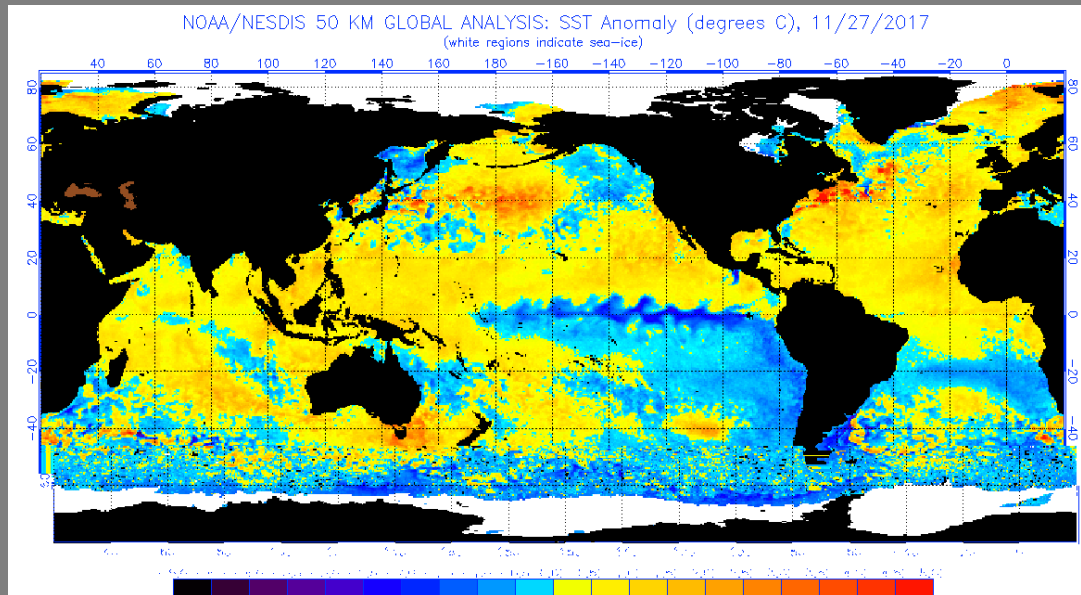


Winter Outlook 2017-2018

Southeast Lower Michigan

December through February

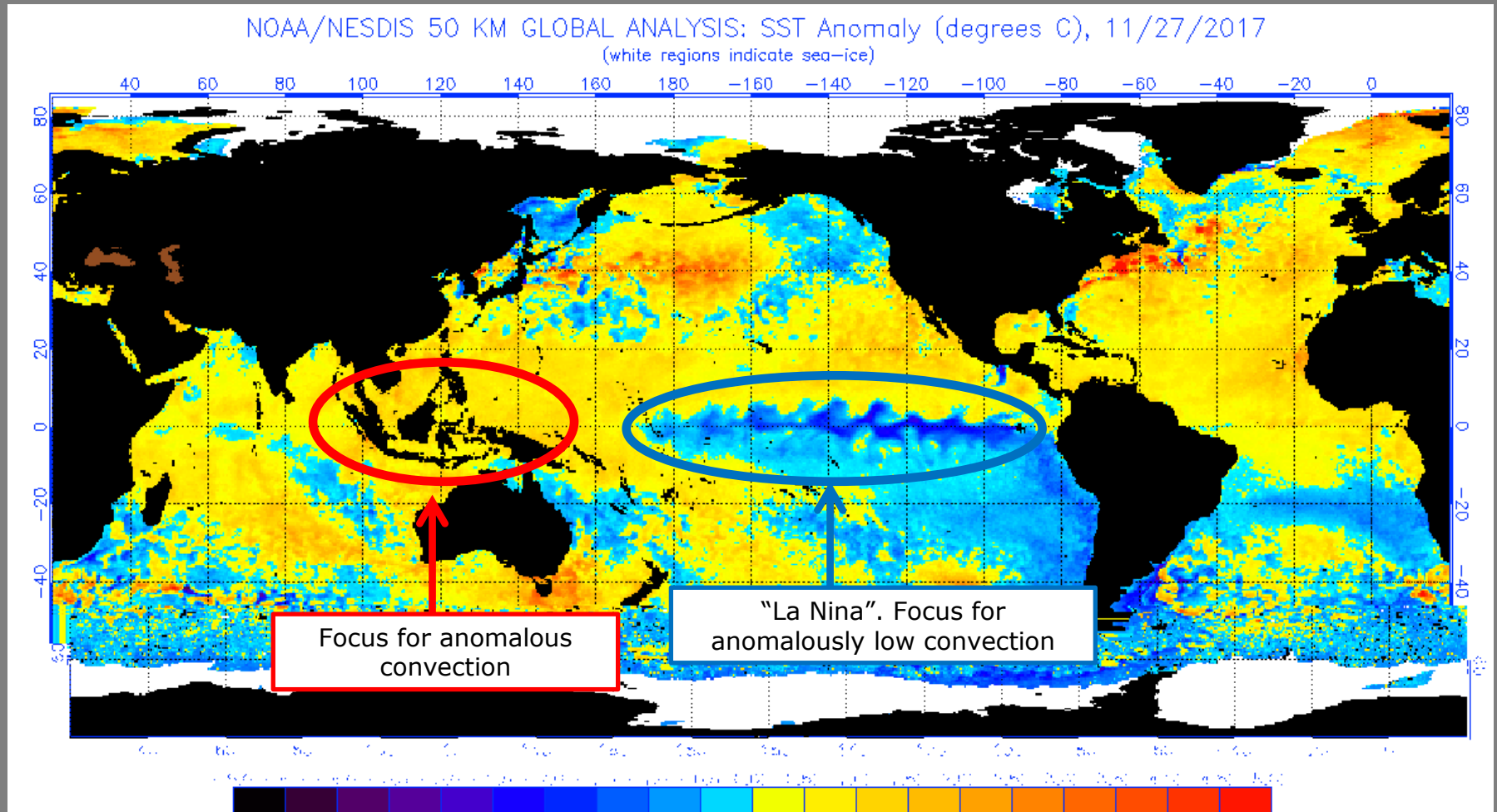


Slide 6: Winter Outlook for SE Michigan
Slides 2-5: Forecast Reasoning

Current Observations

Sea Surface Temperature Anomalies

The ENSO cycle is one of the most predictable forcing mechanisms on seasonal time-scales. Placement of tropical convection has predictable impacts on mid-latitude weather patterns. Knowledge of the current state is critical for all winter forecasts. A La-Nina state exists as we head into winter 2017-18.

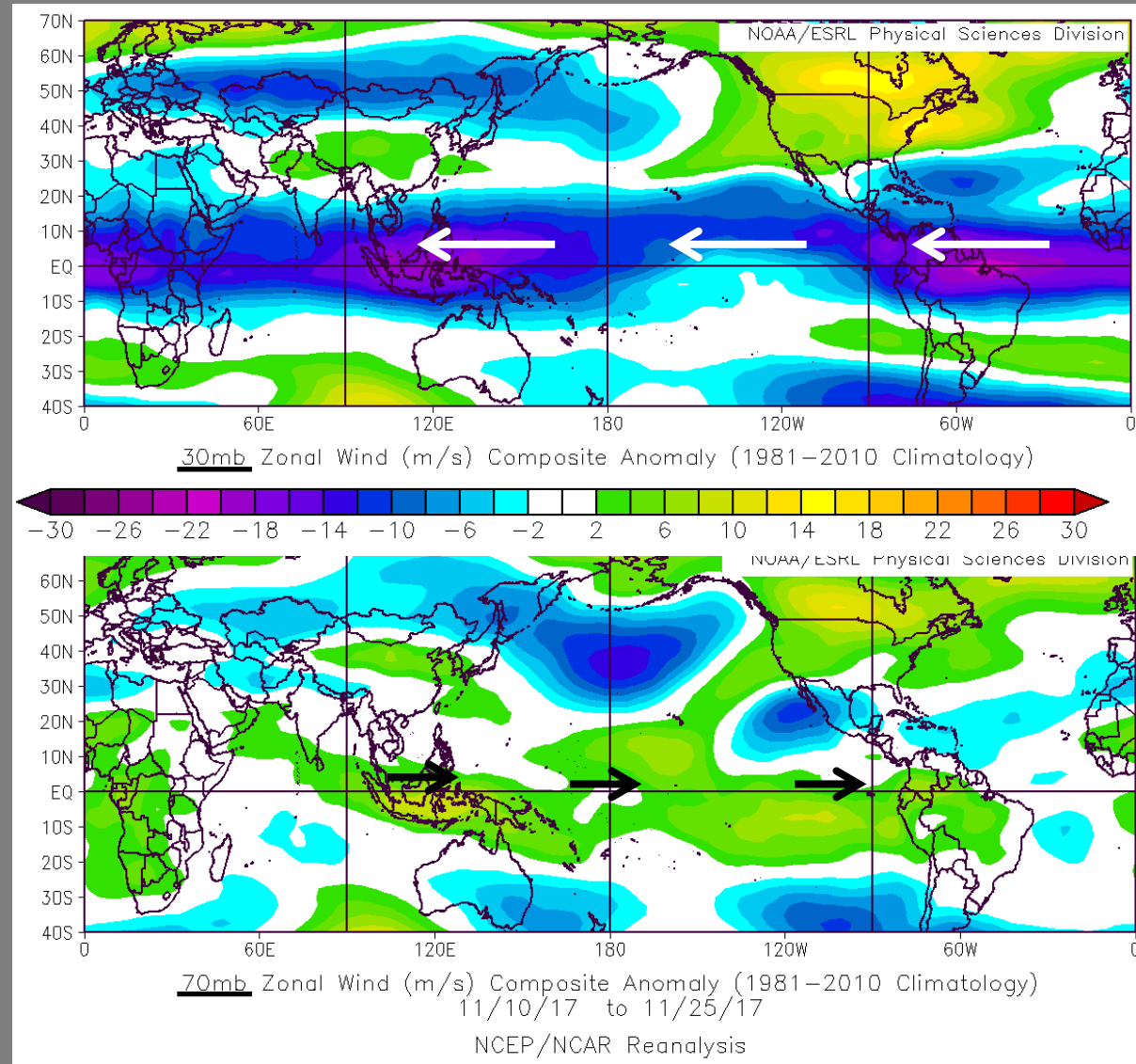


Current Observations Stratosphere (QBO) and Expectations

Stratospheric winds have implications for the global distribution of energy. They are highly predictable as they descend through the stratosphere as easterlies or westerlies.

The *easterly* phase (top), has not yet reached the *lower* stratosphere (*bottom*), where weak westerlies still prevail.

Once it does, conditions will become increasingly favorable for poleward direction of wave energy through the winter. This favors a net deceleration of the polar jet, thereby offering a contribution toward a weaker polar vortex (i.e. a tendency toward a $-AO$ regime).



Tropical Outlook

Forecast State of the Tropical Ocean and Atmosphere

Current observations of a well-coupled La Niña circulation in the tropics lend support to climate model consensus (*right*) that La Niña will provide consistent background forcing through the DJF winter period.

For additional information regarding the current state of ocean-atmosphere coupling, see the CPC ENSO page and the current MEI.

<http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml>

<https://www.esrl.noaa.gov/psd/enso/mei/table.html>

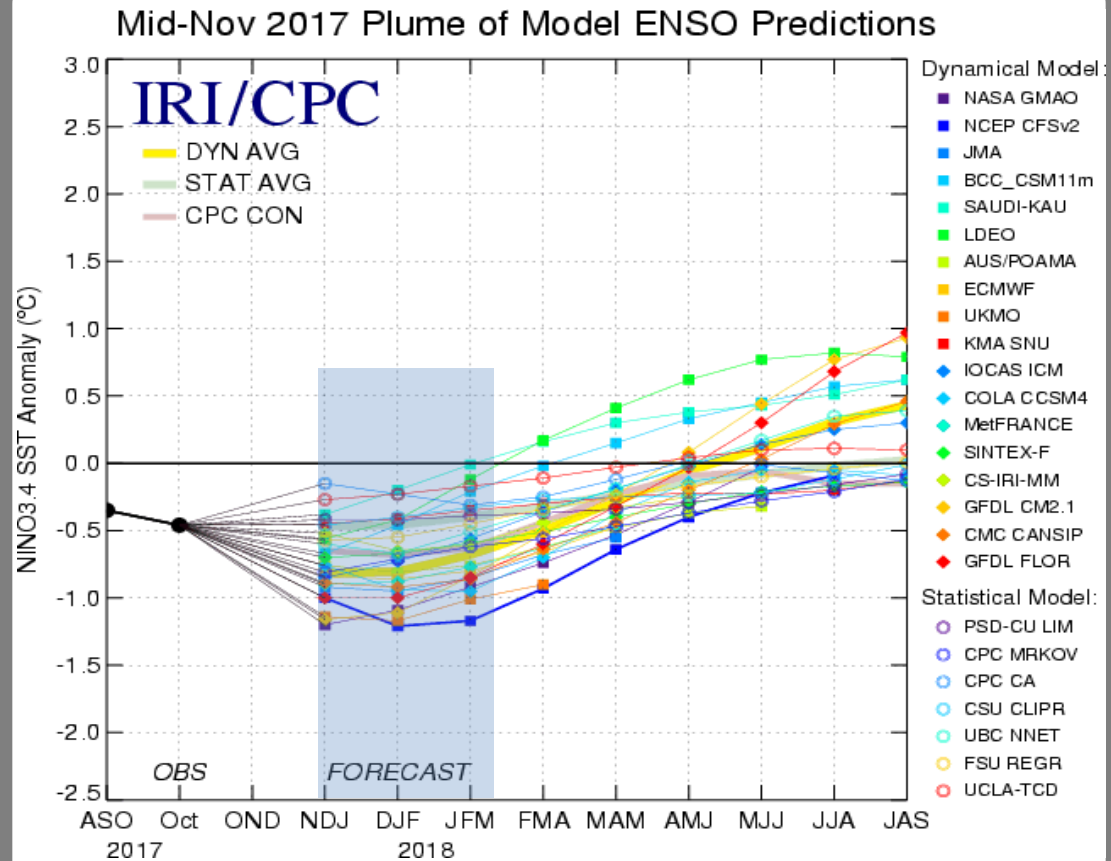
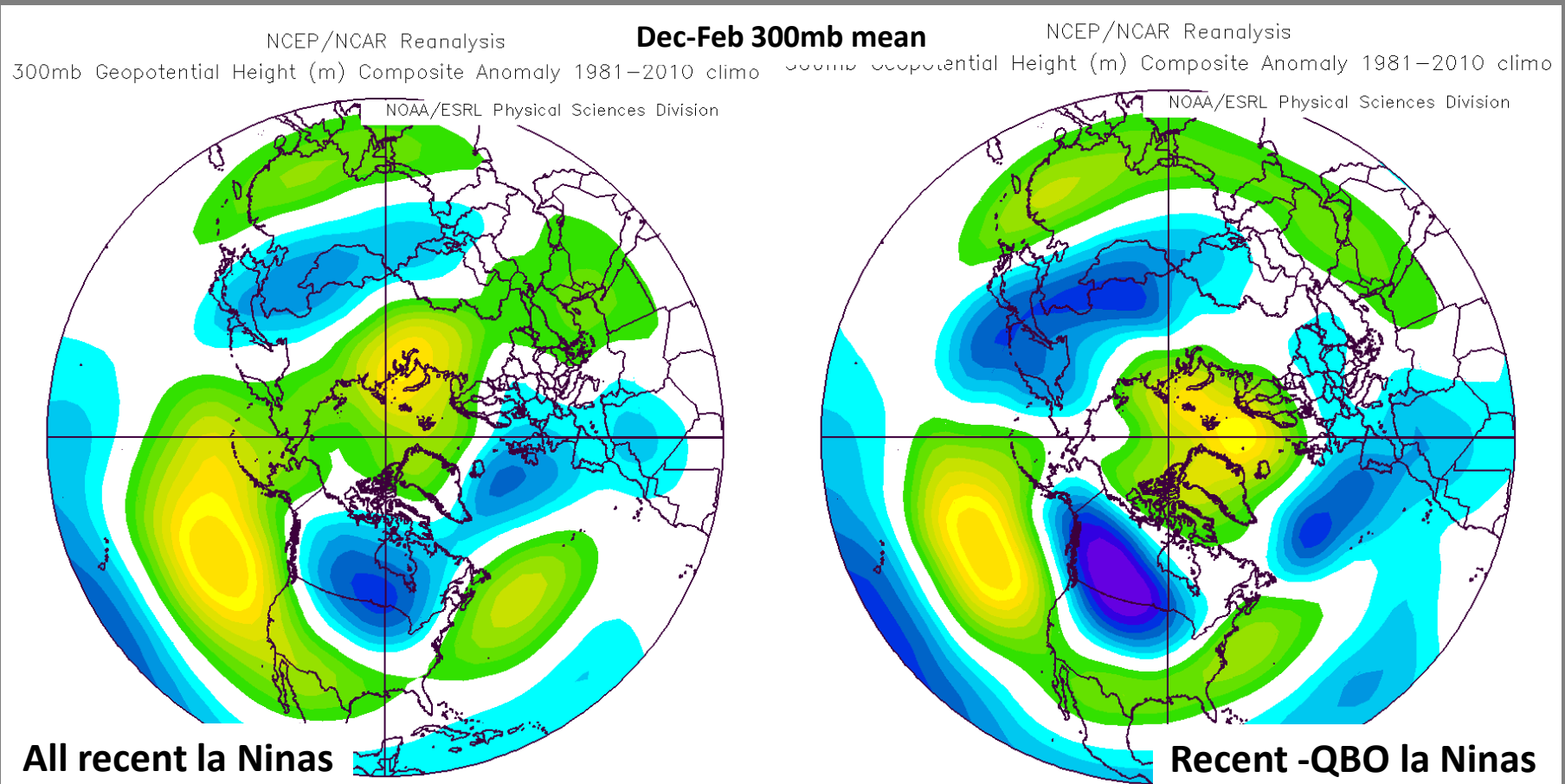


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 17 November 2017).

Analysis

La Nina stratified by QBO

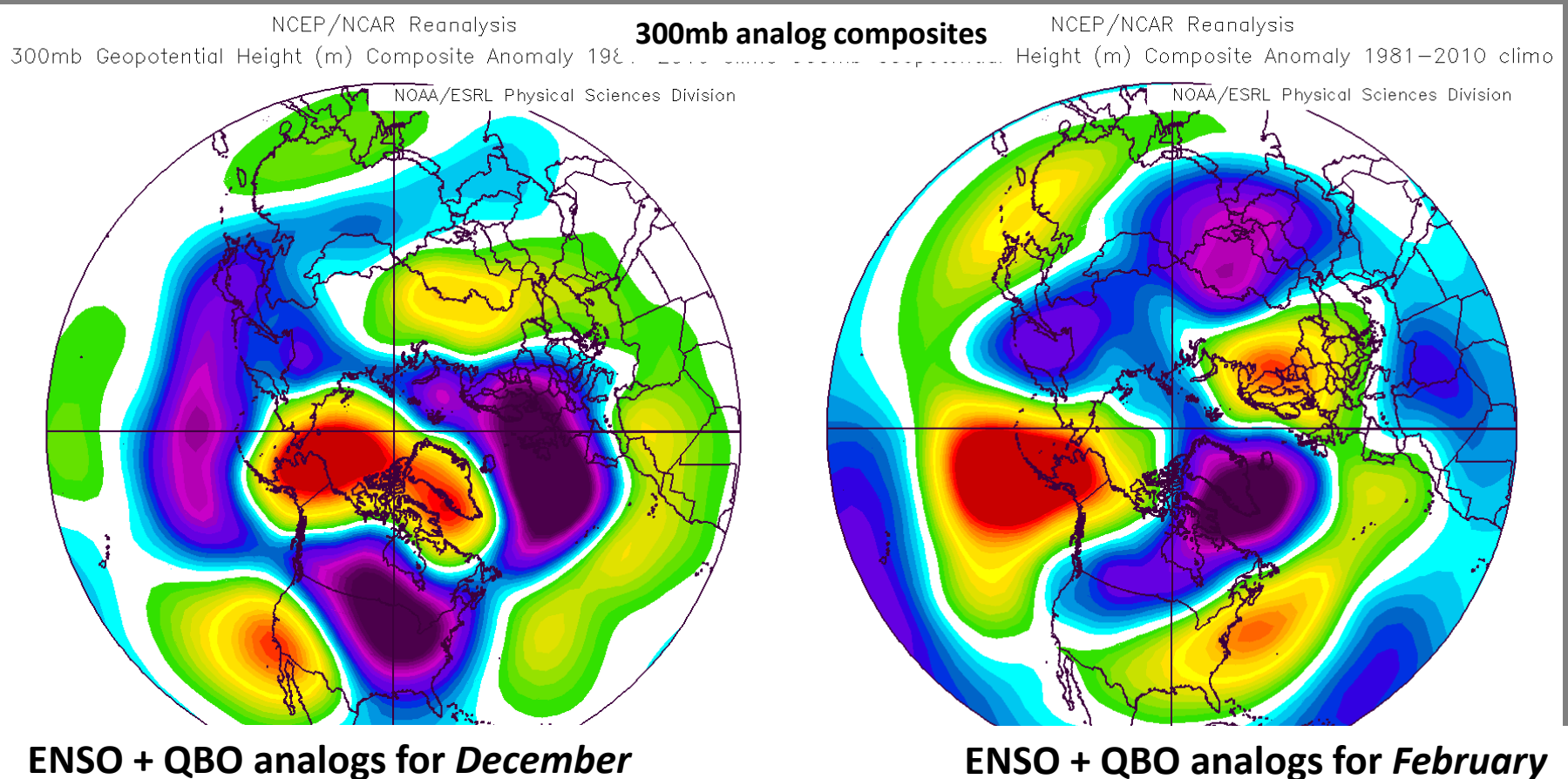
Seasonal (DJF) averages tell part of the story. La Nina composites reveal a preference for troughing over the northern US. There is a weak signal for more baroclinicity (stronger troughing and a more prominent ridge over the SE US) in the $-QBO$ breakout. However, this winter will begin with a $+QBO$ base state in the lower stratosphere and transition toward $-QBO$ with time.



Analysis

Evolution of 2017-18 by past analogs

When consideration is given to the expectation for a persistence of la Nina background forcing and modulation by the stratosphere state (evolving from +QBO early to -QBO late) a strong signal emerges from the analogs. Deep troughing over the northern US and Great Lakes early transitions to increased ridging over the SE US and a tendency for the storm track to pull north and west with time.



Winter Outlook for Southeast Michigan

Temperature Outlook

The expectation for deep troughing to develop during December is becoming evident in long-range modeling. After a mild start, December is forecast to become cold. Sometime around the mid-winter period, a transition to warmer than normal is expected as troughing retracts north and west and ridging over the SE US becomes more dominant.

December: Colder than normal after the first week
January: Colder than normal early, trending warmer late
February: Warmer than normal

Snowfall Outlook

Generally expect lower amplitude disturbances and lake effect to dominate snow potential early. As troughing retracts north and west, there will be a brief period of higher-end potential as the storm track lifts through the Great Lakes before warmer-than-normal conditions develop by February suggesting higher end snow potential shifts west and mixed-precip type events are favored.

December through January – Slightly above normal
February – Below Normal