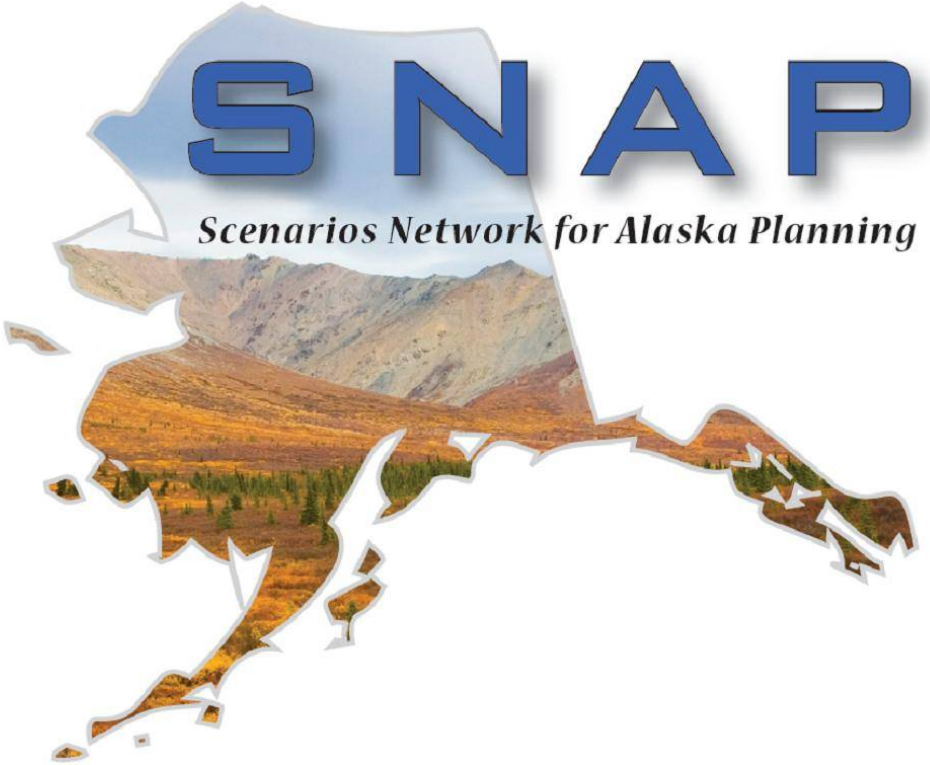
SNAP

Scenarios Network for Alaska Planning



Scott Rupp

Network Director

UNIVERSITY of ALASKA

Many Traditions One Alaska

UNIVERSITY OF ALASKA GEOGRAPHY PROGRAM

UAGP

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What is SNAP?

SNAP 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.

Primary Products

1. Projections of future conditions that are linked to present and past conditions

2. Objective interpretations of scenarios

3. Detailed explanations of the rules and models that describe controls over projected changes including metadata that clearly describe the methods and assumptions underlying the projections

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

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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

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SNAP Projects

Governor's Climate Change Subcabinet

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Maps, Graphs & Data

Google Earth Maps

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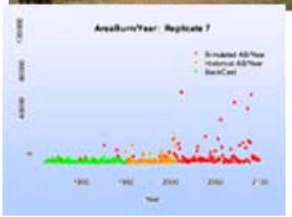
Partners & Affiliations

Home

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

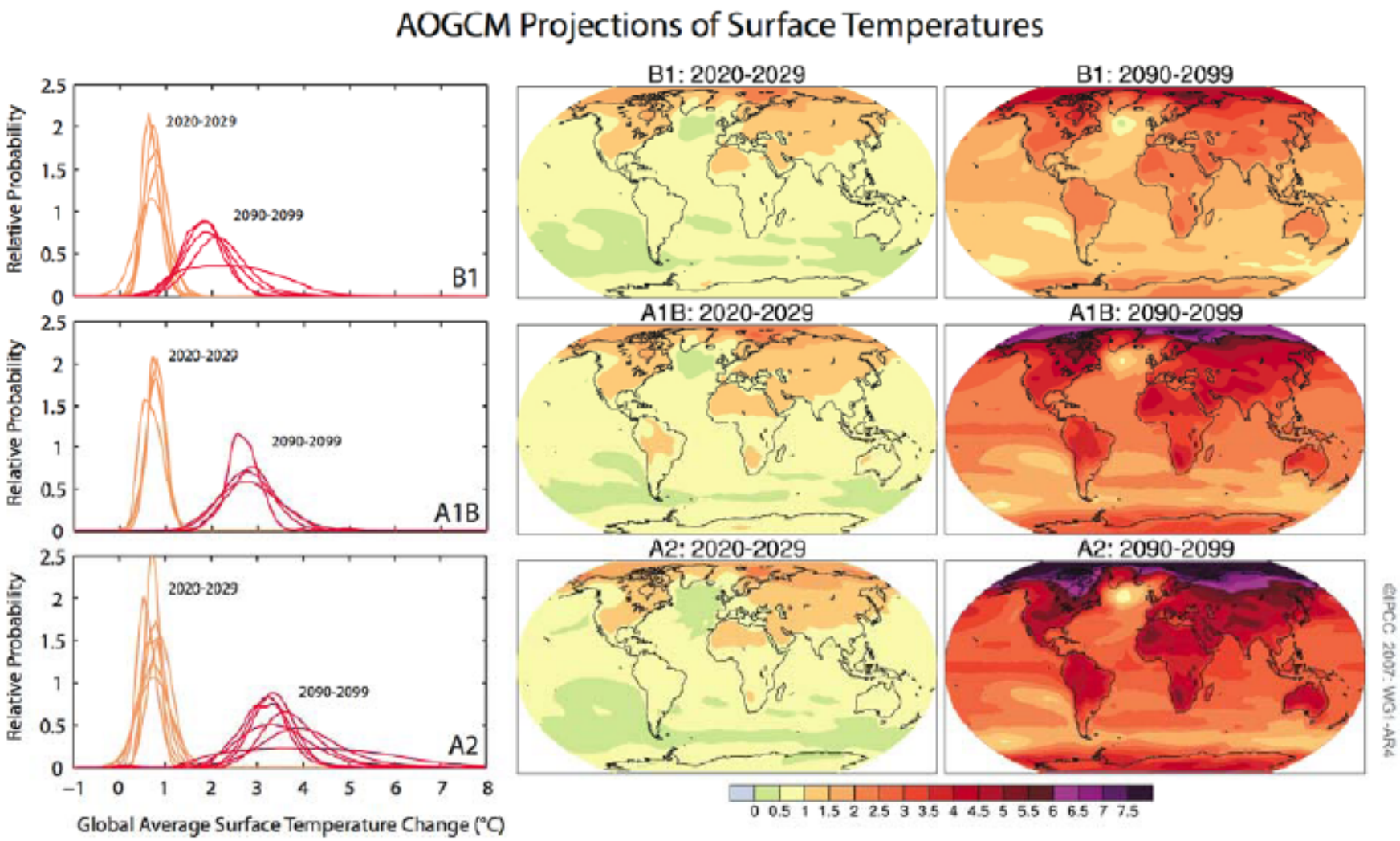
News Highlights

- 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

Supporting Climate Products



IPCC 2007

Projections based on IPCC models

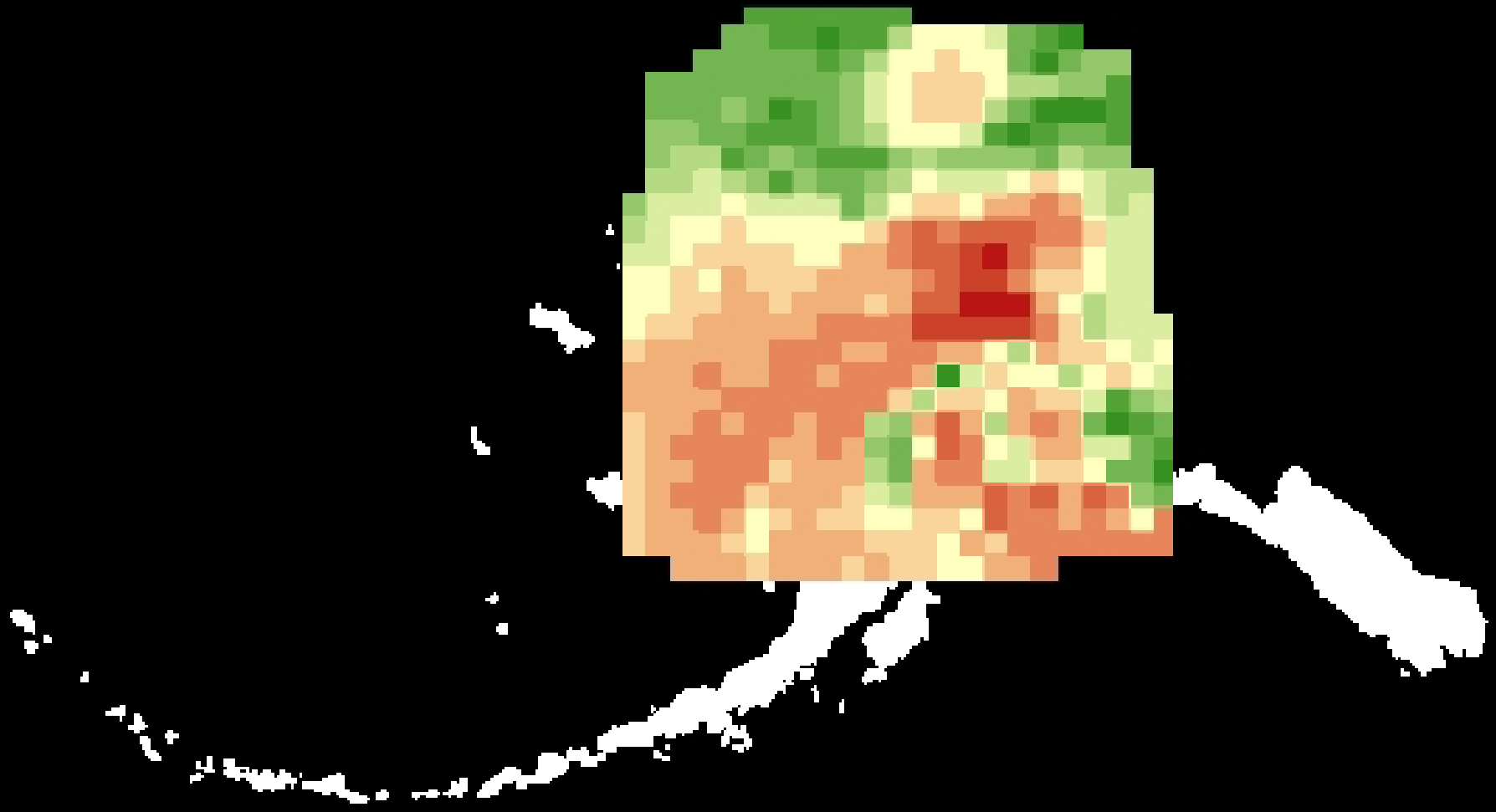
- Calculated concurrence of 15 models with data for 1958-2000 for surface air temperature, air pressure at sea level, and precipitation
- Used root-mean-square error (RMSE) evaluation to select the 5 models that performed best for Alaska, 60-90°N, and 20-90°N latitude.
- First focused on A1B (intermediate) scenario, now added B1 and A2
- Downscaled course resolution GCM data 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

Chapman et al. 2008

Downscaling IPCC Climate Projections: *Rationale*

- GCM models provide only large-scale output, with grid cells of 1°-2° lat and long or more
- Local topography can have profound effects on climate at much finer scales
- Almost all land management decisions are made at much finer scales
- Finer scale projections of future conditions are not available



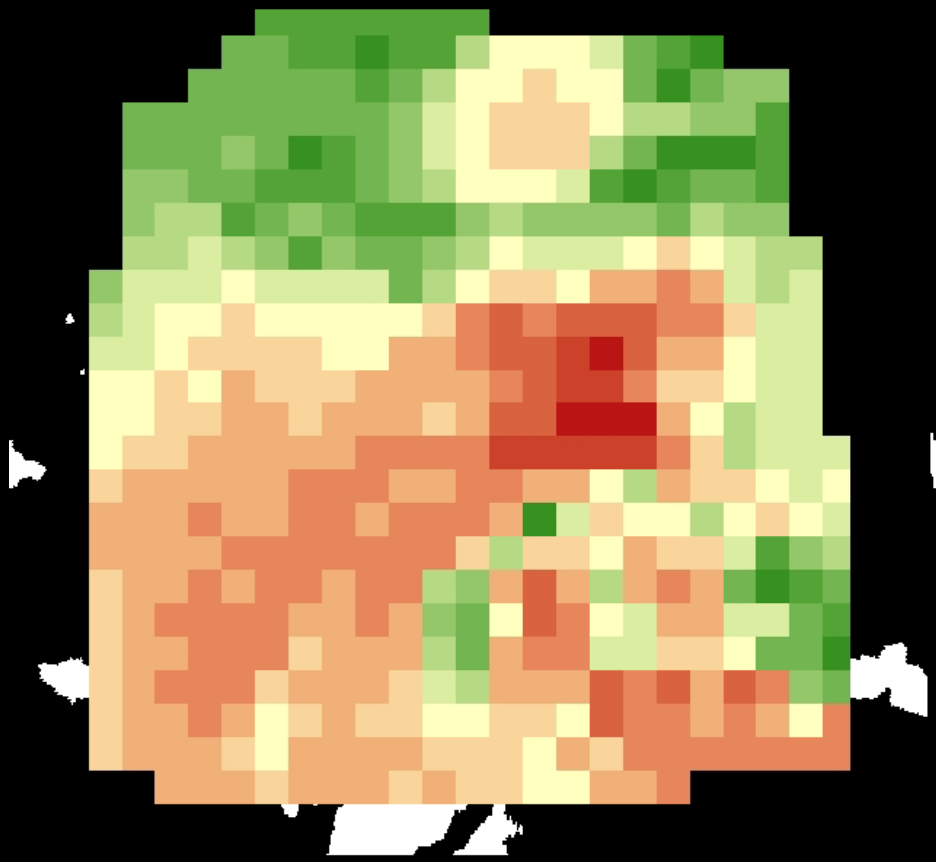
Climate Research Unit (CRU) Historical Observations – 0.5 x 0.5 degrees

Downscaling IPPC Climate Projections: *PRISM*

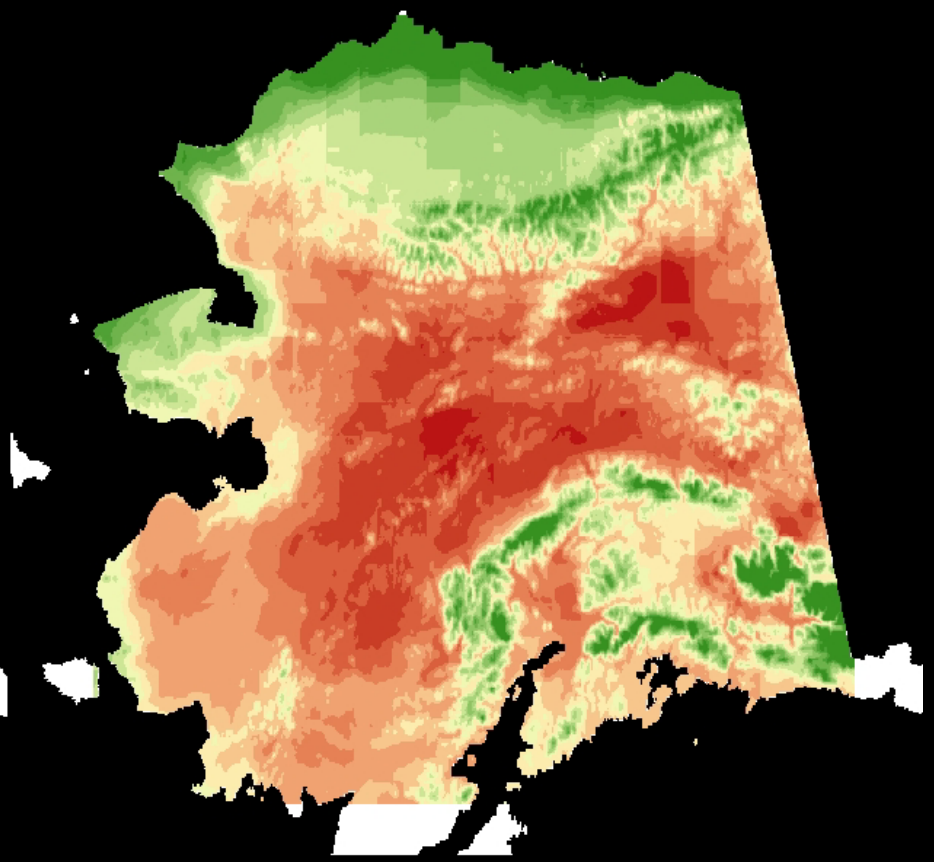
- Historical climate data estimates at 2km resolution are available from PRISM (Parameter-elevation Regressions on Independent Slopes Model)
- PRISM uses point measurements of climate data and a digital elevation model to generate estimates of annual, monthly and event-based climatic elements.
- Each grid cell is estimated via multiple regression using data from many nearby climate stations. Stations are weighted based on distance, elevation, vertical layer, topographic facet, and coastal proximity.
- Originally developed to address the lack of climate observations in mountainous regions or rural areas.

Downscaling IPPC Climate Projections: *Linking PRISM to GCM Projections*

- Calculated mean monthly precipitation and mean monthly surface air temperature for PRISM grid cells for 1961-1990, creating PRISM baseline values
- Calculated GCM baseline values for each of the five selected models using mean monthly outputs for 1961-1990
- Calculated differences between projected GCM values and baseline GCM values for each year out to 2099
- Created “anomaly grids” representing these differences
- Added these anomaly grids to PRISM baseline values.
- This method removed model biases while scaling down data



CRU – 0.5 x 0.5 degrees

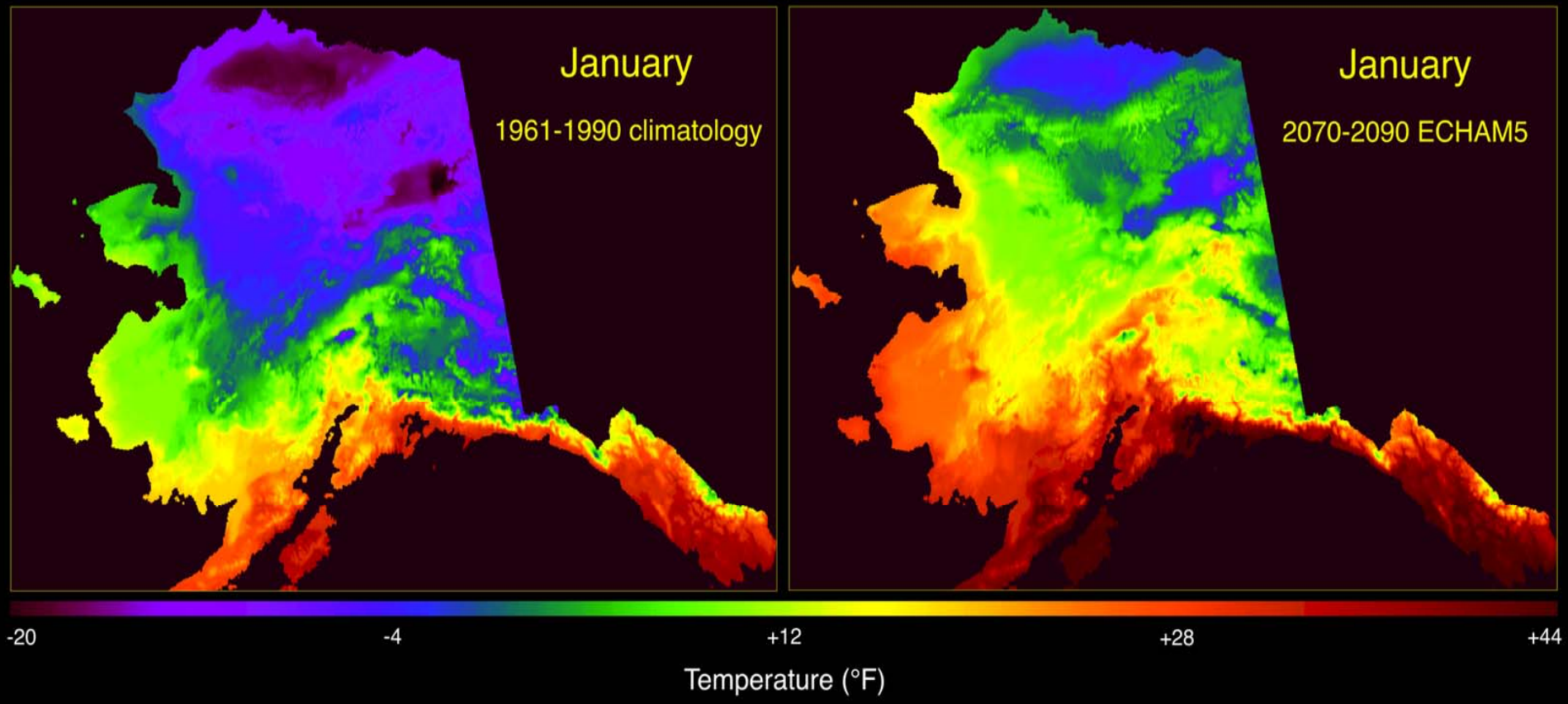


Downscaled CRU – 2 x 2 km

January Temperatures

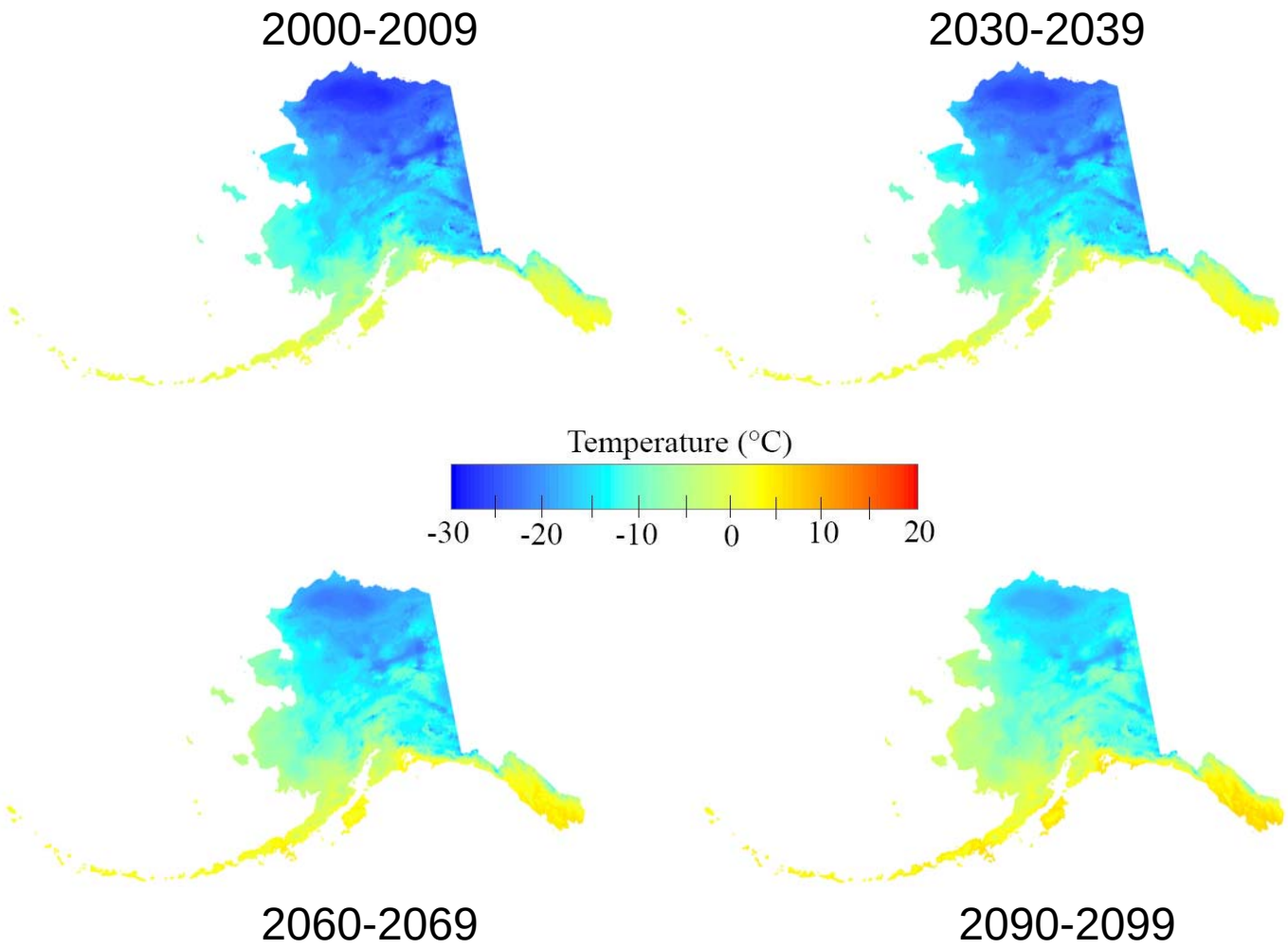
1961-1990 (PRISM climatology)

2070-2090 (ECHAM5)

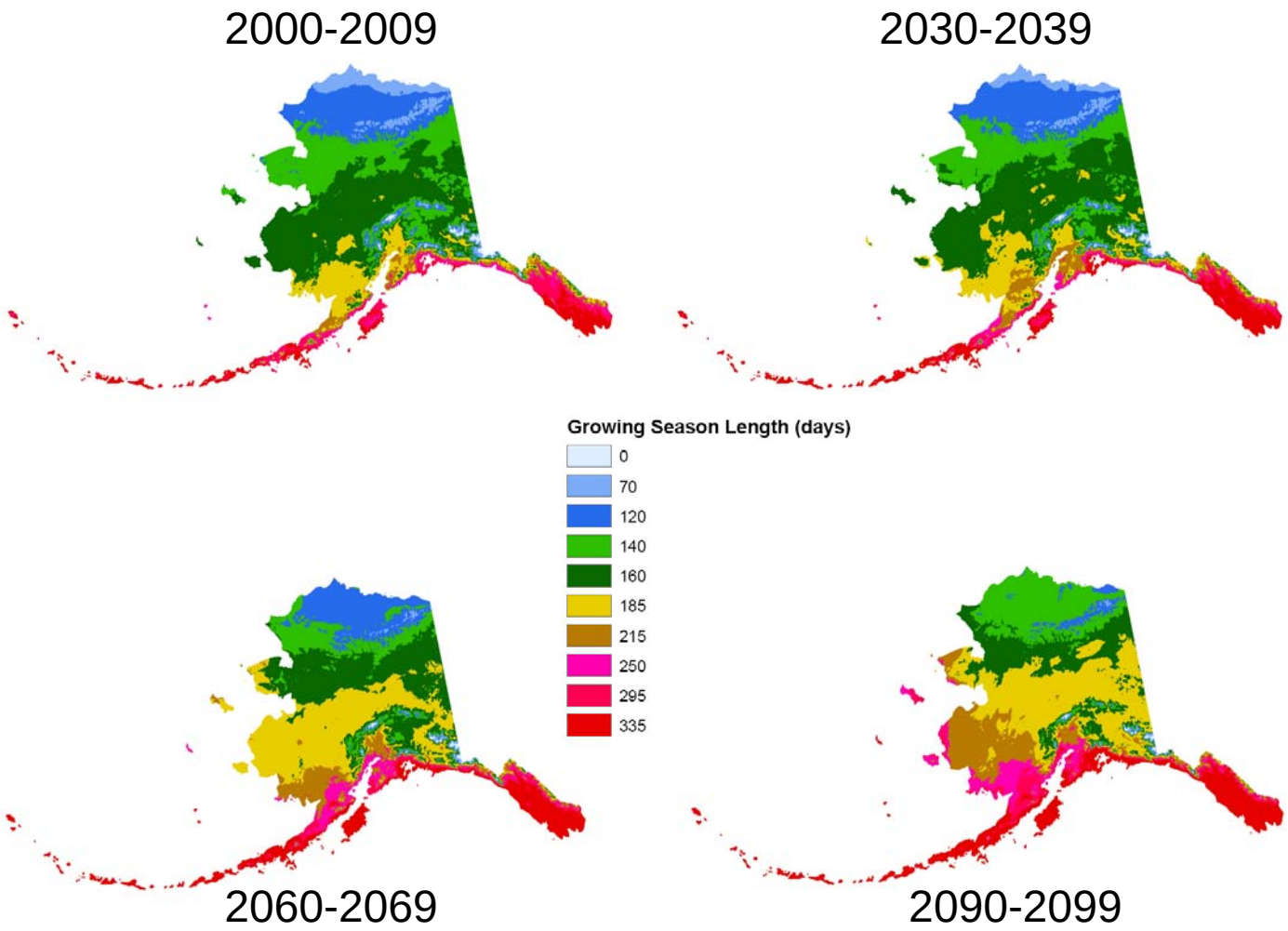


Temperature (°C)
30
20
10
0
-10
-20
-30
Jun 2009
Winter 2000 - 2009
SNAP
Scenarios Network for Alaska Planning
Image NASA
Image © 2008 TerraMetrics
©2008 Google
Eye alt 11501.56 mi

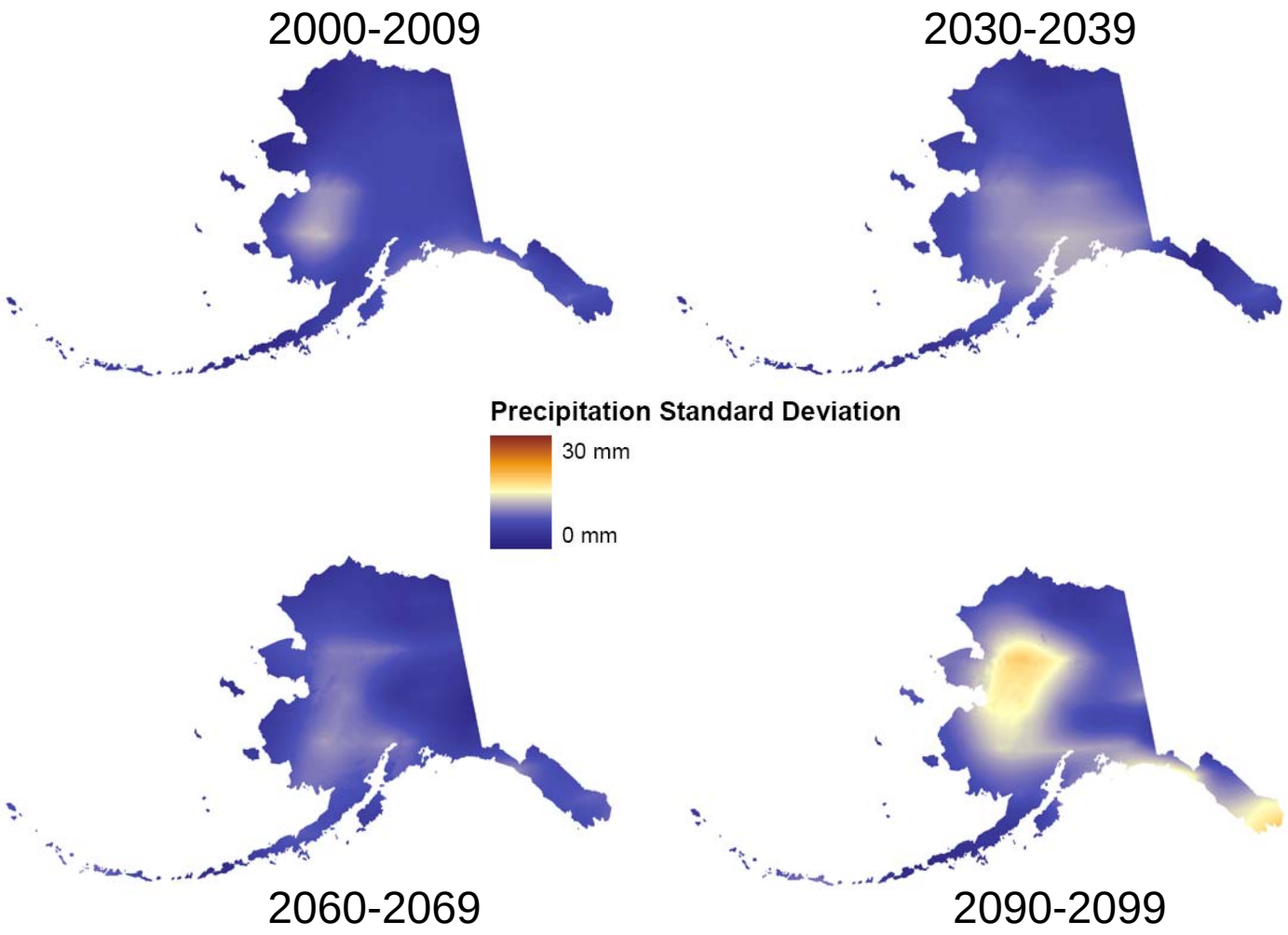
Temperature Projections: Winter

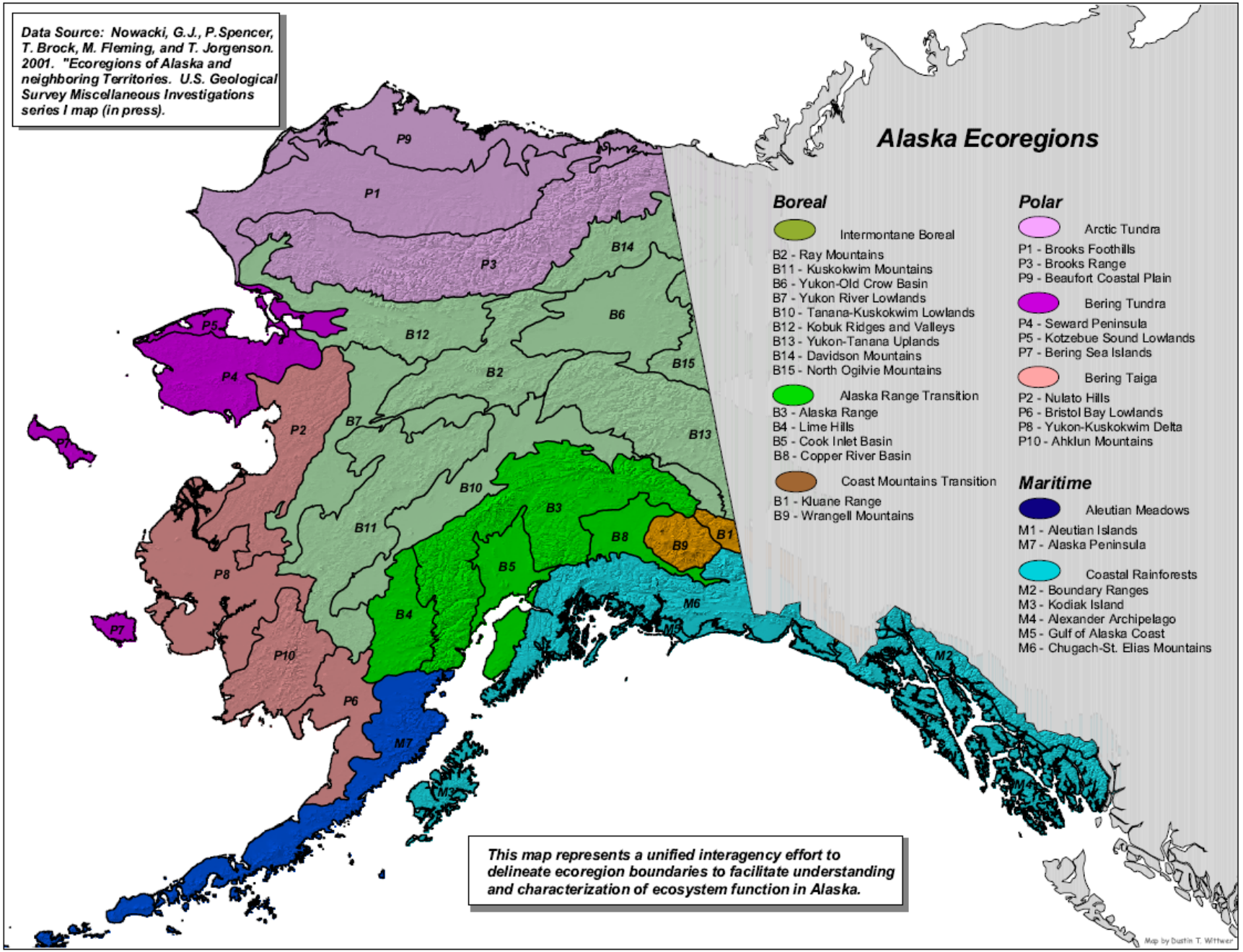


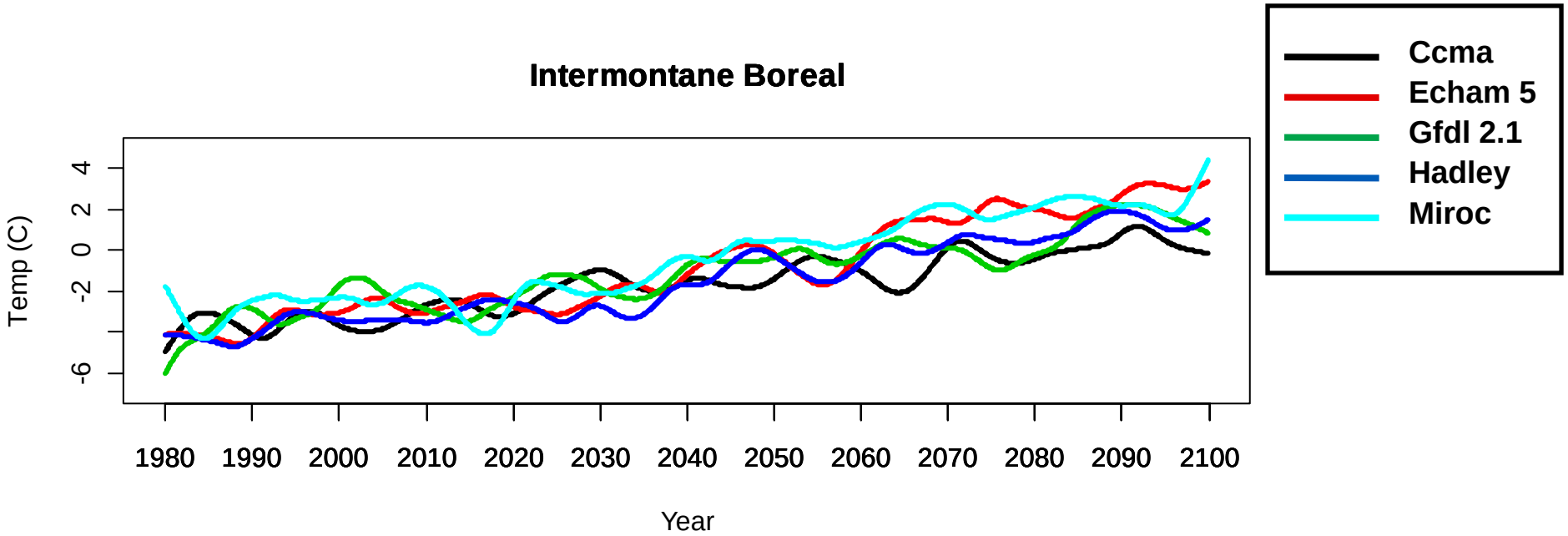
Growing Season Projections

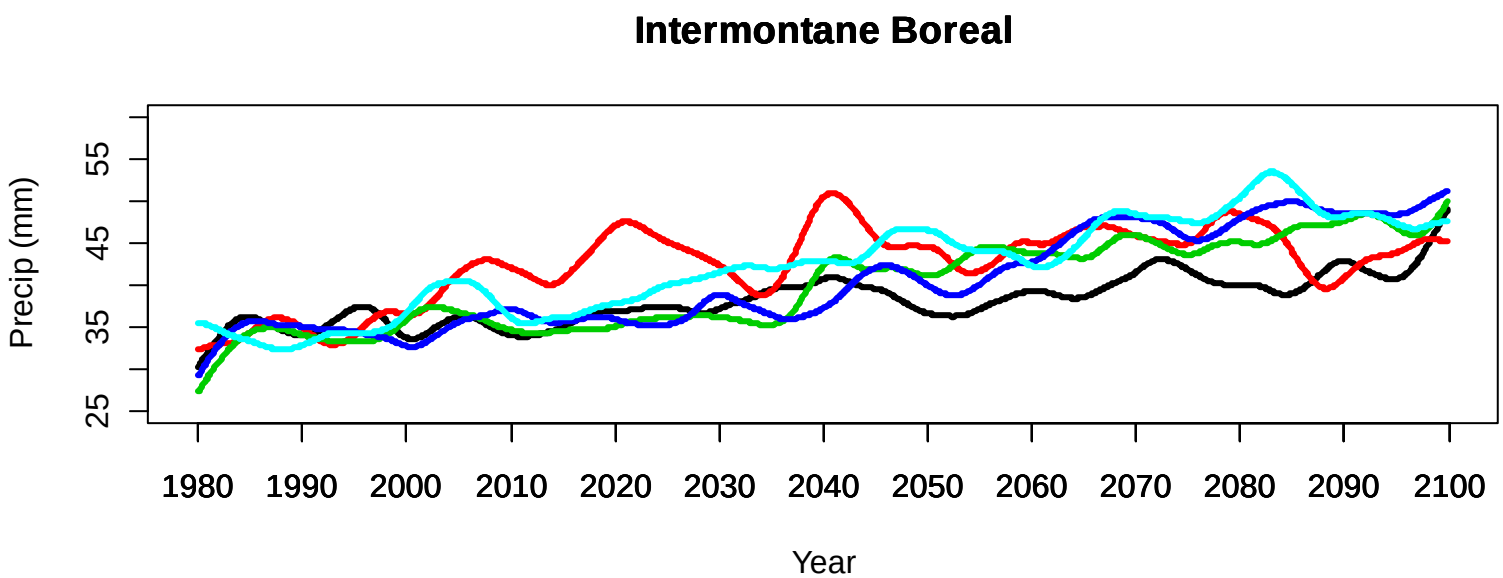


Uncertainty -- Precipitation

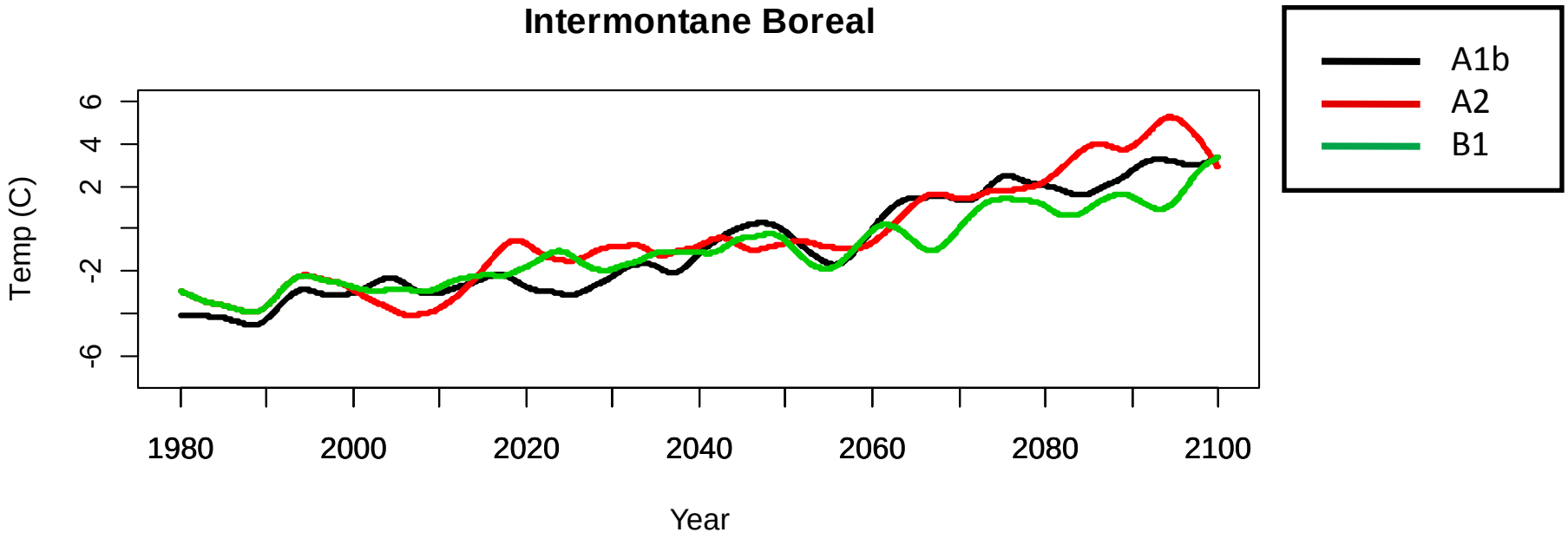


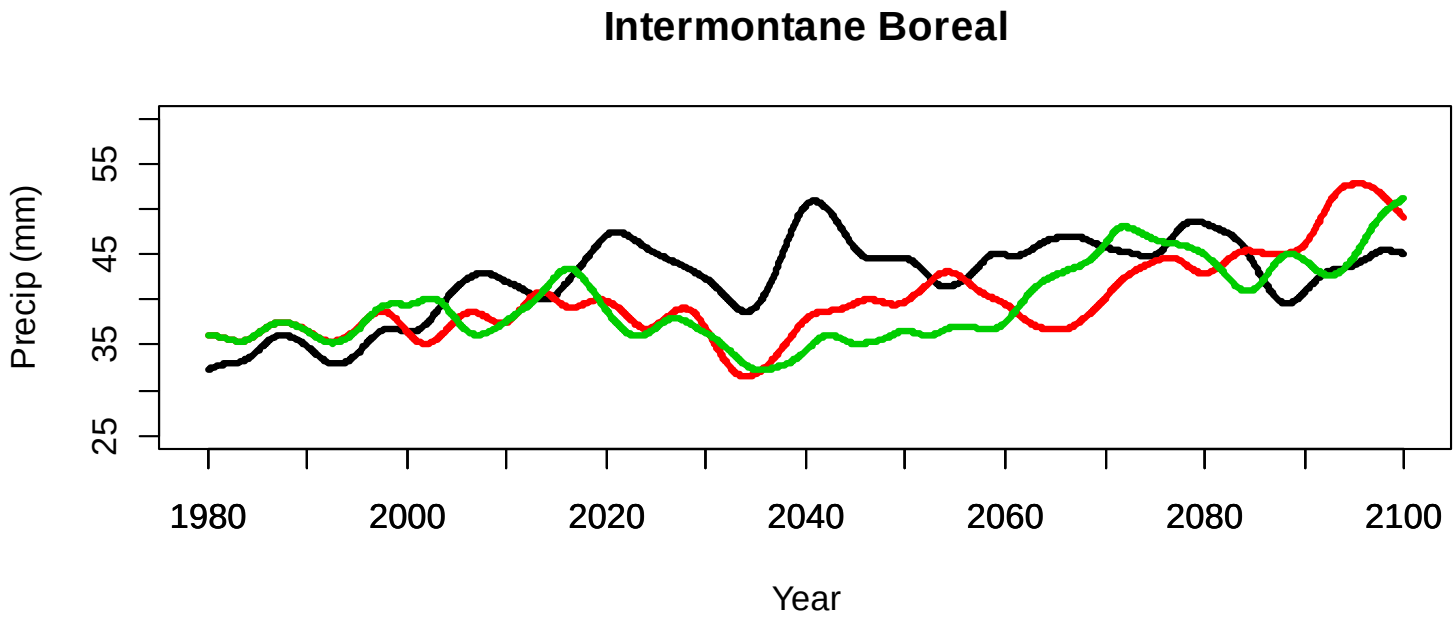

Data Source: Nowacki, G.J., P.Spencer, T. Brock, M. Fleming, and T. Jorgenson. 2001. "Ecoregions of Alaska and neighboring Territories. U.S. Geological Survey Miscellaneous Investigations series I map (in press).
Alaska Ecoregions
Boreal
Intermontane Boreal
B2 - Ray Mountains
B11 - Kuskokwim Mountains
B6 - Yukon-Old Crow Basin
B7 - Yukon River Lowlands
B10 - Tanana-Kuskokwim Lowlands
B12 - Kobuk Ridges and Valleys
B13 - Yukon-Tanana Uplands
B14 - Davidson Mountains
B15 - North Ogilvie Mountains
Alaska Range Transition
B3 - Alaska Range
B4 - Lime Hills
B5 - Cook Inlet Basin
B8 - Copper River Basin
Coast Mountains Transition
B1 - Kluane Range
B9 - Wrangell Mountains
Polar
Arctic Tundra
P1 - Brooks Foothills
P3 - Brooks Range
P9 - Beaufort Coastal Plain
Bering Tundra
P4 - Seward Peninsula
P5 - Kotzebue Sound Lowlands
P7 - Bering Sea Islands
Bering Taiga
P2 - Nulato Hills
P6 - Bristol Bay Lowlands
P8 - Yukon-Kuskokwim Delta
P10 - Ahklun Mountains
Maritime
Aleutian Meadows
M1 - Aleutian Islands
M7 - Alaska Peninsula
Coastal Rainforests
M2 - Boundary Ranges
M3 - Kodiak Island
M4 - Alexander Archipelago
M5 - Gulf of Alaska Coast
M6 - Chugach-St. Elias Mountains
This map represents a unified interagency effort to delineate ecoregion boundaries to facilitate understanding and characterization of ecosystem function in Alaska.
Map by Dustin T. Witthwer


Intermontane Boreal
Temp (C)
4
2
0
-2
-6
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
Year
Ccma
Echam 5
Gfdl 2.1
Hadley
Miroc

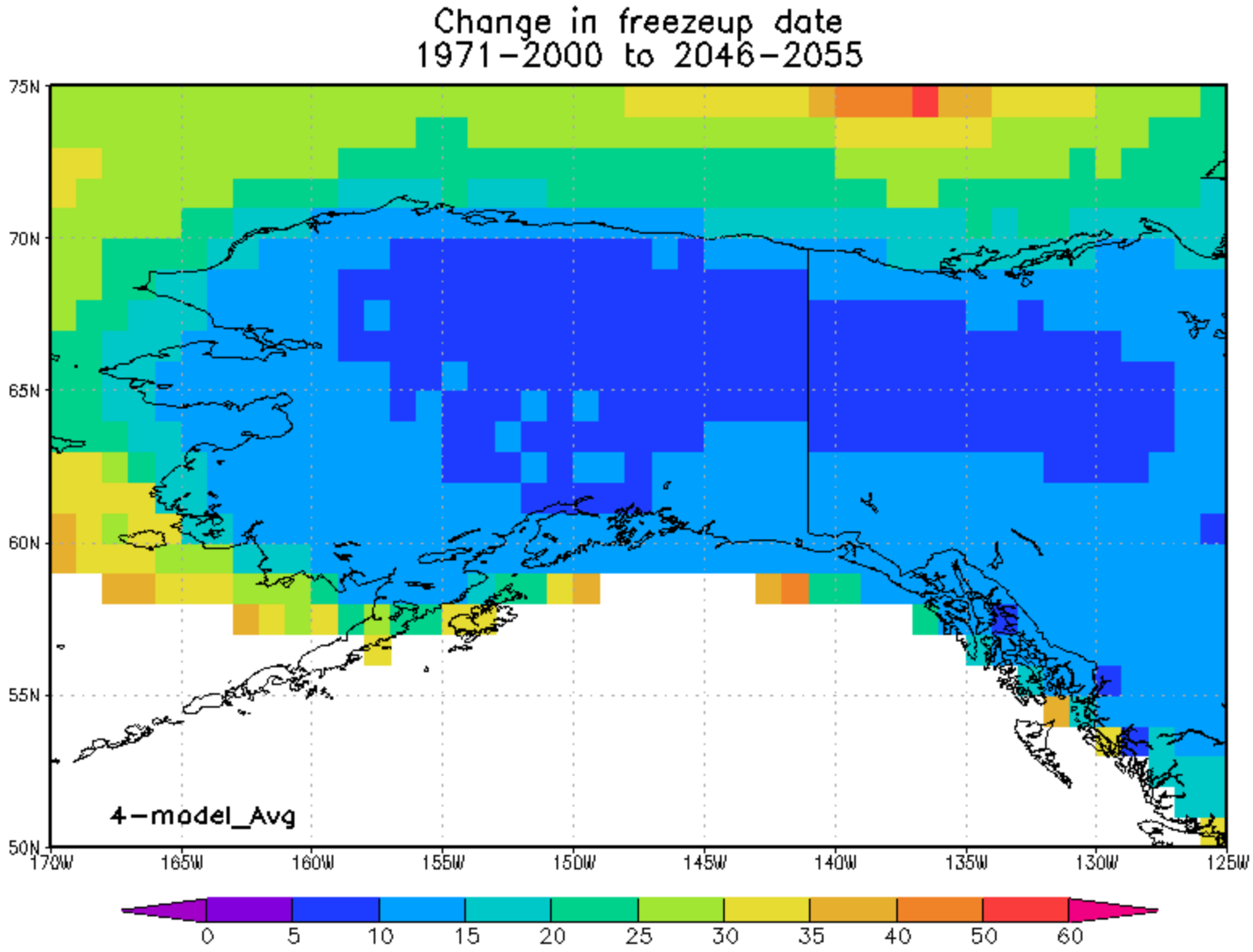

Intermontane Boreal
Precip (mm)
55
45
35
25
1980
1990
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
Year

A1B

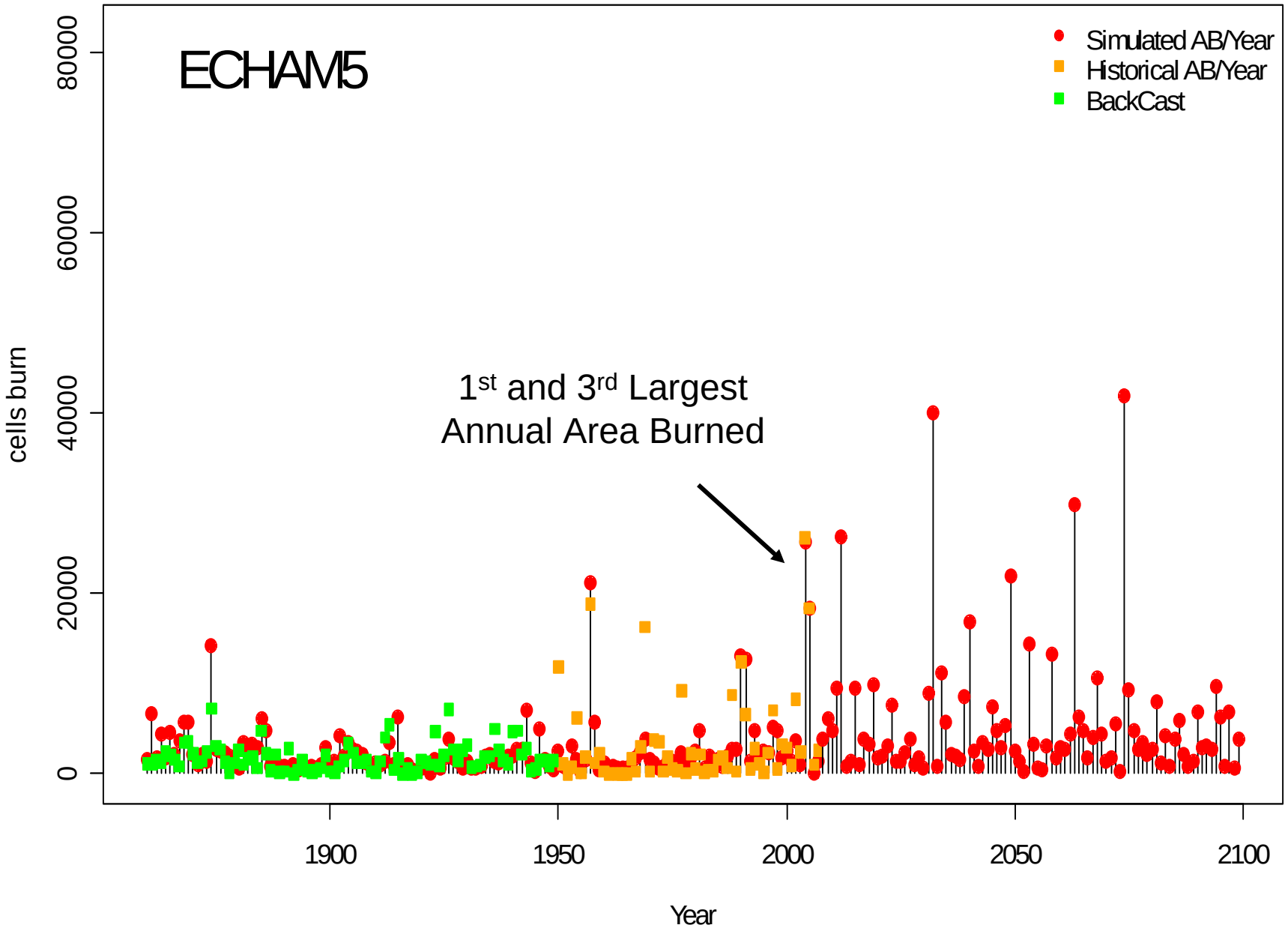

Intermontane Boreal
A1b
A2
B1
Temp (C)
6
4
2
-2
-6
1980
2000
2020
2040
2060
2080
2100
Year


Intermontane Boreal
Precip (mm)
55
45
35
25
1980
2000
2020
2040
2060
2080
2100
Year

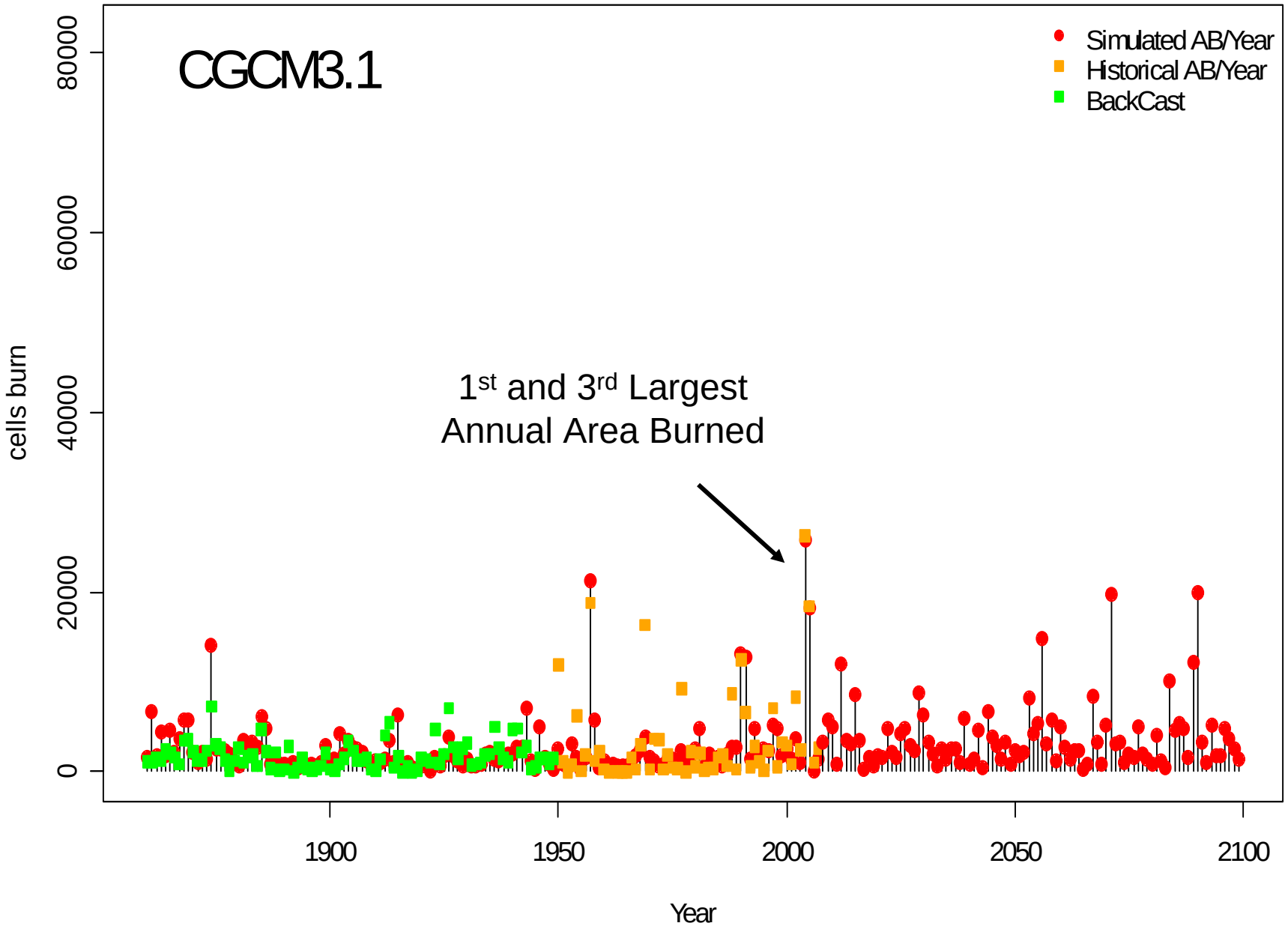
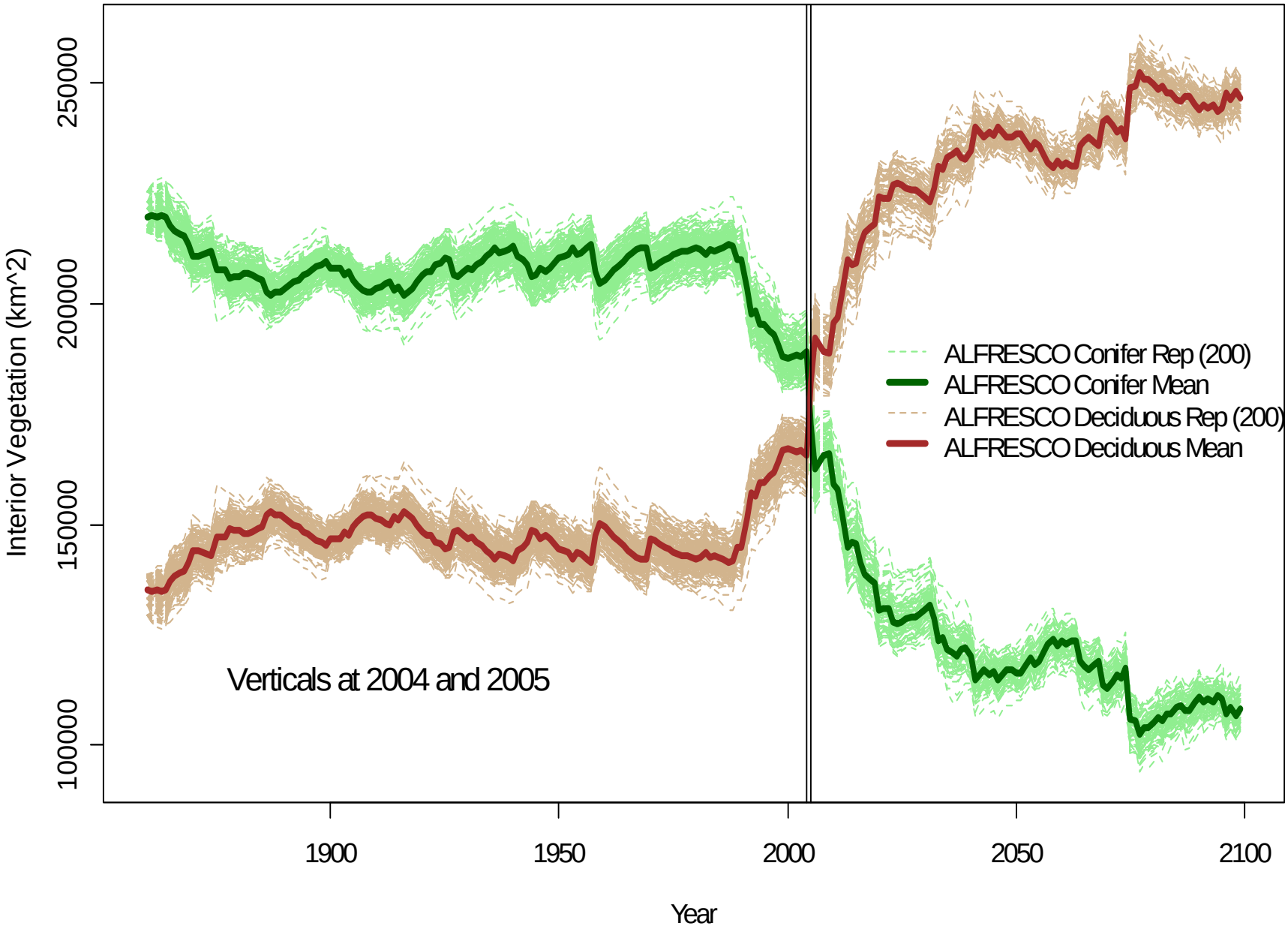
Echam5


Change in freezeup date
1971-2000 to 2046-2055
75N
70N
65N
60N
55N
50N
170W
165W
160W
155W
150W
145W
140W
135W
130W
125W
4-model_Avg
0
5
10
15
20
25
30
35
40
50
60

Simulated Annual Area Burned



Simulated Annual Area Burned



Simulated Vegetation Distribution