CMIP6-based Multi-model Hydroclimate Projection analysis for Pensacola Bay Area

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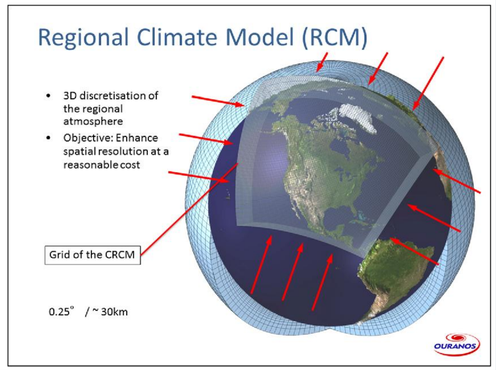
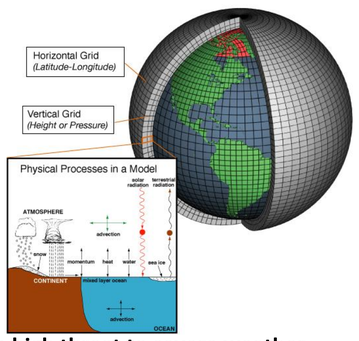
Abstract

- We are analyzing projected data to see **how climate change will affect Pensacola Bay**.
- Climate Change affects many factors that contribute to our environment.
- This analysis could potentially **predict major storm systems**.
- The climate data is from a Regional Climate Model (RCM).
- The most recent data was used to calculate the rates.
- The calculations were limited to runoff and wind.
- The analysis projects that **runoff will increase**.
- The analysis projects that **wind will decrease**.



Background

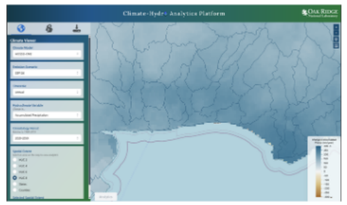
- A **Regional climate model (RCM)** can simulate a climate in a specified area.
- RCMs can use varied Climate Models and Emission Scenarios to help account for potential variables in the data.
- Using these variables, RCMs can simulate many factors, such as **Runoff and Wind speed**.
- The Pensacola Bay is an estuary in **Northwest Florida** that takes up around **144 square miles**.
- The Pensacola Bay encompasses smaller systems in the area, such as the Santa Rosa Sound and the East Bay.
- Due to the areas surrounding environment, they stand a **high threat to severe weather events**, such as Tropical Storms and Hurricanes.
- While we have a multitude of RCMs, we don't know how they behave in comparison to other RCMs.
- **Objective:** To analyze projected climate data from Regional Climate Models to determine how climate change will affect runoff and wind patterns in the Pensacola Bay Area from 1980-2059.



Methods

Step 1:

Gather data from the RCM



- Get Data from each climate projection/climate model from the RCM (pictured above.)
- Compile data from each factor into one excel sheet for each factor (runoff and wind.)

Step 2:

Calculate a sample size of data to test the algorithm

- In order to ensure the algorithm works, you need to create a data set you know is accurate to test the algorithm.
- You must calculate the same rates you will have the algorithm calculate to ensure it is accurate.

Step 3:

Make the algorithm

- Use Python to create an algorithm to calculate the rates for you.

Step 4:

Compare results from the algorithm to previously calculated data

- Only Proceed when all data matches and is correct

Step 5:

run the algorithm for all desired excel files

Step 6:

calculate average rates for each day/month/year

- Add a new column after every 6 columns of data
- Use the excel funtion =AVERAGE(D4:AA4) in order to calculate the averages effectiently

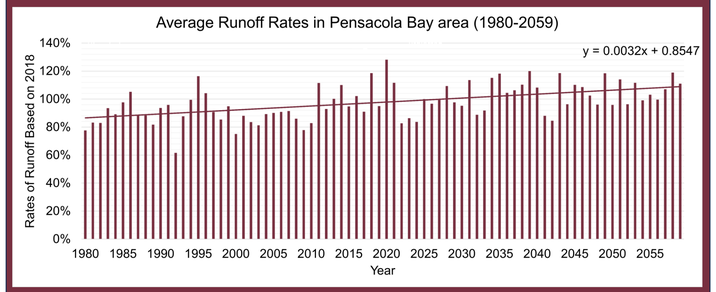
Step 7:

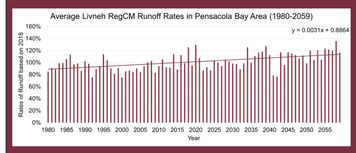
analyze the average data and look for trends

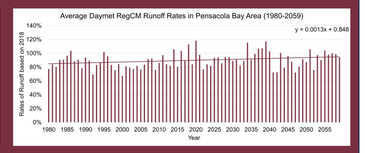
QR Code to sample excel file

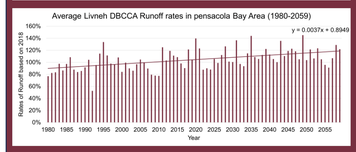
- create graphs of the total averages and for each RCM (every group of 6 columns)

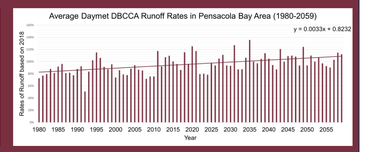
Results

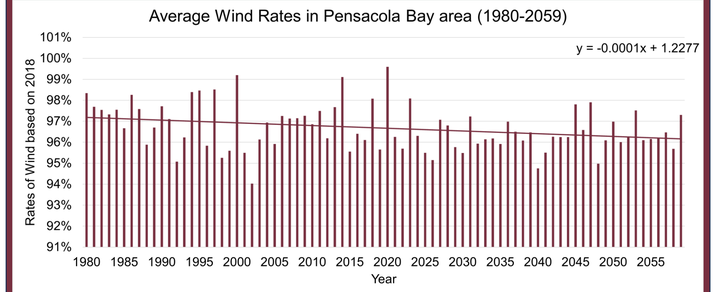


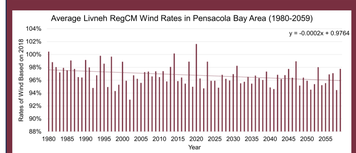


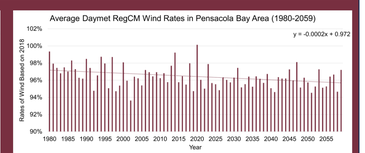


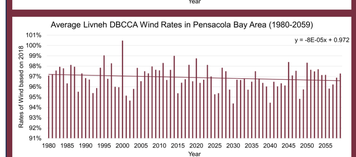


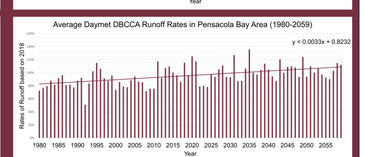












- Runoff showed increasing trend and wind demonstrated decreasing trend for **historical (1980-2025)** and **projected (2026-2059)** periods.

References