



Alaska climate outlook briefing April 2024

Rick Thoman
ACCAP Climate Specialist
April 19, 2024





Monthly feature:
Western Alaska
storminess



Climate
forecast 101



Climate
review and
forecast report
card



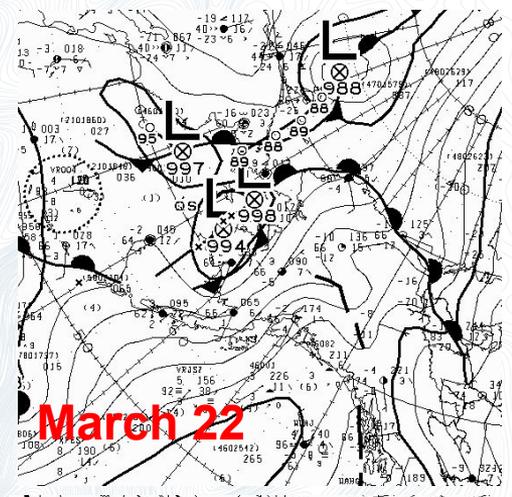
Behind the
climate
forecast



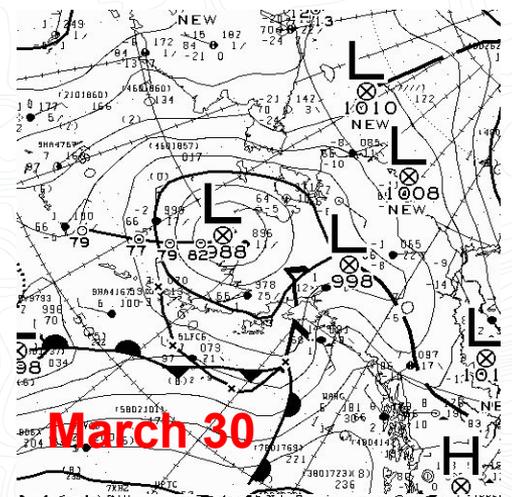
Future outlook



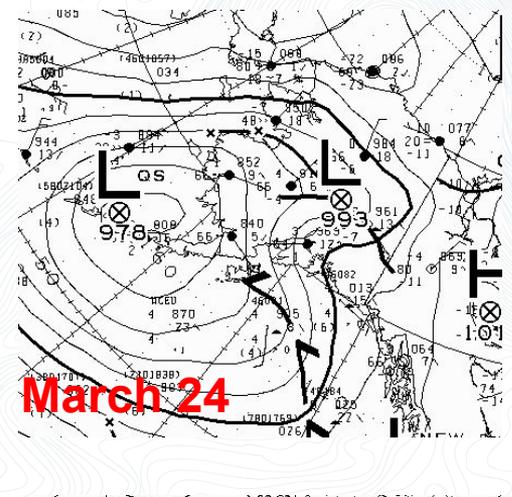
Monthly feature > Western/Northern Alaska Storms



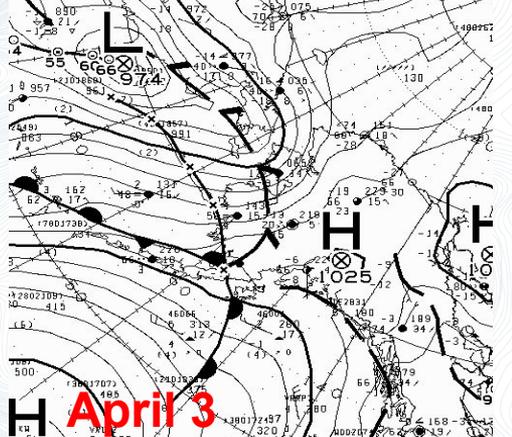
March 22



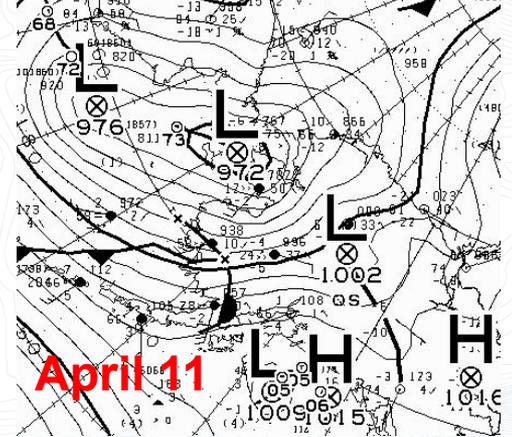
March 30



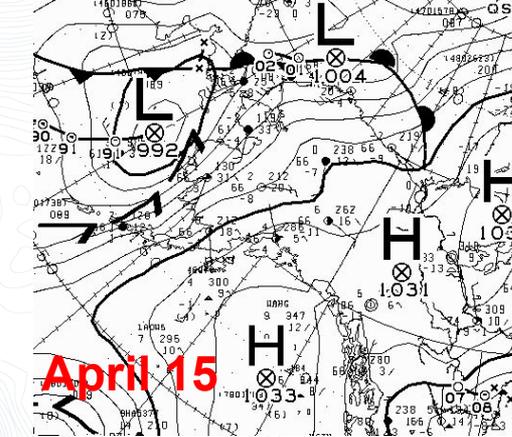
March 24



April 3



April 11



April 15



Monthly feature > **Western/Northern Alaska Storms**



Little Diomedede, Alaska, April 17, 2024
Credit: F. Ozenna

- **Bethel:** Extreme wind April 15
- **Nome:** top 5 wettest April
- **Kotzebue:** top 10 wettest Aprils
- **Utqiagvik:** April 16 reached 36F, tied for second highest temperature so early in the year

Climate forecast 101

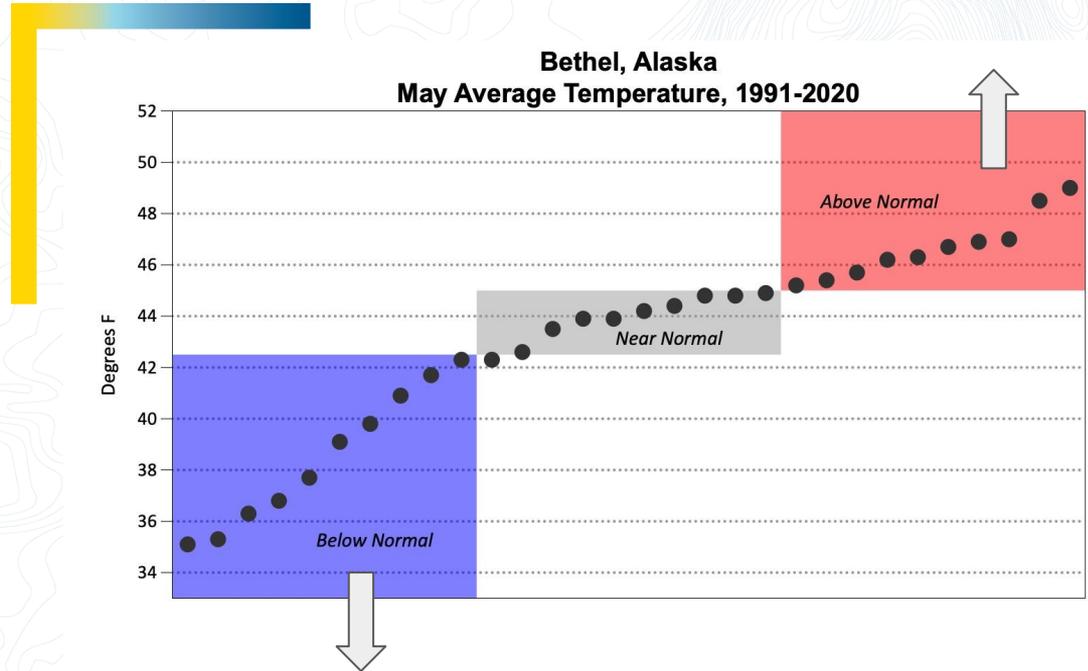


NOAA Center for Weather and Climate Prediction

Climate Prediction Center (CPC) ➤
primary NOAA/NWS forecast responsibility
for two weeks to a year in the future

The basics

- Relation to longterm normal (1991-2020)
- 3 categories
- Probabilistic
- Traditional elements
 - Temperature
 - Centered on average
 - Precipitation
 - Centered on median > can significantly differ from “normal”

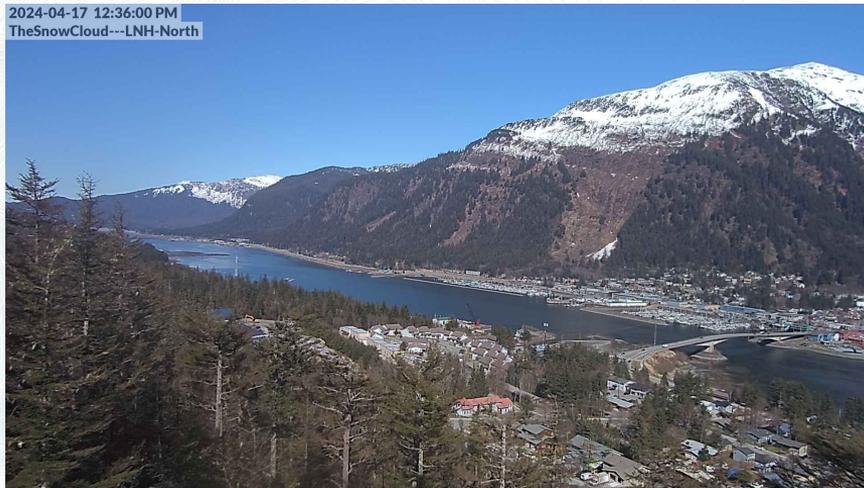




**What's happened and how did
previous climate outlooks perform?**



Notable March to April Happenings



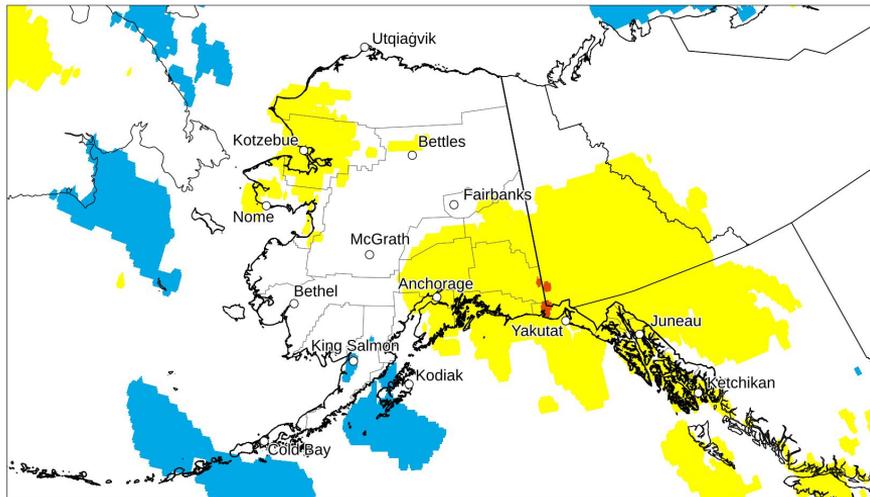
2024-04-17 12:36:00 PM
TheSnowCloud---LNH-North

Juneau and Gastineau Channel
April 17, 2024
Credit: TheSnowCloud

- **Western Alaska:** Repeated storms/blizzards, high snowpack
- **North Slope:** 20s and 30s below cold April 8-9
- **Central and eastern Interior:** mildest mid-April weather in several years
- **Southeast Alaska:** bluebird weather mid-April

Model- based regional analysis > Average temperatures

Temperature Classification for Mar 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider

Much Below

Below

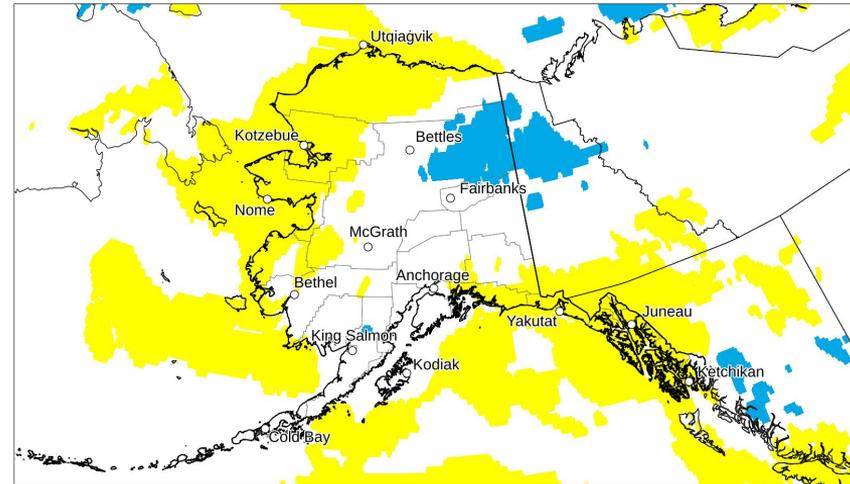
Near Normal

Above

Much Above

Compared to 1991-2020 Base Period

Temperature Classification for Jan-Mar 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider

Much Below

Below

Near Normal

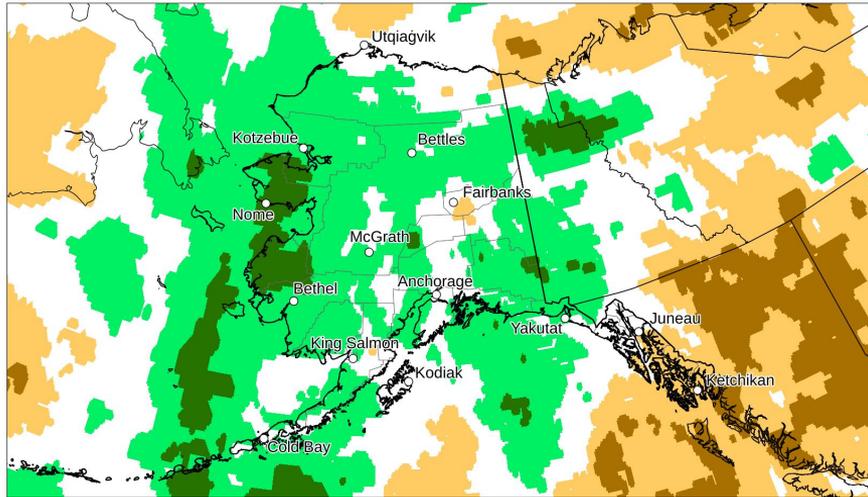
Above

Much Above

Compared to 1991-2020 Base Period

Model- based regional analysis > Total precipitation

Precipitation Classification for Mar 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider

Much Below

Below

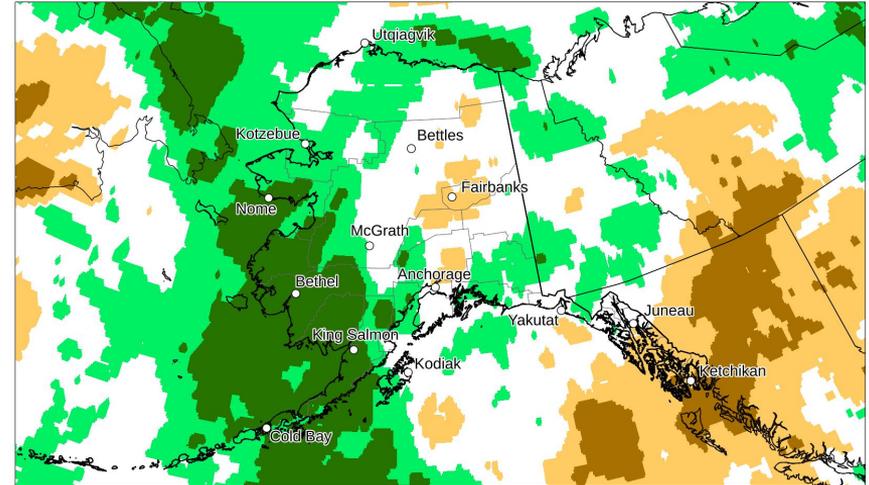
Near Normal

Above

Much Above

Compared to 1991-2020 Base Period

Precipitation Classification for Jan-Mar 2024



Source: ERA5 Reanalysis

Map by: Brian Brettschneider

Much Below

Below

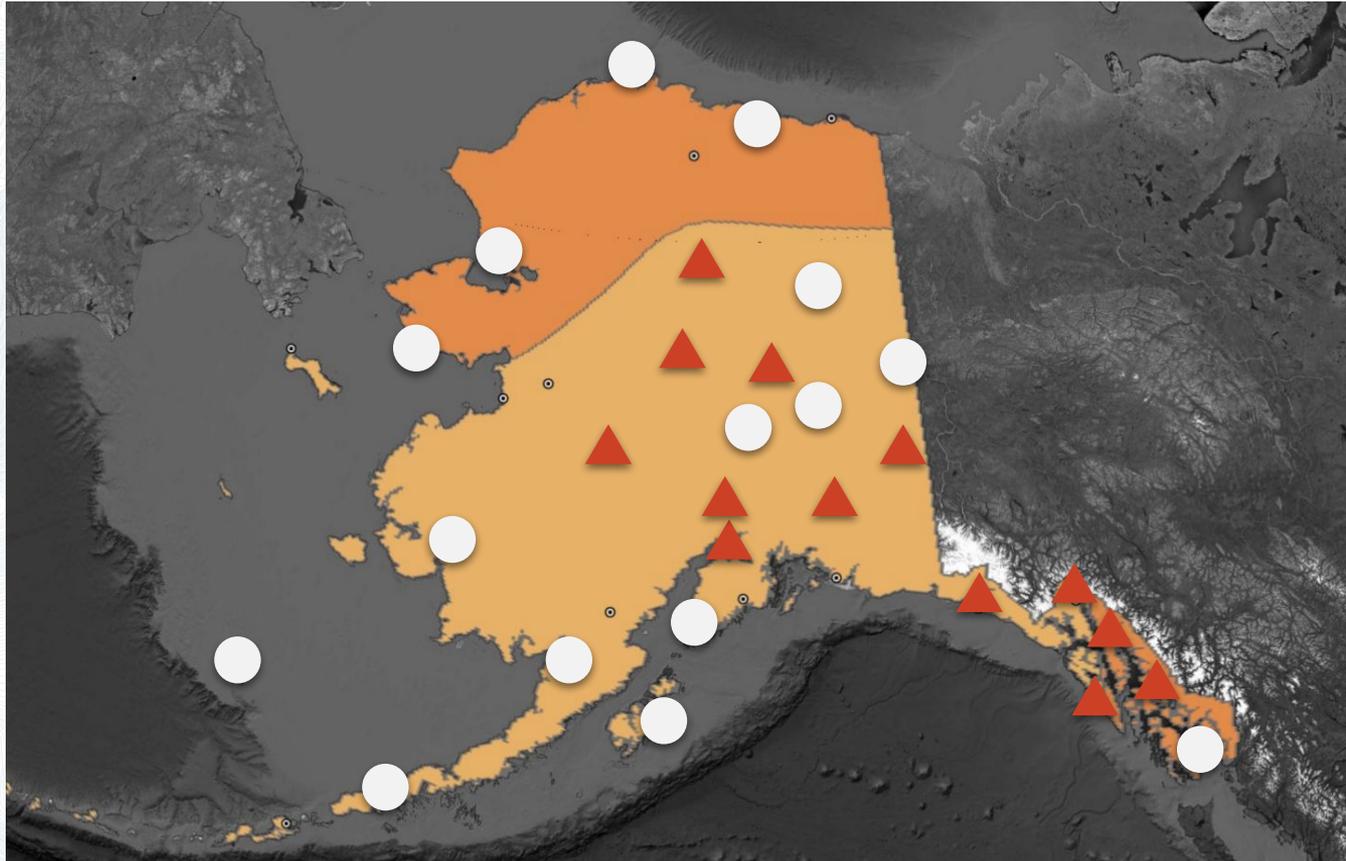
Near Normal

Above

Much Above

Compared to 1991-2020 Base Period

March 2024 temperature > CPC outlook and observed



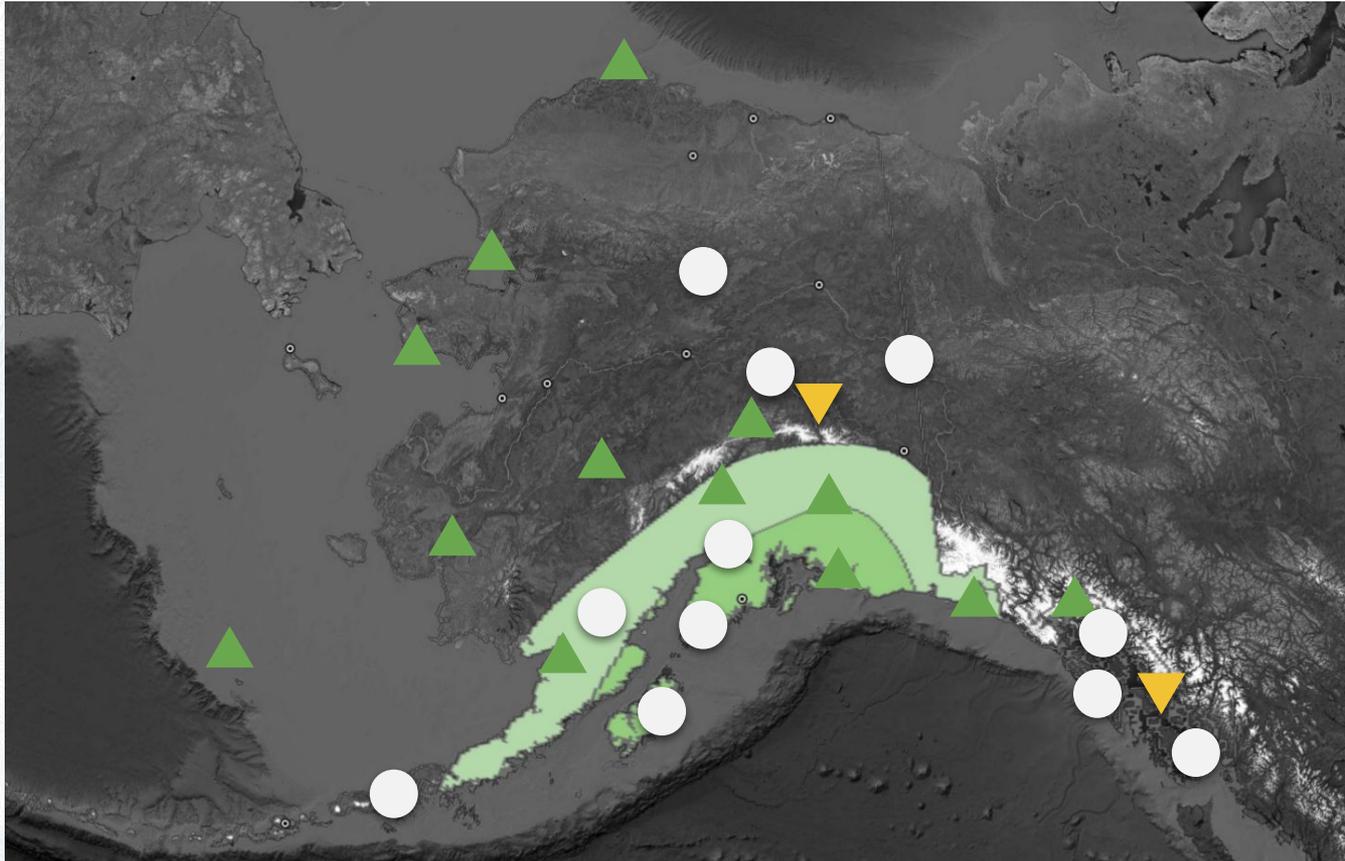
Non-EC skill
score: +14

Percent
correct: 43%

Mid-month
outlook

- ▲ Above normal
- Near normal
- ▼ Below normal

March 2024 precipitation > CPC outlook and observed



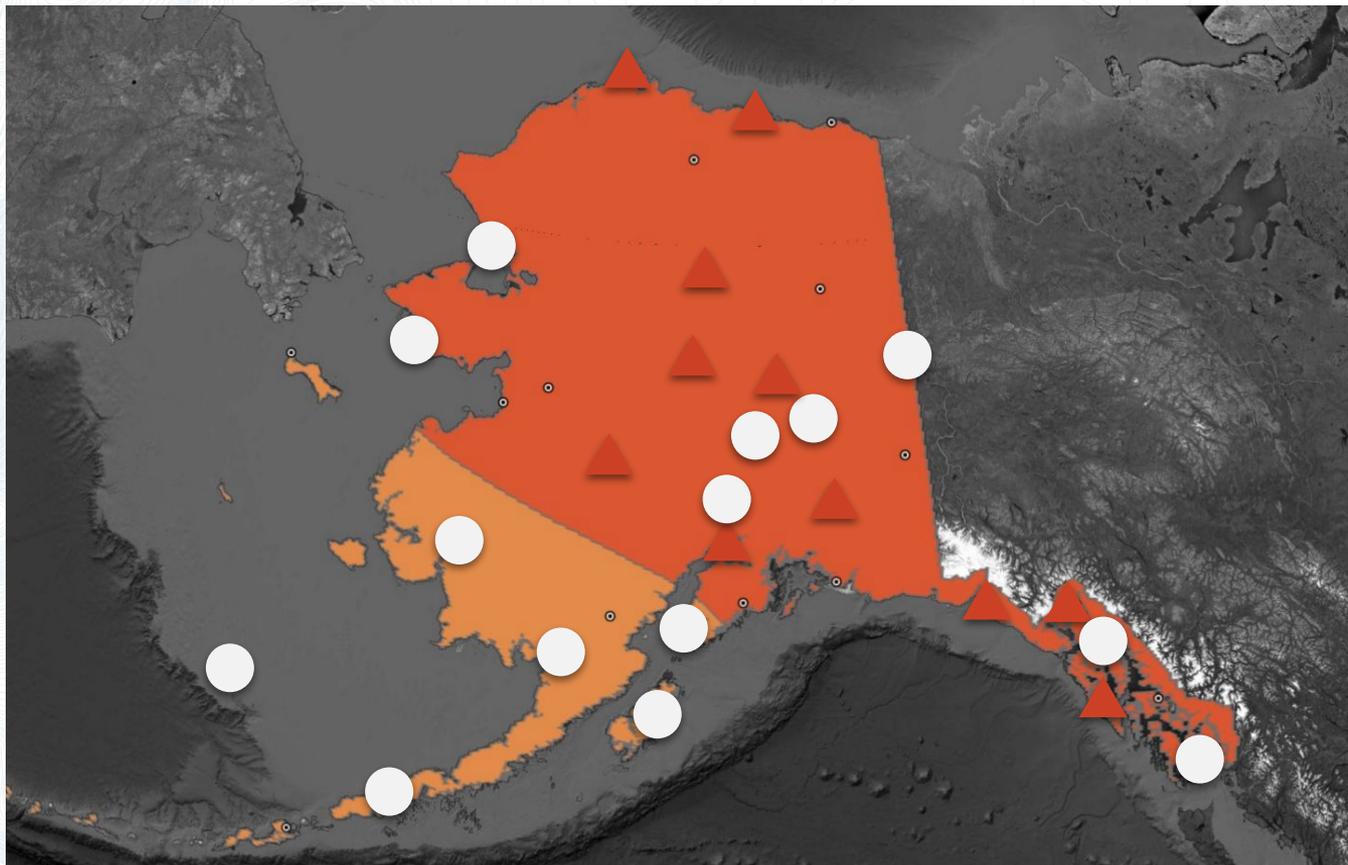
Non-EC skill
score: +33

Percent
correct: 56%

Mid-month
outlook

- ▲ Above normal
- Near normal
- ▼ Below normal

January-March 2024 temperature > CPC outlook & observed

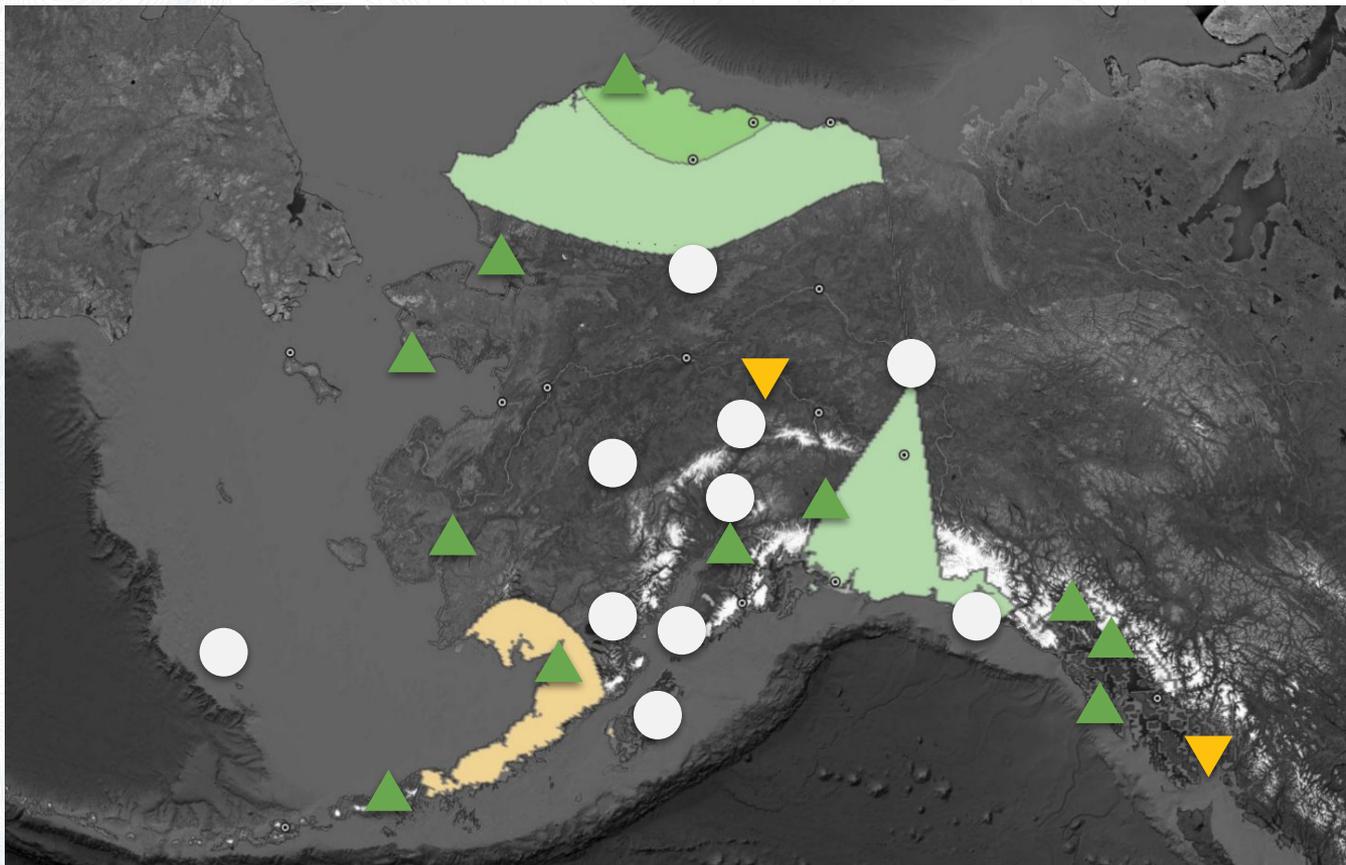


Non-EC skill
score: +16

Percent
correct: 44%

- ▲ Above normal
- Near normal
- ▼ Below normal

January-March 2024 precipitation > CPC outlook & observed

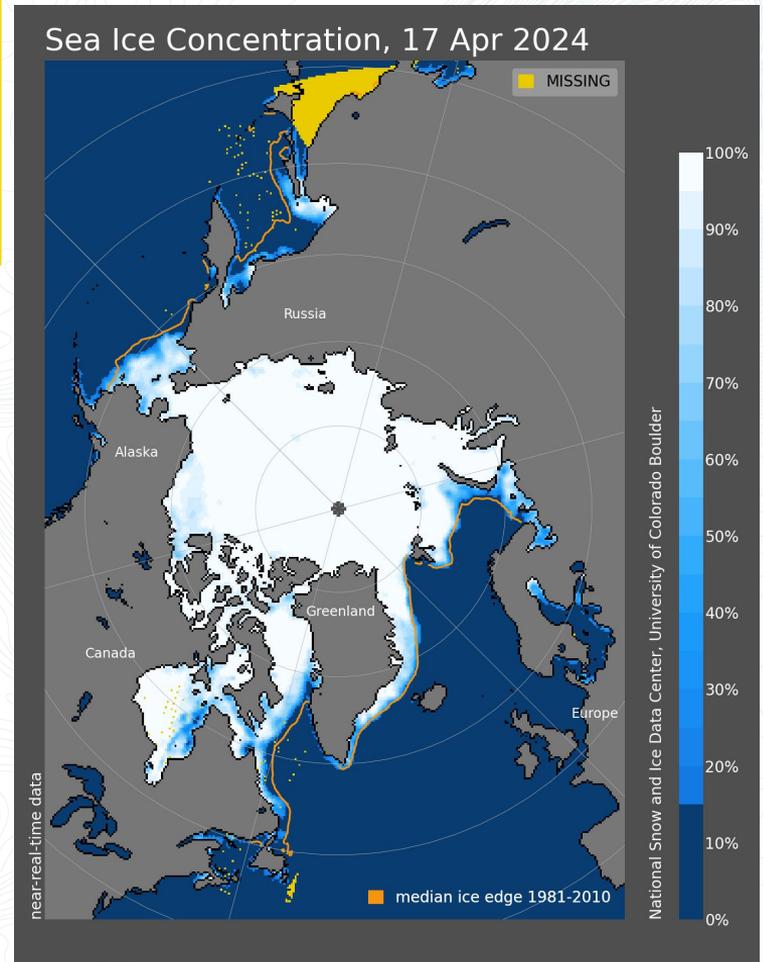
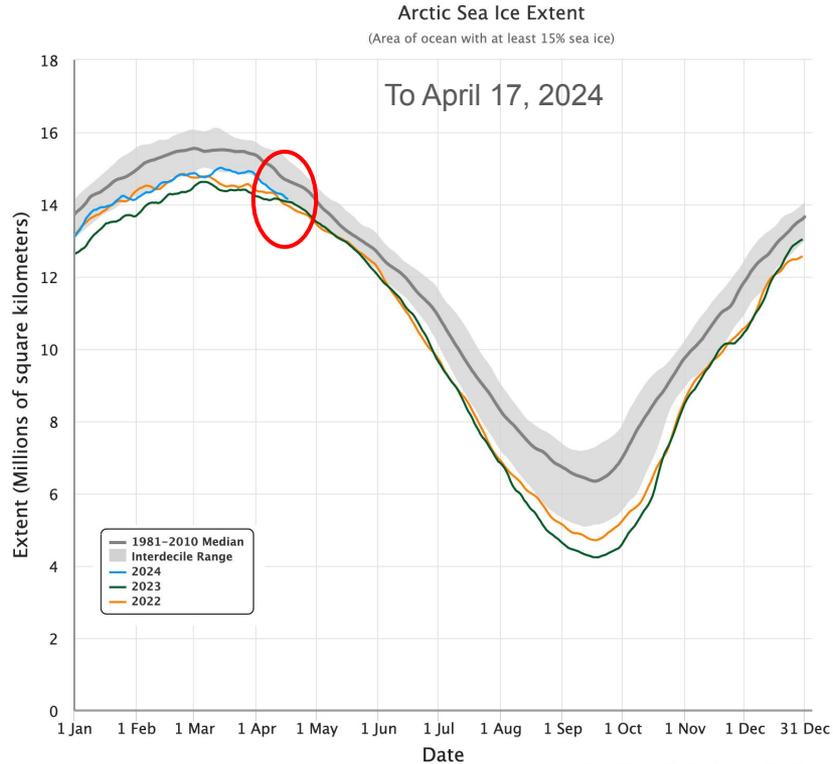


Non-EC skill
score: -25

Percent
correct: 50%

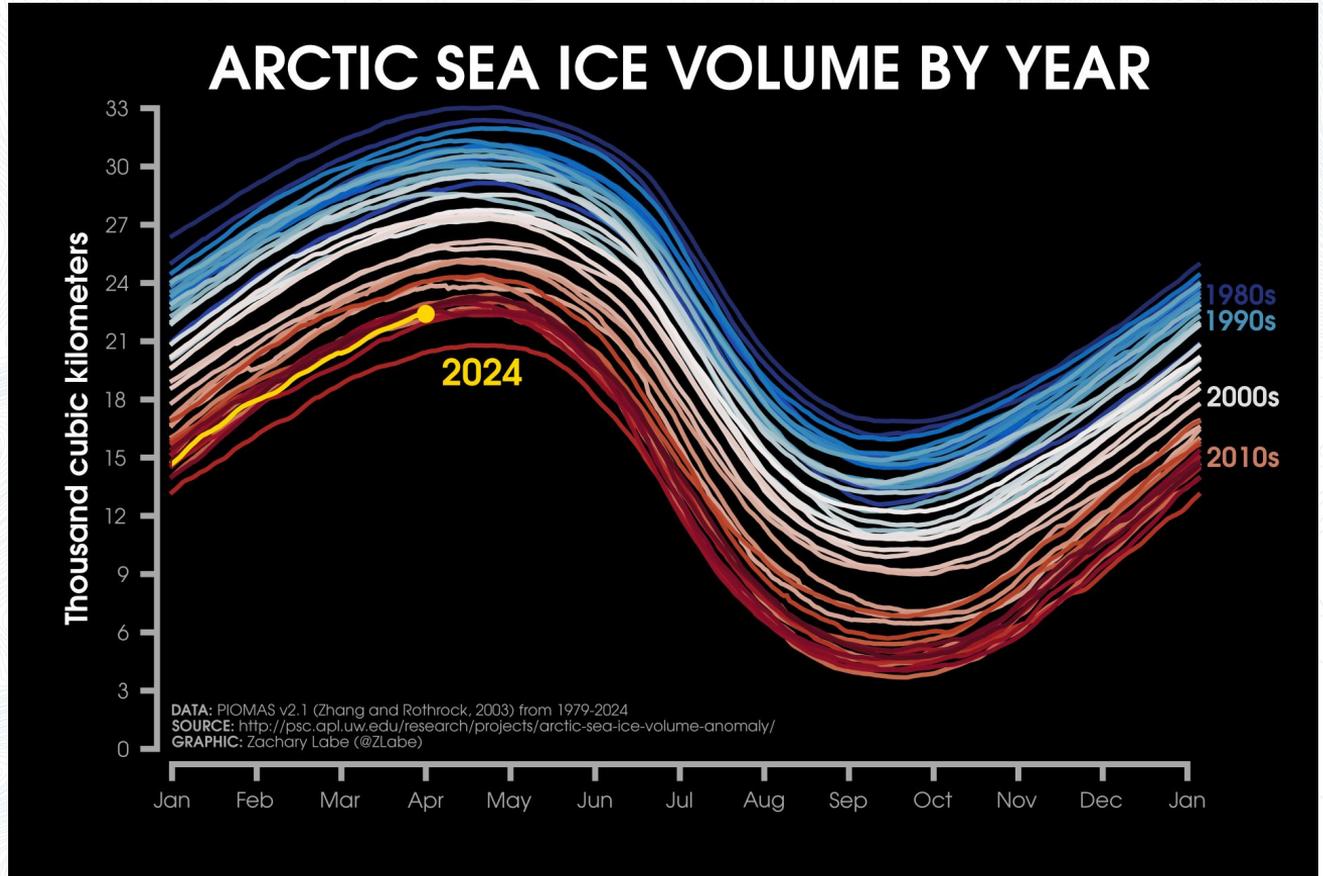
- ▲ Above normal
- Near normal
- ▼ Below normal

Arctic wide sea ice



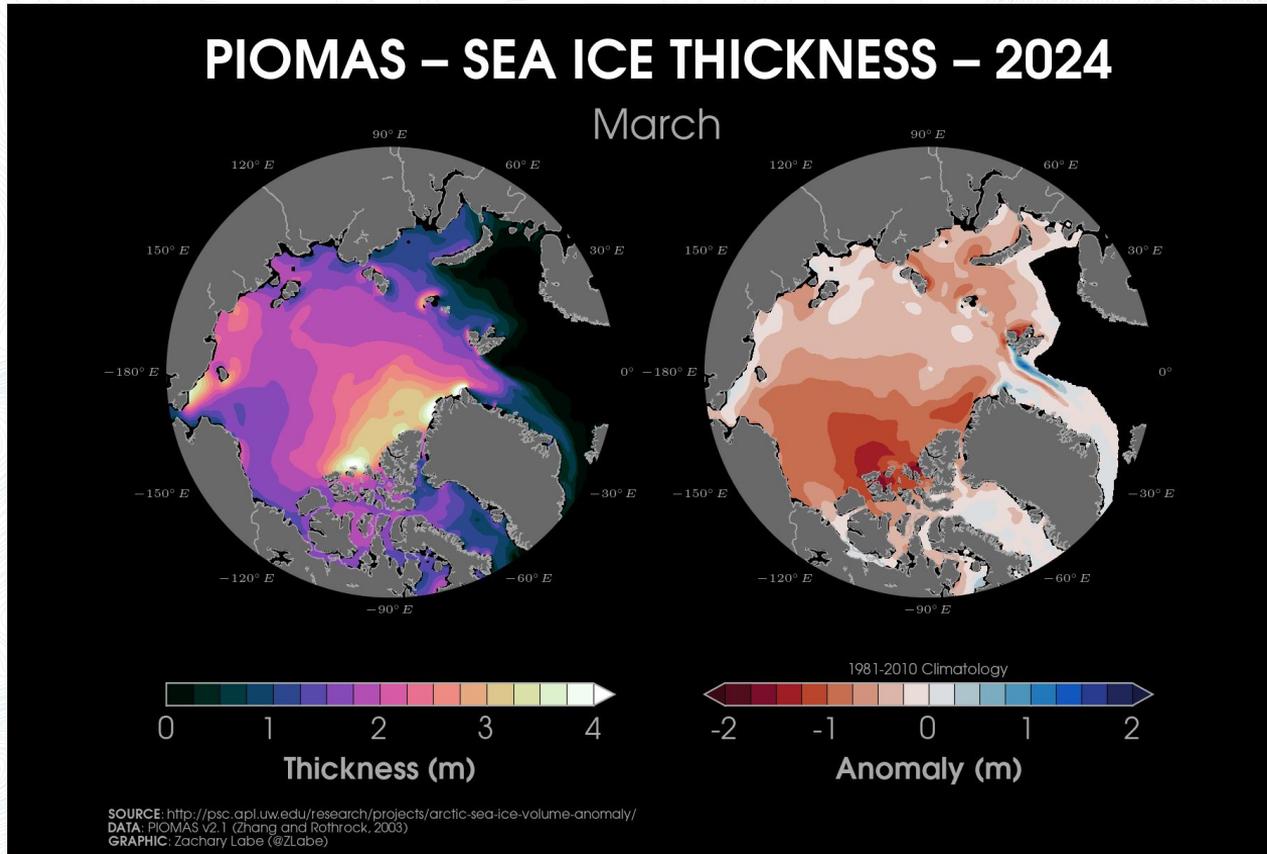
Arctic sea ice volume

Sources:
Data from U.
Wa./PIOMAS data
Graphics by Z. Labe,
Princeton U.



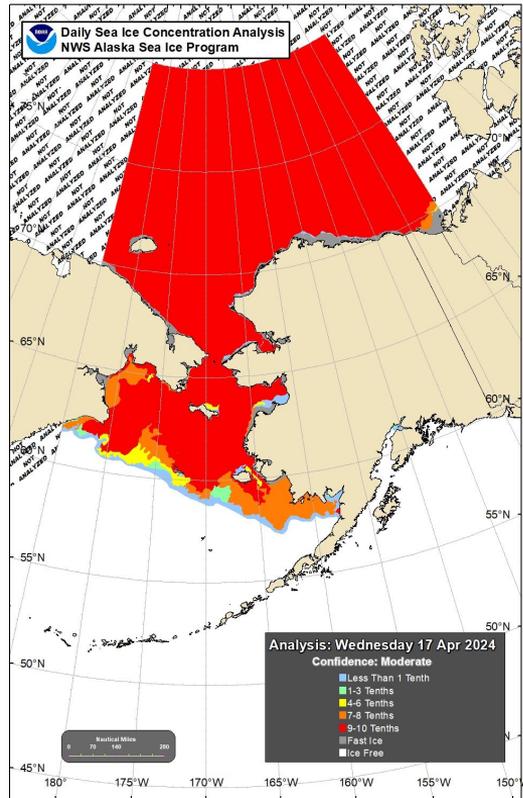
Arctic sea ice thickness

Sources:
Data from U.
Wa./PIOMAS data
Graphics by Z. Labe,
Princeton U.

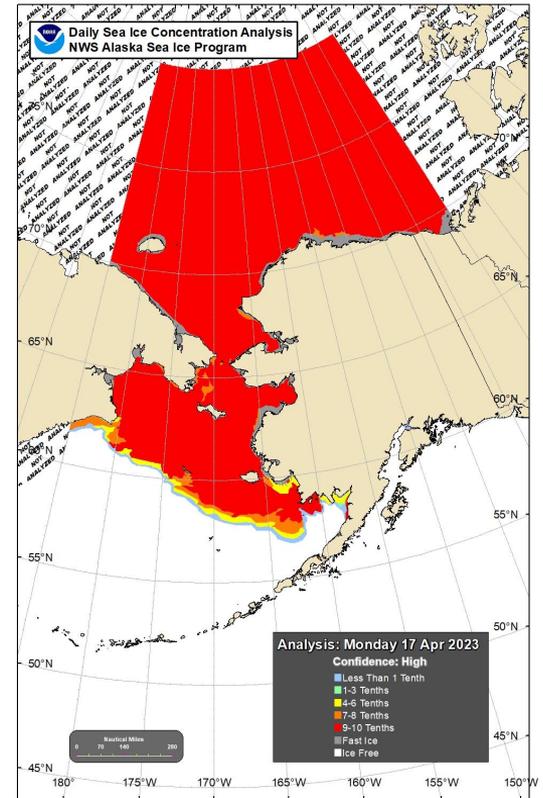


Mid-April sea ice comparison

April 17, 2024



April 17, 2023



Source: National Weather Service
Alaska Region Sea Ice Program

Drought Analysis

Source:
US Drought Monitor

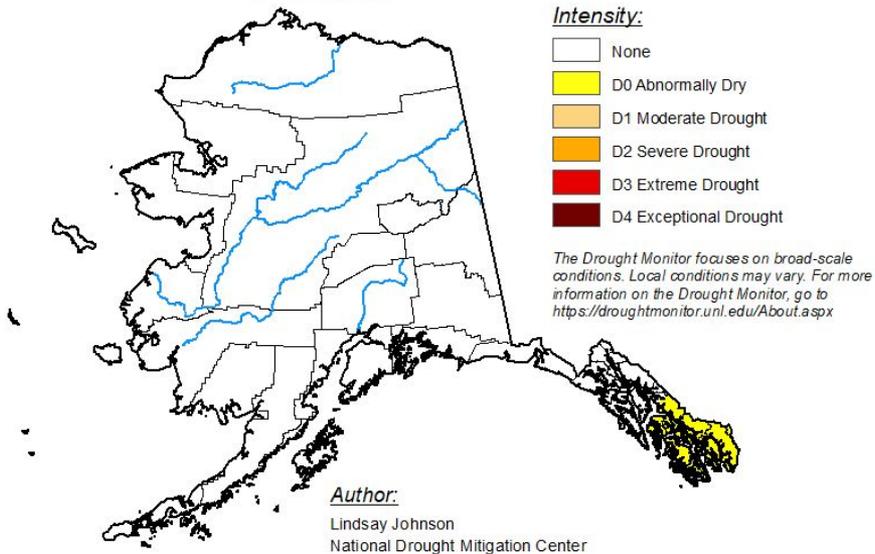


U.S. Drought Monitor

April 16, 2024

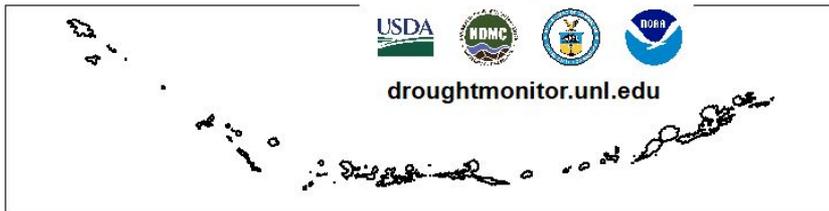
(Released Thursday, Apr. 18, 2024)

Valid 8 a.m. EDT



Author:

Lindsay Johnson
National Drought Mitigation Center

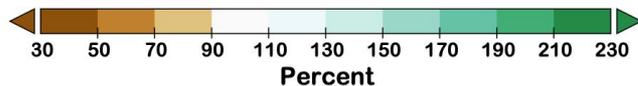
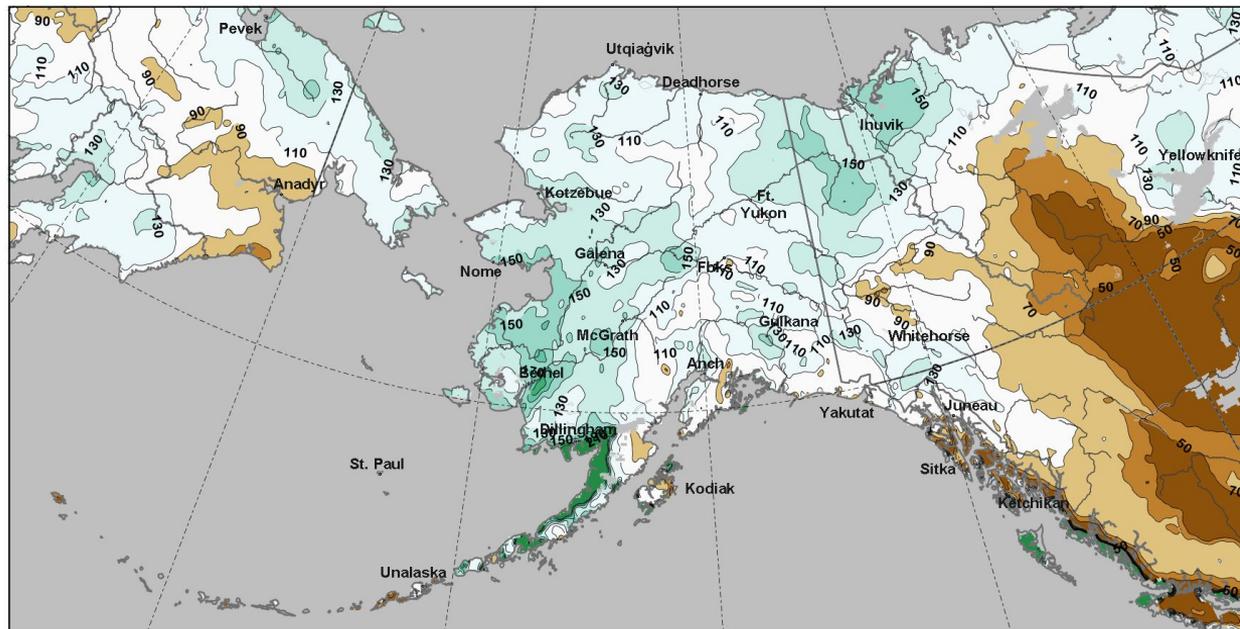


Snowpack Analysis

Source:
ERA5 Land courtesy
ECMWF/Copernicus

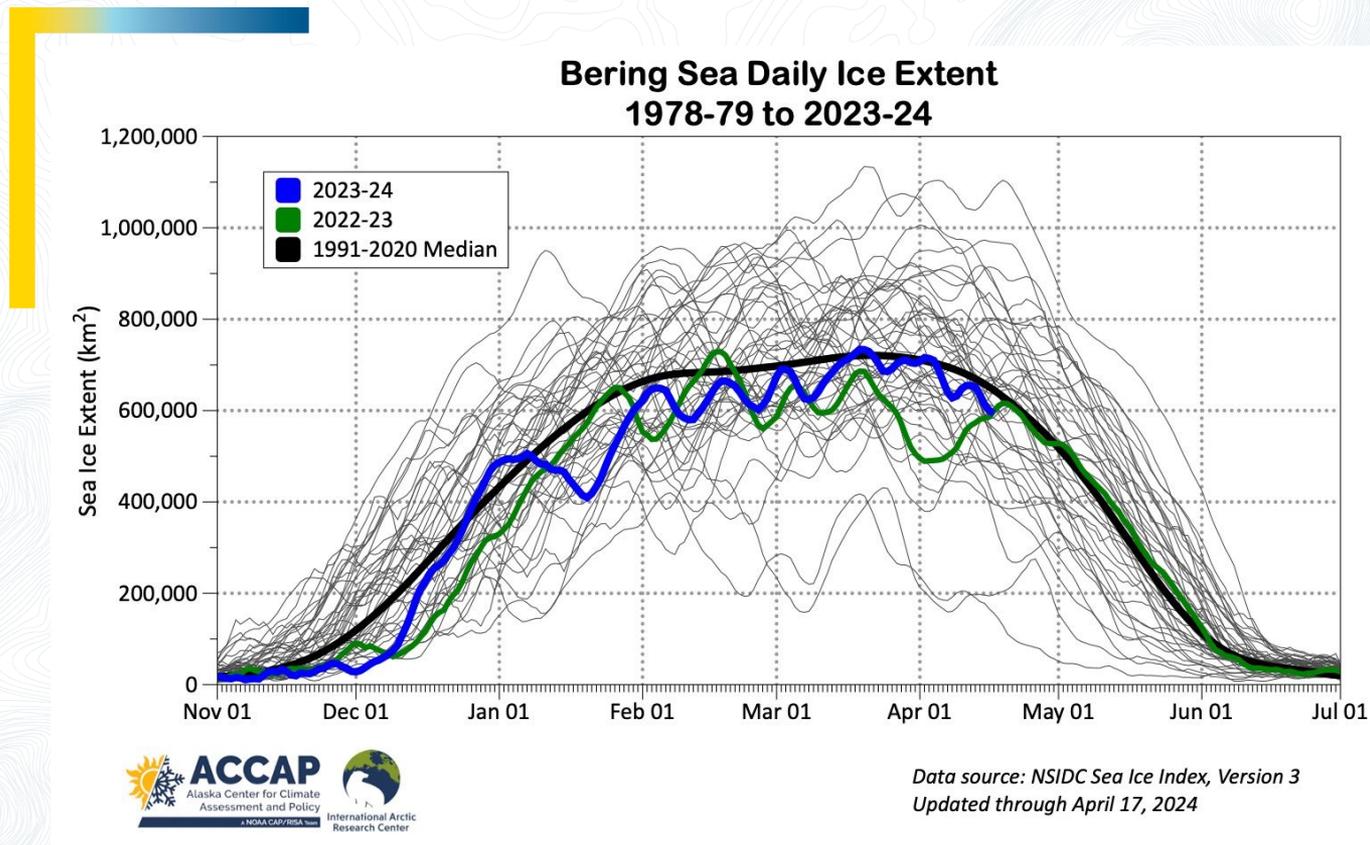
Snowpack Snow Water Equivalent: Percent of Median

April 11, 2024

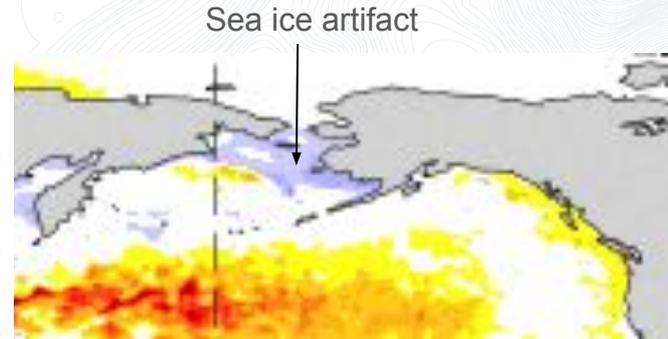
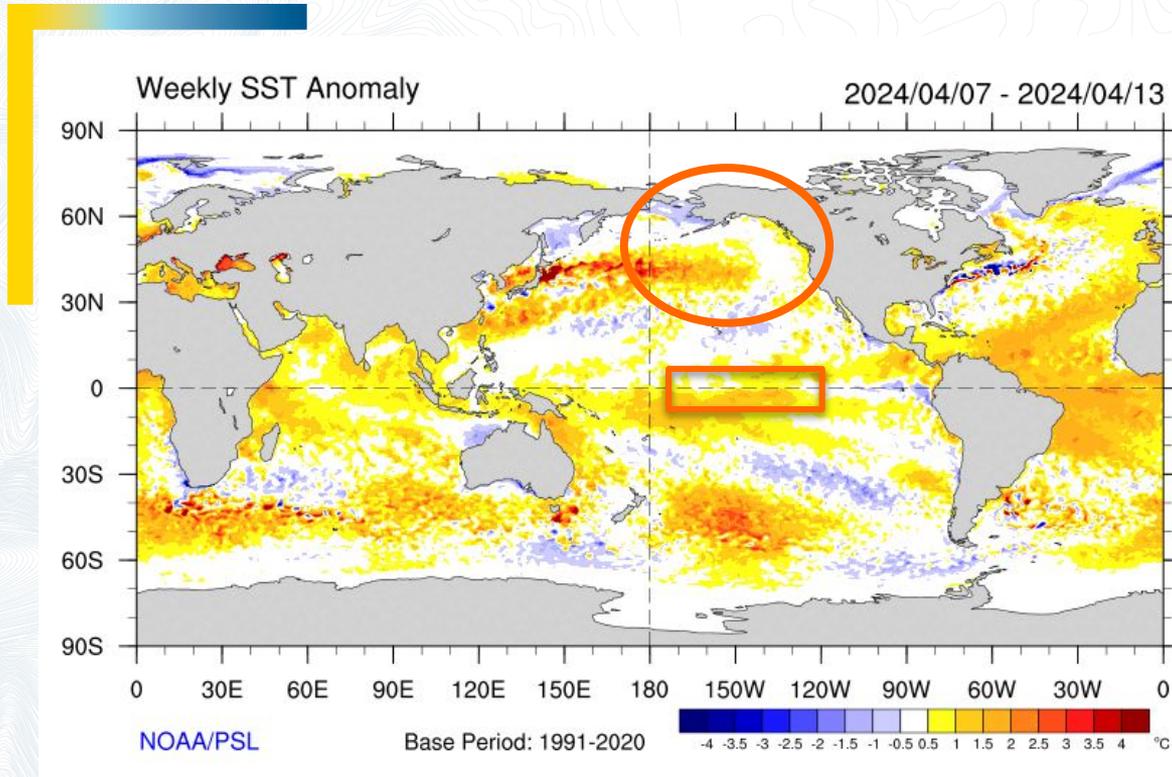


Sea ice extent through the season

Sources:
Data NSIDC Sea Ice Index,
Version 3. Through April
17, 2024.



Global sea surface temperature departure from normal



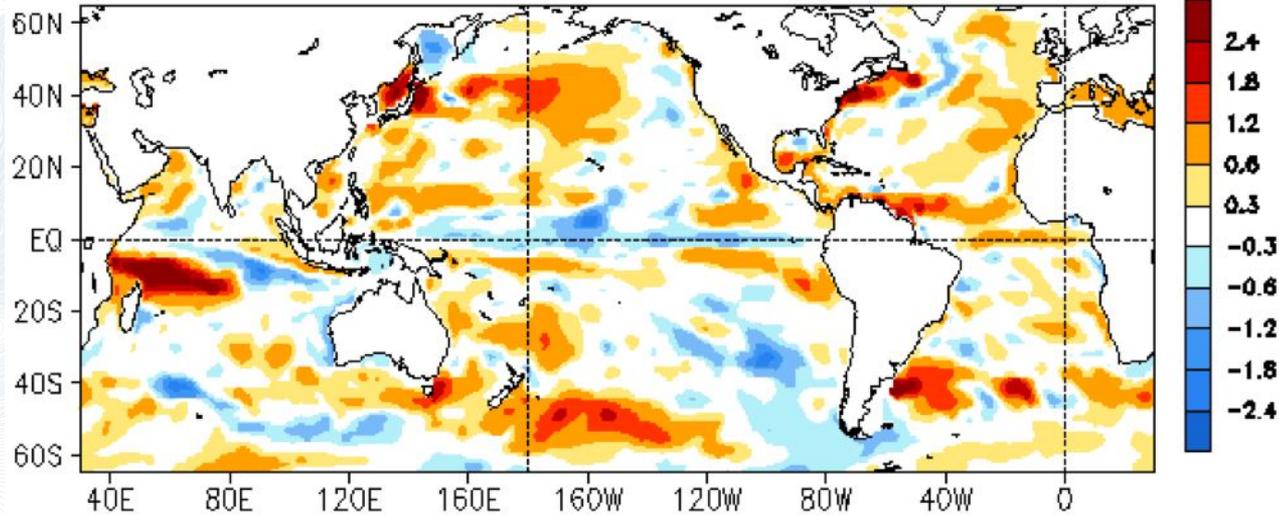
ONI for Jan-Mar: +1.5

PDO for Mar 2024: -0.41

Sources: ONI from CPC
PDO Index from JMA

Upper ocean heat departure from average

MAR 2024 Heat Content Anomaly (°C)
(GODAS, Clima. 91-20)



Little change in
Gulf of Alaska

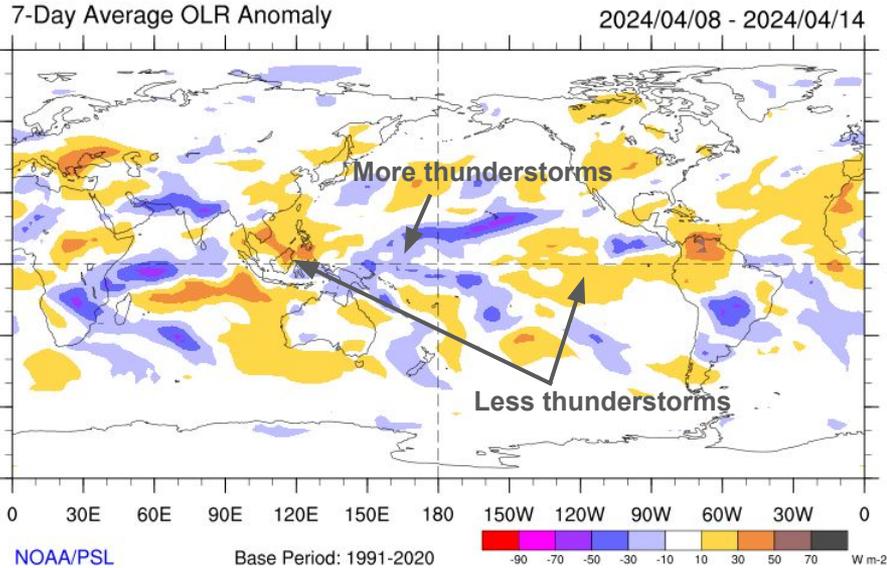
Upper 300 meters of the ocean

Sources:
CPC

Tropical Pacific atmosphere

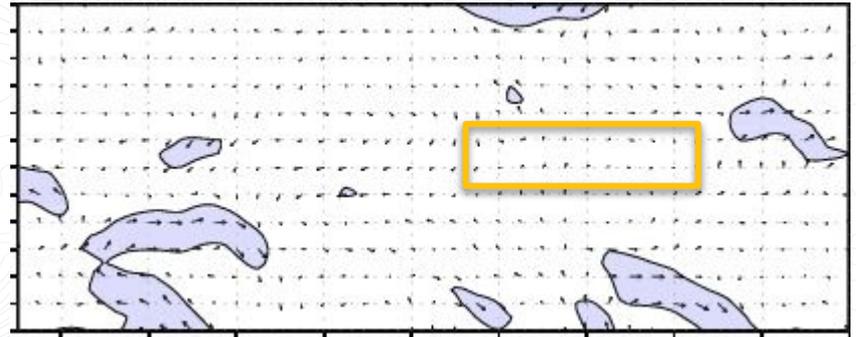
Dec 2023-Feb 2024 Oceanic
Niño Index: +1.8 Fourth
highest past 50 years

Deep tropical convection
Via “outgoing longwave radiation”

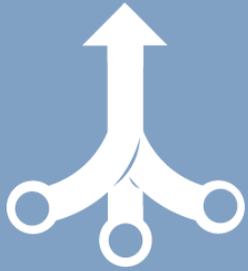


Trade winds near average
Niño Region 3.4

850 mb wind anomalies
~March 18-April 16, 2024



Behind the
climate
forecast



El Niño/La Niña (ENSO) > expert evaluation

Statistical > using the past

Dynamical models > All physics, all the time

- Sea surface temperatures
- Temperature & precipitation
- Sea ice

CPC Niño 3.4 forecasts > experts

March 2024

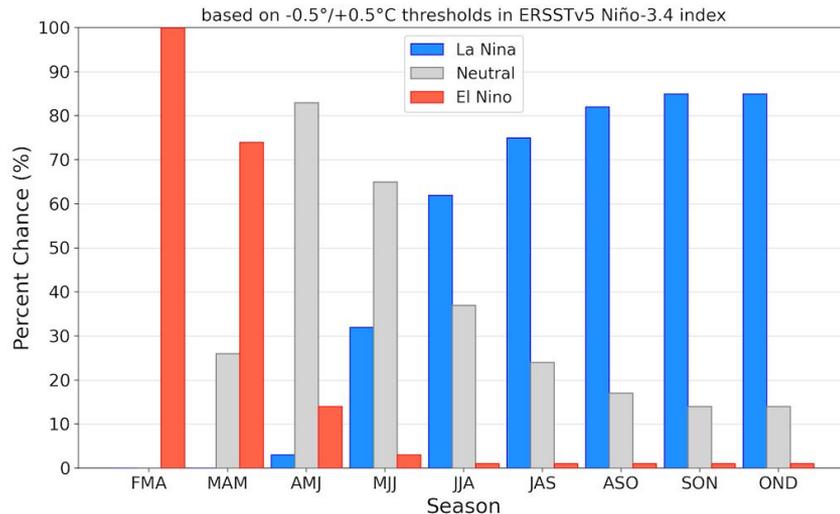
Strong El Niño reached early autumn
5th highest since 1950 by ONI

April 2024

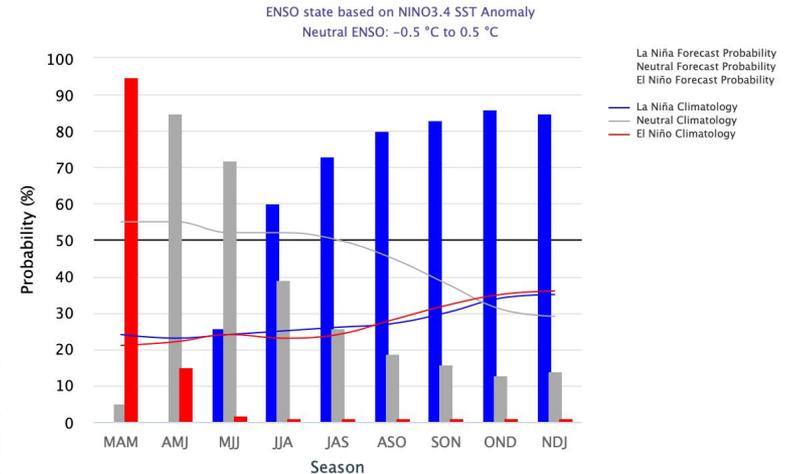
El Niño weakening rapidly next few
months 2024

ENSO Alert System Status:
El Niño Advisory & La Niña Watch

Official NOAA CPC ENSO Probabilities (issued Mar. 2024)



Early-April 2024 CPC Official Probabilistic ENSO Forecasts

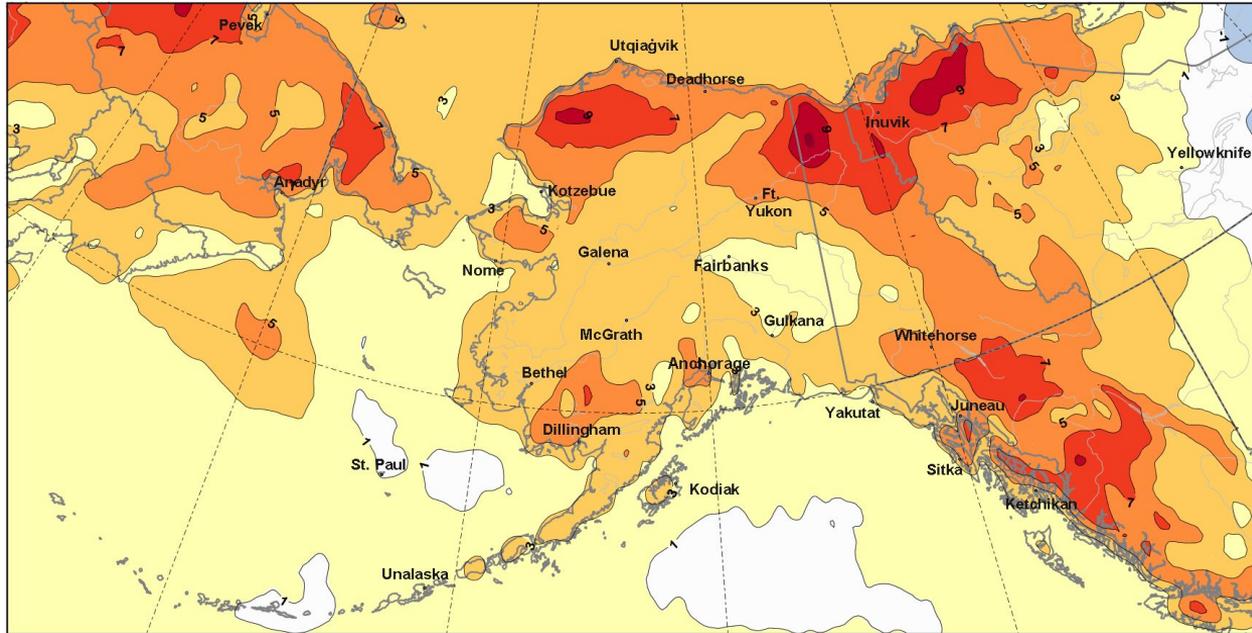


**Statistical
guidance** ➤
using the past
to predict the
future

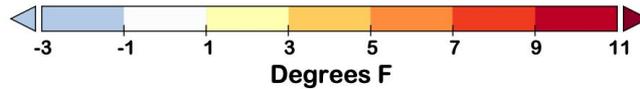
- Long term trends
- Optimum climate normals: Alaska trends the past 15 years
 - Update to new normals means OCN less informative next few years

May half century trends > Temperature

Total Change in May Average Temperature
1974-2023



Trend over 50
years

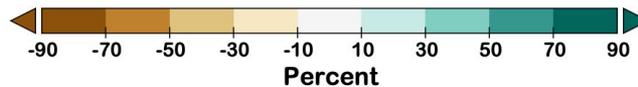
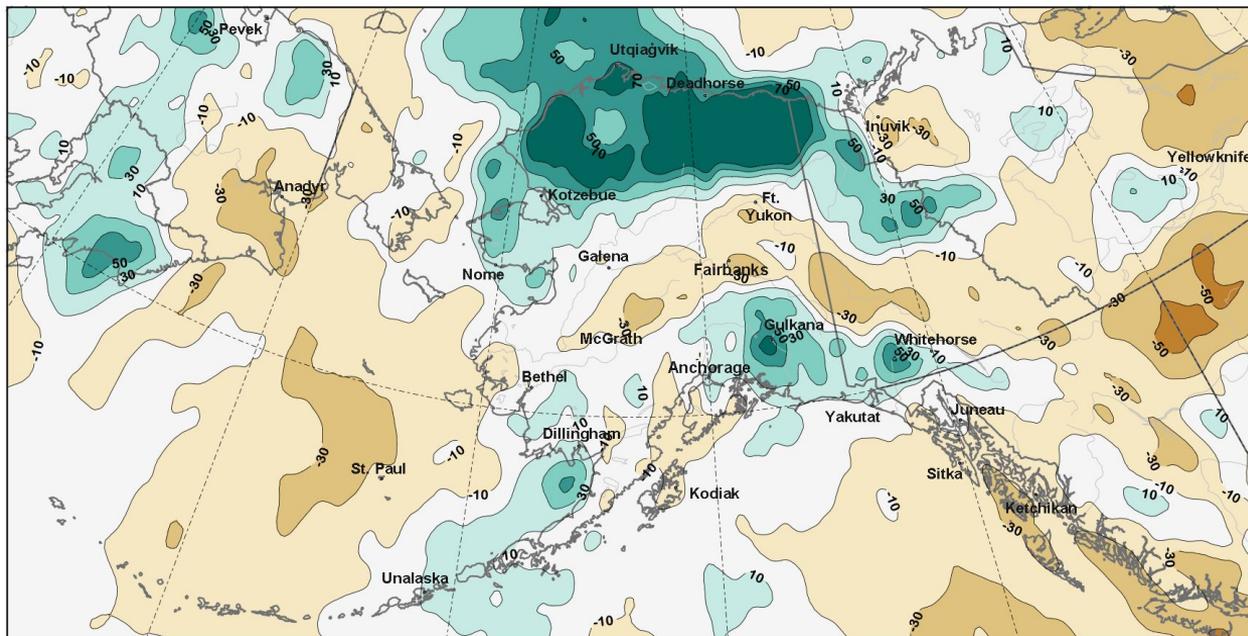


May half century trends > Precipitation

Percent Change in May Average Precipitation

1974-2023

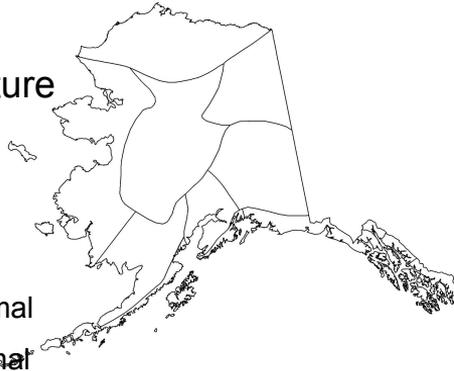
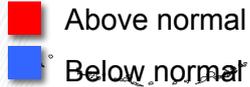
Trend over 50 years



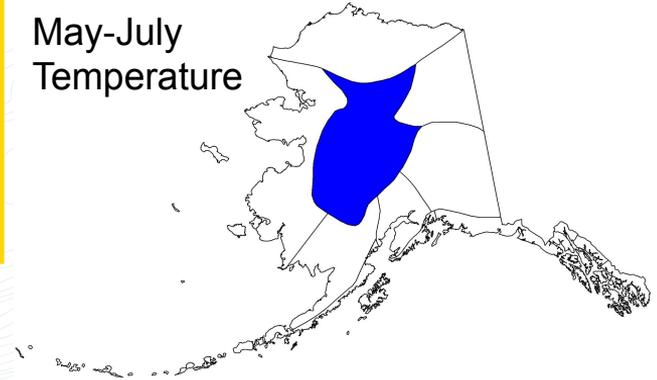
2009 to 2023 trends

Past 15 years compared to 1991-2020

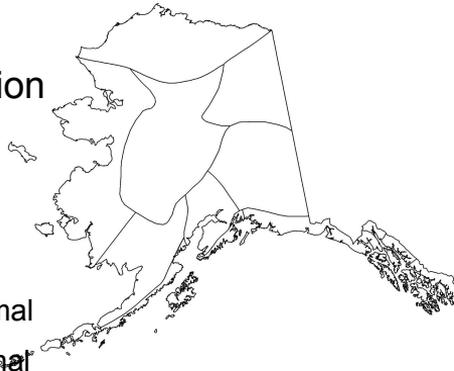
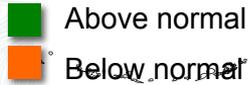
May Temperature



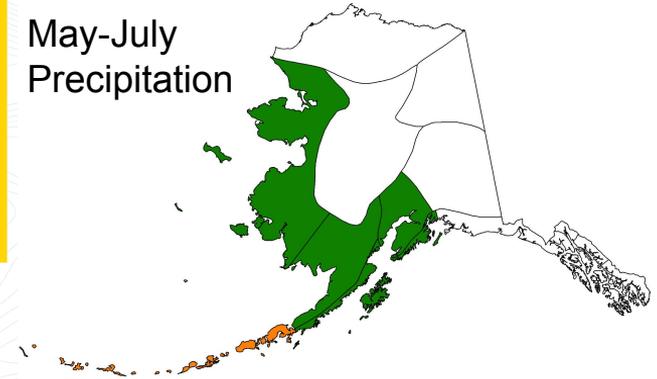
May-July Temperature



May Precipitation



May-July Precipitation



Dynamic model forecasts

Current suite of Dynamic Climate Models

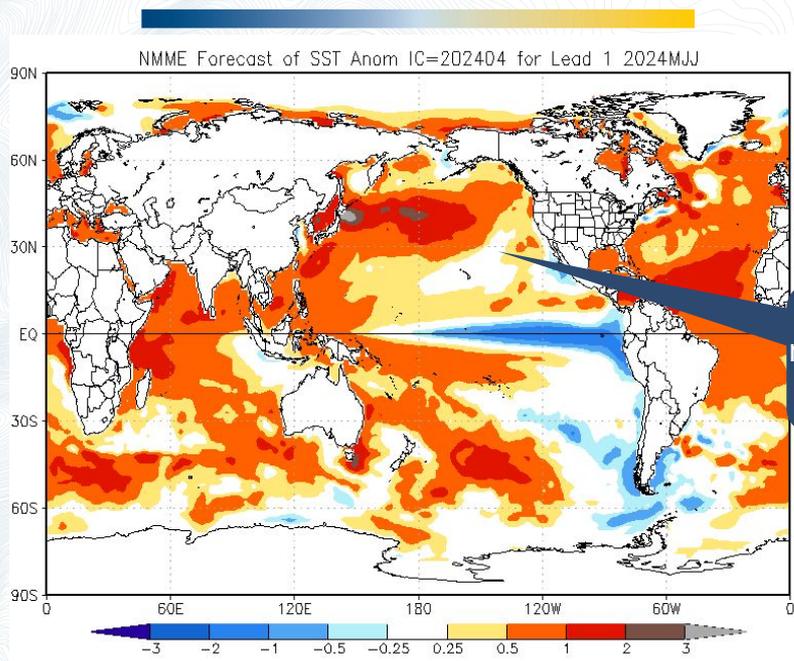
- CPC Experimental Sea Ice Ensemble
- World Climate Service Multi-Model Ensemble
- North American Multi-Model Ensemble (NMME)

What's being forecasted

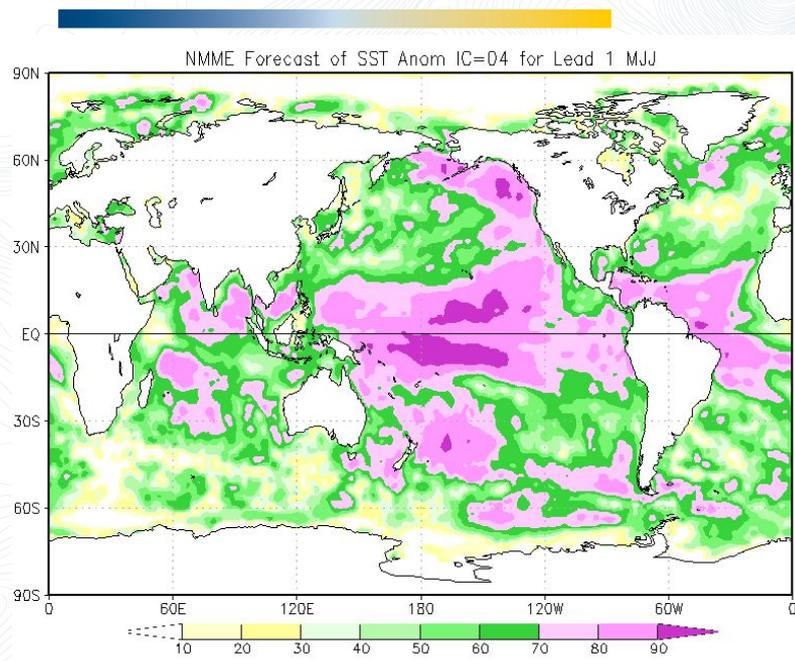
- Sea surface temperatures
- Sea ice forecast
- Temperature and precip relative to normal

May to July 2024 sea surface temperature ➤ NMME

Forecast
departure from normal

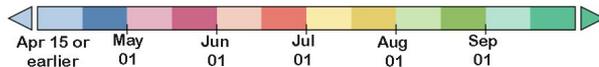
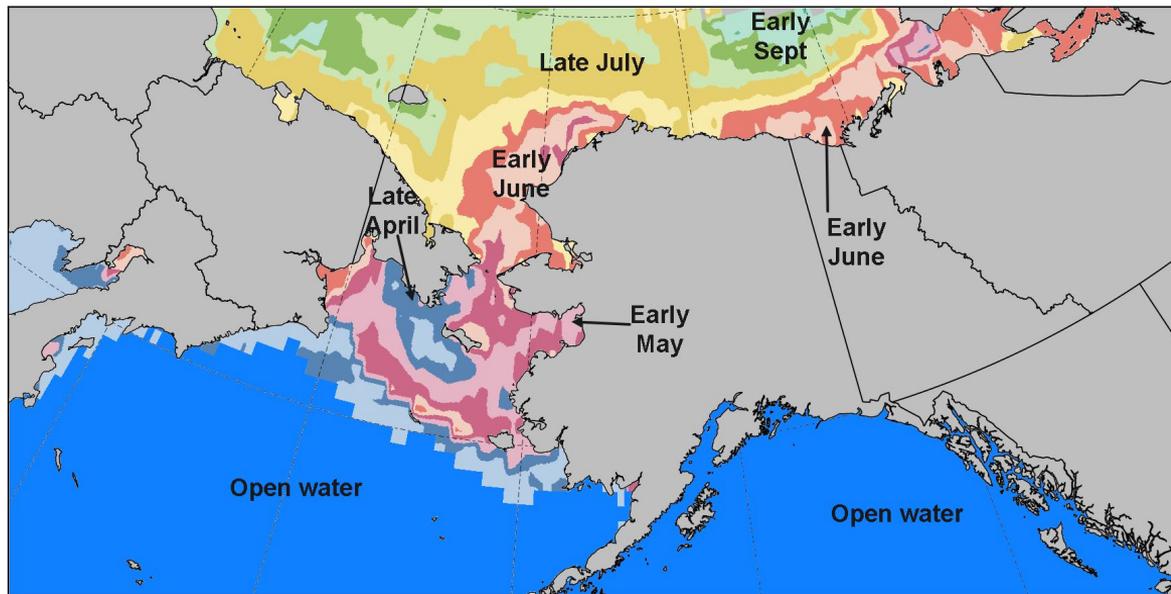


Skill
of the forecast



Experimental sea ice forecast > CPC

First date with open water
Spring/Summer 2024



Open water=Sea ice concentration less than 15%

Average of multiple model runs starting with late March data

May 2024 calibrated probability forecast ➤ NMME

Forecast from →

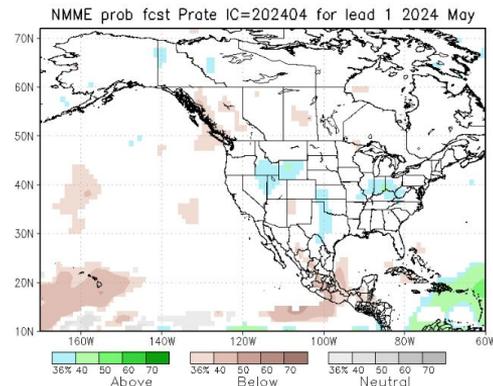
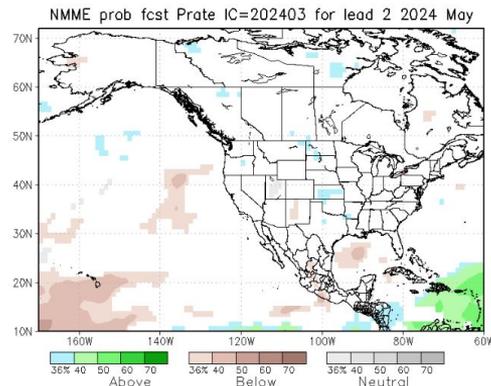
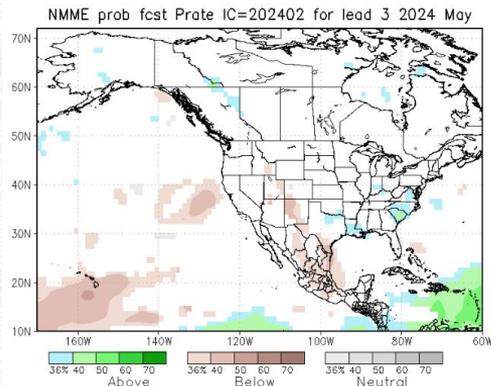
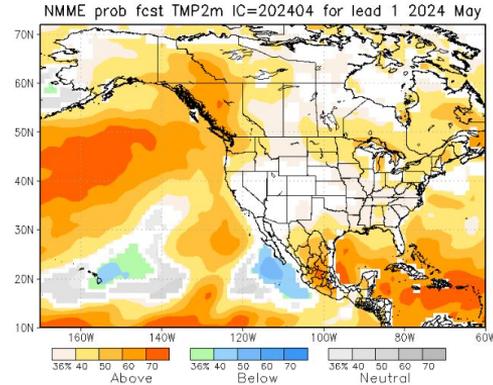
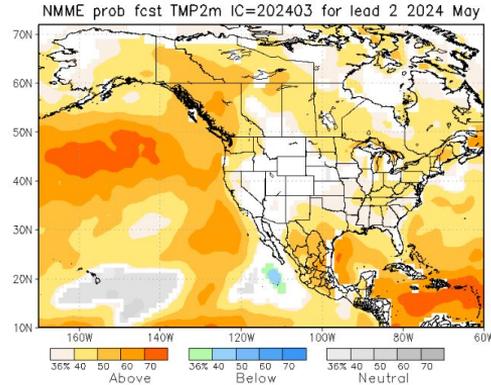
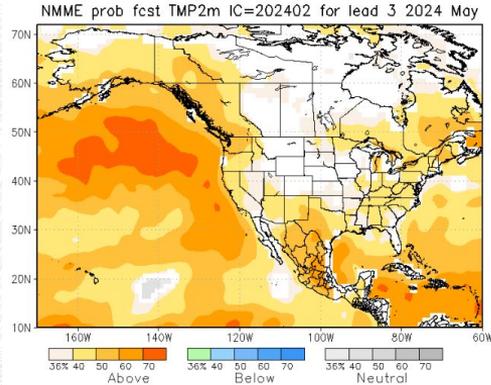
February

March

April

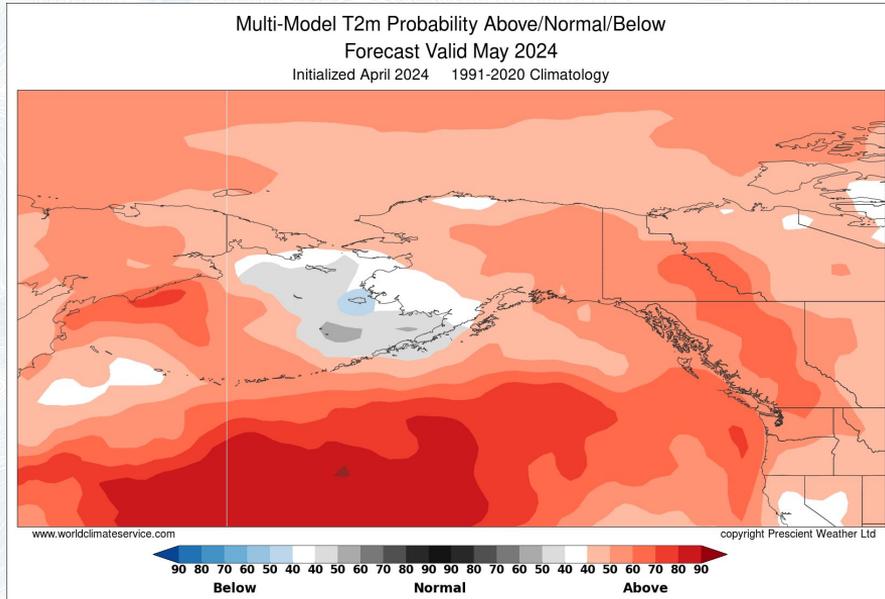
Temperature

Precipitation

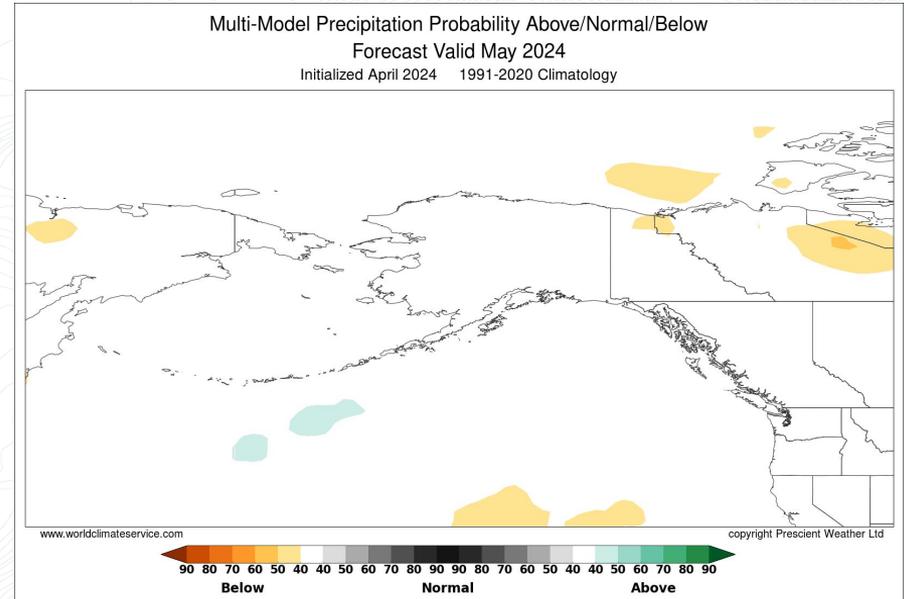


May 2024 outlooks > World Climate Service

Temperature



Precipitation



Bias Corrected, Skill Weighted CFS + ECMWF

May-July 2024 calibrated probability forecast ➤ NMME

Forecast from →

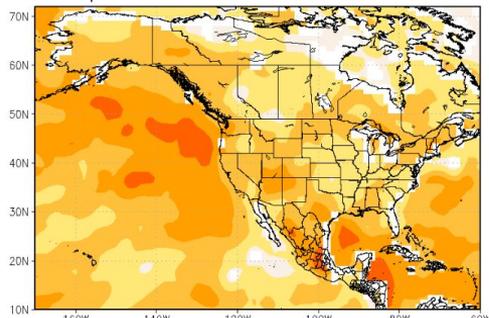
February

March

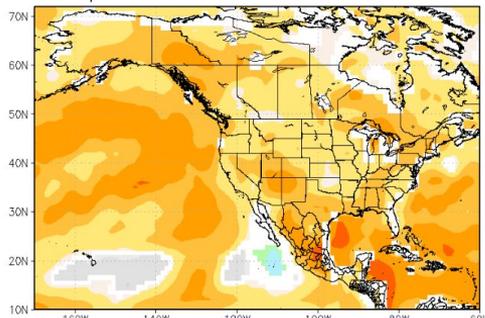
April

Temperature

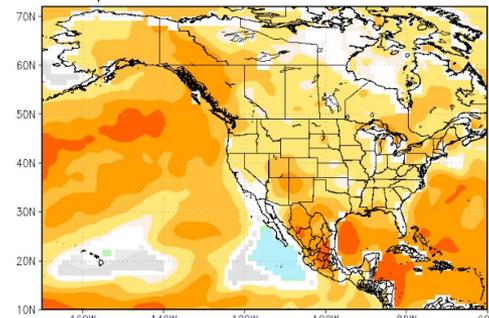
NMME prob fcst TMP2m IC=202402 for lead 3 2024 MJJ



NMME prob fcst TMP2m IC=202403 for lead 2 2024 MJJ

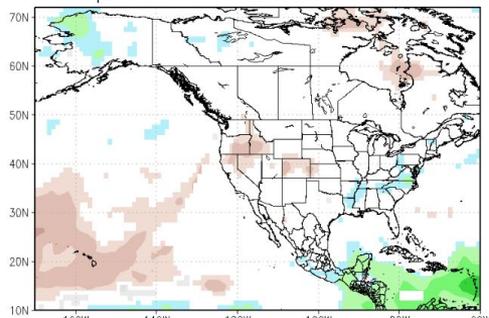


NMME prob fcst TMP2m IC=202404 for lead 1 2024 MJJ

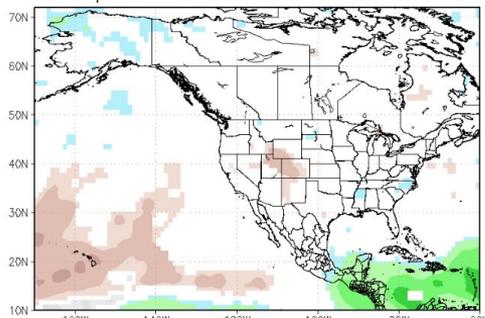


Precipitation

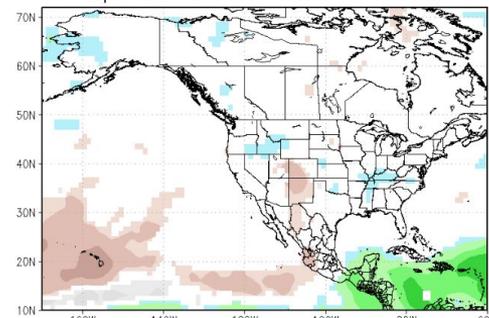
NMME prob fcst Prate IC=202402 for lead 3 2024 MJJ



NMME prob fcst Prate IC=202403 for lead 2 2024 MJJ



NMME prob fcst Prate IC=202404 for lead 1 2024 MJJ

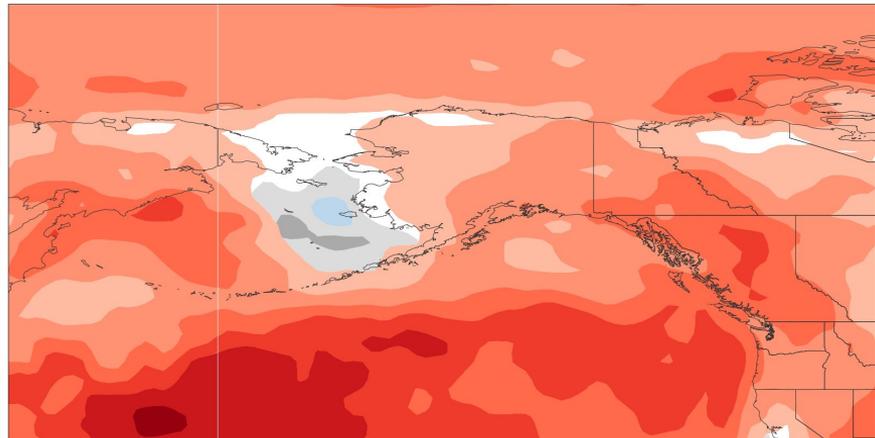


May-July 2024 outlooks ➤ World Climate Service

Temperature



Multi-Model T2m Probability Above/Normal/Below
Forecast Valid May 2024 - Jul 2024
Initialized April 2024 1991-2020 Climatology



www.worldclimateservice.com

copyright Prescient Weather Ltd



Precipitation



Multi-Model Precipitation Probability Above/Normal/Below
Forecast Valid May 2024 - Jul 2024
Initialized April 2024 1991-2020 Climatology



www.worldclimateservice.com

copyright Prescient Weather Ltd



Bias Corrected, Skill Weighted CFS + ECMWF

May-July 2024 outlooks from March

Above%
Normal%
Below%

Temperature

Precipitation

33%
33%
33%

45%
33%
22%

45%
33%
22%

33%
33%
33%

55%
33%
12%

37%
33%
30%

37%
33%
30%

Equal Chances

Above

Equal Chances

Above

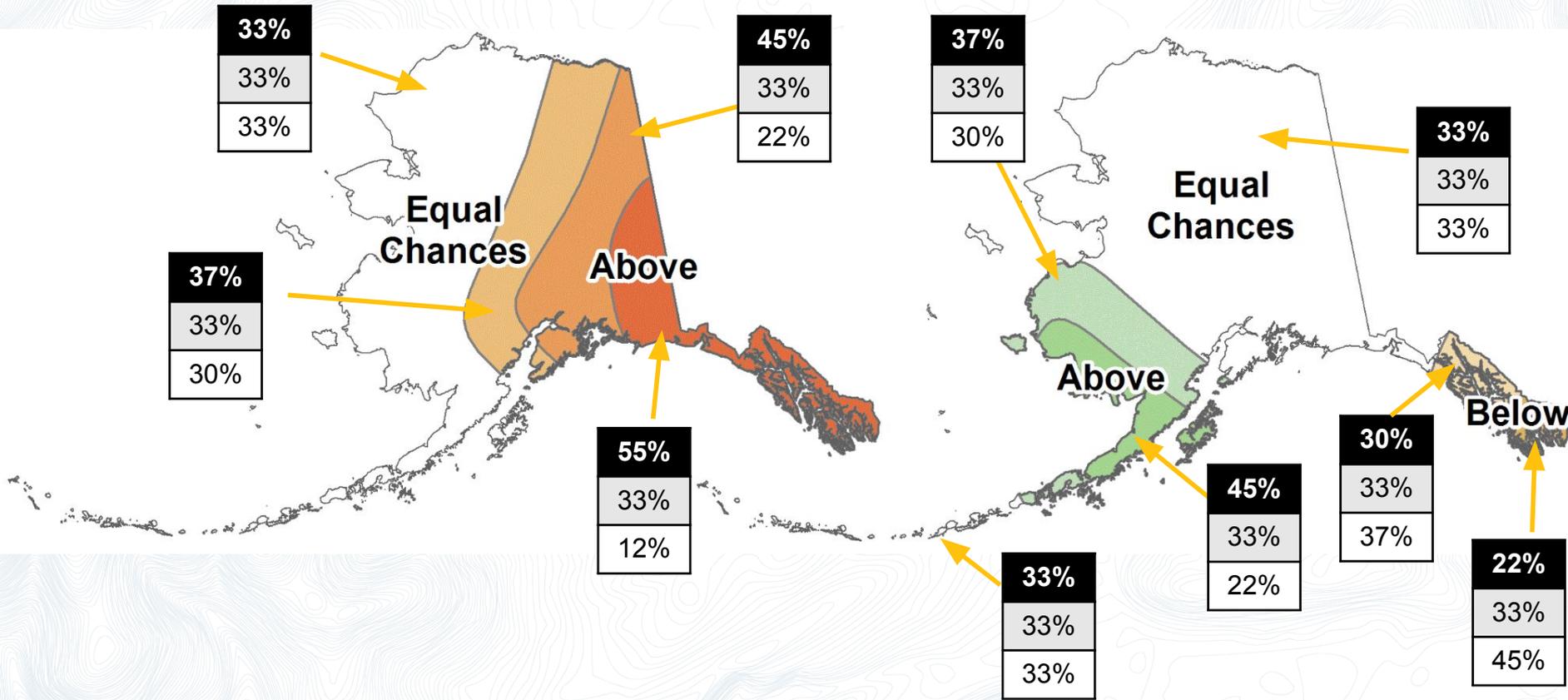
Equal Chances

Future
outlook

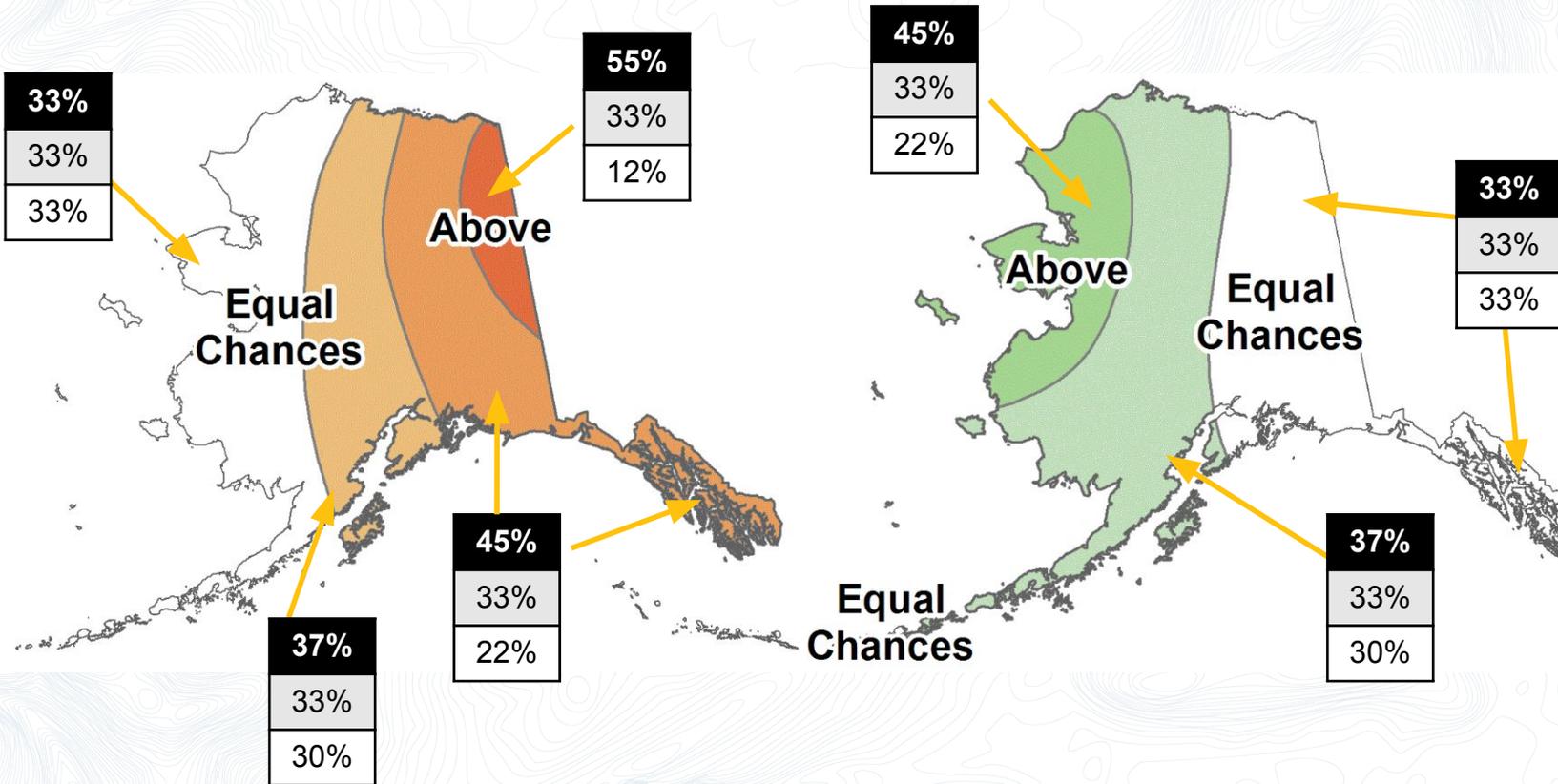


And the answer is...

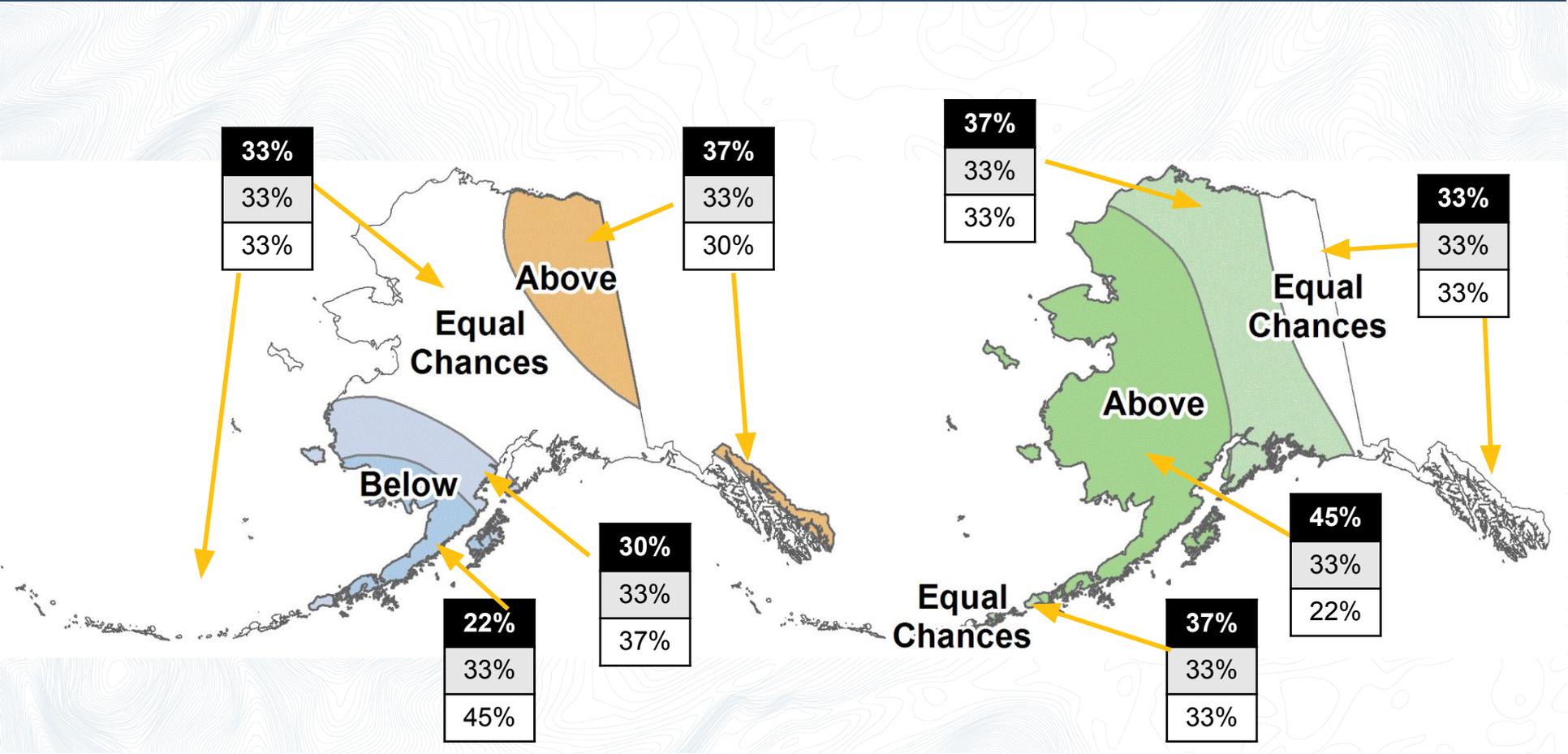
CPC May 2024 outlooks



CPC May-July 2024 outlooks



Summer 2024 outlook



Upcoming ACCAP webinars

Upcoming ACCAP webinars accap.uaf.edu/events

- April 19 ▶ Tools for monitoring Alaskan river ice break-up from the ground, air and space
- April 23 ▶ The 2023 Mendenhall Glacial Lake Outburst Flood and a look at other Alaskan glacial dammed lakes
- April 25 ▶ Alaska River Break-up with NWS/APRFC
- April 30 ▶ Green-up with OneTree Alaska

Email Rick Thoman rthoman@alaska.edu



ACCAP is housed at the International Arctic Research Center on the University of Alaska Fairbanks Troth Yeddha' Campus