

Analyzing the Impact of Climate Change on Global Temperature and Sea Level Rise

Introduction:

The aim of this project is to analyze the impact of climate change on global temperature and sea level rise over time. This includes analyzing ancient statistics to understand traits and patterns in temperature and sea level measurements. To complete this study, I collected data from two different source.

Motivation

After complete this study I hope I get the answer of my research questions which was How has global temperature changed over the past century, and what are the underlying trends? What is the relationship between global temperature rise and sea level rise? Which regions are most affected by sea level rise, and what are the implications for coastal communities? Can we predict future trends in global temperature and sea level rise using historical data?

Data and Analysis:

The analysis will focus on the impact of the climate change observed in global temperature and sea level changes over the years. The data spans from 1995 to 2010, with visual representations provided in the form of graphs. Data collection and cleaning process was explained in Data report.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average	CSIRO - Adjusted sea level (inches)	NOAA - Adjusted sea level (inches)
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1995	0.52	0.79	0.47	0.46	0.27	.43	.45	.45	.33	.47	.44	.26	0.445	6.622047237	6.57674495
1996	0.24	0.46	0.32	0.33	0.27	.28	.36	.48	.25	.24	.38	.37	0.331666666666667	6.78346456	6.723710173
1997	0.33	0.4	0.51	0.33	0.34	.54	.33	.41	.52	.61	.64	.59	0.4625	7.059055111	6.779514525
1998	0.57	0.88	0.63	0.63	0.68	.77	.66	.65	.41	.41	.43	.54	0.605	6.669291332	6.770265291
1999	0.48	0.64	0.32	0.32	0.26	.36	.38	.31	.38	.34	.37	.40	0.38	7.003937001	6.840497137
2000	0.25	0.56	0.55	0.57	0.36	.40	.39	.42	.38	.26	.30	.28	0.393333333333333	7.055118103	6.919122465
2001	0.45	0.44	0.55	0.5	0.58	.52	.59	.49	.52	.50	.72	.56	0.535	7.271653536	7.116325549
2002	0.77	0.78	0.88	0.58	0.64	.53	.62	.53	.63	.54	.59	.44	0.6275	7.366141725	7.258223788
2003	0.74	0.58	0.6	0.55	0.6	.48	.58	.65	.62	.73	.53	.75	0.6175	7.728346449	7.410511627
2004	0.58	0.72	0.63	0.61	0.37	.44	.26	.46	.50	.61	.72	.51	0.534166666666667	7.712598417	7.465565214
2005	0.74	0.6	0.74	0.67	0.63	.65	.61	.60	.71	.75	.73	.68	0.675833333333333	7.716535425	7.566645782
2006	0.56	0.73	0.63	0.47	0.48	.66	.54	.70	.65	.70	.74	.79	0.6375	7.885826764	7.678404507
2007	1.02	0.7	0.71	0.76	0.68	.61	.59	.60	.60	.59	.59	.50	0.6625	7.960629913	7.674412818
2008	0.3	0.38	0.75	0.54	0.5	.49	.60	.45	.61	.67	.69	.54	0.543333333333333	8.303149598	7.828383728
2009	0.65	0.52	0.53	0.61	0.65	.64	.73	.69	.71	.66	.79	.67	0.654166666666667	8.531496054	7.973212968
2010	0.75	0.83	0.92	0.85	0.75	.68	.63	.67	.64	.71	.81	.46	0.725	8.83464566	8.03087412

Figure 1: Final Merged Data

To analysis these data I used Following technologies

- python
- pandas
- Colorama
- matplotlib
- sqlite3
- vs-code

Result Analysis:

The chart "Monthly Temperatures Over Years" depicts the variations in monthly temperatures from the year 1995 to 2010. X-Axis represents the years from 1995 to 2010 and Y-Axis represents the temperature values, ranging from 0.2 to 1.0.

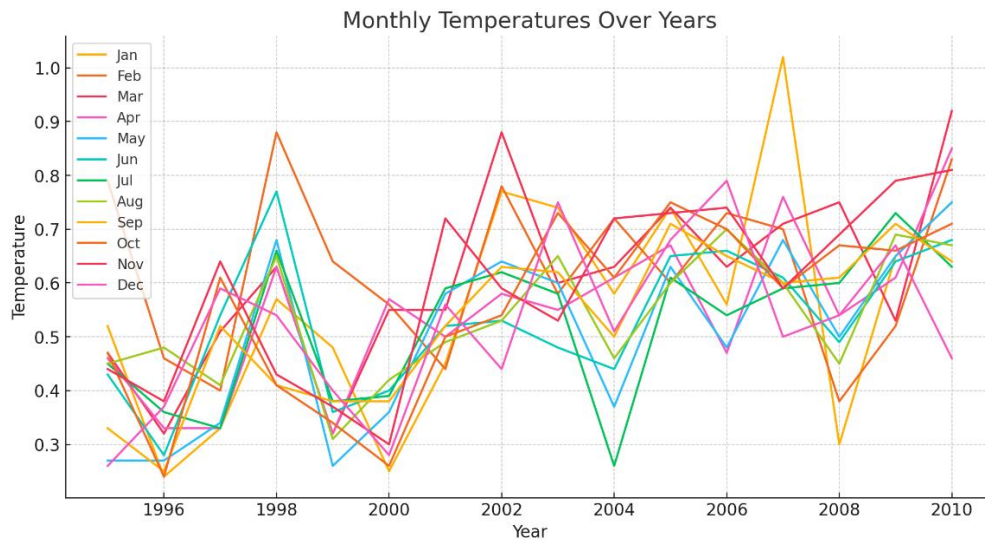


Figure 2: Monthly Temperatures Over Years

Each line shows how the temperature for a particular month has changed year over year. Some years show significant spikes in temperature for certain months, like in 1998 and 2006. There are noticeable fluctuations and peaks within each line, indicating periods of higher or lower temperatures. There are also drops in temperature, such as around 2008 for several months. The "Average Temperature Over Years" chart provides clear evidence of rising global temperatures from 1995 to 2010.

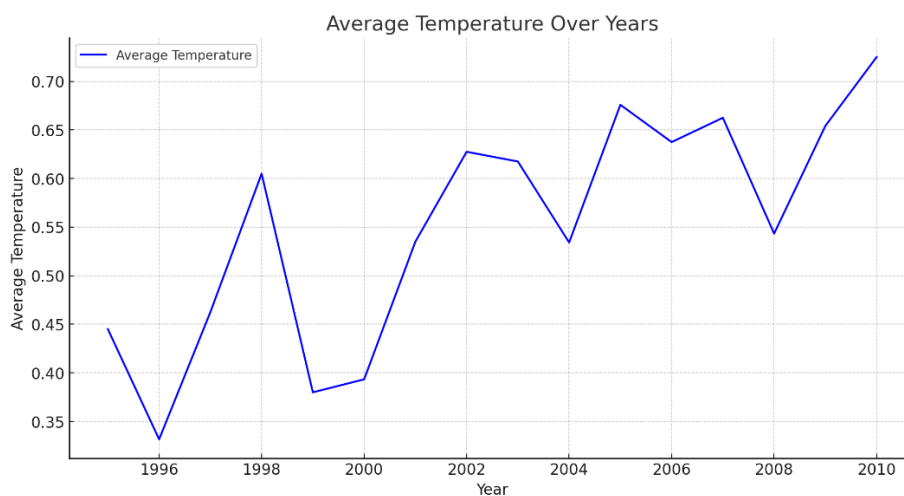


Figure 3: Average Temperature Over Years

The starting point in 1995 is around 0.40 while by 2010, the temperature has risen to approximately 0.70. The gradual upward trend suggests that the Earth is experiencing long-term warming which could have significant impacts on ecosystems, sea levels and weather patterns. Increased temperatures result in the melting of polar ice caps and glaciers, adding more water to the oceans.

In the Figure 4: NOAA - Adjusted Sea Level Over Years, Red Line Represents the sea level rise data from NOAA. The sea level shows a steady increase from around 6.6 inches in the mid-1990s to over 8 inches by 2010.

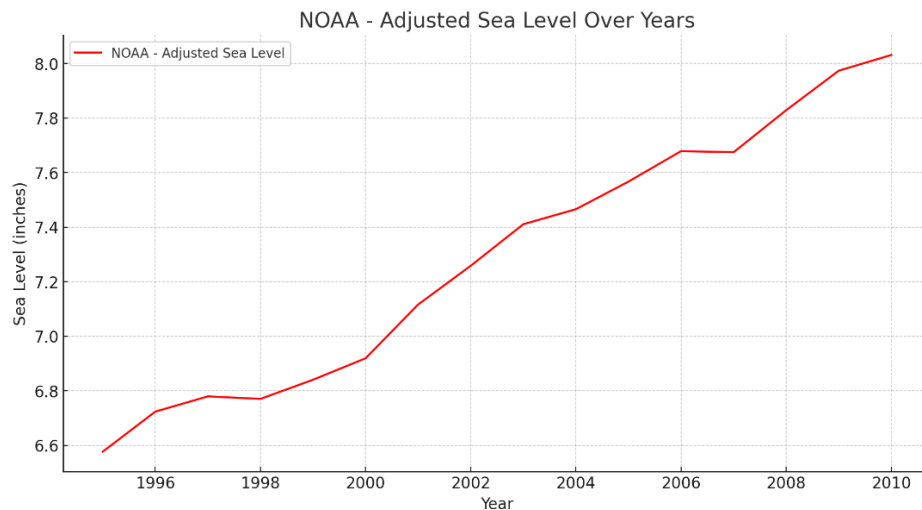


Figure 4: NOAA - Adjusted Sea Level Over Years

In the Figure 5: CSIRO - Adjusted Sea Level Over Years: Green Line: Represents the sea level rise data from CSIRO. The trend is similar to the NOAA data, showing an increase from around 7.0 inches in the mid-1990s to approximately 8.5 inches by 2010.

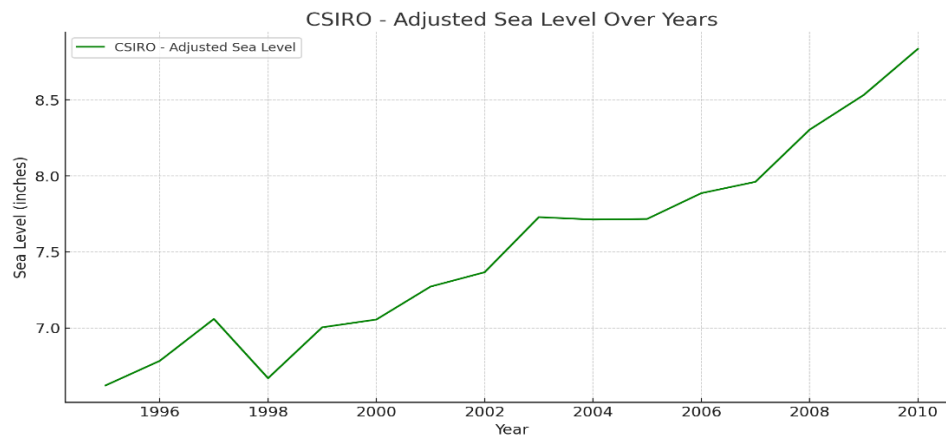


Figure 5: CSIRO - Adjusted Sea Level Over Years

In the Figure 6: Average Temperature Over Years, The graph suggests a correlation between rising global temperatures and increasing sea levels. Both sea level datasets from CSIRO and NOAA show a consistent rise reflecting the impact of global warming on sea levels.

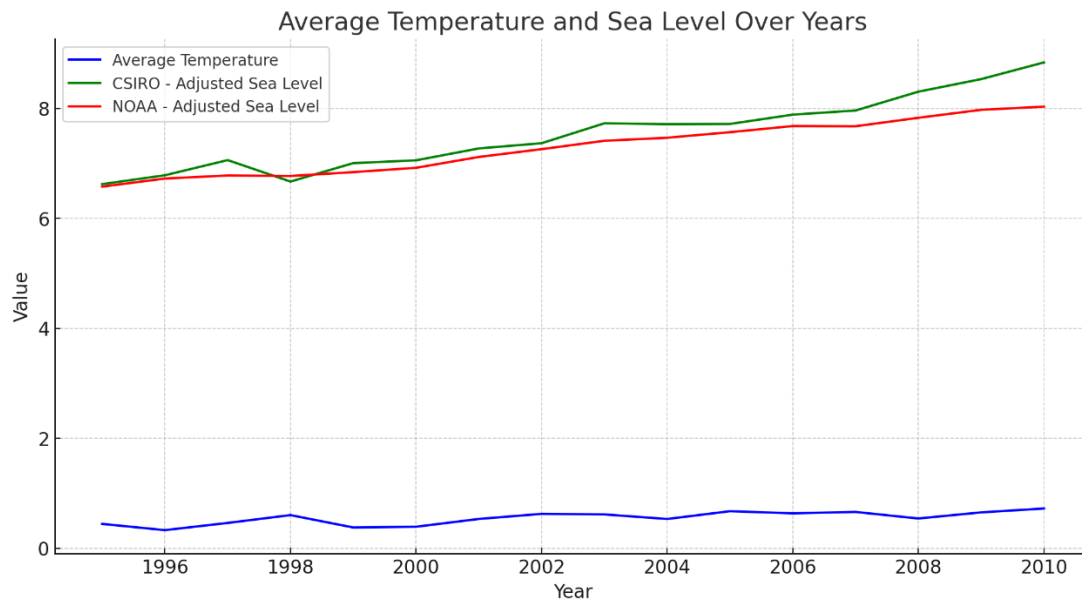


Figure 6: Average Temperature Over Years

In the Figure 6 Blue Line represents the average temperature over the years. The temperature shows fluctuations but generally trends upward, indicating an increase in global temperatures. Green Line (CSIRO - Adjusted Sea Level): Shows the sea level rise adjusted by CSIRO. There is a clear upward trend, indicating that sea levels are rising. Red Line (NOAA - Adjusted Sea Level) shows the sea level rise adjusted by NOAA. Similar to the CSIRO data, there is an upward trend in sea level.

Conclusion:

There is a noticeable correlation between the rise in average temperatures and the increase in sea levels. While global temperatures rise, sea levels also tend to increase due to the thermal expansion of water and melting ice caps. While the provided data gives a clear indication of rising trends so further analysis could involve more variables such as greenhouse gas emissions, ice cap thickness and ocean currents to get a comprehensive understanding of the factors affecting these changes.