ALASKA REGION
CLIMATE OUTLOOK BRIEFING

October 20, 2023

Rick Thoman

Alaska Center for Climate Assessment and Policy/University of Alaska Fairbanks

ACCAP Alaska Center for Climate Assessment and Policy, A NOAA CAP/RISA Team

International Arctic Research Center

National Weather Service

NOAA

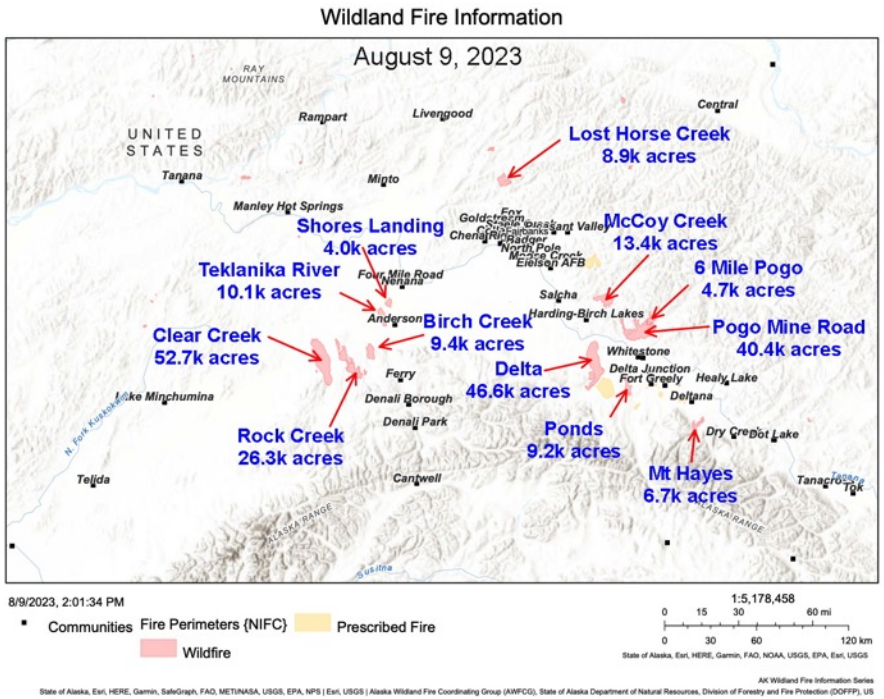
Today's Agenda

- Feature of the month: 2023 Summer Season Summary
- Climate Forecast Basics
- Climate System Review
  - Long Term Perspective
  - CPC forecasts & observations for most recent month & season
  - Current Atmosphere and Ice
  - Climate Drivers: SSTs, ENSO
- Climate Forecast Guidance
  - ENSO
  - Statistical tools
  - Dynamic models
- CPC Outlooks
  - November & November 2023-January 2024
  - Mid-Winter 2023-24

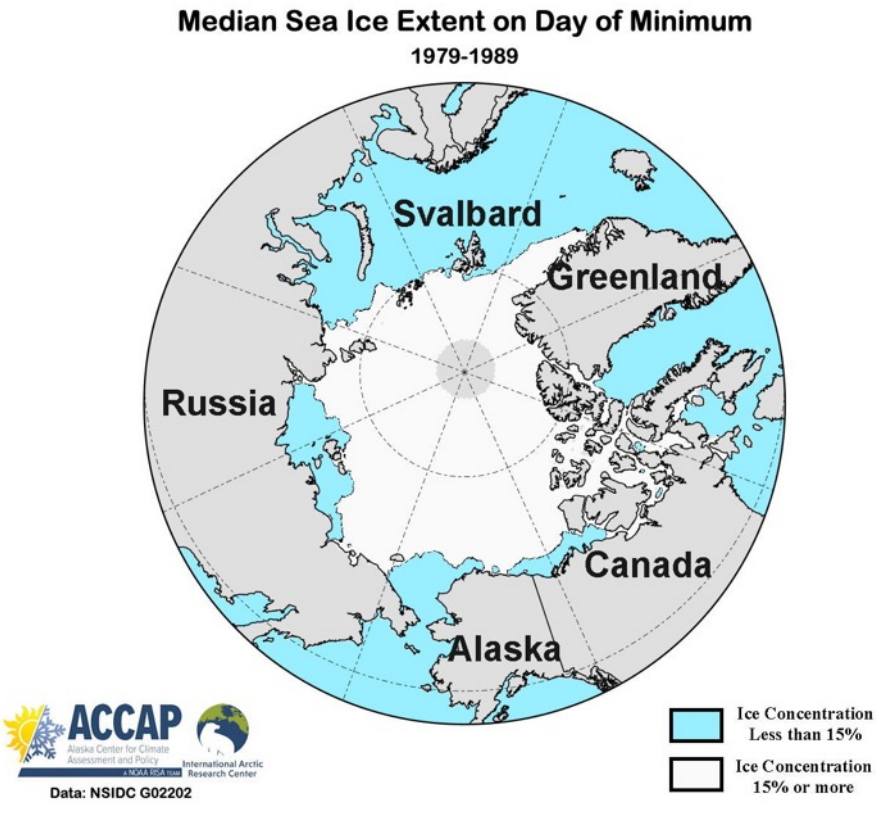
Summer Summary: Wildfire

Wildfire

- Alaska: 295,100 acres burned (16th lowest past 40 years)
- Unprecedented 99.4 percent area burned after July 24th
- Clustered in central Interior where summer precipitation below normal



Summer Summary: Sea Ice



Arctic-Wide Min Extent 6th lowest

Beaufort Sea: 2nd lowest min extent

Chukchi Sea: 10th lowest but 97.5% open water

East Siberian Sea: 3rd lowest

Notable September-October Happenings

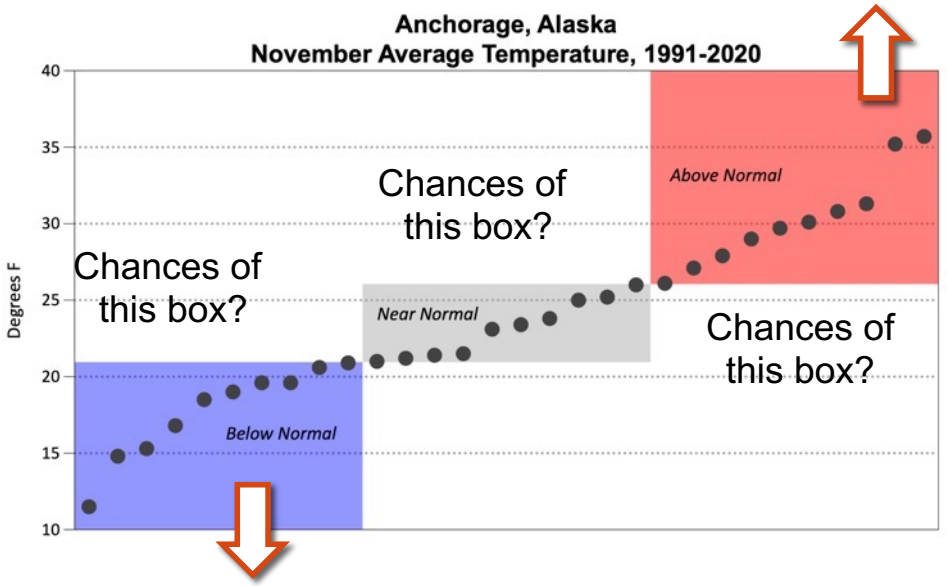
- **Southcentral**:
  - Oct 6 Freezing rain Tazlina and Edgerton Highway
- **Southeast**: Very mild and wet early-mid October
- **Interior**: slightly early snow pack establishment

Alaska Day 2023 in Sitka
Photo credit B. Walton

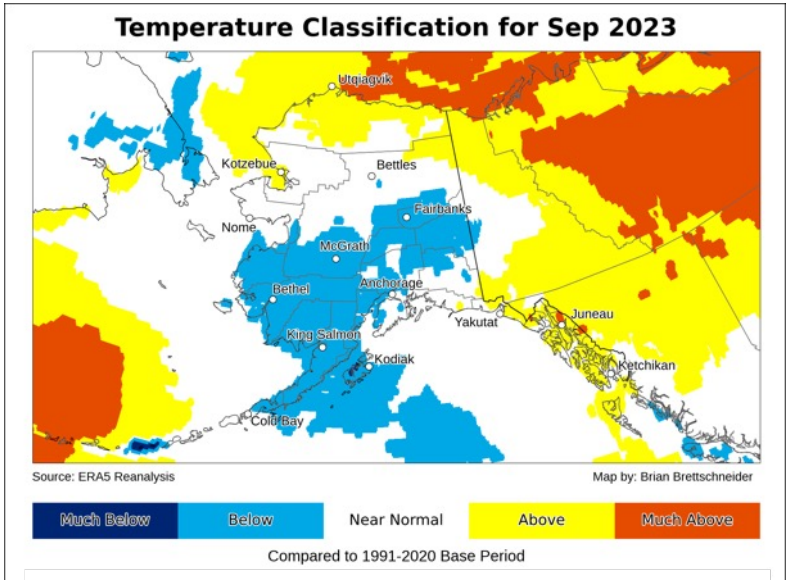
Climate Forecast Basics

Climate Prediction Center: primary NOAA/NWS forecast responsibility

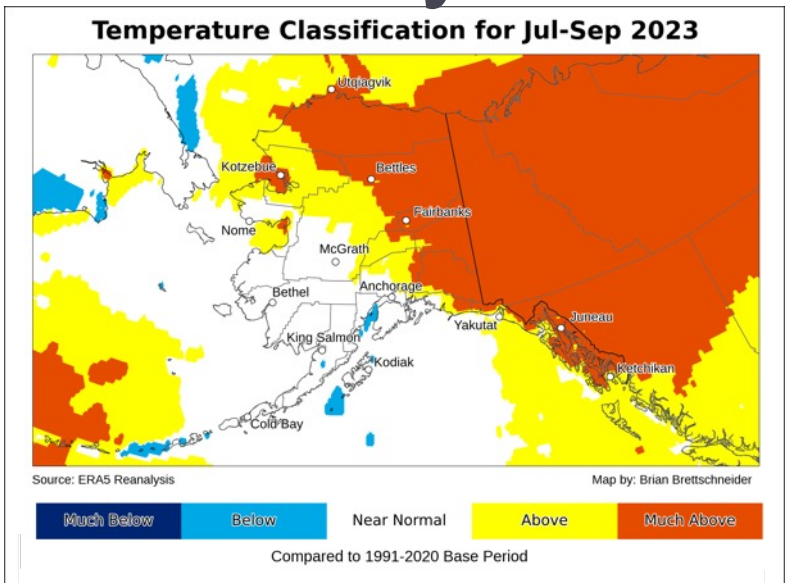
- Climate Outlooks
  - Relation to some long term normal (e.g. 1991-2020)
  - Categorical (often three)
  - Probabilistic
  - Traditional Elements
    - **Temperature**: centered around average
    - **Precipitation**: centered around median (can significantly differ from the “normal”, which by convention is the mean)

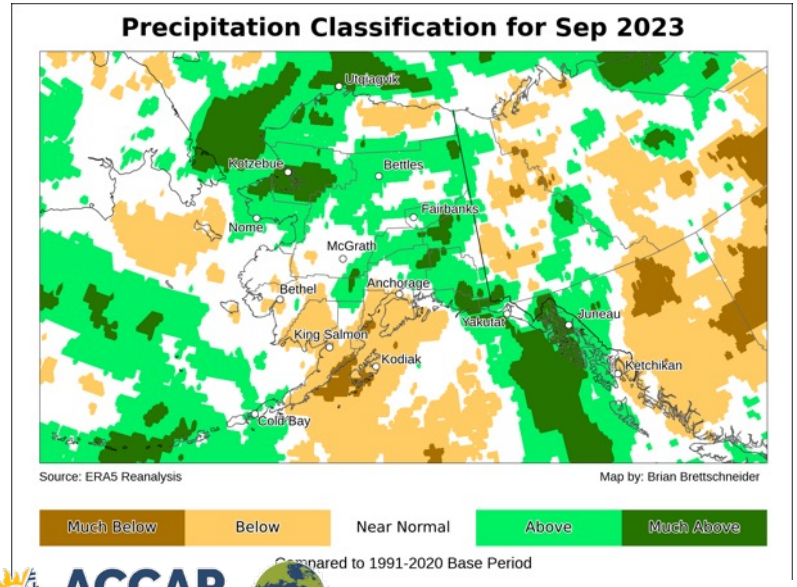


Model-Based Regional Analysis

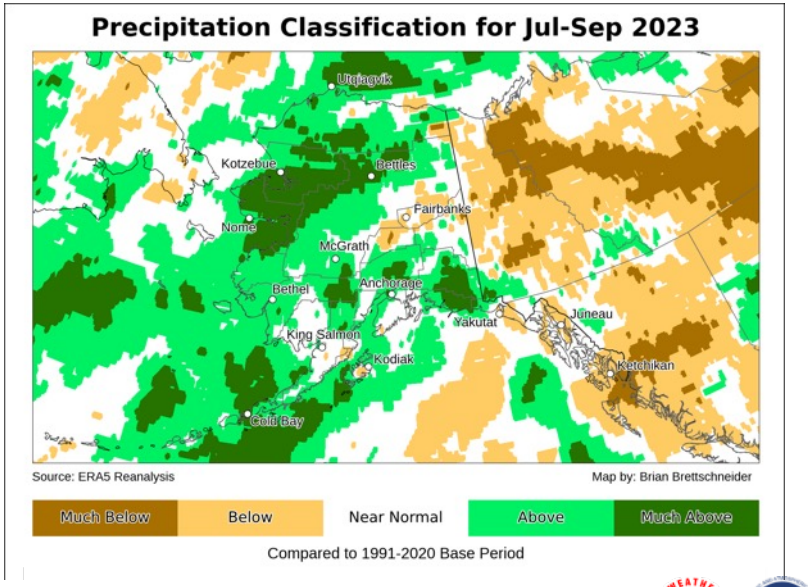


Temp





Precip



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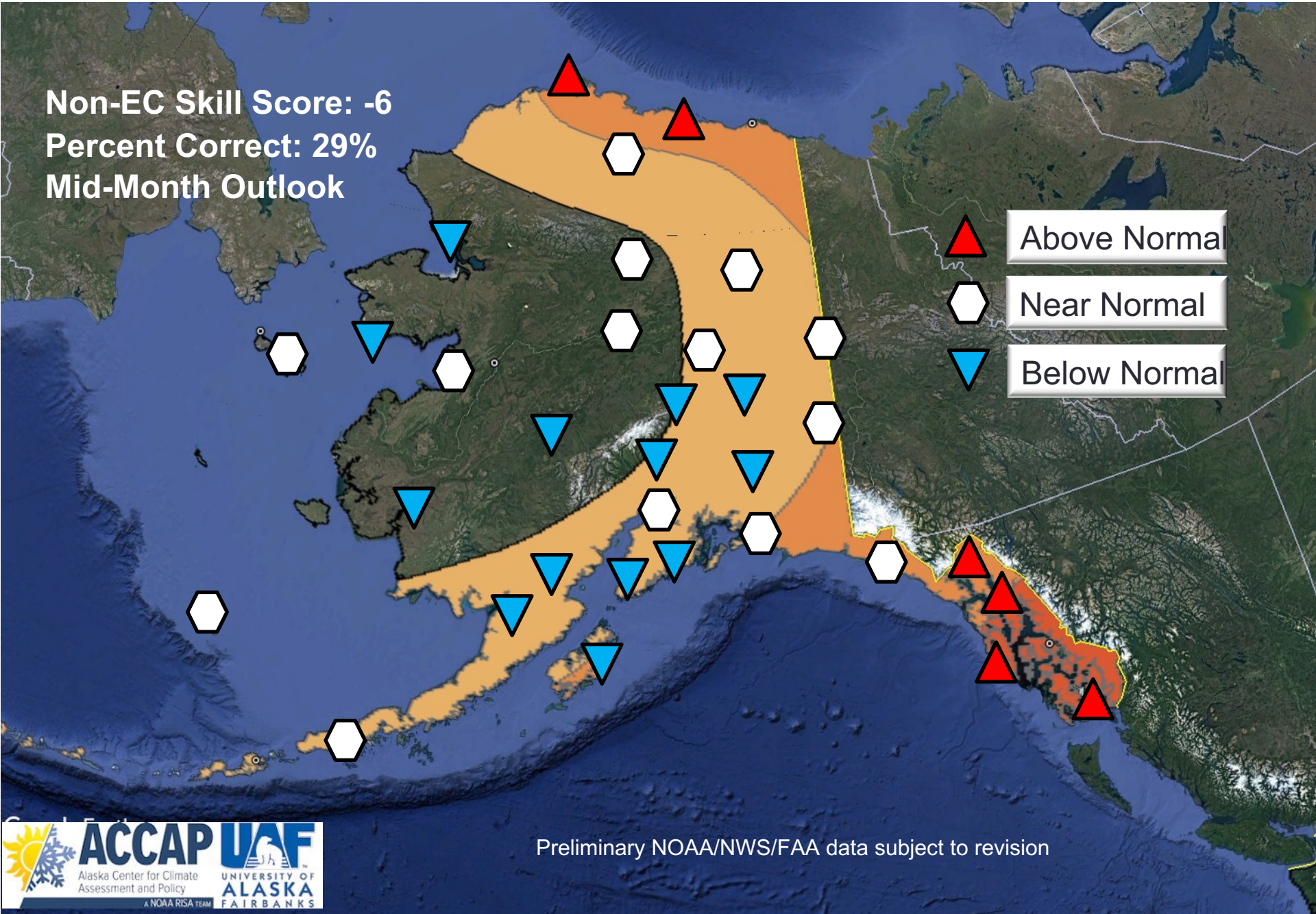
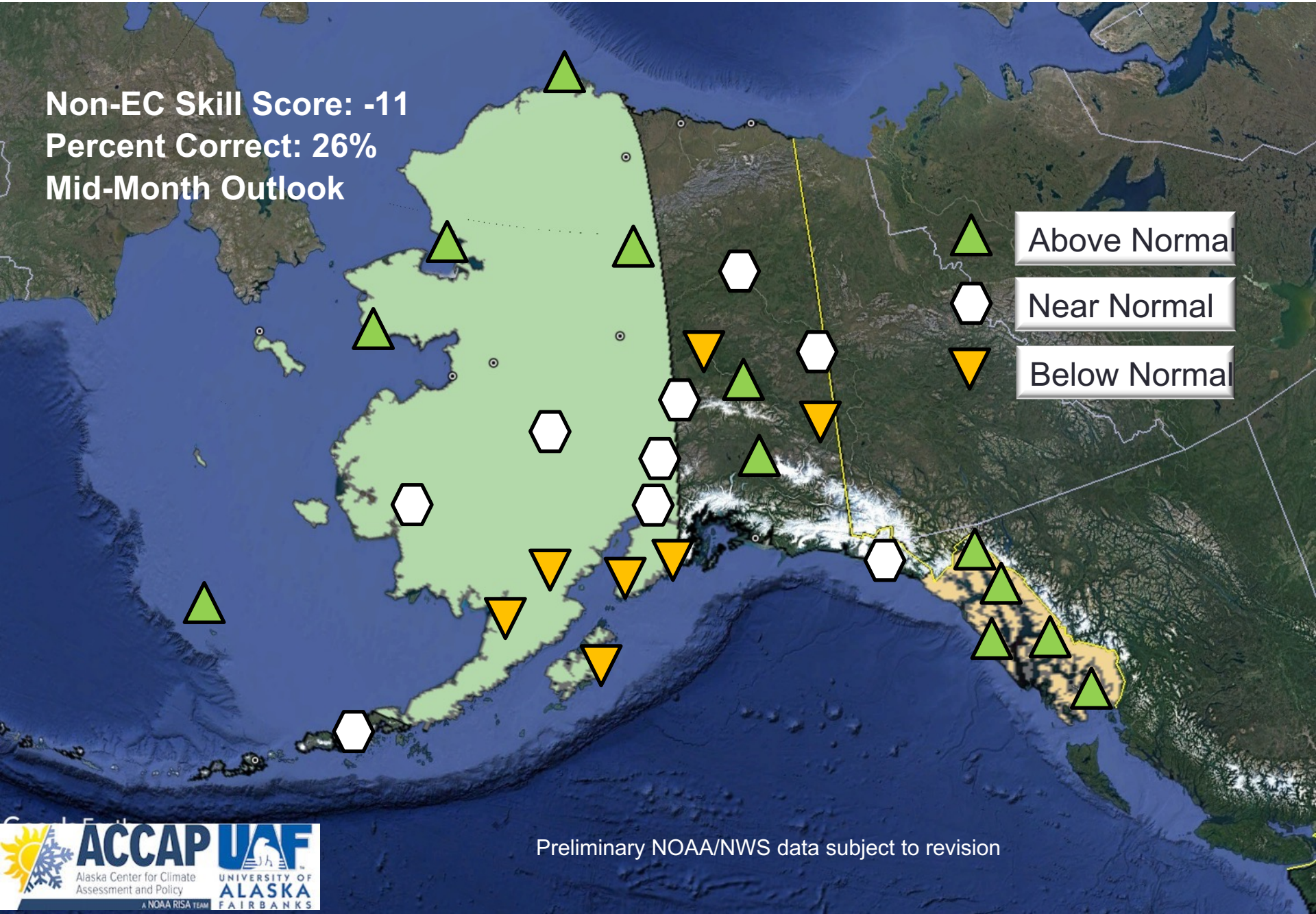
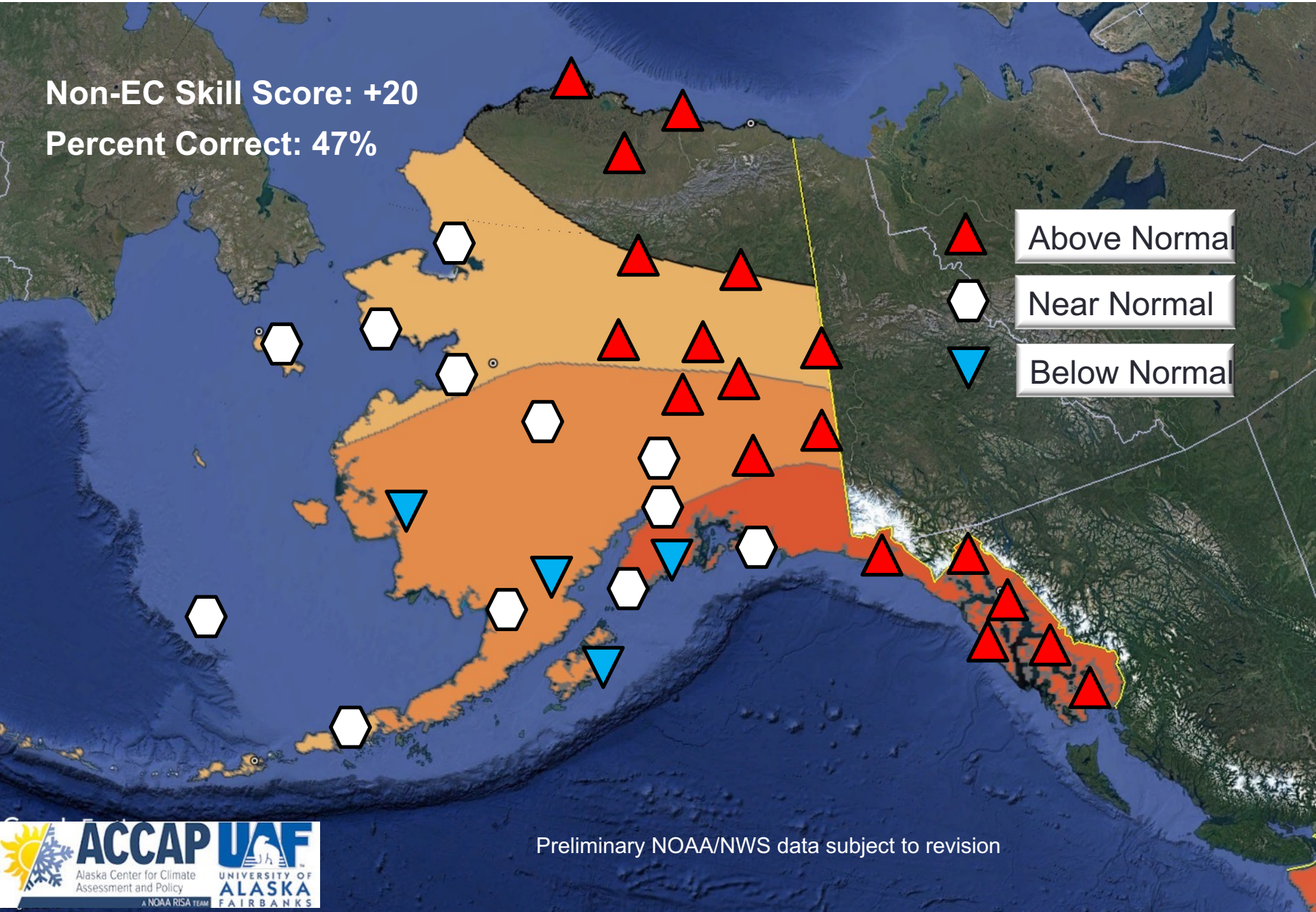
September 2023 Temperature Anomalies



September 2023 Precipitation Anomalies



Jul-Aug-Sep 2023 Temperature Anomalies



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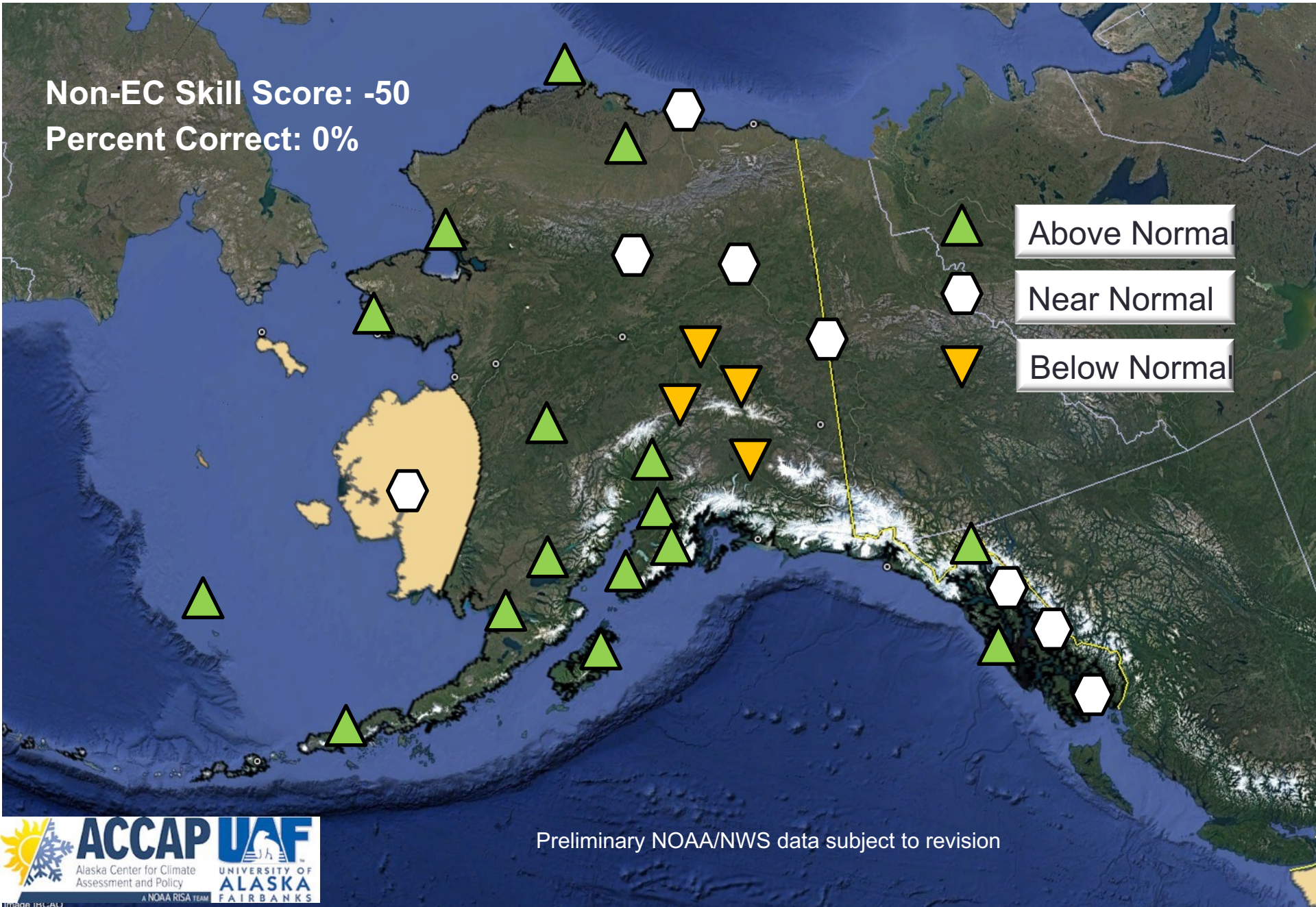
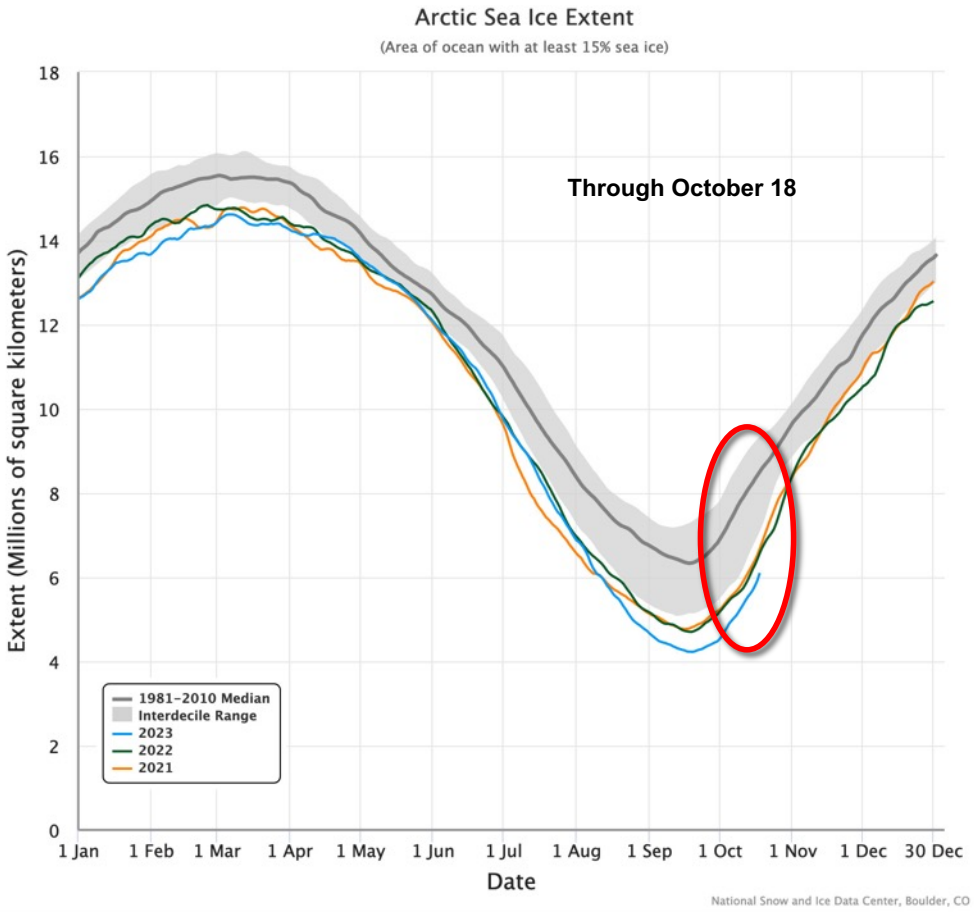
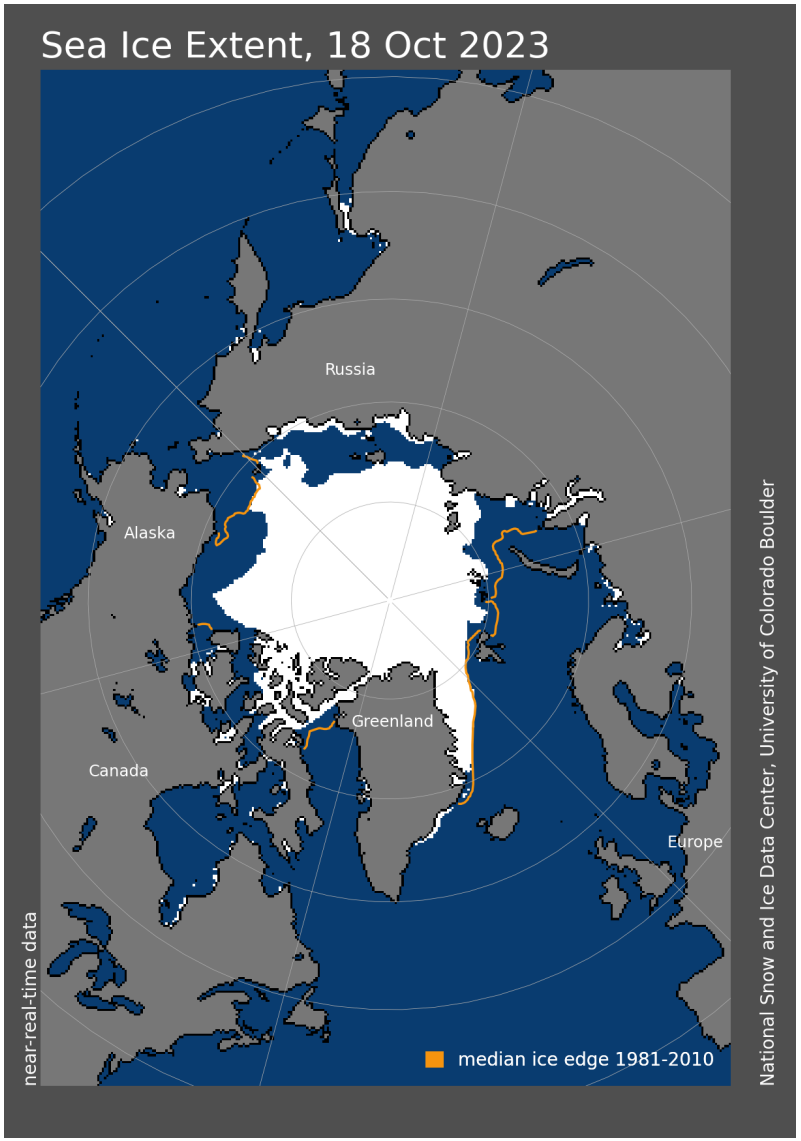


Arctic Wide Sea Ice





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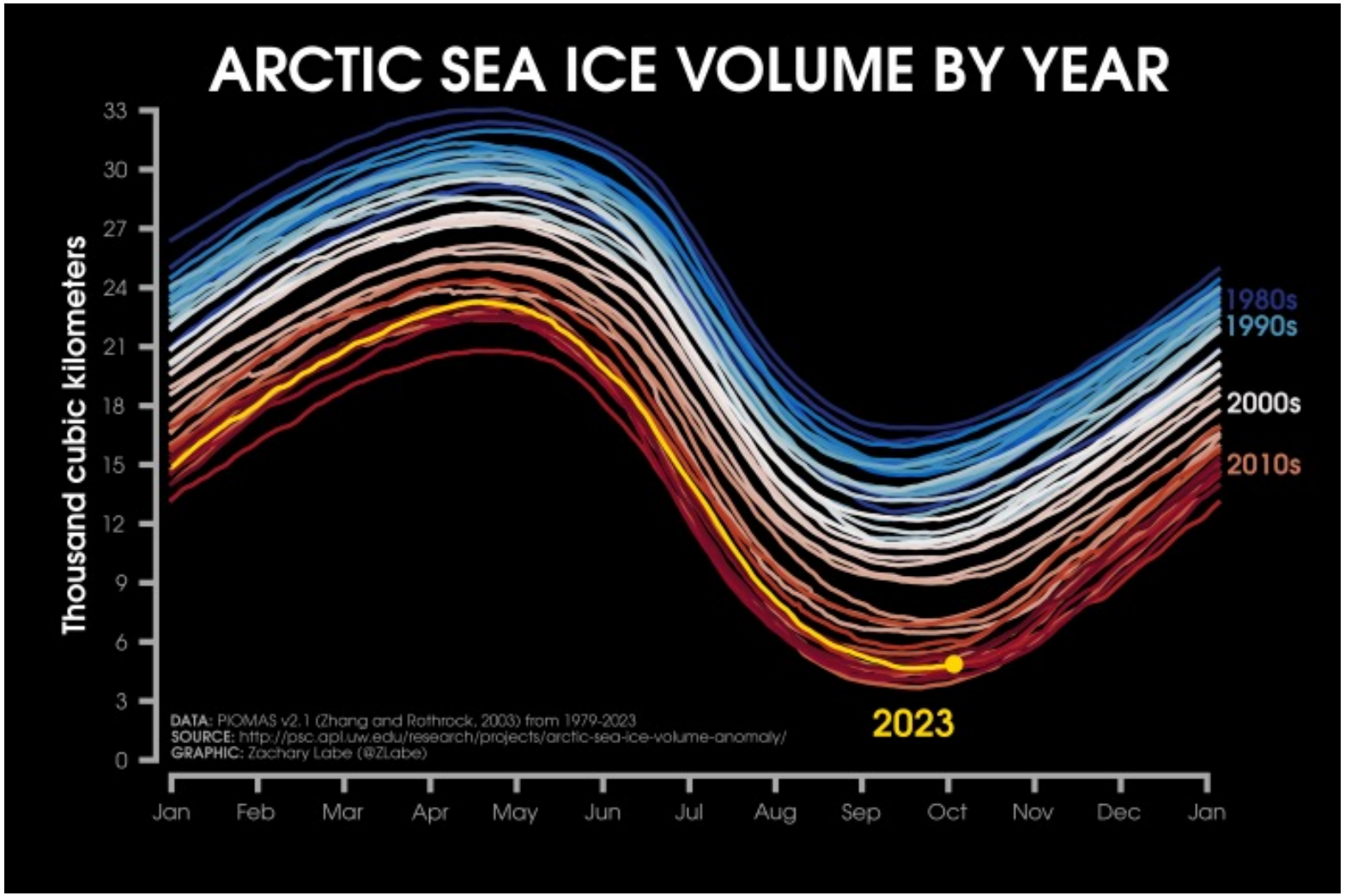
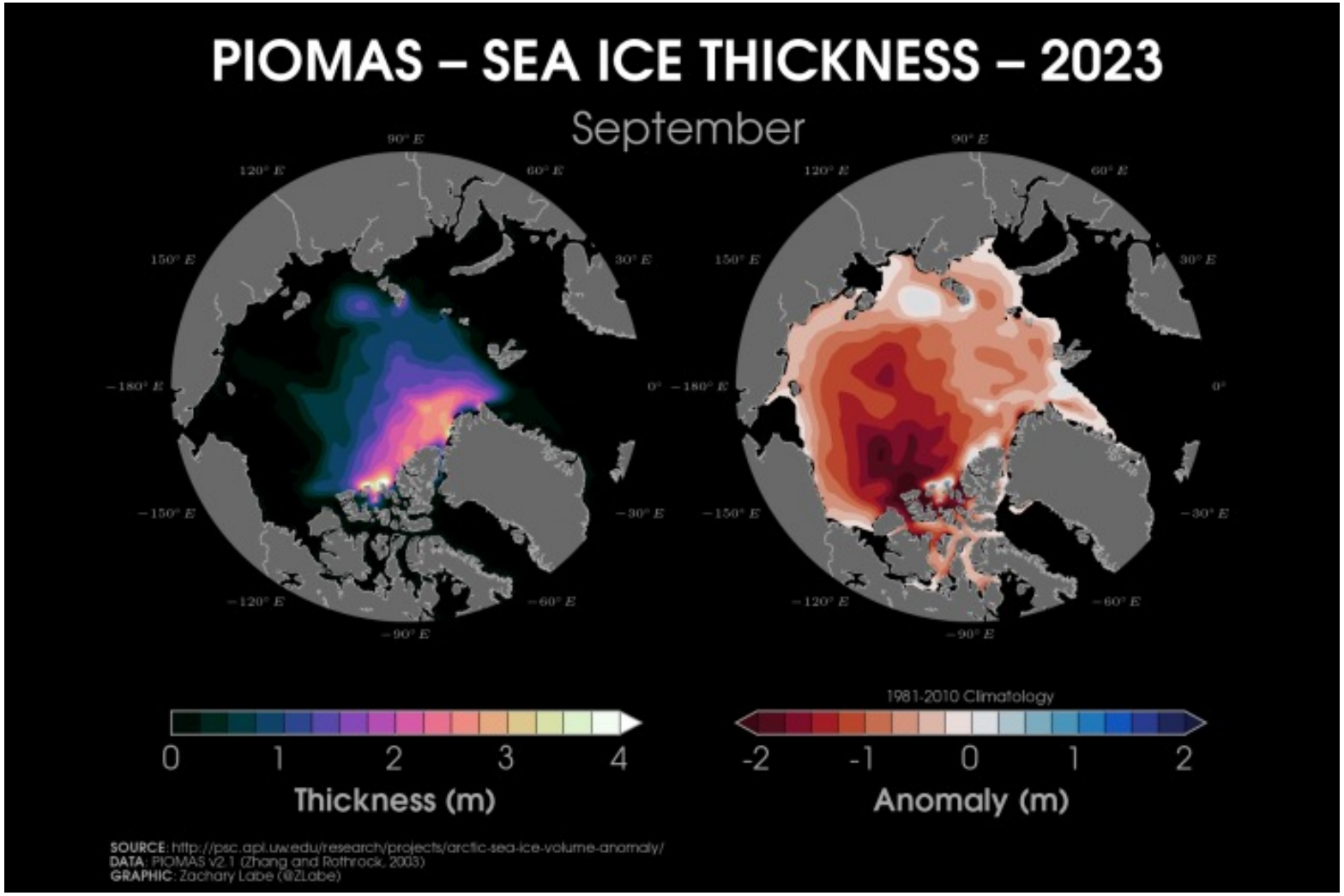
Arctic Sea Ice Volume



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

Arctic Sea Ice Thickness



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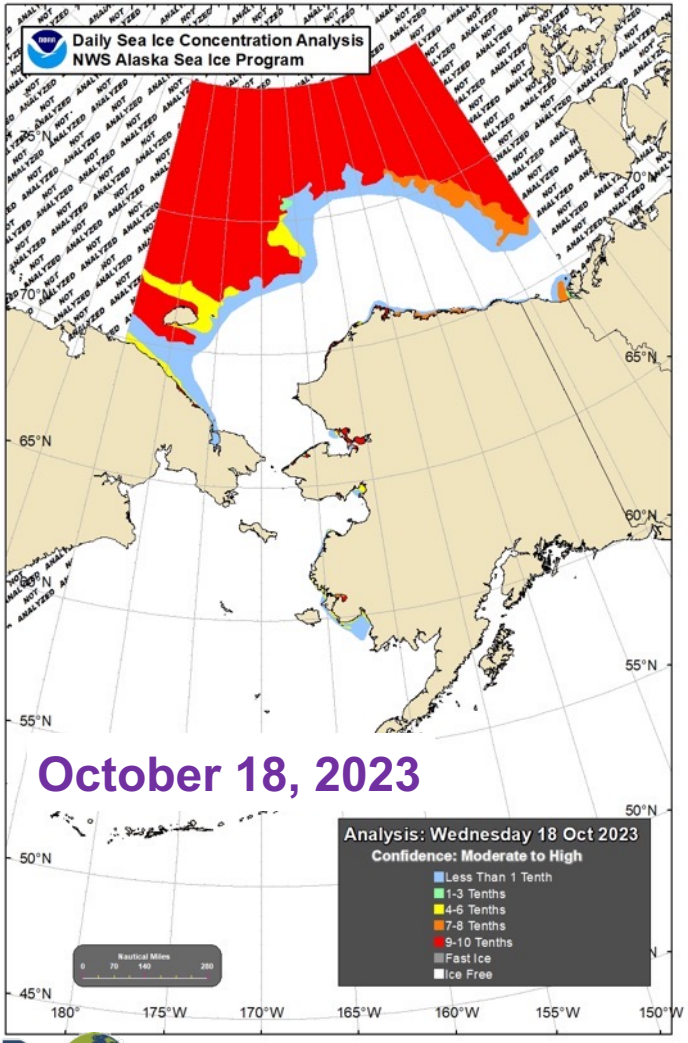
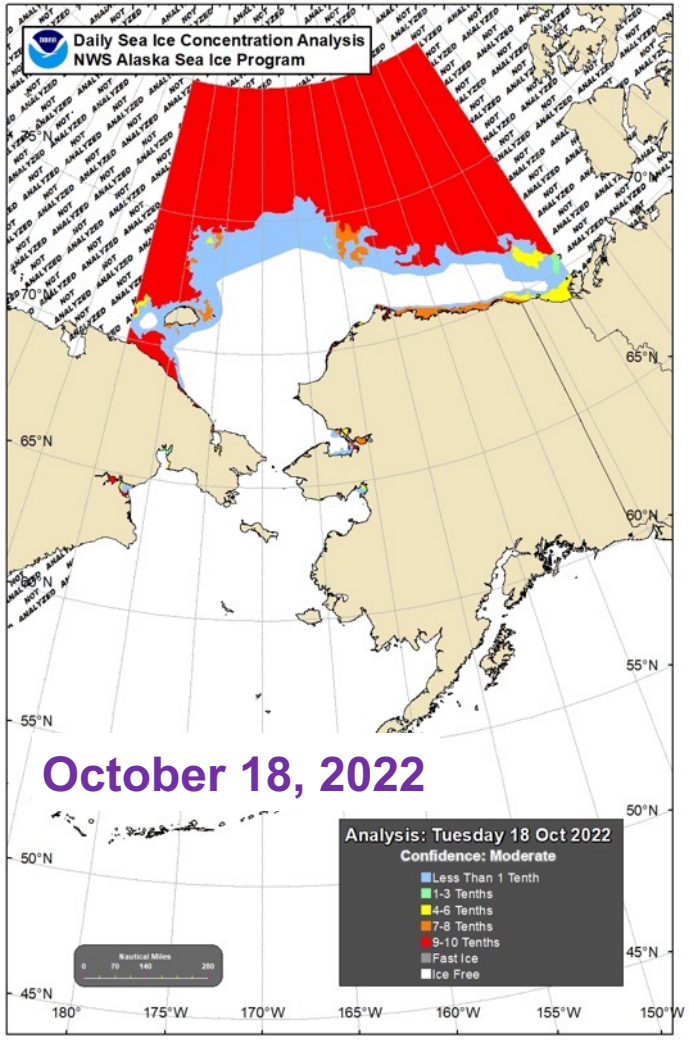
Mid-October Sea Ice Comparison



October 18, 2023



October 18, 2022

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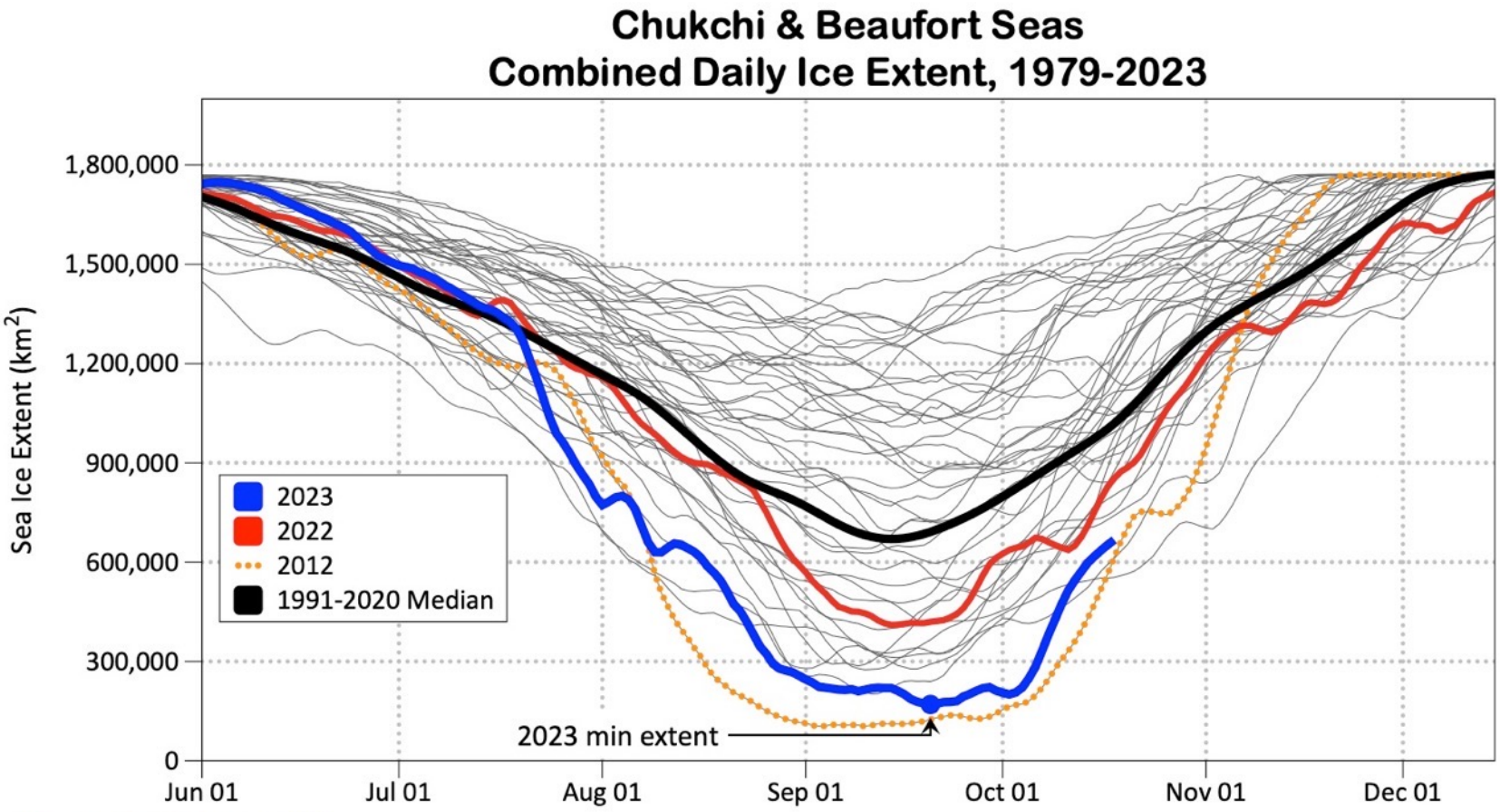
Sea Ice Extent Through the Season



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Data source: NSIDC Sea Ice Index, Version 3
Updated through October 18, 2023

Global SST Departure from Average

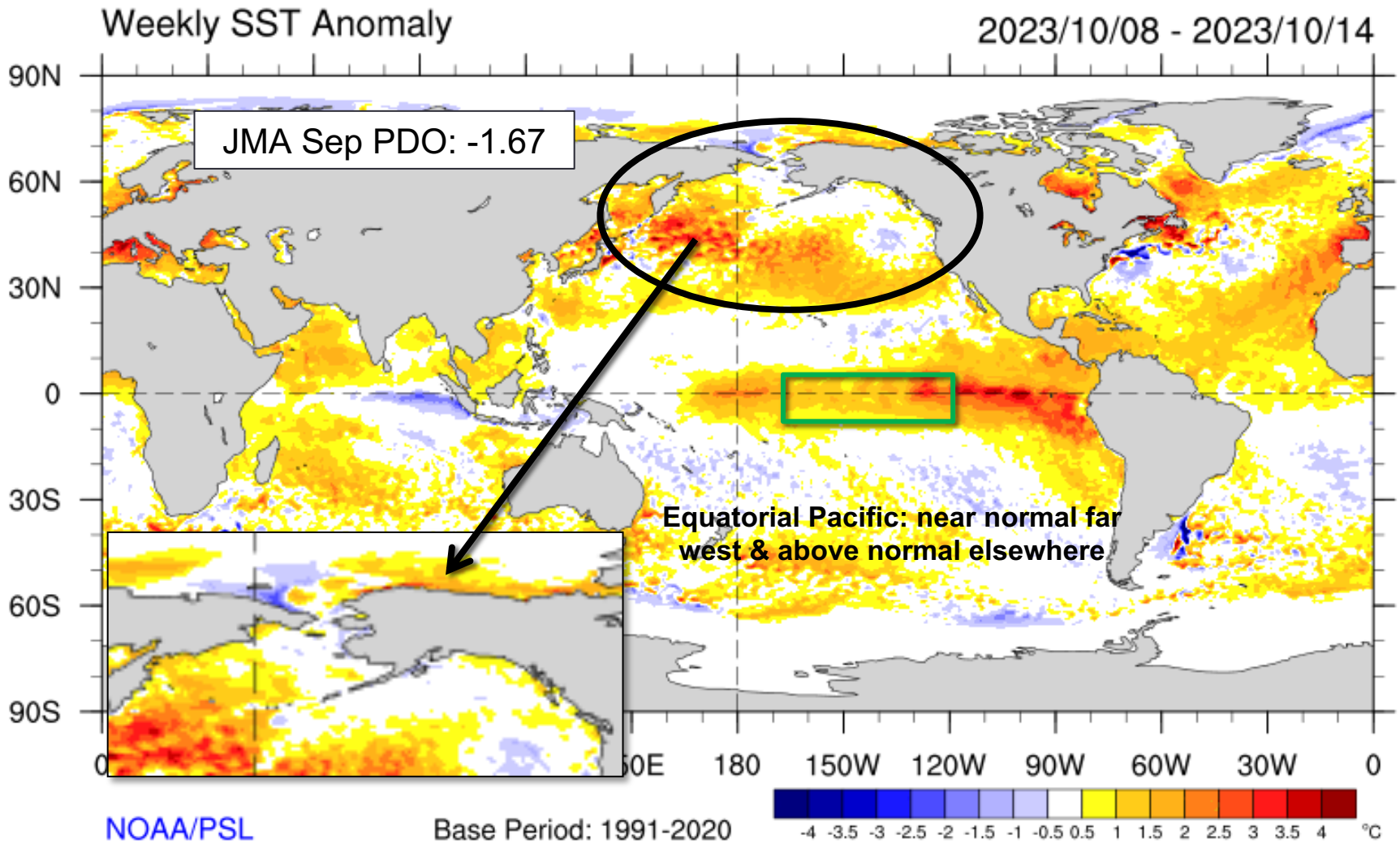
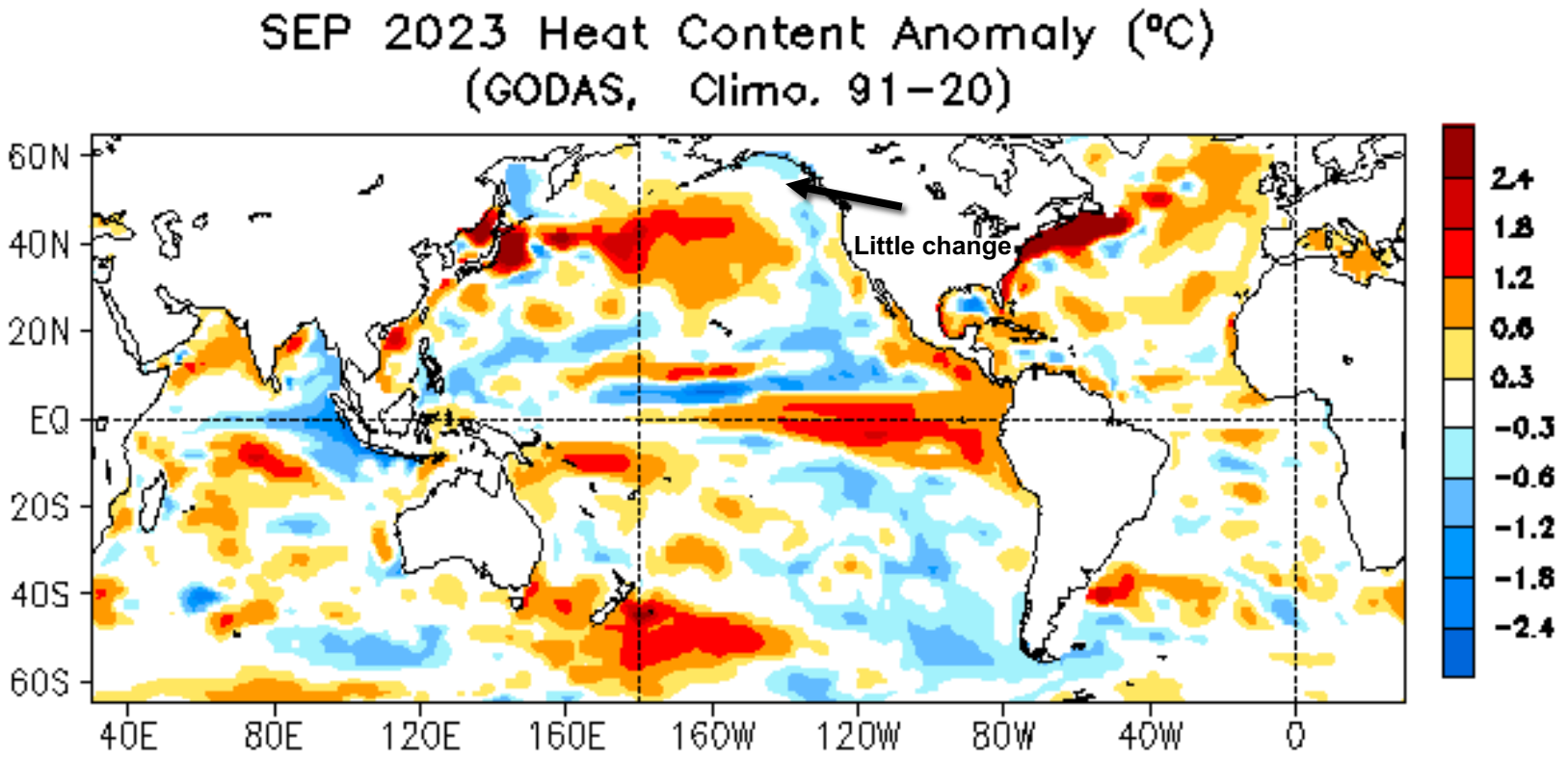


Image courtesy ESRL/PSL

Upper Ocean Heat Content Anomaly



Heat Content Anomaly (°C)
in the upper 300m

Source: CPC

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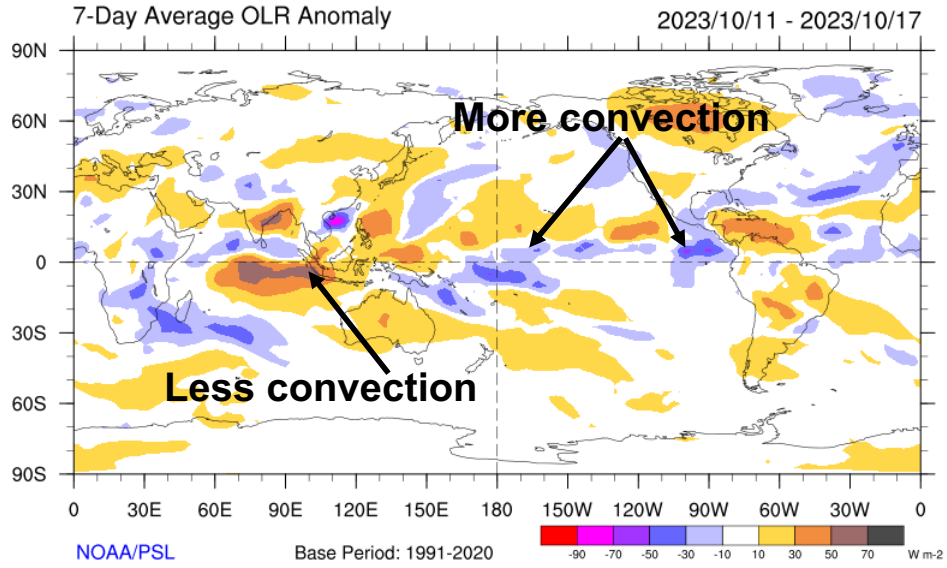
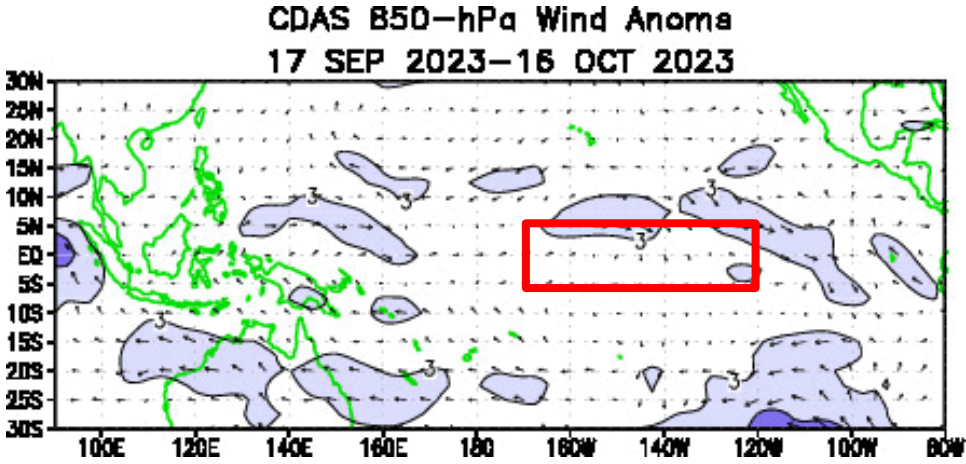
Tropical Pacific Atmosphere



OLR="Outgoing Longwave Radiation"
Proxy for deep tropical convection



Trade winds weaker than average
Niño Region 3.4

July-September 2023 Oceanic Niño Index: +1.3

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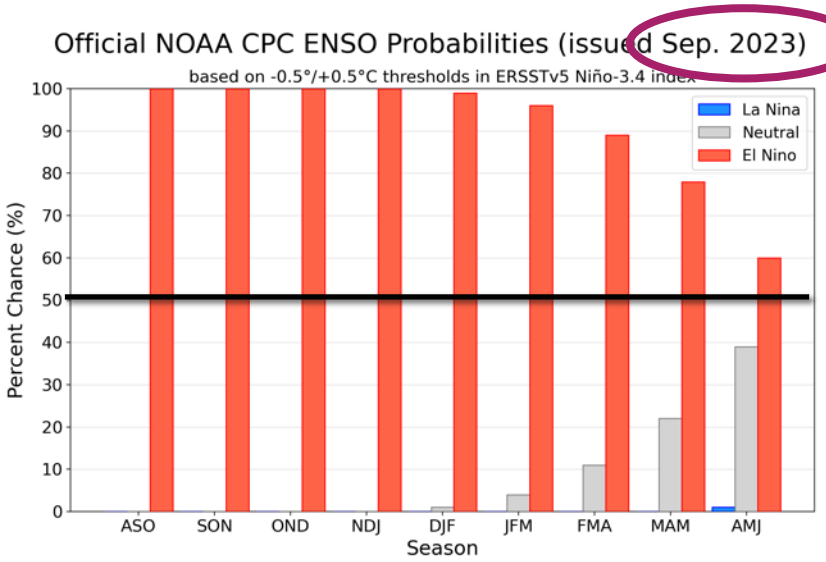
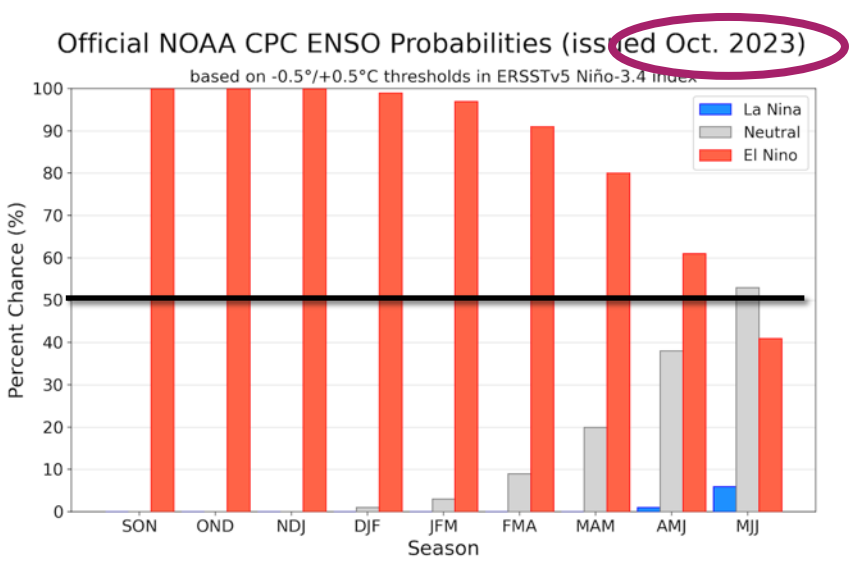
Guidance

- ENSO (El Niño/La Niña)
  - Expert Evaluation
- Statistical (Using the past)
- Dynamic Models (All physics, all the time)
  - Sea surface temperatures
  - Temp and precipitation
  - Sea ice

CPC Niño 3.4 Forecasts: Experts

ENSO Alert System Status: El Niño Advisory





El Niño is here and expected to continue through winter 2023-24
Early Winter (NDJ): 97% chance moderate & 75% strong El Niño

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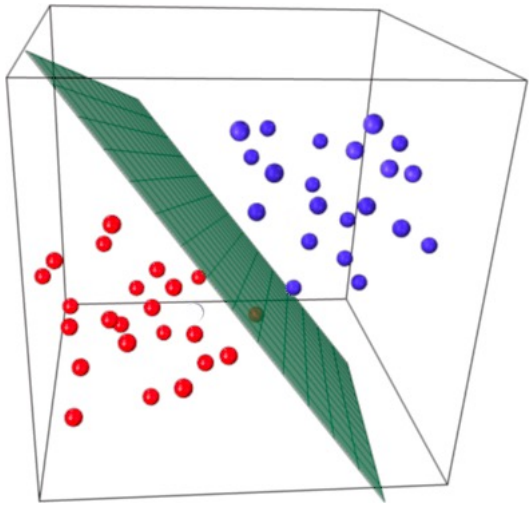
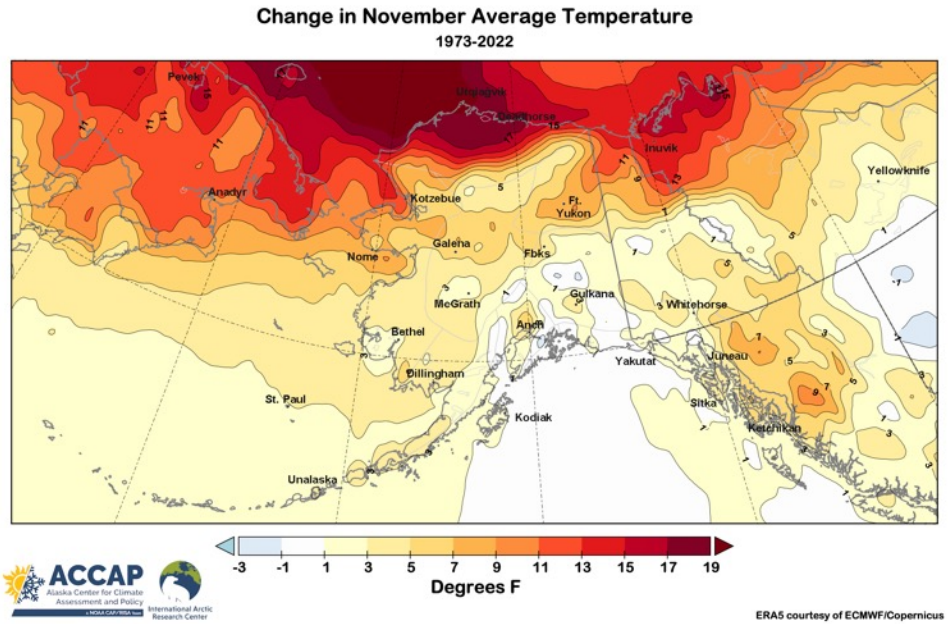
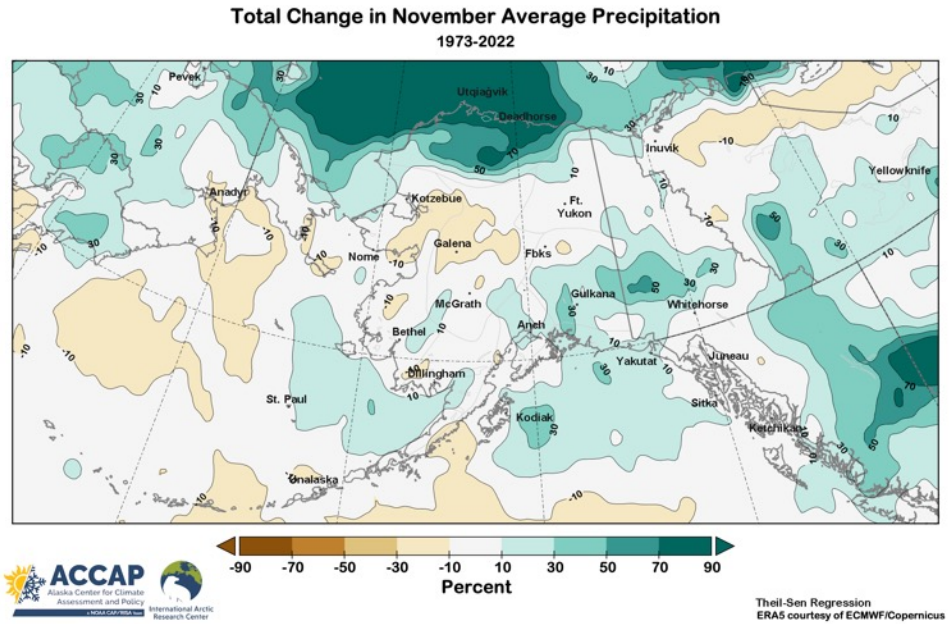
Statistical Guidance
Using the past to predict the future

- Long Term Trend
- Optimum Climate Normals: Alaska trends the past 15 years
  - Update to new normals means OCN less informative next few years
- Past Autumn El Niño events



November Half Century Trends





Temperature Change Trend over 50 years

Precipitation Change Trend over 50 years

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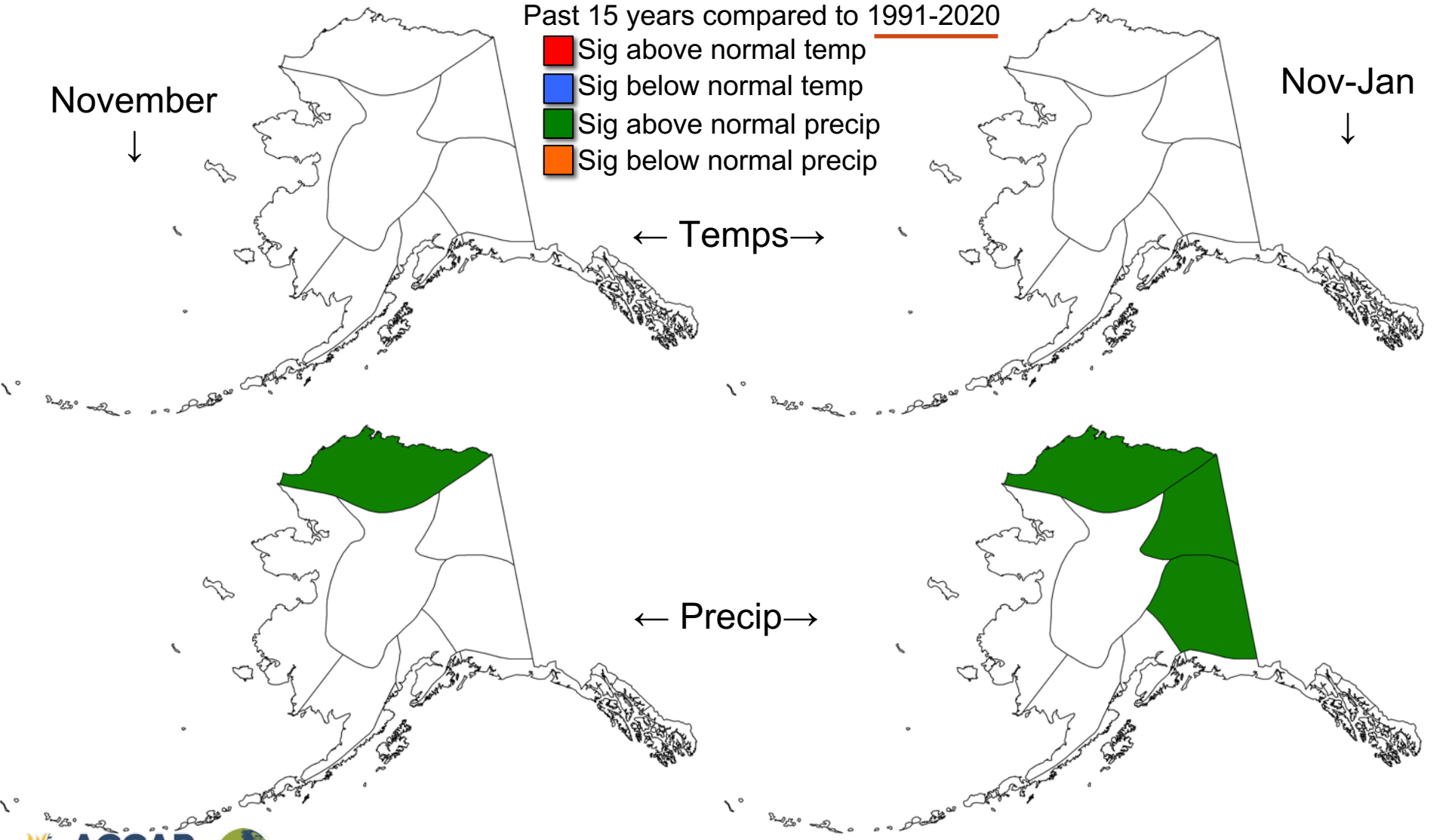
2008-2022 Trends



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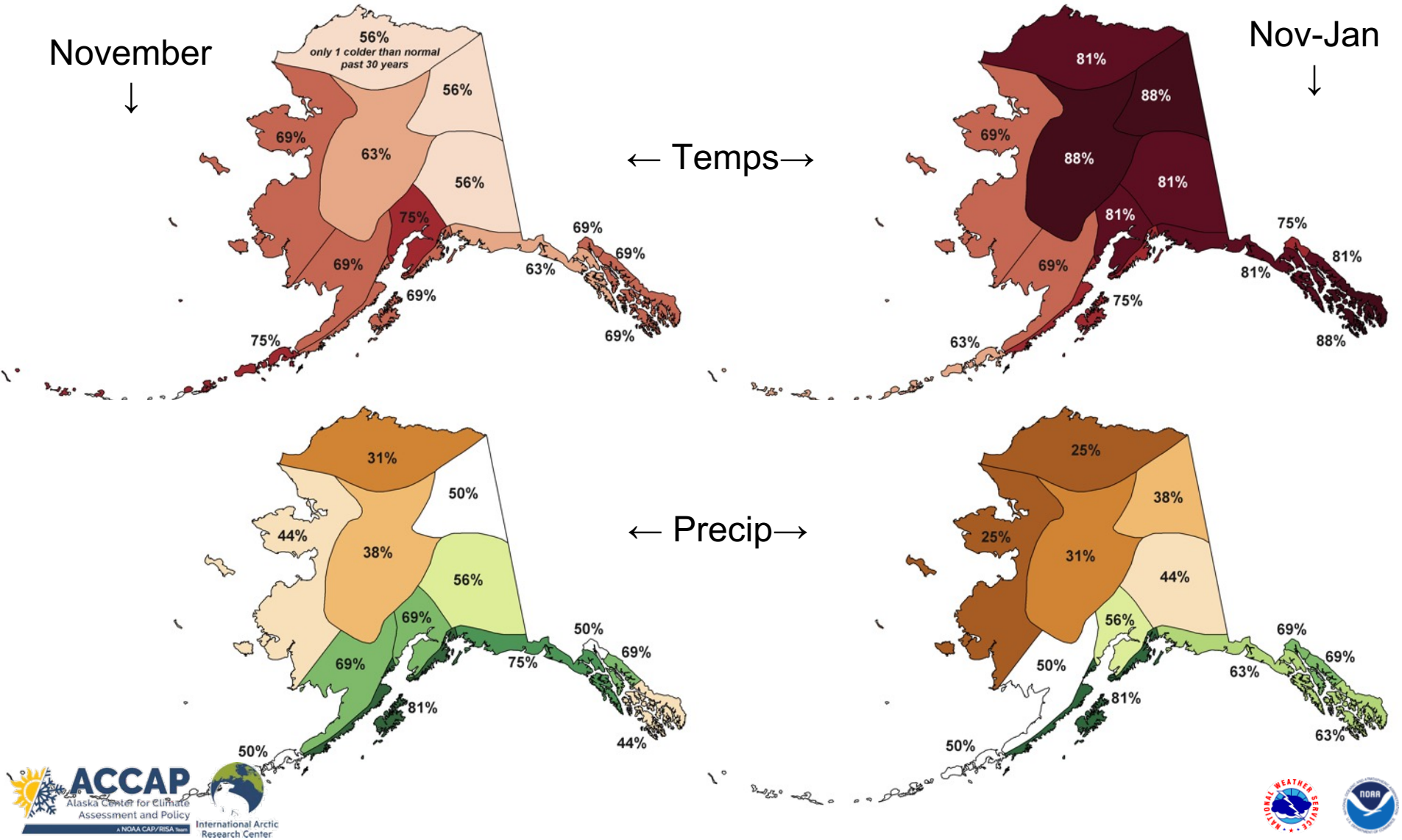
16 El Niño since 1976
Percent years above average



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Dynamic Model Forecasts

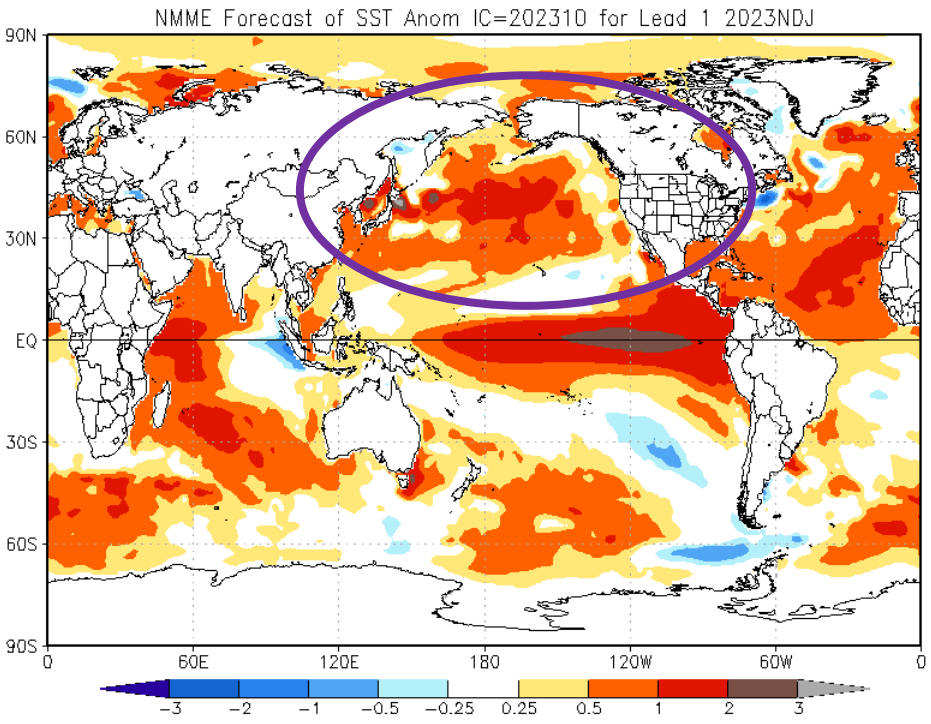
- Sea Surface Temperatures
- Sea ice forecast
- Temperature and precip anomalies

Current suite of Dynamic Climate Models

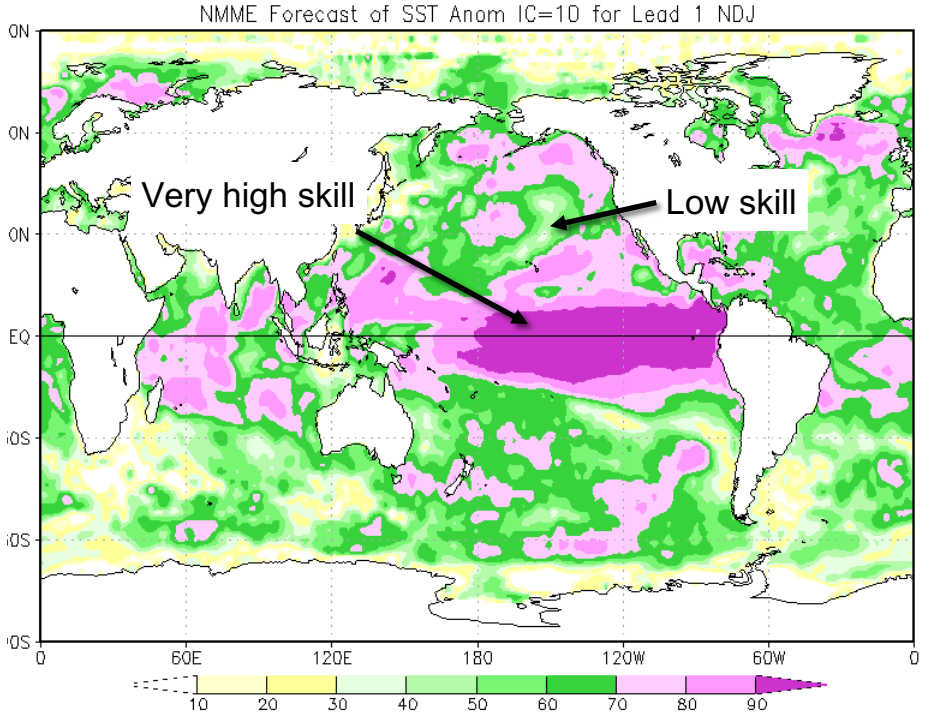
- CPC Experimental Sea Ice Ensemble
- World Climate Service Multi-Model Ensemble
- **NMME**: North American Multi-Model Ensemble

NMME: November 2023 through January 2024 SST Departures from Normal and Forecast Skill

Forecast



Skill



Negative
PDO pattern

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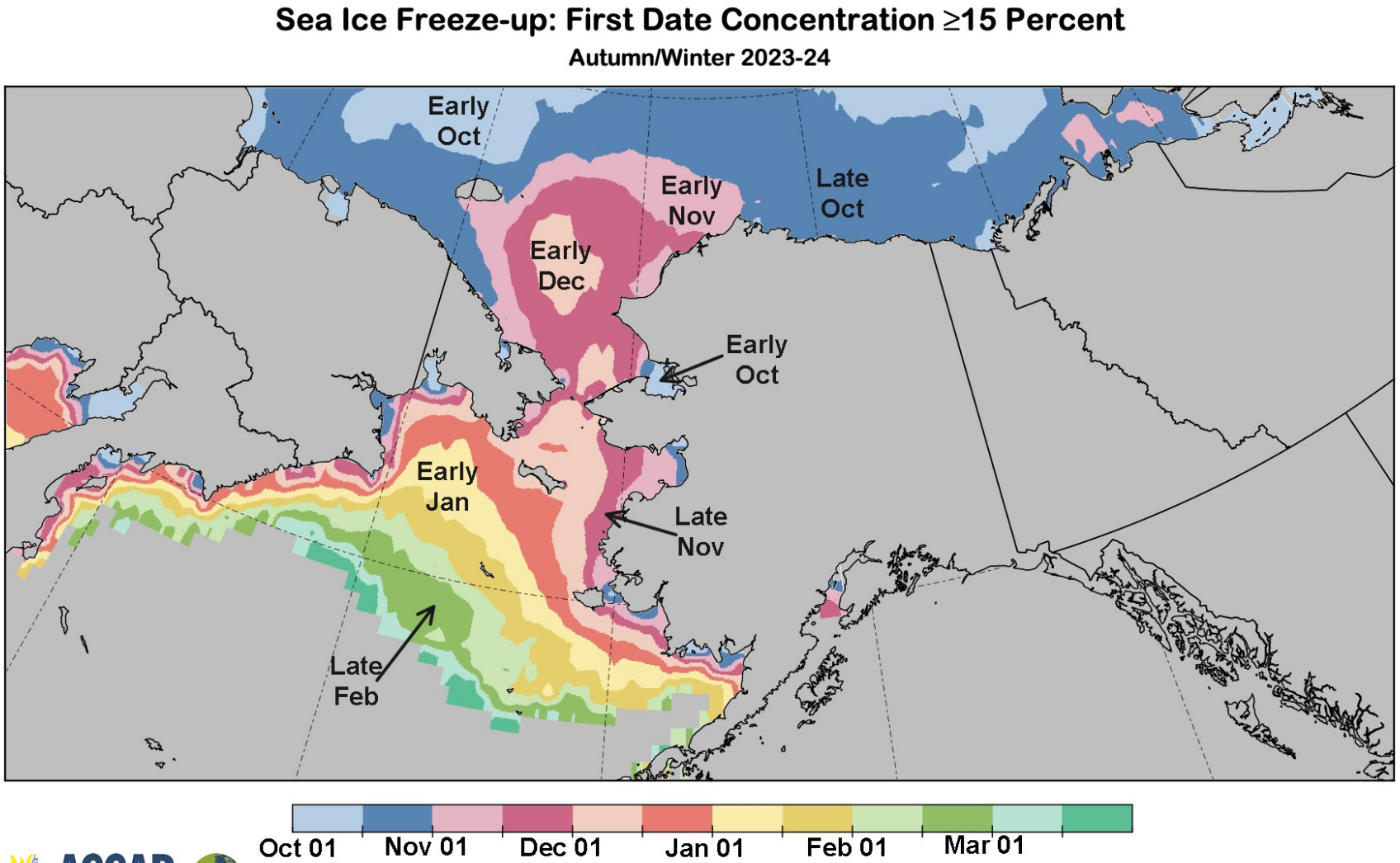
CPC Experimental Sea Ice Forecast



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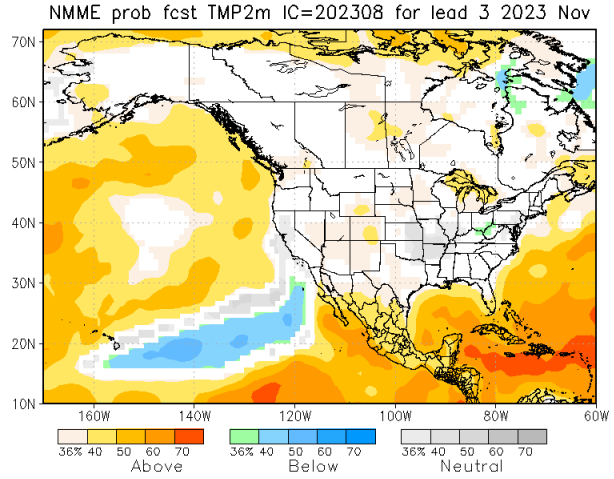
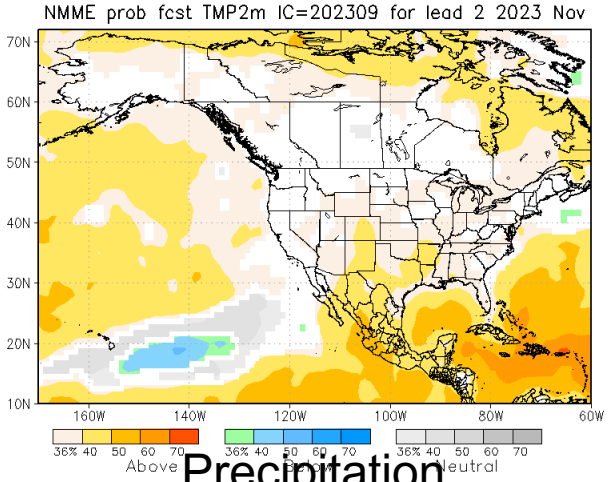
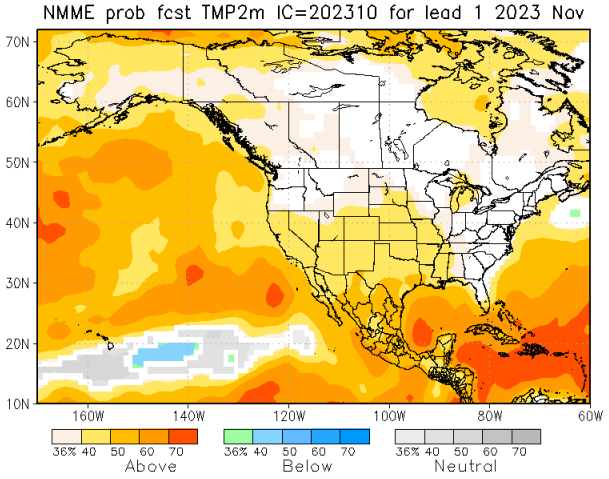
Outlook Made in late Septe[illegible]er
Data: NOAA/CPC Exp. Sea Ic[illegible]ok

NMME Calibrated Probability Forecasts for November 2023

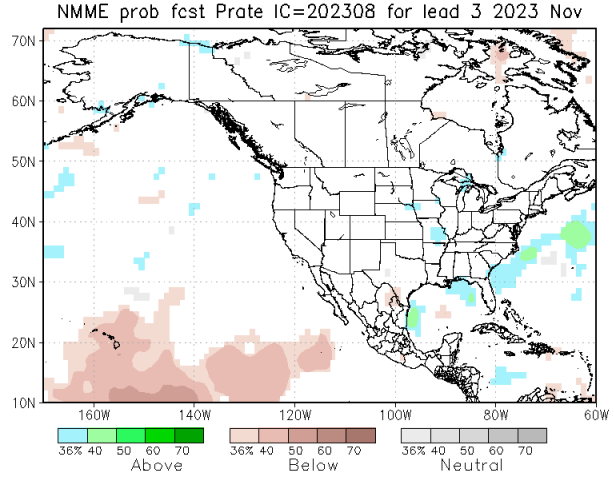
Temperatures

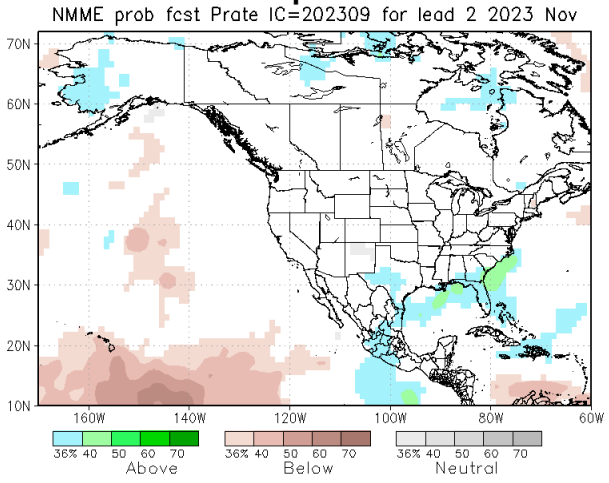


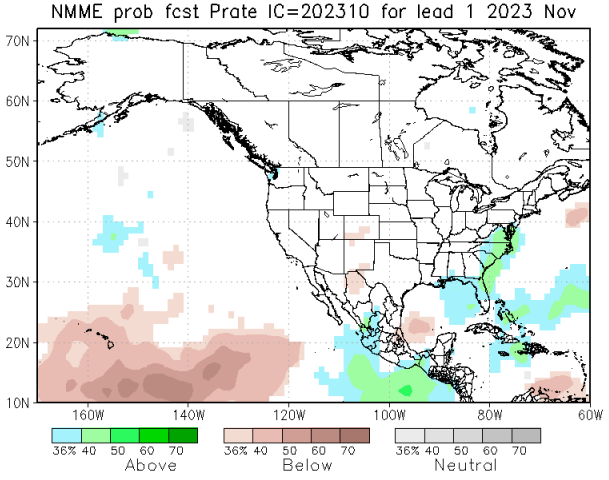




Precipitation







Forecast from: August | September | October

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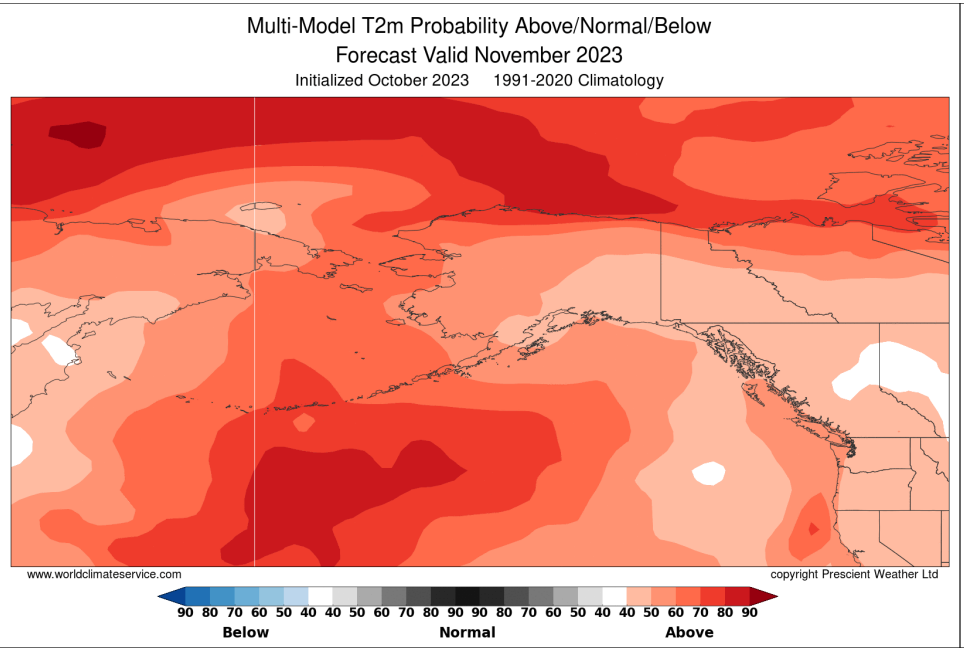
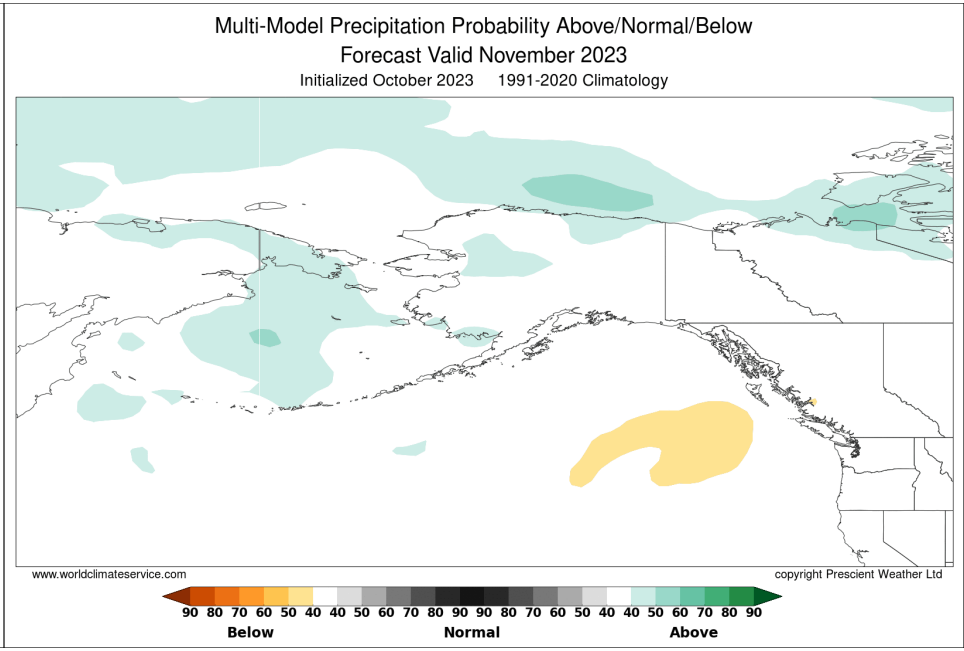
November 2023 Outlooks
World Climate Service

Bias Corrected, Skill Weighted CFS + ECMWF



Temperature Outlook



Precipitation Outlook

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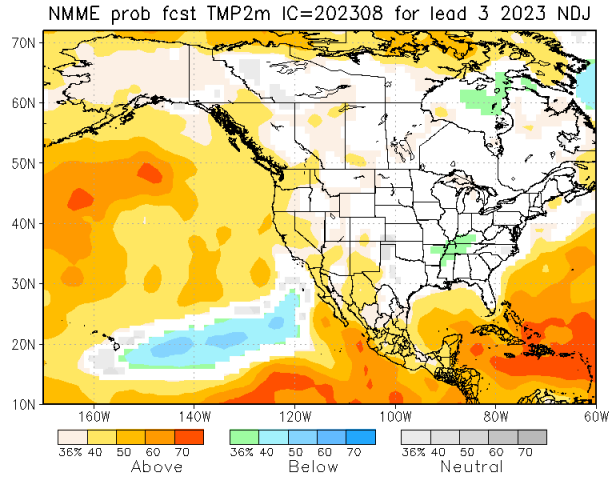
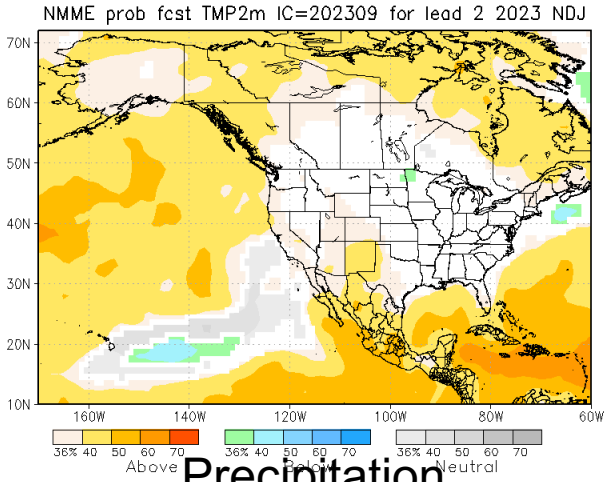
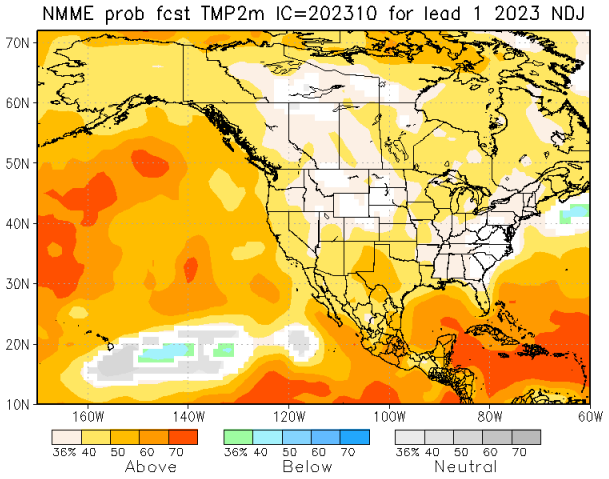
World Climate Service

NMME Calibrated Probability Forecasts for November 2023 through January 2024

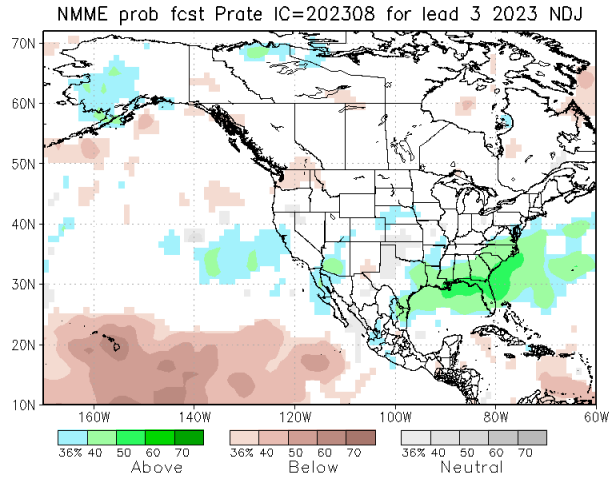
Temperatures

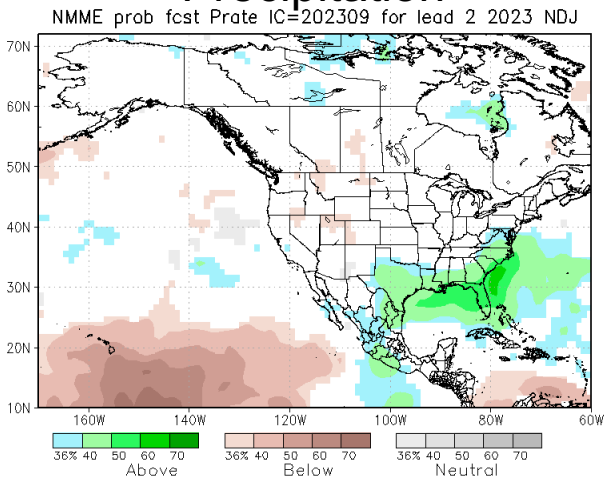


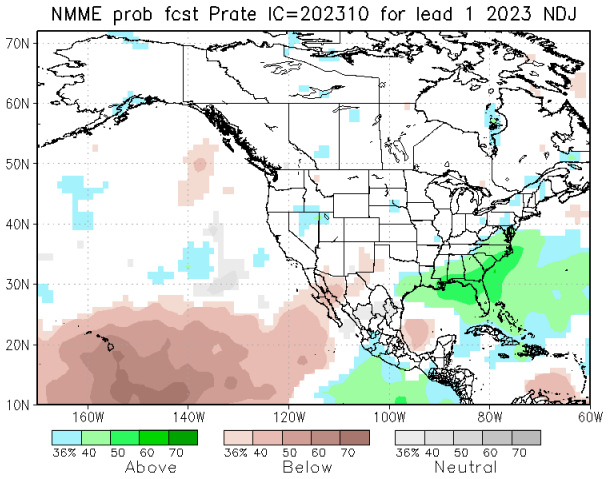




Precipitation







Forecast from: August | September | October

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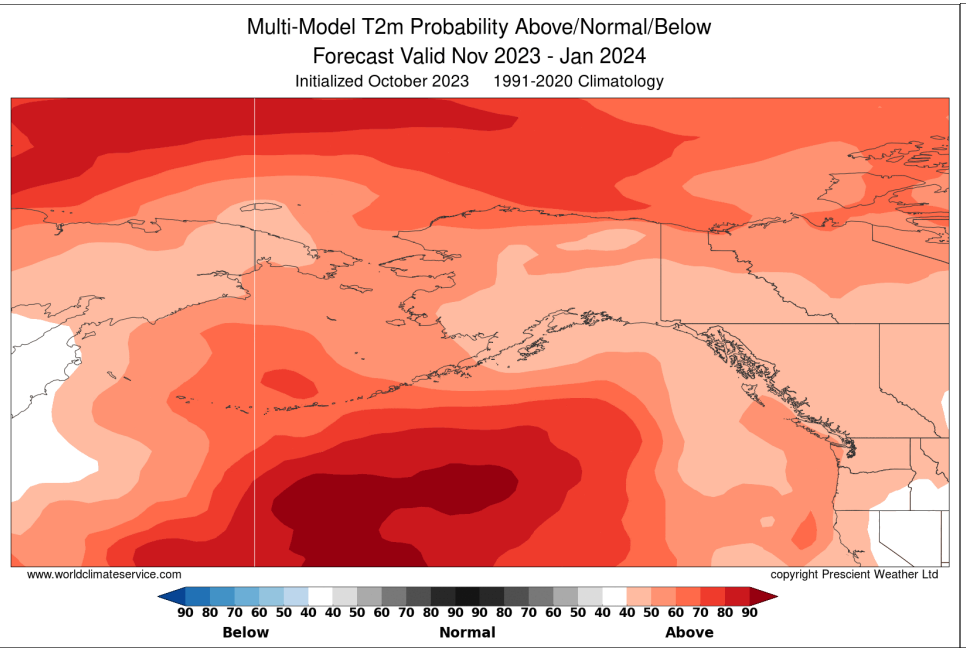
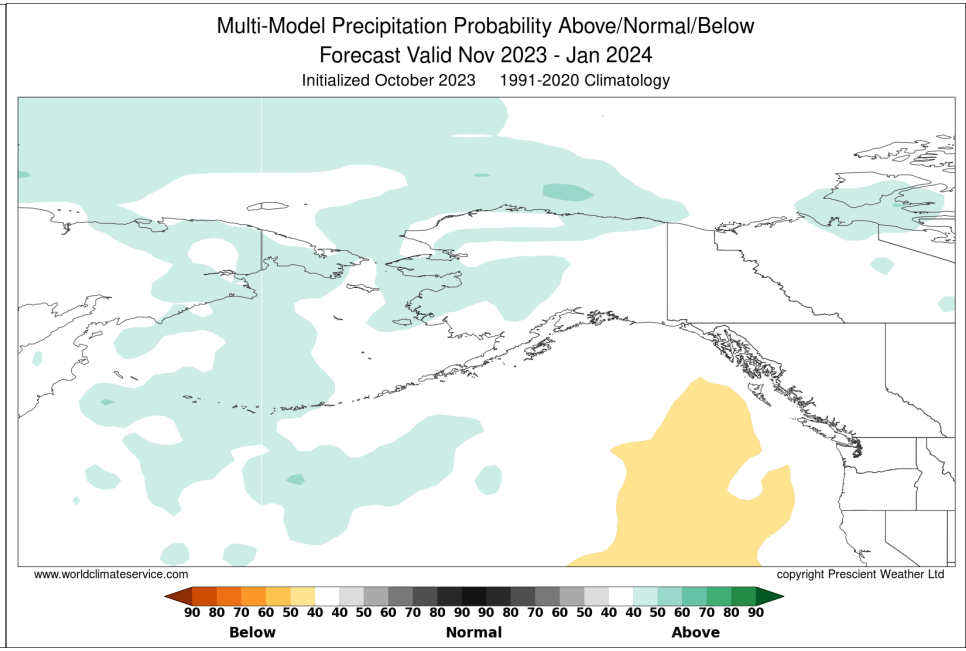
November 2023 to January 2024 Outlooks
World Climate Service

Bias Corrected, Skill Weighted CFS + ECMWF



Temperature Outlook



Precipitation Outlook

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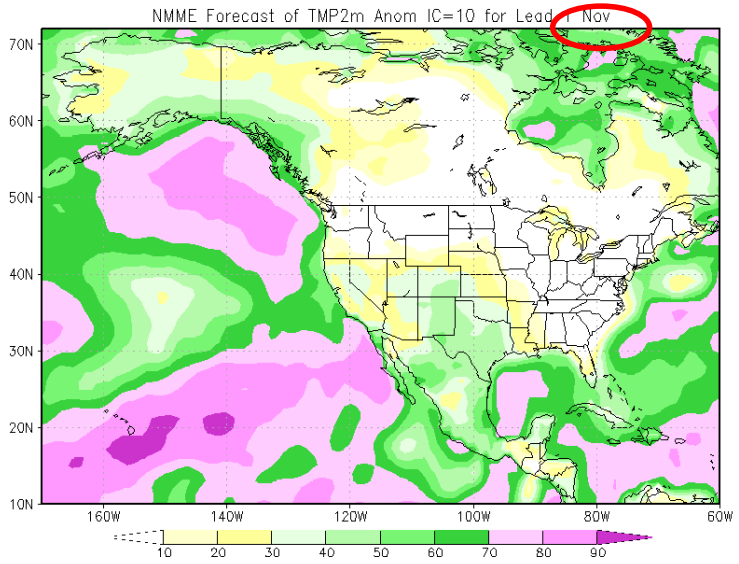
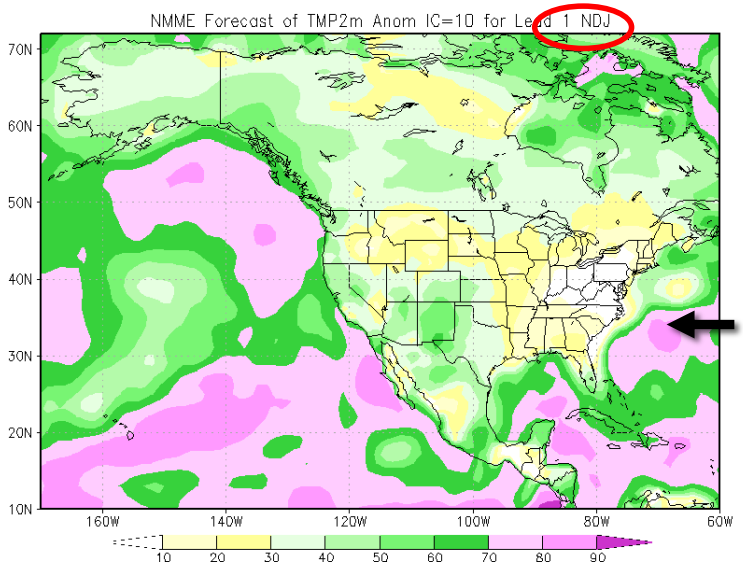
NMME Skill for Nov and Nov-Jan





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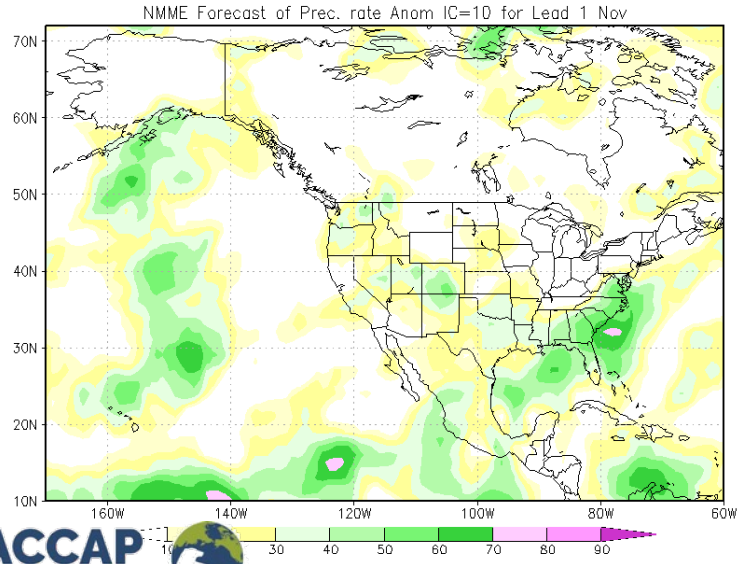

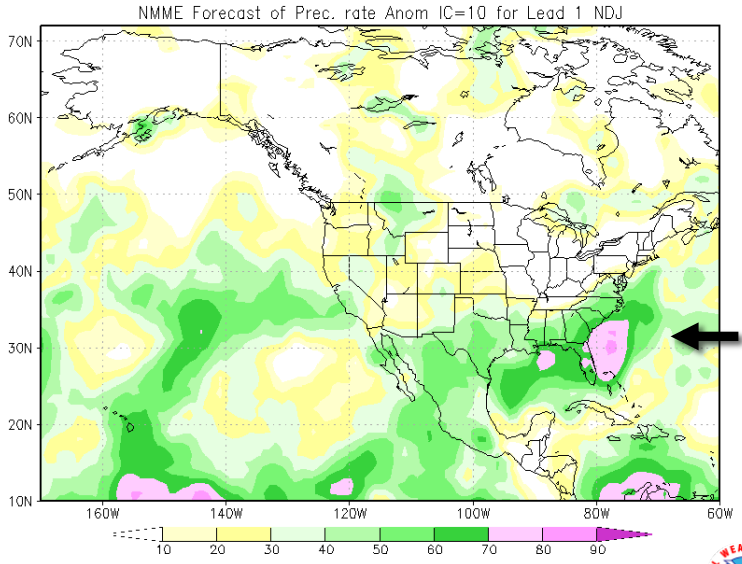

Precip

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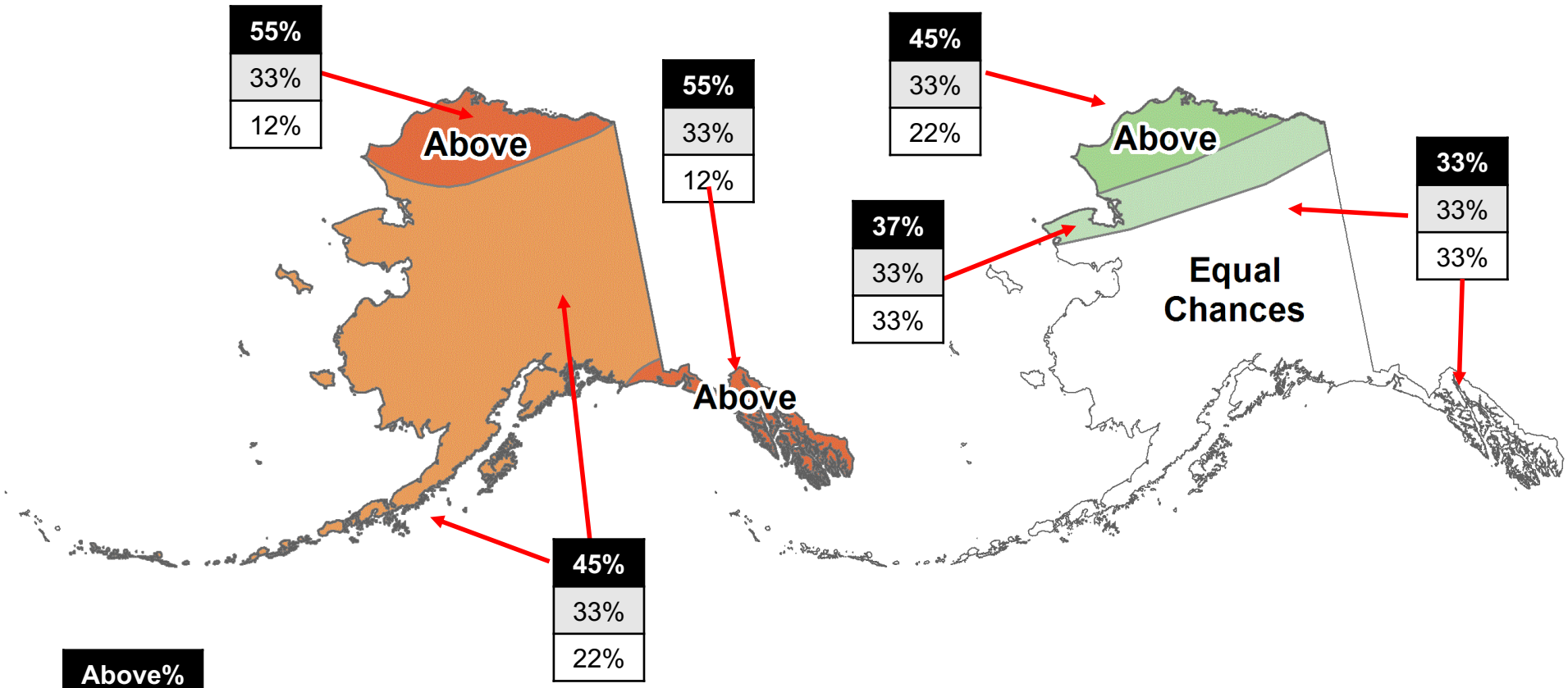
November 2023 to January 2024 Outlook from September



Average Temperature Outlook

Total Precipitation Outlook

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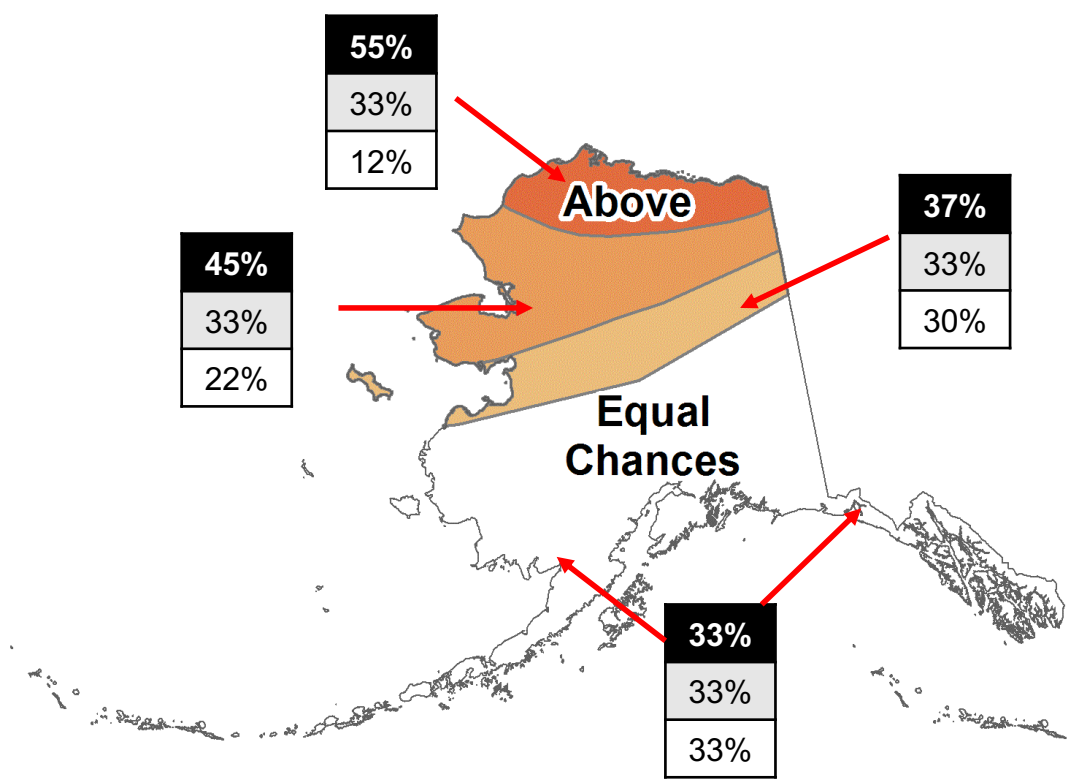
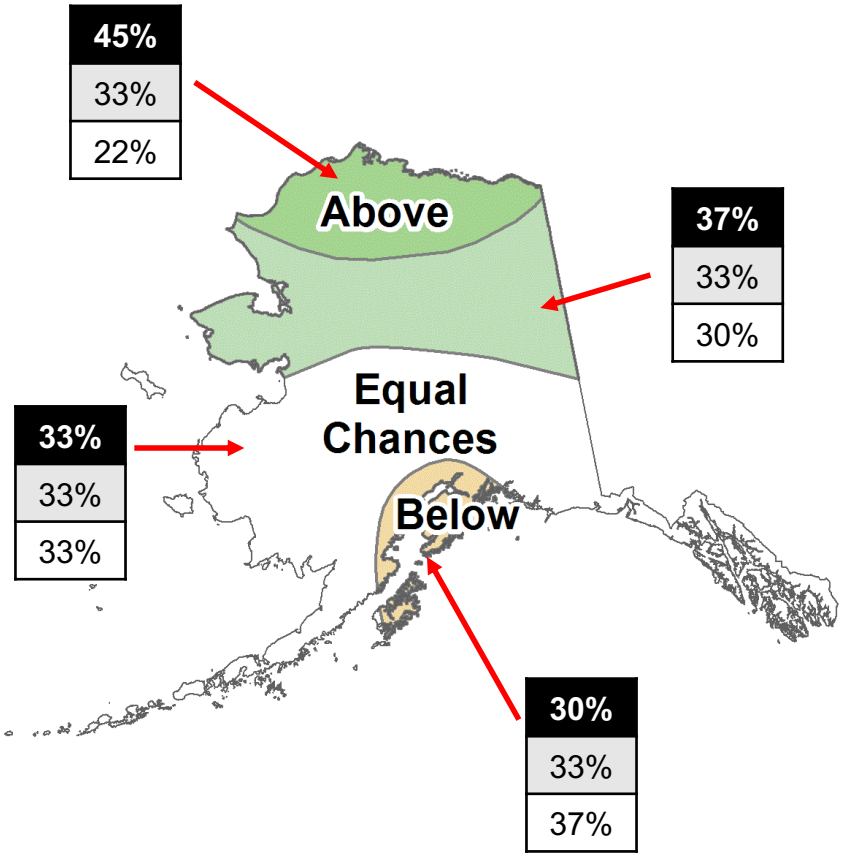
And the Answer Is…

CPC November 2023 Outlook



Average Temperature Outlook



Total Precipitation Outlook

Above%
Normal%
Below%

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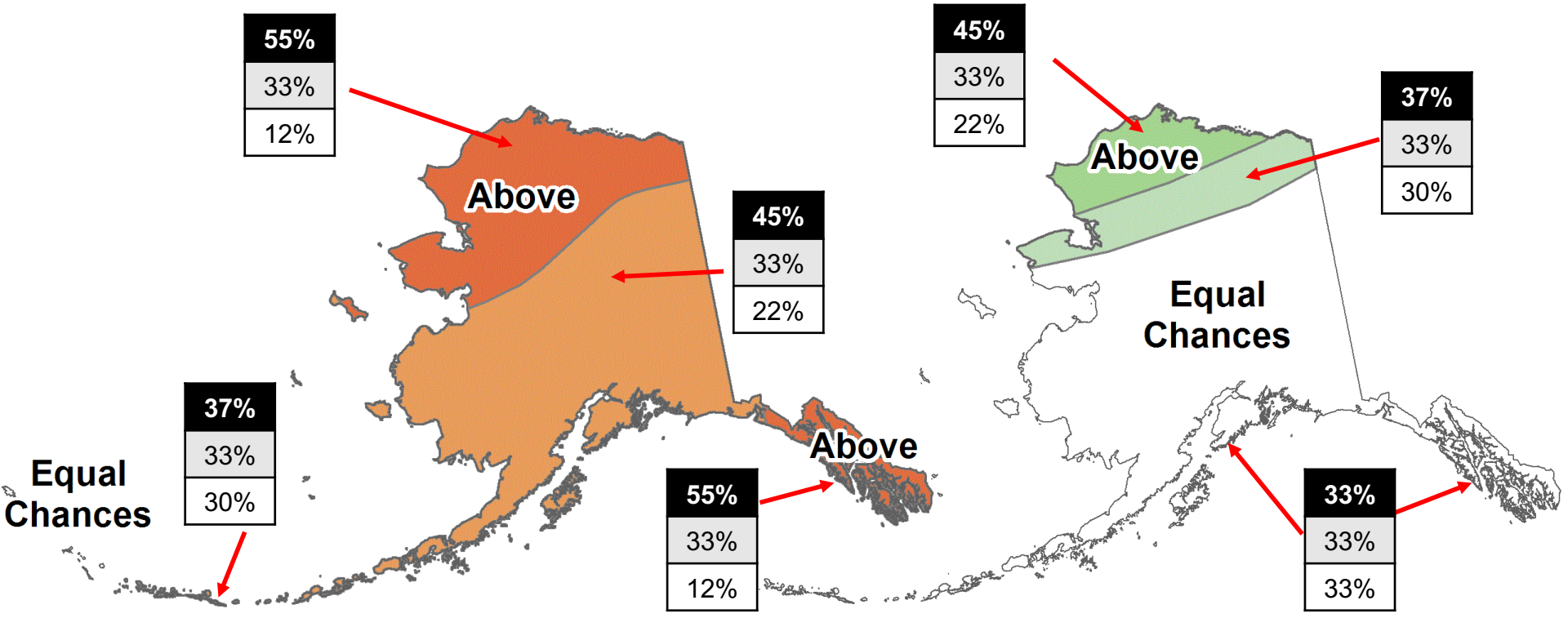
CPC November 2023 to January 2024 Outlook



Above%
Normal%
Below%

Average Temperature Outlook

Total Precipitation Outlook

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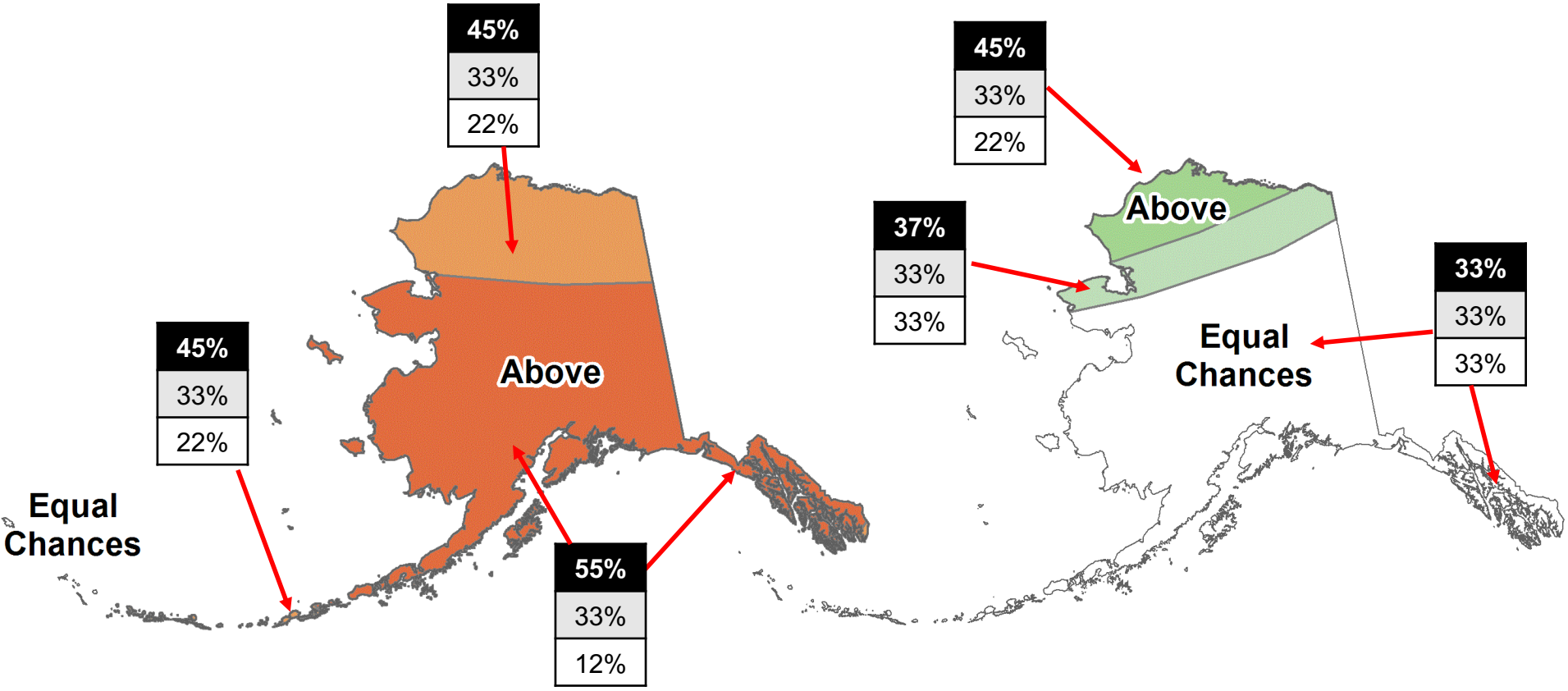
Look Ahead: Mid-Winter 2023-24



Above%
Normal%
Below%

Average Temperature Outlook

Total Precipitation Outlook

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The Webinar Future
Check back for updates

- **October 23**: Developing High-Resolution Records of Storminess from the Southern Bering Sea
- **November 08**: Ice Fog
- **November 21**: 2023 Northern Wildfire

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https://uaf-accap.org/events/