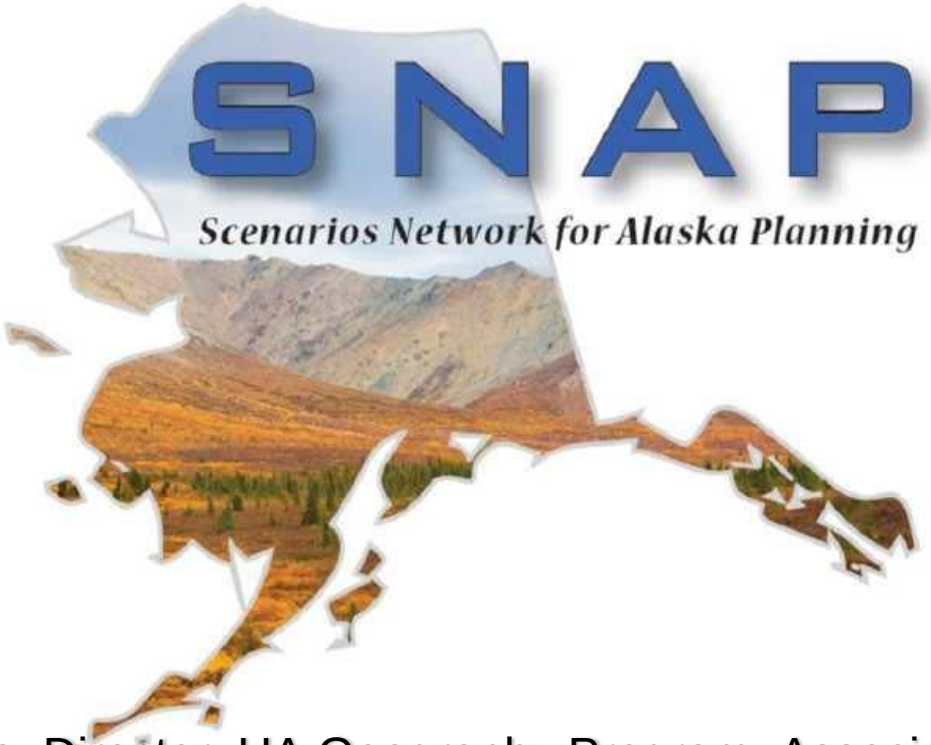


Mike Sfraga, Director, UA Geography Program, Associate Dean,
& Co-Director, UArctic Institute for Circumpolar Policy
Scott Rupp, SNAP Director
John Walsh, International Arctic Research Center

UNIVERSITY of ALASKA
Many Traditions One Alaska

UNIVERSITY OF ALASKA GEOGRAPHY PROGRAM
UAGP

UAF
UNIVERSITY OF ALASKA FAIRBANKS

What is SNAP?

SNAP (Scenarios Network for Alaska Planning) is a collaborative network of the University of Alaska, state, federal, and local agencies, NGOs, and industry partners.

Its mission is to provide timely access to scenarios of future conditions in Alaska for more effective planning by decision-makers, communities, and industry.

Projections based on IPCC models

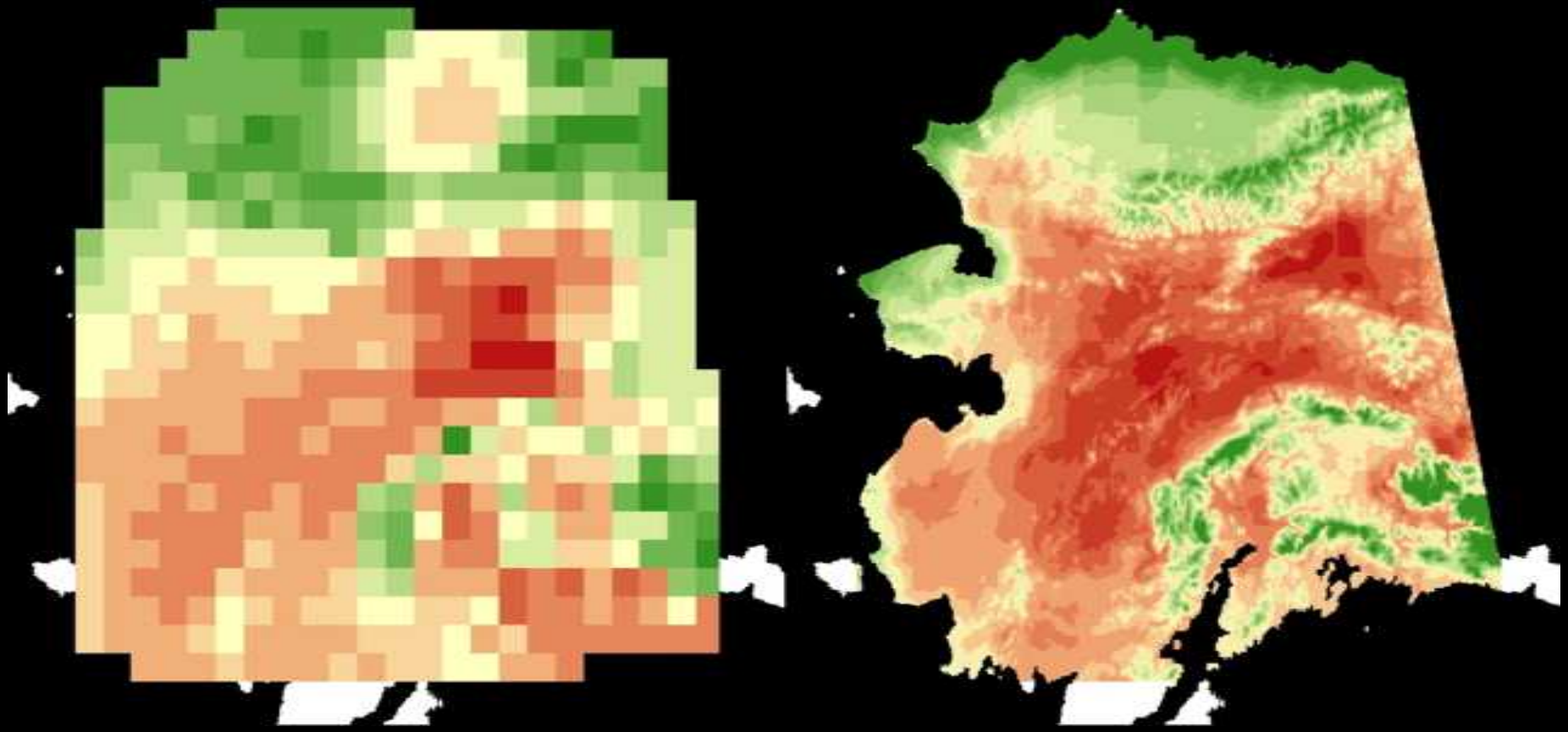
- A set of 15 models compared with data (1958-2000) for surface air temperature, sea level pressure, and precipitation

- Root-mean-square error (RMSE) evaluated over seasonal cycle to select the 5 best-performing models for Alaska, 60-90°N and 20-90°N

- First focused on A1B (intermediate) scenario, recently added B1 and A2

- Downscaled coarse-resolution GCM output to 2km

Overall Rank	Model	Alaska temperature	60-90° N temperature	20-90° N temperature	Alaska precipitation	60-90° N precipitation	20-90° N precipitation	Alaska sea level pressure	60-90° N sea level pressure	20-90° N sea level pressure	Integrated Rank Index
1	MPI ECHAM5	13	1	1	5	3	3	1	1	1	29
2	GFDL CM2.1	6	3	5	2	1	2	5	4	2	30
3	MIROC 3.2	2	4	3	7	6	8	10	3	5	48
4	UKMO HADCM3	11	8	6	3	2	9	4	6	7	56
5	CCCMA 3.1	12	11	10	4	8	2	8	2	4	61
6	GFDL CM2.0	6	9	14	1	10	6	4	8	4	62
7	MRI CGM2.3.2A	11	13	7	6	5	4	2	11	6	65
8	CNRM CM3	1	5	5	12	12	13	7	12	11	78
9	NCAR CCSM3	8	2	2	9	8	7	15	15	13	79
10	INMC 3.0	7	6	10	10	13	12	9	7	9	83
11	NCAR PCM1	14	13	14	8	5	10	6	5	12	87
12	CSIRO MK3.0	6	14	12	11	11	5	11	9	9	88
13	IPSL CM4	11	7	12	13	9	11	14	11	15	103
14	GISS E R	6	10	10	14	14	15	13	14	14	110
15	IAP_FGOALS1_0_G	15	15	15	15	15	14	12	13	10	124



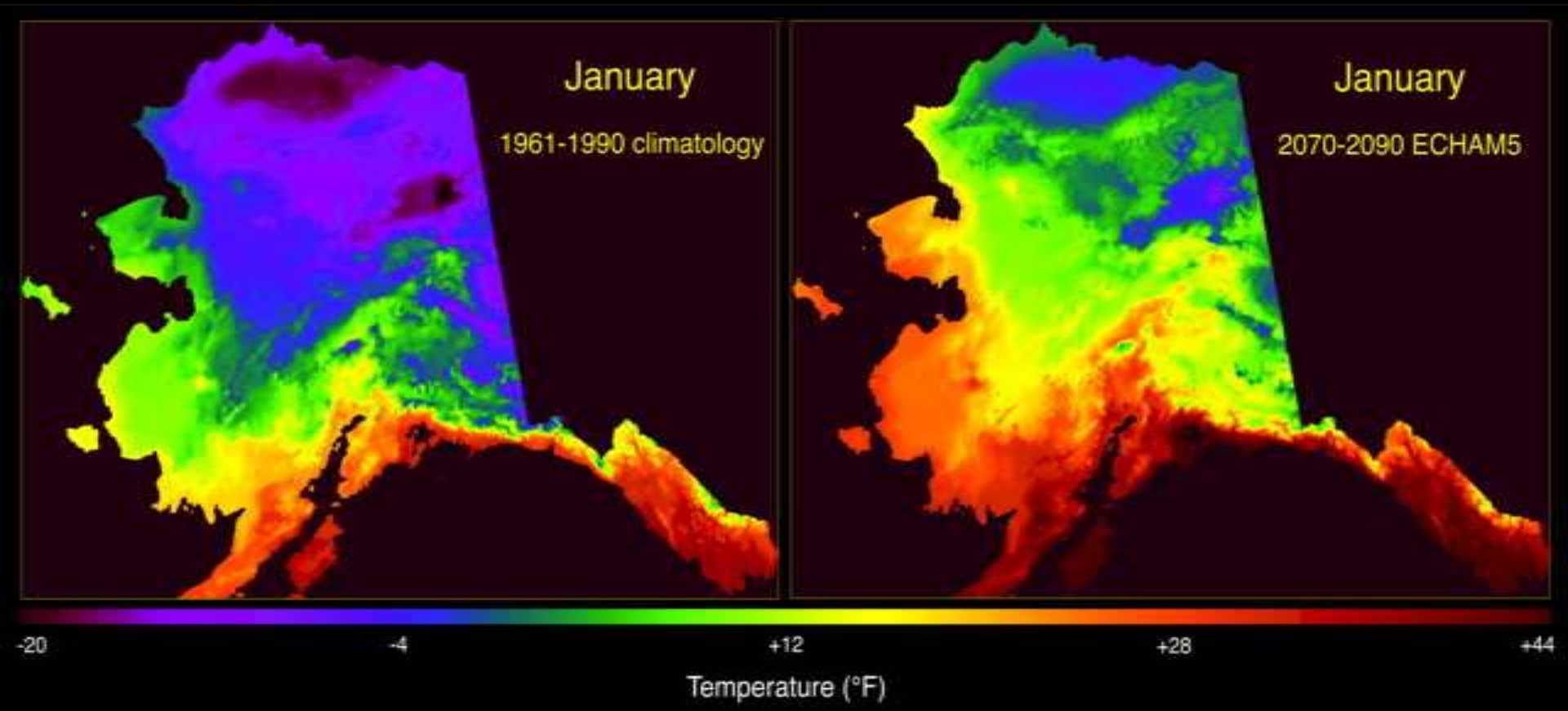
CRU – 0.5 x 0.5 degrees

Downscaled CRU – 2 x 2 km

January Temperatures

1961-1990 (PRISM climatology)

2070-2090 (ECHAM5)

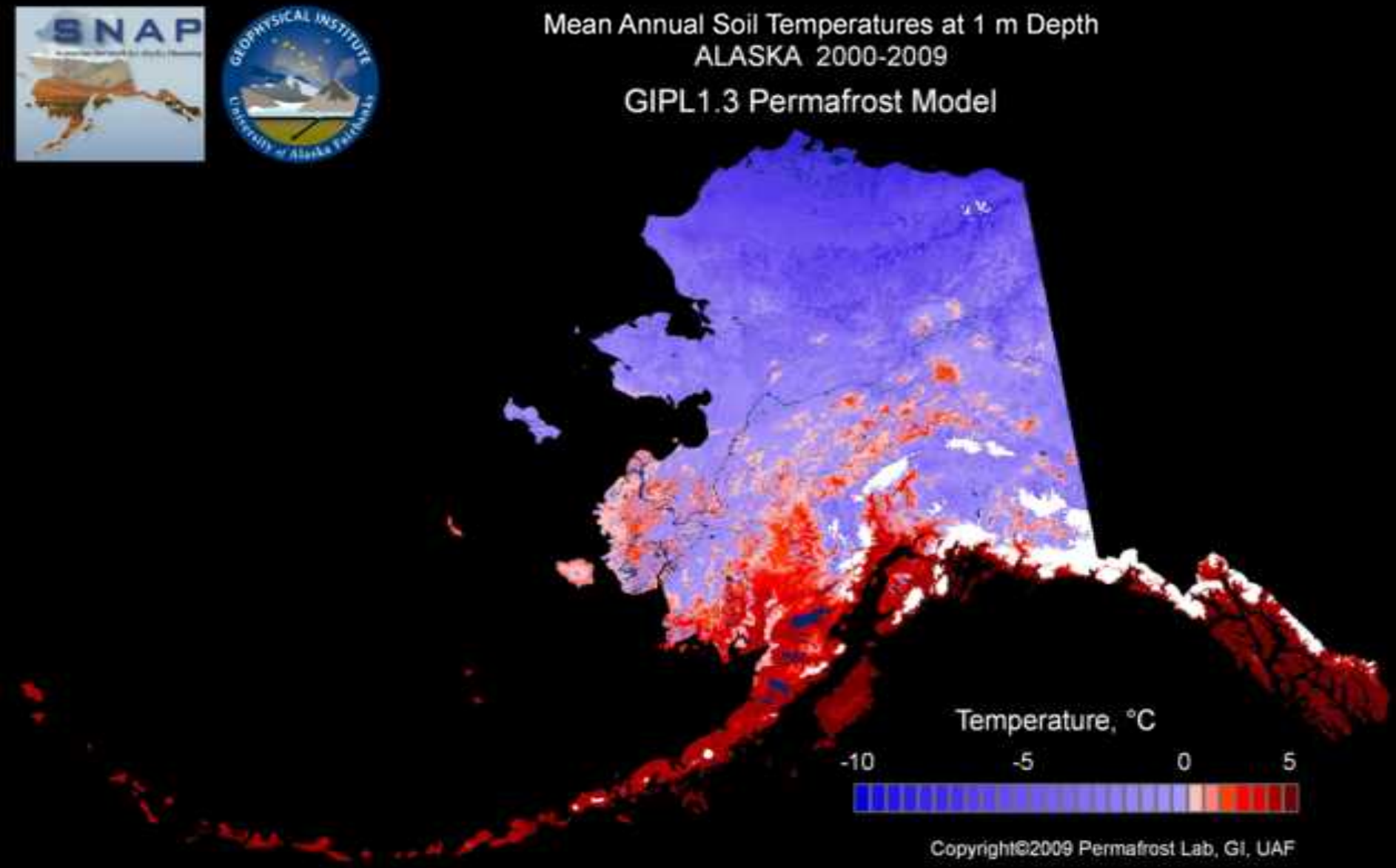


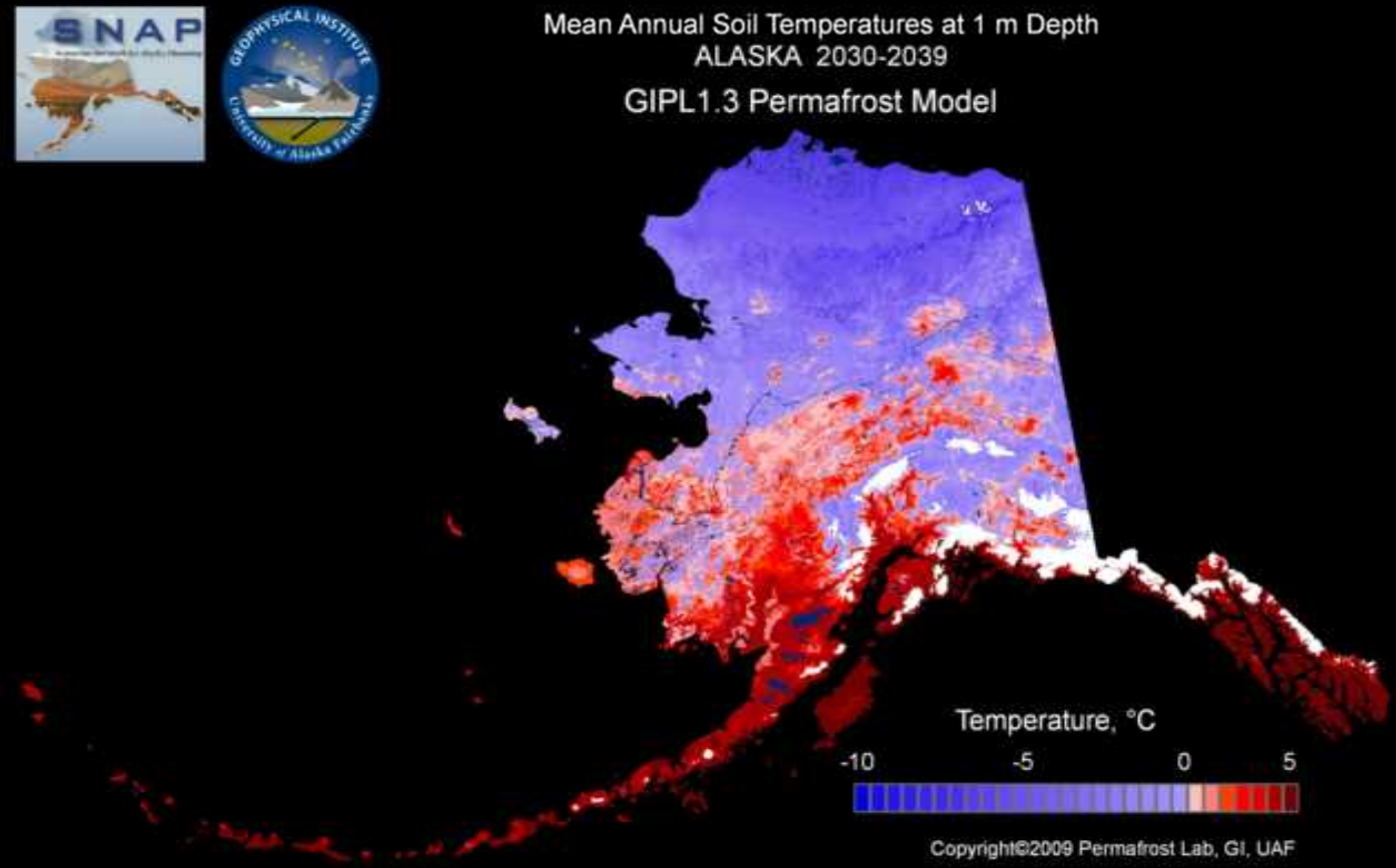
Sample of projections (A1B scenario): Fort Yukon temperatures by decade

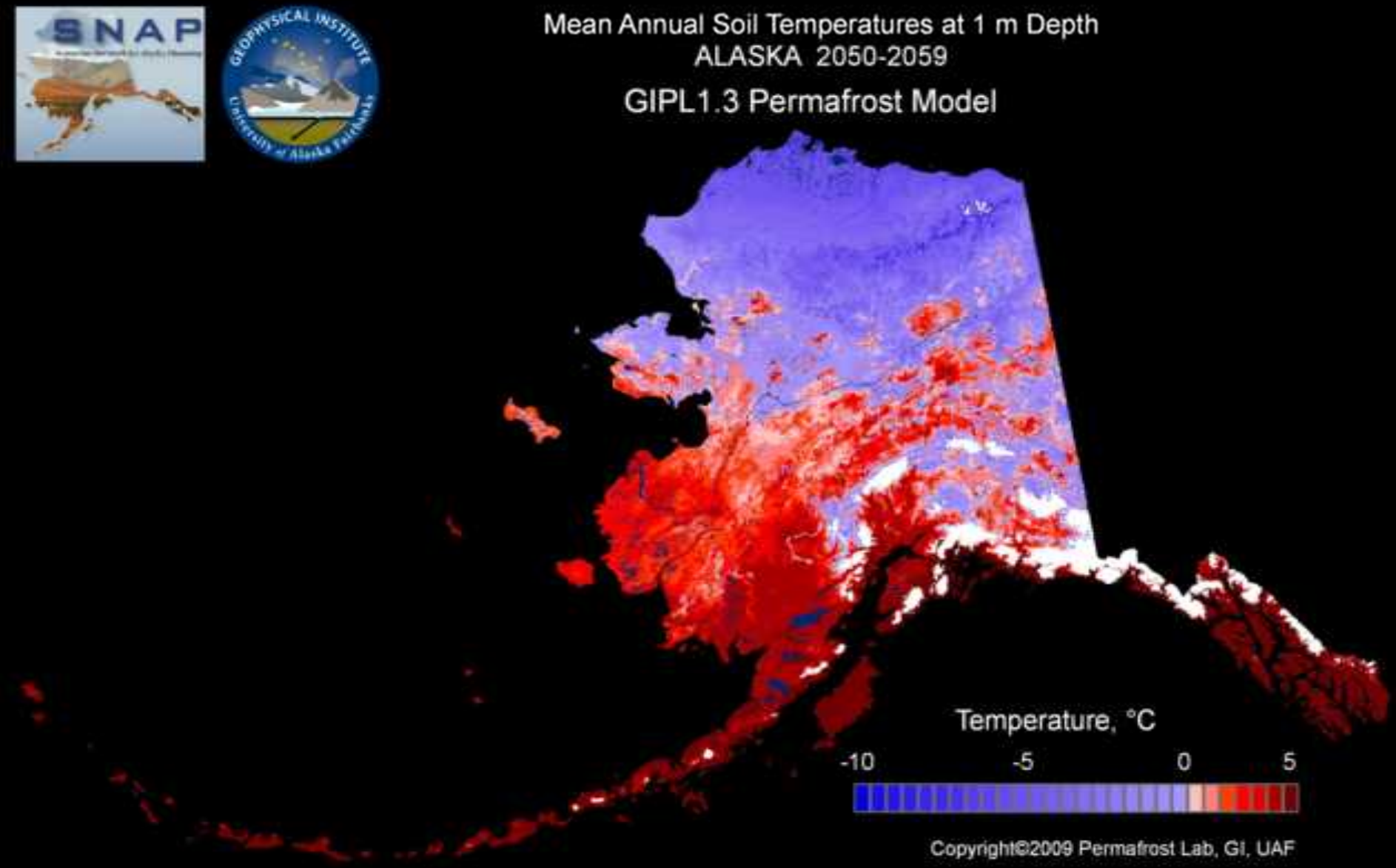
FORT-YUKON 66.5647 66.5681 214.7261 214.7170 0.520 KM

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1961-1990	-20.3 (0.0)	-15.0 (0.0)	0.6 (0.0)	21.5 (0.0)	45.0 (0.0)	60.3 (0.0)	63.2 (0.0)	56.5 (0.0)	41.3 (0.0)	19.0 (0.0)	-7.3 (0.0)	-18.0 (0.0)
1991-2000	-17.9 (3.5)	-13.7 (1.2)	4.9 (2.1)	23.6 (3.3)	46.2 (1.4)	61.1 (1.3)	63.8 (0.7)	58.1 (0.4)	42.1 (1.1)	19.8 (0.9)	-5.2 (1.8)	-16.6 (2.8)
2001-2010	-16.4 (3.2)	-11.2 (3.7)	4.0 (1.6)	24.5 (2.1)	47.3 (1.9)	60.7 (1.3)	64.8 (1.7)	58.2 (1.0)	42.3 (1.0)	21.0 (1.7)	-4.2 (1.5)	-16.8 (2.3)
2011-2020	-16.0 (3.3)	-11.6 (2.3)	3.8 (4.0)	24.1 (2.1)	46.6 (0.9)	62.1 (1.3)	63.3 (1.5)	58.0 (1.1)	43.1 (1.0)	20.3 (2.1)	-4.6 (1.3)	-15.4 (2.0)
2021-2030	-12.9 (5.4)	-7.2 (3.6)	6.0 (2.3)	25.0 (3.2)	46.8 (0.6)	61.7 (1.5)	63.8 (1.7)	58.7 (1.8)	42.5 (1.1)	21.7 (2.4)	-3.9 (1.8)	-13.4 (2.9)
2031-2040	-13.3 (1.5)	-9.2 (4.5)	5.8 (4.1)	25.9 (2.6)	47.5 (1.5)	62.3 (1.3)	65.1 (2.5)	59.3 (2.0)	43.4 (1.4)	23.5 (2.4)	-0.1 (1.7)	-12.9 (2.4)
2041-2050	-10.9 (3.5)	-6.8 (3.7)	11.1 (3.2)	25.6 (3.0)	48.8 (2.1)	63.0 (1.9)	66.0 (1.7)	60.1 (1.5)	45.5 (2.1)	26.0 (2.0)	2.3 (1.5)	-9.3 (2.8)
2051-2060	-10.9 (4.3)	-4.5 (6.4)	7.5 (2.4)	27.2 (3.2)	48.4 (0.8)	63.8 (1.8)	66.5 (1.7)	60.5 (2.0)	45.1 (1.7)	25.4 (1.4)	1.8 (1.0)	-7.1 (2.1)
2061-2070	-6.8 (2.0)	-3.8 (3.6)	10.4 (4.2)	29.3 (3.1)	50.9 (2.5)	64.4 (3.4)	67.3 (3.1)	61.5 (2.3)	46.2 (2.4)	27.3 (2.1)	5.2 (3.1)	-6.0 (4.6)
2071-2080	- 6.4 (1.9)	-3.4 (3.9)	10.8 (2.0)	29.3 (3.8)	51.3 (3.0)	64.3 (3.6)	67.7 (3.2)	62.7 (2.4)	46.9 (1.7)	27.8 (2.7)	5.3 (3.7)	-4.3 (3.9)
2081-2090	-3.8 (1.6)	-0.6 (3.3)	11.4 (3.6)	30.4 (3.6)	51.5 (2.3)	65.4 (3.5)	68.3 (2.2)	63.2 (2.6)	46.8 (1.7)	29.0 (1.2)	7.2 (2.6)	-2.7 (3.8)
2091-2100	-5.0 (2.9)	-1.6 (3.7)	13.4 (3.1)	31.5 (3.5)	52.7 (2.3)	65.2 (3.5)	69.0 (4.4)	63.4 (3.4)	48.4 (2.1)	28.9 (2.4)	7.1 (2.2)	-0.1 (3.0)

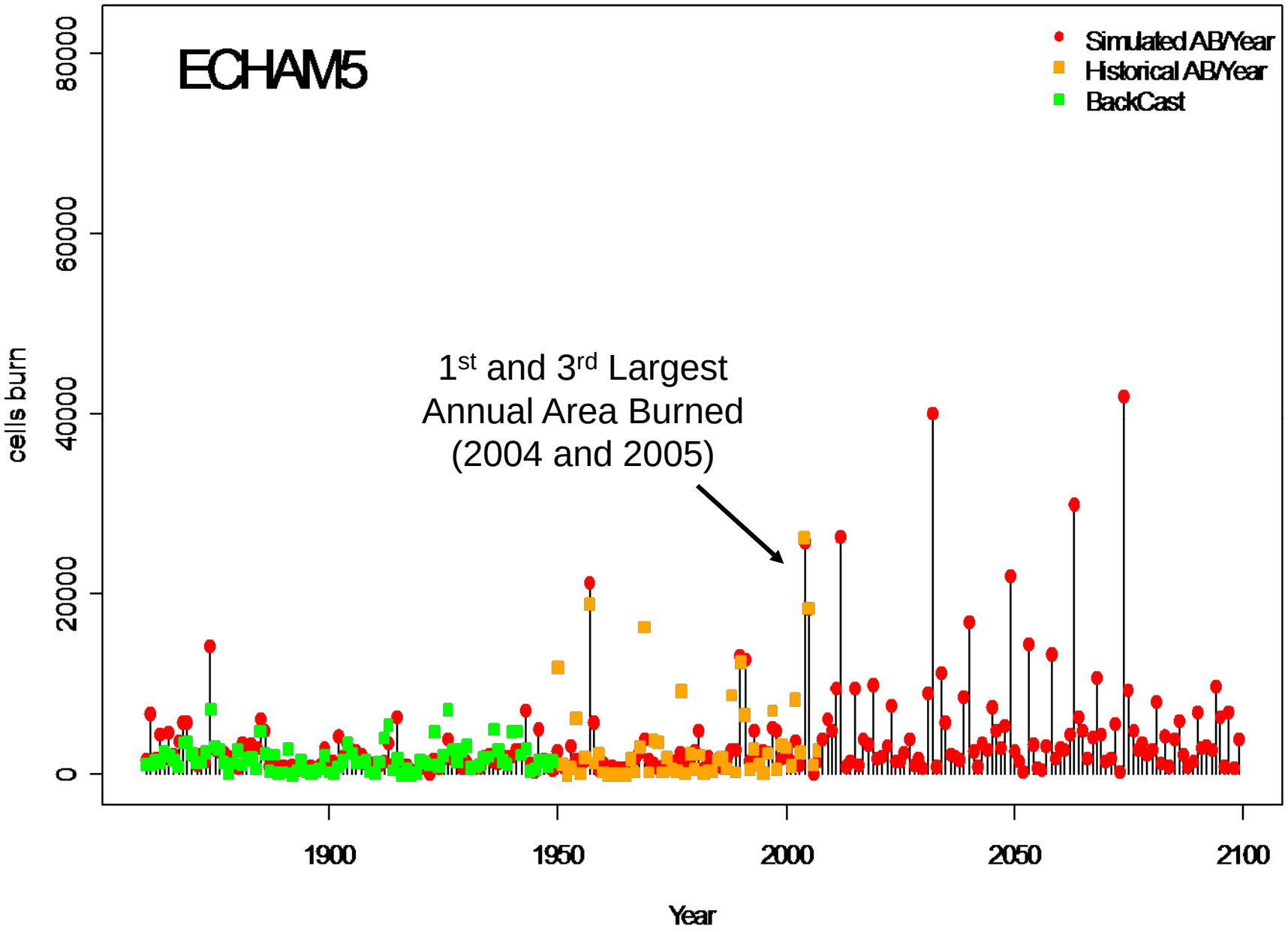
Projected date at which mean temperatures cross the freezing point in spring


SNAP
GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks
Mean Annual Soil Temperatures at 1 m Depth
ALASKA 2000-2009
GIPL1.3 Permafrost Model
Temperature, °C
-10
-5
0
5
Copyright©2009 Permafrost Lab, GI, UAF


SNAP
GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks
Mean Annual Soil Temperatures at 1 m Depth
ALASKA 2030-2039
GIPL1.3 Permafrost Model
Temperature, °C
-10
-5
0
5
Copyright©2009 Permafrost Lab, GI, UAF


SNAP
GEOPHYSICAL INSTITUTE
University of Alaska Fairbanks
Mean Annual Soil Temperatures at 1 m Depth
ALASKA 2050-2059
GIPL1.3 Permafrost Model
Temperature, °C
-10
-5
0
5
Copyright©2009 Permafrost Lab, GI, UAF

Simulated Annual Area Burned

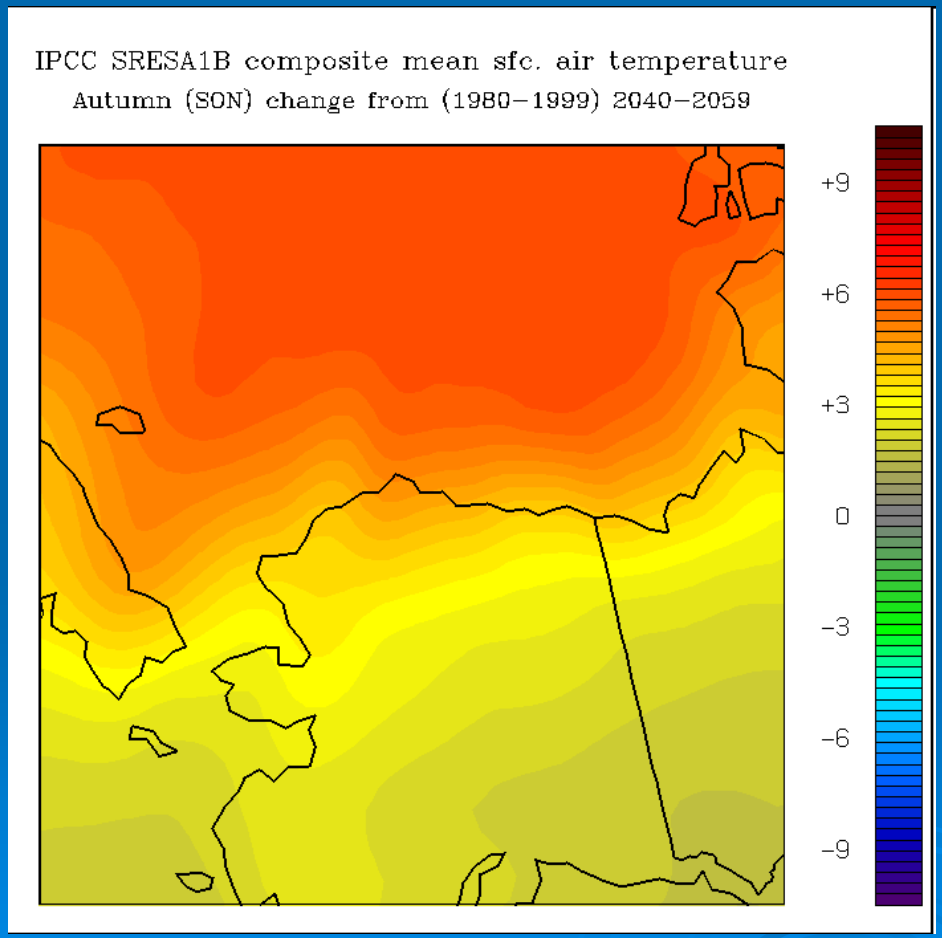


Future directions

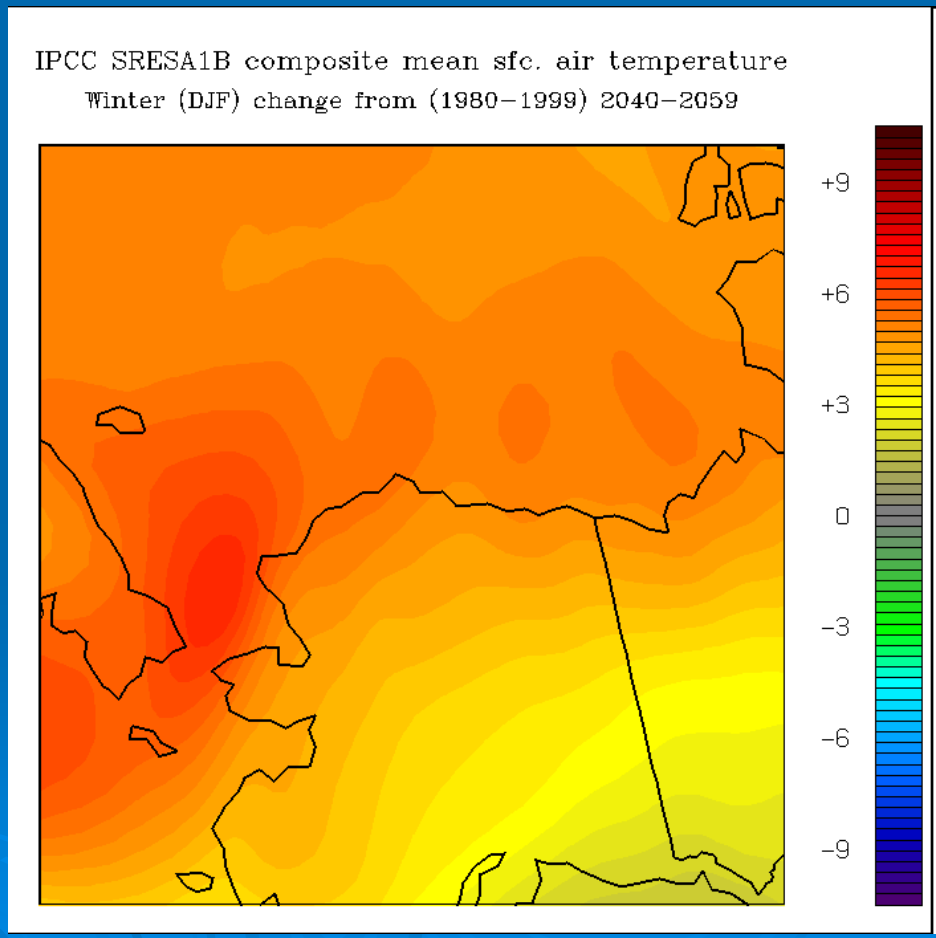
- Geographical expansion (offshore, Canada)
- Variables of greater stakeholder relevance
  -- snow, soil moisture, ground firmness,…
- Downscaling of sea ice
- Winds, storminess

Projected change of surface air temperature (°C), 2040-2059

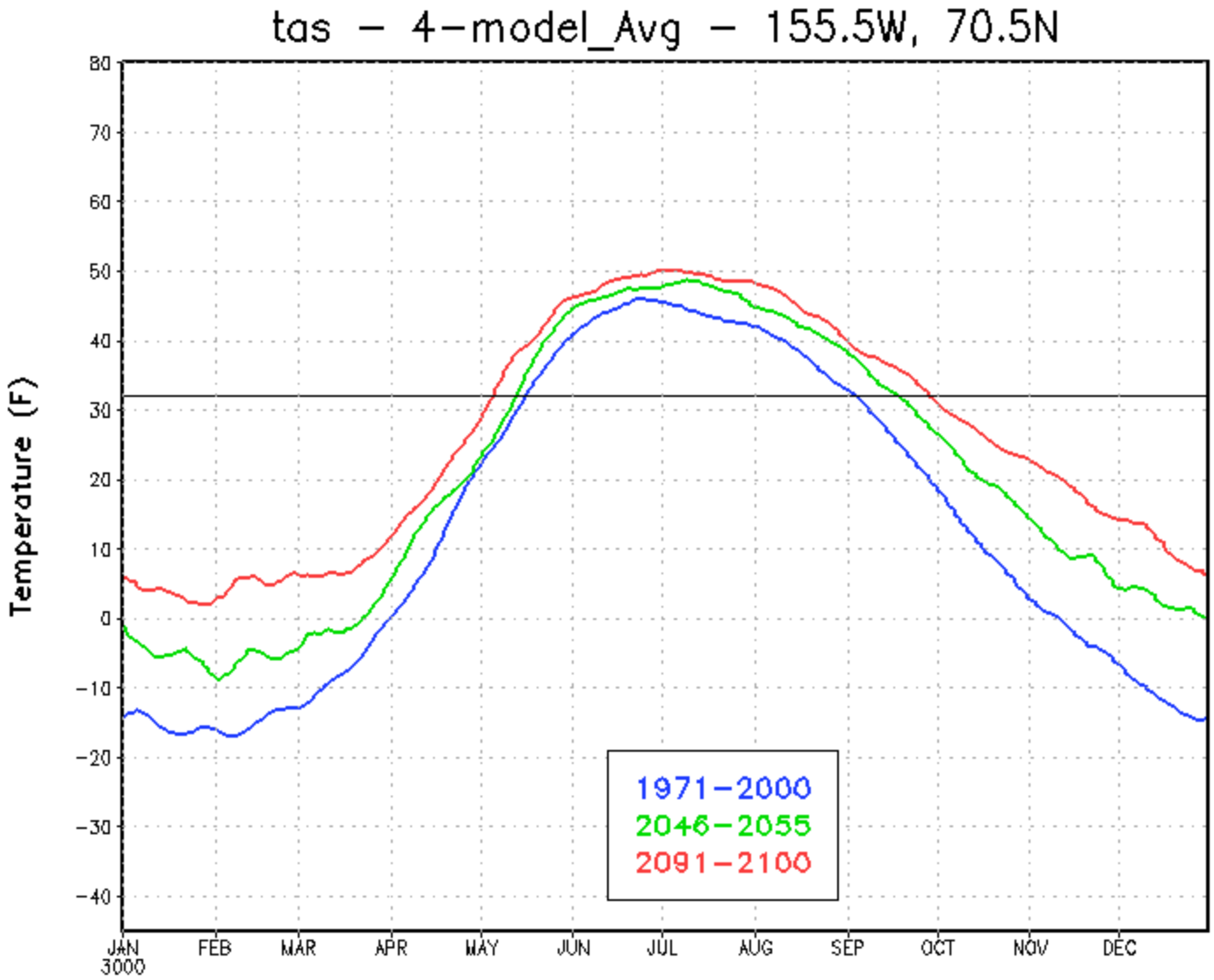
autumn (SON)



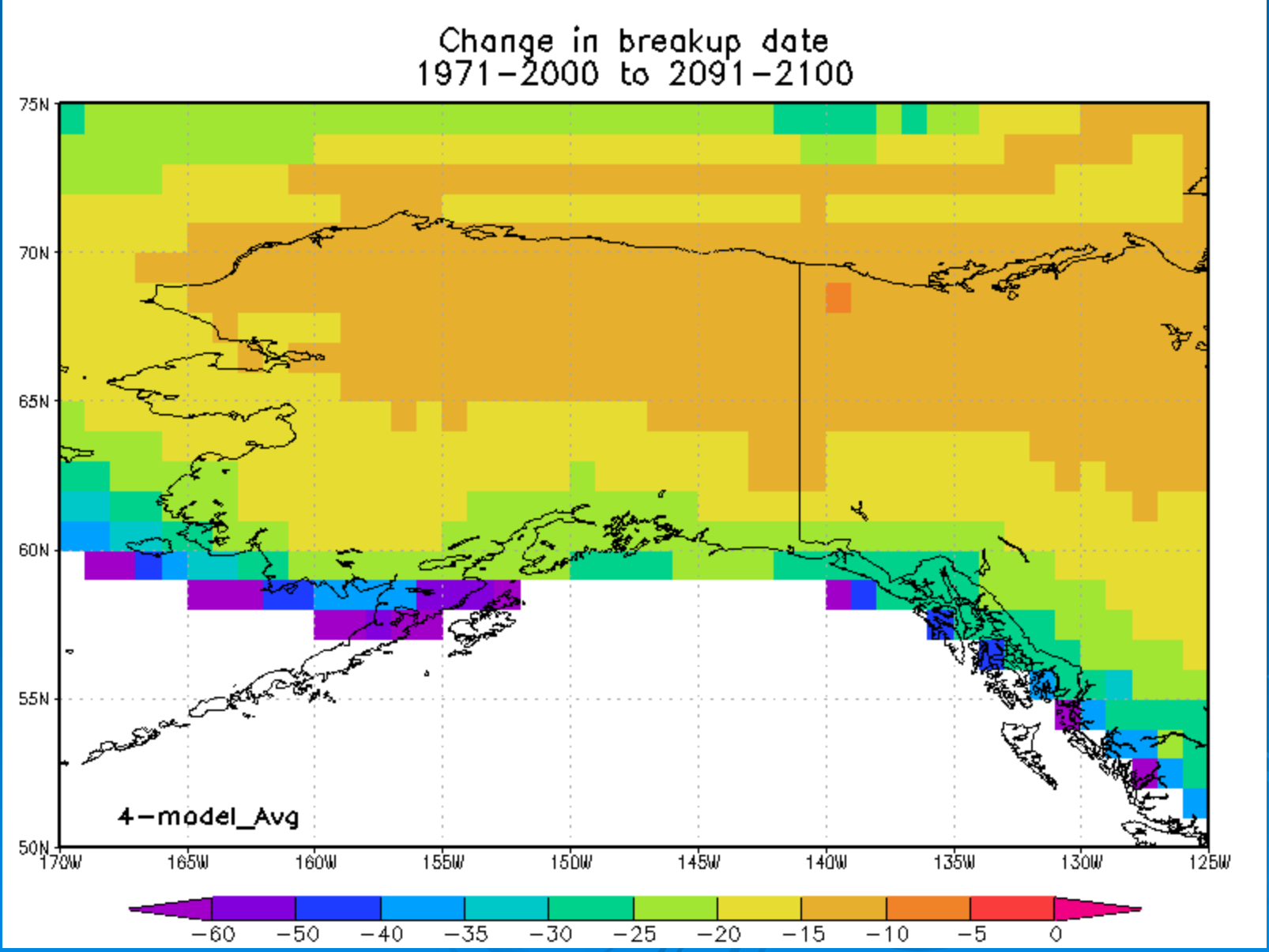
winter (DJF)



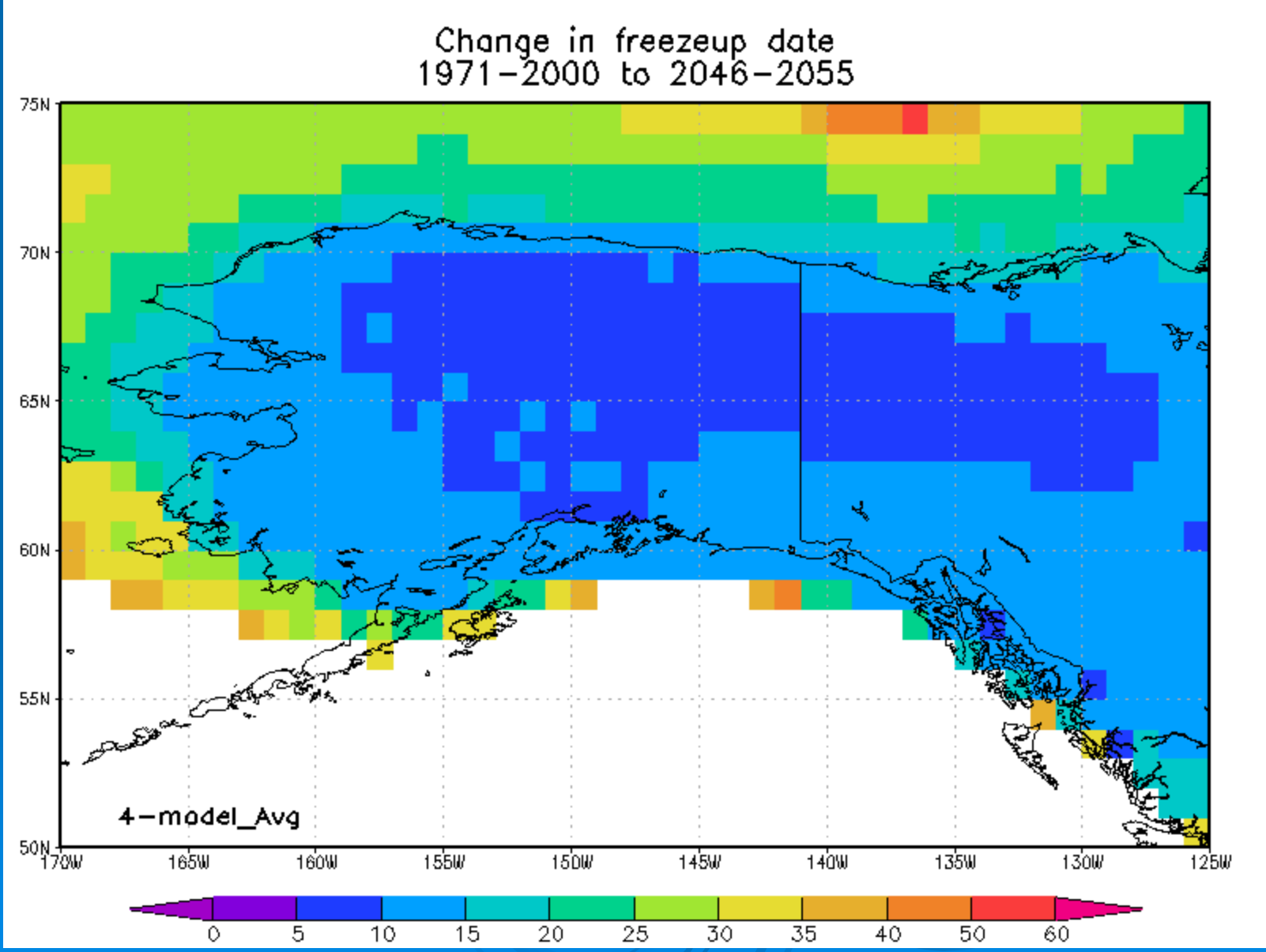
Mean seasonal cycle of surface air temperature (Barrow)



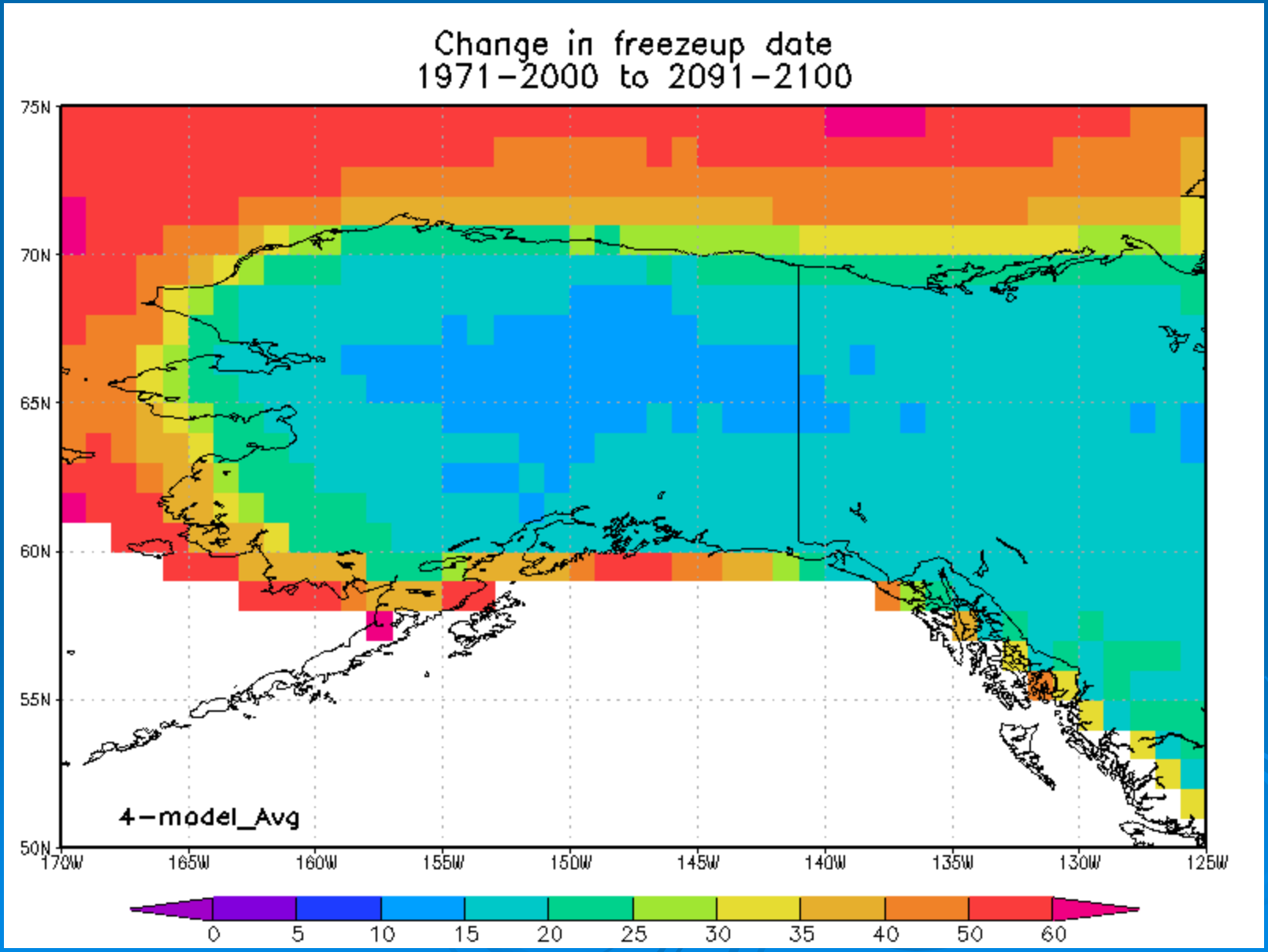
IPCC model projections of change in thaw date by 2091-2100



IPCC model projections of change in freeze-up by 2046-2055



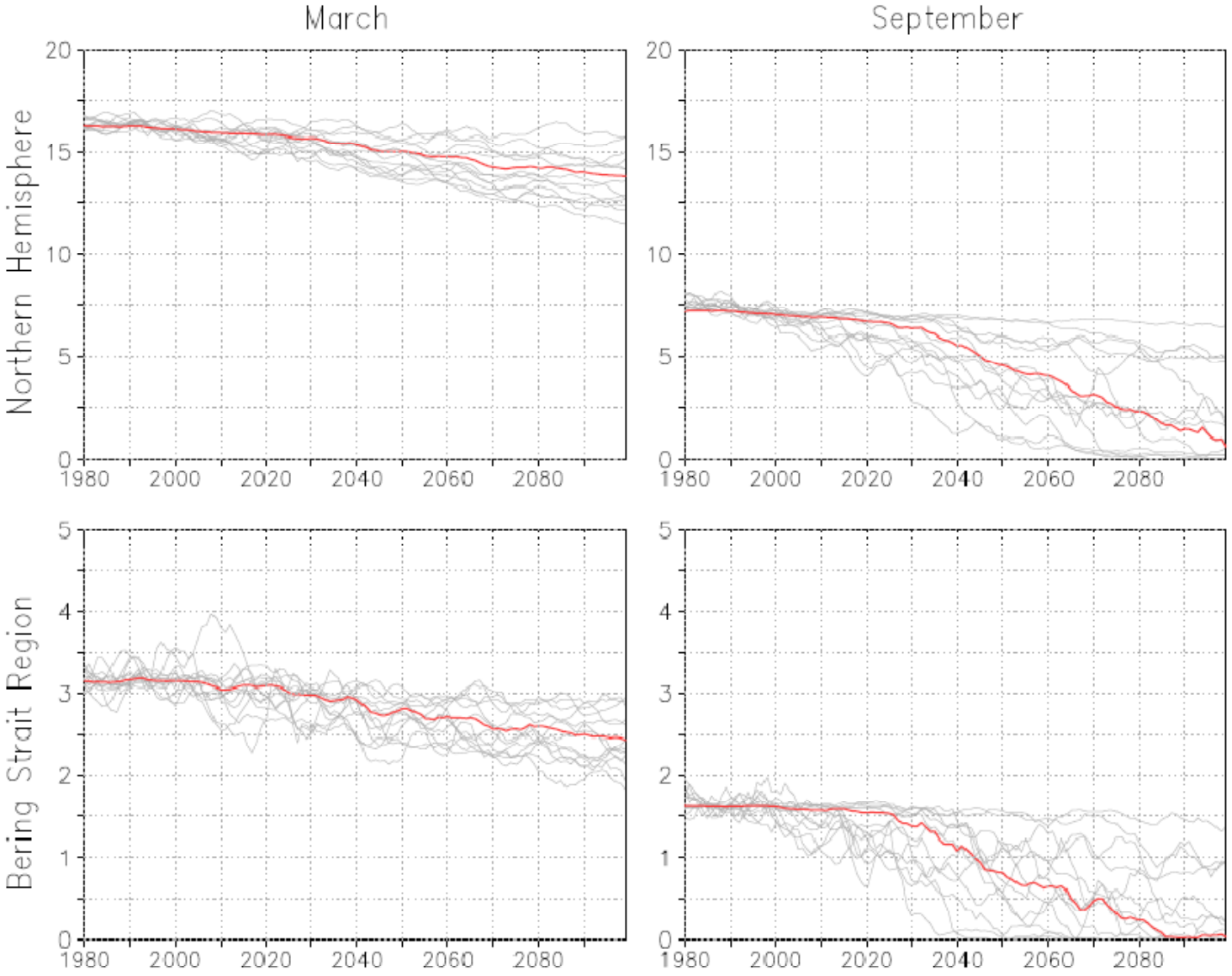
IPCC model projections of change in freeze-up by 2091-2100



Northern Hemisphere

Ice Extent

Bering/ Chukchi/ Beaufort Sector

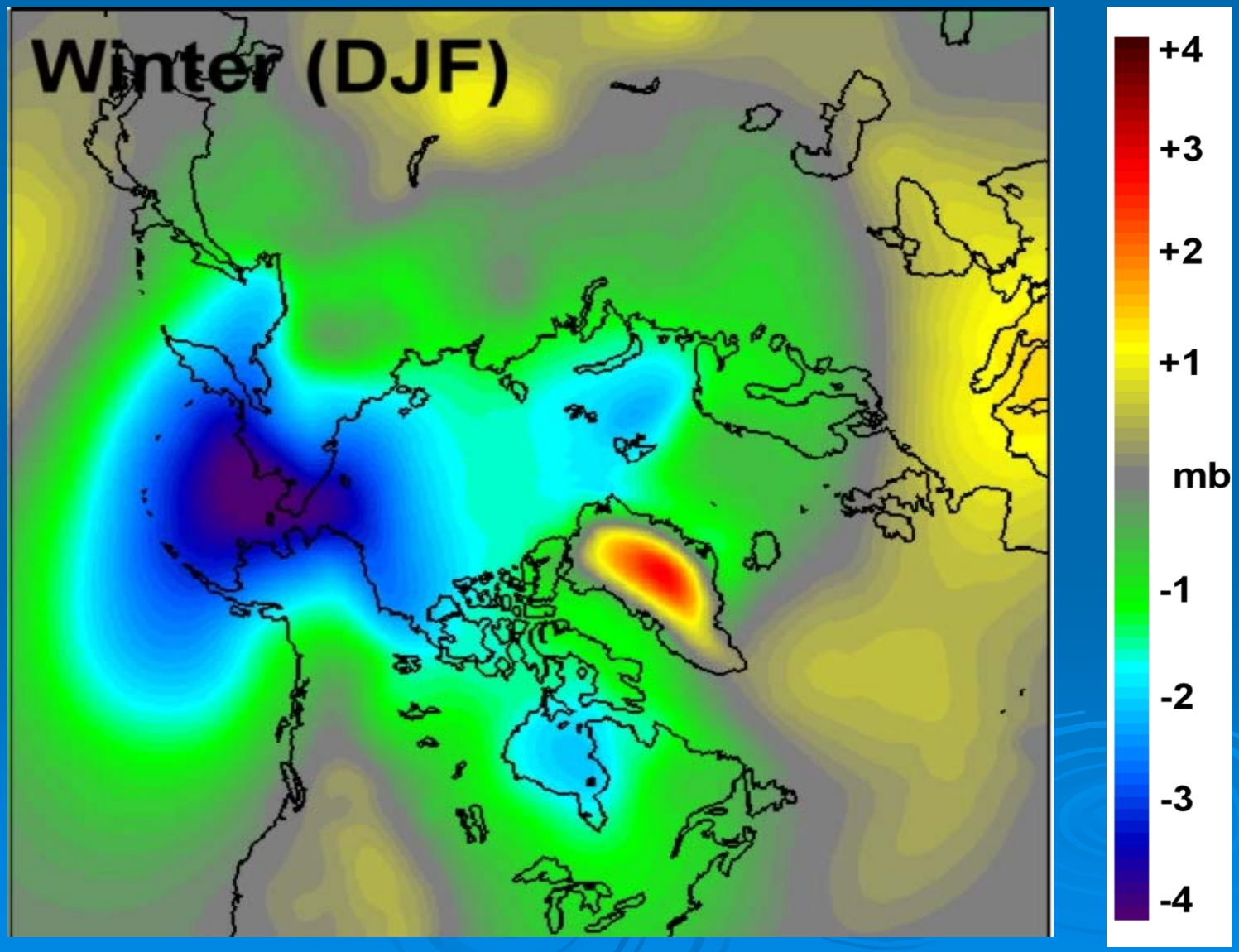


Future directions

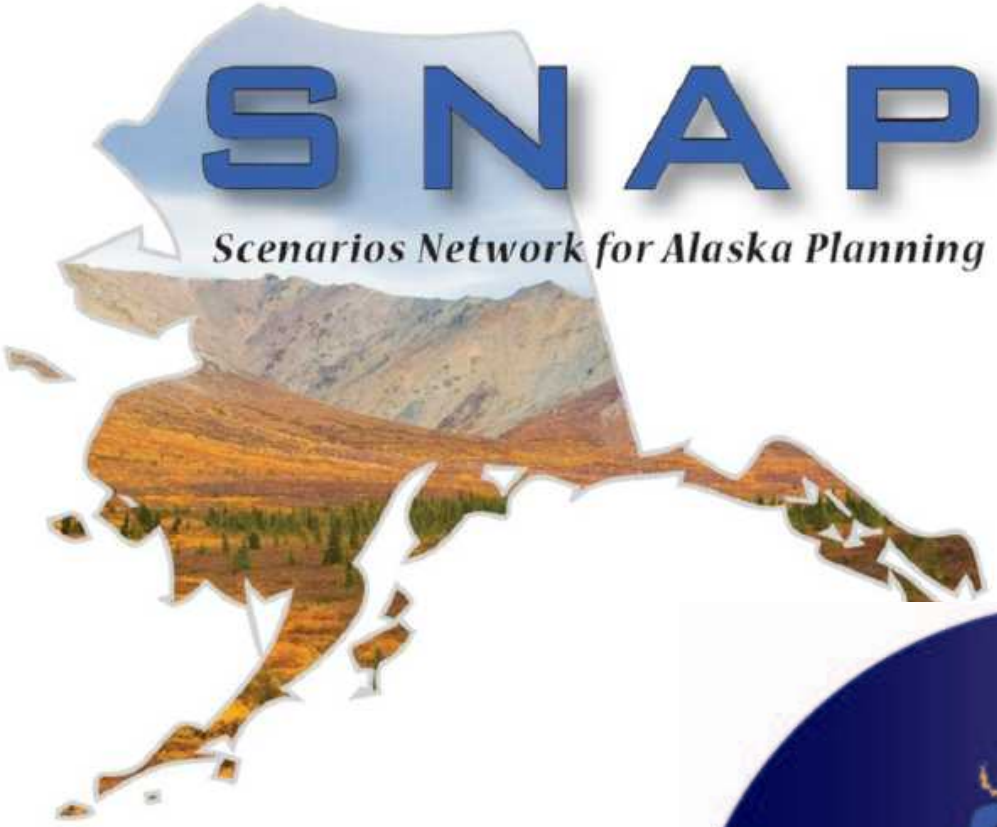
- Geographical expansion (offshore, Canada)
- Variables of greater stakeholder relevance
  -- snow, soil moisture, ground firmness,…
- Downscaling of sea ice
- Winds, storminess

Coastal erosion in Alaska

Projected change in winter sea level pressure: 2070-2090
lower pressure ⇒ more storms? Plausible




Temperature (°C)
30
20
10
0
-10
-20
-30
Jun 2009
Winter 2000 - 2009
SNAP
Image NASA
Image © 2008 TerraMetrics
Google
Eye alt 11501.56 mi


SNAP
Scenarios Network for Alaska Planning


SNAP
Scenarios Network for Arctic Planning

Home | SNAP: Scenarios Network for Alaska Planning - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.snap.uaf.edu/

Most Visited Getting Started Latest Headlines

SNAP

Scenarios Network for Alaska Planning

Spotlight

SNAP Maps Now Available in Google Earth

Selected SNAP statewide climate maps are now available in Google Earth format. Google Earth – which is available for free download from http://earth.google.com/ – allows for quick and easy interactive access to high-resolution... read more »

Objective data for people who make policy, management, and economic decisions

communities • transportation • coastlines • forests • resources • infrastructure

- Home
- SNAP Overview
- SNAP In-Depth
- News Archive
- Contact Info

SNAP Projects

Governor's Climate Change Subcabinet
- Browse by Topic
- Browse by Region

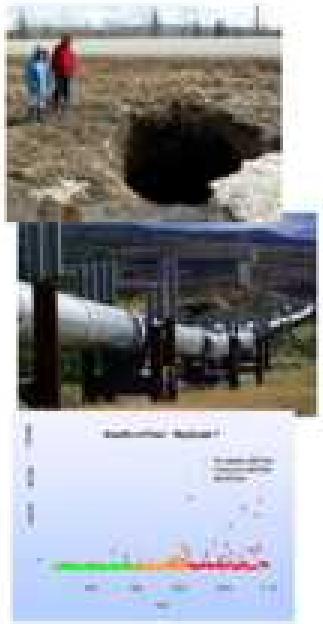
Maps, Graphs & Data

Google Earth Maps
- Browse by Topic
- Browse by Region
- Browse by Format

Partners & Affiliations

Welcome to SNAP, the Scenarios Network for Alaska Planning. We are a collaborative organization linking the University of Alaska, state, federal, and local agencies, and NGOs.

Our mission is to provide timely access to management-relevant scenarios of future conditions in Alaska.



Quick Links

- Climate change projections in Google Earth format
- SNAP fact sheets and documents
- Governor's Subcabinet on Climate Change

News Highlights

- SNAP Maps Now Available in Google Earth
- Climate data available for download
- Ongoing Project: Landscape Connectivity
- ALFRESCO downloads now available

News Archive »

Site Last Modified 10/7/2008