CMSC 6950 Final Project - pymagicc

Prudhvi Kommareddi

June 2021

1 Introduction

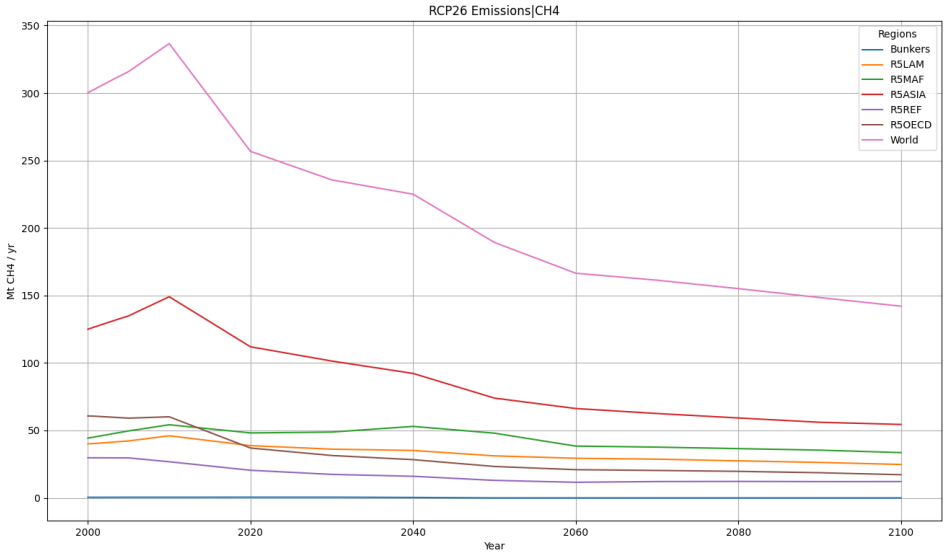
Pymagicc[1] is a Python interface for the Fortran-based reduced-complexity climate carbon cycle model MAGICC (Meinshausen, Raper, and Wigley 2011). Aiming at broadening the user base of MAGICC1, Pymagicc provides a wrapper around the MAGICC binary, which runs on Windows and has been published under a Creative Commons Attribution. NonCommercial-ShareAlike 3.0 Unported License. Pymagicc itself is licensed under the GNU Affero General Public License v3.0.

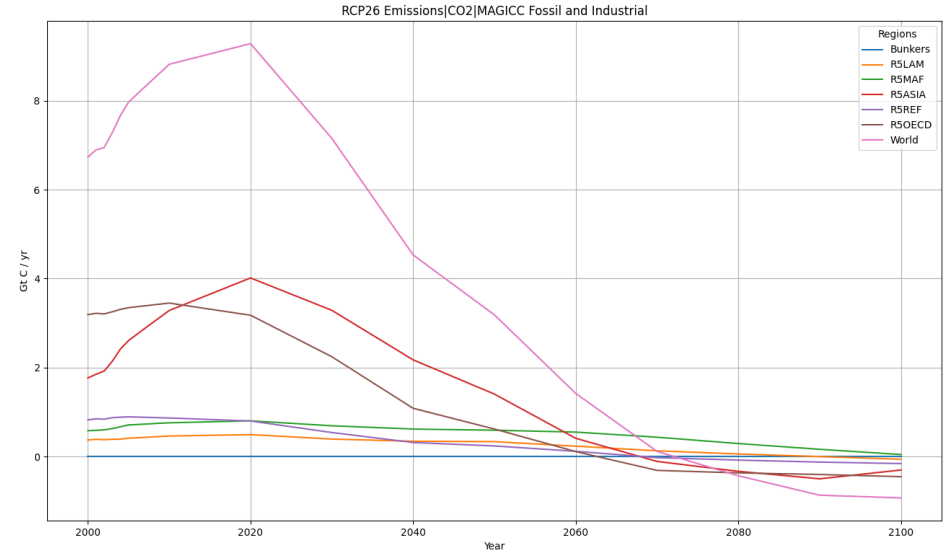
2 Tasks

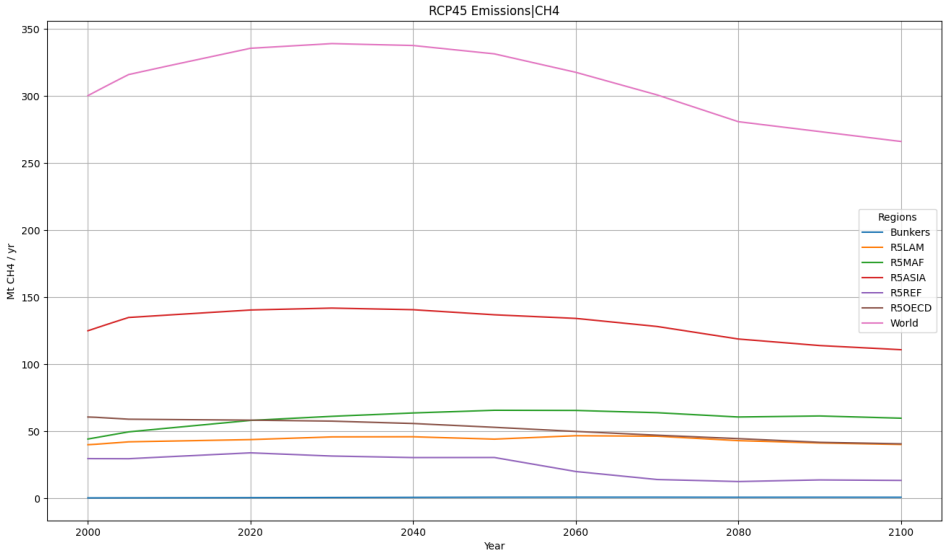
This project utilises the Pymagicc module to achieve the below computational tasks and visualizations.

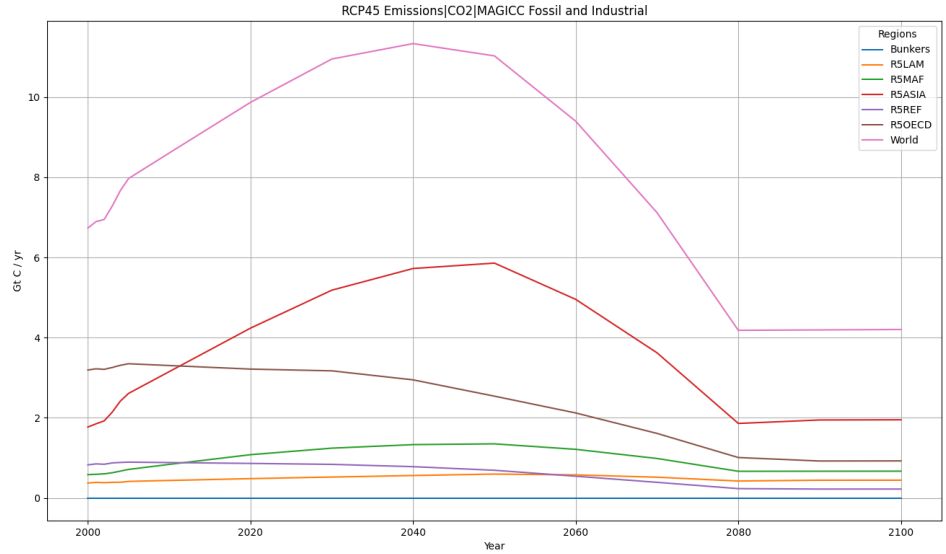
2.1 Task 1- Generate Greenhouse Gas Emissions

In this task, we read data from RCP2.6, RCP4.5, RCP6, RCP,8.5 scenario files, convert the data in MAGICData format to a pandas DataFrame, and then build visualizations to show Carbon Dioxide and Methane gas emission projections for RCP2.6 and RCP4.5 scenarios.


RCP26 Emissions|CH4
Regions
Bunkers
R5LAM
R5MAF
R5ASIA
R5REF
R5OECD
World
Mt CH4 / yr
Year
0
50
100
150
200
250
300
350
2000
2020
2040
2060
2080
2100

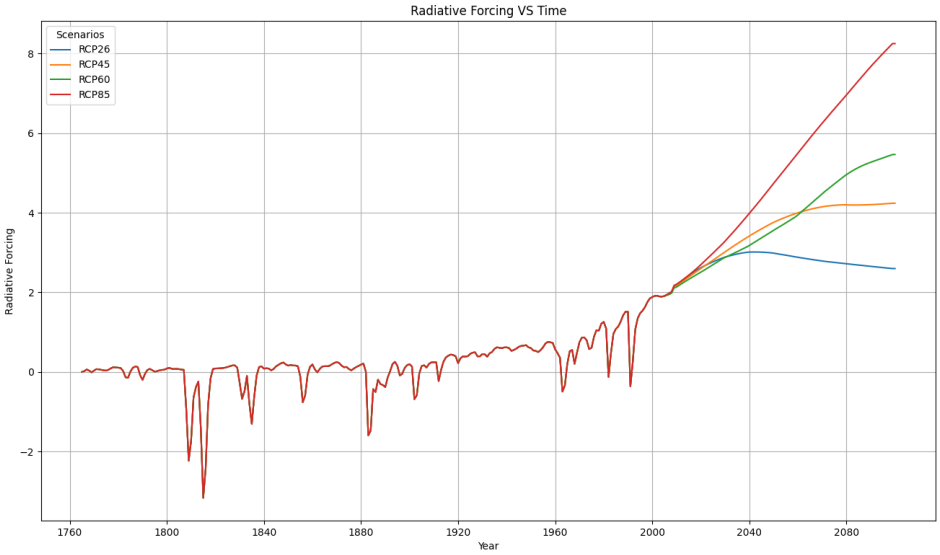

RCP26 Emissions|CO2|MAGICC Fossil and Industrial
Regions
Bunkers
R5LAM
R5MAF
R5ASIA
R5REF
R5OECD
World
Gt C / yr
Year
0
2
4
6
8
2000
2020
2040
2060
2080
2100


RCP45 Emissions|CH4
Mt CH4 / yr
Year
Regions
Bunkers
R5LAM
R5MAF
R5ASIA
R5REF
R5OECD
World


RCP45 Emissions|CO2|MAGICC Fossil and Industrial
Gt C / yr
Year
Regions
Bunkers
R5LAM
R5MAF
R5ASIA
R5REF
R5OECD
World

2.2 Task 2- Generate Radiative forcing plot

In this task, we run the MAGICC model on RCP2.6, RCP4.5, RCP6, RCP,8.5 scenarios and visualize the Radiative Forcing projections for each of the given projections from 1765 to 2100.



References

[1] Robert Gieseke, Sven N. Willner, and Matthias Mengel. Pymagicc: A python wrapper for the simple climate model magicc. *Journal of Open Source Software*, 3(22):516, 2018.