Empirical based tools for prediction of US temperature and precipitation at weeks 3-4

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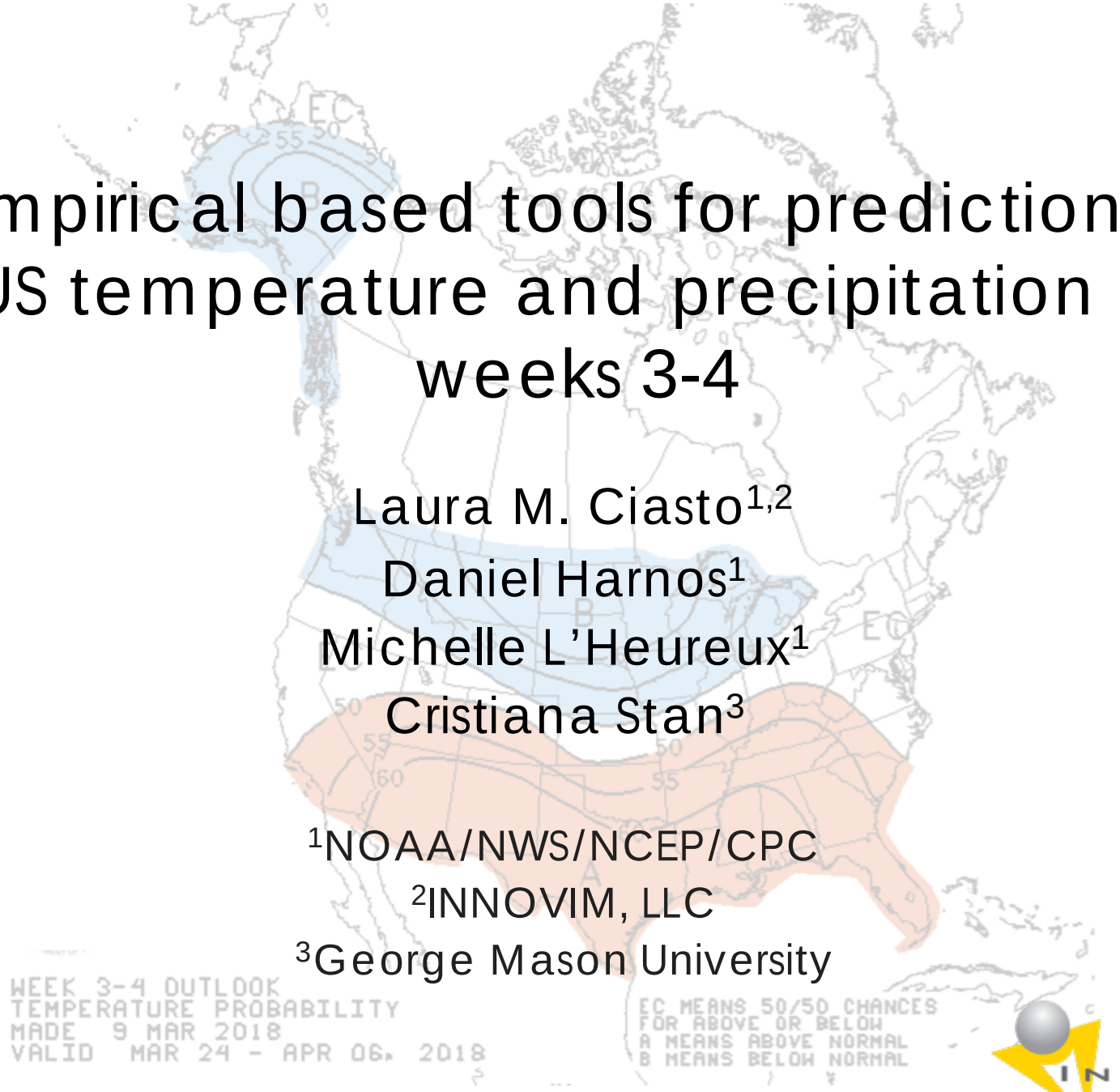

Week 3-4 Outlook

National Weather Service

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- Observations & Metrics
- Past Outlooks

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- 6 to 10 Day
- 8 to 14 Day
- 30-day
- 90-day

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As of the May 19th, 2017, release, Week 3-4 outlooks precipitation outlooks are experimental, whereas the temperature outlooks

HOME> Outlook Maps> Week 3-4 Outlooks

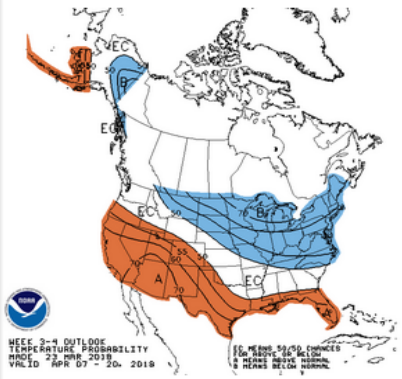
Week 3-4 Outlooks

Valid: 07 Apr 2018 to 20 Apr 2018

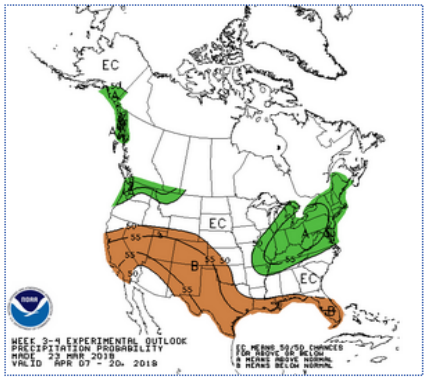
Updated: 23 Mar 2018

Please provide comments using the online survey.

Temperature Probability



Precipitation Probability (Experimental)



Click HERE for information about how to read Week 3-4 outlook maps

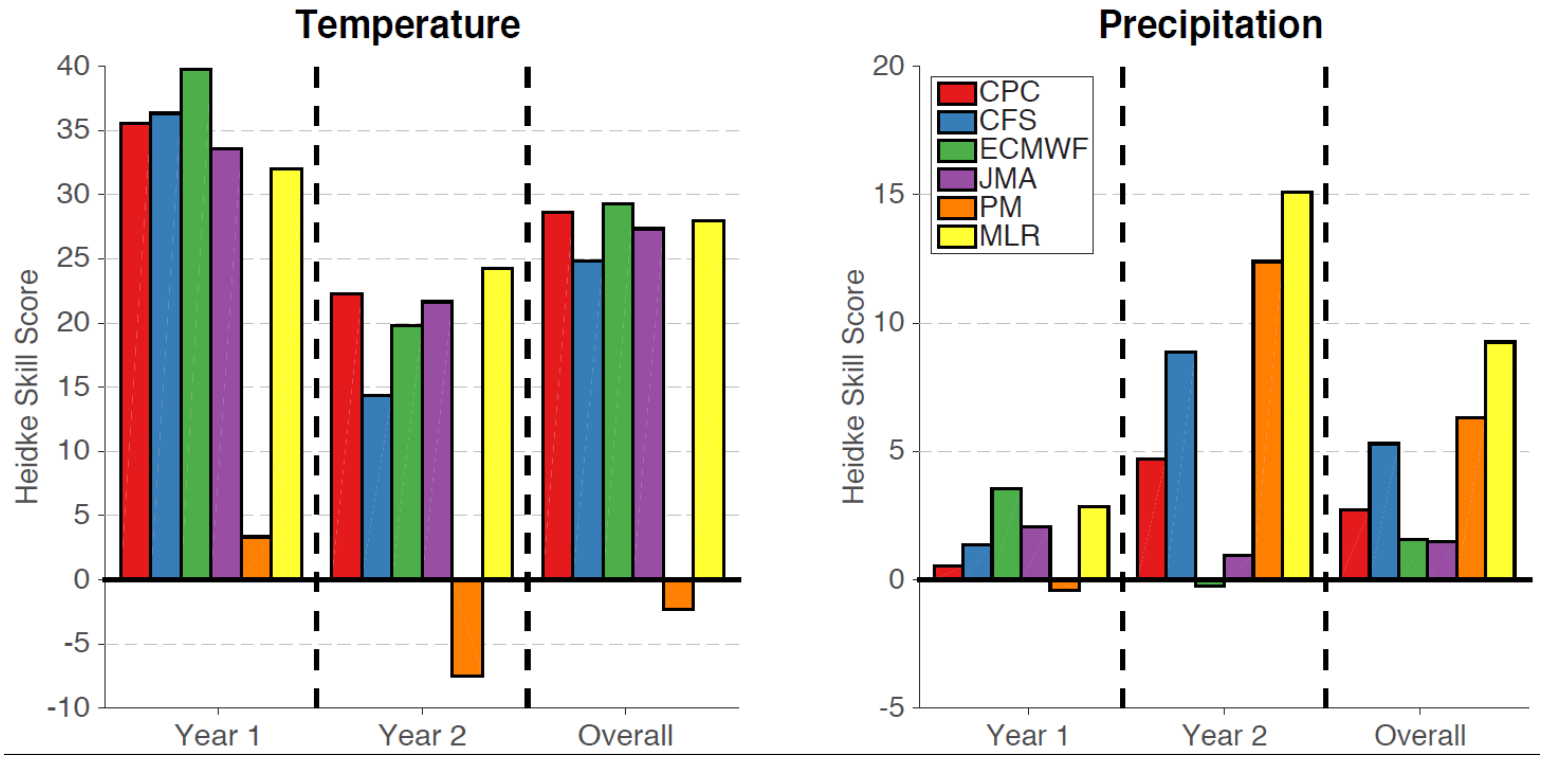
Prognostic Discussion for Week 3-4 Temperature and Experimental Precipitation Outlooks
NWS Climate Prediction Center College Park MD
300PM EST Fri Mar 23 2018

Statistical Guidance
Multiple Linear Regression (MLR) model

- Predictors (all standardized; 1982-2013 base) over a running 3-month period:
  - ENSO: 2 week average Nino 3.4 index (OISSTv2)
  - MJO: Daily Wheeler-Hendon (2004) RMM1 and RMM2
  - Linear trend

- Predictands at15-28days (Week 3-4)
  - Probabilities and anomalies: Temperature at 2m and precipitation

Real-time Performance of MLR



Courtesy of D. Harnos

- Temperature: comparable to dynamical and official forecasts
- Precipitation: outperforms dynamical and official forecasts

Extending the MLR

- Funding: NGGPS/MAPP

- Objective: Evaluate skill of extratropical teleconnections in the CPC multivariate regression framework
  - Oscillatory modes: 28-day, 45-day and ***120-day***
  - Arctic Oscillation (AO)

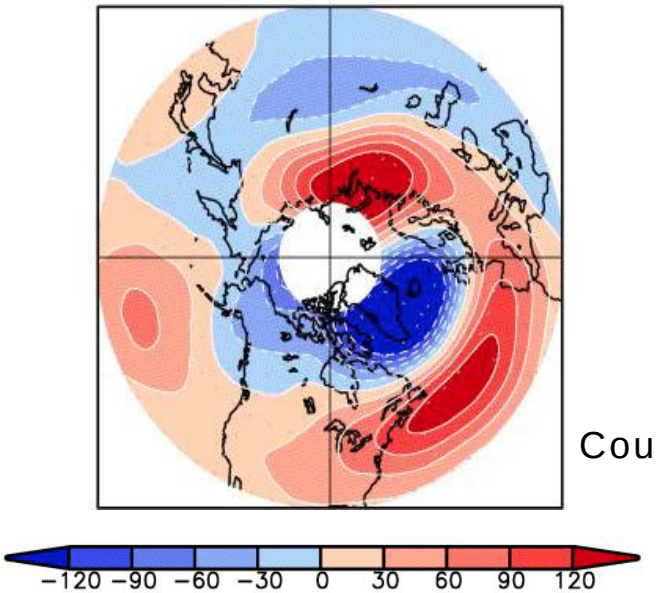
- Methodology
  - Run MLR model with added extratropical predictor(s) to obtain T2m and precipitation forecasts at 15-28 days (Week 3-4)
  - Test skill of forecasts via Heidke Skill Score (HSS)
  - Compare extended MLR (4-predictor) to the original (3-predictor) via F-statistic (L'Heureux et al 2015)

Oscillatory Modes of Extratropical Circulation

Cristina Stan (GMU)

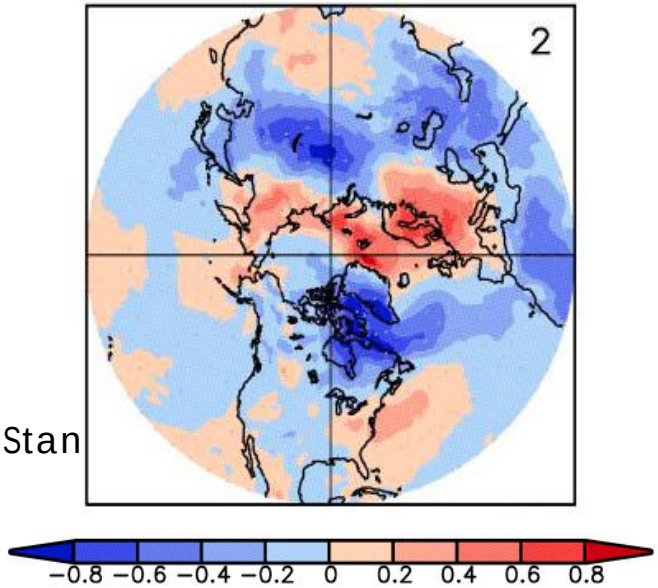
- 28-day, 45-day and ***120-day***

500-hPa Geopotential Height



Courtesy of C. Stan

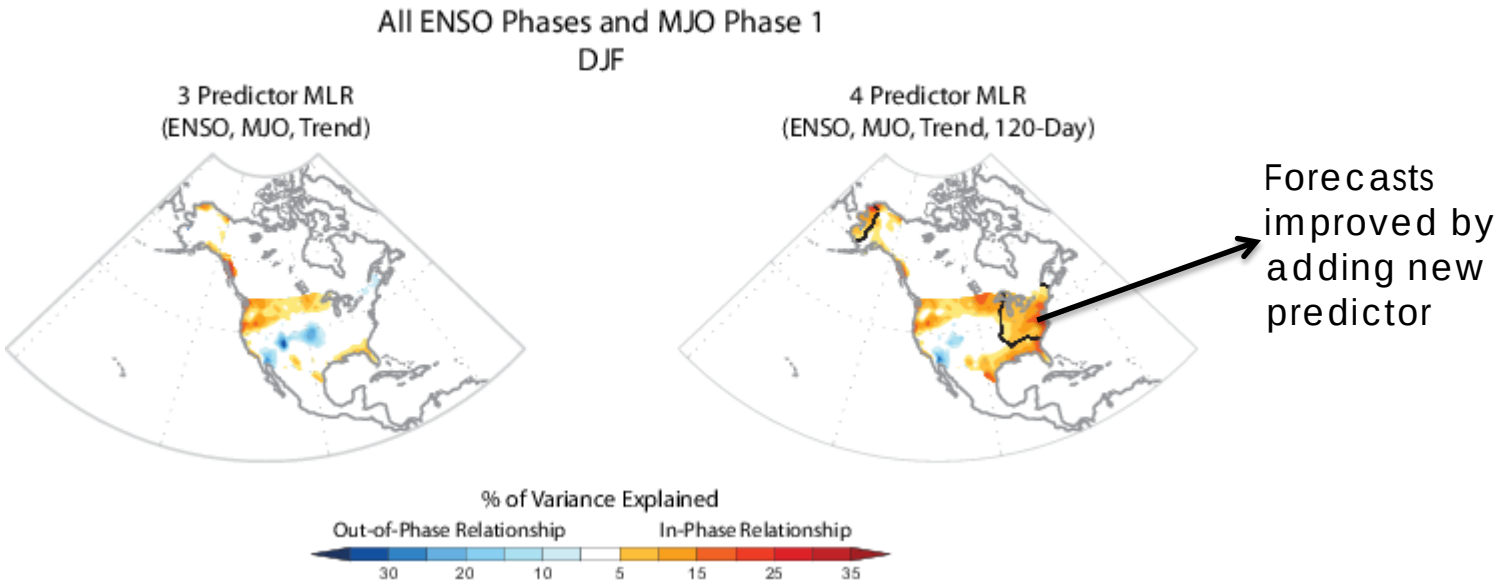
2m Temperature



- Use associated time series as added predictor in MLR→ Week 3-4 outlook

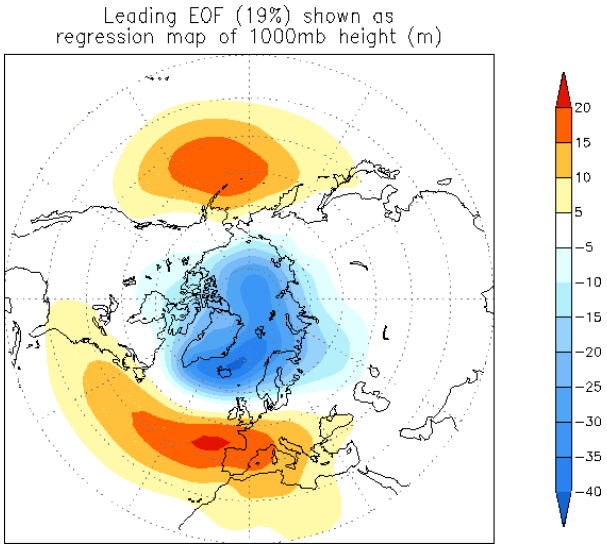
120-day Oscillatory Mode

Variance Explained by Relationship between Observed and Forecasted 2-m Temperature Anomalies Forecasted from MLR



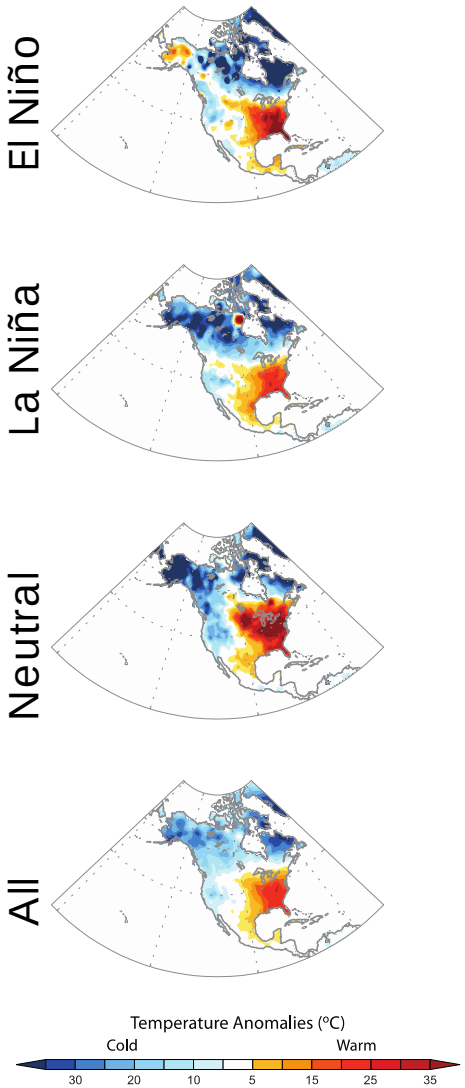
- Preliminary analysis: improved T2m forecasts
- No improvements in precipitation
- Possible complications with transition to real-time operations

Arctic Oscillation (AO)



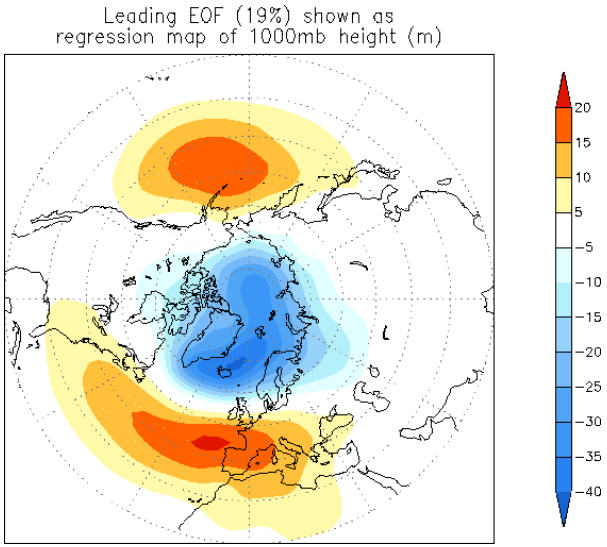
Composites
15 days after
an AO event

Temperature
anomalies



- Leading mode of atmospheric variability
- Strong impacts on T2m
- Well-established; currently monitored at CPC

Arctic Oscillation (AO)



Composites
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Precipitation
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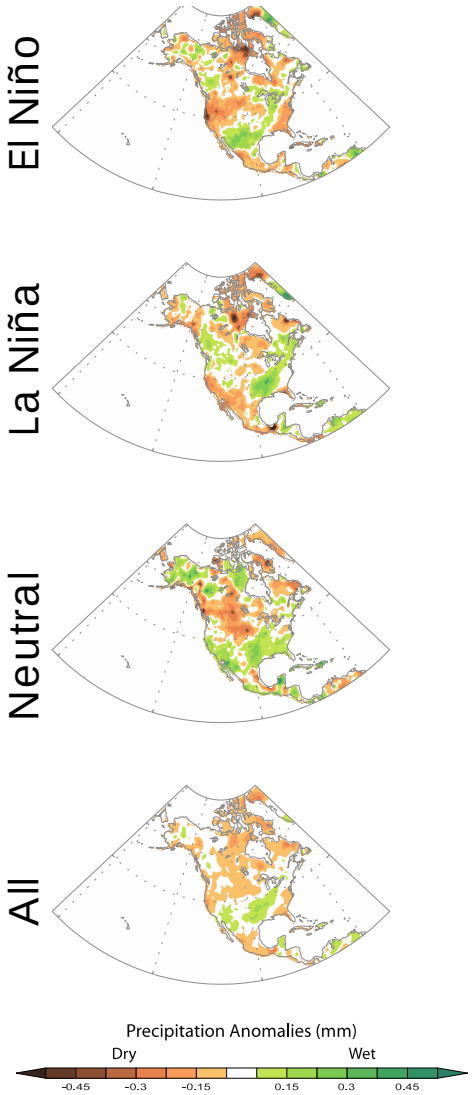
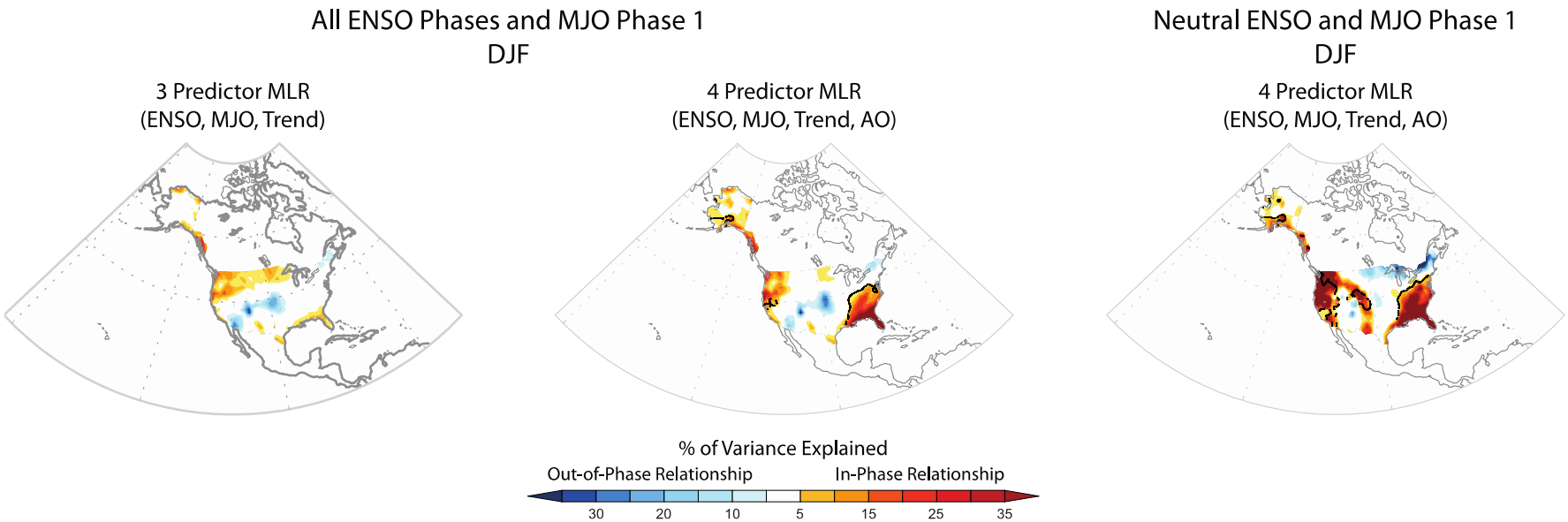
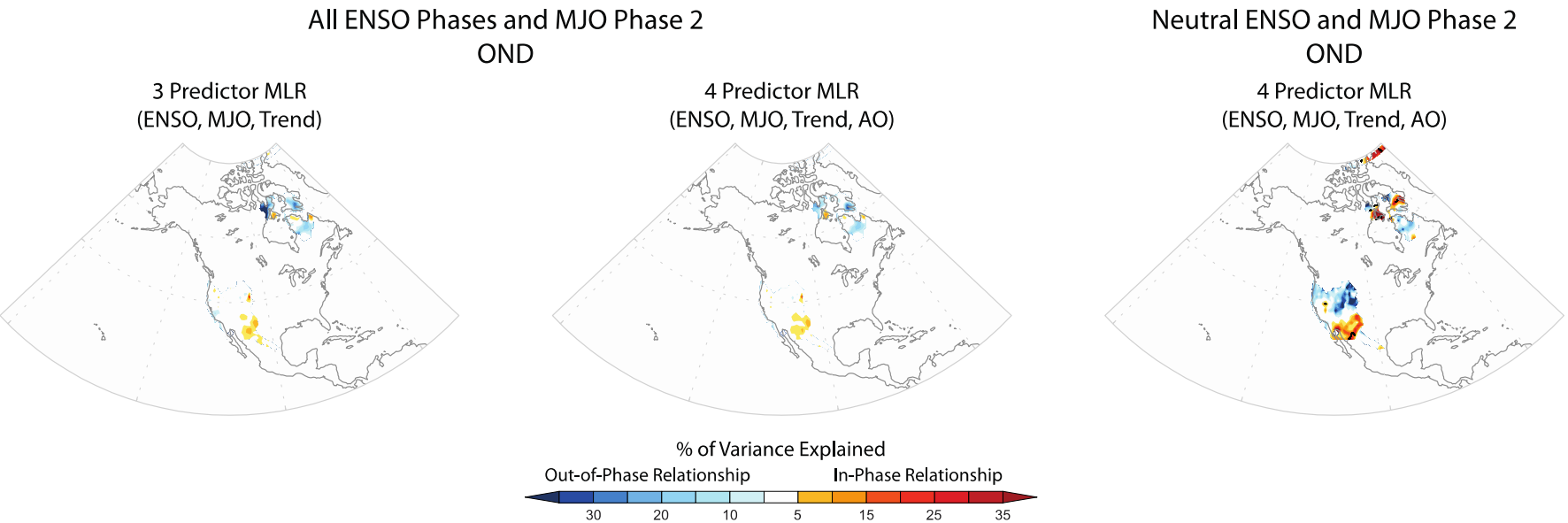


Variance Explained by Relationship between Observed and Forecasted 2m Temperature Anomalies



- Improved skill over eastern/south eastern US
- Amplified in ENSO neutral conditions

Variance Explained by Relationship between Observed and Forecasted Precipitation Anomalies



- Little change

Current Status and Future Work

- Two potential extratropical predictors
  - 120 day oscillatory mode
  - Arctic Oscillation

- April 6: Meeting with CPC forecasters

- Spring/Summer: Test in real-time framework

- Other extratropical predictors to test
  - Stratospheric Polar Vortex
  - North Pacific Oscillation/West Pacific