# DATA VISUALISATION PROJECT

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Data Visualisation | S'24

# ABSTRACT


- Climate Change Definition:
  - Significant and lasting alterations in long-term weather patterns and average temperatures.
- Environmental Threat:
  - Jeopardizes ecosystems, biodiversity, and natural resources.
  - Endangers the health of our planet and future generations.
- Health Risks:
  - Rising temperatures and extreme weather events directly impact human health.
  - Worsens diseases and global health disparities.
- Economic Challenges:
  - Damages infrastructure, agriculture, and supply chains.
  - Poses risks to global prosperity.
- Social Inequality:
  - Disproportionately affects vulnerable communities.
  - Emphasizes the need for equitable solutions and social justice.

# PHASE-1

- The project "Visualizing Climate Change Dynamics: Insights for Informed Decision-Making" was chosen due to the critical significance of climate change as a global challenge.
- By harnessing the power of data visualization, this project seeks to illuminate key factors influenced by climate change, such as energy usage, fossil fuel prices, emissions, and economic ramifications.
- Through visual representation of complex data sets, stakeholders can gain clarity on the interconnected dynamics shaping our energy landscape and the the benefits derived from avoiding climate damages.

# PHASE-1

TO DO:

- Compilation and documentation of relevant datasets on climate change, energy usage, and disaster occurrences in India.
- Development of methodologies for analyzing trends, impacts, long-term variability, and correlations within the datasets.
- Design and creation of initial visualizations, including line charts, area plots, bar charts, scatter plots, and correlation matrices.
- Production of detailed documentation outlining project goals, methodologies, and initial findings.

# PHASE-2

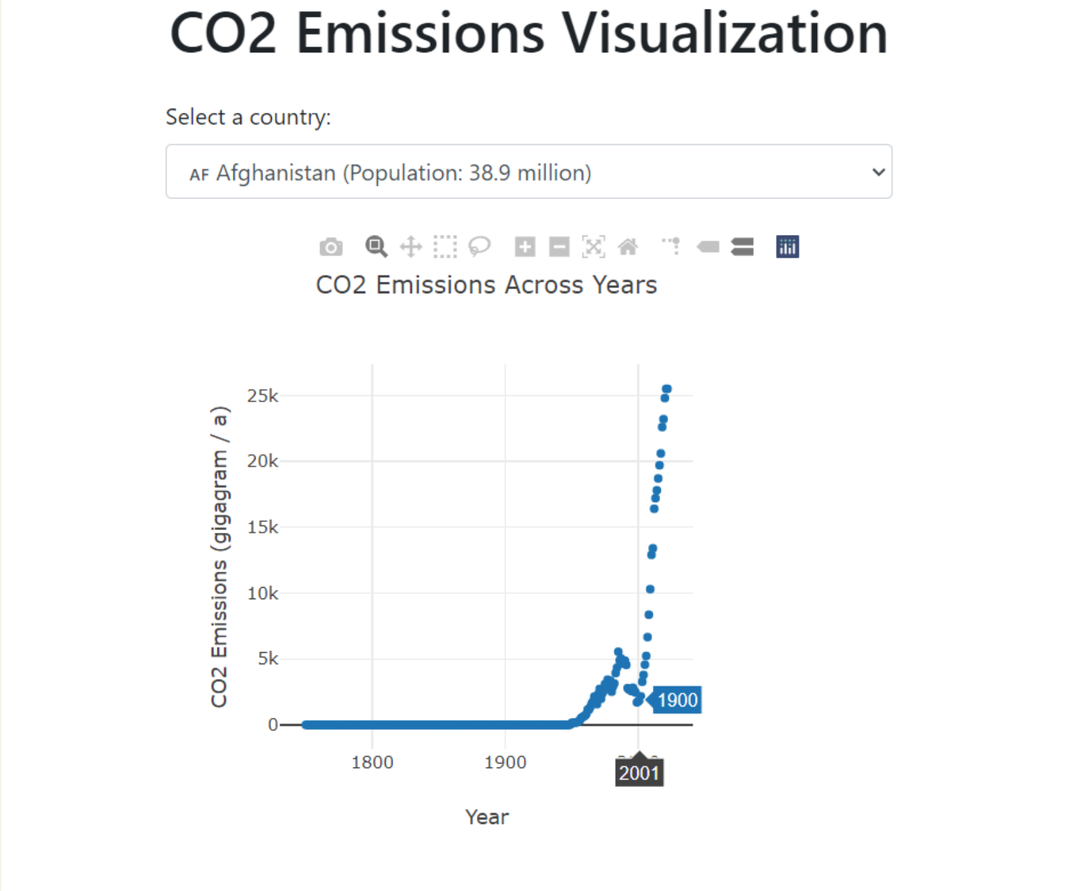
- After recieving feedback from the teaching assistant and the professor we had to make a few modifications in the decided deliverables. This is a brief summary of what we have done for R2 of data visualisation project - "Visualizing Climate Change Dynamics: Insights for Informed Decision-Making"

# WHAT WE HAVE

- Video simulation of rise in global sea level from 1880-2014

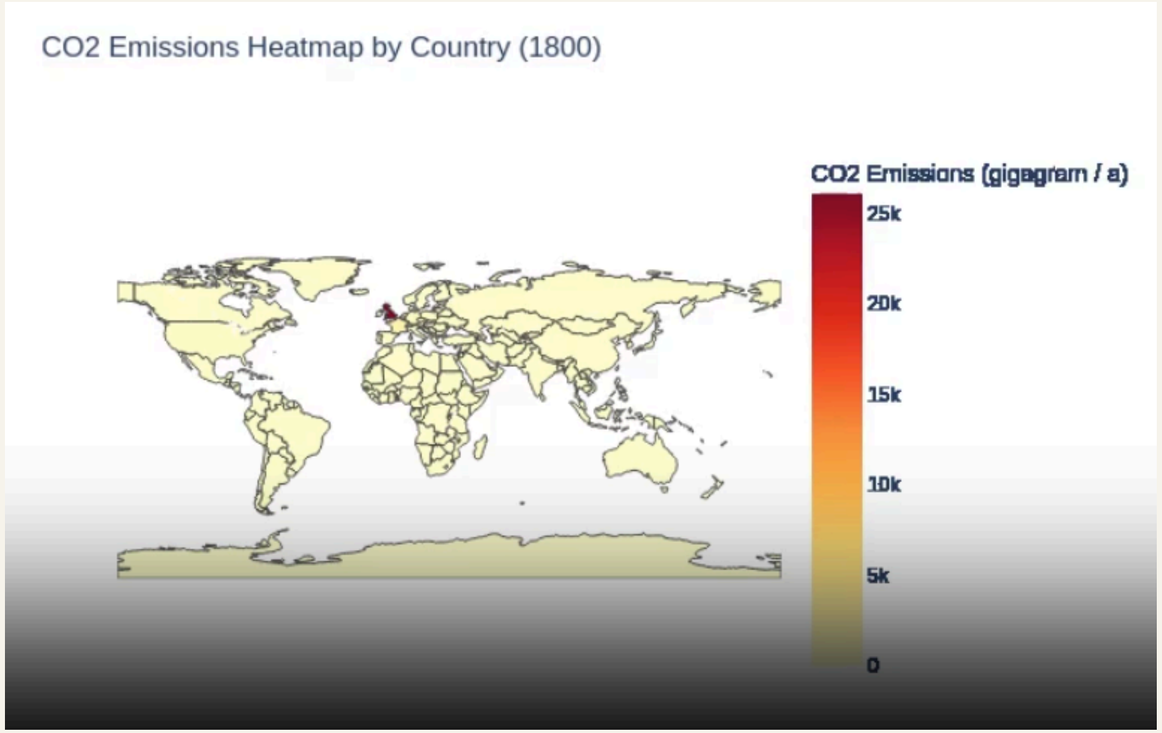
# WHAT WE HAVE

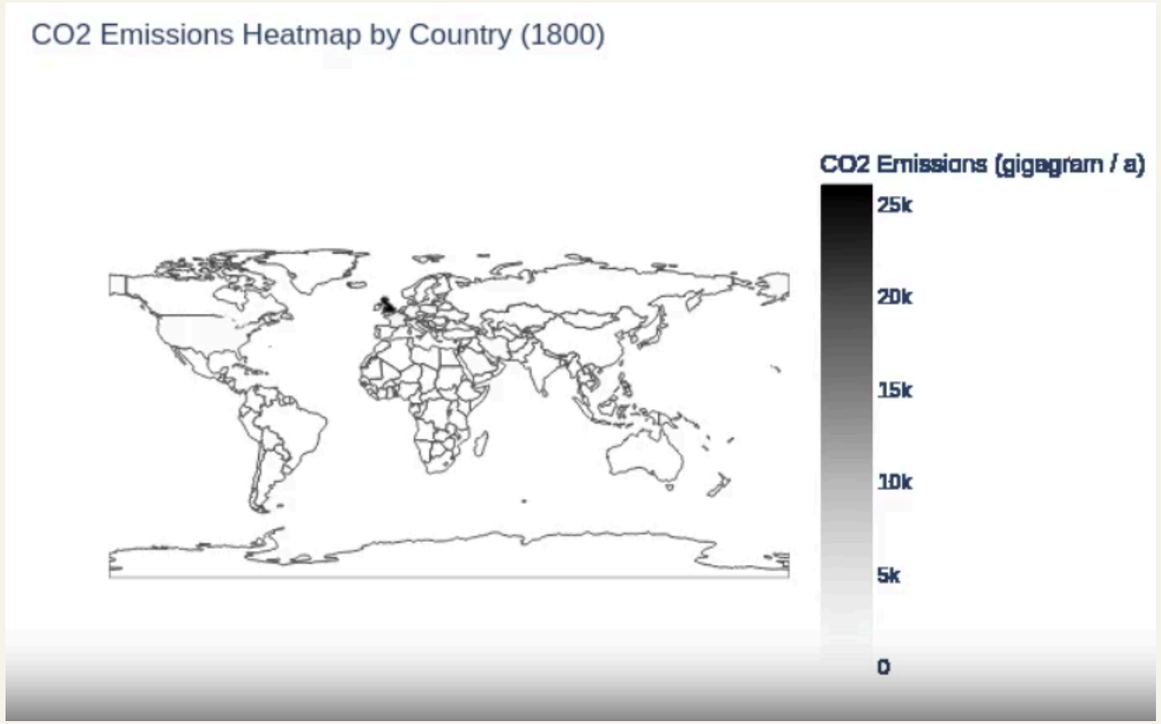
- **Co2 Emissions for a particular country over the years from 1800-2022**



# WHAT WE HAVE

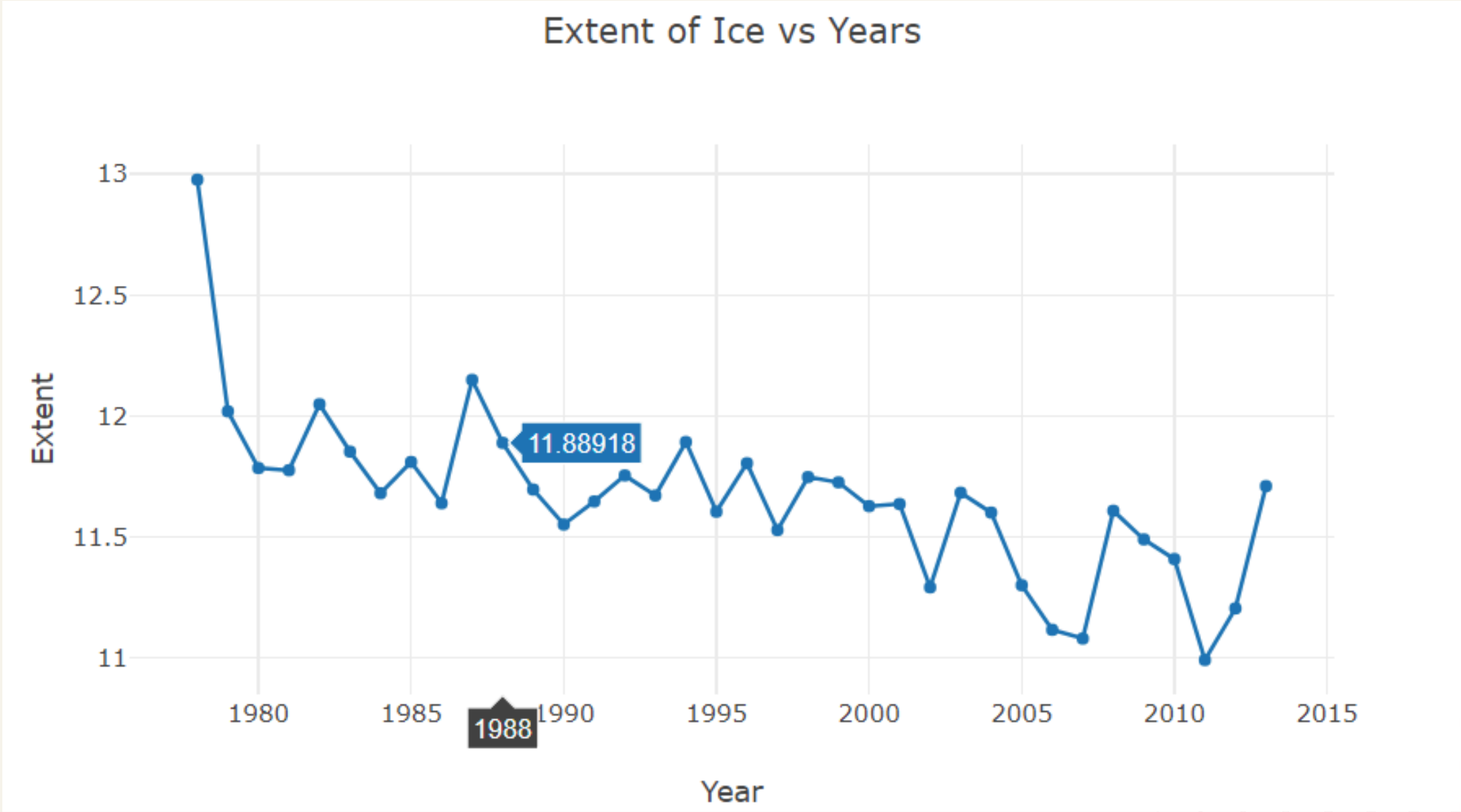
- A Heatmap Times-series of Co2 Emissions over the globe from 1800-2022

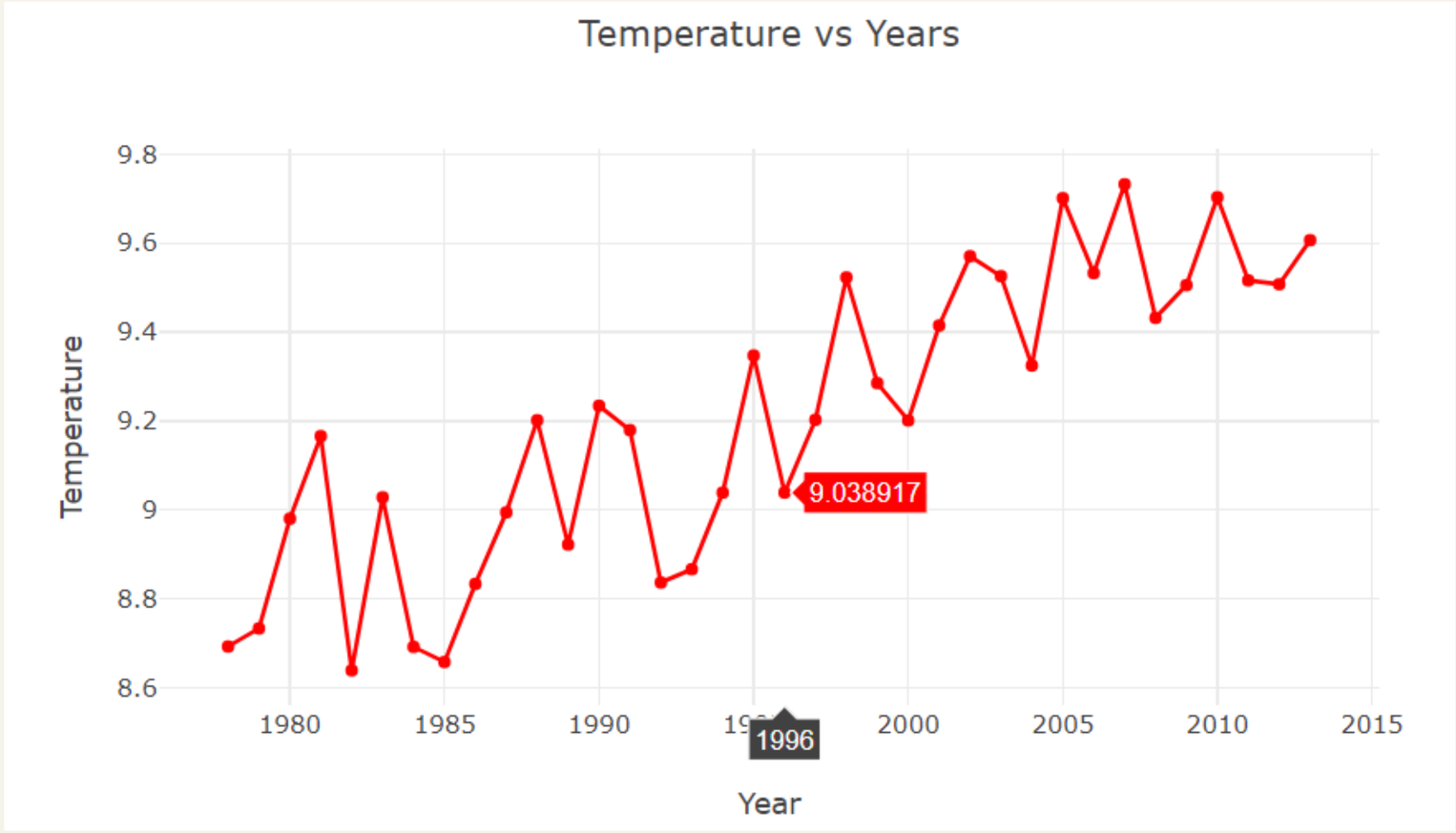


# WHAT WE HAVE

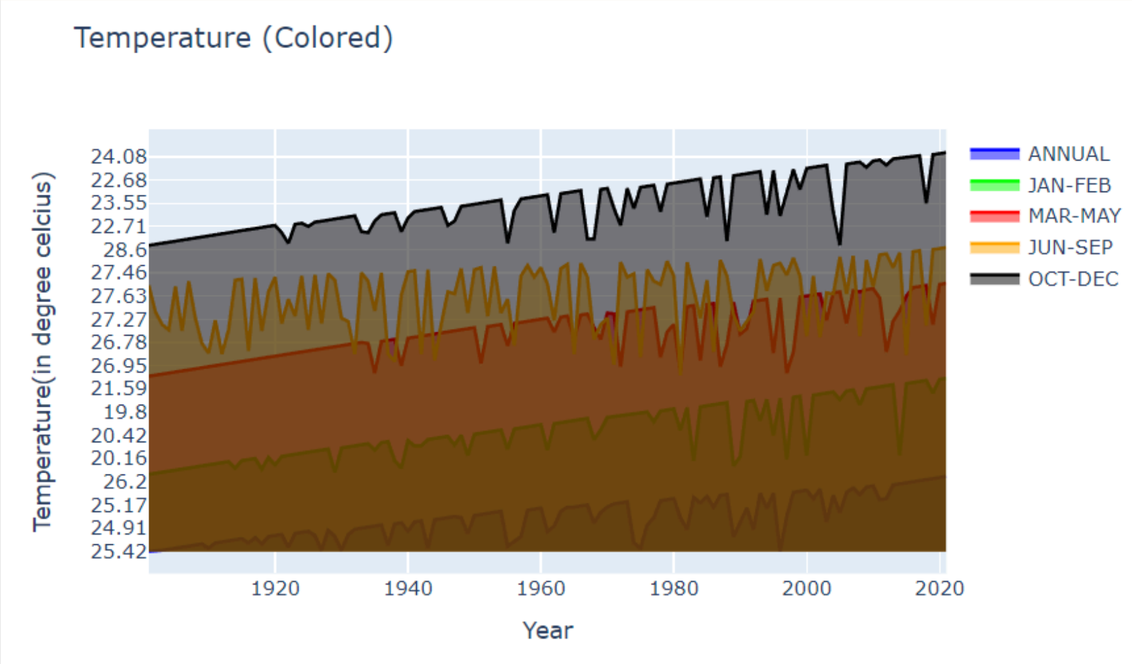
- A visualisation of Global surface temperature change comparing with amount of ice in sea from 1978-2019.

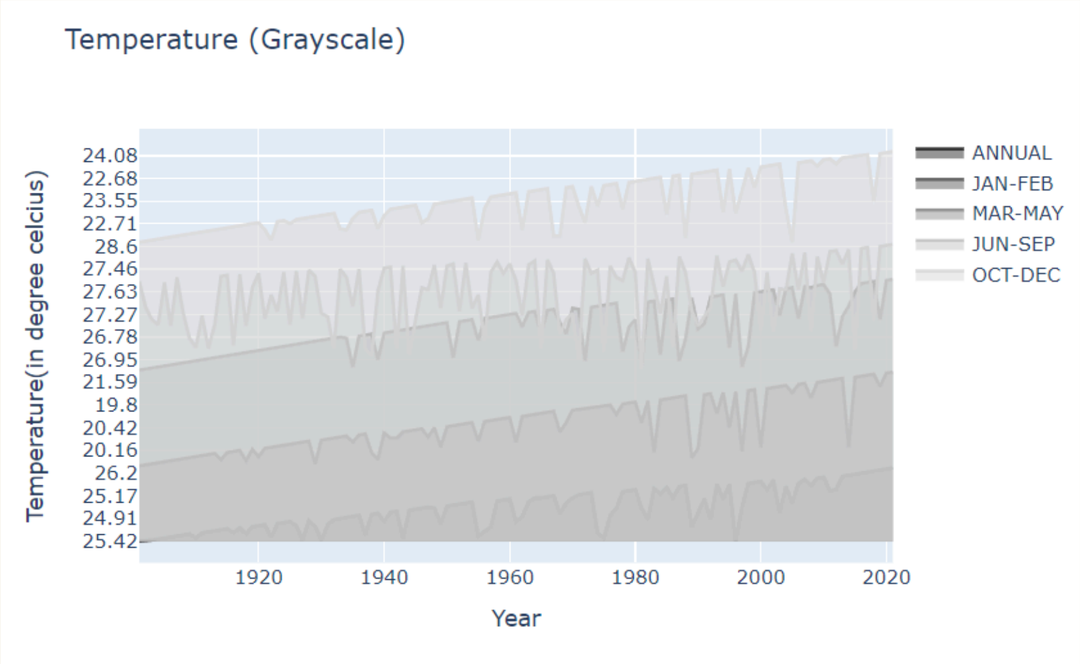


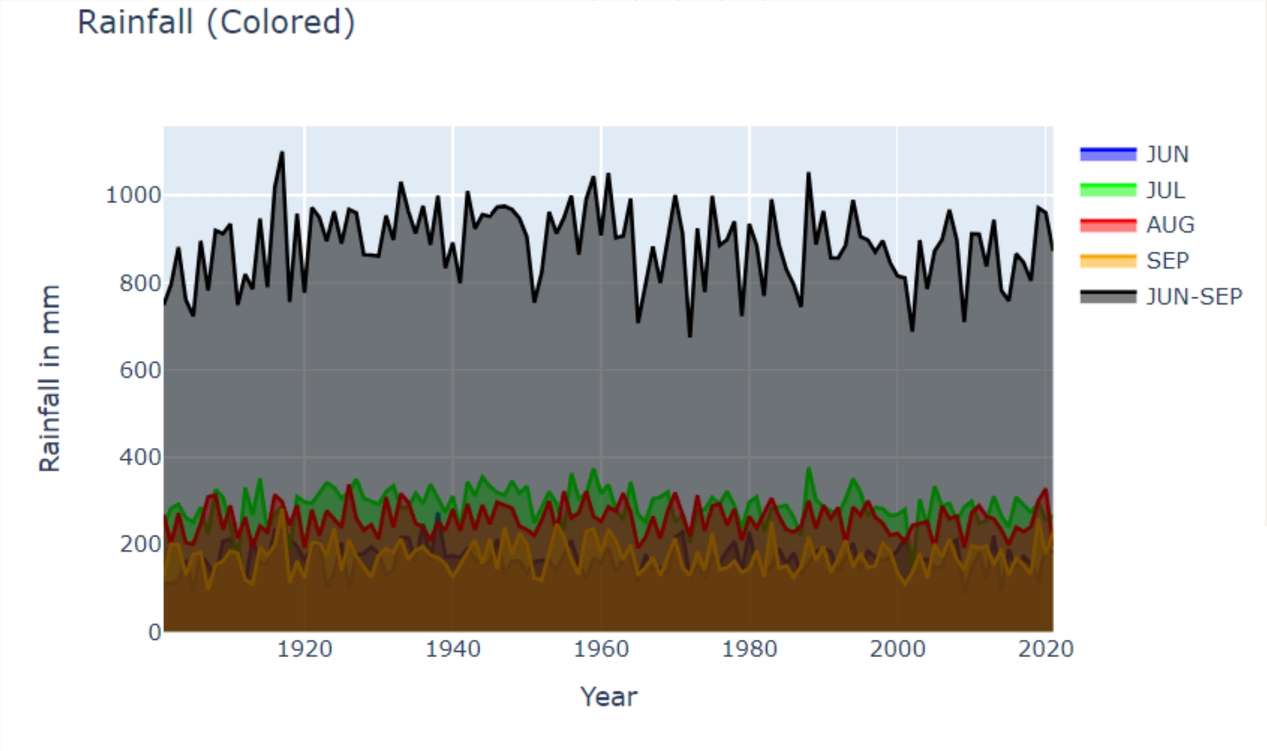

Temperature vs Years
Temperature
9.8
9.6
9.4
9.2
9
8.8
8.6
9.038917
1980
1985
1990
1996
2000
2005
2010
2015
Year

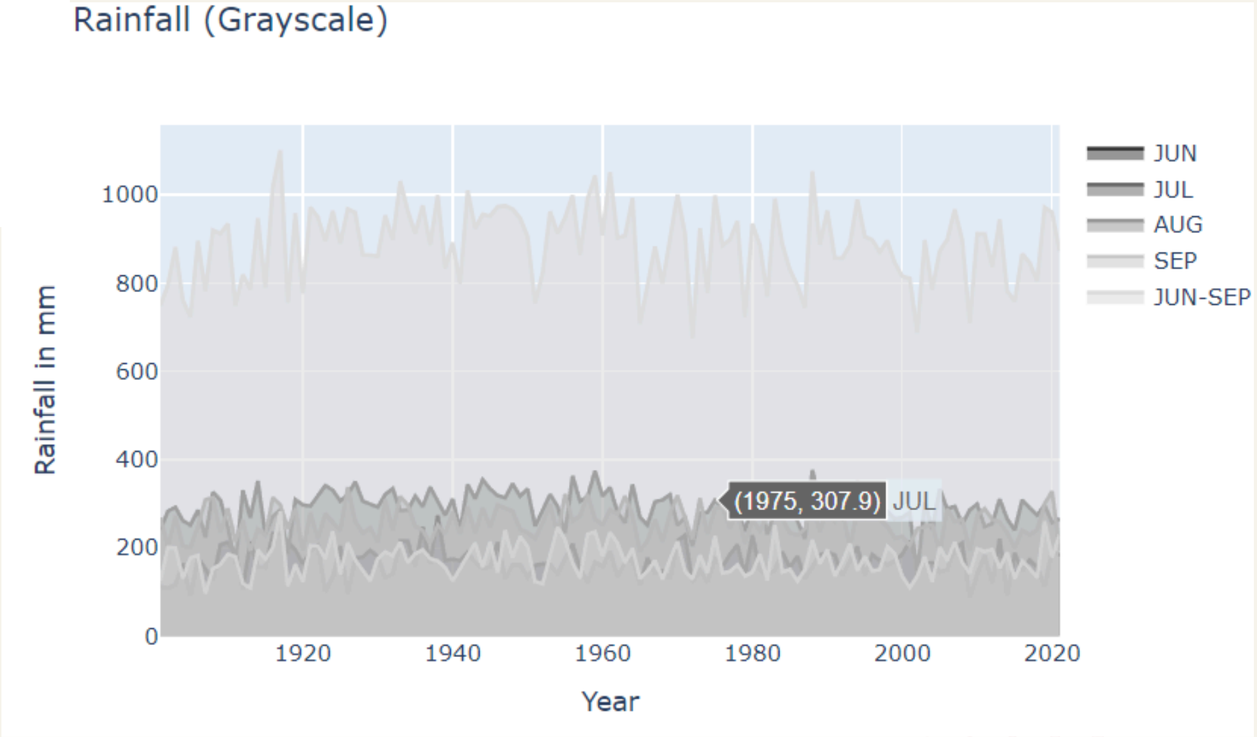
# WHAT WE HAVE

- **A visualisation of Rainfall and Temperature of India over the years from 1901-2020**




Rainfall (Colored)
Rainfall in mm
0
200
400
600
800
1000
1920
1940
1960
1980
2000
2020
Year
JUN
JUL
AUG
SEP
JUN-SEP


Rainfall (Grayscale)
Rainfall in mm
0
200
400
600
800
1000
1920
1940
1960
1980
2000
2020
Year
(1975, 307.9) JUL
JUN
JUL
AUG
SEP
JUN-SEP

# CHOICE OF VISUALISATION

- Here we have generated frames which is a snapshot of sea level at a particular year. We have combined the frames pertaining to years 1880 all the way to 2014. Our plan involved creating a visually engaging video simulation to illustrate the gradual increase in sea levels over the years using time series visualization.

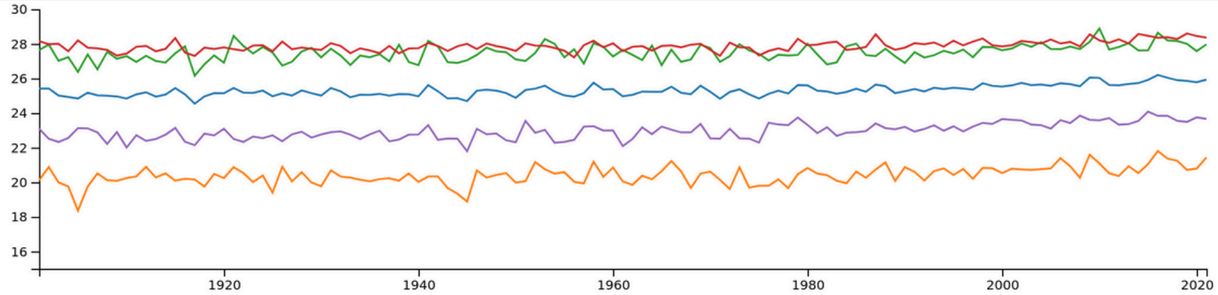
- For this line chart has been used and users are provided with a dropdown menu offering the choice of selecting any country from around the world, as well as the option to view data for the entire planet.  Line charts excel in illustrating temporal trends, making them ideal for showing how CO2 emissions have changed over time.

# CHOICE OF VISUALISATION

- Using the visualisation, one can compare the co2 emissions country wise under the same visualisation. The heatmap makes it easier to make comparisons across different countries and their rates of C02 emissions over the years which was not possible in the previous visualisation of the line-chart.
- Line charts are particularly suitable for visualizing continuous data over a continuous time interval, making them ideal for illustrating trends and patterns in time-series data. In the line chart visualization, the extent of sea ice is represented by blue lines, while the land average temperature is depicted by red lines, each on separate graphs.
- We developed area charts to represent data for each quarter of the year, with distinct color encoding for every quarter. Area charts are typically used to represent cumulative data and show trends over time while emphasizing the magnitude of change.

# PHASE-3

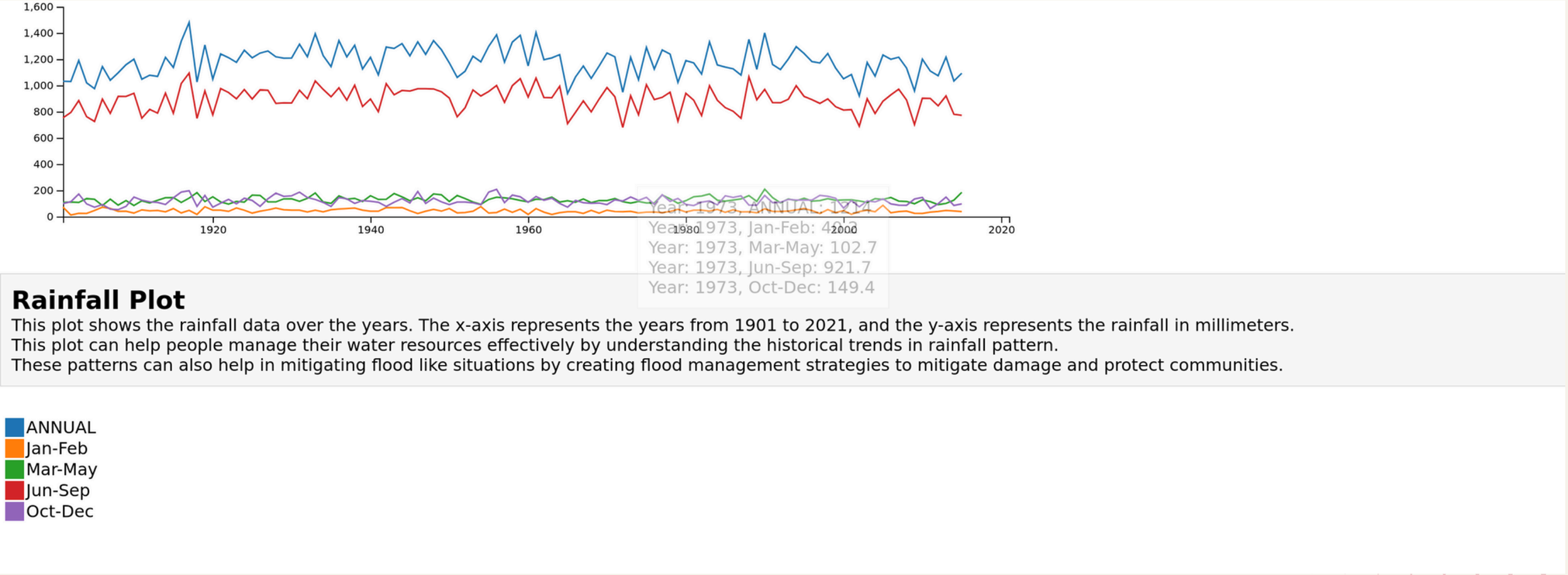
## A visualization of Rainfall and Temperature of India over the years from 1901-2020




**Temperature Plot**

This plot shows the temperature data over the years. The x-axis represents the years from 1901 to 2021, and the y-axis represents the temperature in degrees Celsius.
This plot can help people understand climate trends particularly in terms of temperature.
Analyzing temperature data over time can provide insights into long-term climate trends, helping researchers and policymakers understand patterns such as global warming or cooling

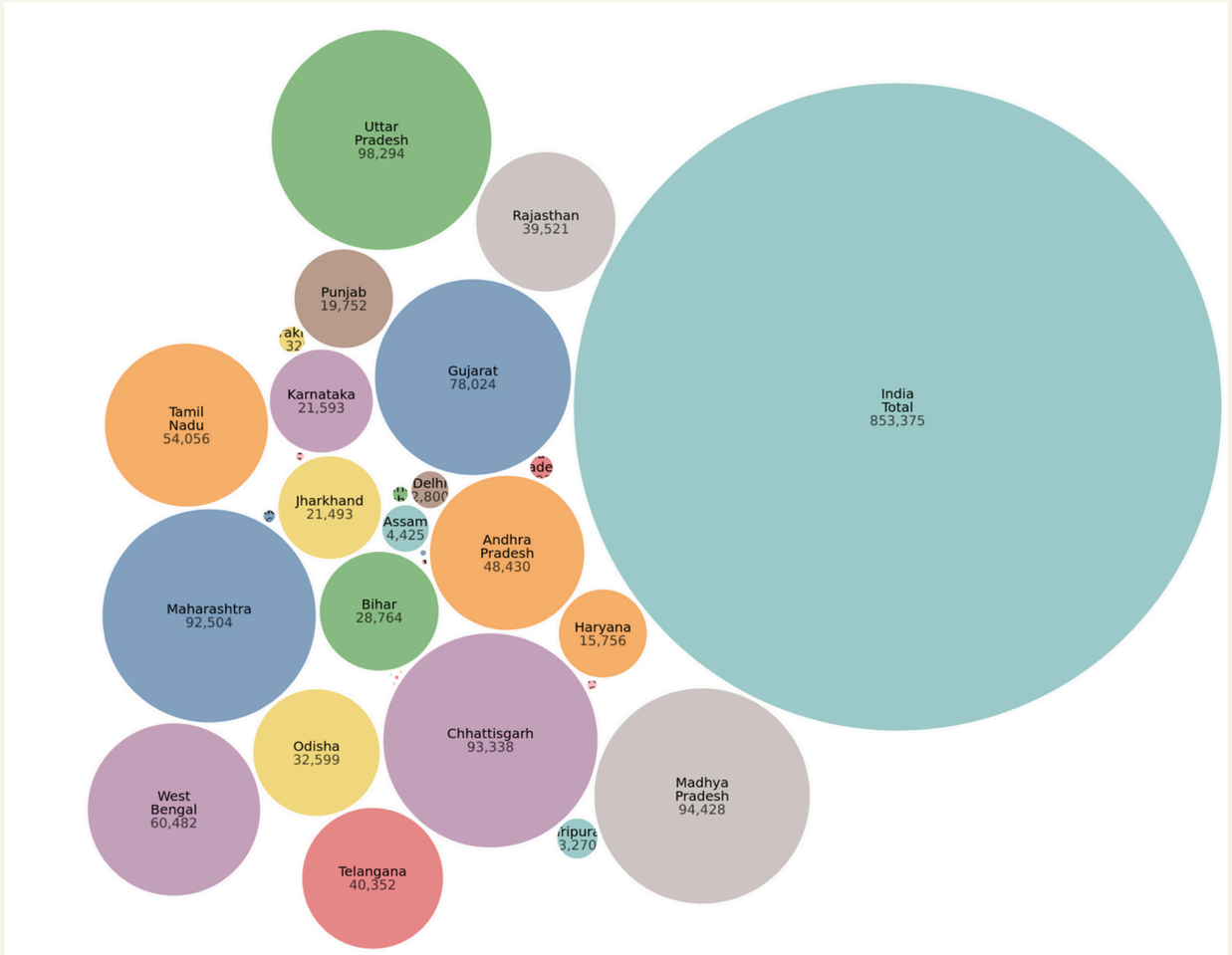
ANNUAL
JAN-FEB
MAR-MAY
JUN-SEP
OCT-DEC




**Instead of developing area charts to depict data for each quarter of the year, with distinct color encoding for every quarter, we opted for line charts. Line charts are chosen for their ability to represent trends over time with clarity and readability. Each time period is represented by a different color, ensuring visual distinction without cluttering the graph.**

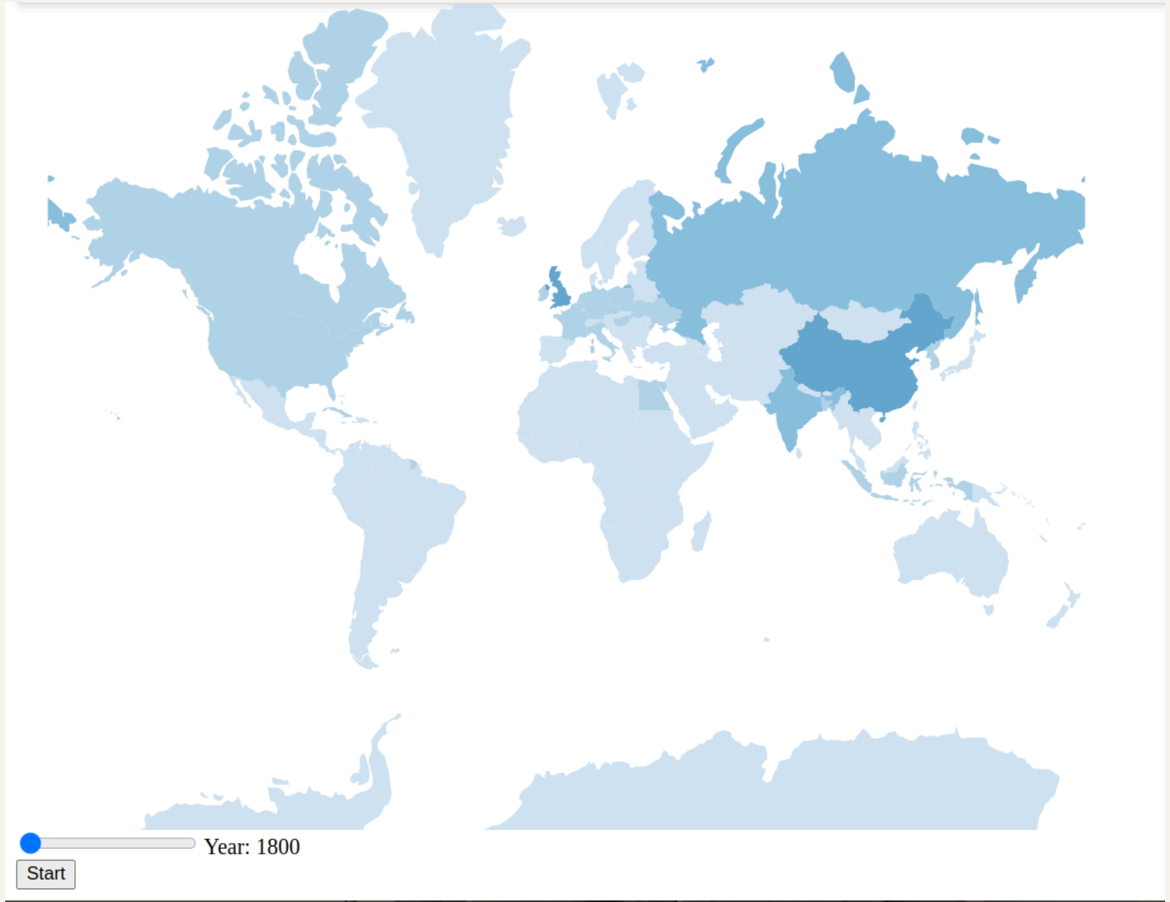
# PHASE-3

## GHG Emissions throughout the states of India



# WHAT WE HAVE

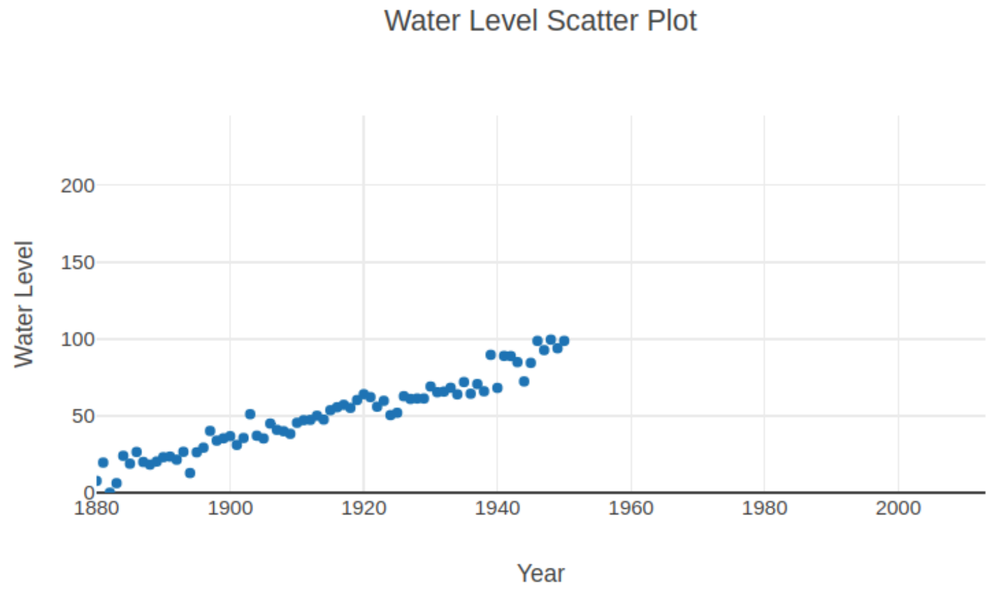
- A Heatmap Times-series of Co2 Emissions over the globe from 1800-2022 (Animated Version)



# WHAT WE HAVE

Animation of Sea rise and a scatter plot to show values

6

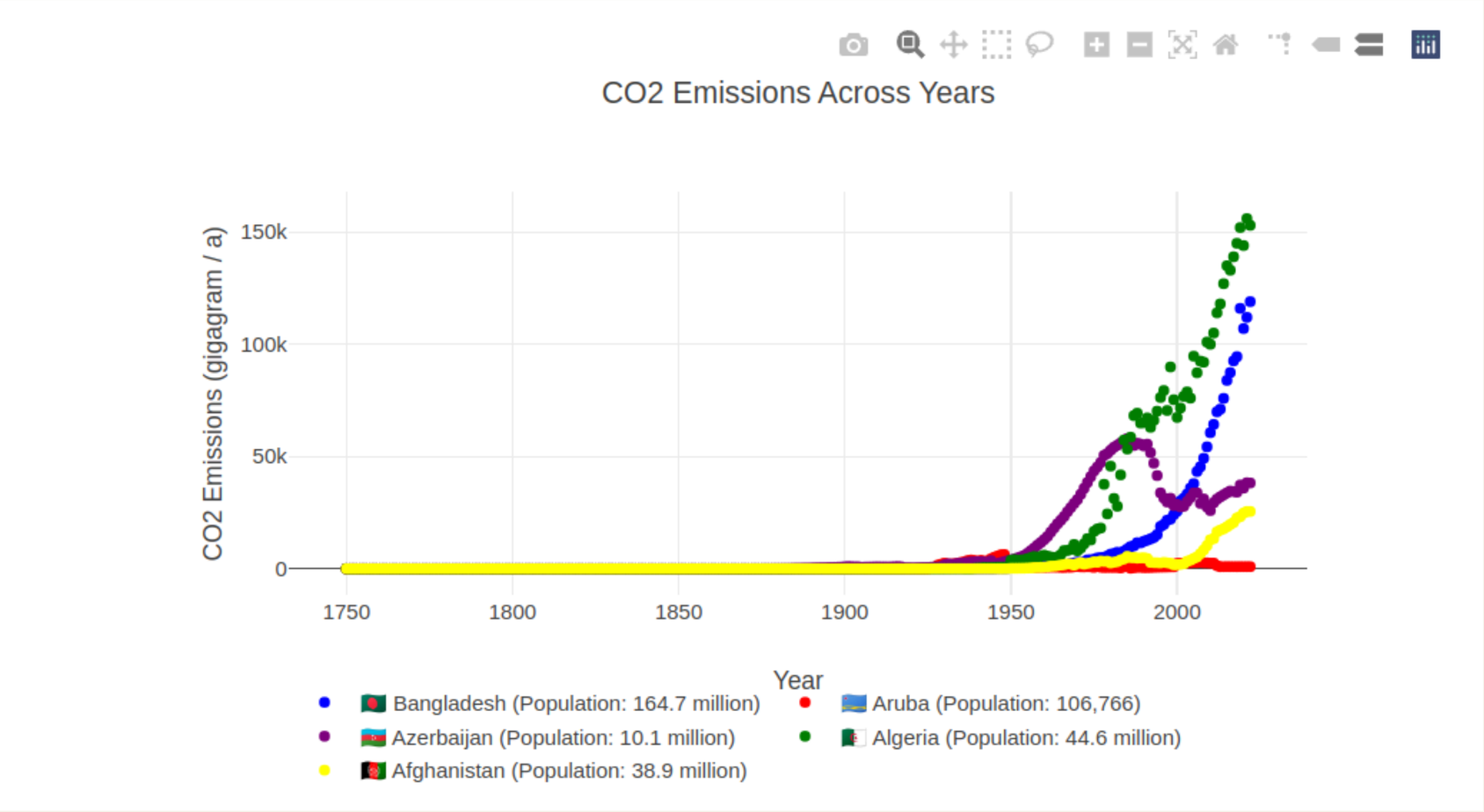



Year: 1950

Pause Toggle Color

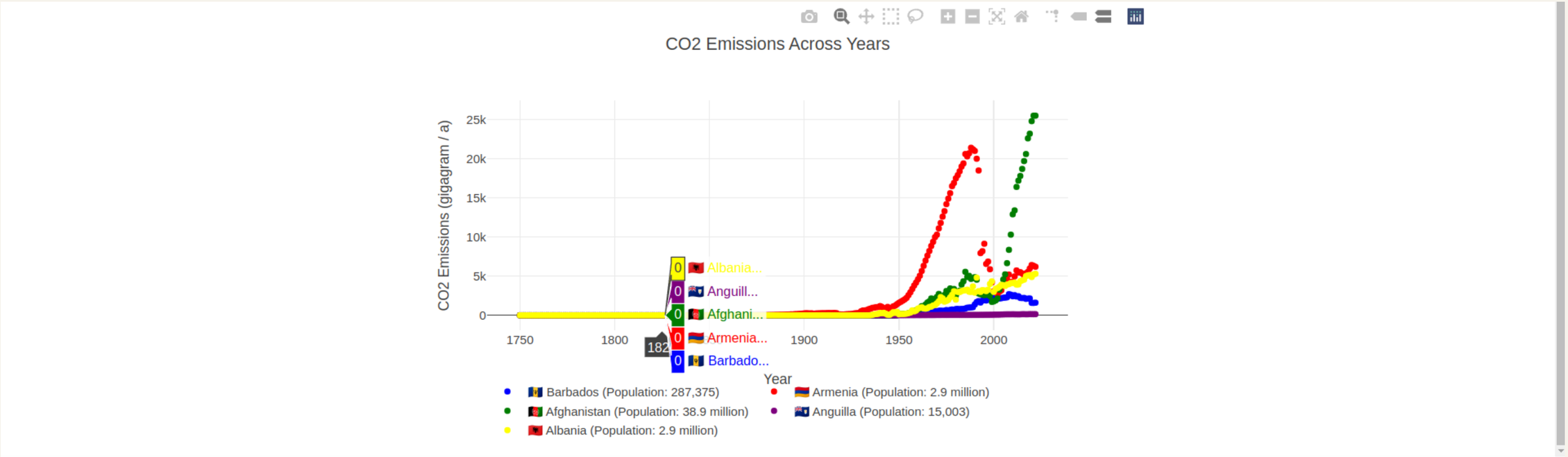
# WHAT WE HAVE

Co2 Emissions for at most 5 country over the years from 1800-2022



# WHAT WE HAVE

- **Co2 Emissions for multiple countries over the years from 1800-2022**



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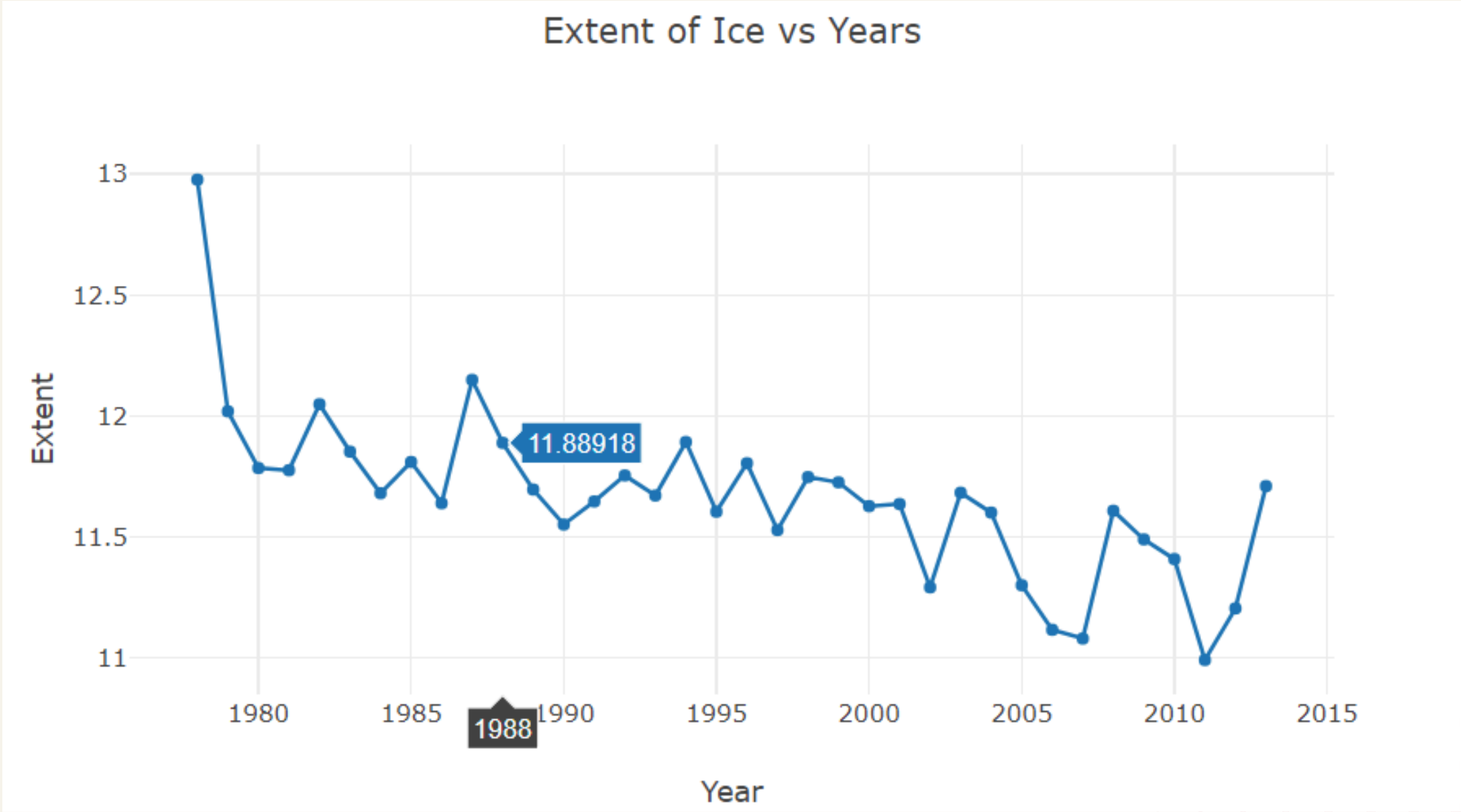
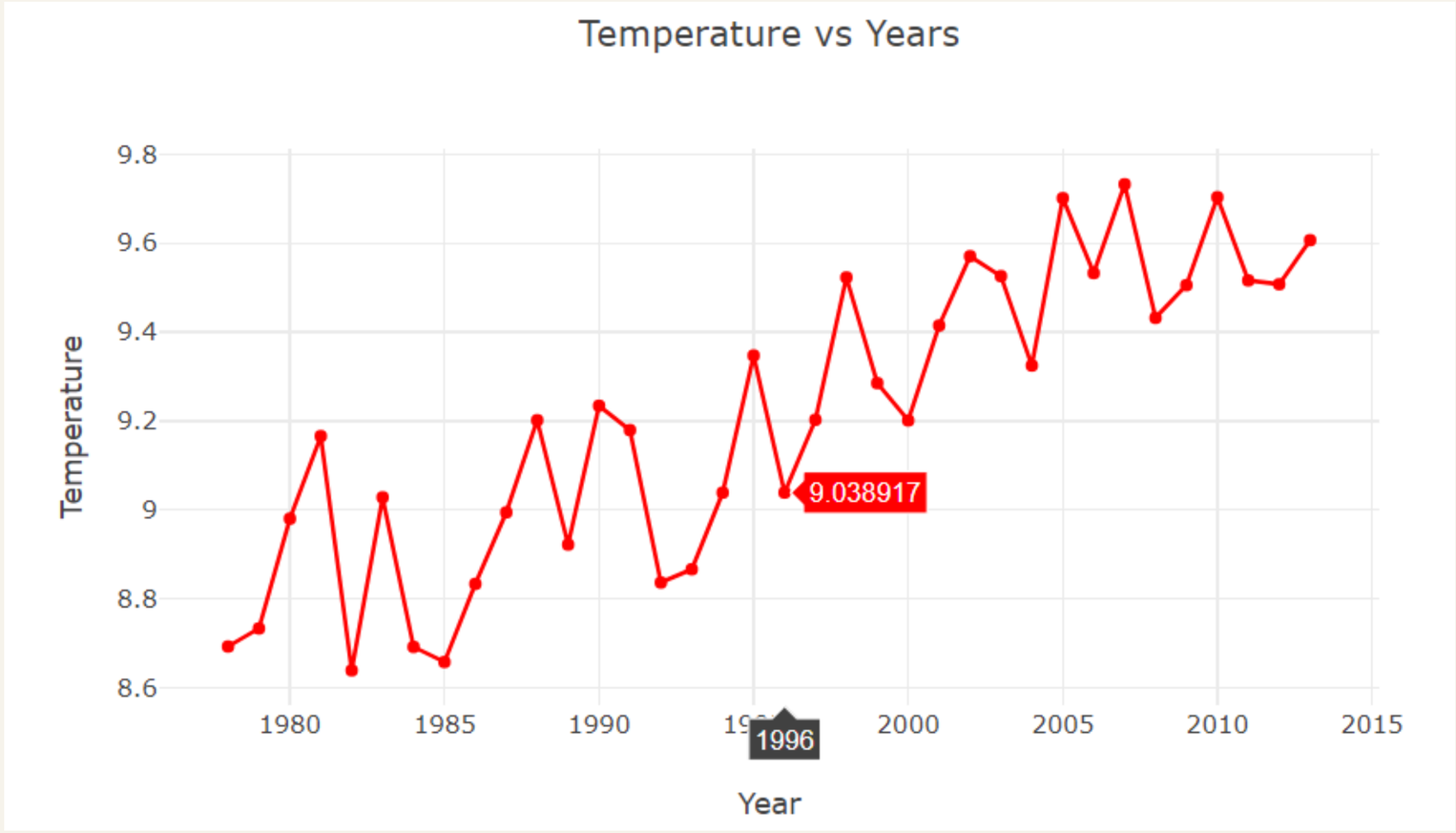
- A visualisation of Global surface temperature change comparing with amount of ice in sea from 1978-2019.




Temperature vs Years
Temperature
9.8
9.6
9.4
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9
8.8
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9.038917
1980
1985
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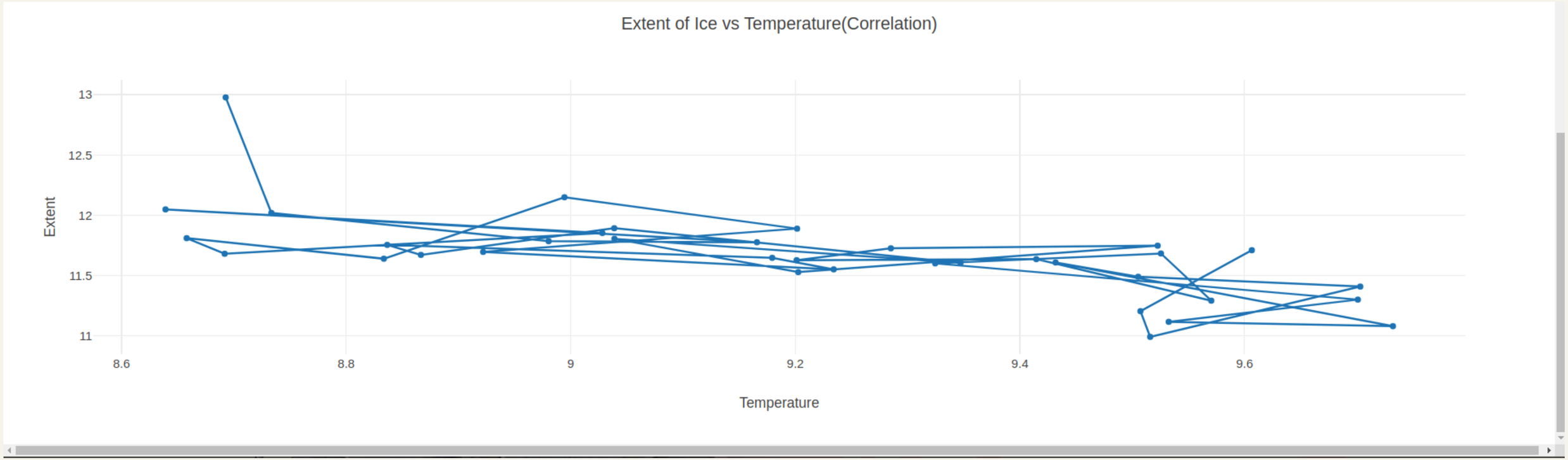
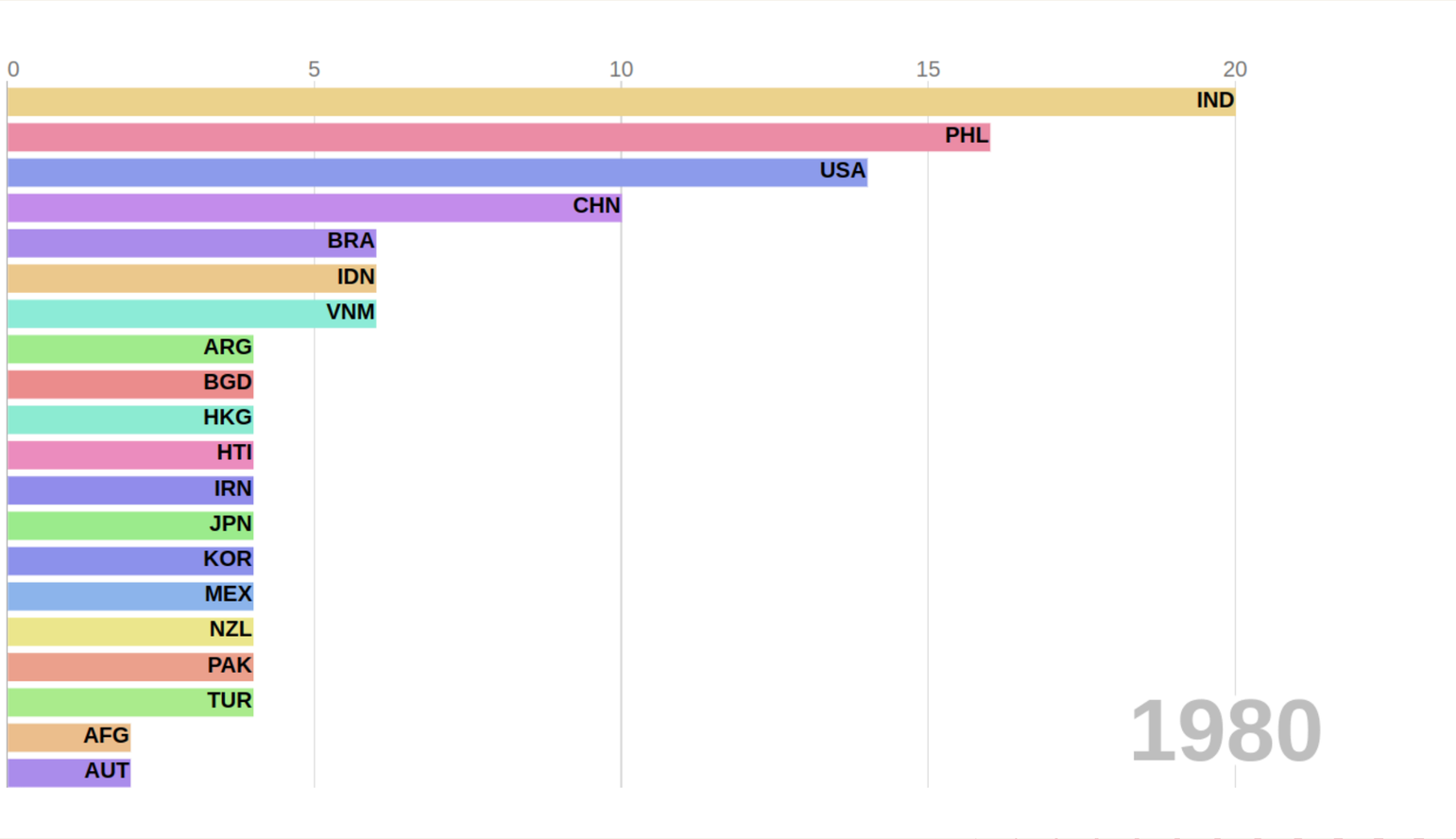
Year


Extent of Ice vs Temperature(Correlation)
Extent
13
12.5
12
11.5
11
8.6
8.8
9
9.2
9.4
9.6
Temperature

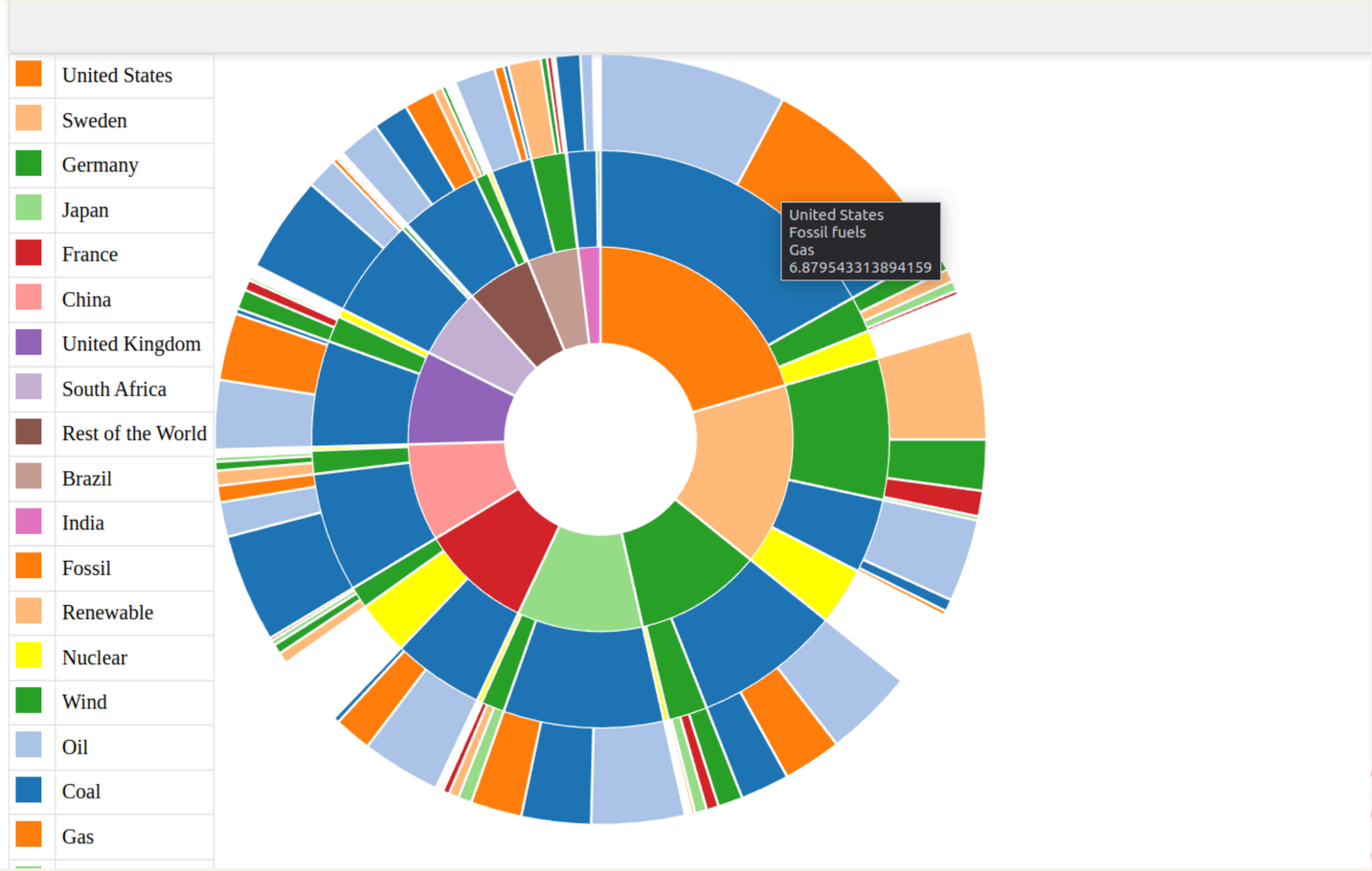
# WHAT WE HAVE

- A visualisation of the top 20 country having natural disasters due to climate change



# WHAT WE HAVE

- A visualisation of reliance of the world on  different sources of fuel.



We created a packed bubble chart to visualize greenhouse gas (GHG) emissions across different states in India, including an aggregated view for the entire country. The packed bubble chart offers a convenient way to compare emissions between states without the need to examine individual values closely. Additionally, this visualization provides a quick overview of the relative magnitude of emissions across states, facilitating easy identification of high-emission regions.

# THANK YOU