

The Impact of Strong Negative Arctic Oscillations on the 2009-2010 and 2010-11 Florida Dry Seasons

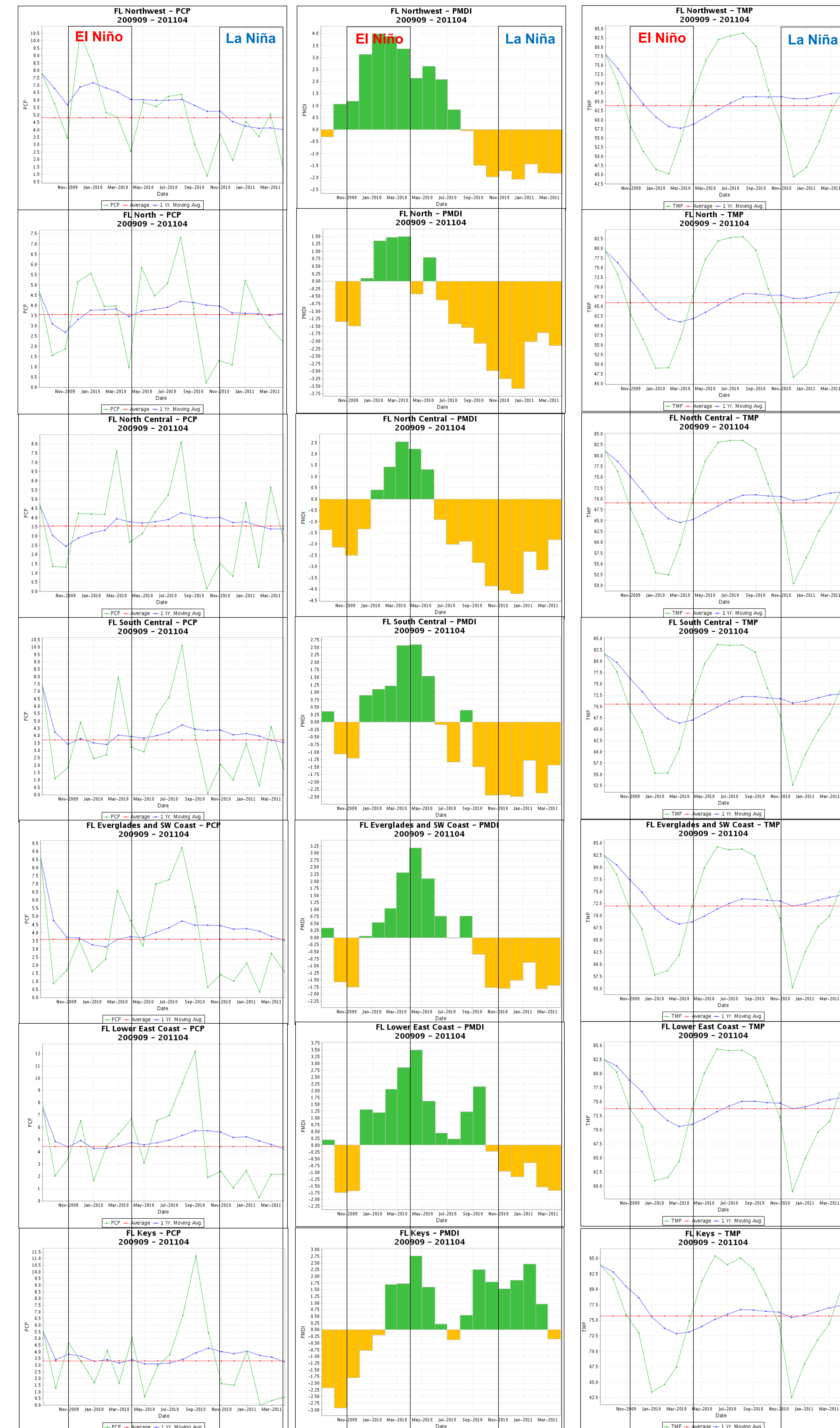
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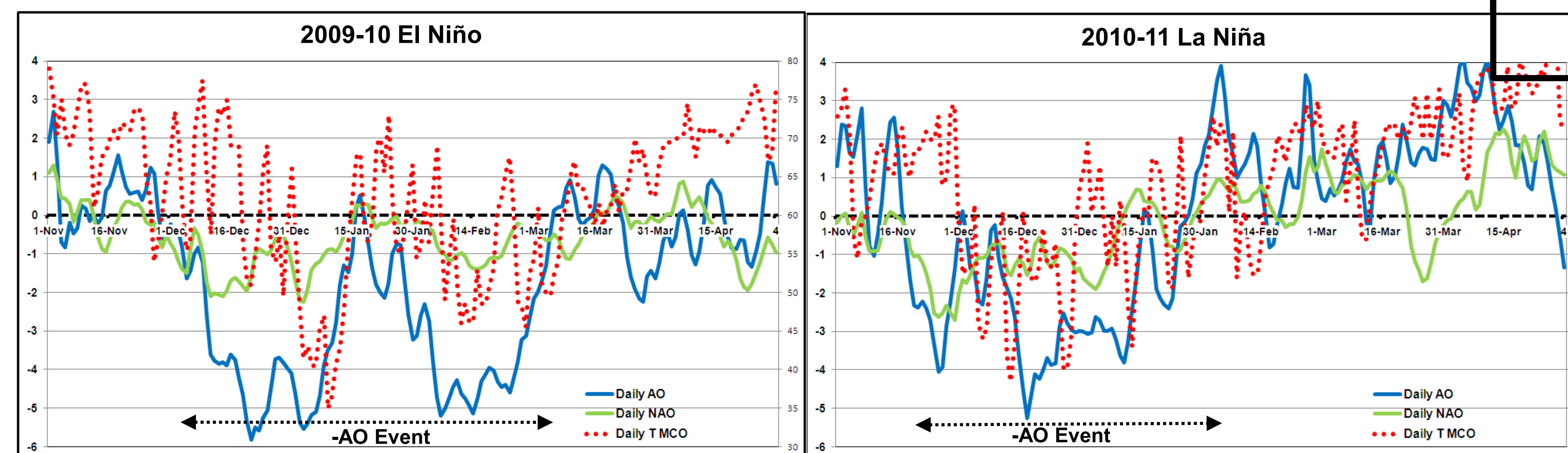
NOAA, National Weather Service, Melbourne, FL



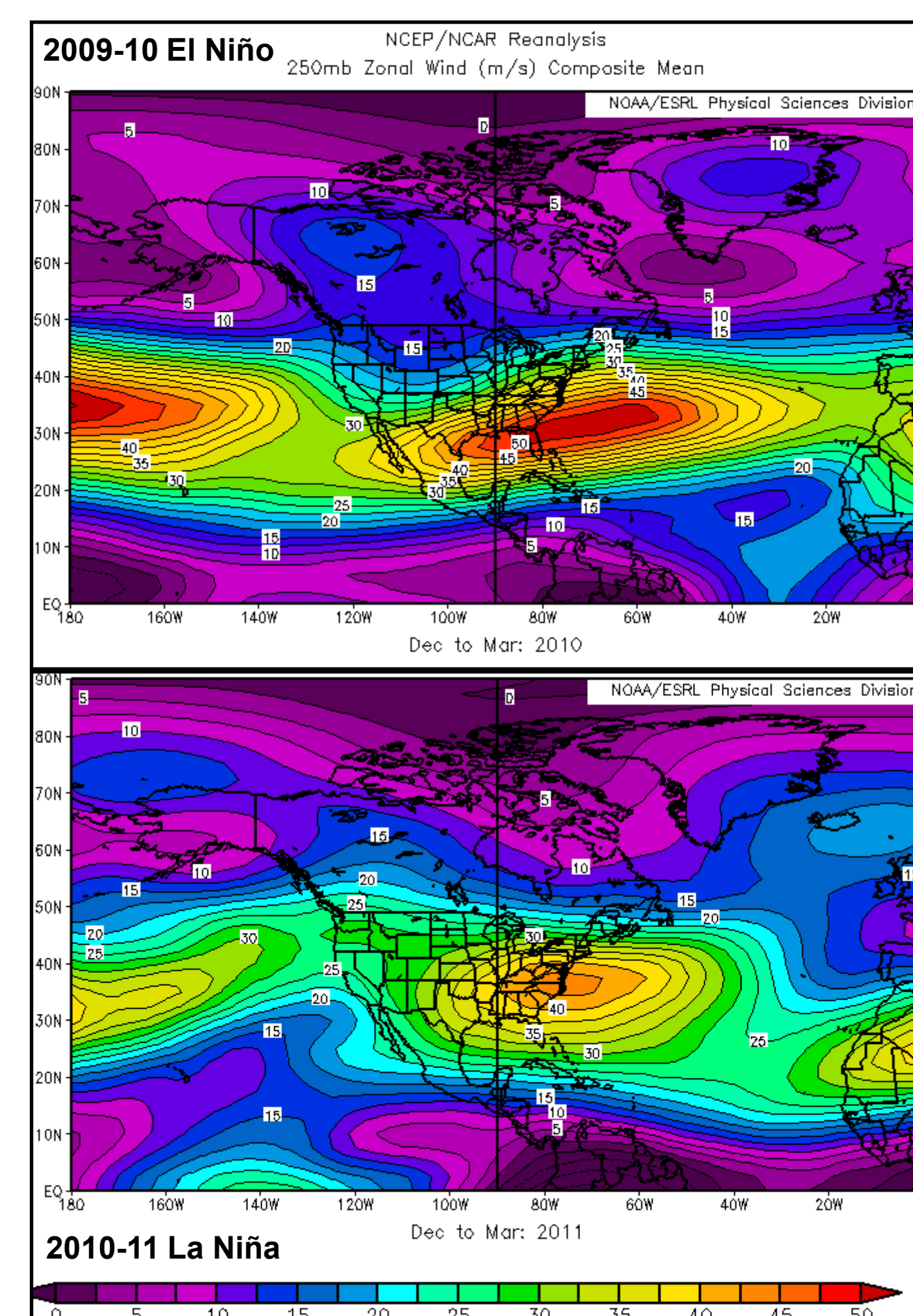
Mean monthly precipitation, Palmer Drought Index and temperature for Florida's seven climatic divisions for the 2009-10 (strong **El Niño**) and 2010-11 (strong **La Niña**) dry seasons (November-April).



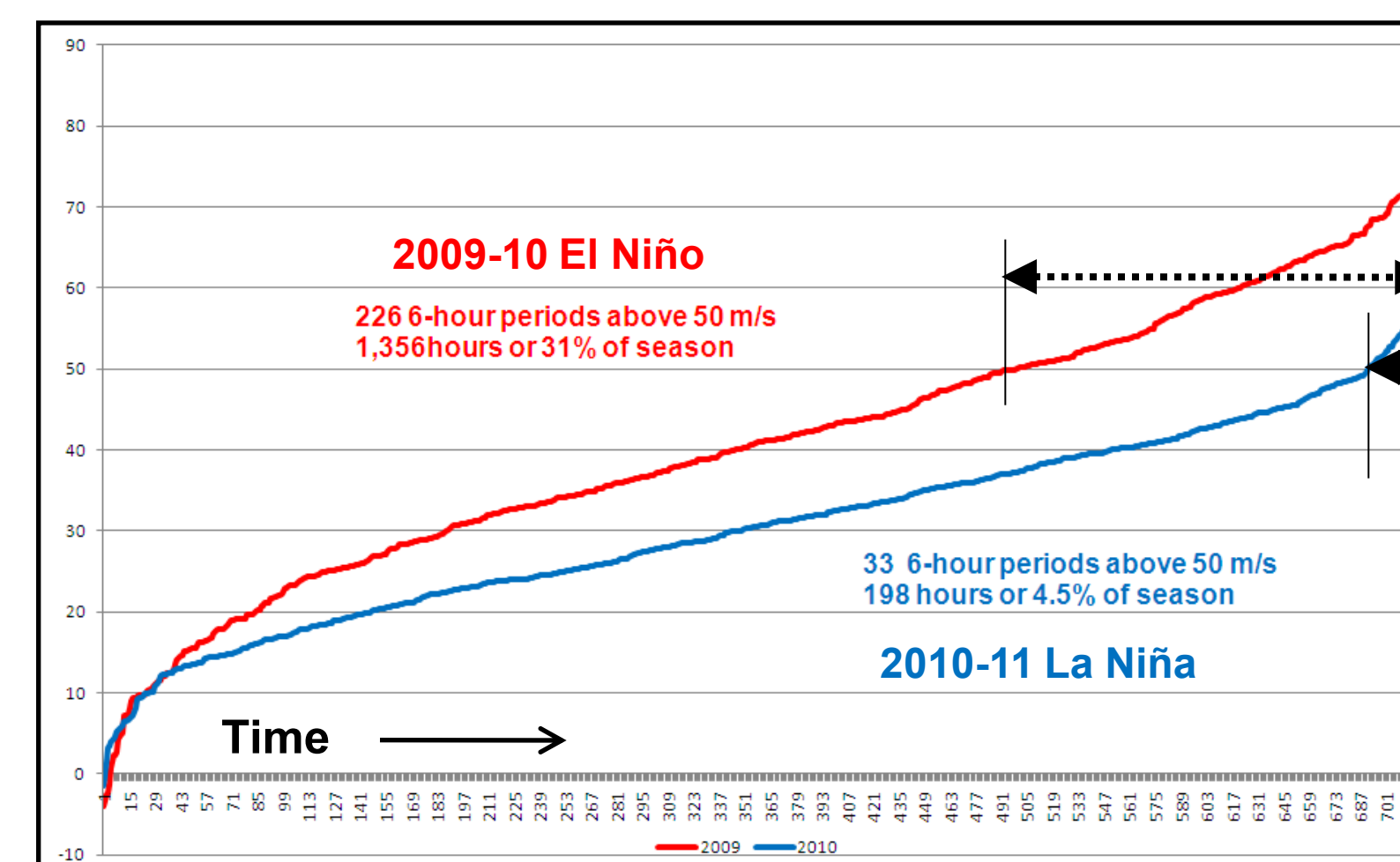
The Florida dry seasons of 2009-10 (strong El Niño) and 2010-11 (strong La Niña) were unprecedented in that they were characterized by opposite phases of ENSO, but both were significantly modified by record negative Arctic Oscillation (AO) events. The influence of ENSO phase on jet stream position and mean storm track relative to Florida was typical for El Niño and La Niña; stronger jet stream over Florida with well above normal passage of extratropical (ET) cyclones during the 2009-10 El Niño and much weaker jet stream and fewer ET storms during the 2010-11 La Niña. However, the negative AO events had significant impacts on expected dry season temperature and rainfall patterns and resulted in extreme intraseasonal temperature variability with a record cold spell from January to March 2010 and a record cold December 2010. Past research has indicated that negative AO would weaken typical La Niña impacts and strengthen El Niño impacts while positive AO would strengthen La Niña impacts and weaken El Niño impacts. This was generally verified during the last two dry seasons. However, the degree to which AO events interacting with strong ENSO events can influence dry season weather was surprising. How predictable are these relationships? Investigation of intraseasonal temperature variability illustrates that the phase of ENSO can have an impact on the relationship between AO and temperature and vice versa, but that some of the most extreme temperature events occurred during neutral phases of both. Work is underway on simple conceptual models to help illustrate the interactions of ENSO and the AO and their impact on Florida to aid in understanding uncertainty and promote the use of seasonal forecasts.



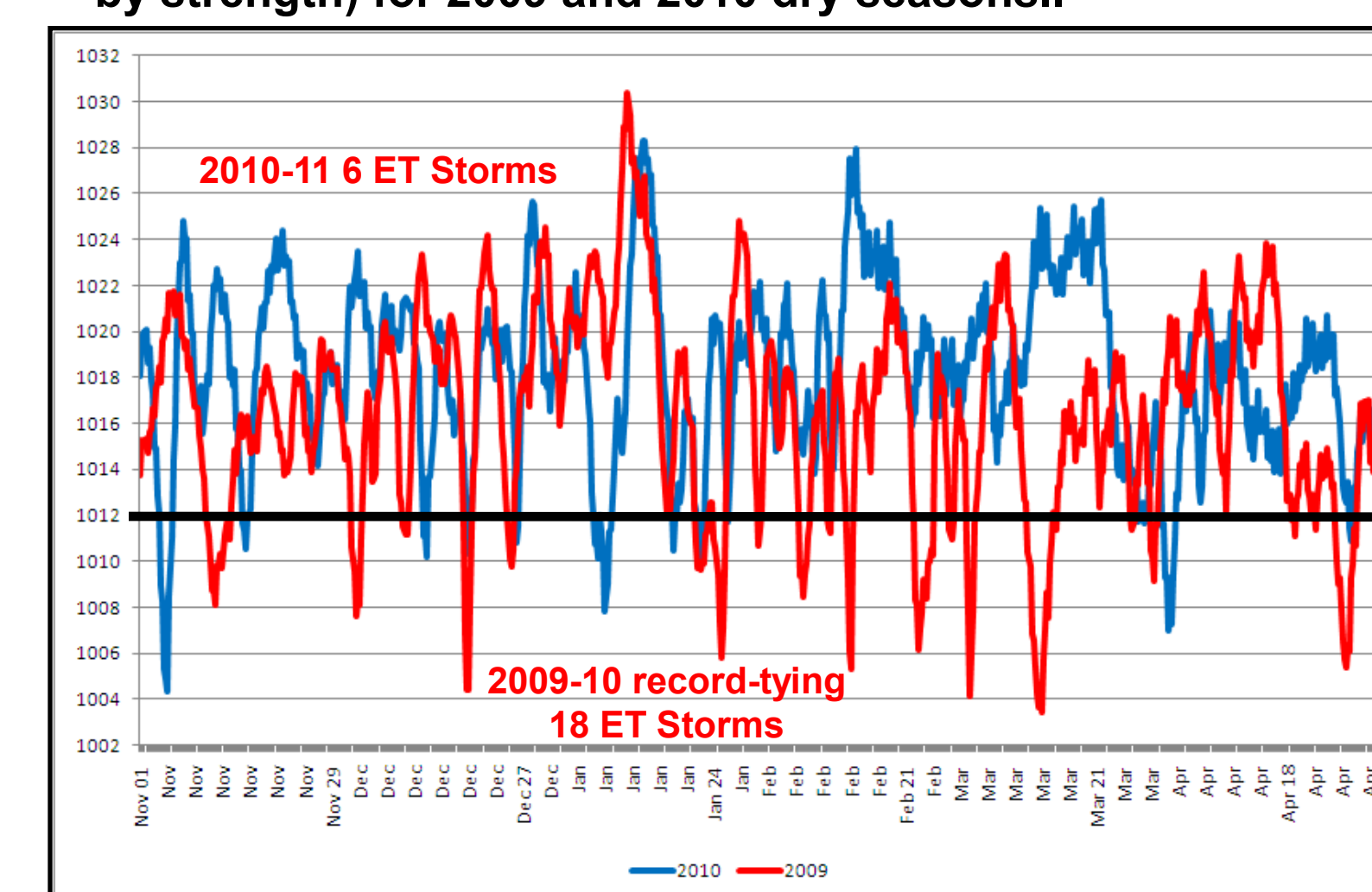
Daily dry season (November-April) AO index, NAO index and mean temperature for Orlando, Florida



December to March mean 250 mb zonal wind (m/s)



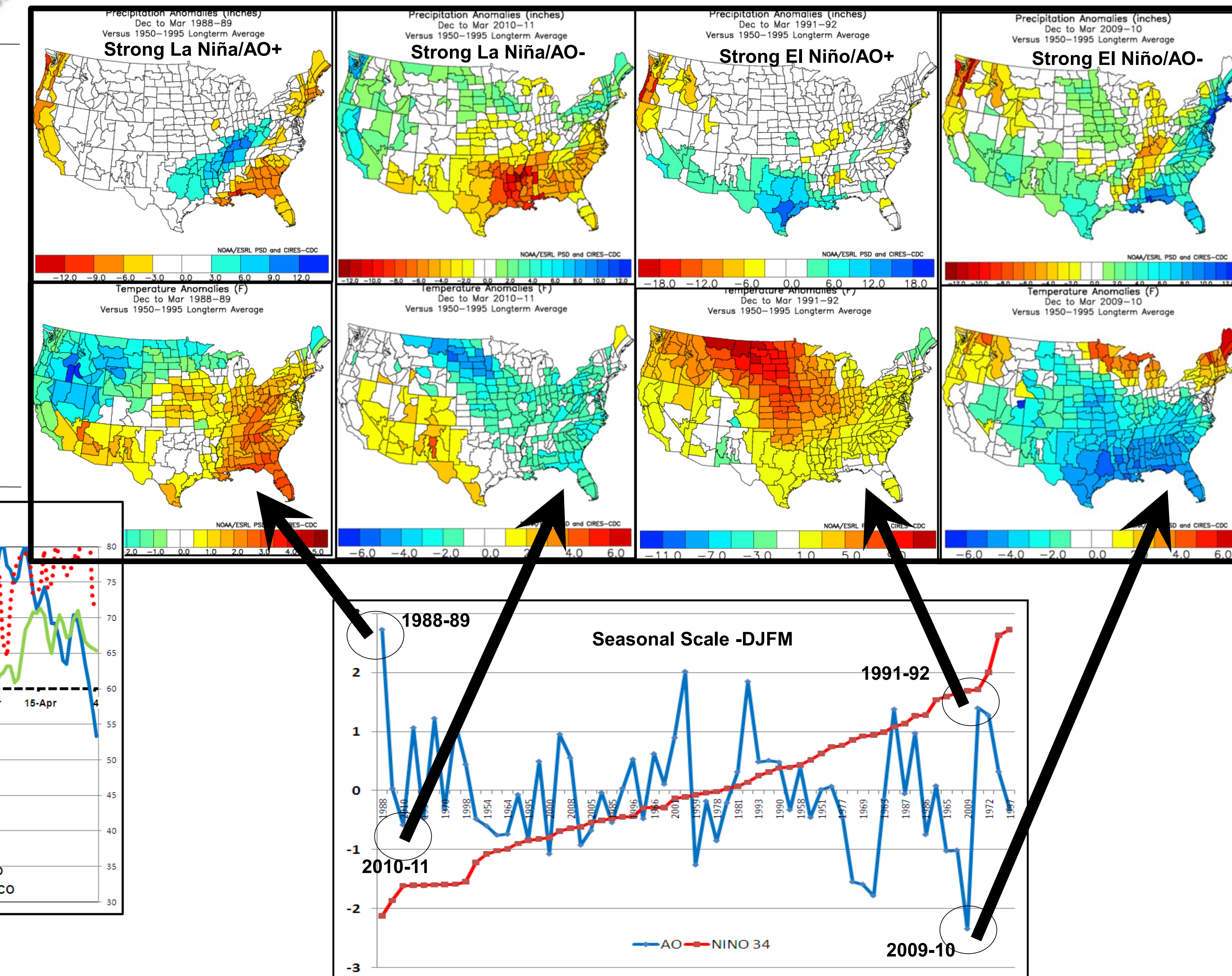
Plot of duration above threshold of 6-hour mean 250 mb zonal wind (m/s) over Florida grid (i.e. 6-hour wind sorted by strength) for 2009 and 2010 dry seasons..



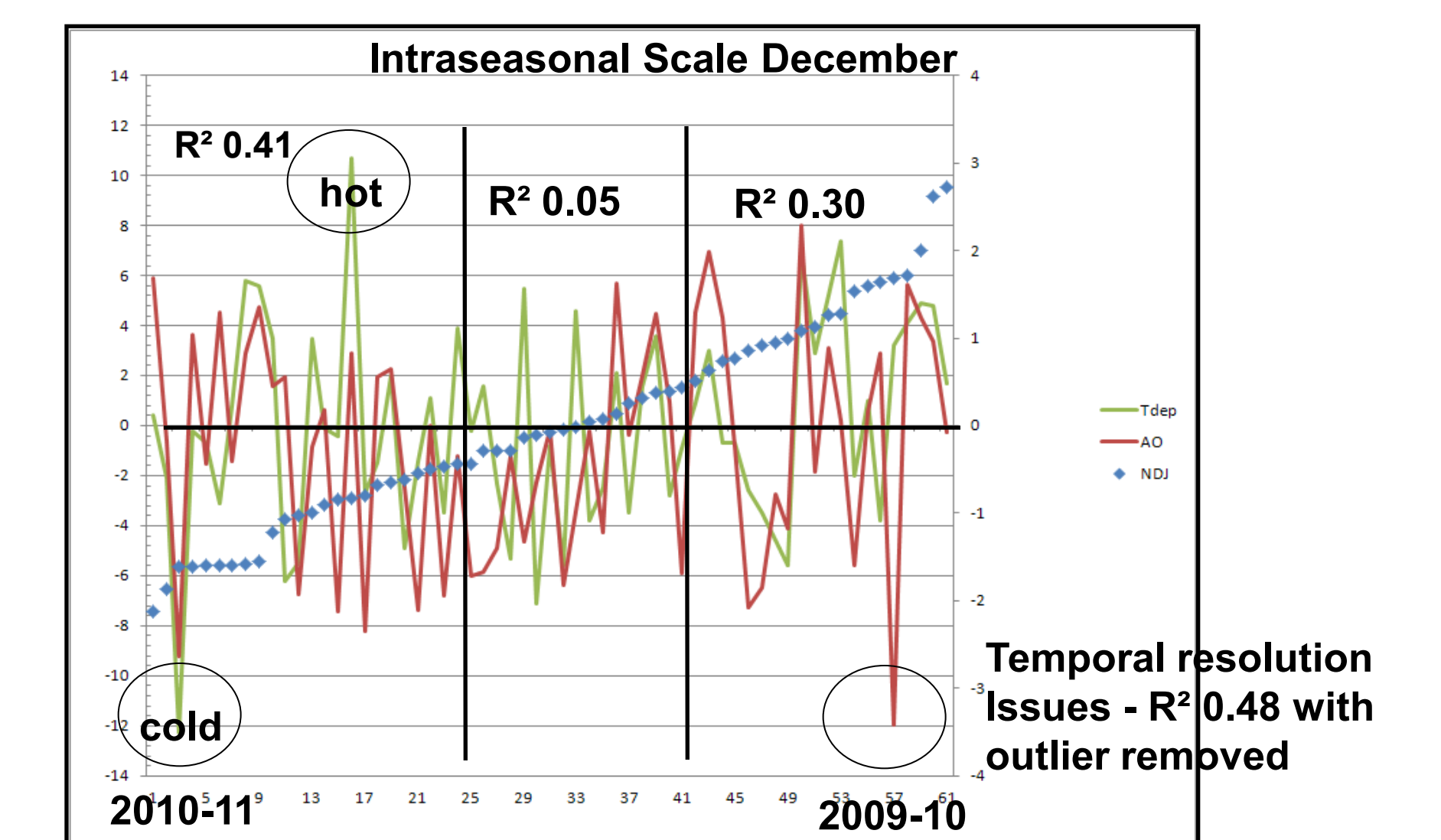
Plot of 6-hourly mean MSLP (mb) over Florida grid for 2009-10 and 2010-11 dry seasons. Significant ET cyclone Threshold shown as 1012 mb.

Hagemeyer, B.C., 2007: **The relationship between ENSO, PNA, and AO/NAO and extreme storminess, rainfall, and temperature variability during the Florida dry season: thoughts on predictability and attribution.** Preprints, 19th Conference on Climate Variability and Change, San Antonio, TX, Amer. Meteor. Soc., Paper JP2.19.
Hagemeyer, B.C., 2008: **Attribution of extreme variability of temperature, rainfall and storminess in the Florida dry season and development of probabilistic aids for decision makers.** Climate prediction application science workshop 2008, Chapel Hill, NC (OS/08).
Hagemeyer, B. C., 2010: **The 2009-10 El Niño and Florida Dry Season Tomatoes: A Reality Check for the Limits of Predictability.** 35th NOAA Annual Climate Diagnostics and Prediction Workshop, Raleigh, NC, 4-7 October 2010.

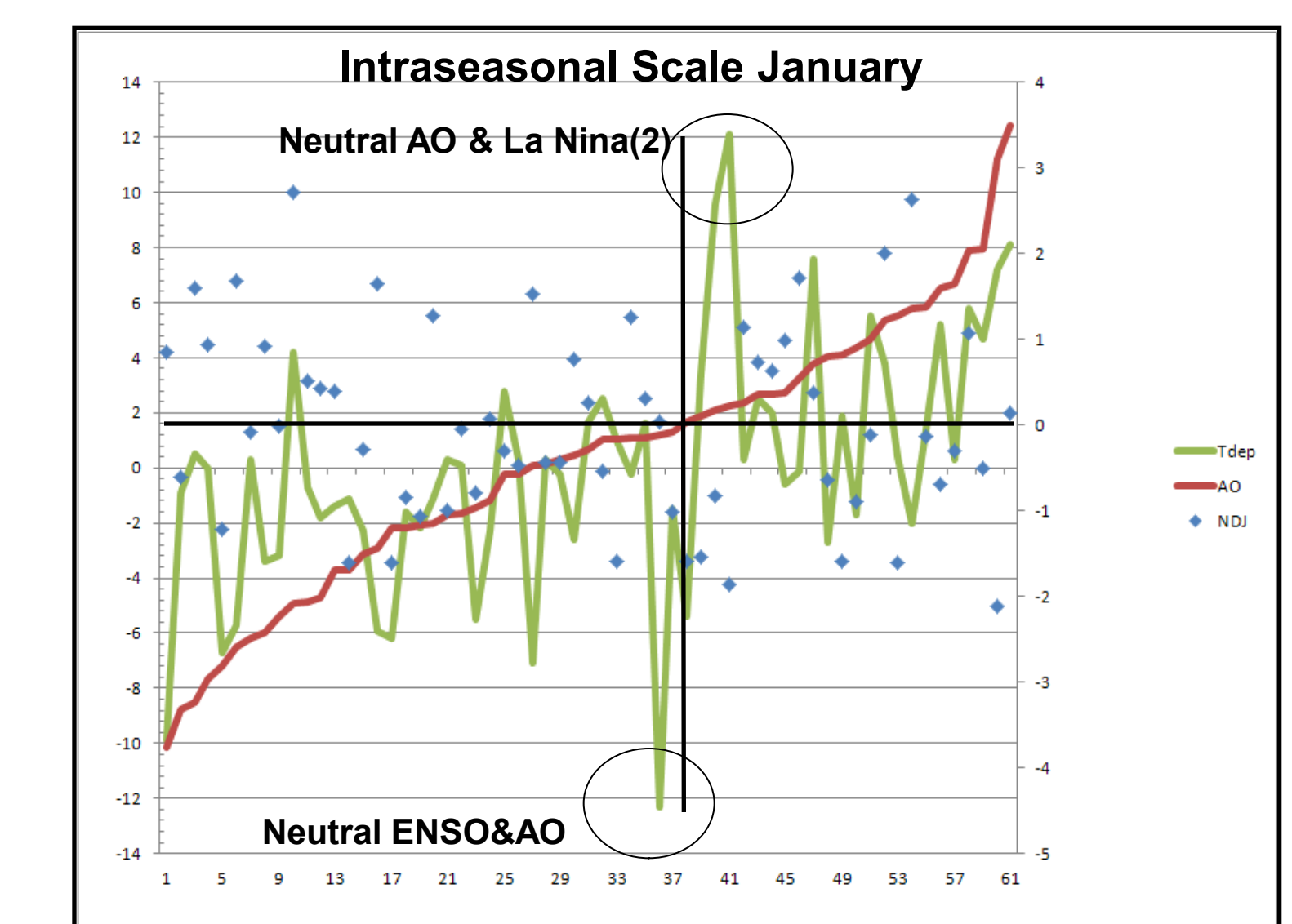
Predictability of Impacts of ENSO/AO Interactions?



December to March (1950-2010) mean AO versus NINO 3.4 sorted by ENSO



December (1950-2010) AO, Orlando mean min temp and NDJ NINO 3.4 sorted by ENSO. Correlation coefficients for temp departure on AO stratified by ENSO.



January (1951-2011) AO, Orlando mean min temp and NDJ NINO 3.4 sorted by AO