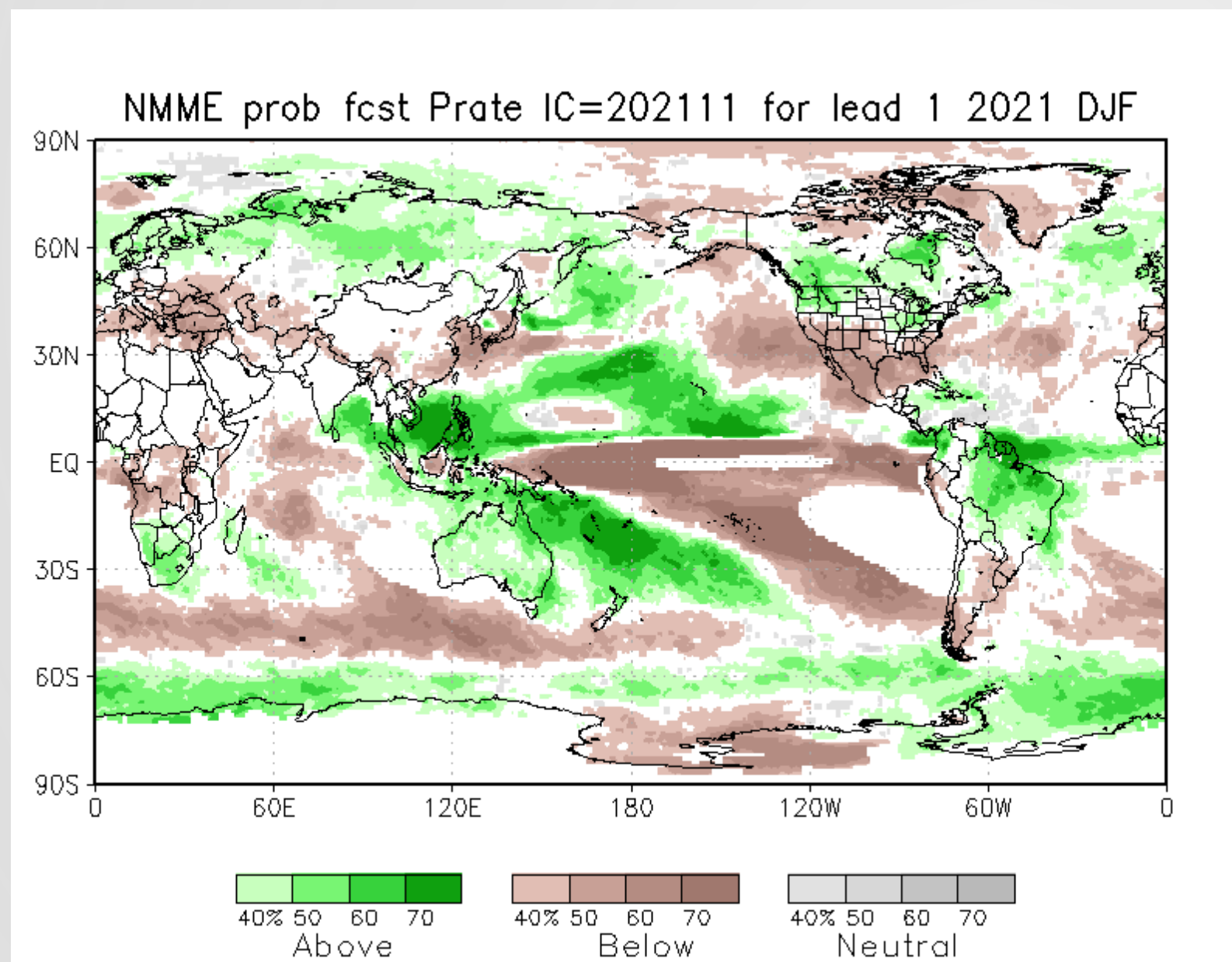# The National Multi-Model Ensemble for Seasonal Forecasting

November 17, 2021

Michael L. Anderson, State Climatologist

Forecasting the Water Year

- Fall (September/October/November)
  - Antecedent Conditions
  - Precipitation Onset
  - Temperature Anomaly
  - Soil Moisture State with Snowpack Initiation
- Winter (December/January/February)
  - Wet/Dry
  - Notable Anomalies
- Spring (March/April/May)
  - Late-Season Bailout or Early Shutoff?
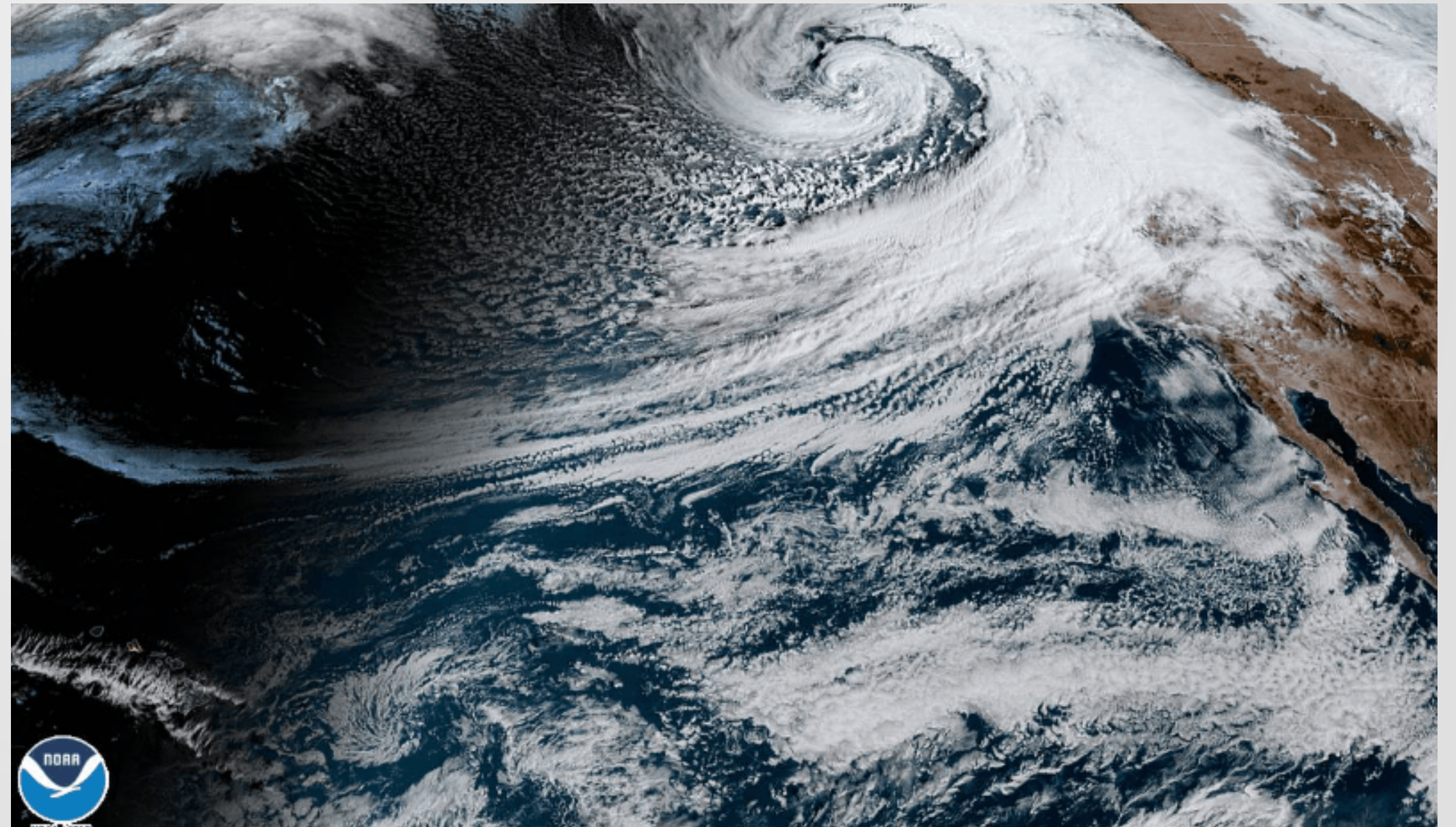 - Peak Snowpack Melt Timing and Magnitude
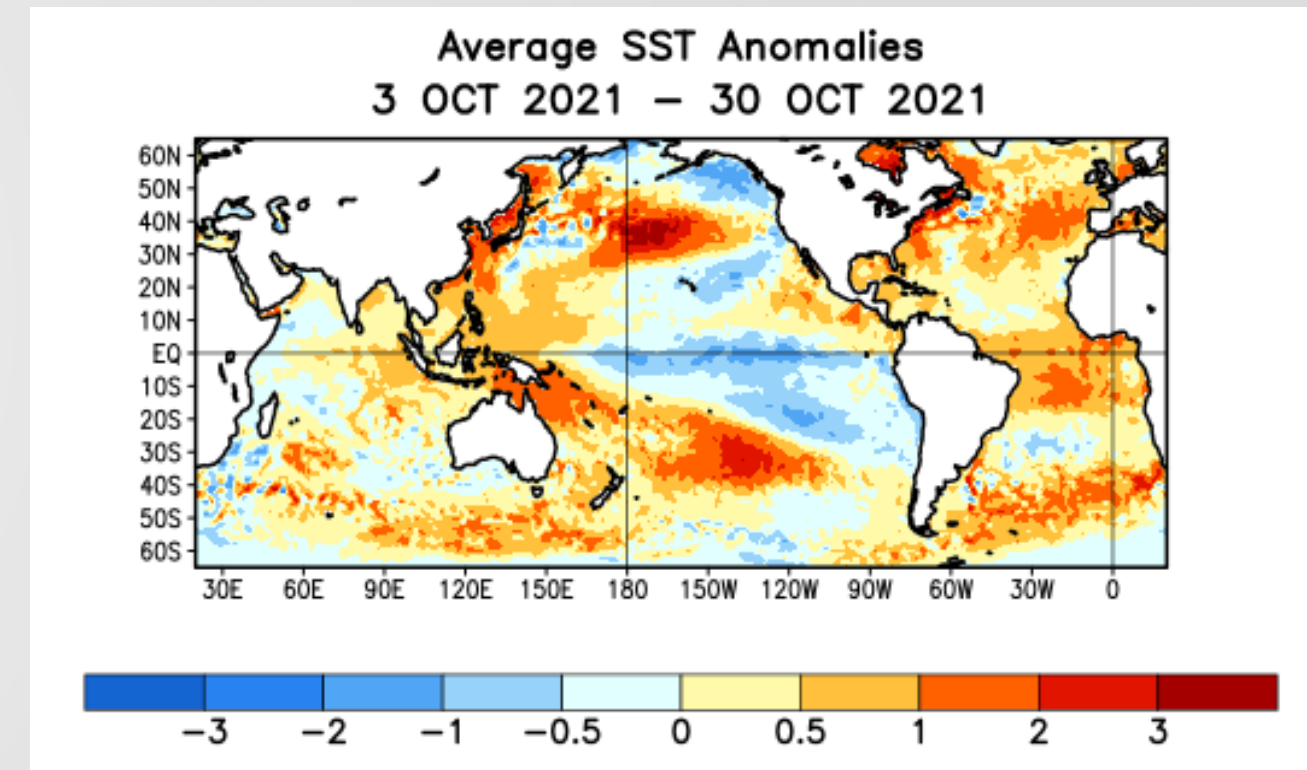
Think about how NMME or other forecasts feed information into this framework

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Talk Takeaways

- What is an ensemble and why use it?

- Sources of climate variability

- WY 2022Outlook with some links to sources

24 Oct 2021 16:56Z NOAA/NESDIS/STAR GOES-West GEOCOLOR

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What is the NMME and what is an ensemble?

- NMME – **N**ational **M**ulti-**M**odel **E**nsemble is a collection of dynamic models predicting the earth system evolution out to 6 months

- An ensemble is a group which in forecasting is the group average prediction which has been shown to have more predictive power than any individual model

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Temperature and Precipitation Prediction

https://www.cpc.ncep.noaa.gov/products/NMME/seasanom.shtml

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Ensemble Prediction

La Niña

POLAR JET STREAM

BLOCKING HIGH PRESSURE

Cold

Wet

Dry

Wet

VARIABLE PACIFIC JET STREAM

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https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensocycle/enso_cycle.shtml
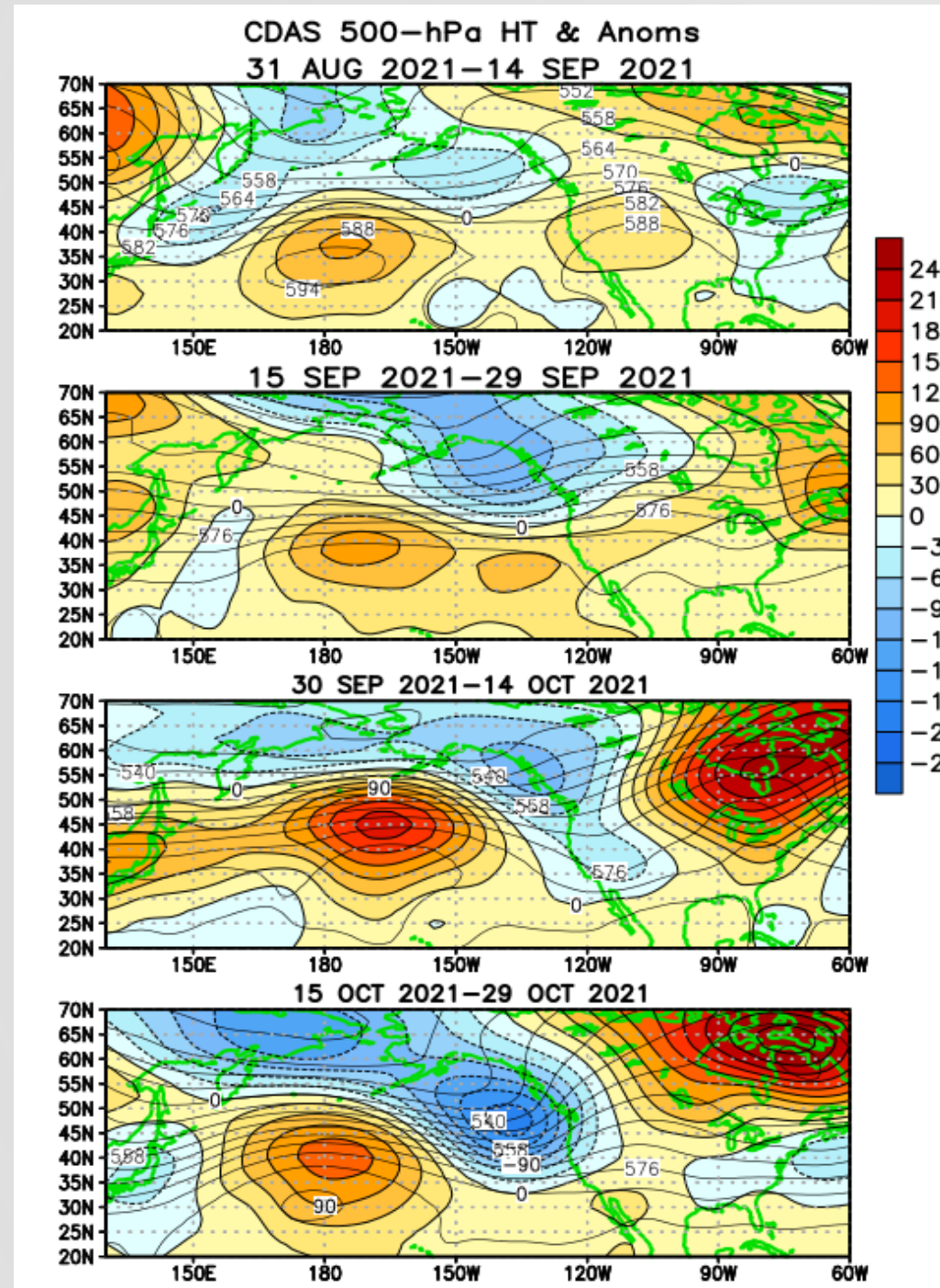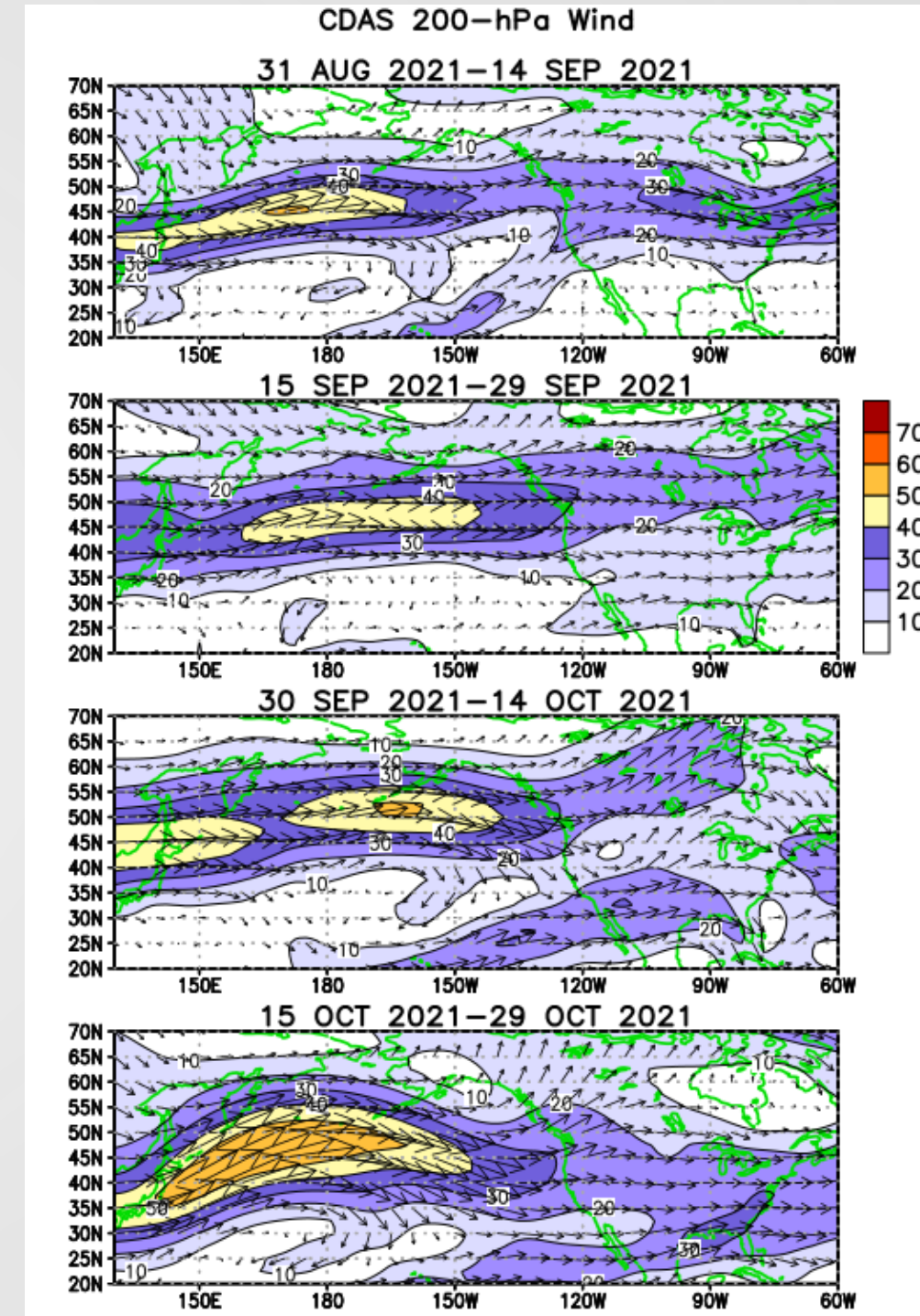
Atmosphere Conditions October 2021

Mid-Atmosphere Pressure

Jet Stream

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/index.shtml
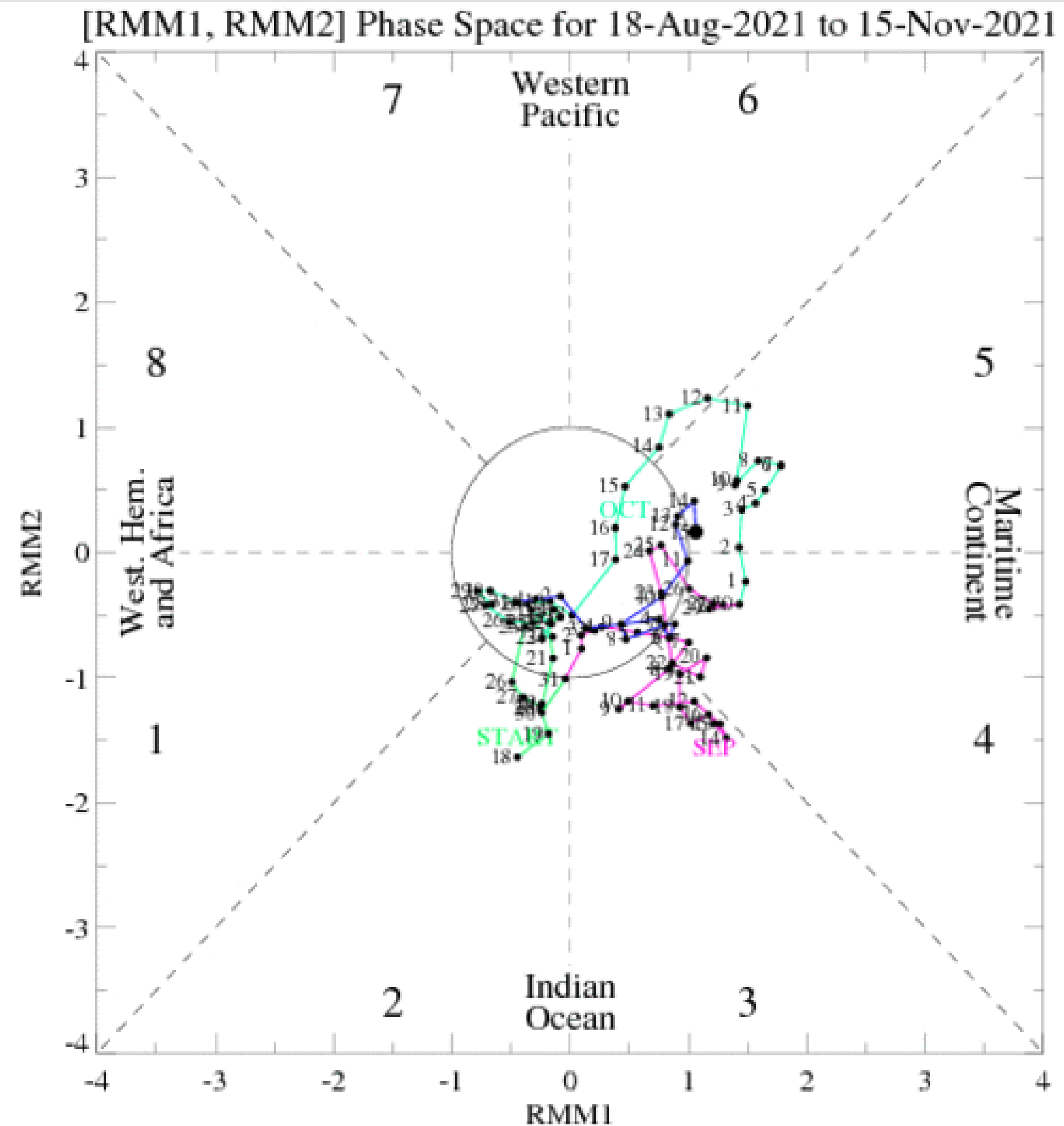
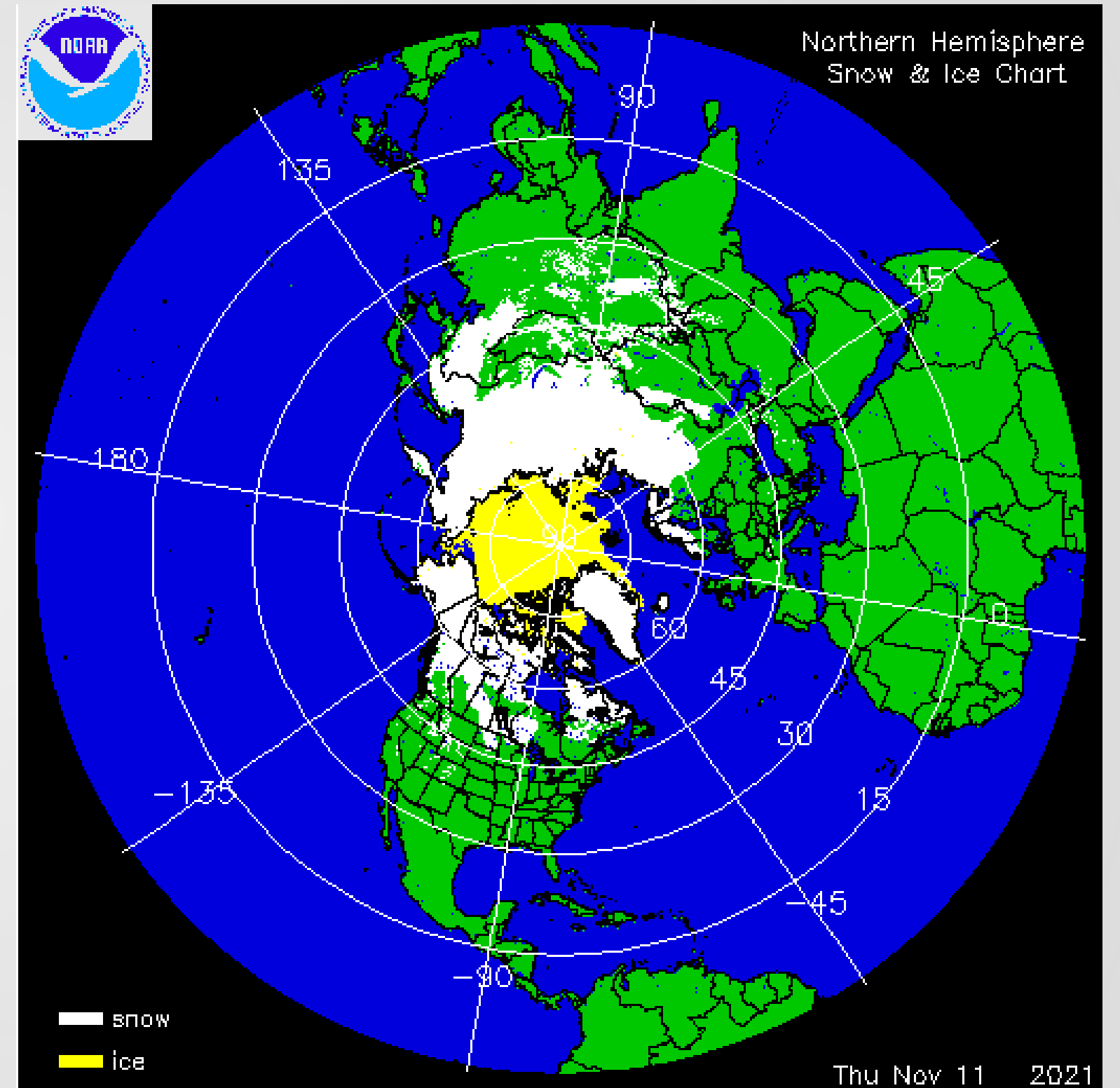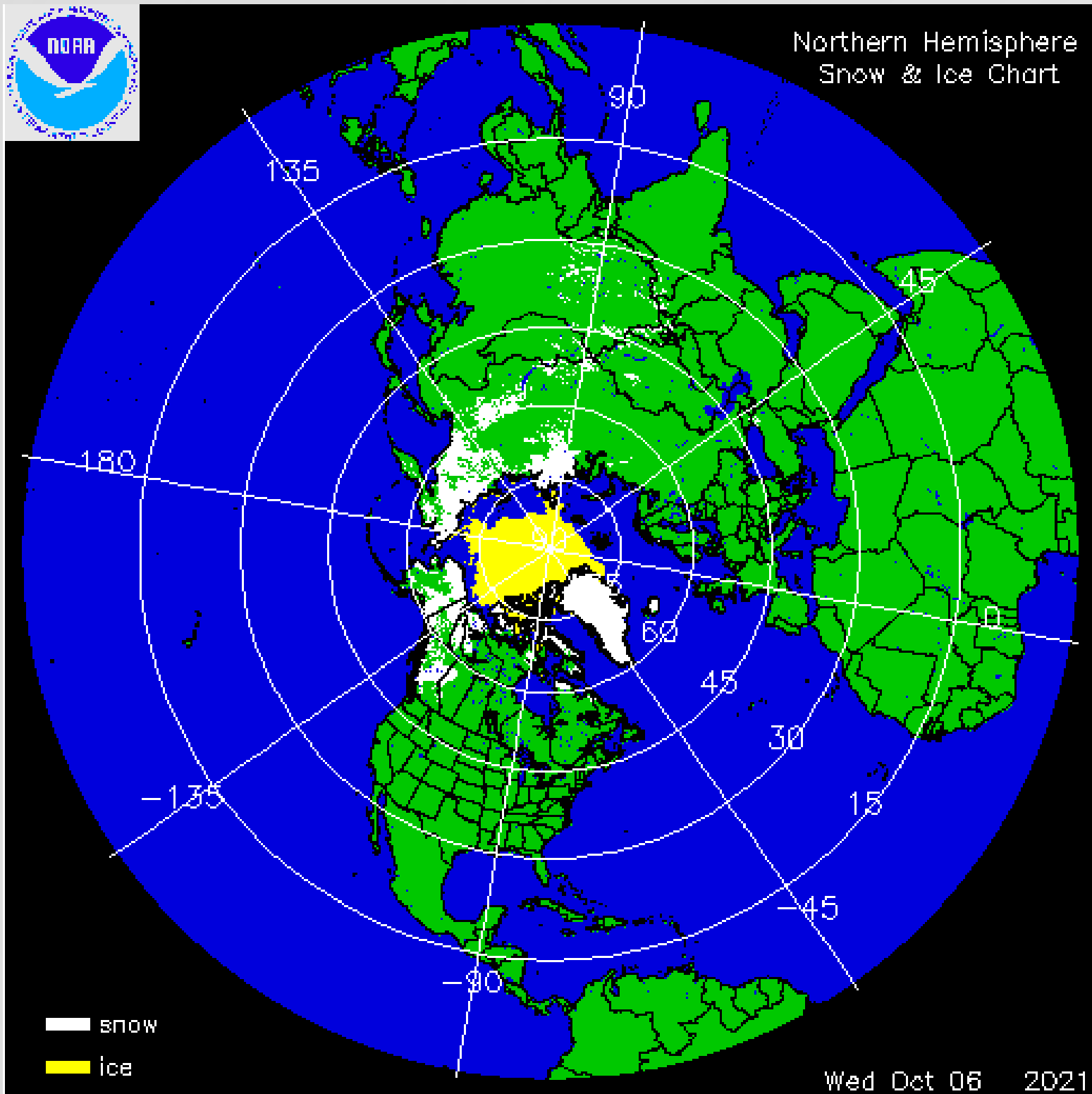Graphics from ENSO Diagnostic Discussion of 11/1/2021

Madden Julian Oscillation

- Sub-seasonal variability
- Tropical Convective Energy and its movement influence extratropical outcomes
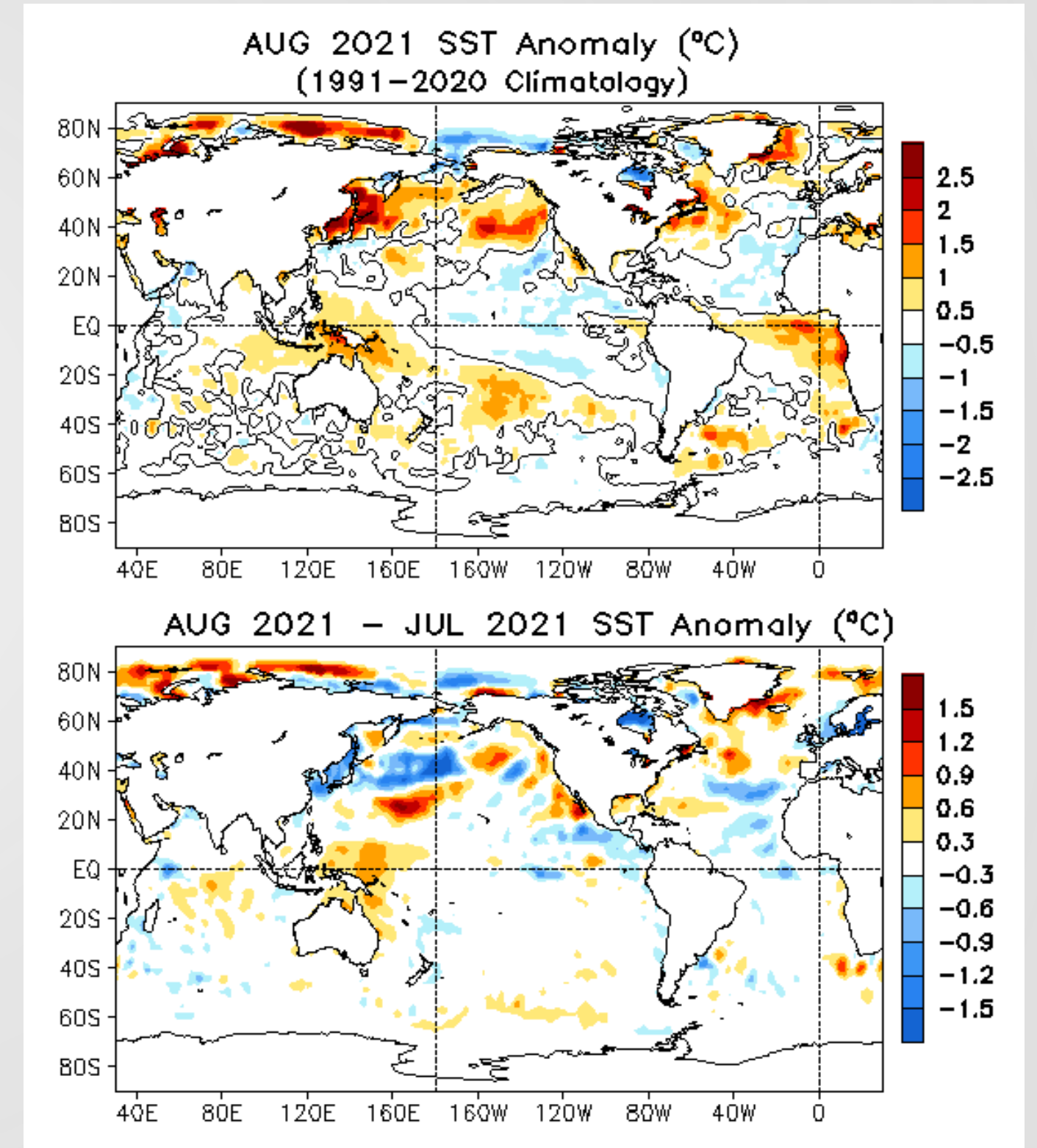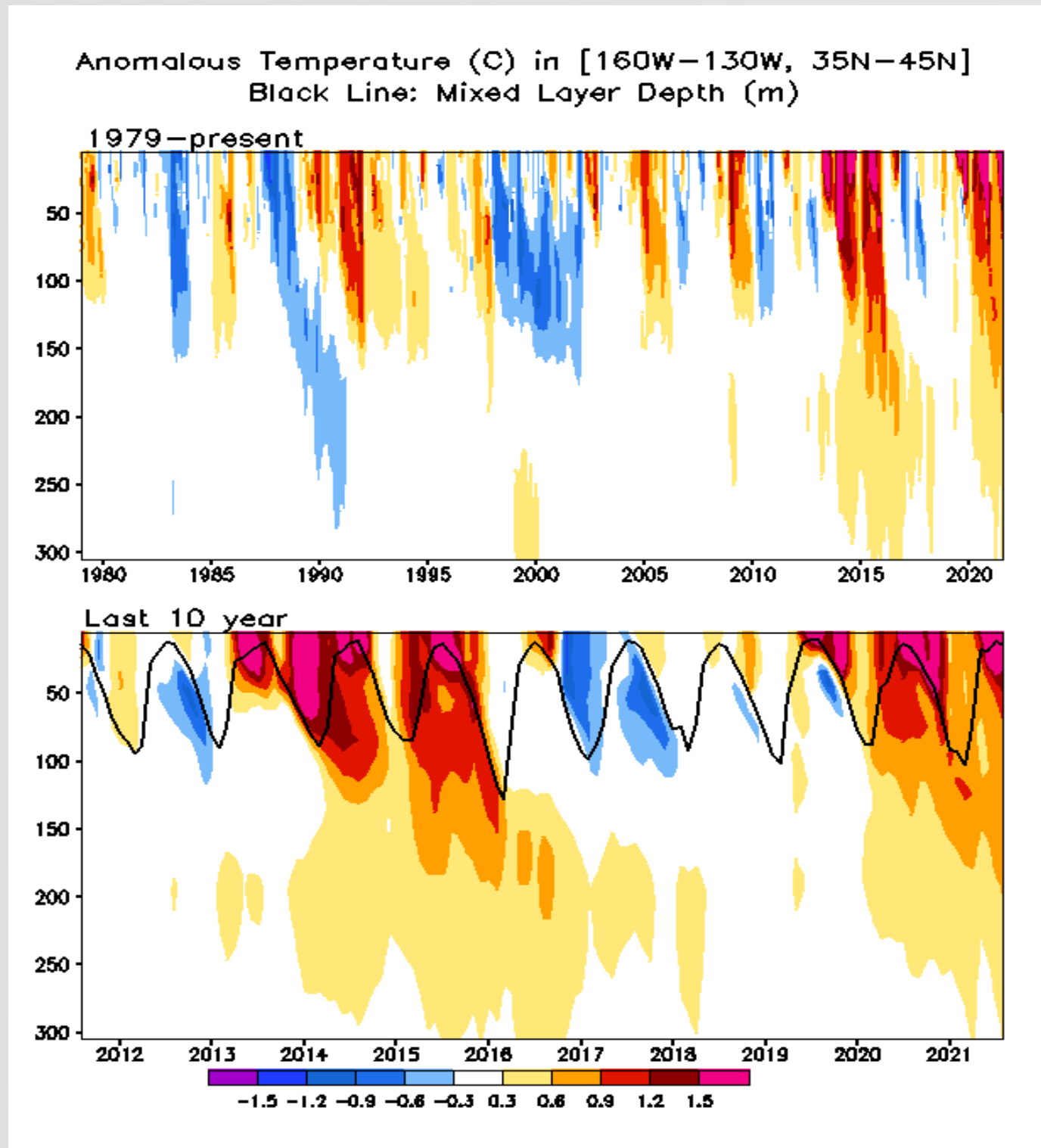- Mapped as phase and strength

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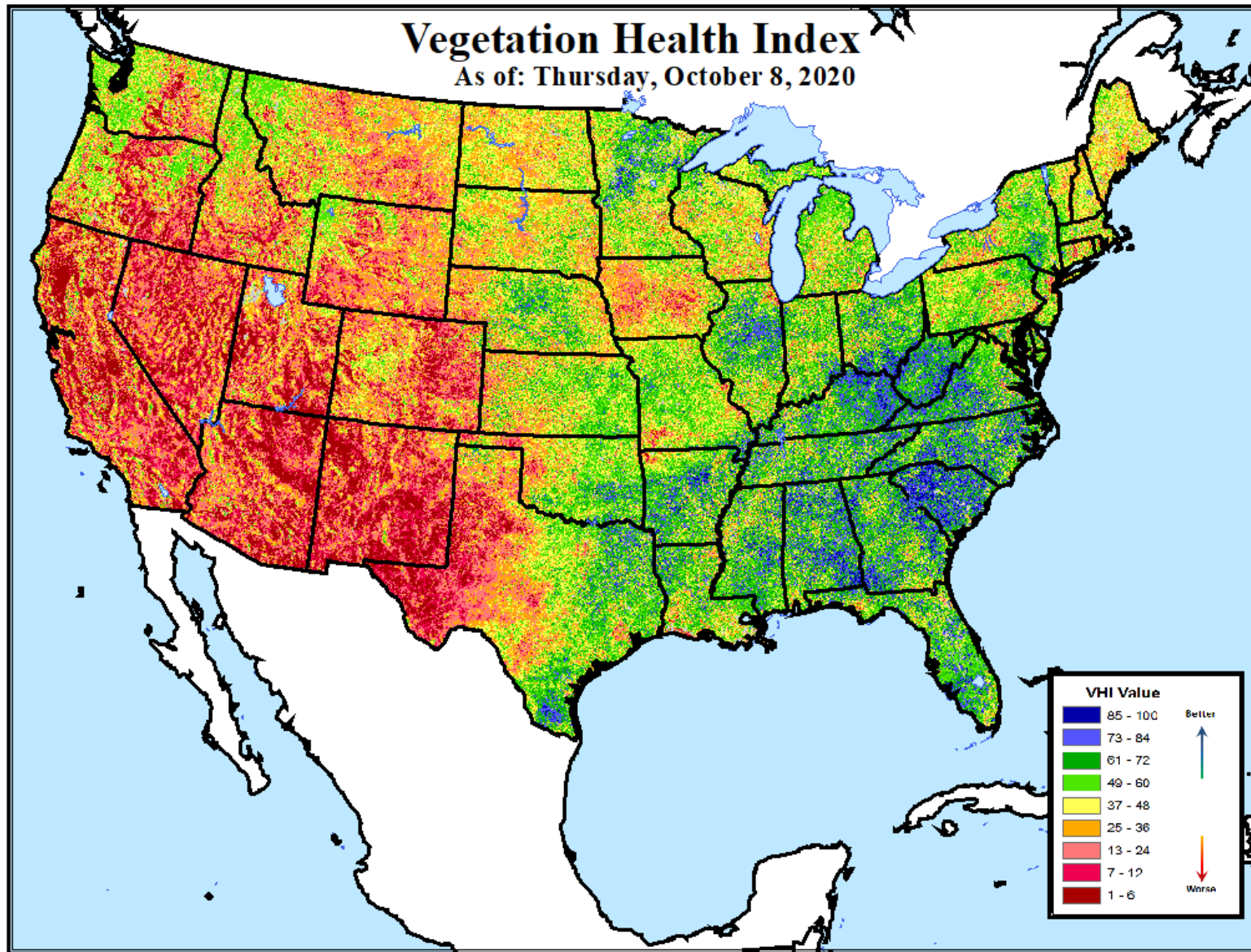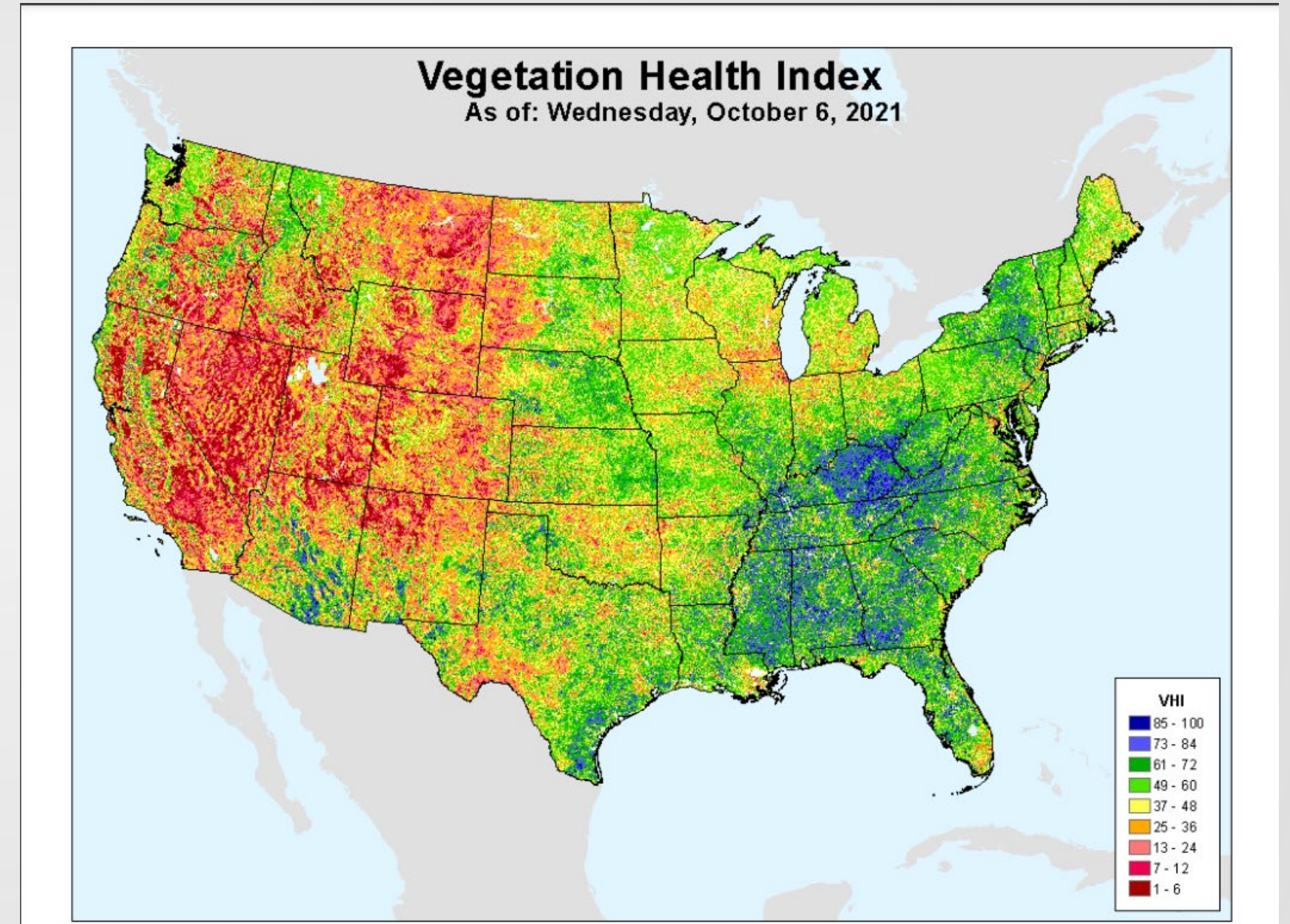
Polar Conditions Northern Hemisphere

Ocean Conditions August 2021

Land Surface Conditions October 2021
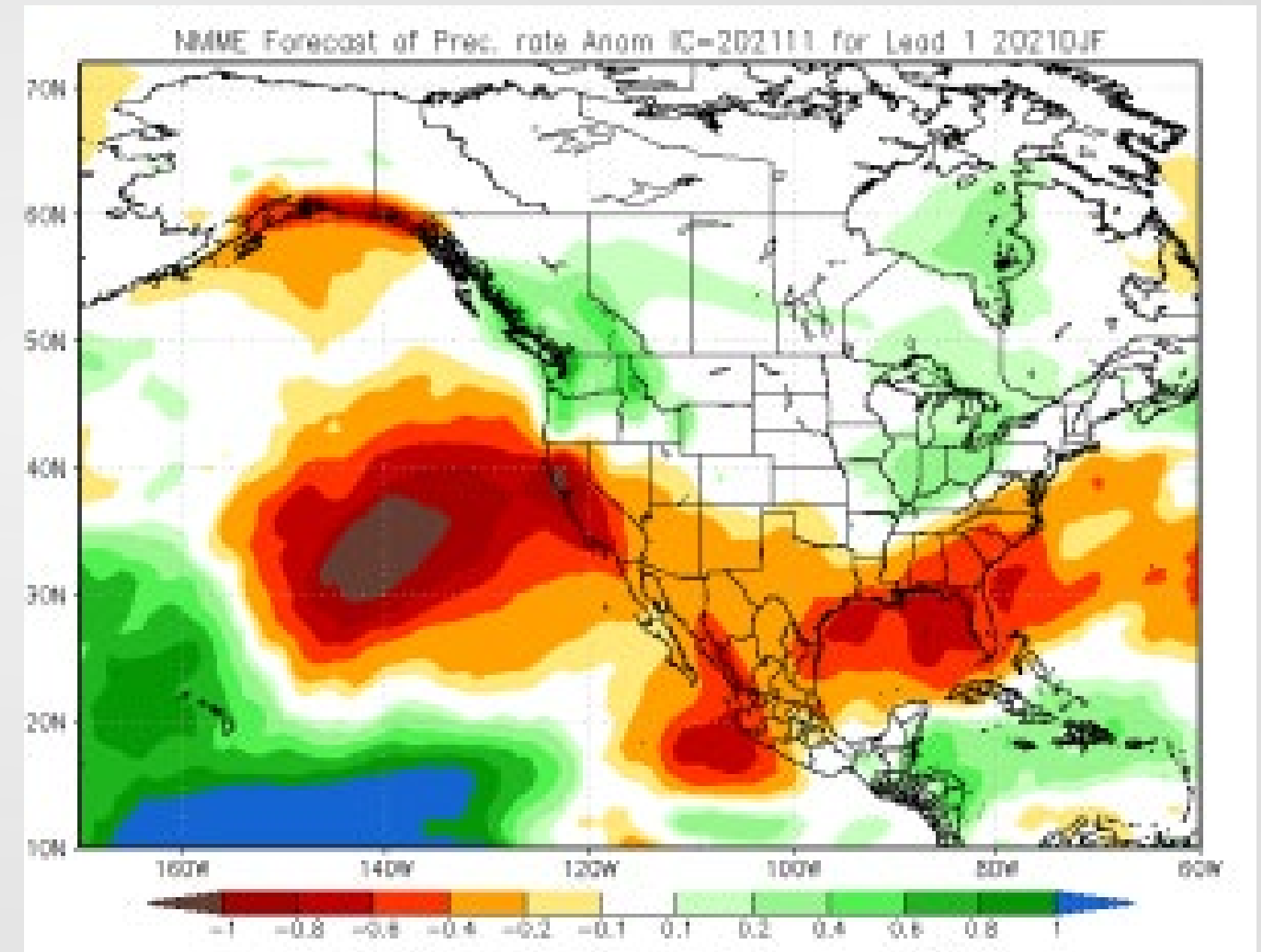

2020

2021

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https://www.drought.gov/topics/vegetation#data-maps-tools

NMME - Outlooks

DJF Temperature

DJF Precipitation

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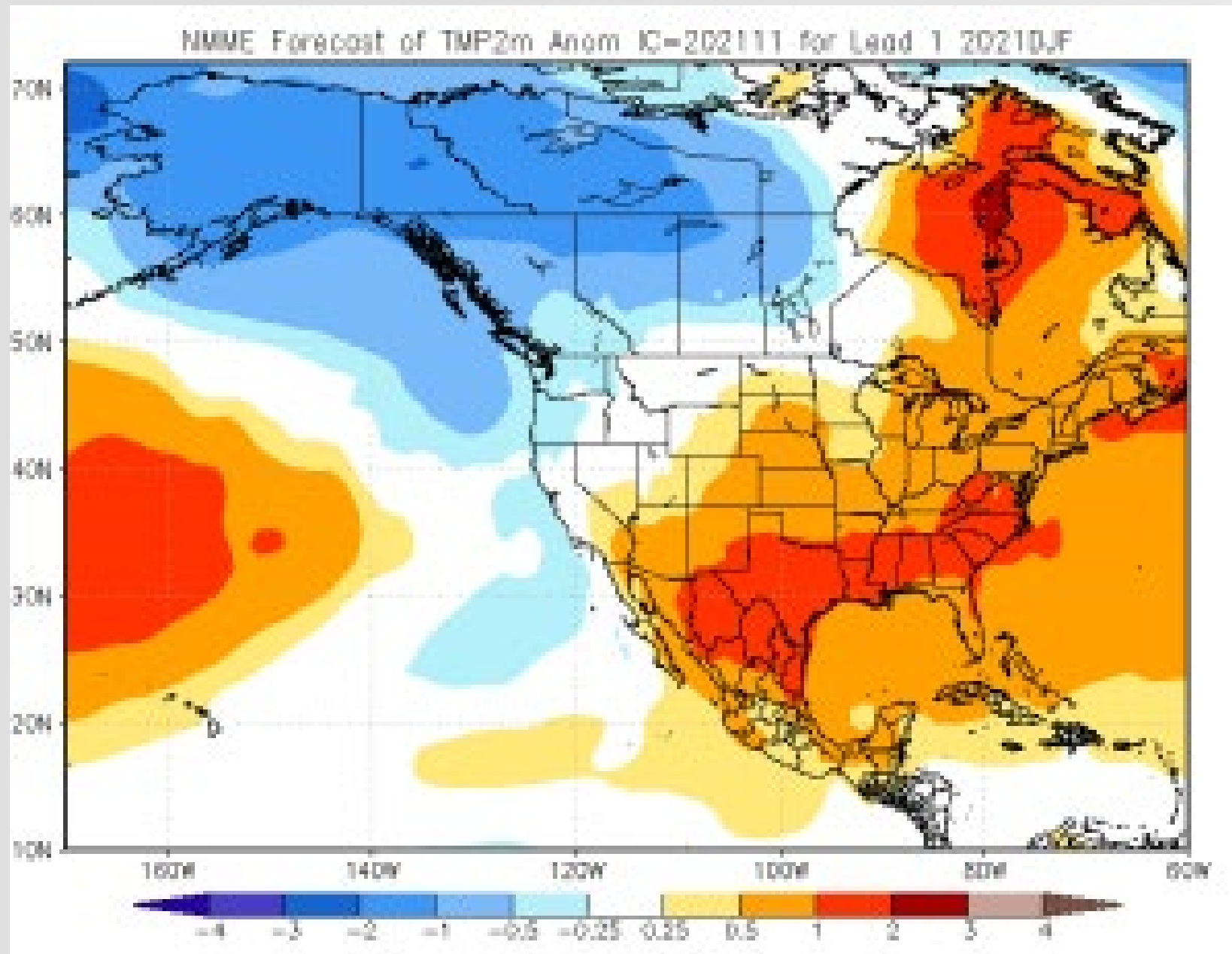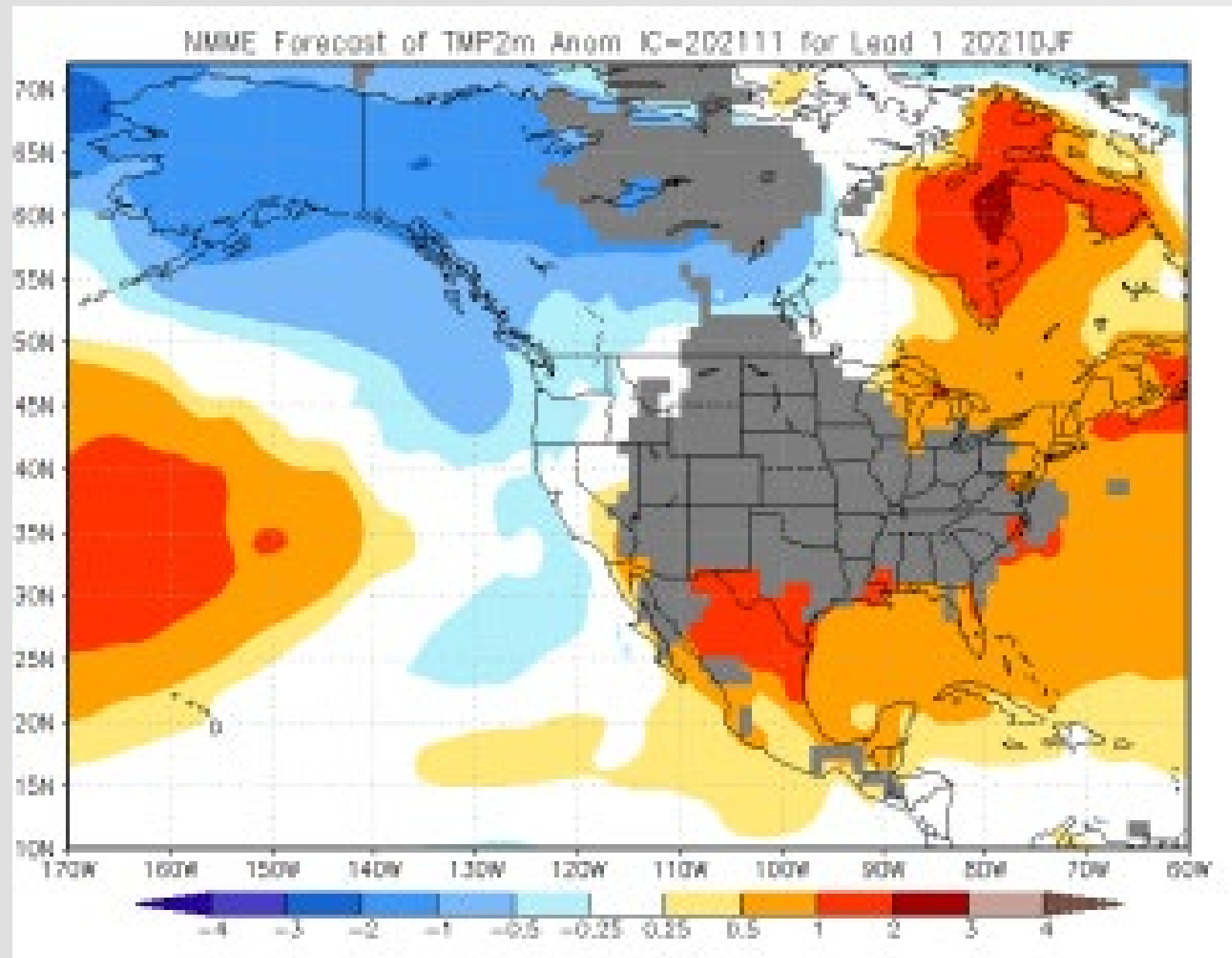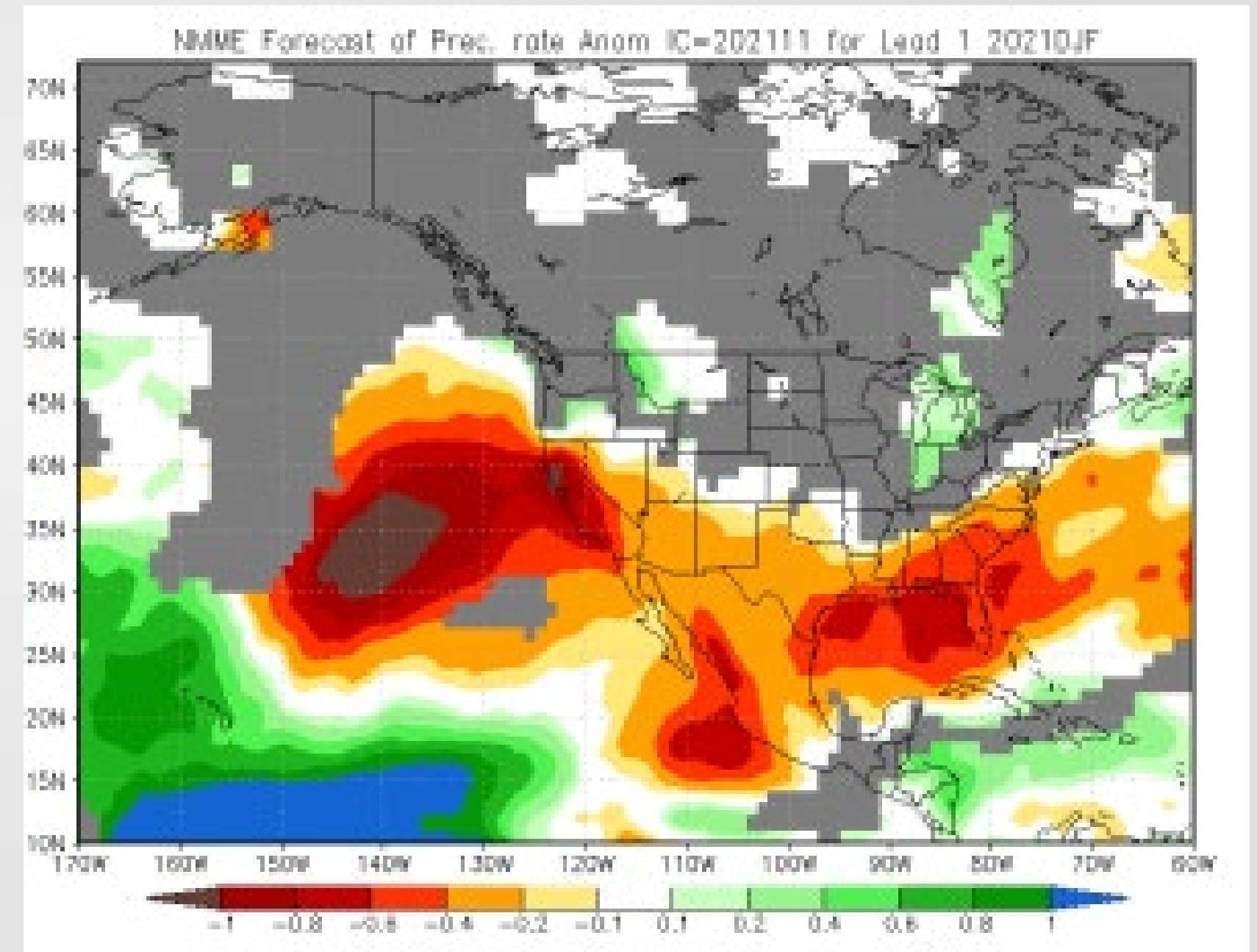
NMME – Outlooks with Skill Mask

DJF Temperature

DJF Precipitation

Summary Thoughts

- NMME is a baseline experimental comparison for seasonal prediction
- An ensemble outperforms individual model simulations in most cases
- Land/Ocean/Ice/Atmosphere relationships are changing as the world warms
- Models help to form expectations, but are not perfect predictors
- Understanding physical processes and their interactions are key to successful seasonal forecasting

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Questions?

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- media@water.ca.gov

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