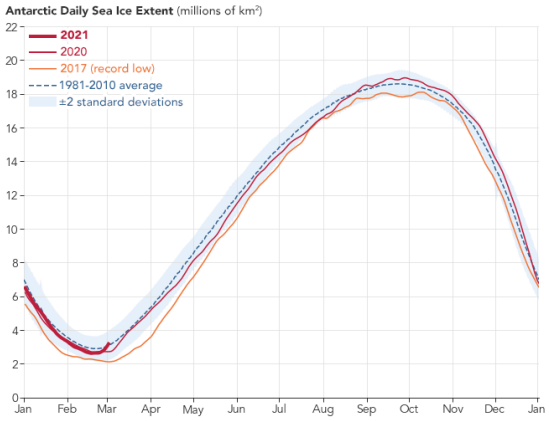
Analyzing Global Climate Trends Through Sea Ice Levels

A UVA Data Science Case Study by Cato Zhong Spring 2024



Prompt:

Congratulations! After graduating from UVA, you accept a job at an environmental consulting firm monitoring the global climate. The analyses you conduct will help inform policy decisions and shape the direction the world takes in the next 20 years. It is important that you understand the intricacies of nature, how it fluctuates, what are some key indicators of climate change, and how to evaluate the climate overall. However, you do not have the luxury of time. Every moment of indecision could lead to a worse outcome for the entire world.

Your supervisor wants to know how climate change has affected one key metric, sea ice levels. Since global warming became a documented issue, melting sea ice has caused sea levels to rise and you want to know how much. This can be particularly challenging because of the seasonal and variable nature of sea ice, with sea ice levels fluctuating greatly depending on the month and year. To accomplish this task, you will need to use the skills you have learned in your data science education and develop a model that can model the historical data available now and forecast a prediction for the next 10 years. They would like to know if sea ice levels can be explained by natural variability, or if there is a downward trend that requires immediate action.

Deliverable:

Develop a model using the provided historical sea ice data from November 1978 to the present to forecast future sea ice extent. Your models need to conclude whether or not there has been a long term trend in sea ice extent and whether or not it will continue to get worse. You can use different time series forecasting models like SARIMA or triple exponential smoothing to model this data. Your results should communicate a finding to your supervisor and provide evidence to support your position.