Forecasting Seasonal Precipitation in Wisconsin's Central Sands

Colin McGuire; University of Wisconsin – Madison

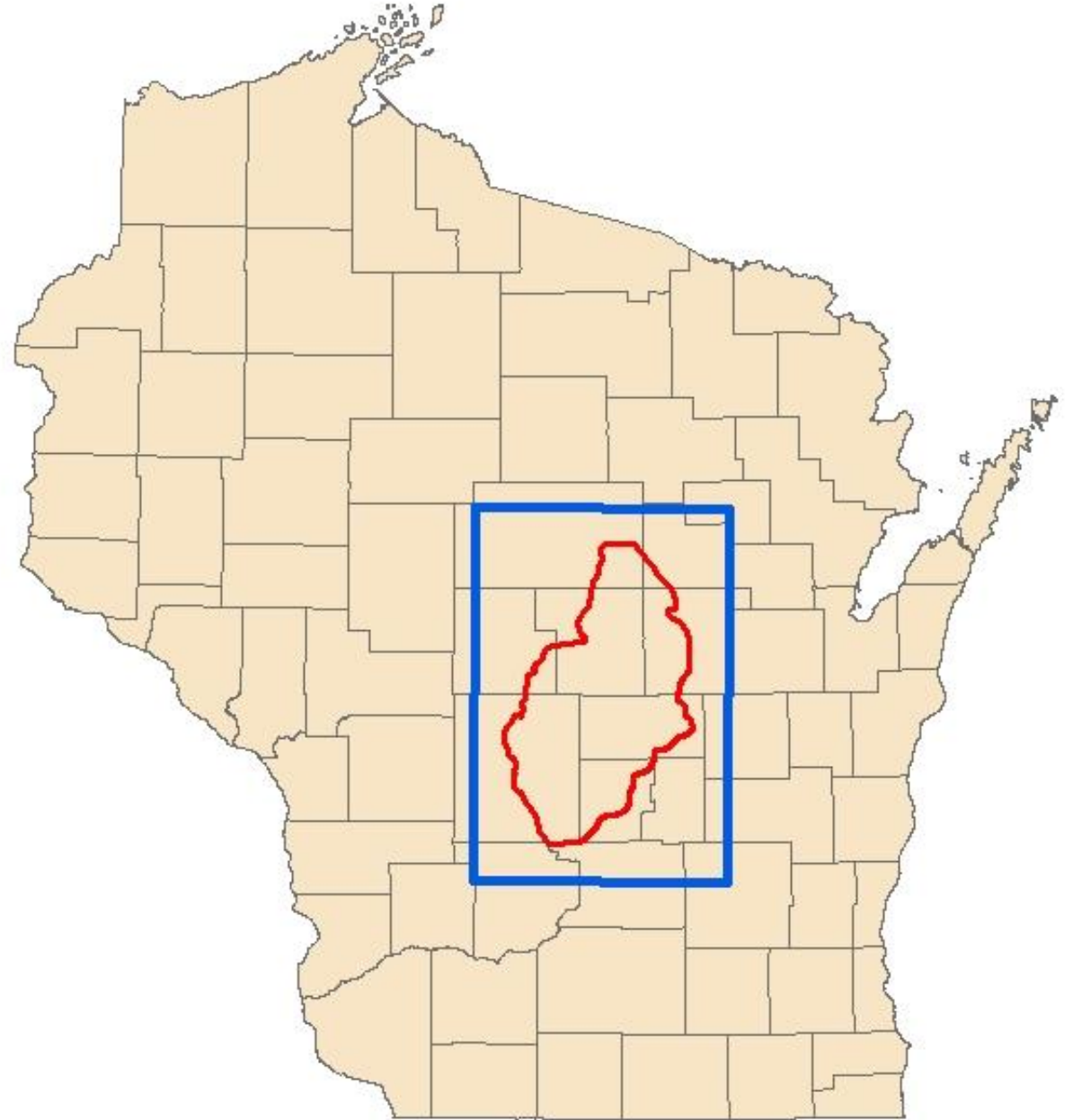Paul Block; University of Wisconsin – Madison

Project Area

- **Central Sands Delineation**
  - Shape georeferenced from WDNR delineation

- **PRISM Monthly Precipitation Data**
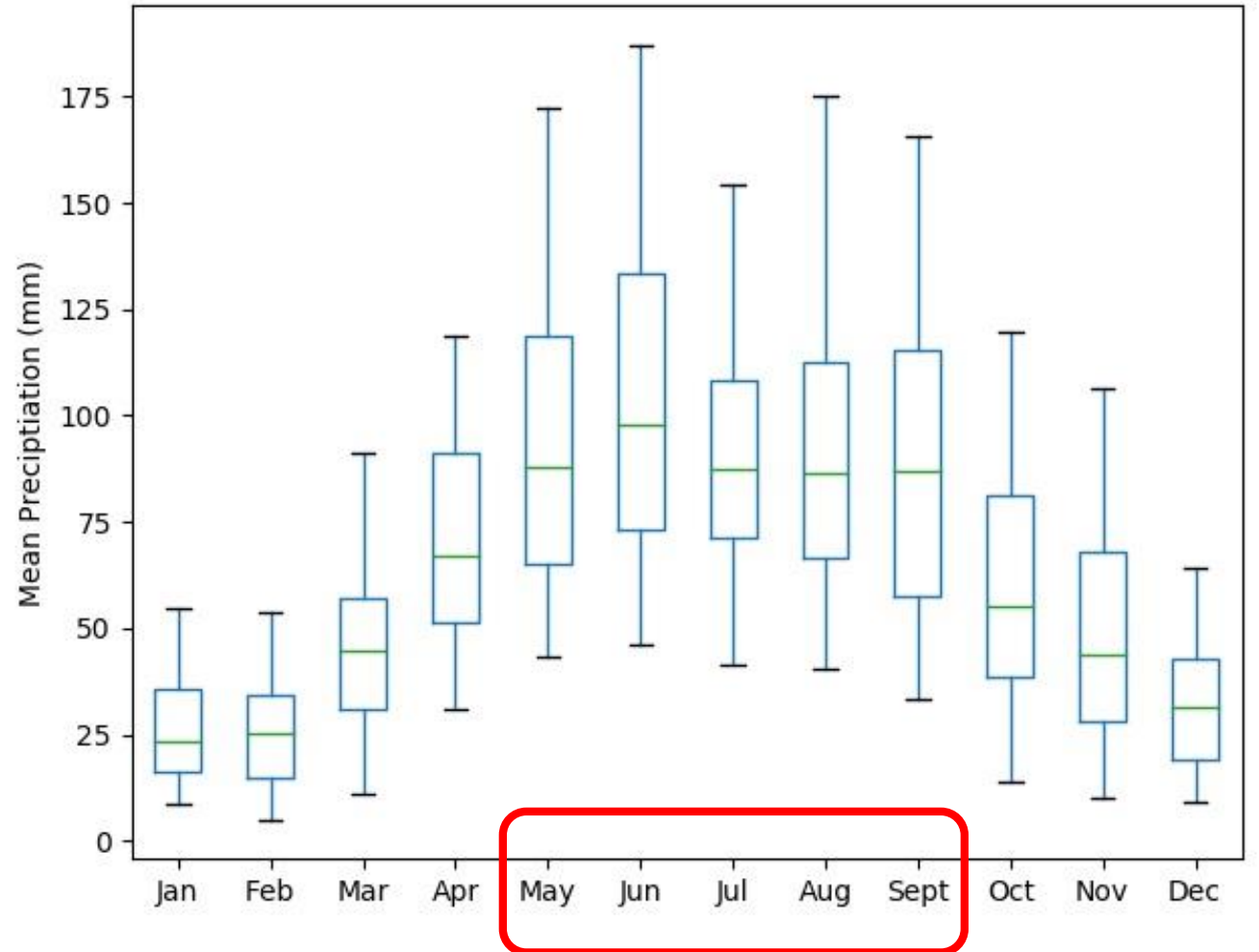 - PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

Monthly Climatology: 1895 - 2012

Annual Precipitation:
- 790 mm (average)

Season of Interest - MJJAS:
- 477 mm (average)
- 60% of annual precipitation

MJJAS Precipitation

Spatial

- **EOF1**
  - ~81% Variance Explained
  - Relatively Uniform
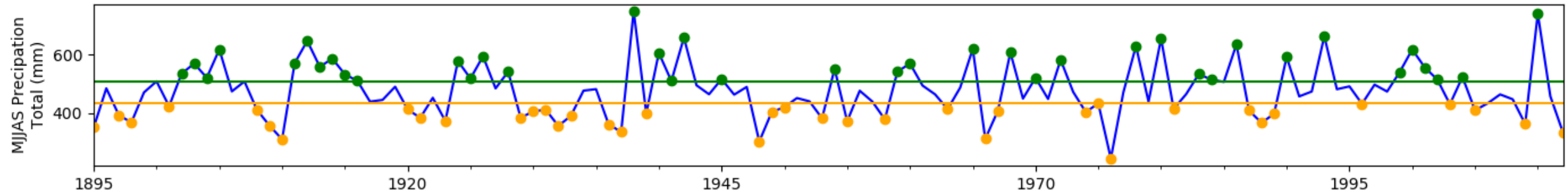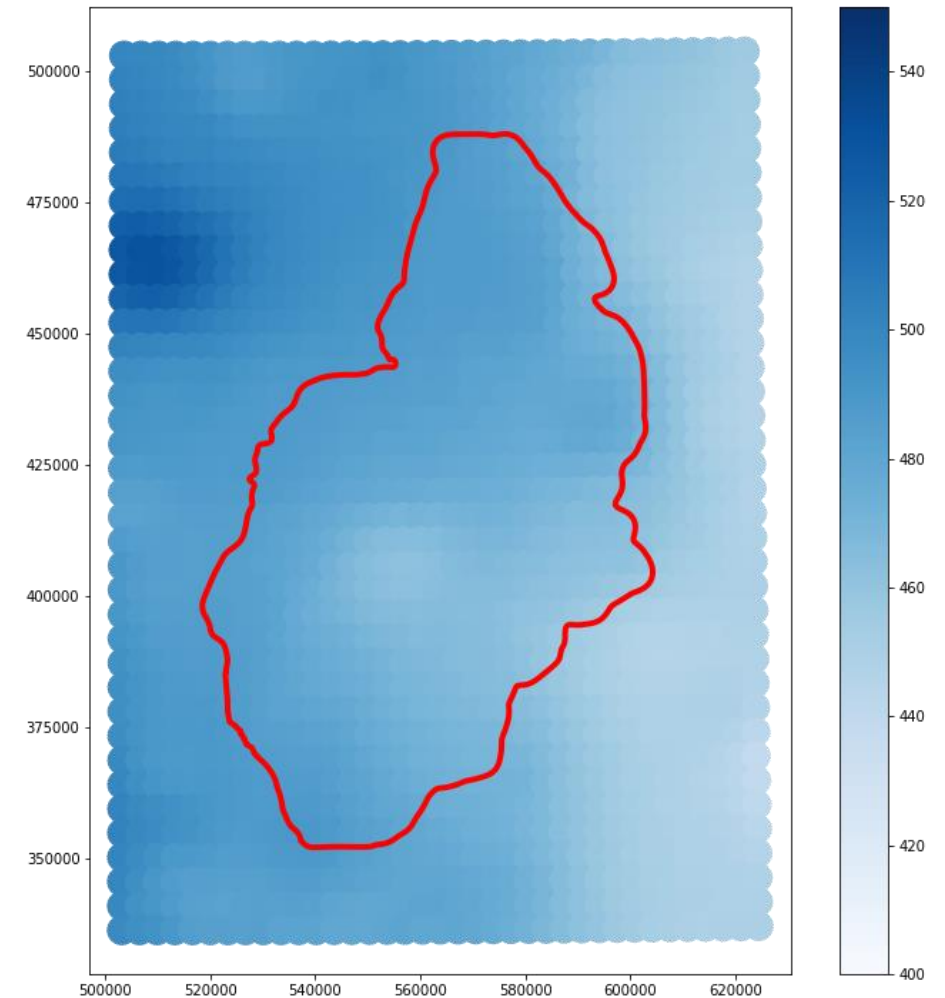 - PC1 ≈ Mean Time Series

- **EOF2**
  - ~8% Variance Explained
  - North – South Gradient

Temporal

- **Dry Years**: <33rd Percentile

- **Wet Years**: >67th Percentile

Monthly Climatology

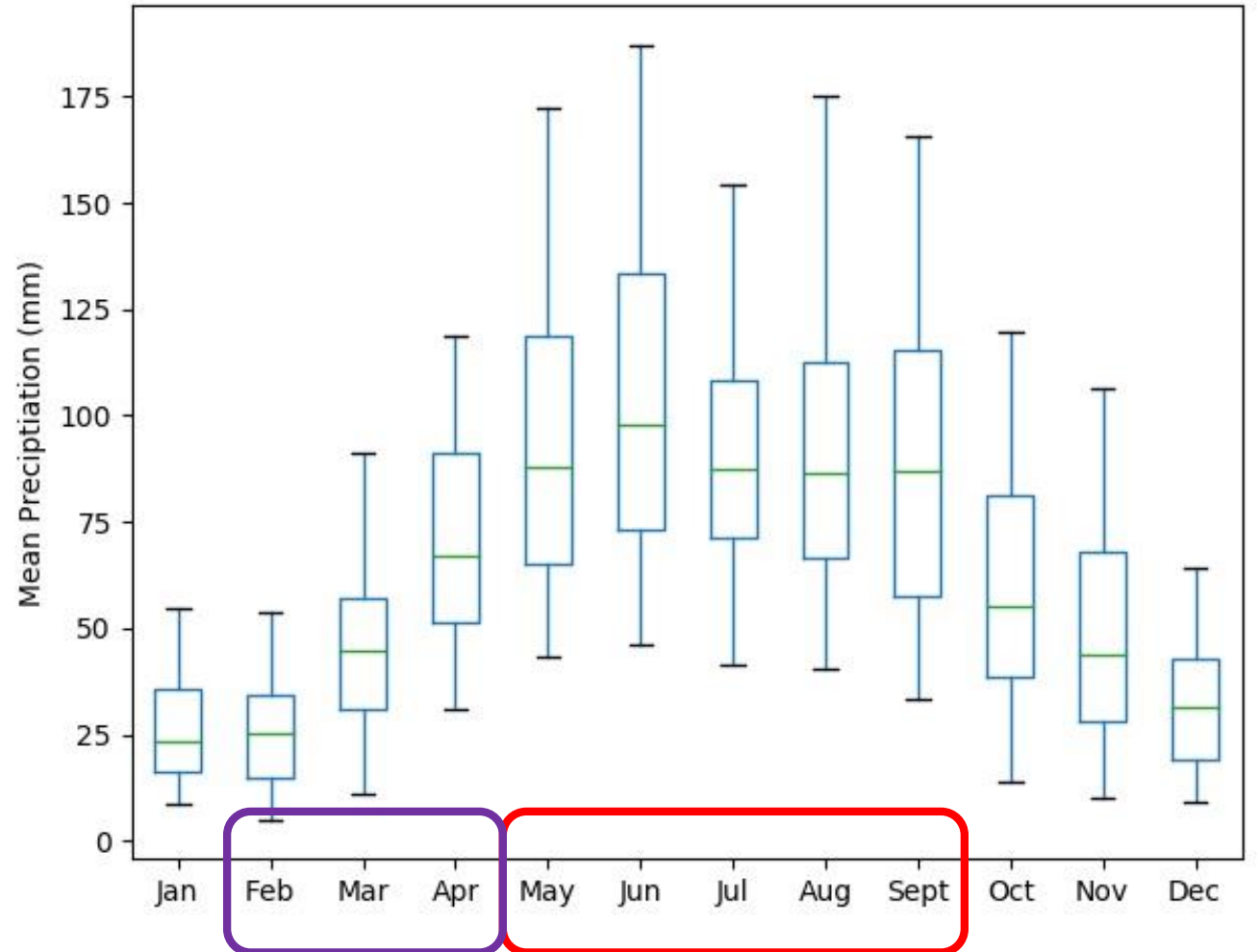**Annual Precipitation:**
- 790 mm (average)

Season of Interest - MJJAS:
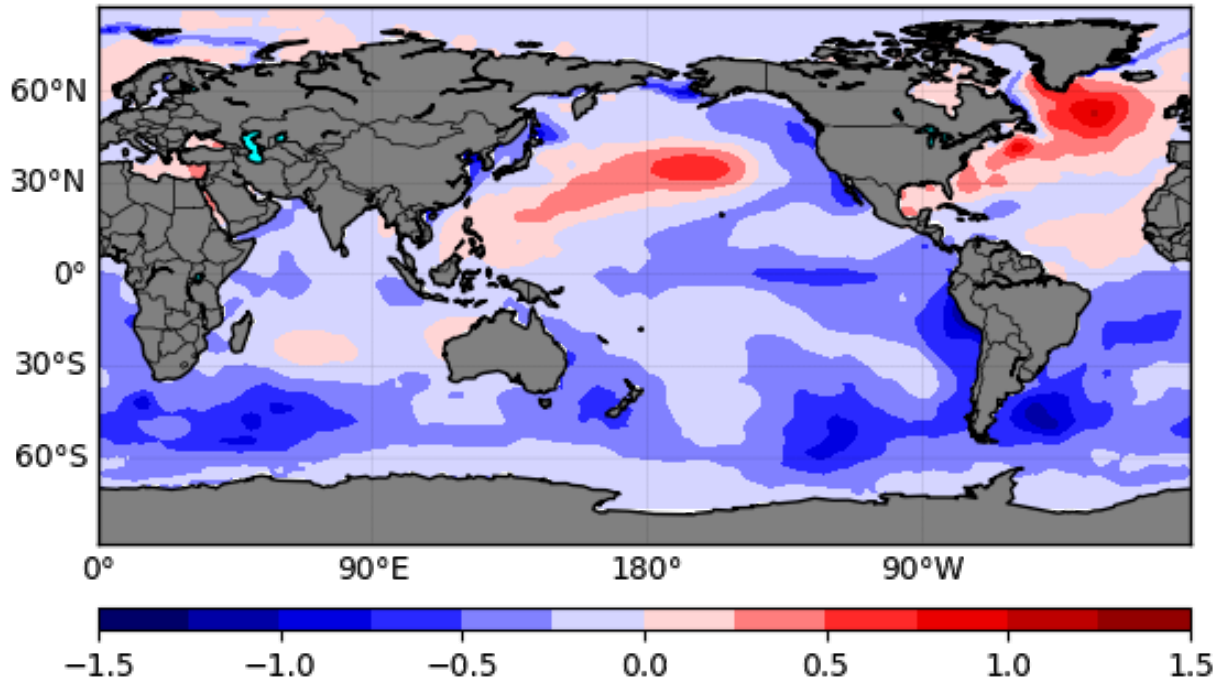- 477 mm (average)
- 60% of annual precipitation

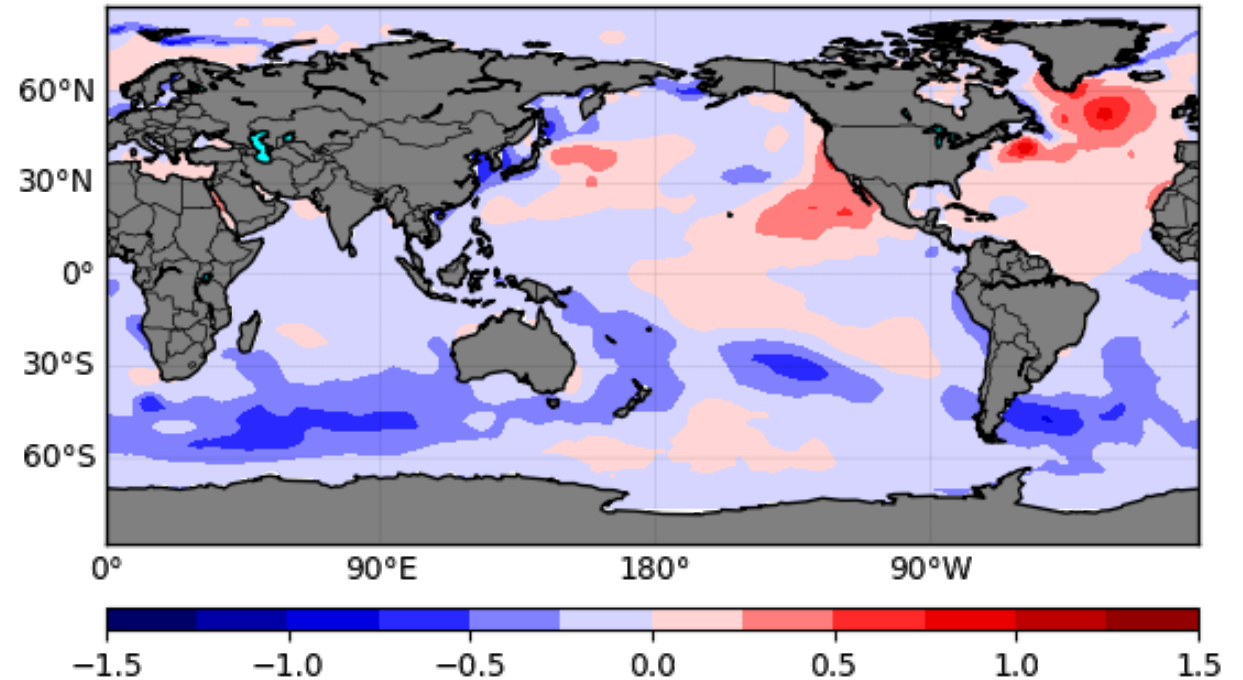Season-Ahead **Predictors of Moisture Transport to the Basin?**

FMA SST Anomaly Composite Mapping

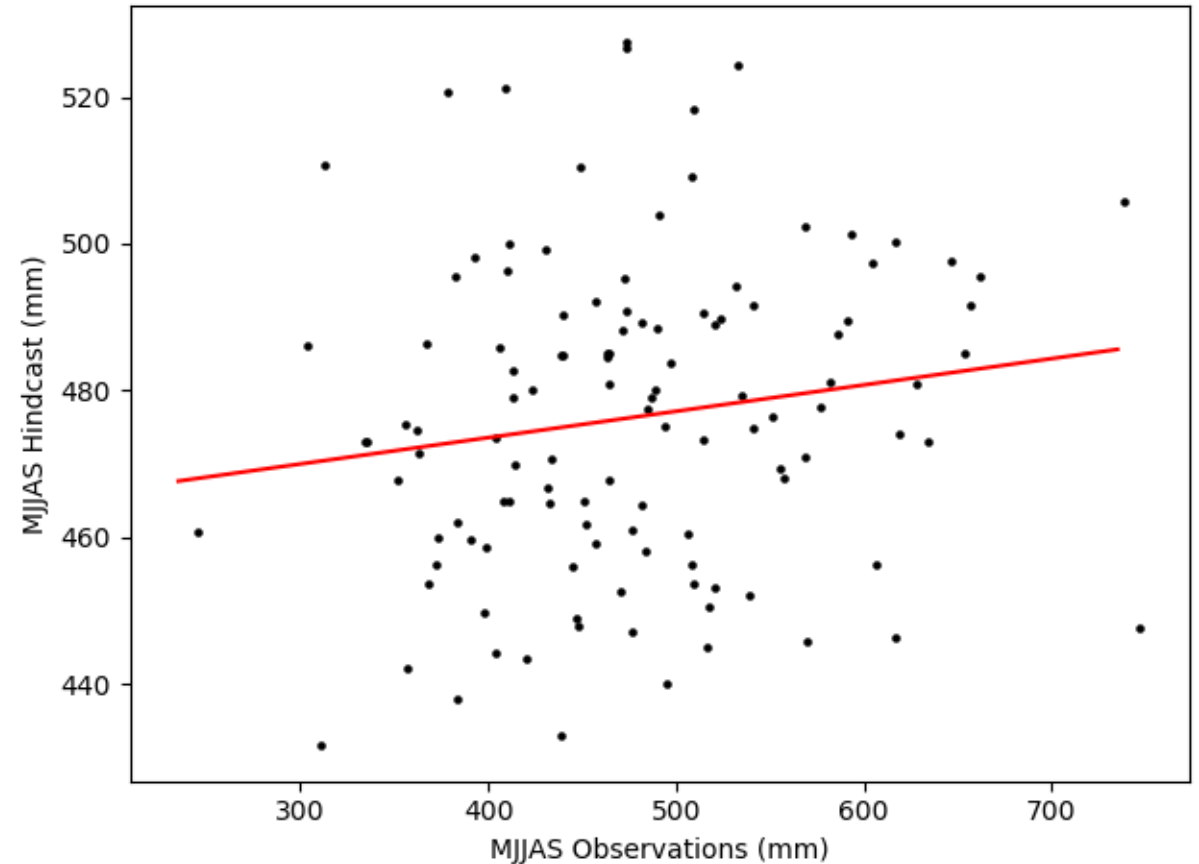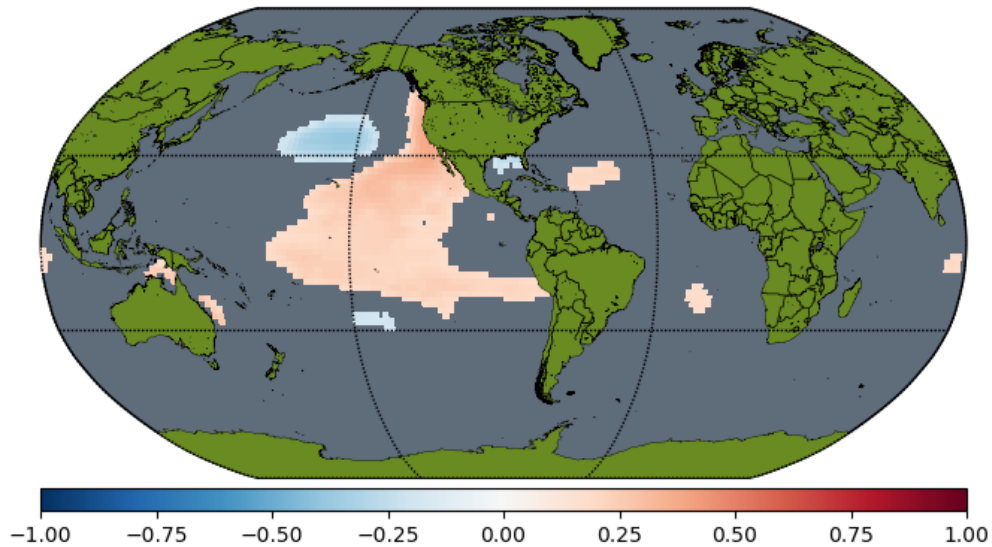**Very Dry**: <10th Percentile

Very Wet: >90th Percentile

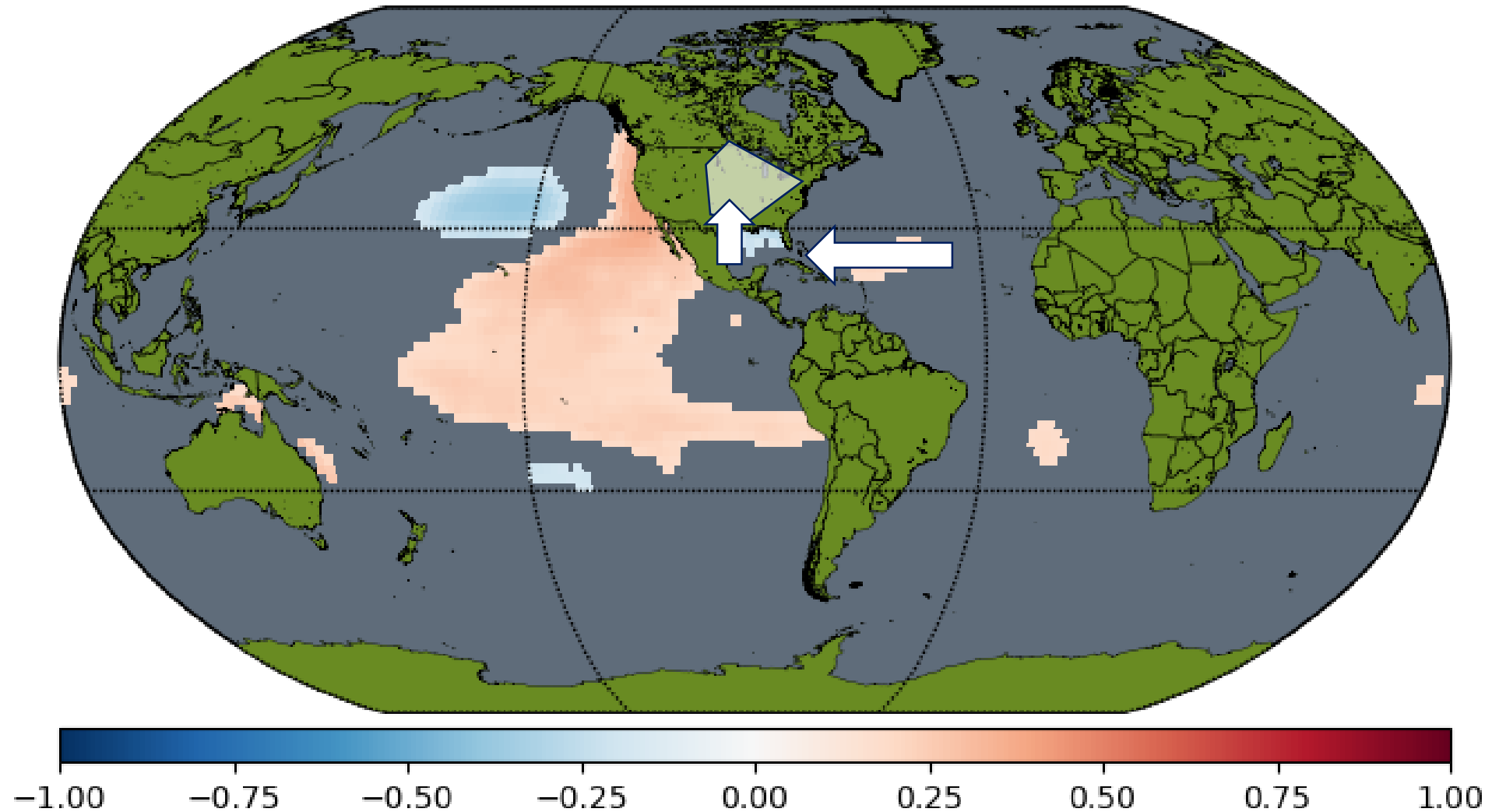Mean FMA SST Anomalies (°C)

Mean FMA SST Anomalies (°C)
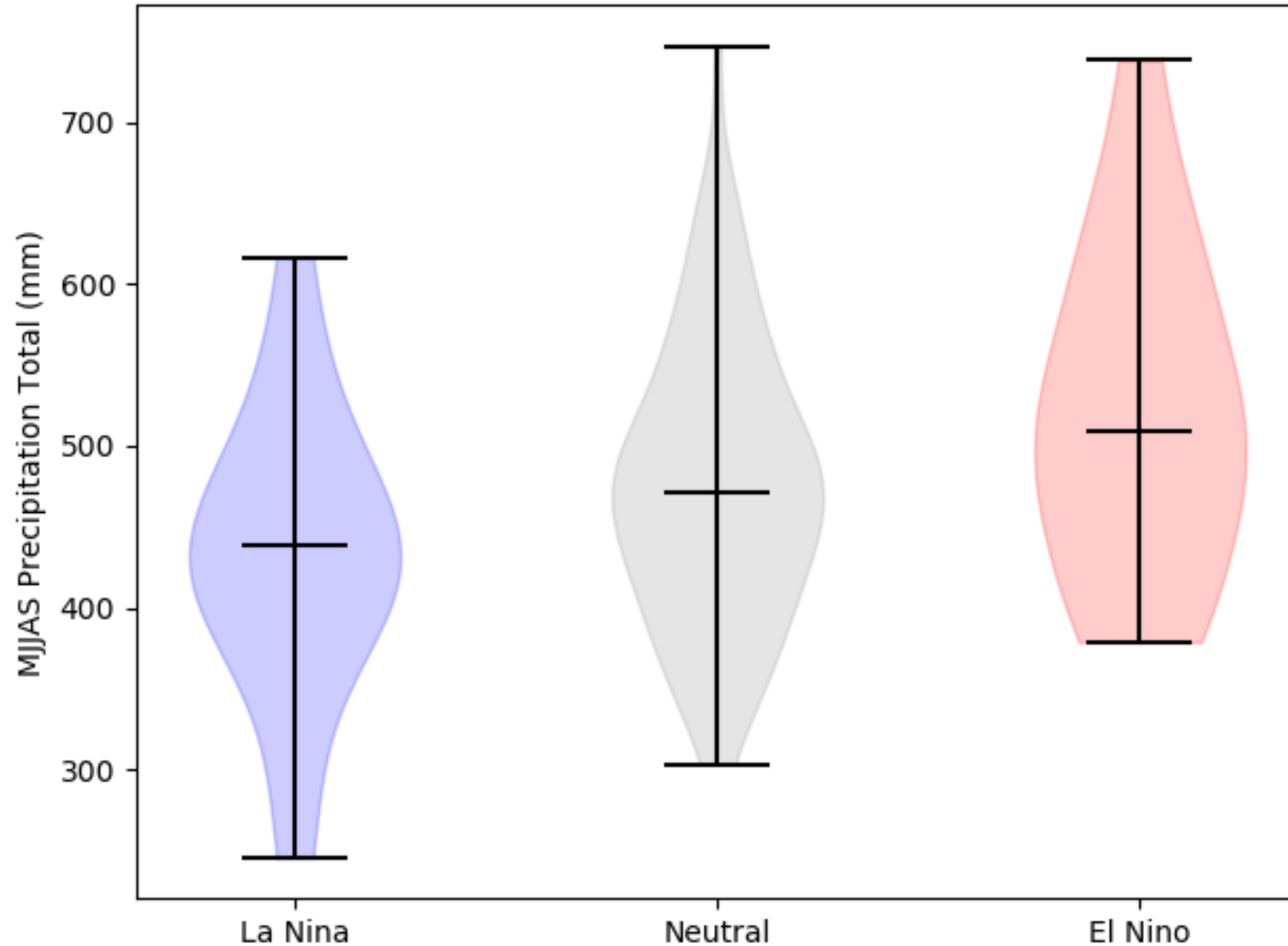
SST-SLP Linear Forecast Model

Correlation: 0.15

$$hcast = obs * 0.0359 + 459.2$$
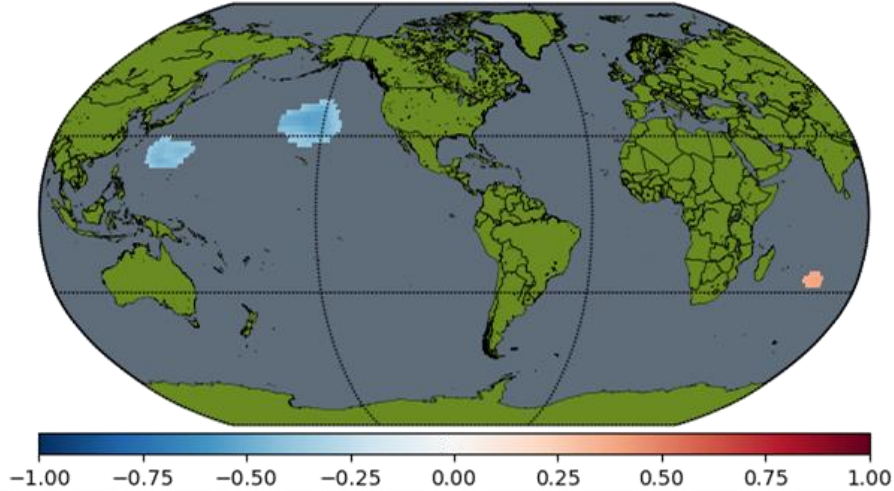
Atmospheric Moisture Transport
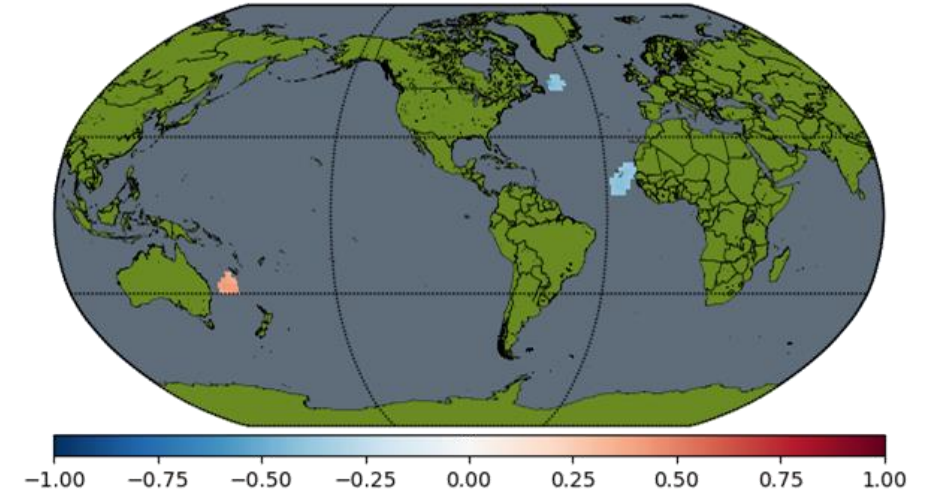
Multivariate ENSO Index (MEI)
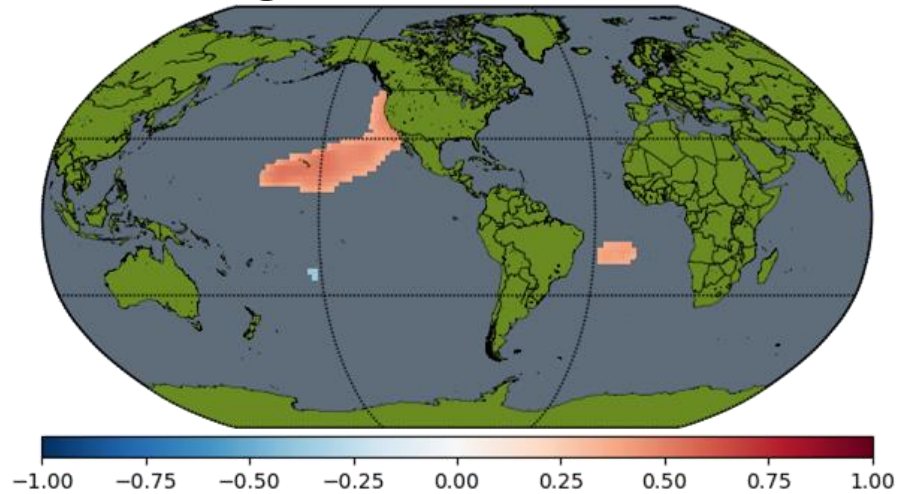
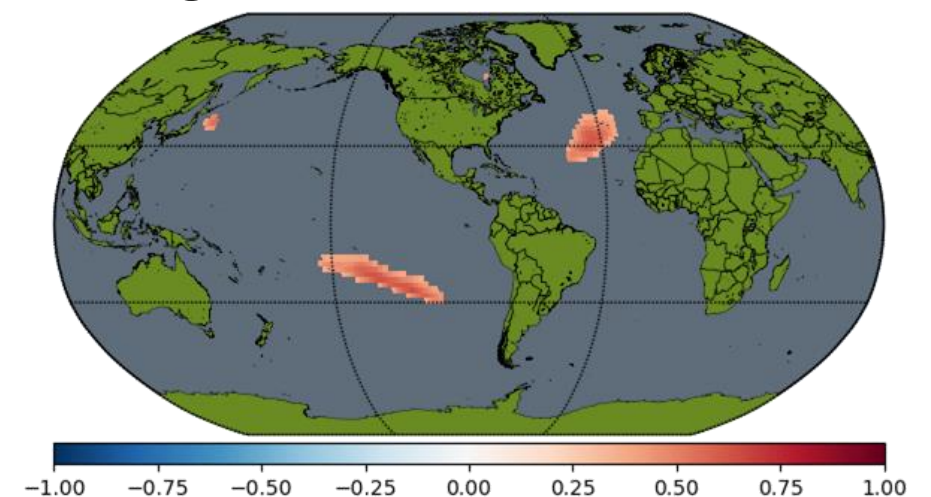# NIPA: SST-SLP Forecast Models

Positive – Correlation: 0.47

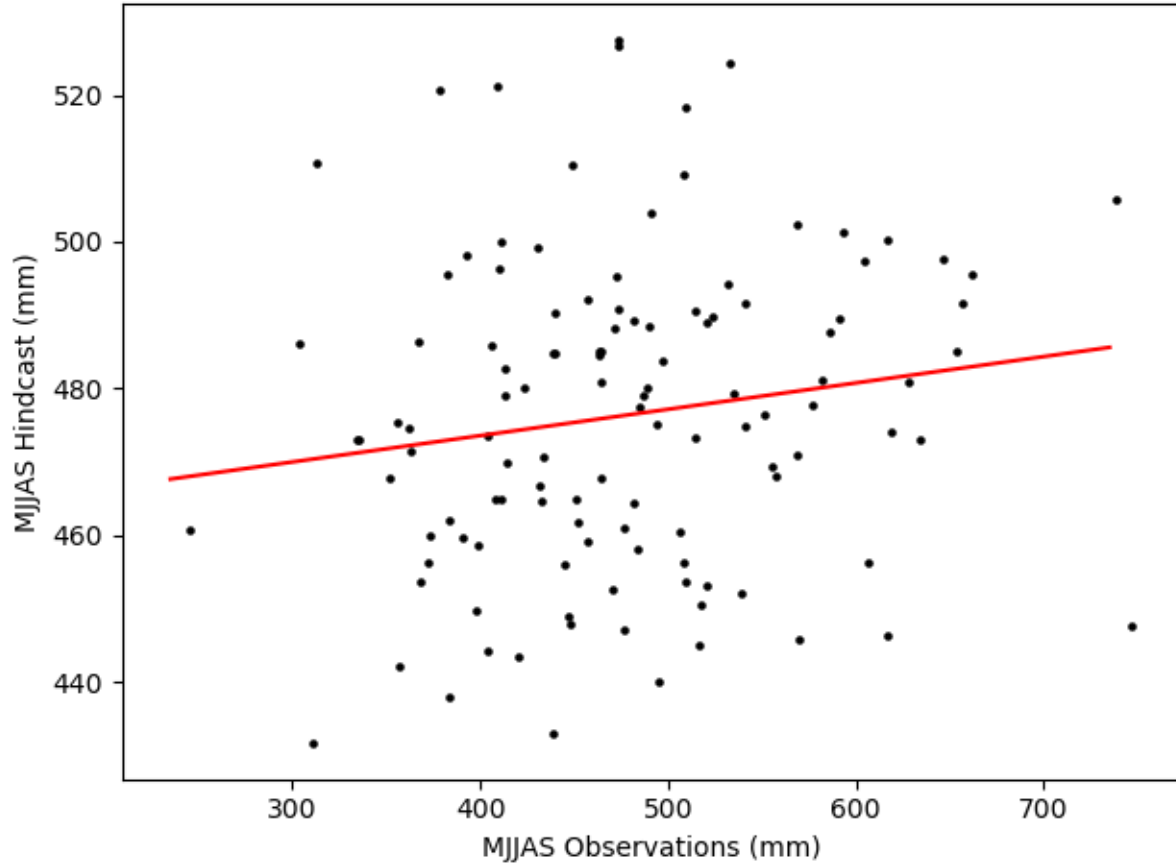Neutral Positive – Correlation: 0.27

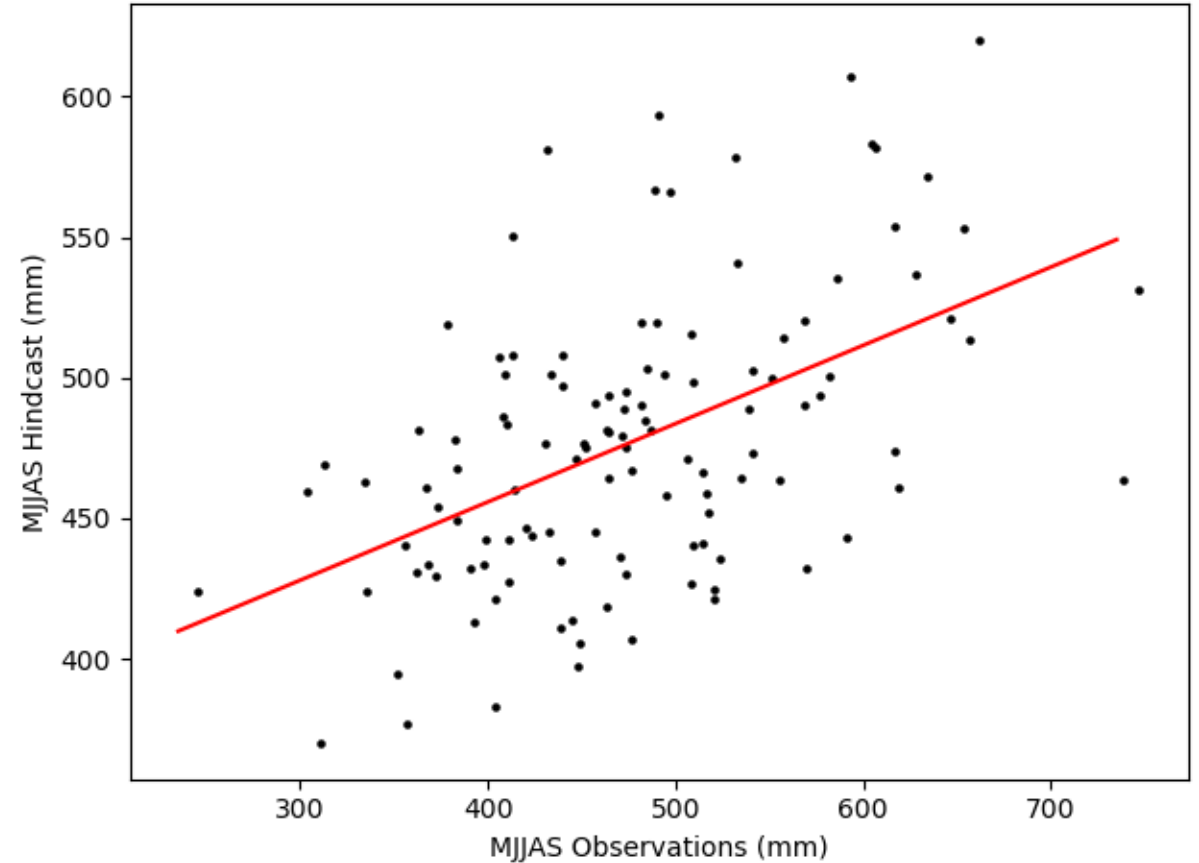Neutral Negative – Correlation: 0.45

Negative – Correlation: 0.40

NIPA: Phased-Based Approach

Correlation: 0.15

$$hcast = obs * 0.0359 + 459.2$$

Correlation: 0.51

$$hcast = obs * 0.2784 + 344.4$$

Forecast Evaluation: Contingency Table

Forecast Categories:
- **Above Normal**: >67th percentile
- **Normal:** 33-67th percentile
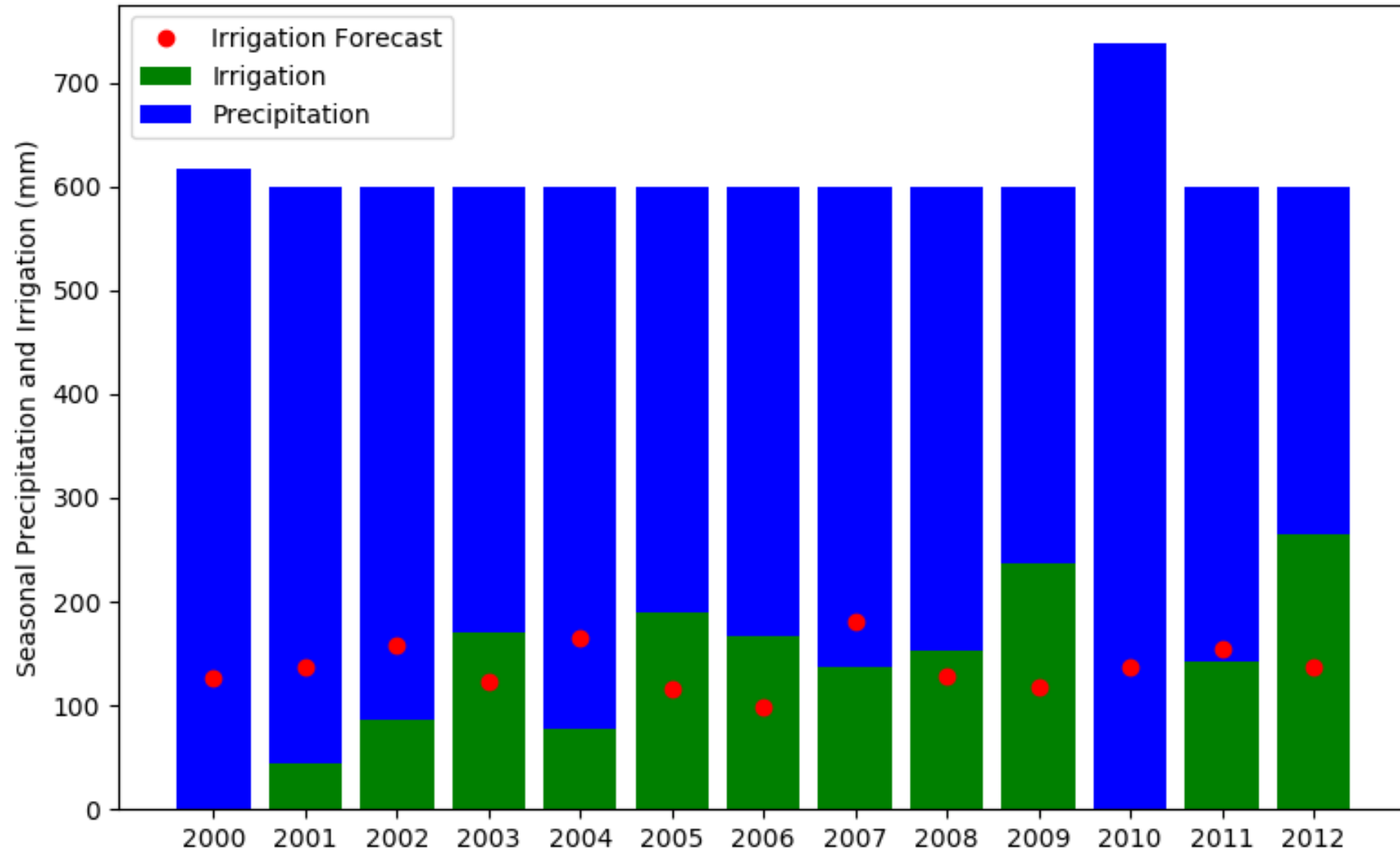- **Below Normal**: <33rd percentile

Hits
- 54 of 118 years
- 46%

Extreme Misses
- 6 of 118 years
- 5%

Observed Category

	A	N	B
A	16	6	3
N	20	26	24
B	3	8	12

Forecast Category

Potential Forecast Application: Potato Irrigation

Future Work

Precipitation Forecast Improvements
- Increase Probability of Detection for Dry/Wet Years
- Evaluate Dynamic Model Performance

Precipitation – Groundwater – Irrigation
- Investigate Relationships
- Empirical Groundwater Level Forecast

Real Estate
- Lakefront vs Non-Lake Front
- Effects of Climate

Questions?