Sea Surface Salinity as a Subseasonal Predictor for Summer Precipitation in the Midwest

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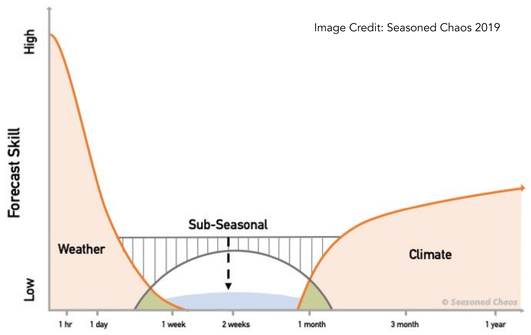
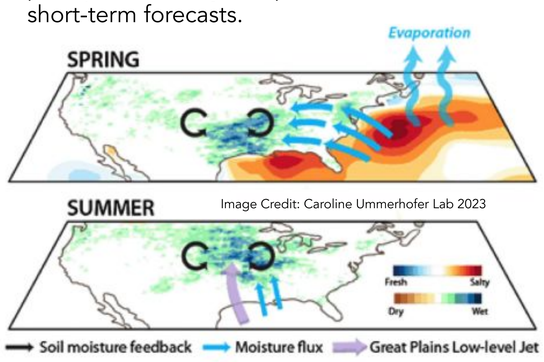
INTRODUCTION



Seasonal to Subseasonal Timescales have poor predictability compared to seasonal and short-term forecasts.



- Patterns of Sea Surface Salinity can indicate areas of ocean moisture export to the atmosphere
- High Sea Surface Salinity signals indicate evaporation and vice versa

SCIENCE QUESTIONS

1. Do we find patterns of sea surface salinity preceding precipitation events in the Midwest on a subseasonal scale?
2. Where do we find these patterns?
3. How are salinity patterns related to precipitation events?

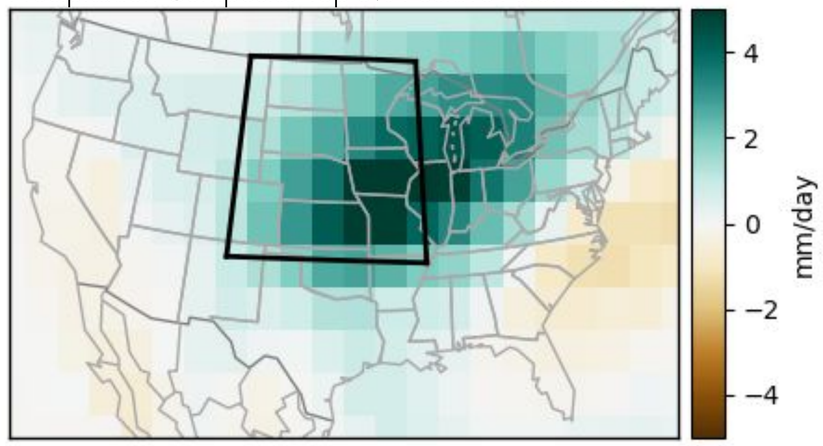
DATA

Data: CESM 2 Climate Model
Detrended anomalies
10 ensemble members
1850-1950 May-August
'Midwest': Lon: 106°-90° W Lat: 36°-49° N

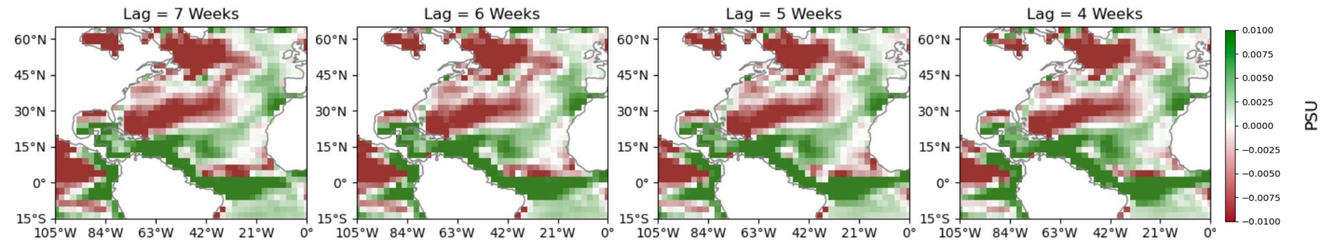
RESULTS

- Composited Top 5% Positive and Negative Precipitation Anomalies
- Composited sea surface salinity for the top 5% of summer positive/negative precipitation days in the Midwest
- Composited weekly lags from Week 0-11 from our initial positive/negative precipitation anomalies
- Salinity pattern in the Gulf of Mexico/Caribbean Sea Salinity pattern was most prominent 4 weeks before our rainy days.
- This pattern weakens out as lags move into the seasonal timescale

Precipitation Composite Top 5% Positive Anomalies

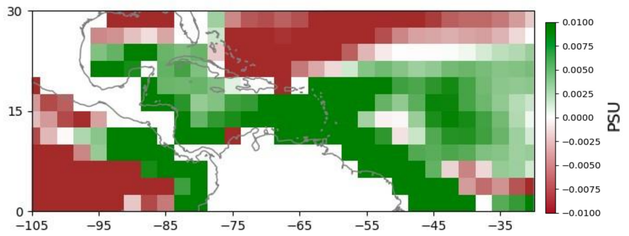


SSSA composites for lags of Midwest positive precip events

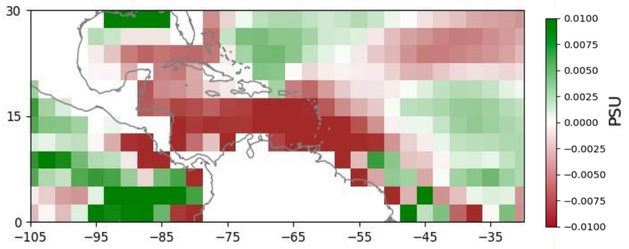


Computed pattern correlation coefficients of 4 week lag Gulf of Mexico/Caribbean Sea salinity pattern to salinity in that region for the months from May to August and composited precipitation anomalies for those days with a 4 week lead.

SSSA Composites Positive Precip Anomaly n = 2157

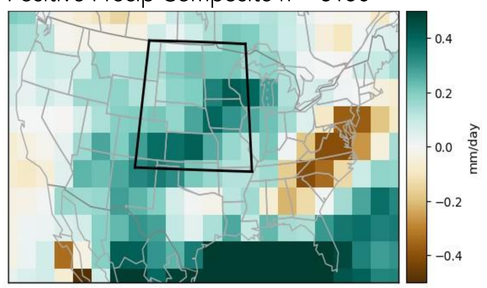


SSSA Composites Negative Precip Anomaly n = 2157



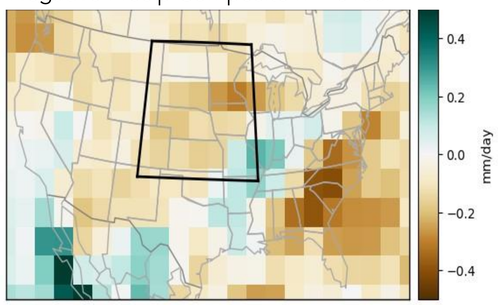
4 Weeks Later

Positive Precip Composite n = 6150



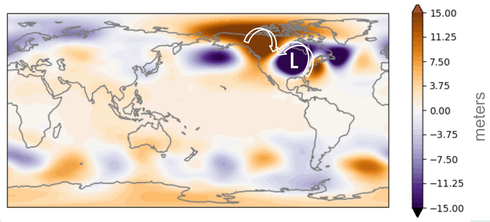
4 Weeks Later

Negative Precip Composite n = 6150



DISCUSSION

500 mb height composite Lag = 0 Positive Precip



The proposed mechanism for this moisture transport is via the Caribbean Low Level jet to the Great Plains Low Level Jet region where the moisture is swept into a 500 mb pattern with favorable conditions for precipitation.

MAIN TAKEAWAY

Research revealed when we composite precipitation for similar salinity patterns to our 4 week pattern we see precipitation in the Midwest **4 weeks ahead** of this pattern's appearance in the G ulf of Mexico and Caribbean Sea.

FUTURE WORK

1. Extending the Time Scales to Seasonal Scale
2. Exploring Other Regions of predictability such as Teleconnections in the Pacific

ACKNOWLEDGEMENTS

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