1 Introduction

The impact of climate change on agriculture has become a critical area of study as the global climate continues to undergo significant transformations. Historically, agriculture has been a vital component of human civilization, providing sustenance and economic stability. However, the advent of climate change, characterized by rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events, poses unprecedented challenges to agricultural productivity.

This report aims to address the question: ***How will projected climate changes impact agricultural yields across different regions globally?*** By examining various climate models and agricultural projections, this study seeks to elucidate the potential consequences of climate change on crop yields, regional agricultural productivity, and food security.

2 Data used

2.1 Data Source 1

Metadata URL: Crop irrigated data set Meta data
Data URL: Crop irrigated data set
Description: This dataset provides statistics about corn production held across the country of USA, which was not irrigated in Bushels per acre from 2005–2022.

2.2 Data Source 2

Metadata URL: Crop not irrigated data set Meta data
Data URL: Crop not irrigated data set
Description: This dataset provides statistics about corn production held across the country of USA, which was irrigated in Bushels per acre, 2005–2022.

2.3 Data Source 3

Metadata URL: Climate change Meta data
Data URL: Climate change data set
Description: This Data set gives a comprehensive report about climate change In the USA between the years 2004 - 2022.

When analyzing the data parameters like CO2 emissions, precipitation rate, temperature change, corn yielded and not yielded, and at last comparison between the change in yield and temperature change is done in order to understand the trend throughout the years.
Parameters like temperature are measured in Celsius, Co2 emission in ppm, and precipitation in millimeters. The crop yield is measured in bushel units.
In the data pipeline, 2 data sets namely Crop irrigated and crop not irrigated are processed and any empty value rows have been removed with importance to the column value i.e. the total number of crops irrigated and not irrigated.
For the data set for climate change there is data for countries all around the globe, and as the question in this analysis revolves around the USA, so data about other countries have been removed and processed accordingly.
All the above data sources are under the open data license; only the data set Kaggle dataSet should cite the open license.

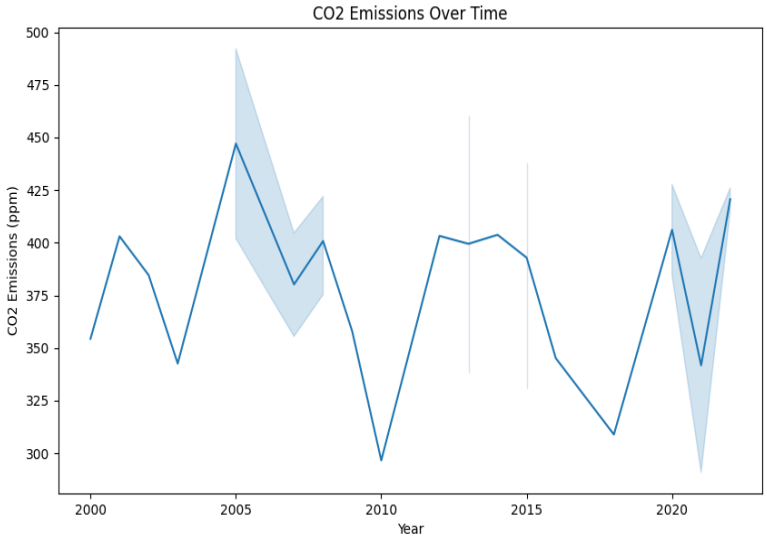
3 Analysis

The analysis is done on the following factors:

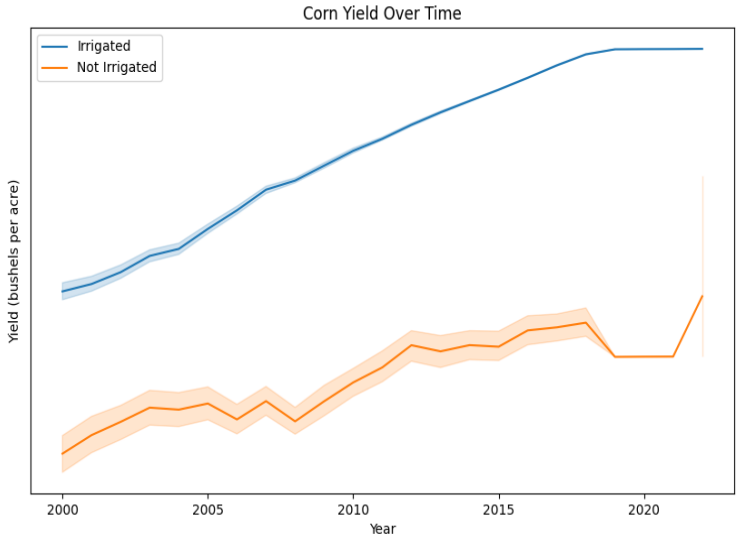
- The Co2 emission over time
- Corn yield over time, the number of crops irrigated and not irrigated.
- Precipitation changes with time
- Sea level rise over time.

- Temperature changes over time.
- Lastely comparing the crop yield with temperature change.

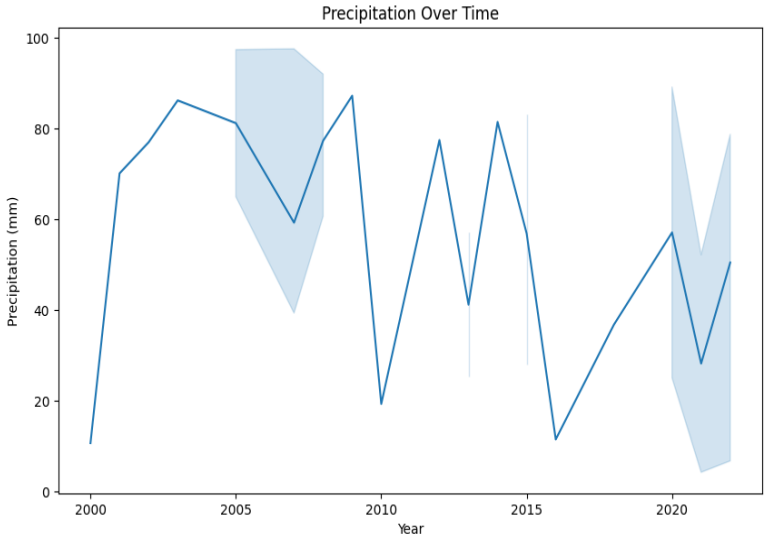
The first 5 factors are used to understand the basic trend of environmental factors which influence the crop yield over the time period between 2004-2022. The final factor is crucial in addressing the central question of this report. This analysis tells us whether there was a change in the crop yield with the change in temperature in the country of the United States.
All the analysis is done with the help of Seaborn and Numpy. Only line graphs are used to analyze the trend or change in the factor over time.



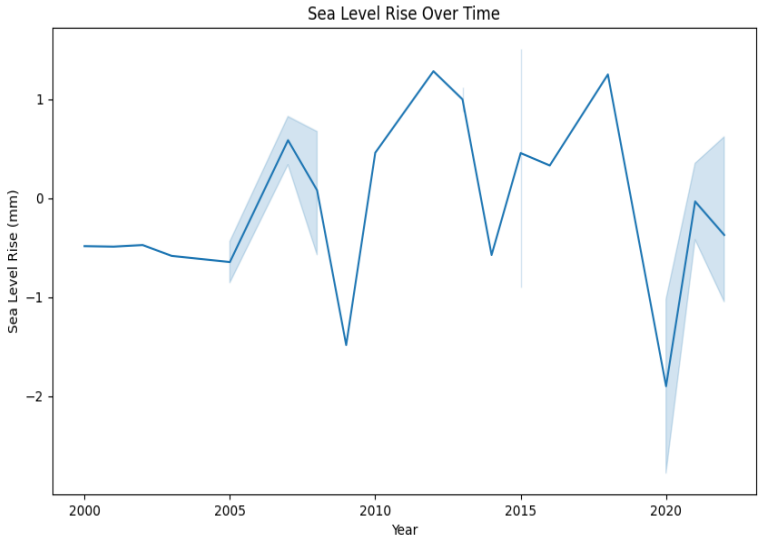
The first analysis is done to find out the trend in the Co2 emission over time mainly between the years 2004-2022, and it can be seen in the graph that the Co2 emission has started to increase in the last decade.



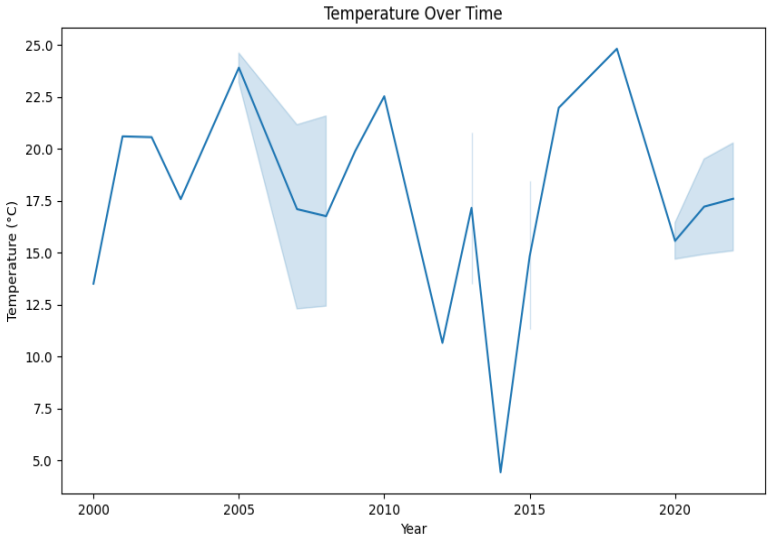
The Graph shows that starting from the year 2000 till the year 2018 the crops irrigated and not irrigated have remained the same, but the crops not irrigated yield have increased exponentially for the past few years.



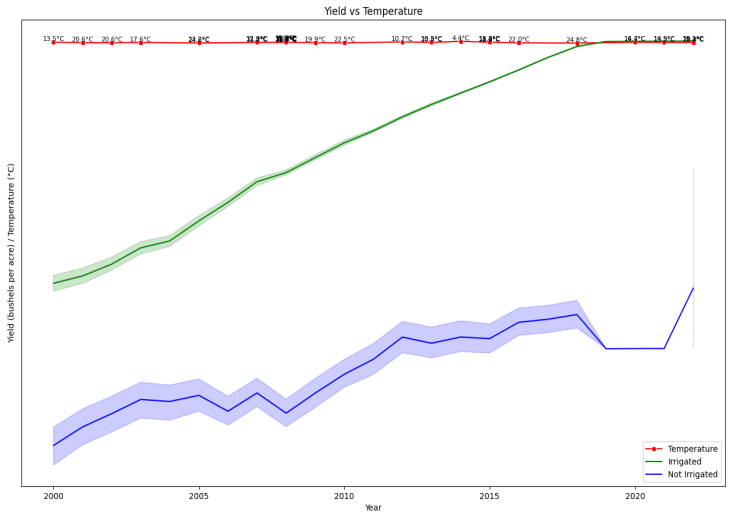
In this graph, it is very clearly evident that the precipitation over the years has reduced a lot as compared to the early 2000s, because of major climate changes in the past years.



From the above graph, it can be seen that the sea level has also risen over time.



From the above, we cannot clearly conclude, about the trend in the temperature change, but for the past few years, it is clearly evident that the temperature has started to increase.



The last graph that is analyzed is the comparison of crop yield and temperature change, we cannot see a clear trend, that climate change has affected the crop yield, there can be many factors that can cause it, with the advancement of agricultural techniques and improvement of availability of water and other help, did not affect the crop yield.

4 Conclusions

Now to conclude the report and answer the question ***How will projected climate changes impact agricultural yields across different regions globally?***, we still can't answer this question properly because of insufficient data available for climate change on countries, the data which is available is too computationally inefficient to analyze. If there is more consolidated data available, then the above question could be answered with higher accuracy and precision.

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