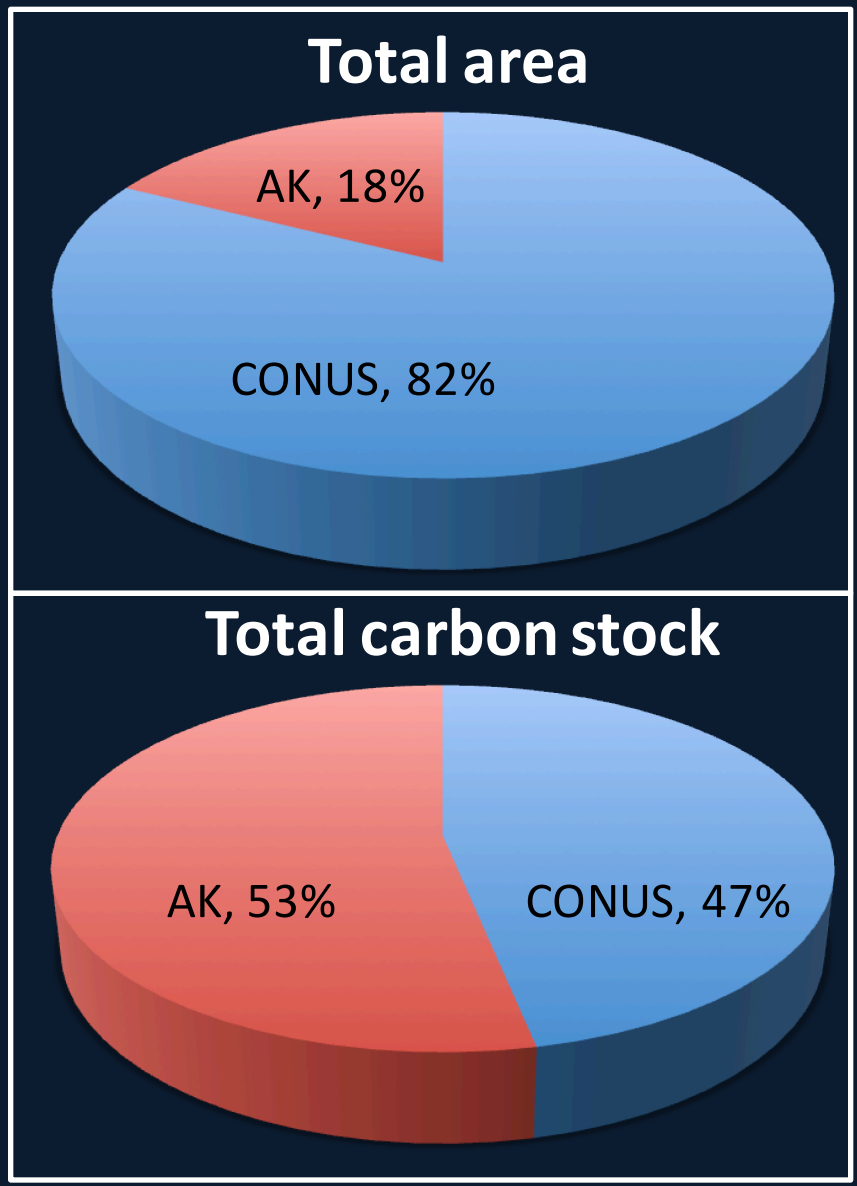
USGS
science for a changing world

Baseline and Projected Future Carbon Storage and Greenhouse-Gas Fluxes in Ecosystems of Alaska

Professional Paper 1826

U.S. Department of the Interior
U.S. Geological Survey

How much carbon is stored in AK?



USGS

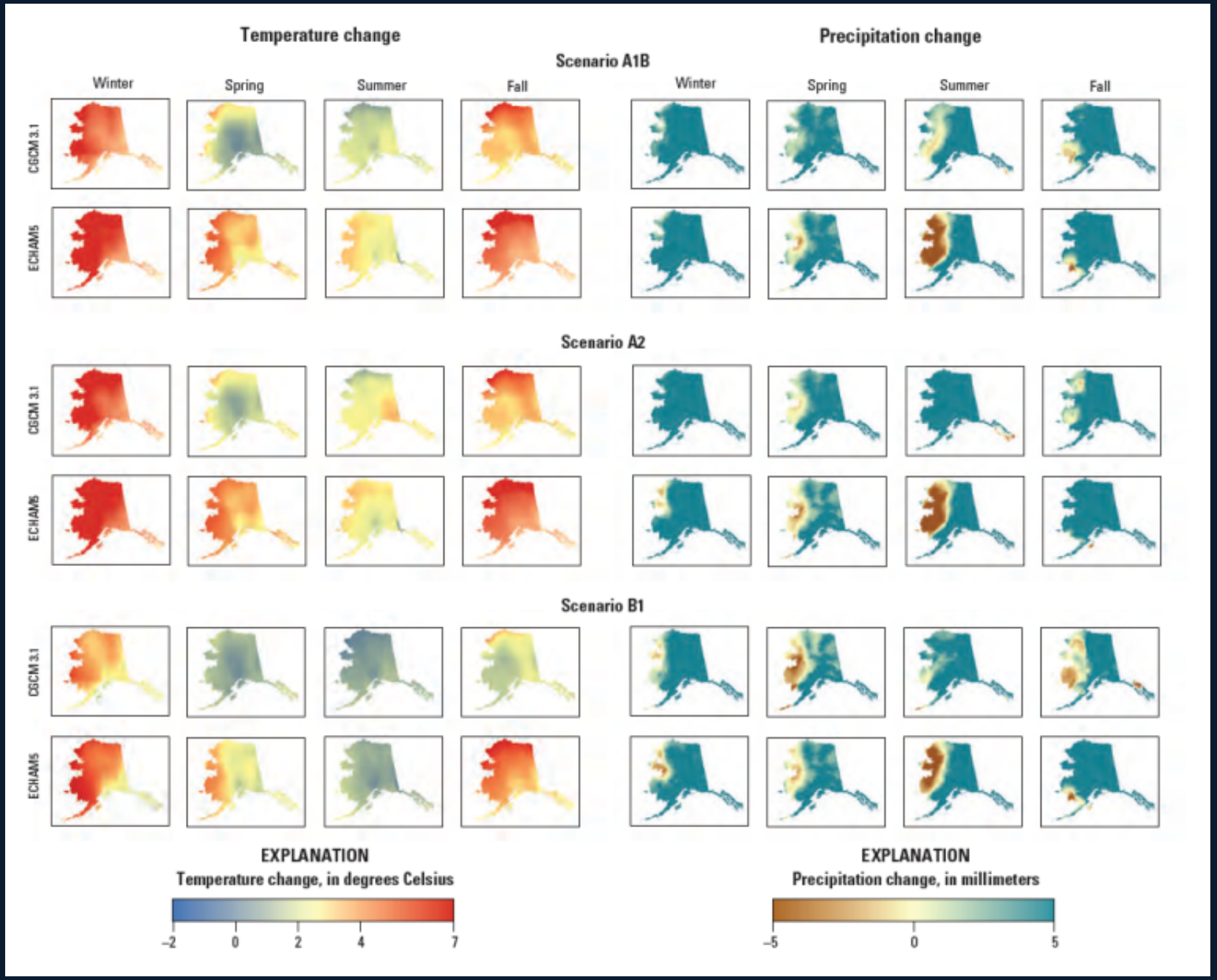
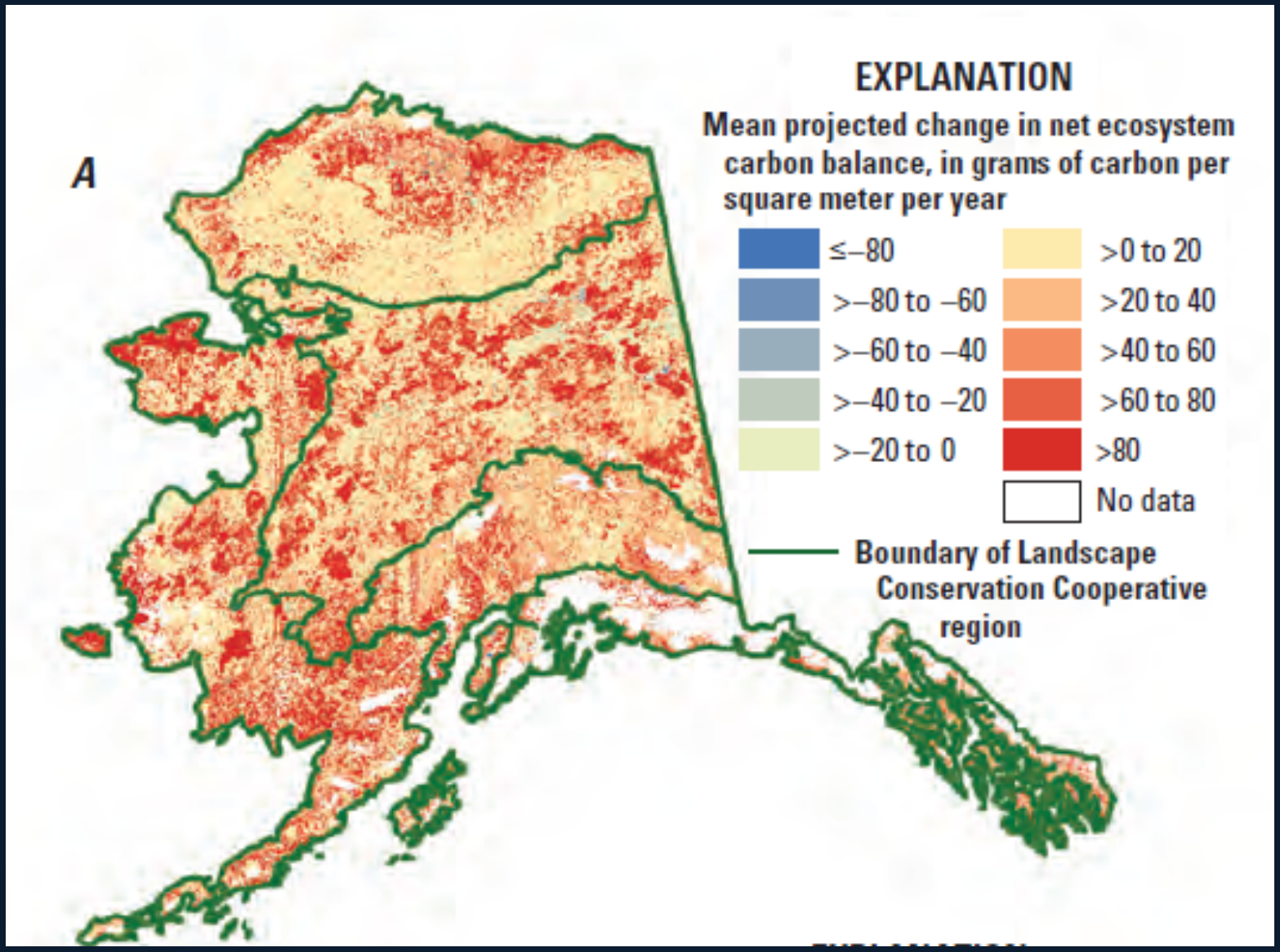

Temperature change
Precipitation change
Scenario A1B
Winter
Spring
Summer
Fall
CGCM 3.1
ECHAM5
Scenario A2
Scenario B1
EXPLANATION
Temperature change, in degrees Celsius
–2
0
2
4
7
EXPLANATION
Precipitation change, in millimeters
–5
0
5

Table 2.10. Summary of fire activity for the Northwest Boreal Landscape Conservation Cooperative North simulated for the last decades of the historical period (2000–2009) and the projection period (2090–2099).

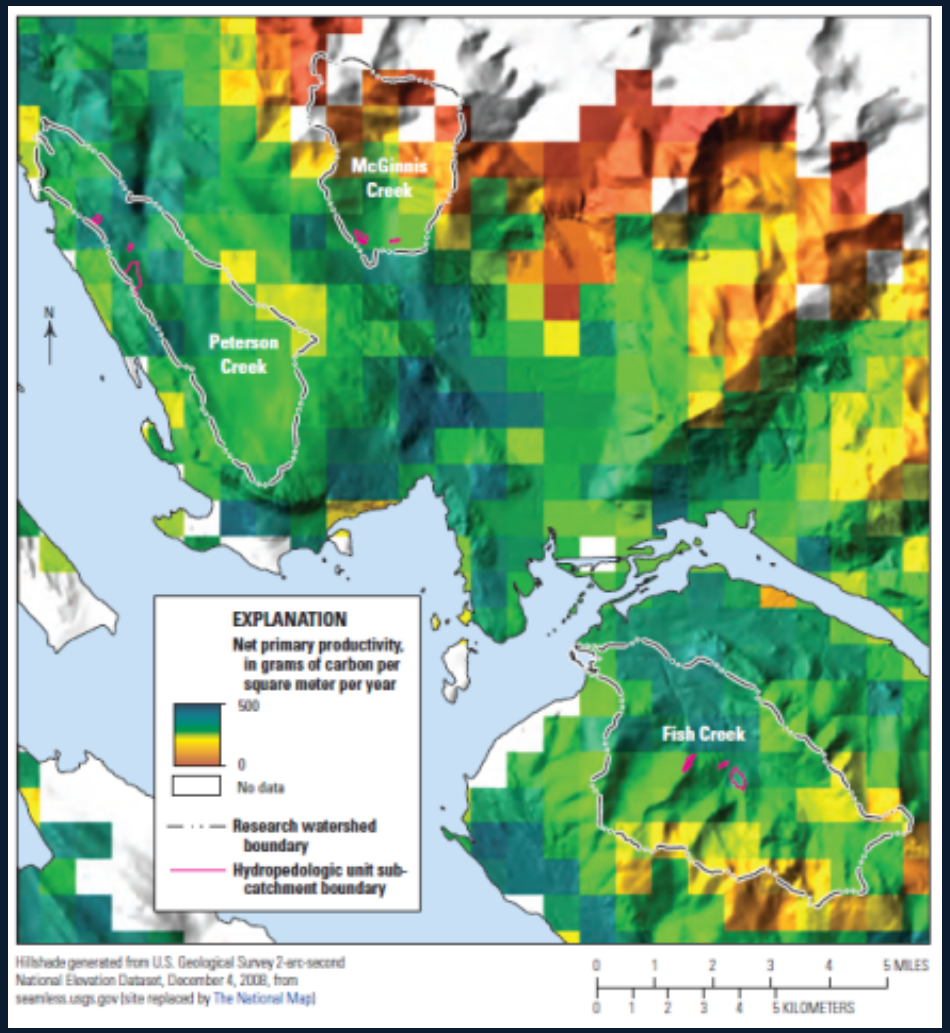
[The 50th (median) and 95th percentiles were computed across 200 model replicates for each future climate simulation. Details regarding the models and scenarios shown can be found in table 2.9. km², square kilometer]

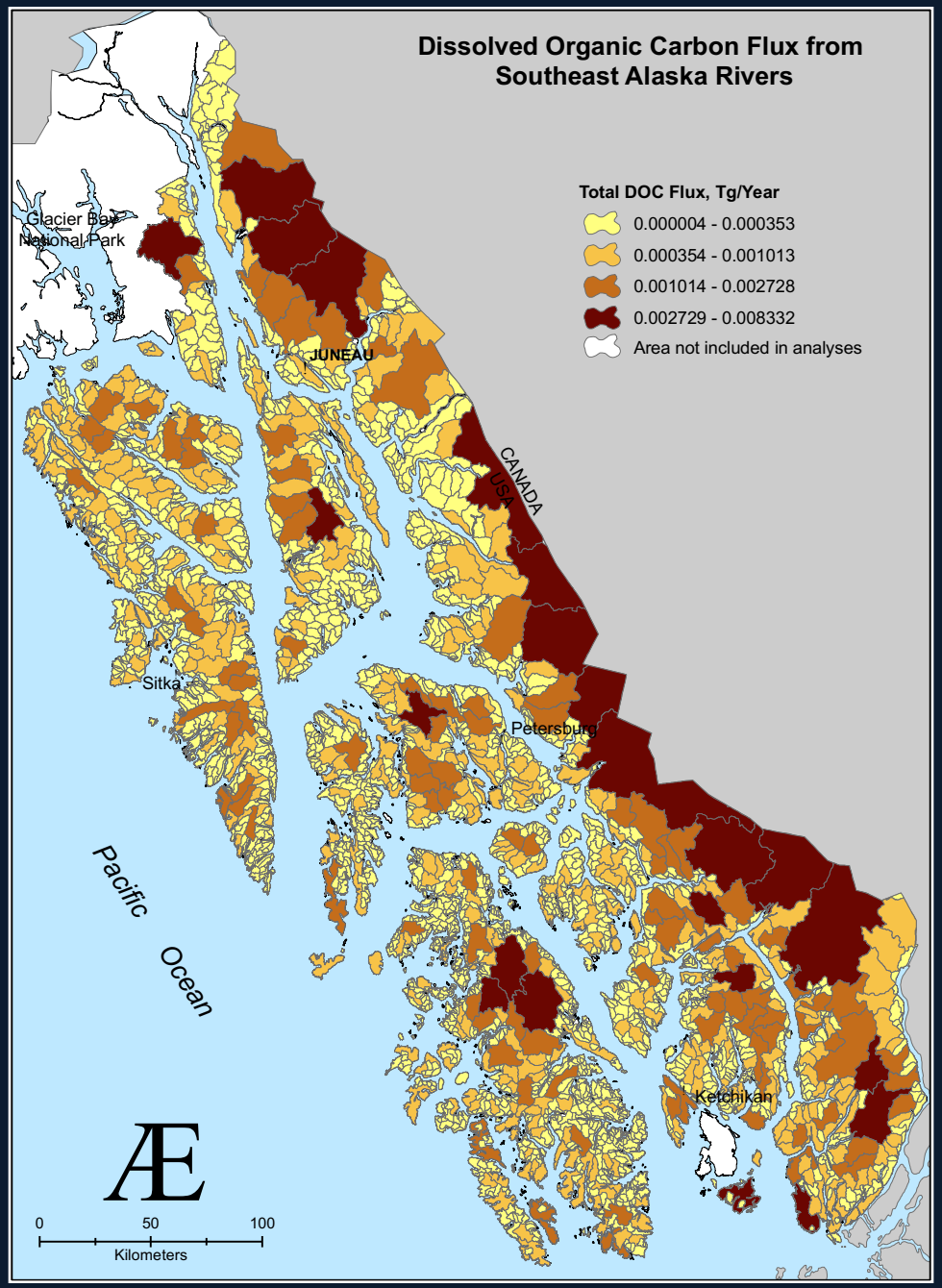
Climate scenario	Metric (percentile)	Historical period		Projection period		Change in number of wildfires (percent)	Change in area burned (percent)
		Number of wildfires	Area burned (km²)	Number of wildfires	Area burned (km²)		
CGCM3.1							
A1B	Median	42	2,274	45	2,295	5.9	0.9
A1B	95th	62	10,342	64	10,199	3.5	–1.4
A2	Median	42	2,194	44	3,239	7.2	47.6
A2	95th	63	10,459	66	16,626	5.3	59.0
B1	Median	42	2,216	48	2,622	15.5	18.3
B1	95th	62	10,511	67	7,855	7.3	–25.3
ECHAM5							
A1B	Median	42	2,200	40	3,174	–3.6	44.3
A1B	95th	63	10,426	62	12,217	–0.6	17.2
A2	Median	42	2,186	37	2,176	–10.8	–0.5
A2	95th	63	10,422	61	12,642	–3.1	21.3
B1	Median	42	2,230	38	1,798	–7.2	–19.4
B1	95th	63	10,264	57	8,090	–9.2	–21.2

Projected Changes in Carbon Flux



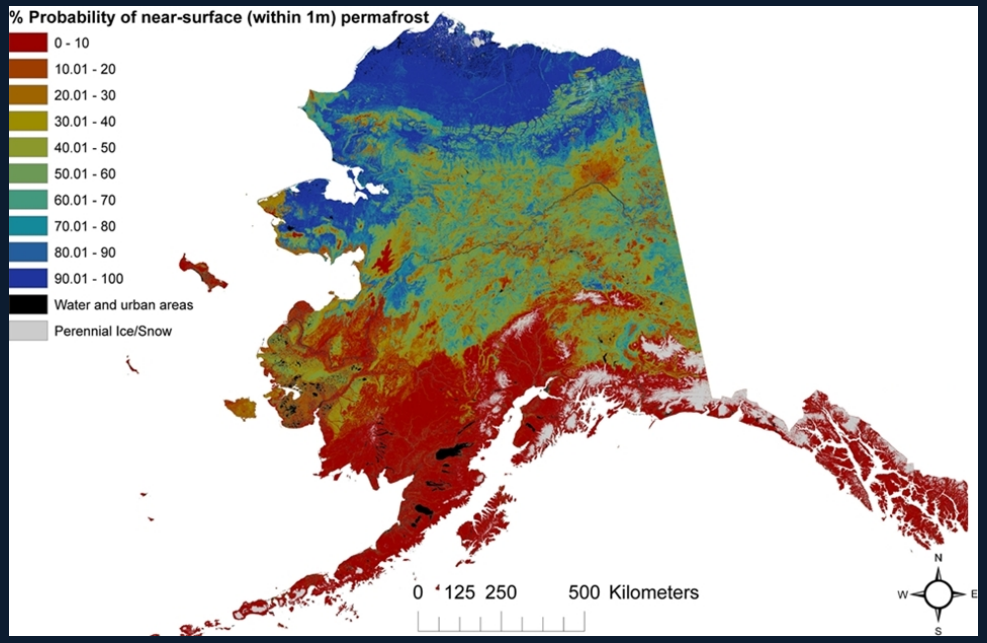
Aquatic Carbon Transport

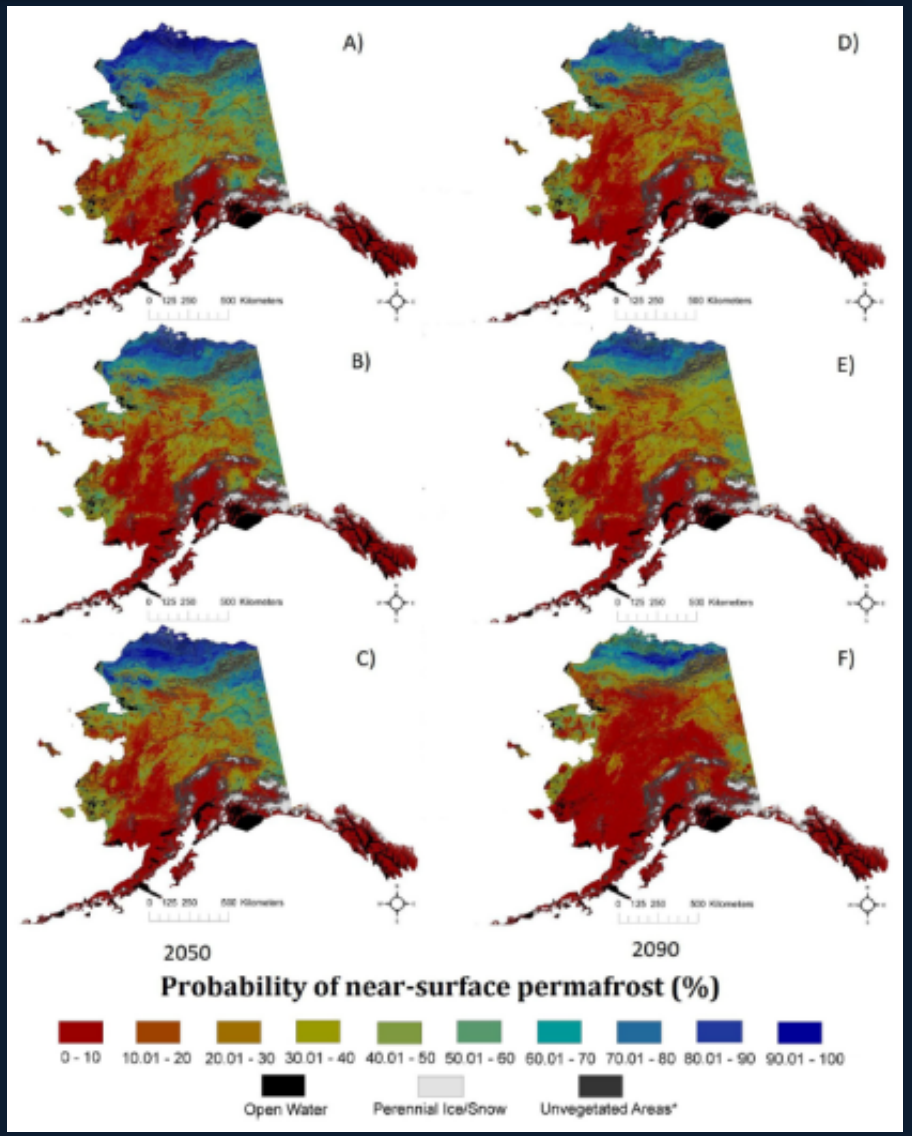




USGS

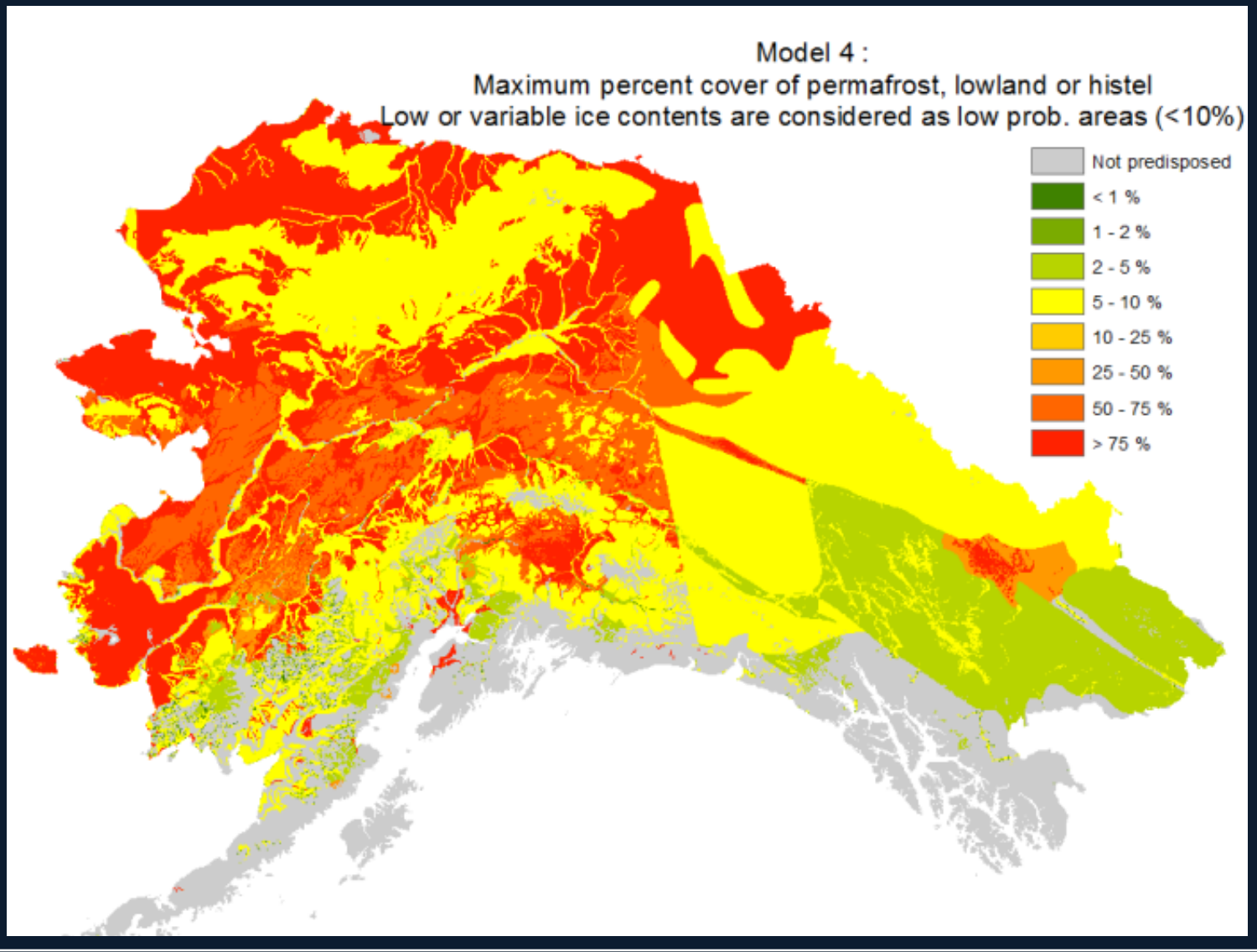
Permafrost Mapping





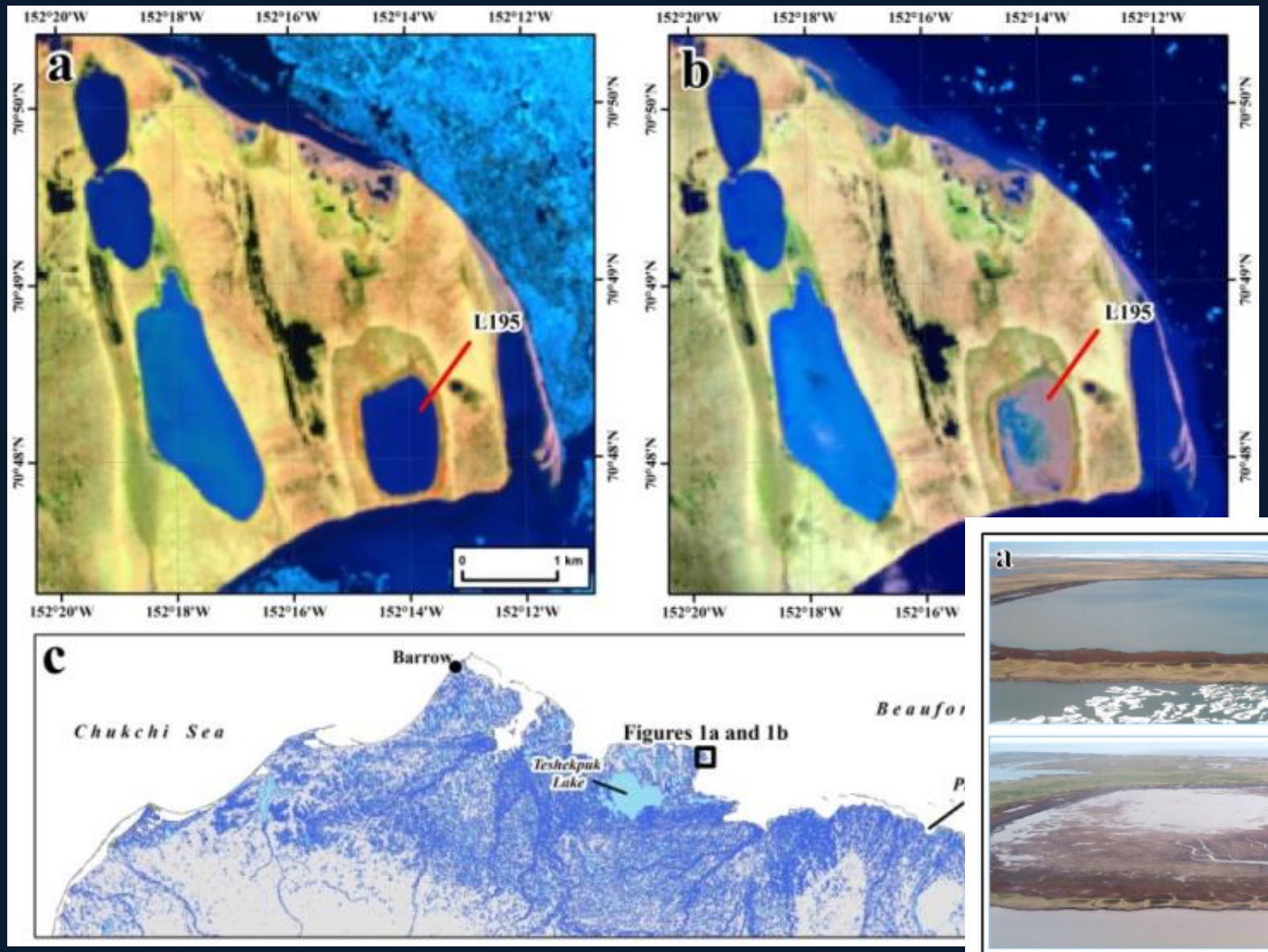
USGS

Areas Predisposed to Thermokarst Disturbance



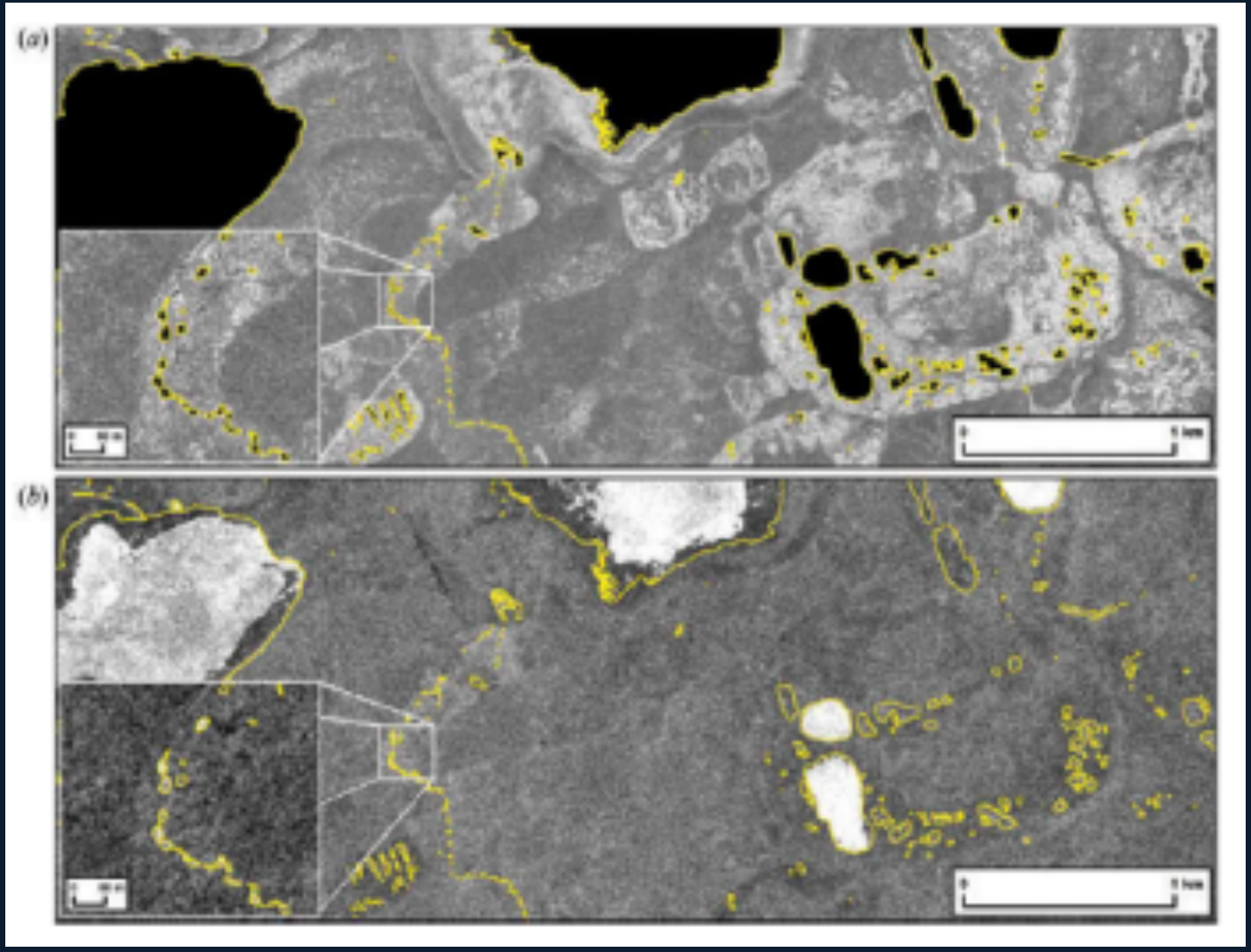
USGS

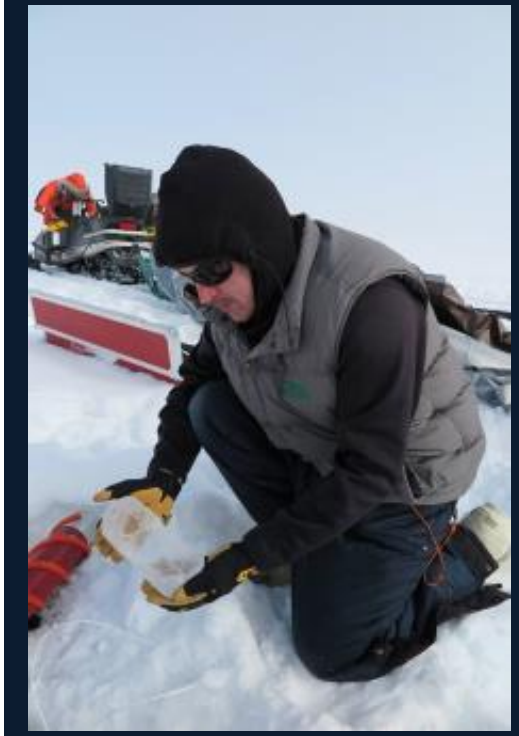
Documenting an Arctic Lake Drainage Event



USGS

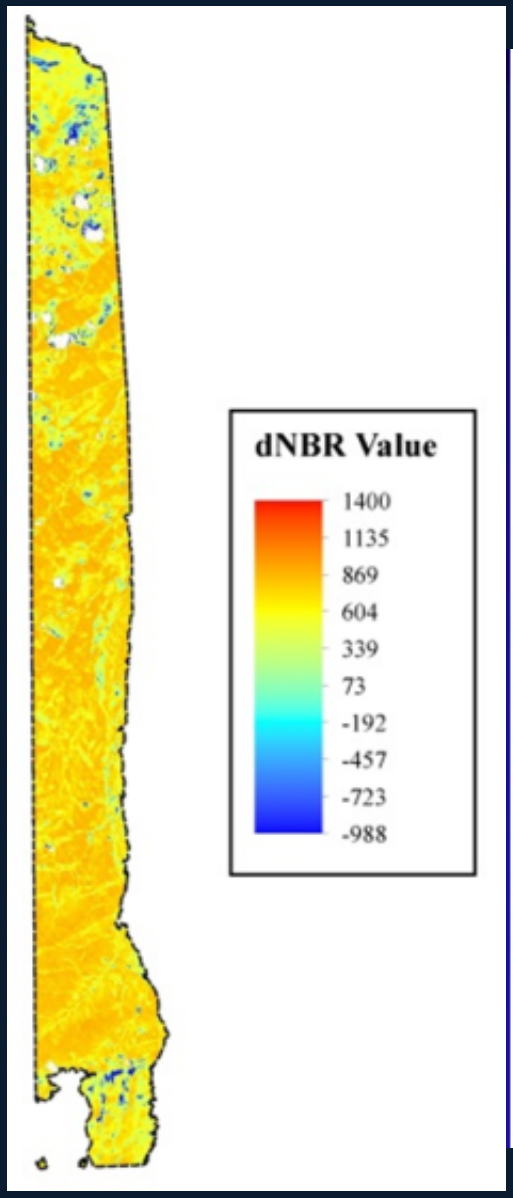
TerraSAR-X and Ground Penetrating Radar Data Identify Winter Water

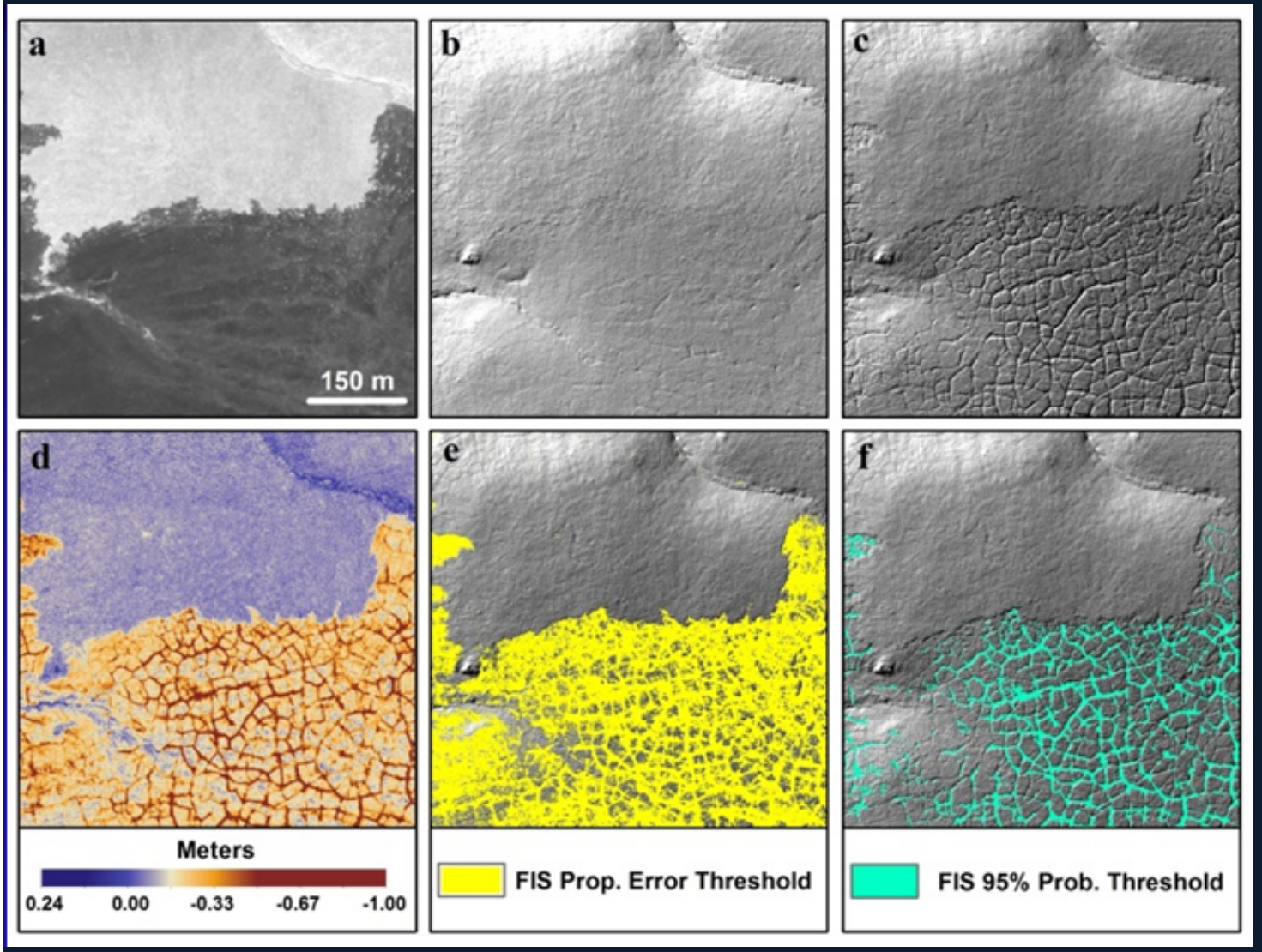




USGS

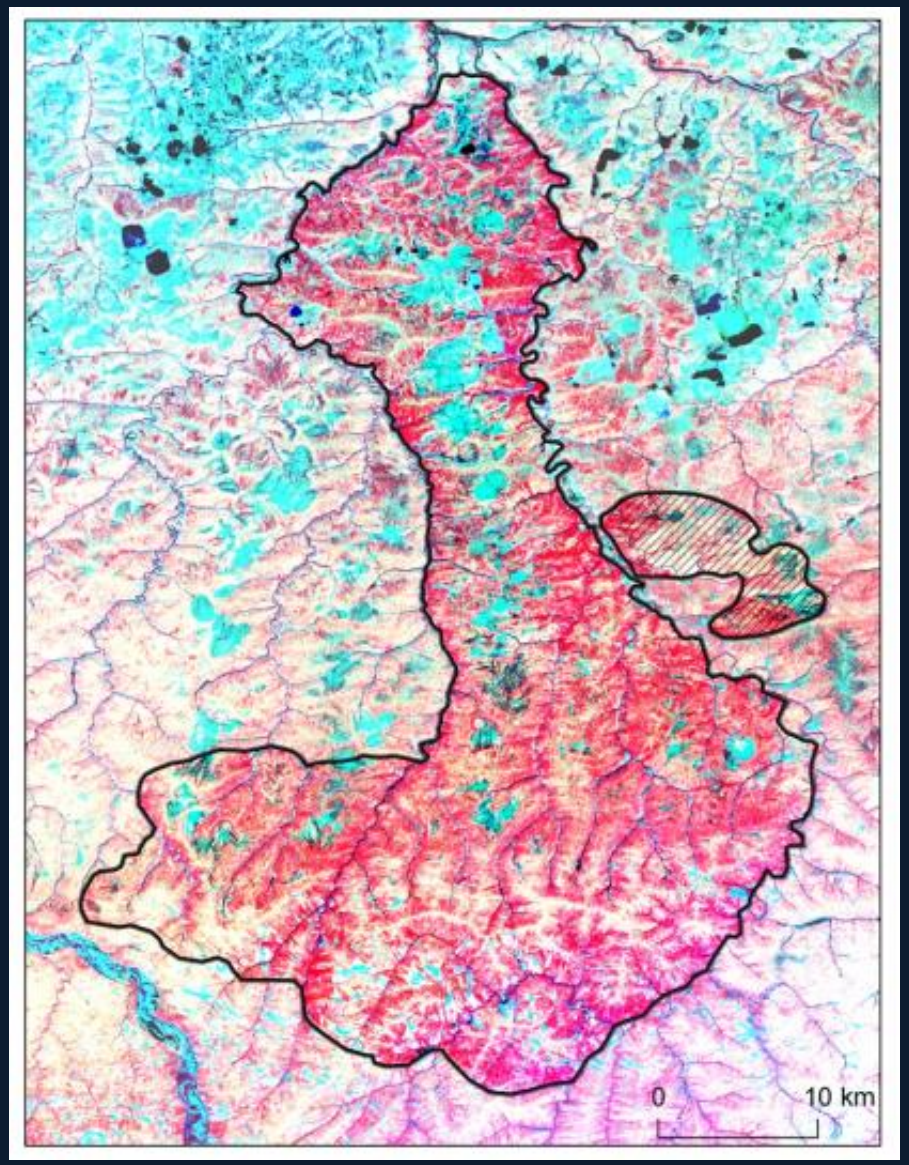
LiDAR Documents Widespread Permafrost Thaw

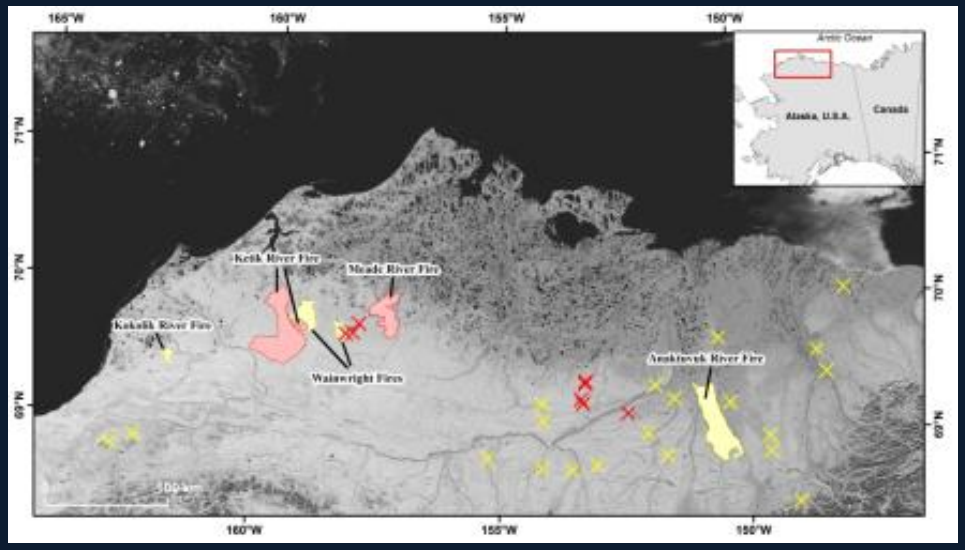




USGS

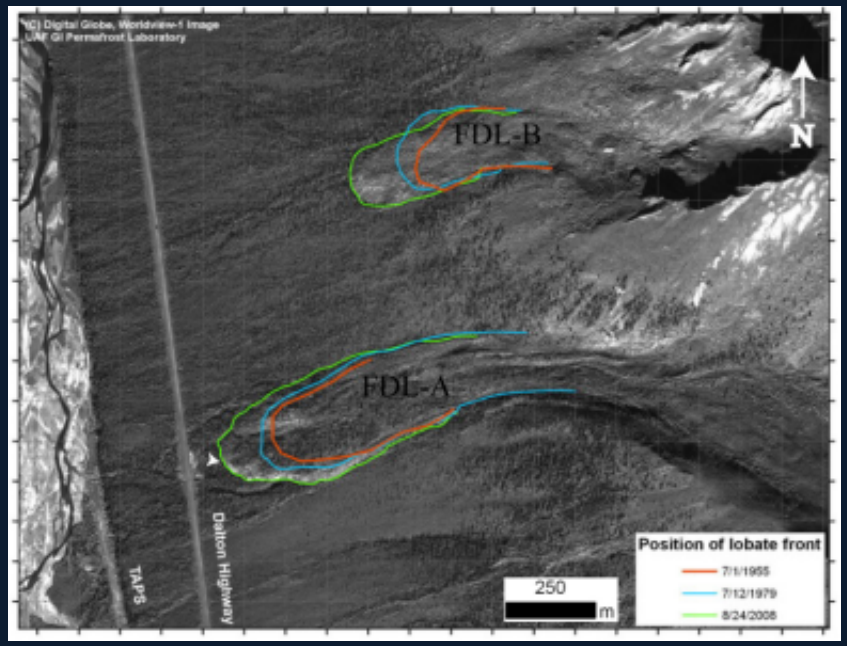
Monitoring Tundra Fires





USGS

Risk and Vulnerability of Natural Hazards



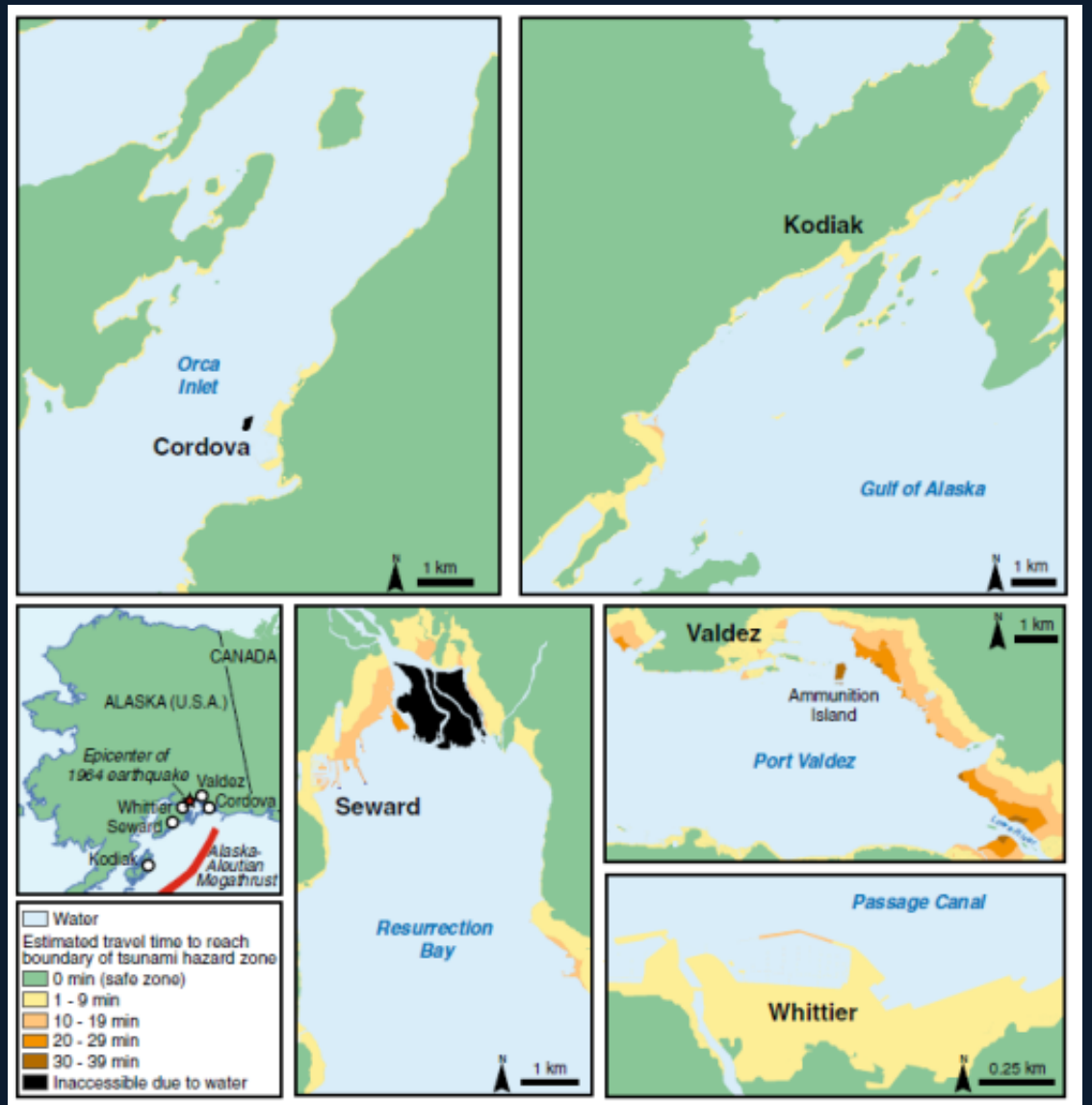


Fig. 1 Regional map showing community locations and maps of modeled pedestrian evacuation travel times in Cordova, Kodiak, Seward, Valdez, and Whittier (Alaska, USA) relative to maximum tsunami hazard zones and assuming a slow walking speed of 1.1 m/s. Map extents for each community vary considerably and are based on the extent of resident and employee locations within a community

USGS