Sea Ice over Bering Sea: The past, present and the future

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Monthly Sea Ice Concentration

Climatology 1980-99

HadleyISST_ice

BEST-BSIERP Ecosystem Partnership

http://bsierp.nprb.org

Temperature anomaly °C

Ice concentration

ALASKA

St. Matthew I.

Bristol Bay

St. Paul I.

M2

Alaska Peninsula

Dec Jan Feb Mar Apr May Jun

J F M A M J J A S O N D

176° 172° 168° 164° 160°W
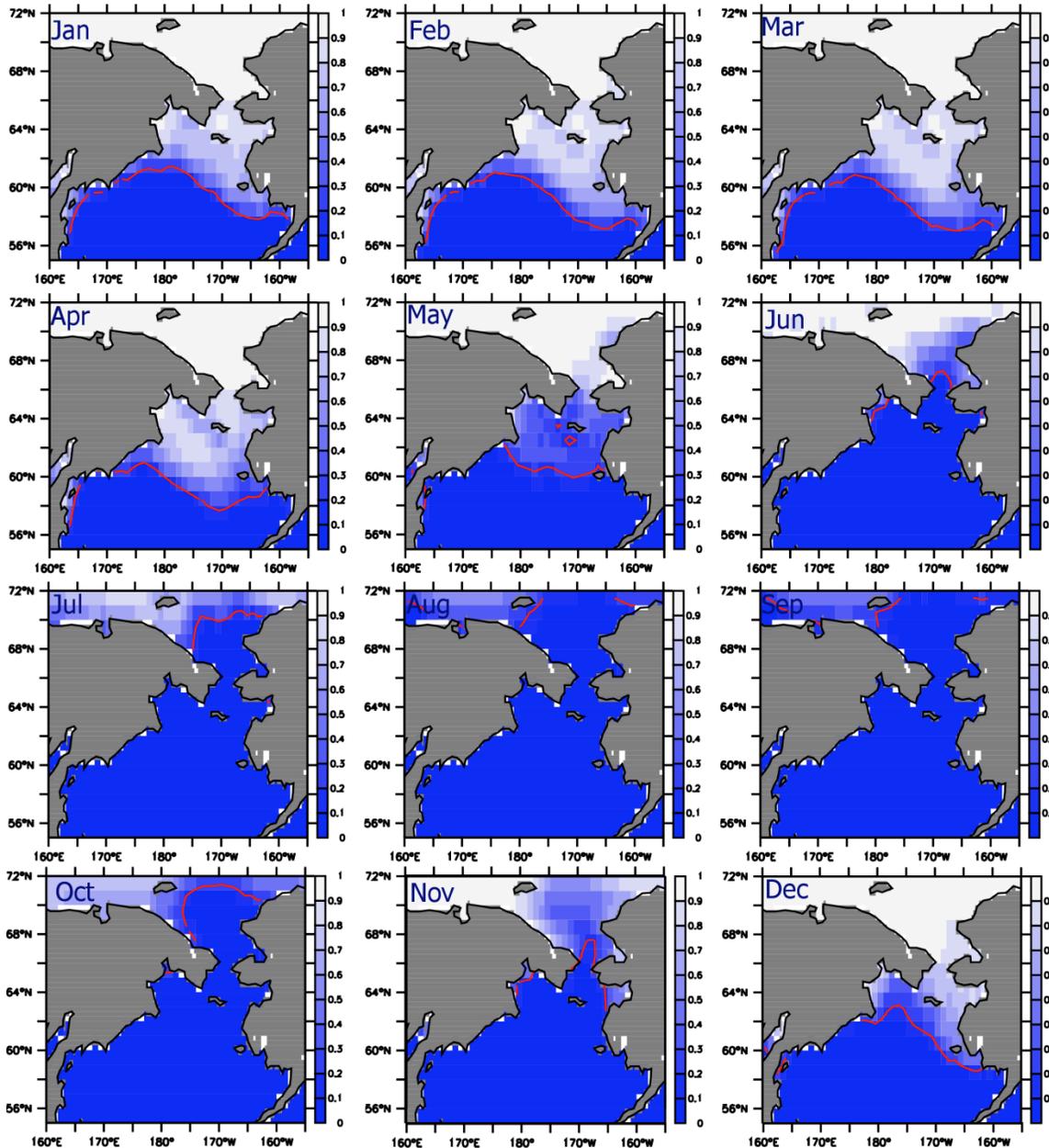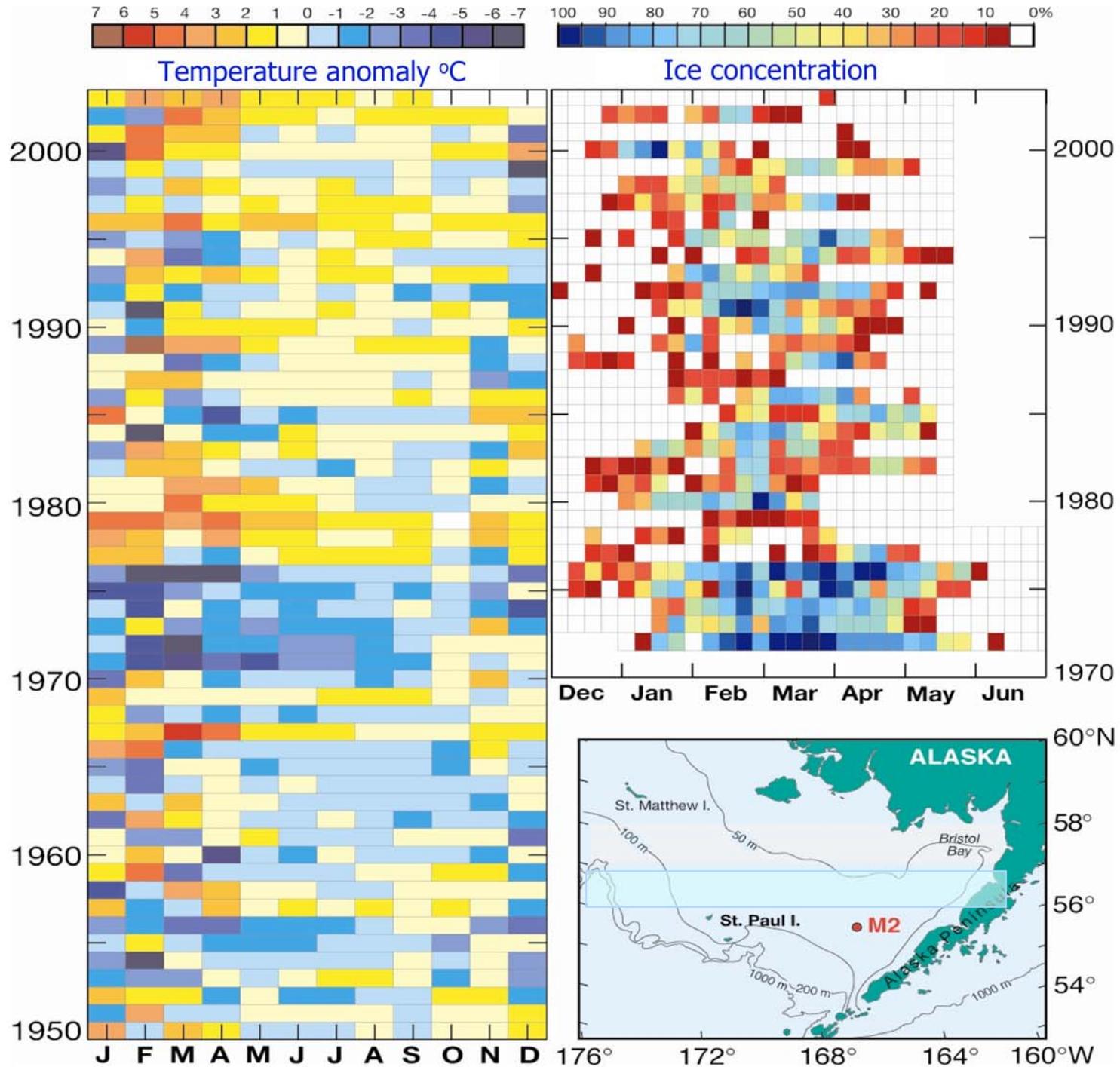
Monthly Sea Ice Extent Anomaly: 1970 - 2008
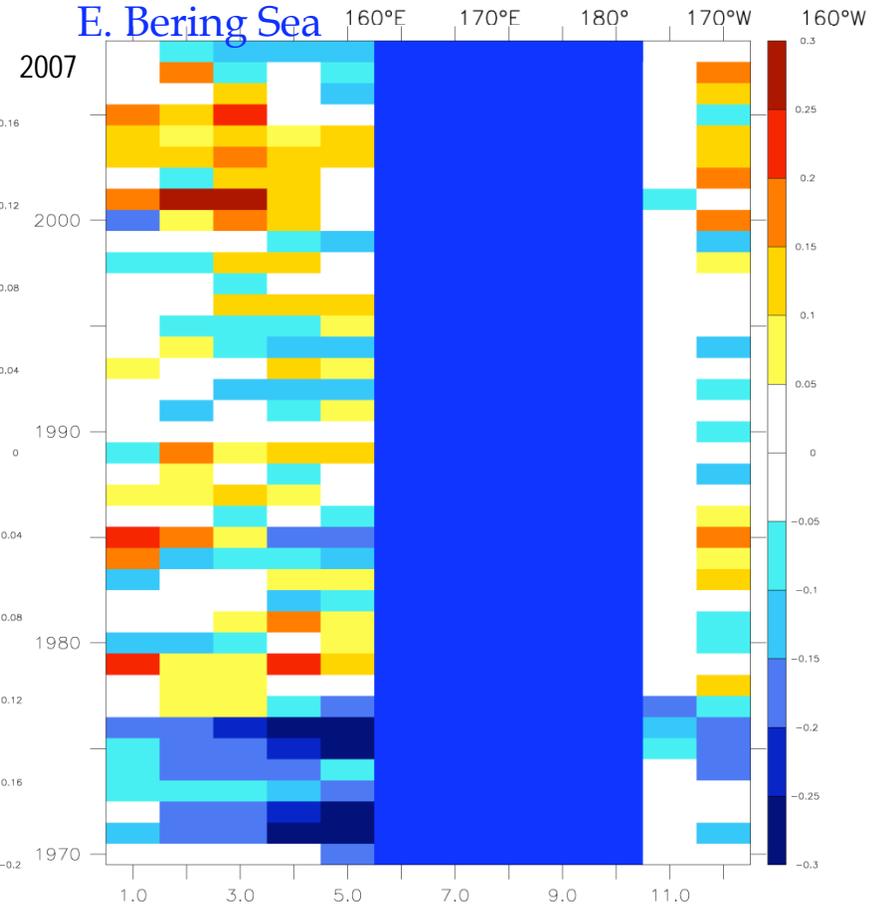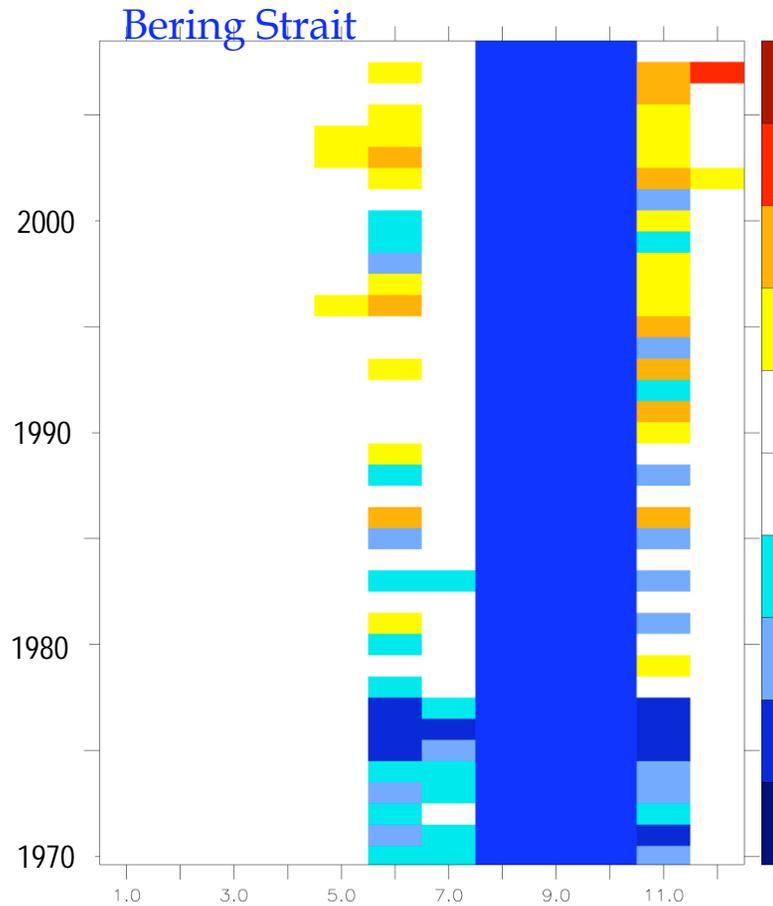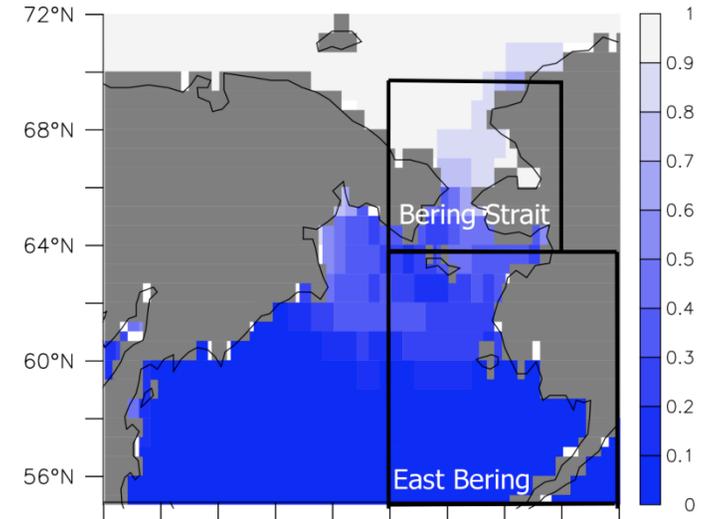
The Progress of Climate Models

FAR — 1990 — "Swamp" Ocean

AR4 — 2007 — Chemistry — Interactive Vegetation

FAR — ~500 km (T21)

AR4 — ~110 km (T106)
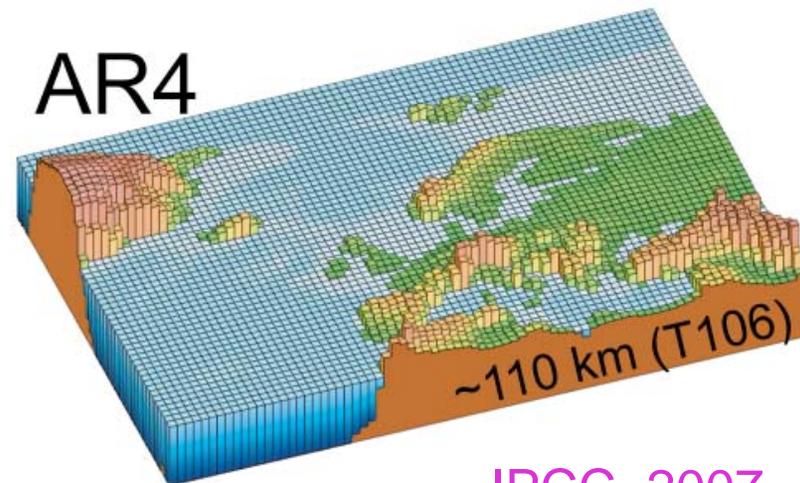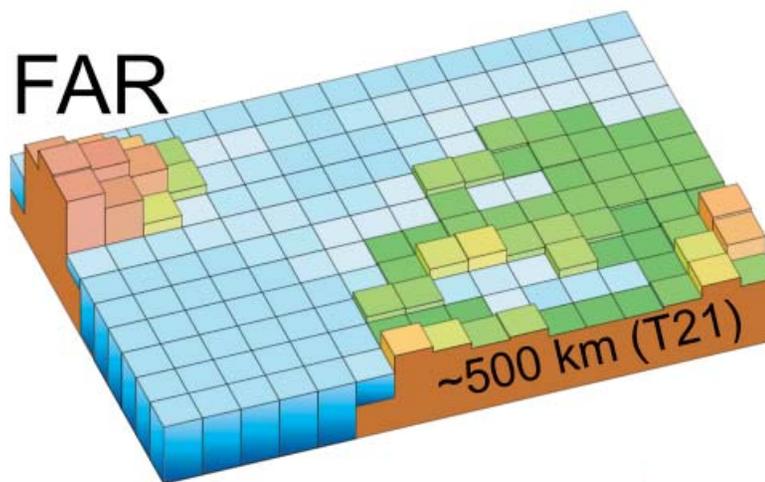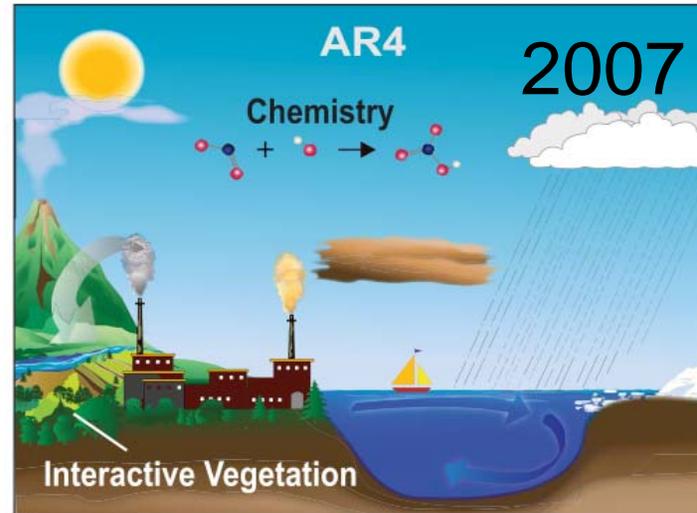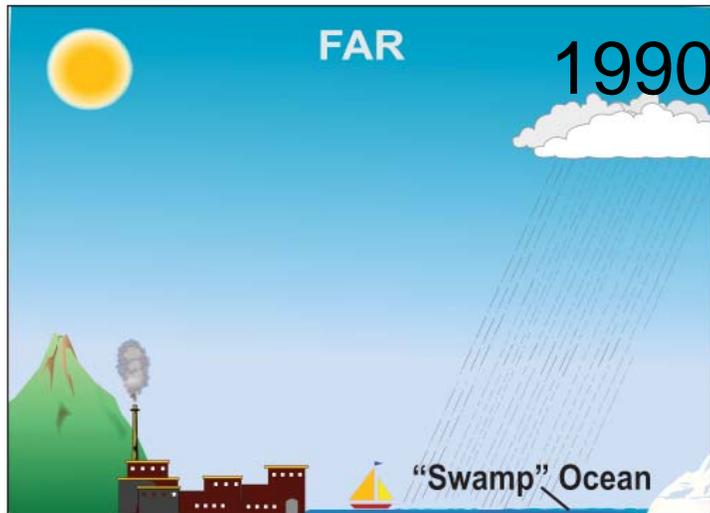
IPCC, 2007

Ensemble Member

Made with the same model but different initial conditions only characterize the uncertainty associated with internal climate variability (natural variation).

Ensemble Mean

The average of the ensemble members (runs) from one model or a group of models.

Emission Scenarios

A plausible representation of the future development of emissions of substances that are potentially radiatively active.


East Bering Sea

March Ice Extent

(a) CO_2 emissions

Scenarios
A1B
A1T
A1FI
A2
B1
B2
IS92a

A2
A1B

(b) CO_2 concentrations

Scenarios
A1B
A1T
A1FI
A2
B1
B2
IS92a
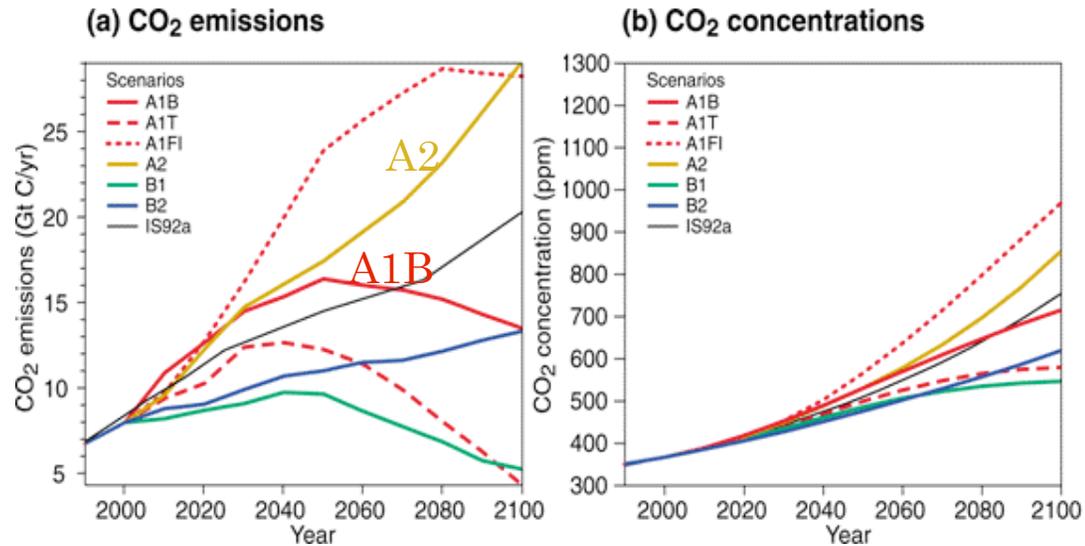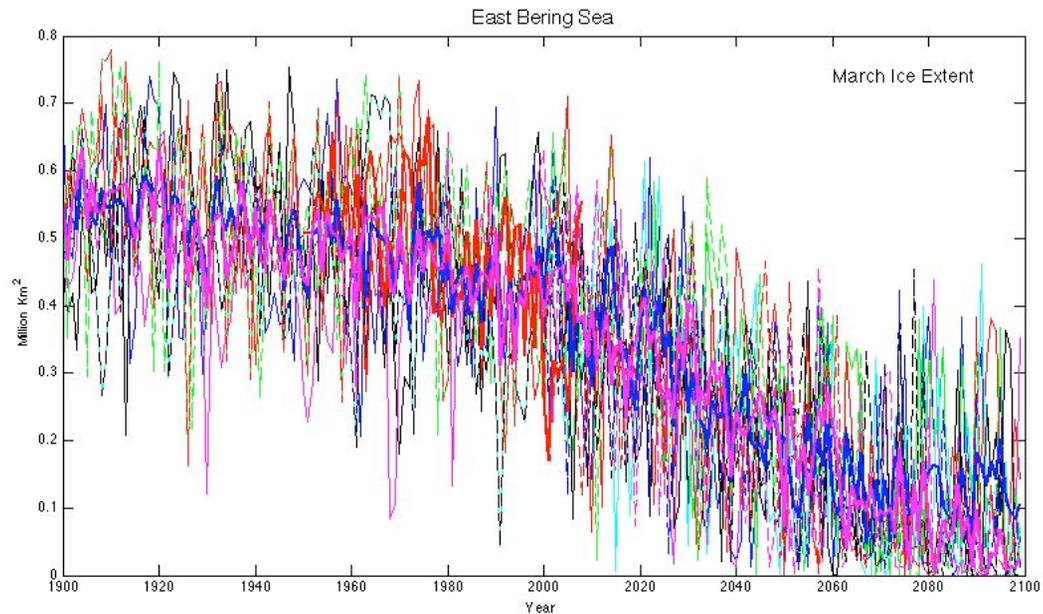
NH Sept Sea Ice Extent

A1B Sep NH Ice Extent

CCSM3,CNRM,
ECHO-G, IPSL,
MIROC(med),
UKHadGEM1
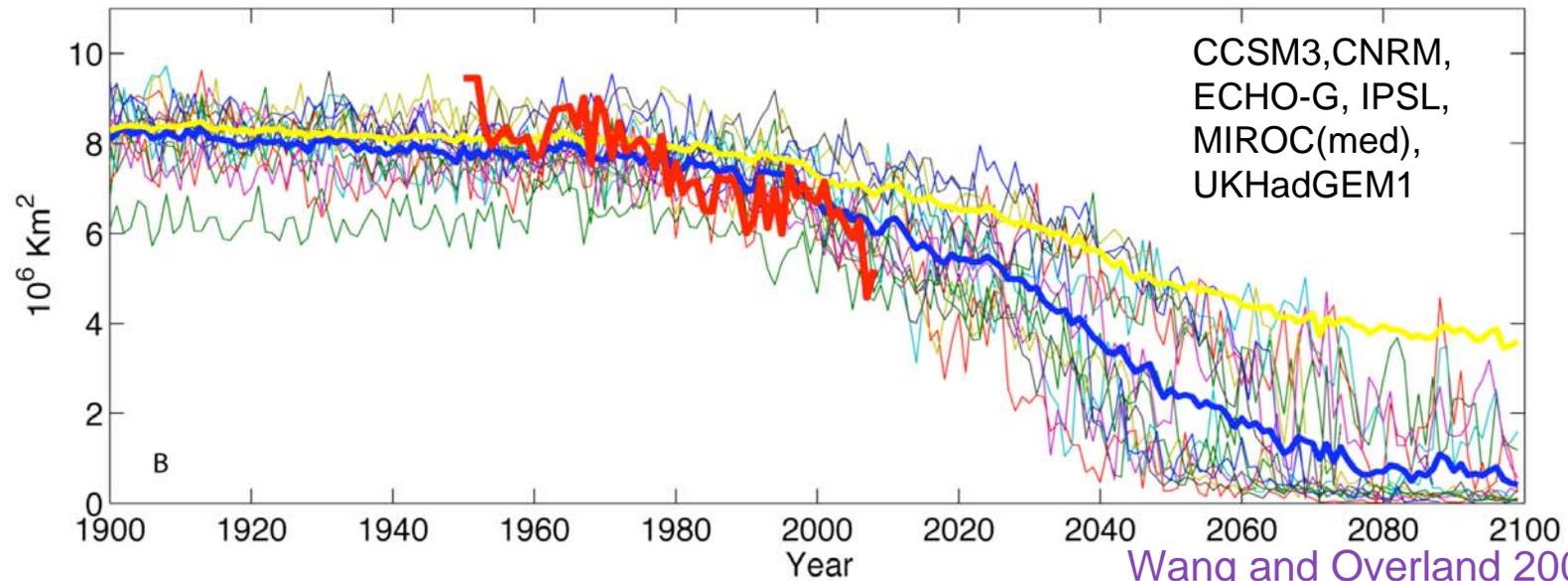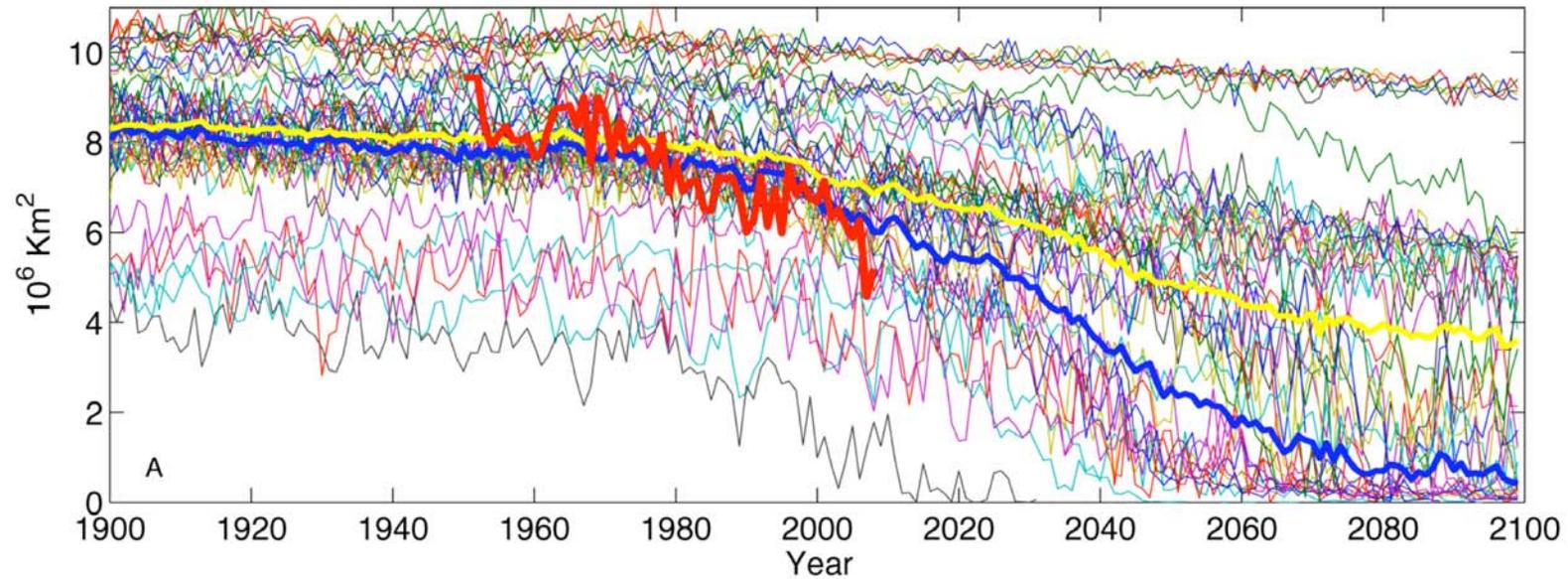
Wang and Overland 2009
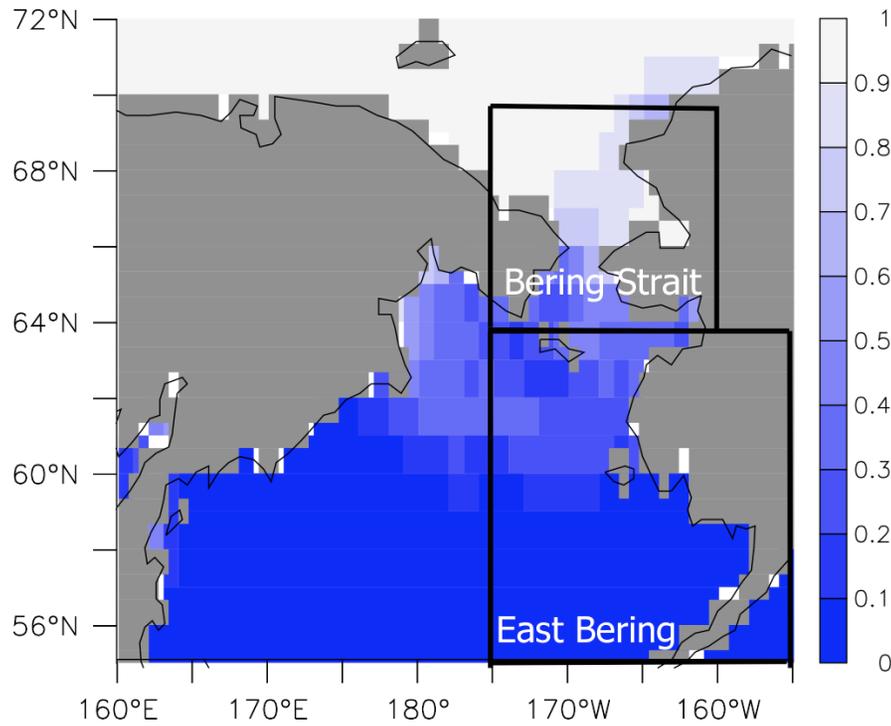
Regions of Interests
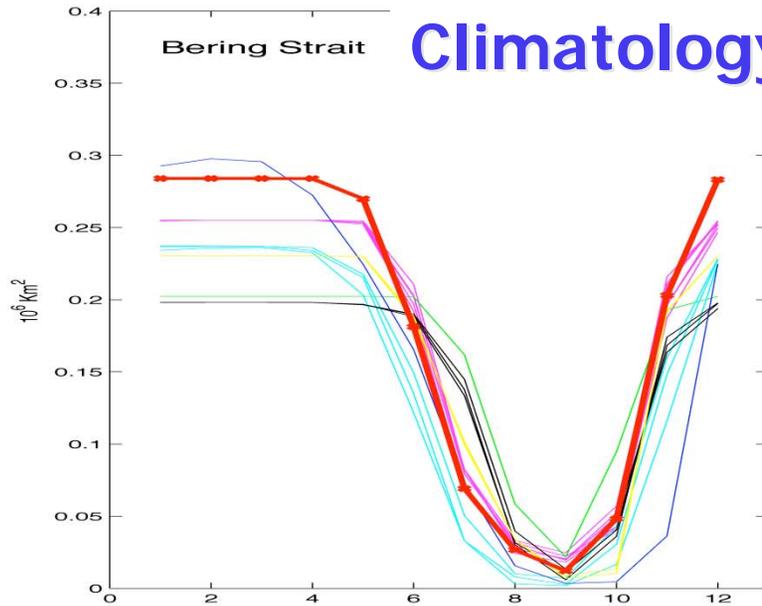
Climatology/Seasonal Cycle

Monthly Sea Ice Extent over Bering Strait

March

May

December
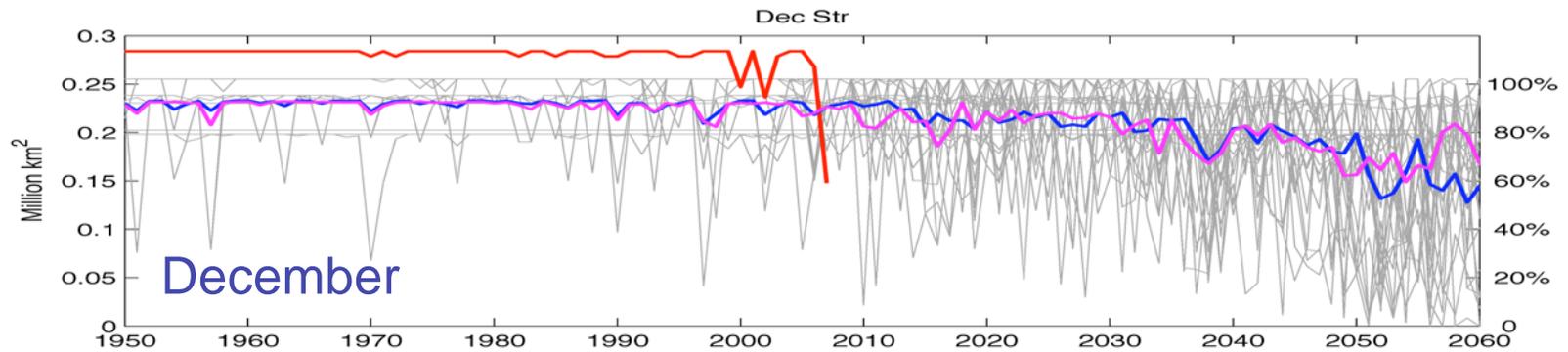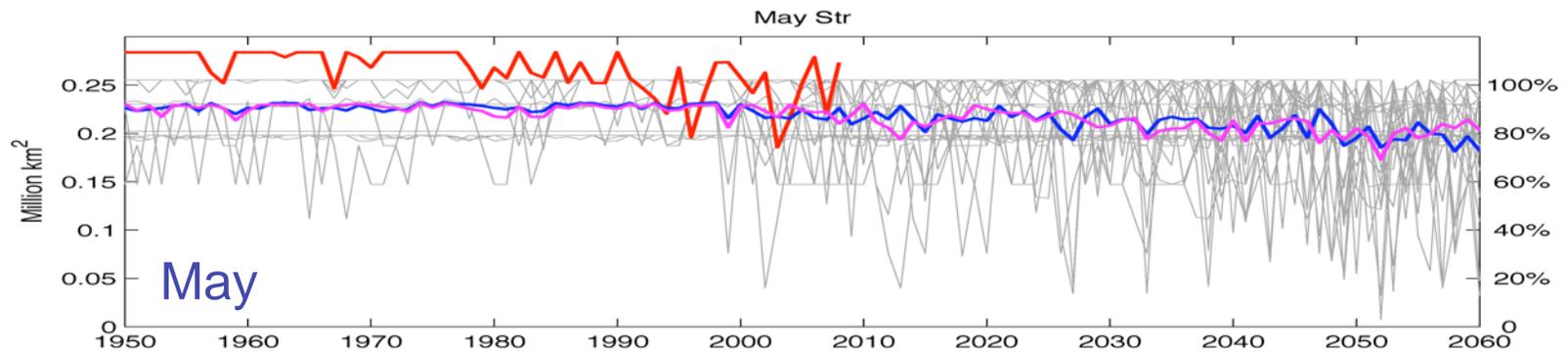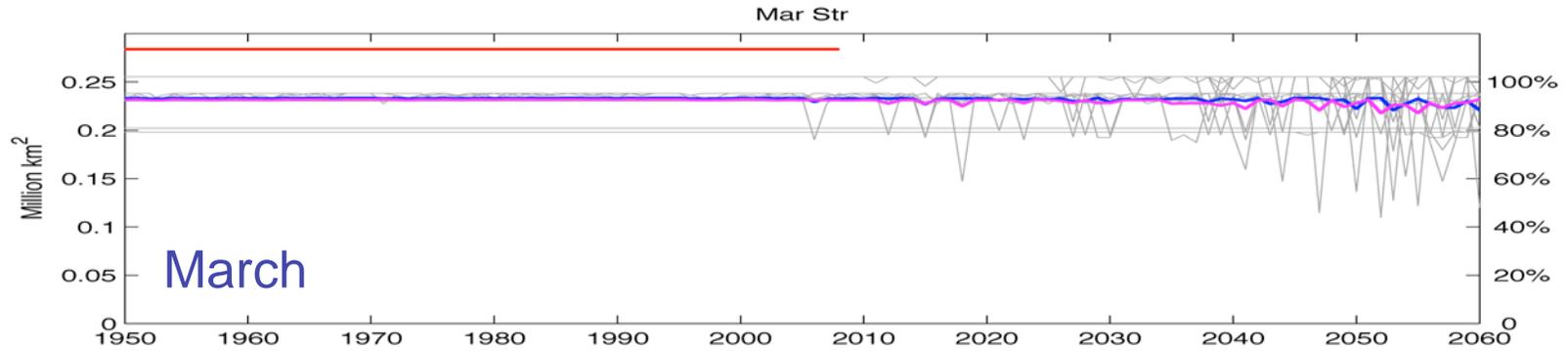
Monthly Sea Ice Extent over E. Bering

March

May

Dec
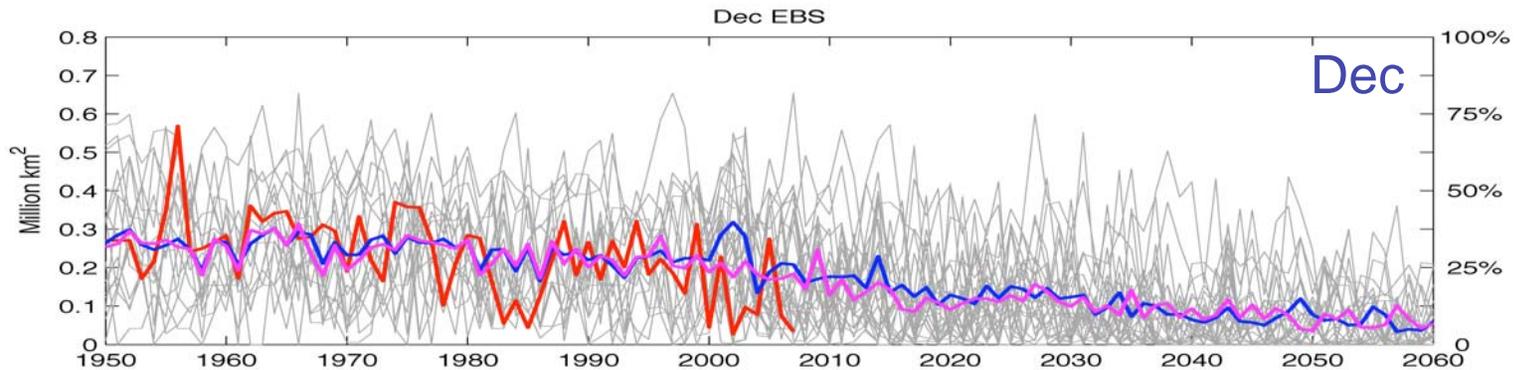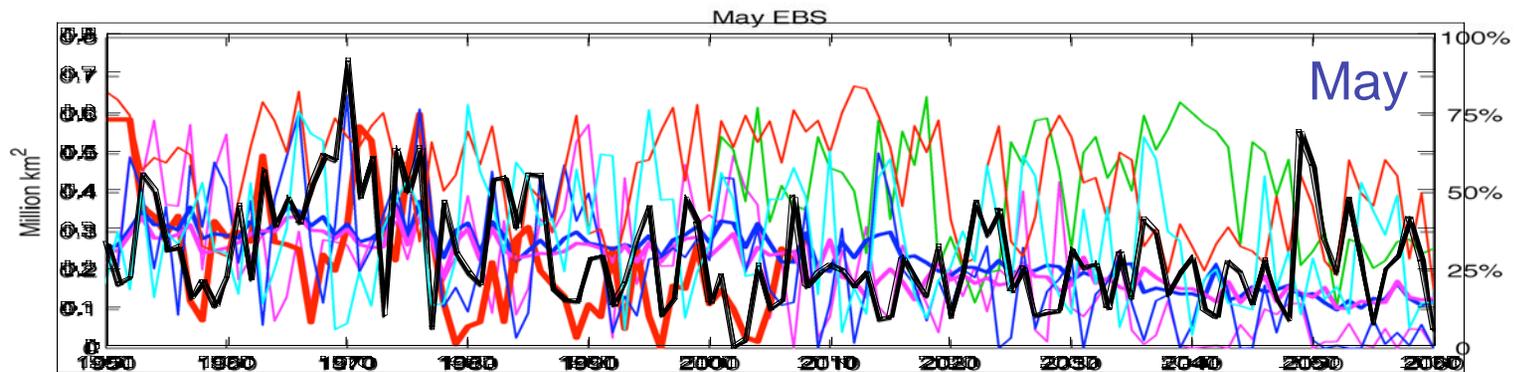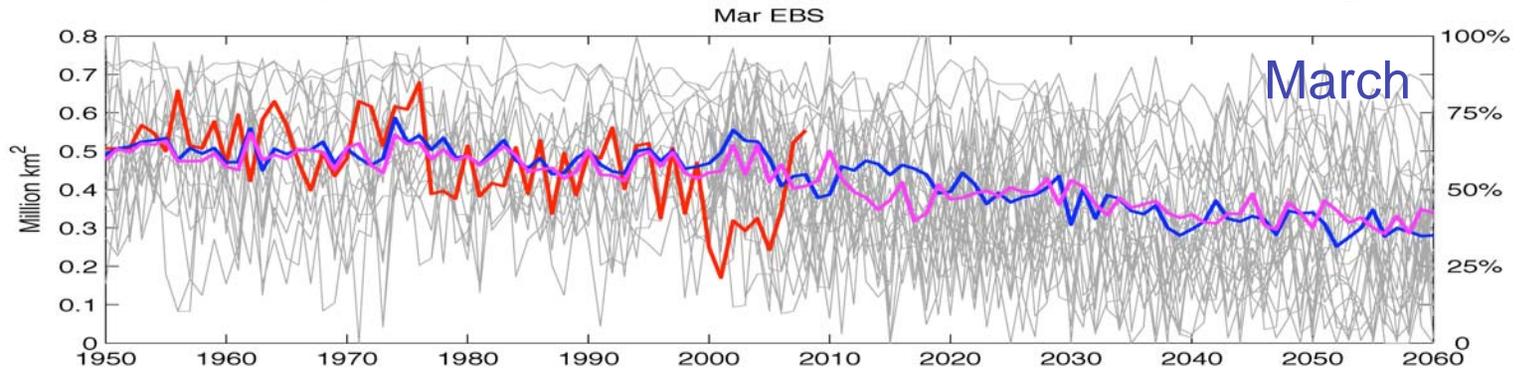
Trend of Sea Ice Extent
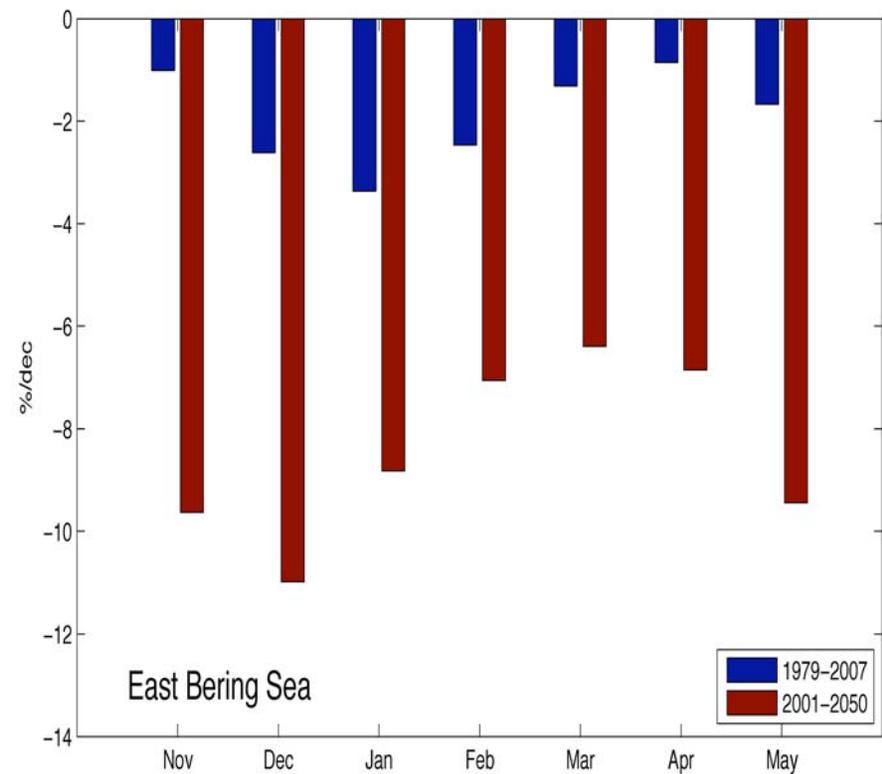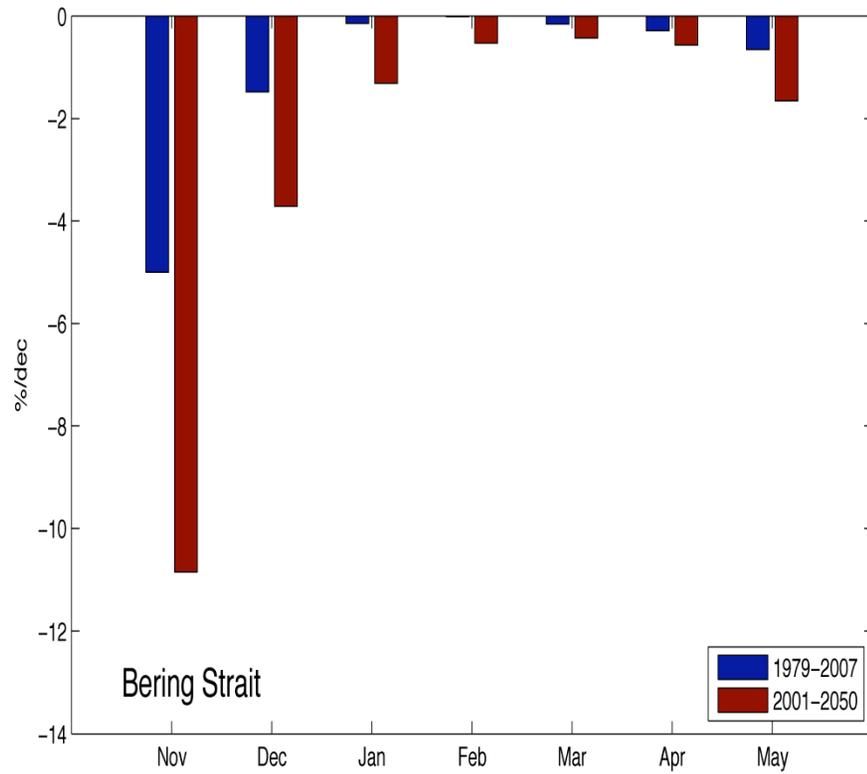
DECADAL MEAN ICE EDGE
under A1B scenario
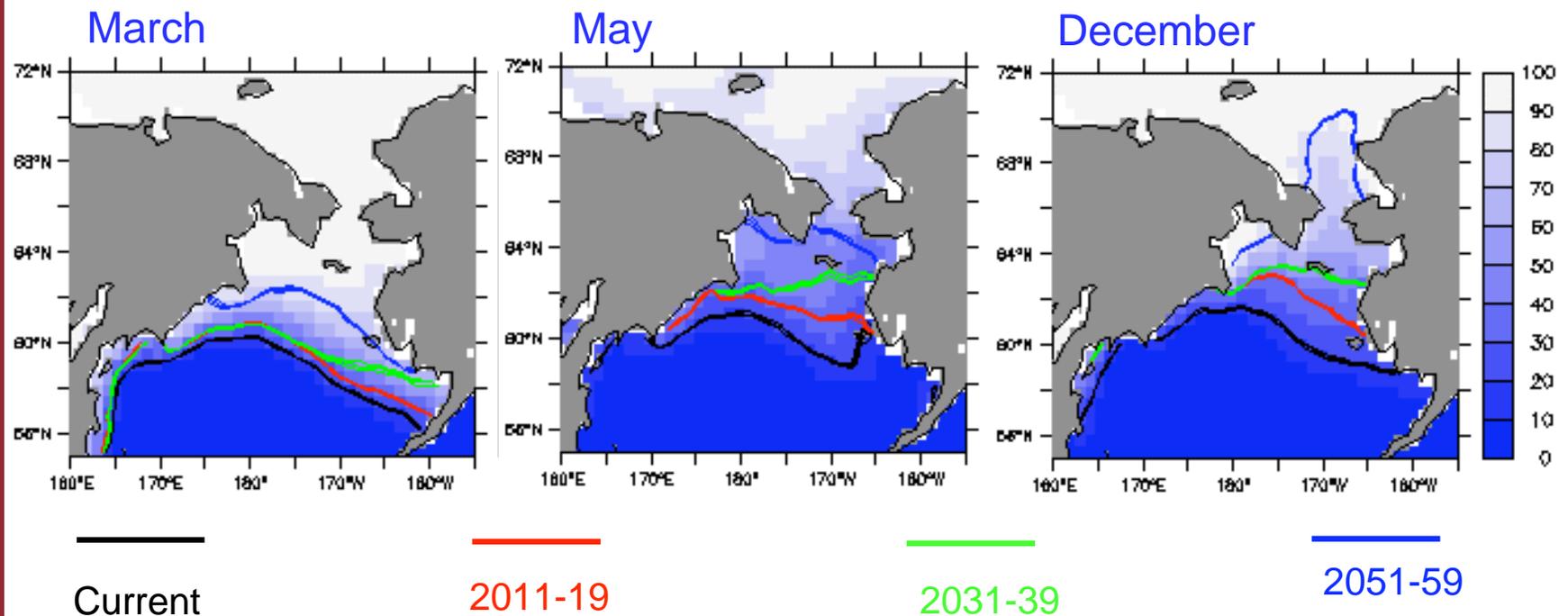
CCSM3

60 Year Surface Air Temperature Change

Relative to 1980-1999 mean
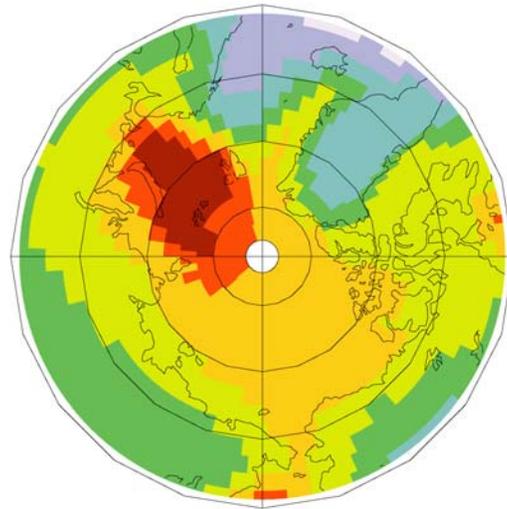
JFM
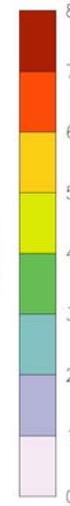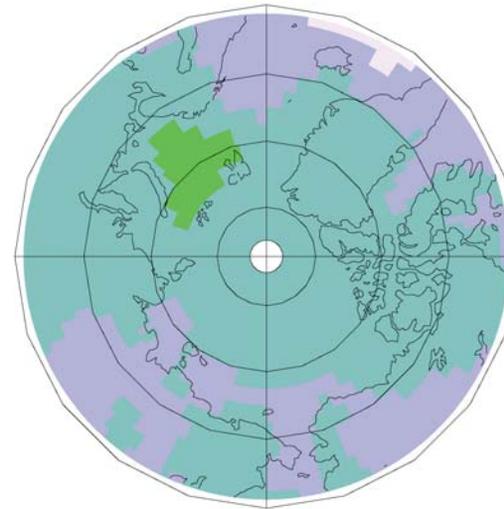
AMJ

Decadal Mean for 2046–2054

JAS

OND

SUMMARY

2007 Sea Ice

Arctic

Chukchi

Bering

Nautical Miles
0   100 200

0   200 400
Kilometers
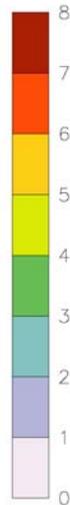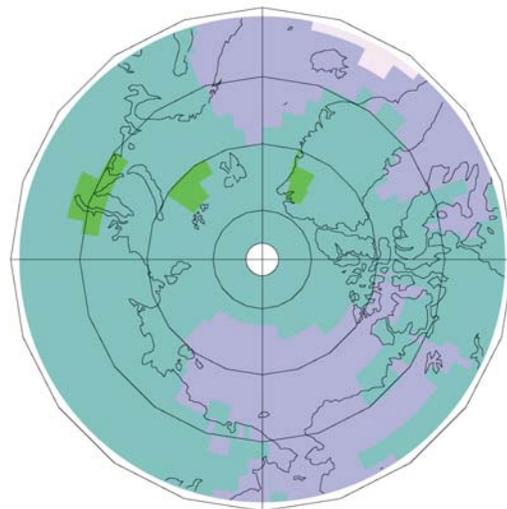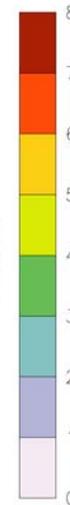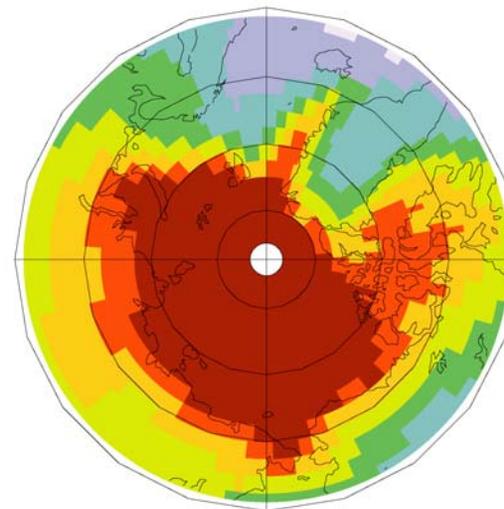
• **Linear decline trend is projected by climate models for both Bering Strait (Dec.) and East Bering Sea.**

• **Larger declining trend in Fall and Spring indicating that the ice season will be shorter over the Bering Sea.**

• **There is a large interannual variability in the Bering Sea ice extent, which will continue in the next 50 years.**