# Climate change investigation.

## Earth surface temperature in Europe regions

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# Overview

Climate change & Global warming is here


Data overview:

Sources: Berkeley Earth data page, Kaggle, Copernicus, TradingEconomics, WolrdData, Climateknowledgeportal.Worldbank

| dt | AverageTemperat... | AverageTemperat... | Country |
|---|---|---|---|
| 1Nov43 – 1Sep13 | -37.7 – 38.8 | 0.05 – 15 | 243 unique values |
| 1743-11-01 | 4.3839999999999995 | 2.294 | Åland |
| 1743-12-01 | | | Åland |
| 1744-01-01 | | | Åland |
| 1744-02-01 | | | Åland |
| 1744-03-01 | | | Åland |
| 1744-04-01 | 1.53 | 4.68 | Åland |
| 1744-05-01 | 6.702000000000001 | 1.789 | Åland |
| 1744-06-01 | 11.609000000000002 | 1.577 | Åland |

Models:

Linear regression,
ElasticNet,
Polynomial regression,
AFD/KPSS for TSA, ARIMA

Methodology:

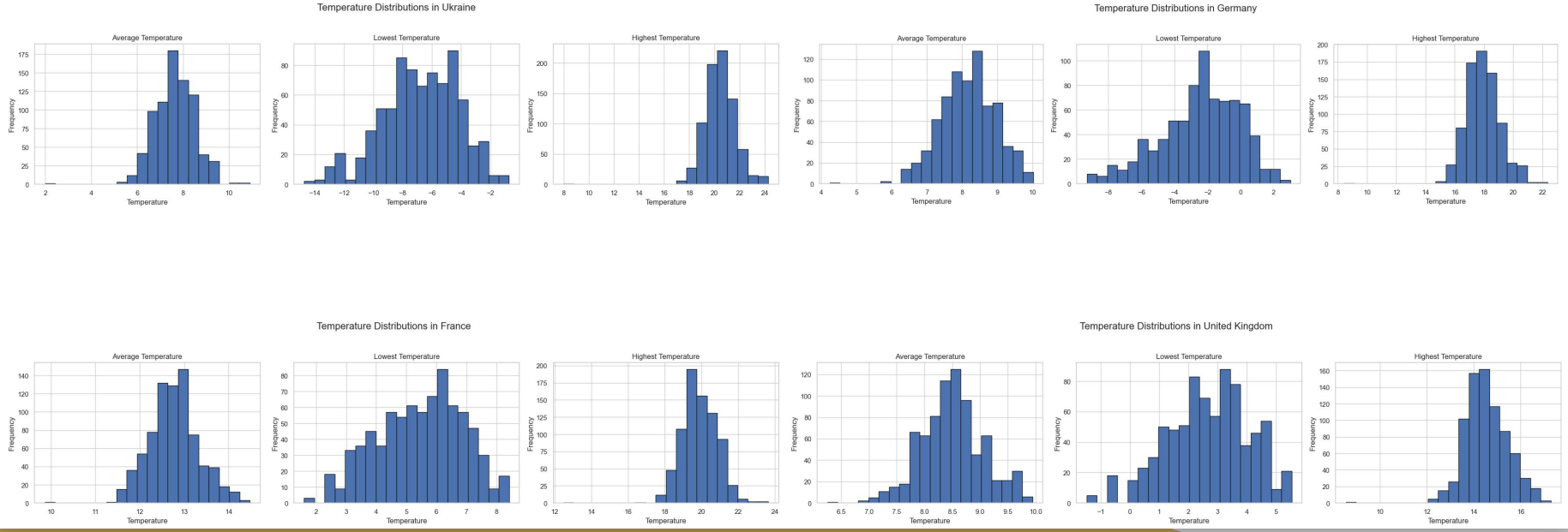
Data exploration
Cleaning
Joining
Refactoring
EDA
Modeling-Testing-Improving
Analysis
Outcome

# Data preprocessing & Distribution Analysis

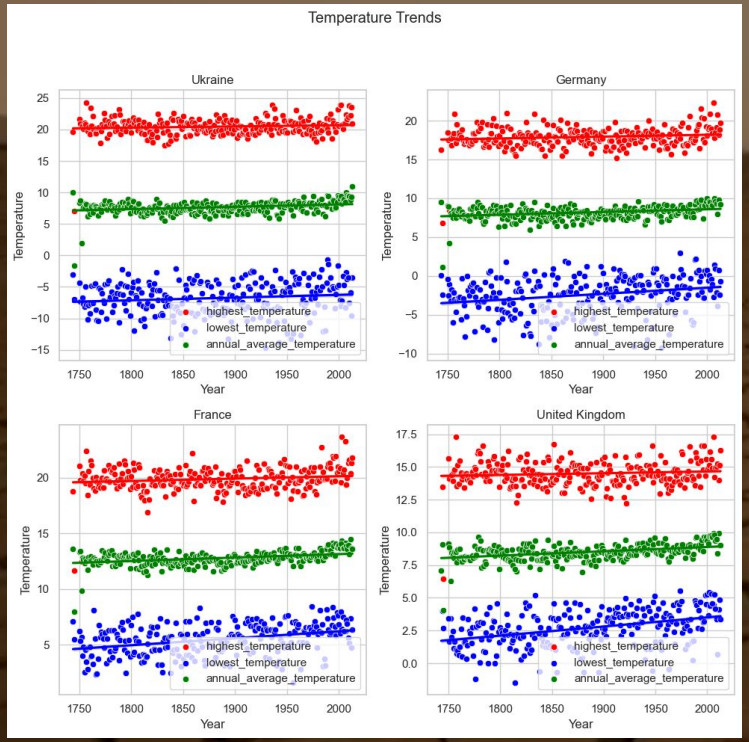
Data is joined from several sources of different content to as much as possible complement each other

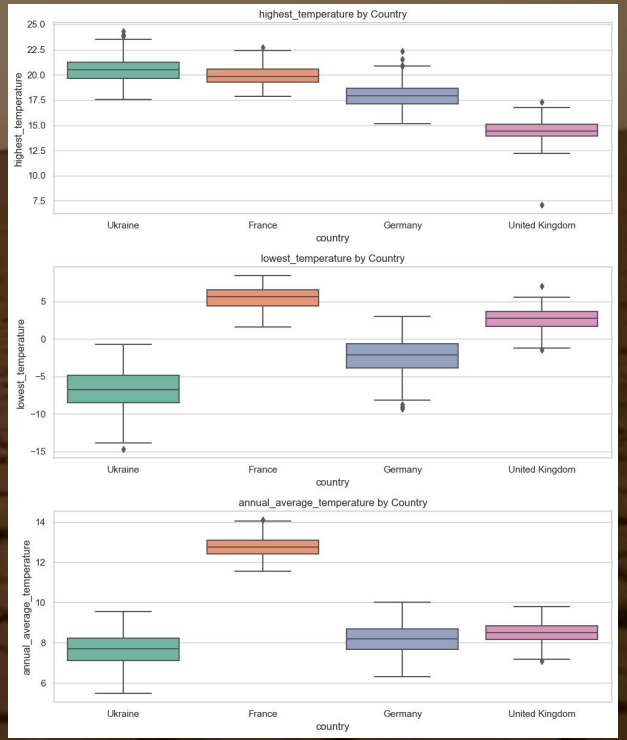
To avoid struggling with seasonal variations - data was split into Min(Winter), Max(Summer) and Mean (Annual_Average) branches. Grouped by selected countries.

Necessary cleaning .. etc

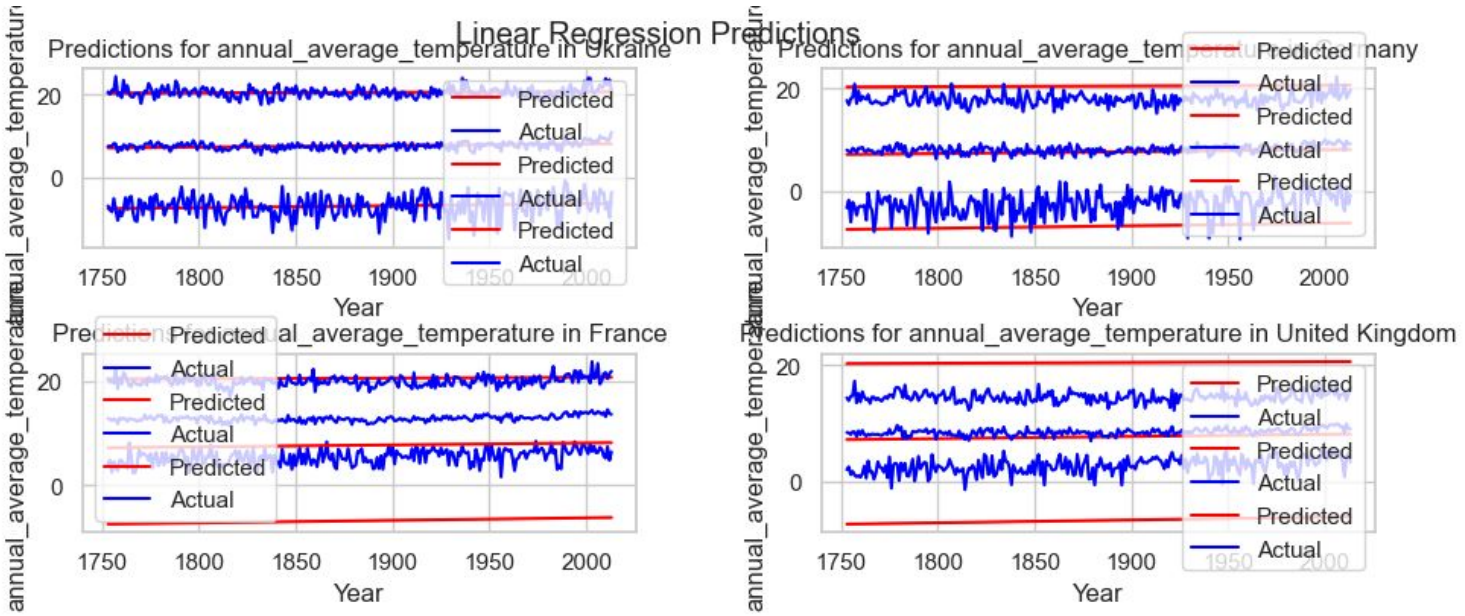


# EDA

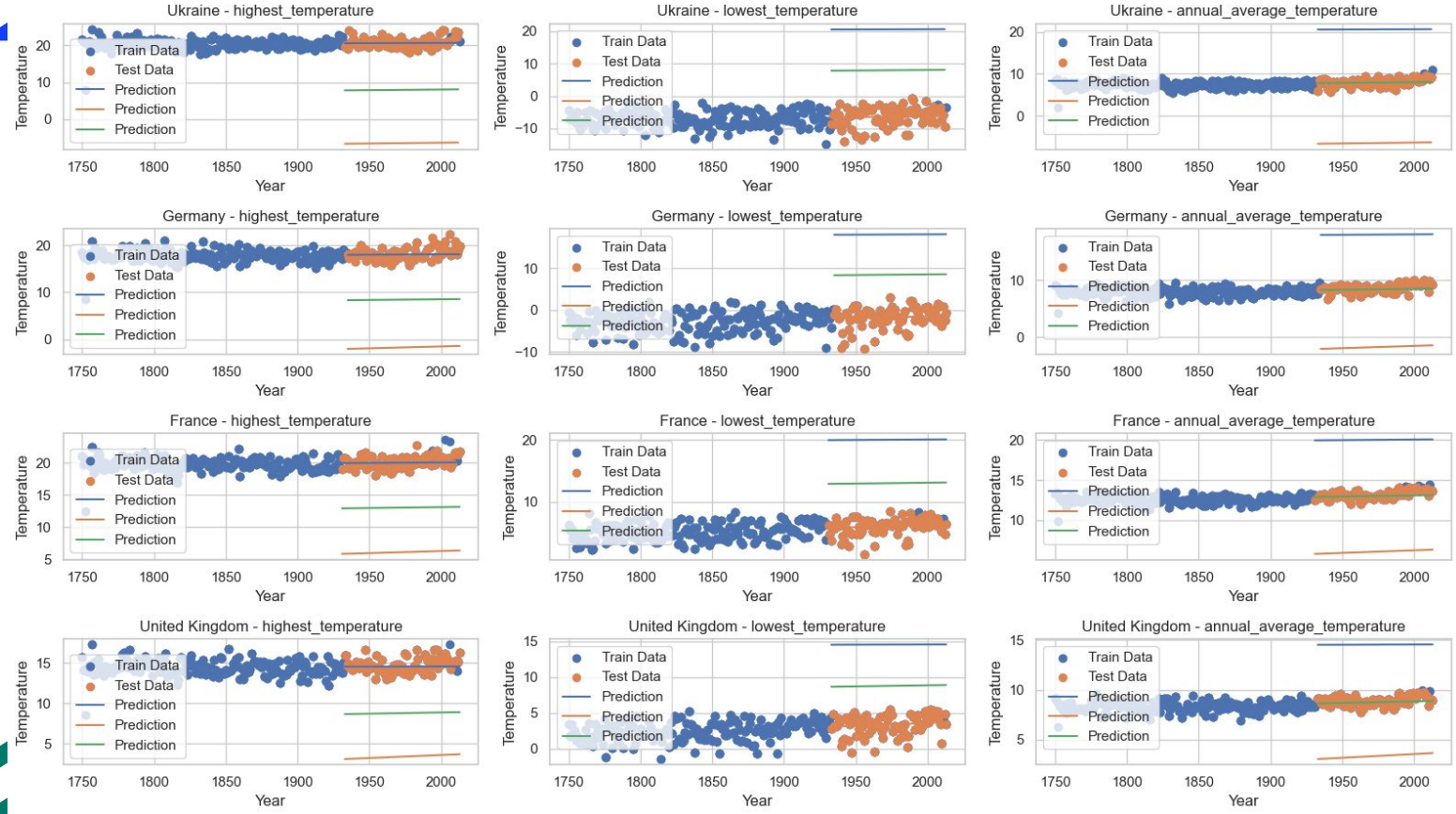

Temperature Trends
Ukraine
Germany
France
United Kingdom
Temperature
Year
highest_temperature
lowest_temperature
annual_average_temperature


highest_temperature by Country
lowest_temperature by Country
annual_average_temperature by Country
Ukraine
France
Germany
United Kingdom
country

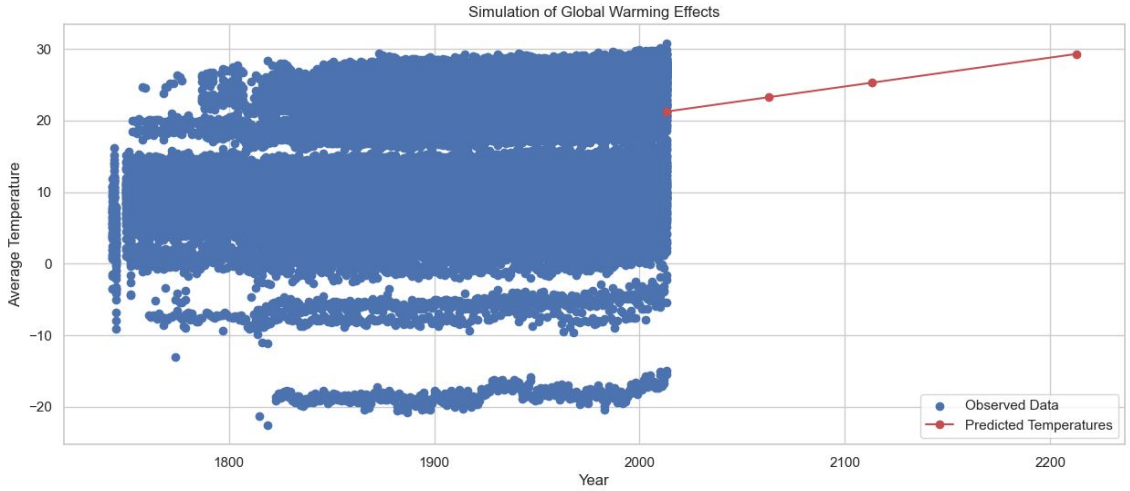
# Check for universality



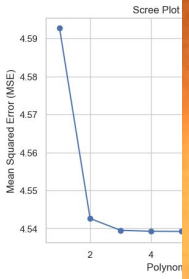
# Linear Regression Predictions

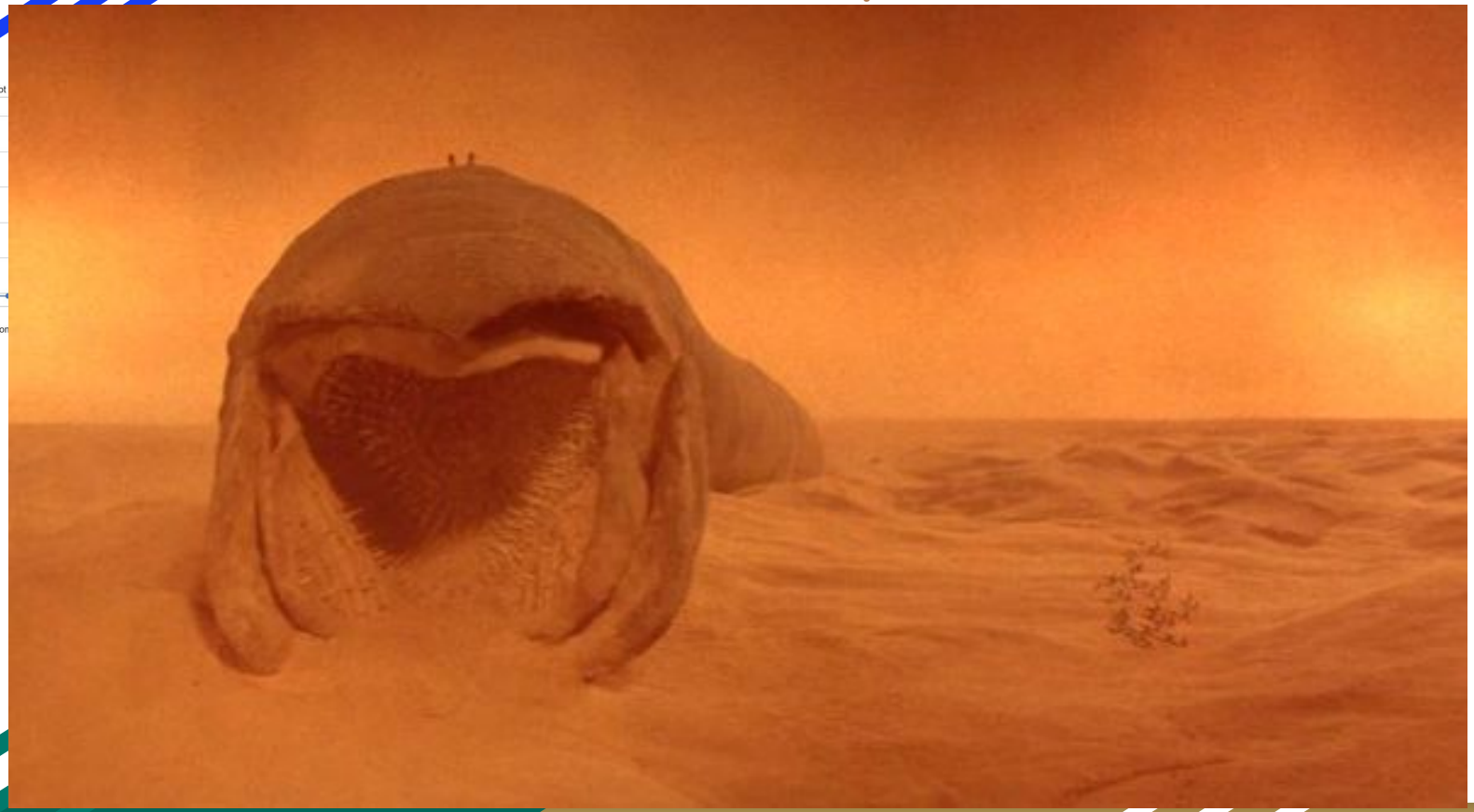


# Extrapolation to the Globe

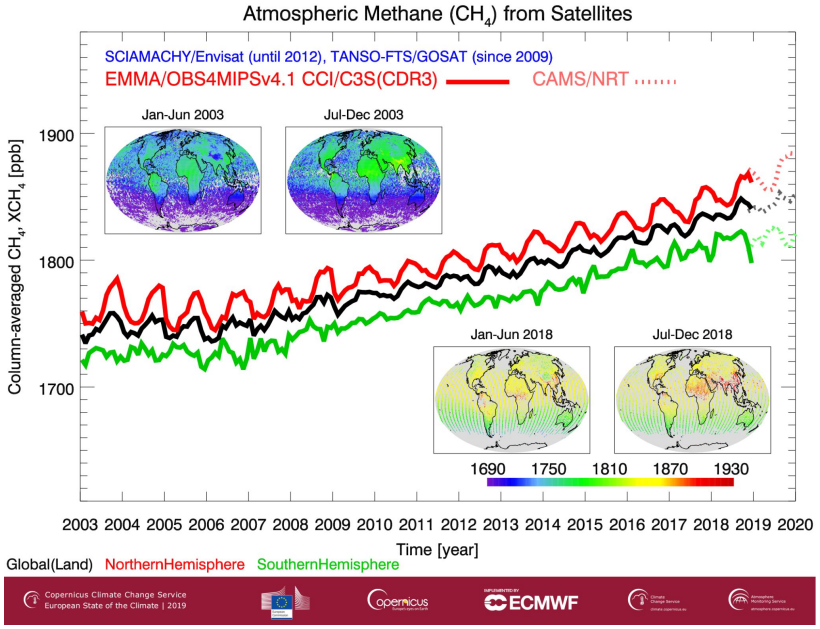


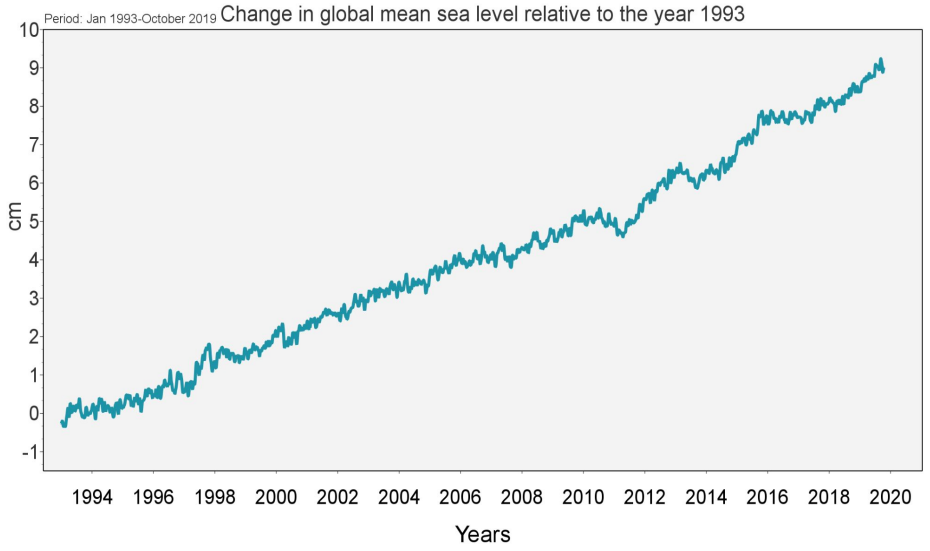
# Here comes Poly-Model



# Comparison with other parameters

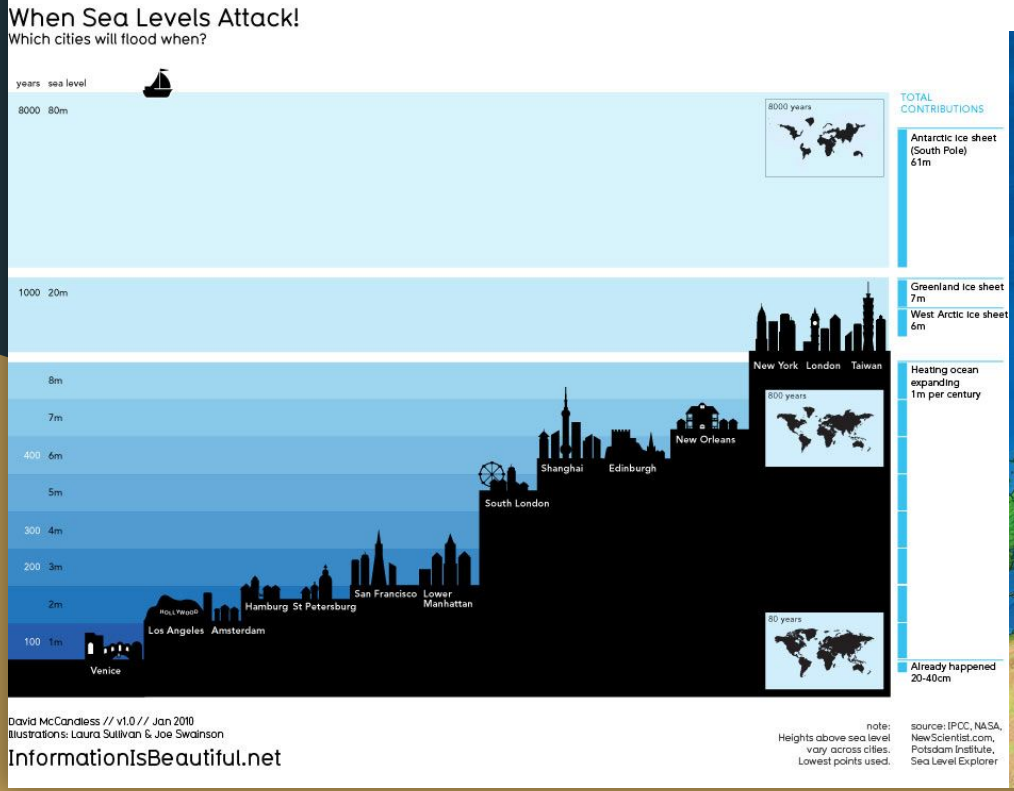


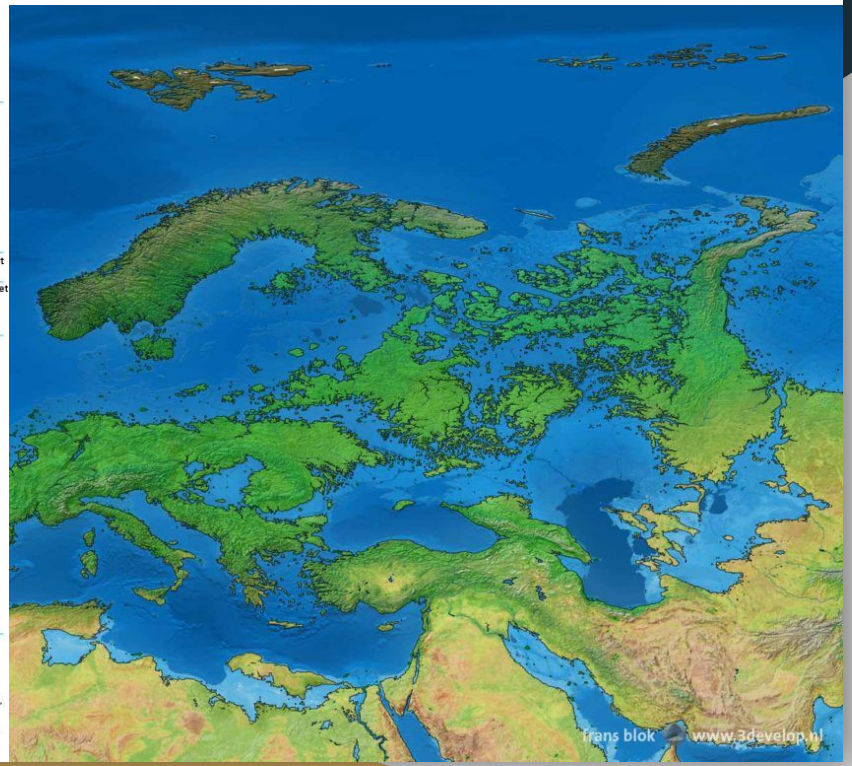





Copernicus Climate Change Service
European State of the Climate | 2019
Copernicus
ECMWF

# Expected Sea level rise - 65 m



# Outcome

**Projected Impact** The simulation foresees a perilous outcome in around 100 years or even sooner. The non-linear nature of temperature change is evident due to the complexity of Earth's systems, including ice and water surfaces affecting reflectivity, air pollution, greenhouse gas concentrations, and more. This acceleration in global temperature rise is already noticeable. The current global average temperature is approximately 15 degrees Celsius, but the model predicts a hazardous escalation. An annual temperature increase of +2°C is considered to have devastating climate effects, while reaching +27.5°C would be a planetary disaster, rendering Earth uninhabitable.

According to the prediction, we have less than 70 years left. The hope for humanity and the planet's future lies in urgent strategic actions. Unfortunately, the presence of authoritarian regimes like Russia, China, and North Korea exacerbates the global crisis, prioritizing power over environmental concerns.

**Possible Implications**

1. *Human Health*: Expect a surge in heat-related health problems and fatalities, particularly affecting vulnerable demographics like the elderly, children, and individuals with medical conditions.
2. *Ecosystem Disruption*: Drastic temperature spikes will disrupt ecosystems, leading to species extinction, reduced biodiversity, and disruptions in natural food chains.
3. *Agriculture and Food Security*: Extreme heat will harm crop yields, triggering food shortages and price spikes, exacerbating hunger and poverty in various regions.
4. *Water Resources*: Higher temperatures will intensify evaporation, causing droughts and reducing water availability, further straining resources for human consumption, agriculture, and industry.
5. *Sea Level Rise*: Global warming contributes to the melting of polar ice caps and glaciers, resulting in rising sea levels that threaten coastal areas and displace millions in low-lying regions.
6. *Extreme Weather Events*: Increased atmospheric heat will fuel extreme weather events such as hurricanes and storms, causing widespread destruction and loss of life.
7. *Disruption of Climate Patterns*: Drastic temperature shifts may lead to unpredictable changes in climate patterns, potentially disrupting monsoons, weather cycles, and regional climates, with far-reaching consequences.


Thank you for your attention