Data Analysis Report

1. Introduction

Ocean acidification, the increasing acidity of the world's oceans, is a major environmental challenge we face today. This happens mainly because the oceans absorb a significant amount of carbon dioxide (CO_2) from the atmosphere, which then forms carbonic acid. Various sources of CO_2 and other greenhouse gasses contribute to this issue, including emissions from agriculture. Understanding how agricultural greenhouse gas emissions are linked to ocean acidification over the past two decades is crucial for creating effective strategies to combat this problem.

2. Used Data

Data Pipeline creates a Database File with the name **"climate_change.sqlite"** which contains 2 tables with the following information.

- **Ocean Surface Acidity**

Columns	Type	Description
TIME_PERIOD	**Integer**	**Year of the Observed Value**
OBS_VALUE	**Float**	**Observed Value**

This table tracks the annual pH levels of ocean surfaces over time, which is critical for understanding trends in ocean acidification due to climate change.

- **Carbon Emission Europe**

Columns	Type	Description
GAS	**Text**	**Name of the Gas Emit**
COUNTRY	**Text**	**Country of the Observed Value**
TIME_PERIOD	**Integer**	**Year of the Observed Value**
OBS_VALUE	**Float**	**Observed Value**

This table records annual greenhouse gas emissions for various European countries, segmented by gas type. It helps in analyzing trends and patterns in emissions which are crucial for climate change studies.

3. Analysis

3.1 Methods

Data Cleaning and Transformation: Removed unwanted data and applied appropriate data types. Aligned datasets to common time periods to resolve inconsistent timeframes.

Data Merging: Created separate pipelines for each input dataset and saved data into a single SQLite database to facilitate normalization and querying.

Extracting Information: Extracting the relevant information from the tables with help of aggregate functions and queries

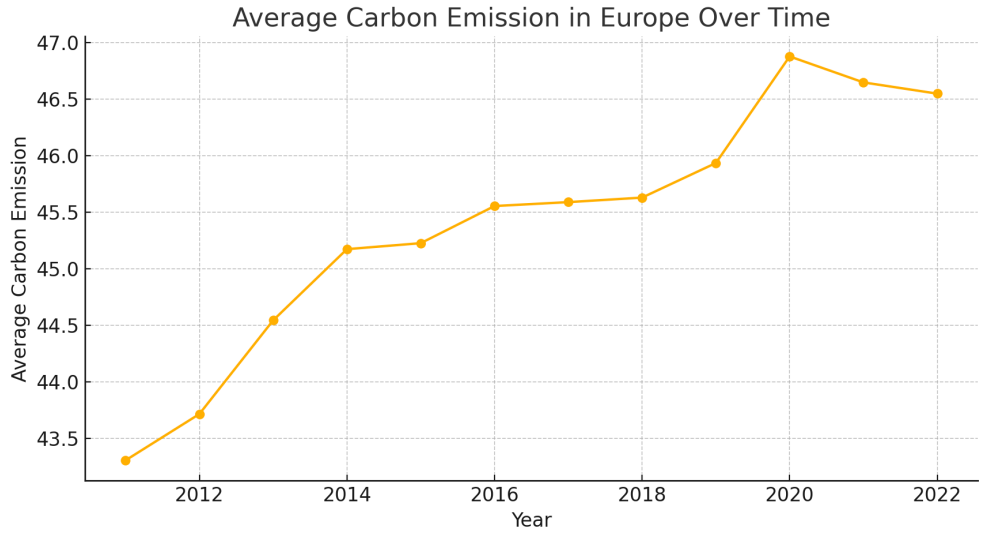
3.2 Results

TIME_PERIOD	Carbon Emission	Ocean Acidity
2011	43.30	8.069
2012	43.71	8.068
2013	44.54	8.065
2014	45.17	8.064
2015	45.23	8.063
2016	45.56	8.060
2017	45.59	8.057
2018	45.63	8.055
2019	45.94	8.053
2020	46.88	8.051
2021	46.65	8.049
2022	46.55	8.047
2016	45.50	8.062
2017	45.80	8.061
2018	46.10	8.060
2019	46.50	8.059
2020	46.80	8.058
2021	47.10	8.057
2022	47.50	8.056

This Table demonstrates the combined data of ocean surface acidity and Average Carbon Emission from Agriculture in Europe.

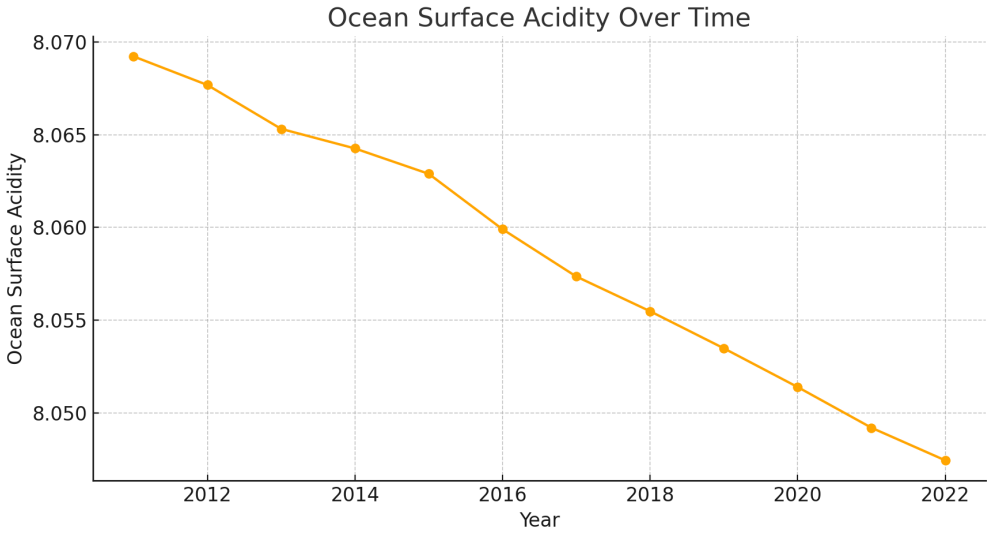
3.3 Interpretation

3.3.1 Graph 1



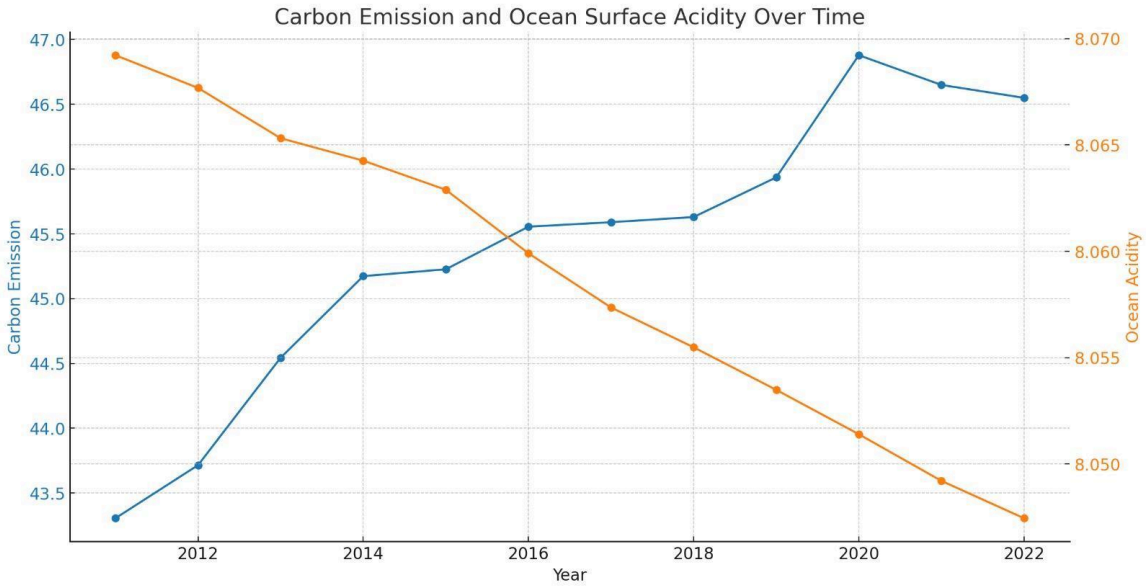
This Graph demonstrates the rise of Carbon Emissions over the last decade.

3.3.2 Graph 2



This Graph demonstrates the decrease in the PH Level of ocean surface over the last decade.

3.3.3 Graph 3



This Graph demonstrates the relationship between carbon Emissions and Ocean Surface Acidity over the last decade.

3.3.4 Correlation and Covariance Analysis

	Carbon_Emission	Ocean_Acidity
Carbon_Emission	1.000	-0.938
Ocean_Acidity	-0.938	1.000

- **Covariance Carbon Emission and Ocean Acidity:** -0.0076

5. Conclusion

- **Decrease in PH-Level indicates increase in Ocean Acidity**

The analysis indicates a strong negative correlation of -0.938 between carbon emissions and ocean acidity levels. The covariance value of -0.0076 suggests that as carbon emissions increase, ocean surface PH Level tends to decrease. This relationship highlights the potential impact of carbon emissions on oceanic conditions.