

Data Science Project 1

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DATA FILES USED

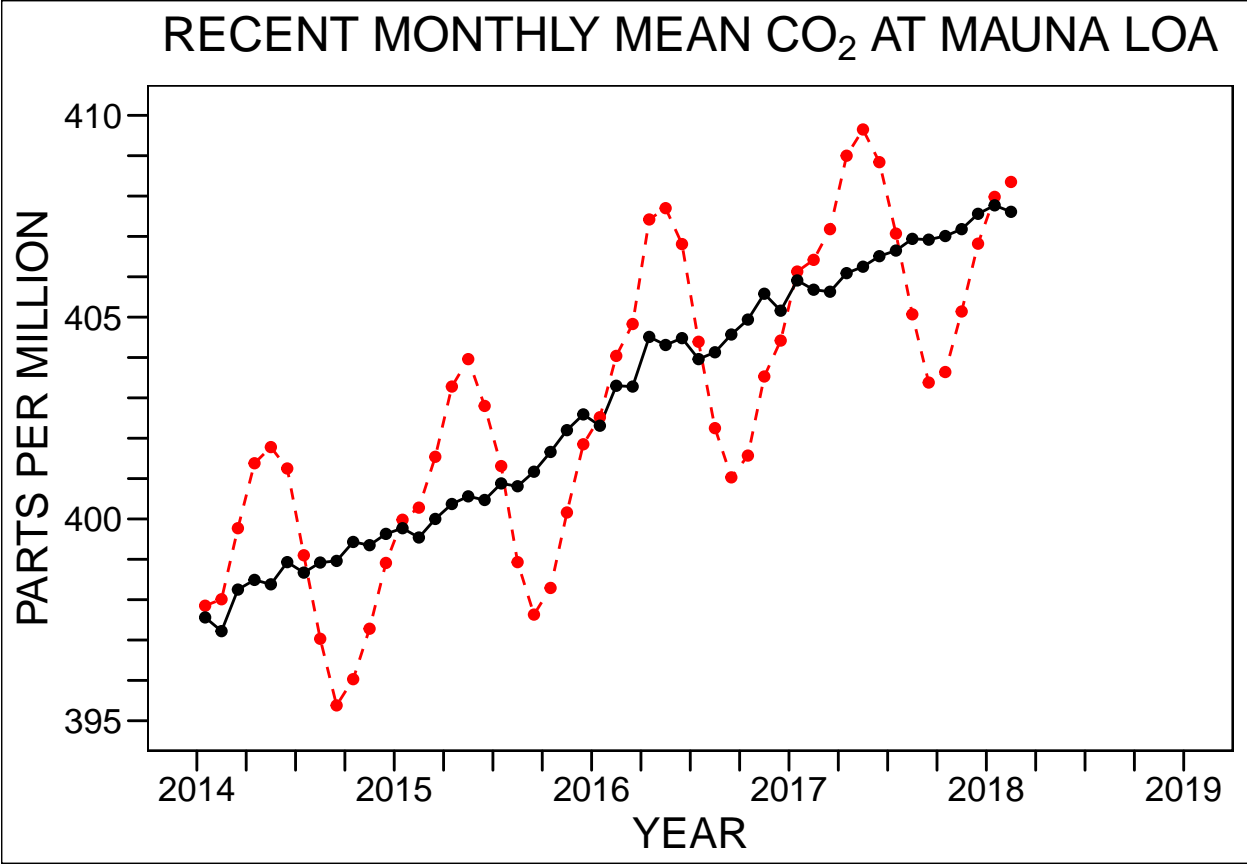
- Source and description of MLCO2annual dataset
- MLCO2annual dataset (comma delimited text file)
- Source and description of MLCO2monthly dataset
- MLCO2monthly dataset (comma delimited text file)
- Source and description of MLCO2weekly dataset
- MLCO2weekly dataset (comma delimited text file)
- Source and description of MLCO2growth dataset
- MLCO2growth dataset (comma delimited text file)

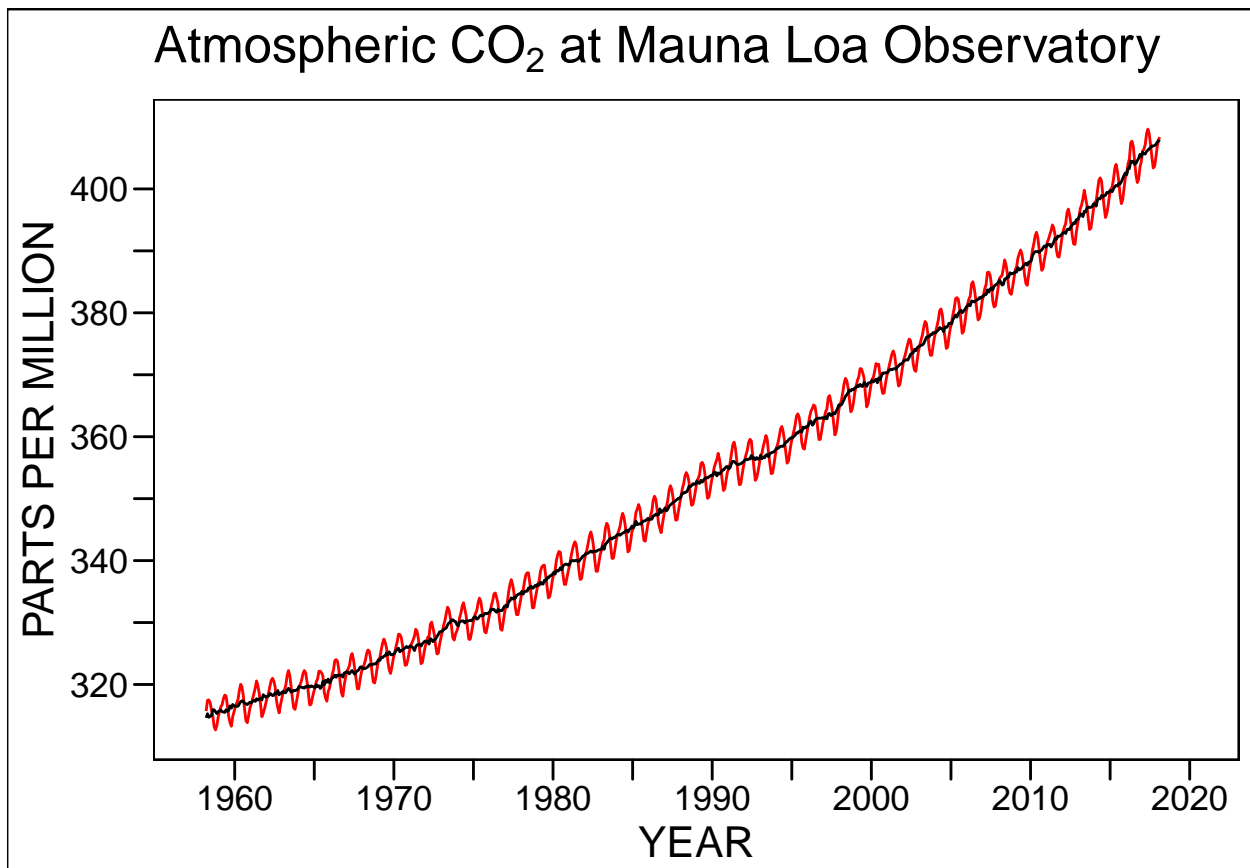
DIRECTIONS

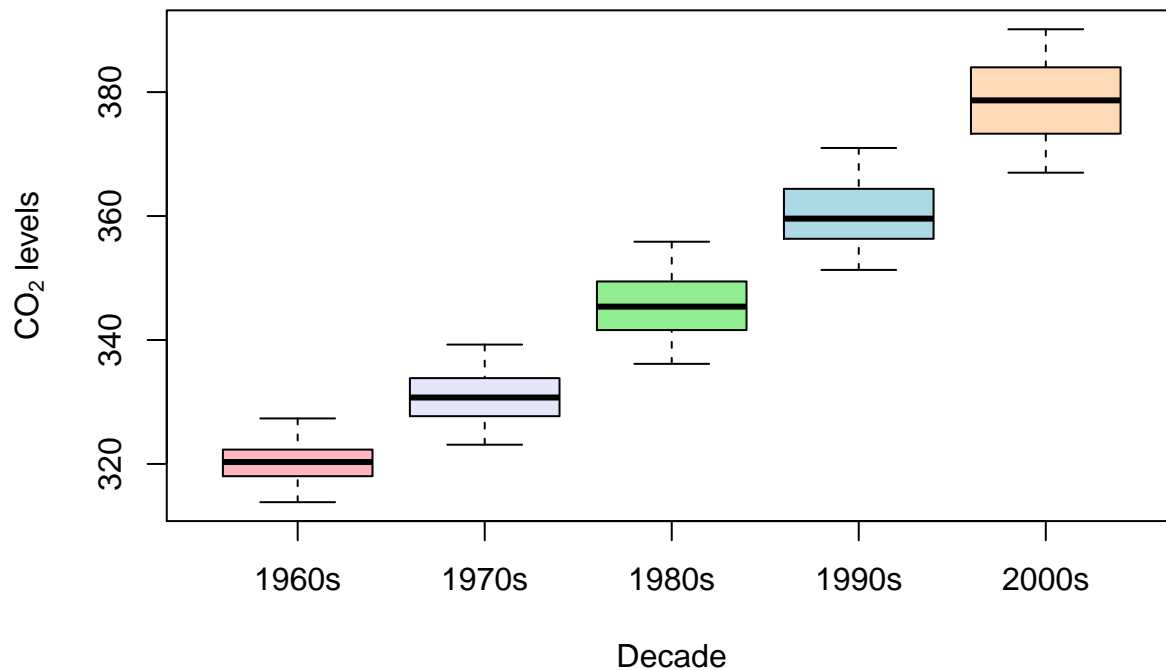
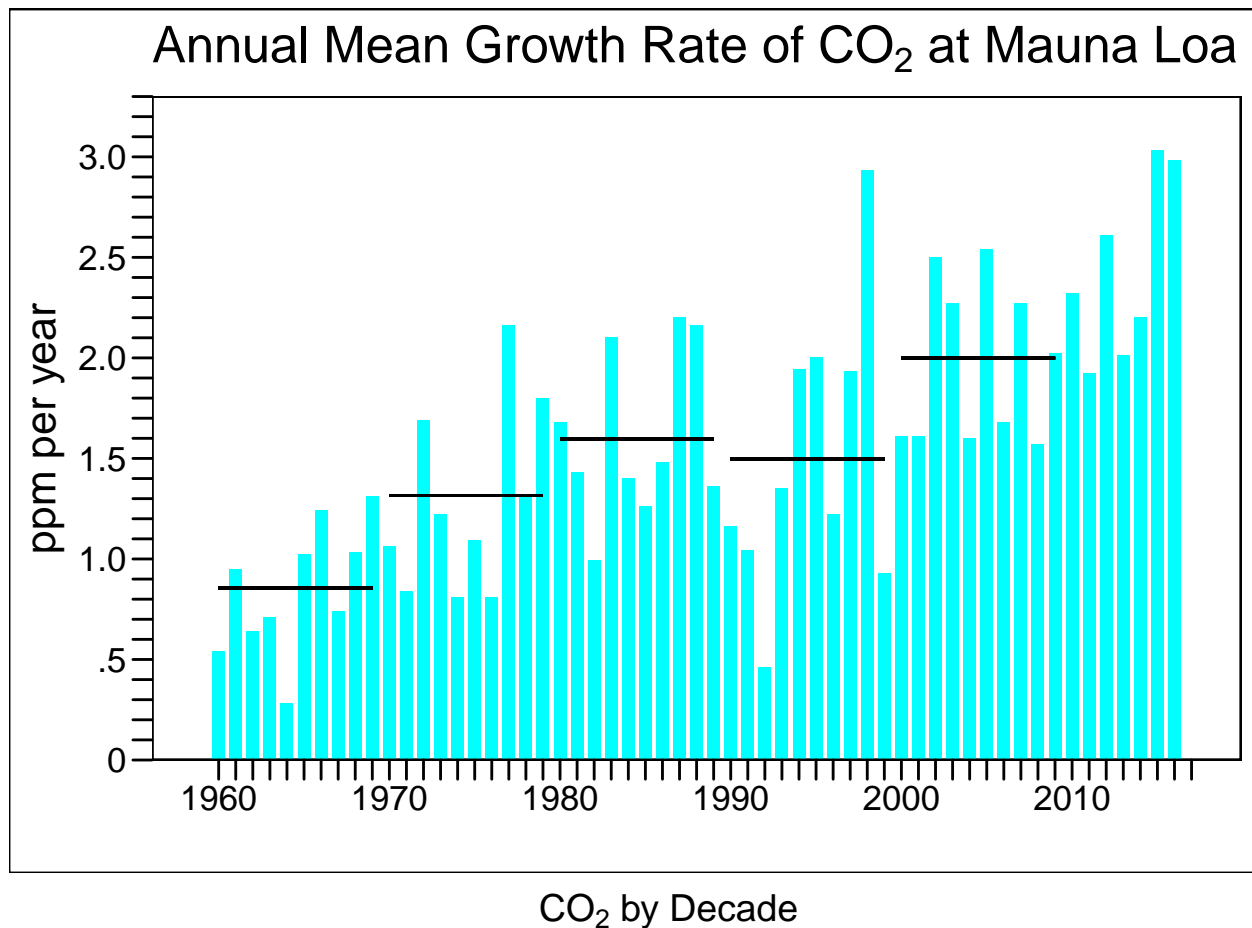
Use only the three datasets provided. In some cases, you will have to create new variables or perform your own calculations / transformations. When replicating graphs, you do not have to include the round NOAA and Scripps badges or the March 2018 date stamps.

- Replicate the content of the graph shown on this page.
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- Using the monthly data, create side-by-side boxplots of CO2 by decade. Exclude the 1950s (1959 and before) and 2010s (2010 and after) because the data for those decades is incomplete.
- Use the multiplot function from the Rmisc package to create a display for the 21st century that includes four stacked plots. Exclude the incomplete 2018 data.
 - barplot of mean CO2 for each year with error bars showing uncertainty (using annual data)
 - side-by-side boxplots of CO2 by year (using weekly data)
 - side-by-side boxplots of adjusted CO2 by year (using monthly data)
 - a time series plot showing the change in CO2 for one year, 10 years, and since 1800 (using weekly data)

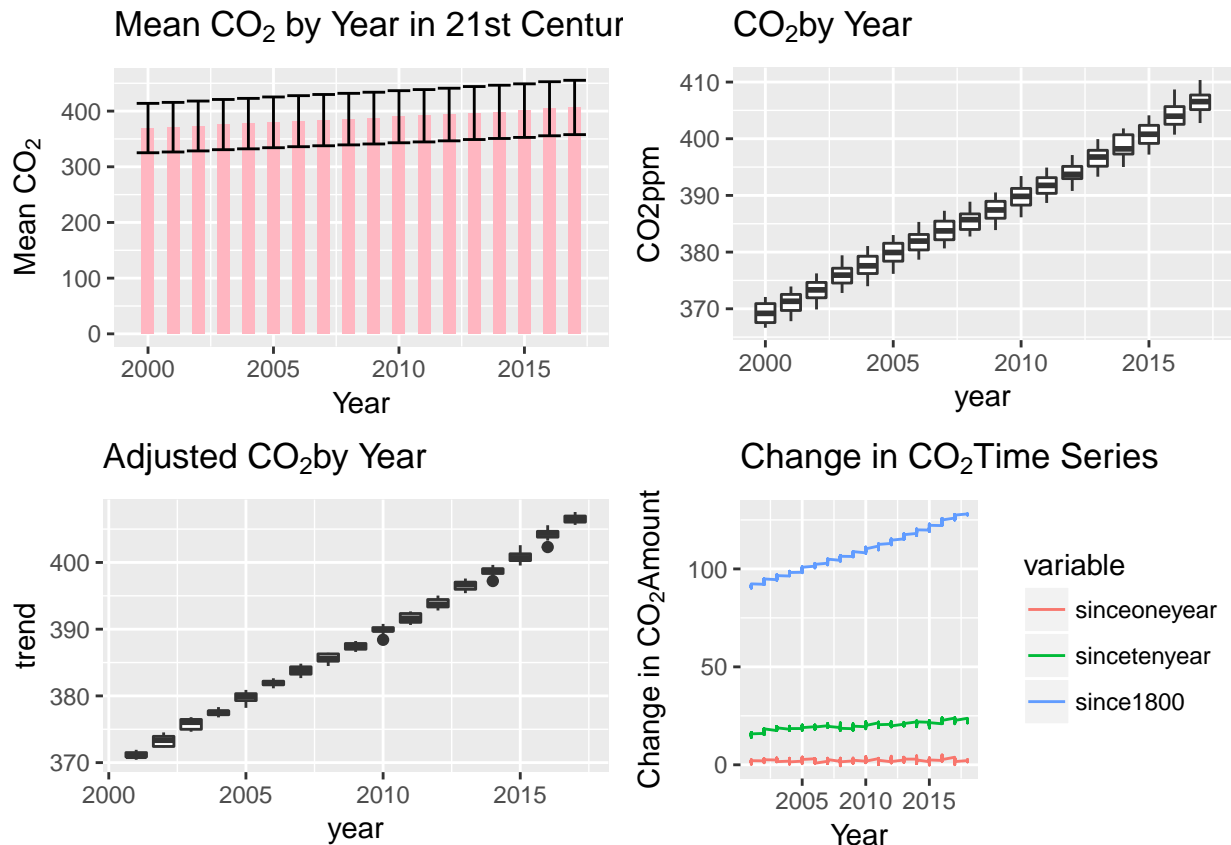
RESULTING GRAPHS







Warning: Removed 20 rows containing non-finite values (stat_boxplot).



QUESTIONS

- 1) Discuss briefly how these data were collected.

The data we were given was from Mauna Loa, Hawaii. This is the complete data from 2014 up until March of 2018. Therefore, the 2018 data is preliminary. The data was obtained at an altitude of 3,000 m in the northern subtropics. The data we were given was reported as a dry air mole fraction defined as the number of molecules of carbon dioxide divided by the number of all molecules in air and then multiplied by one million (ppm), this is including CO₂ itself after the water vapor has been removed.

- 2) What trend(s) or patterns over time do you observe in the CO₂ graphs?

All eight of the graphs show a steady increase, or positive correlation, in CO₂ over time. The change in CO₂ time series graph displays that while CO₂ is increasing over time, it's not changing drastically over short periods of time. Therefore suggesting that CO₂ levels have been steadily increasing since 1800.

- 3) In what way could these analyses be used to support the theory of anthropogenic (man-made) climate change? Why are data and graphs such as these *evidence* rather than *proof*?

This data could be used to support the theory of anthropogenic climate change because every one of the eight graphs show us that the CO₂ level is continuously increasing over time. It is also a fact that the population on Earth is increasing steadily over time. Therefore, we can suggest that the more people on earth, the more likely the CO₂ levels are to rise. This is evidence rather than proof because there are other factors effecting climate change other than CO₂. You can not predict ahead of time what the other factors will be or what the CO₂ levels will be for future years/decades.