Climatological Evaluation on Extreme Precipitation in Florida

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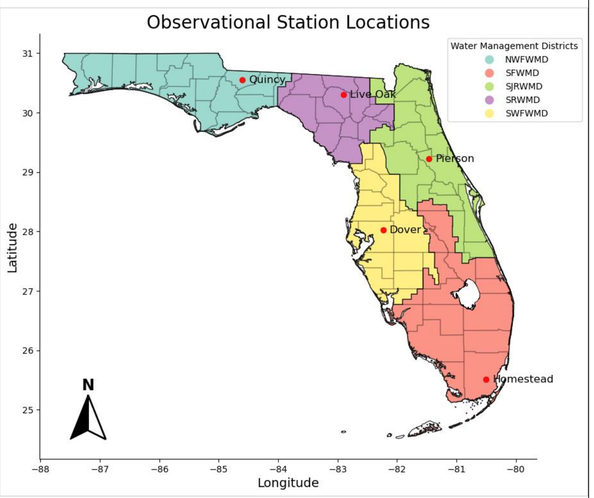
Background

- Florida receives at least 50in of precipitation annually.
- Extreme precipitation for Florida is defined as 3in or more within 24hrs.
- Excessive precipitation is one reason for flooding, causing damage to communities, agriculture, and water quality.
- El Niño Southern Oscillation (ENSO) can influence precipitation amounts.
- Current climate projections cannot provide accurate predictions for hydrometeorological variables.
- There is currently no comprehensive statewide assessment of water impacts due to climate change.
- This study aims to better understand the climatological pattern of extreme precipitation events in Florida.

Methods

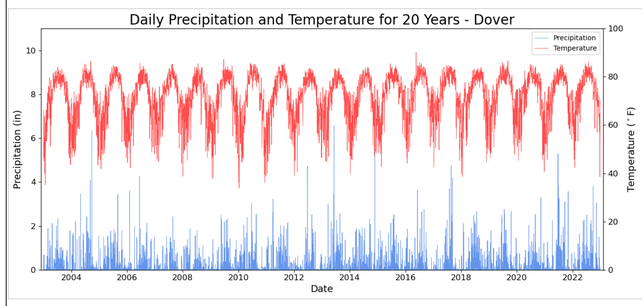
- 5 FAWN observational stations

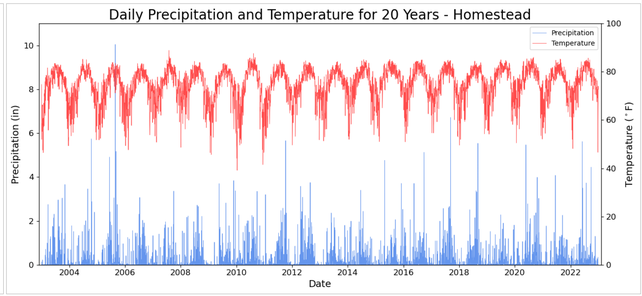


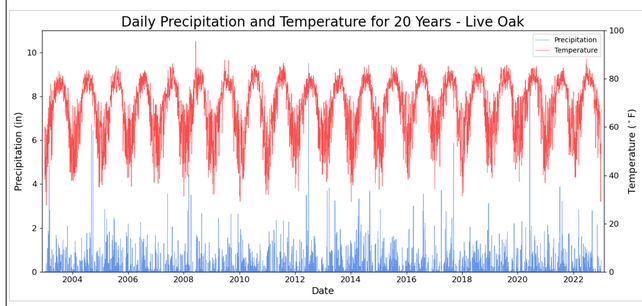
- Collected daily values for the mean 2m temperature and total precipitation for 2003-2022.
- Correlated NCEP-NCAR Reanalysis 1 data to observational data.
- Analyzed the time series and frequency of daily precipitation totals and extreme precipitation events per year.
- Mann-Kendall tests assessed trends for precipitation, temperature, and extreme precipitation events.

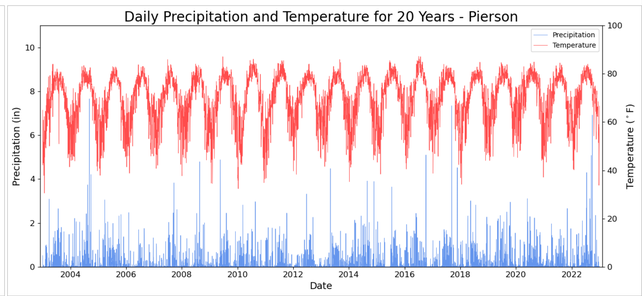
Results

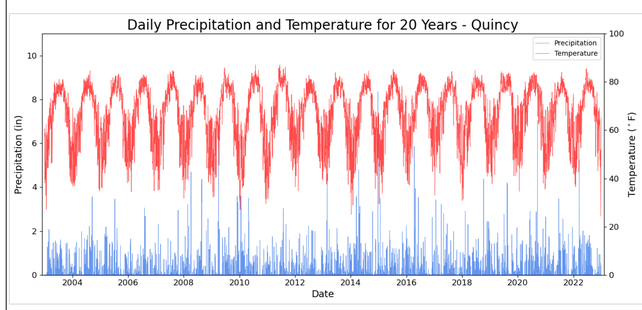
- Daily Precipitation and Temperature Time Series and ENSO

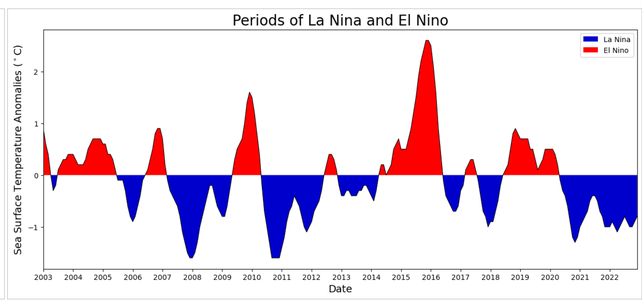












- Mann-Kendall Test Results

Table 1. Daily Temperature Trends

	Dover	Homestead	Live Oak	Pierson	Quincy
Trend	**Increasing**	**Increasing**	**Increasing**	Increasing	Increasing
p-value	**0.0**	**0.0**	**0.0**	2.2204	6.1687

Table 2. Daily Precipitation Trends

	Dover	Homestead	Live Oak	Pierson	Quincy
Trend	**Increasing**	**Increasing**	**Increasing**	Increasing	**Increasing**
p-value	**0.0007**	**0.0005**	**0.0158**	2.0106	**0.0173**

Table 3. Extreme Precipitation Event Trends

	Dover	Homestead	Live Oak	Pierson	Quincy
Trend	Increasing	Increasing	Increasing	Increasing	Increasing
p-value	0.0939	0.5528	0.9077	0.5627	0.7538

Future Studies

- More analysis of different reanalysis data could establish a better understanding of atmospheric modeling for precipitation variables.
- A longer period and more stations could better assess the hydrometeorological trends in Florida.
- More evaluation should be done on the seasonality of extreme precipitation events, including the influence of ENSO.

Discussion

- The reanalysis data was deemed unusable as its daily precipitation was weakly correlated to observations.
- Homestead and Live Oak had the most (40) and least (22) extreme precipitation events, respectively.
- Increasing trends in the daily temperature were significant for Dover, Homestead, and Live Oak.
- Increasing trends in the daily precipitation was significant for Dover, Homestead, Live Oak, and Quincy.
- No statistically significant trends for extreme precipitation events.
- The influence ENSO has on precipitation is unclear in this study.

Conclusion

- There is a limitation in reanalysis data as it cannot accurately model precipitation-based variables.
- The results show that precipitation and temperatures are rising throughout Florida.
- The rising trend for daily precipitation can negatively affect the environment.
- However, the future of extreme precipitation in Florida could not be projected as no trend was seen.
- There is an uncertainty in the influence of natural phenomena as there was no apparent connection between ENSO and precipitation intensity.

References

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