NAME: _____ **PERIOD:** _____ **DATE:** _____

LAB PARTNERS: _____**LAB #37**

GLOBAL WARMING

PHENOMENON

The Muir Glacier, Alaska

August 13, 1941 **August 31, 2004**

Information Obtained From https://climate.nasa.gov/climate_resources/4/graphic-dramatic-glacier-melt/

1. Looking at the images above, ask at least two questions that you have about these photos.

2. What appears to be happening between August 13, 1941 and August 31, 2004?

INTRODUCTION

The greenhouse effect is the natural process that keeps the surface of the Earth warm. Without it, the Earth would be frozen and unable to support life. In recent years, scientists have expressed fears that we may be altering the greenhouse effect so that more heat is trapped by our atmosphere each year, resulting in a slow increase in the Earth's overall temperature. The purpose of this investigation is to analyze and interpret real data to make inferences if global warming is taking place.

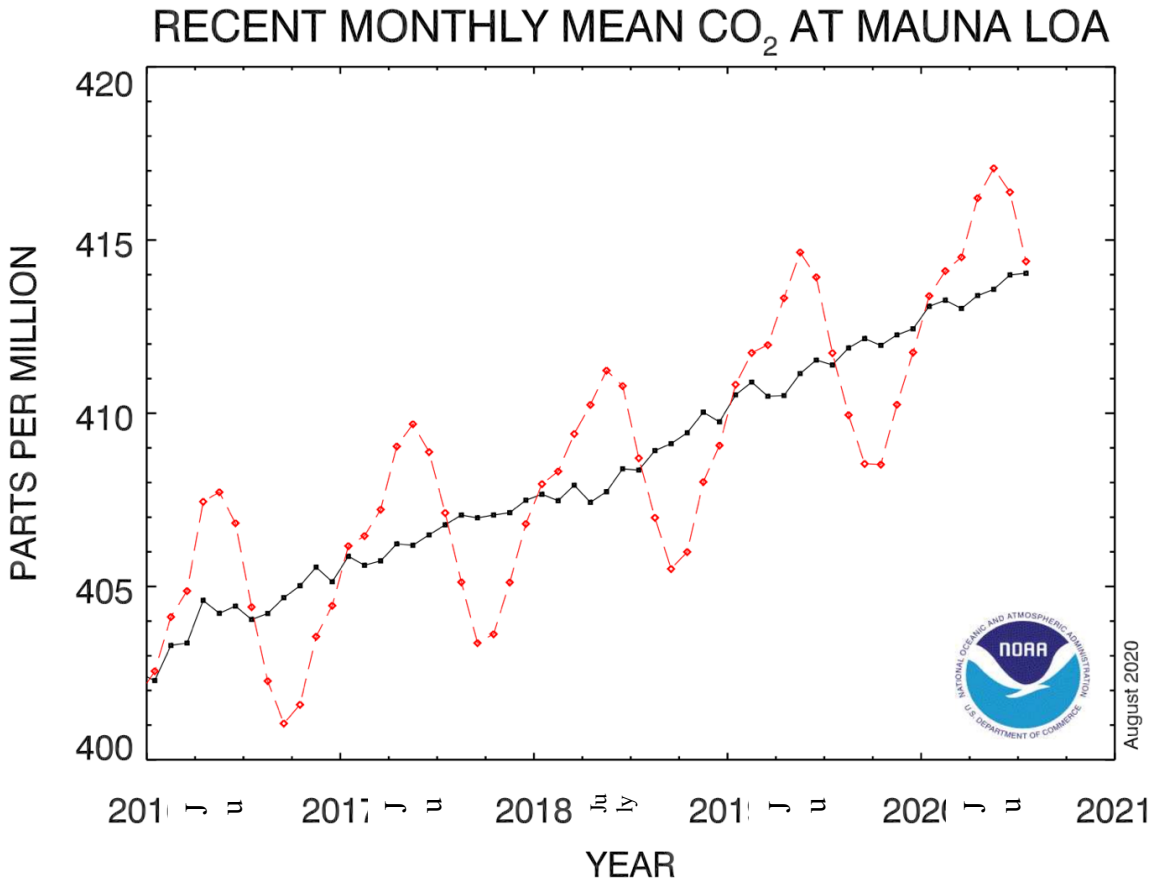
NYSSLS

HS-ESS3-5 Earth and Human Activity - Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

Analyzing and Interpreting Data

PART I CARBON DIOXIDE LEVELS

The graph below shows the average concentration of carbon dioxide in the atmosphere in parts per million (ppm) over a five and a half year period.
Examine the graph and answer questions 1-7.



Data obtained from https://www.esrl.noaa.gov/gmd/ccgg/trends/

1. Describe the short term change which occurs in carbon dioxide concentration during a **one year period**.

2. During which season of the year is the carbon dioxide concentration of the air the highest?

3. During which season of the year is the carbon dioxide concentration of the air the lowest?

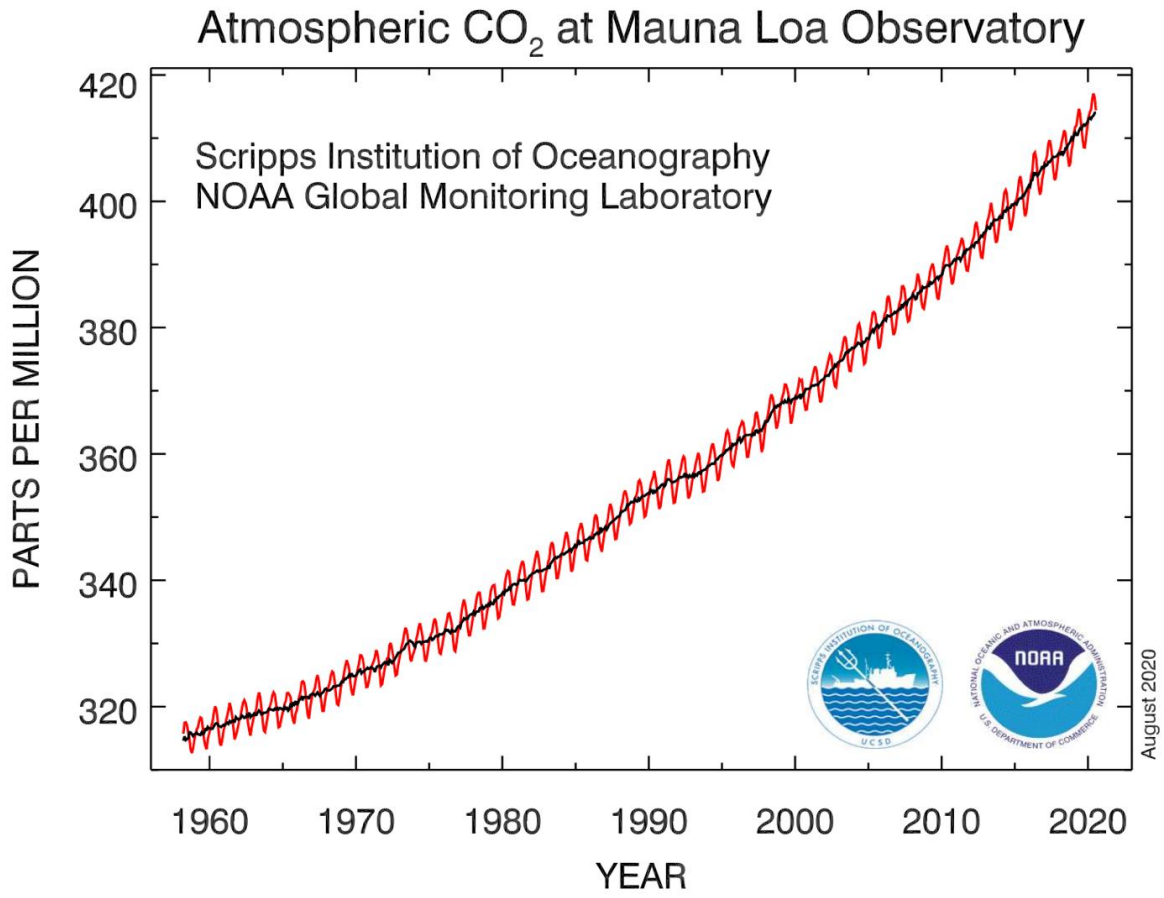
4. What gas do green plants take from the air to manufacture sugars and starches in the process of photosynthesis?

5. What is the most logical explanation for the decrease in carbon dioxide during the summer months?

6. What are two possible explanations why the carbon dioxide concentration increases during the winter months?

7. What effect if any will the destruction of tropical rainforests have on the carbon dioxide concentration of the air? Why?

The Atmospheric CO_2 at Mauna Loa Observatory graph below shows the average carbon dioxide concentration over a 62-year period of time.

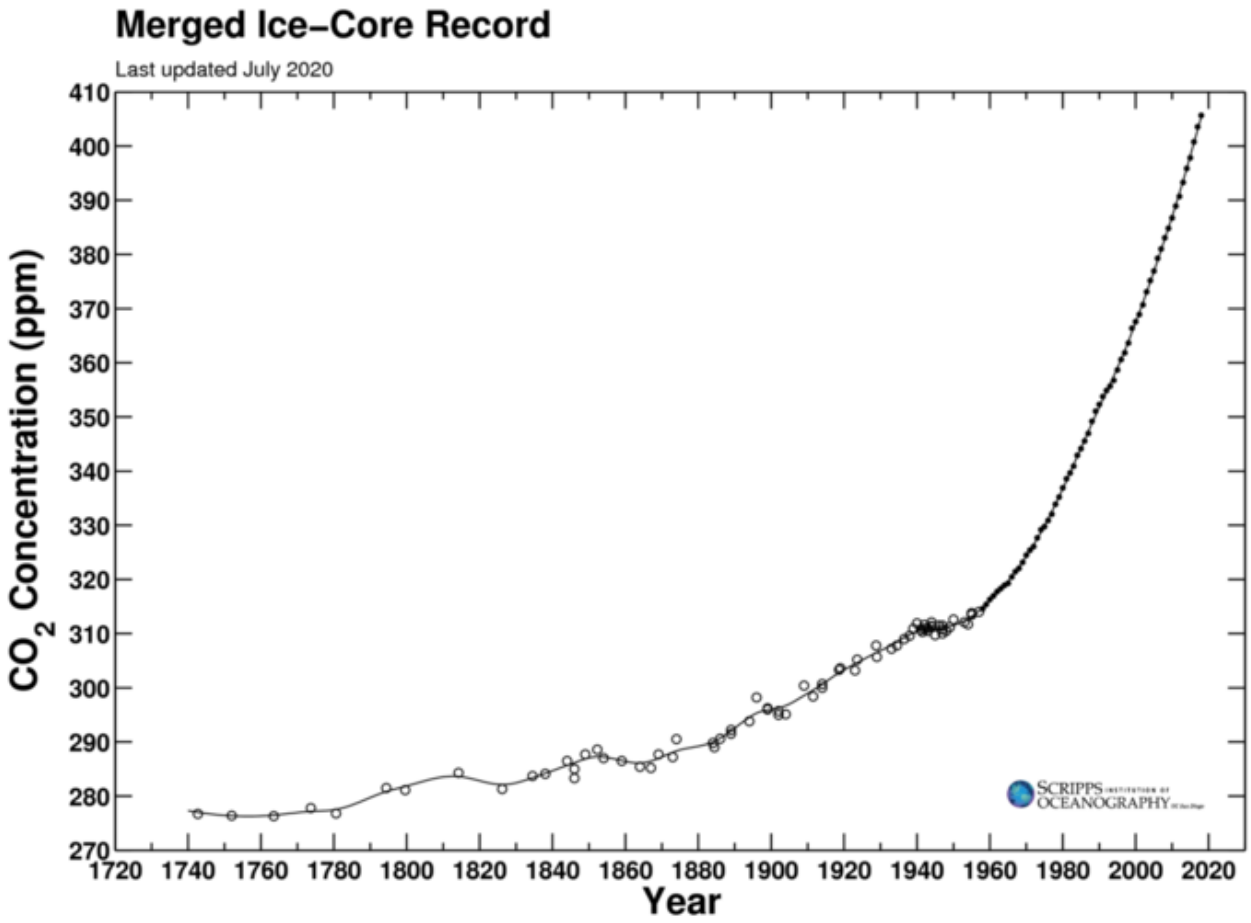


Data obtained from https://www.esrl.noaa.gov/gmd/ccgg/trends/

Answer questions 8-9 based on the **Atmospheric CO2 at Mauna Loa Observatory** graph above.

8. This graph clearly shows the seasonal variation that you saw in the previous graph. What **long term** trend about atmospheric carbon dioxide concentration is shown by this graph?

9. What do you think is responsible for this?



Data Obtained from https://scrippsco2.ucsd.edu/data/atmospheric_co2/icecore_merged_products.html

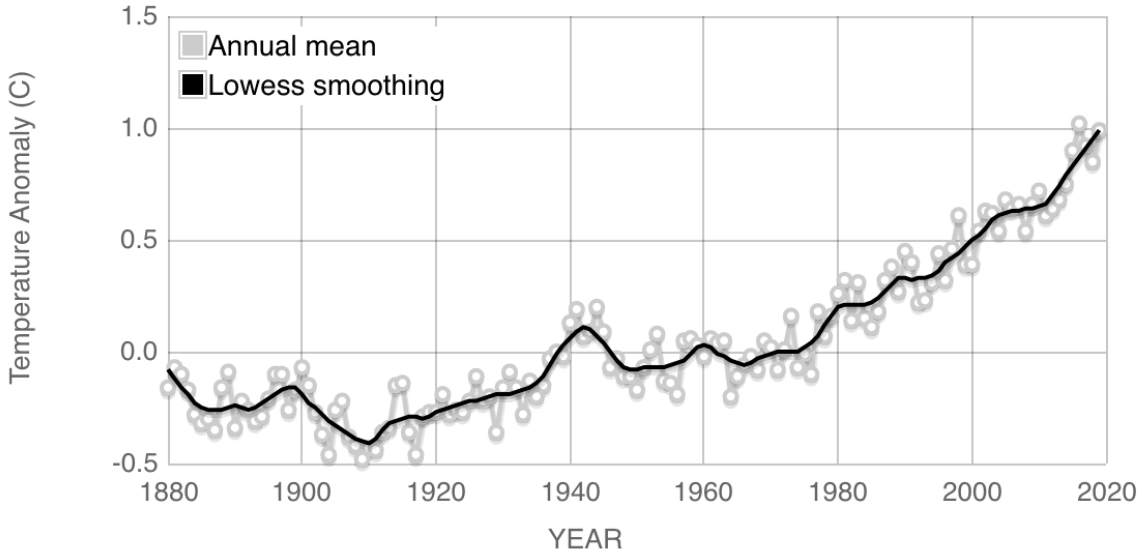
One of the problems with making inferences about global warming is deciding if changes we see are caused by humans or are just part of natural variations. The graph above shows atmospheric carbon dioxide levels over a 280-year period.

10. Have atmospheric carbon dioxide levels been increasing over the past 280 years?

11. What events in human history in the late 1800's and early 1900's are responsible for the dramatic change in carbon dioxide concentrations?

GLOBAL LAND-OCEAN TEMPERATURE INDEX

Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS



Data obtained from https://climate.nasa.gov/vital-signs/global-temperature/

12. If atmospheric carbon dioxide levels are increasing, then what should be happening to global temperatures?

13. Explain in detail how carbon dioxide levels can affect global temperatures.

14. Does the graph above support your answer to question 12?

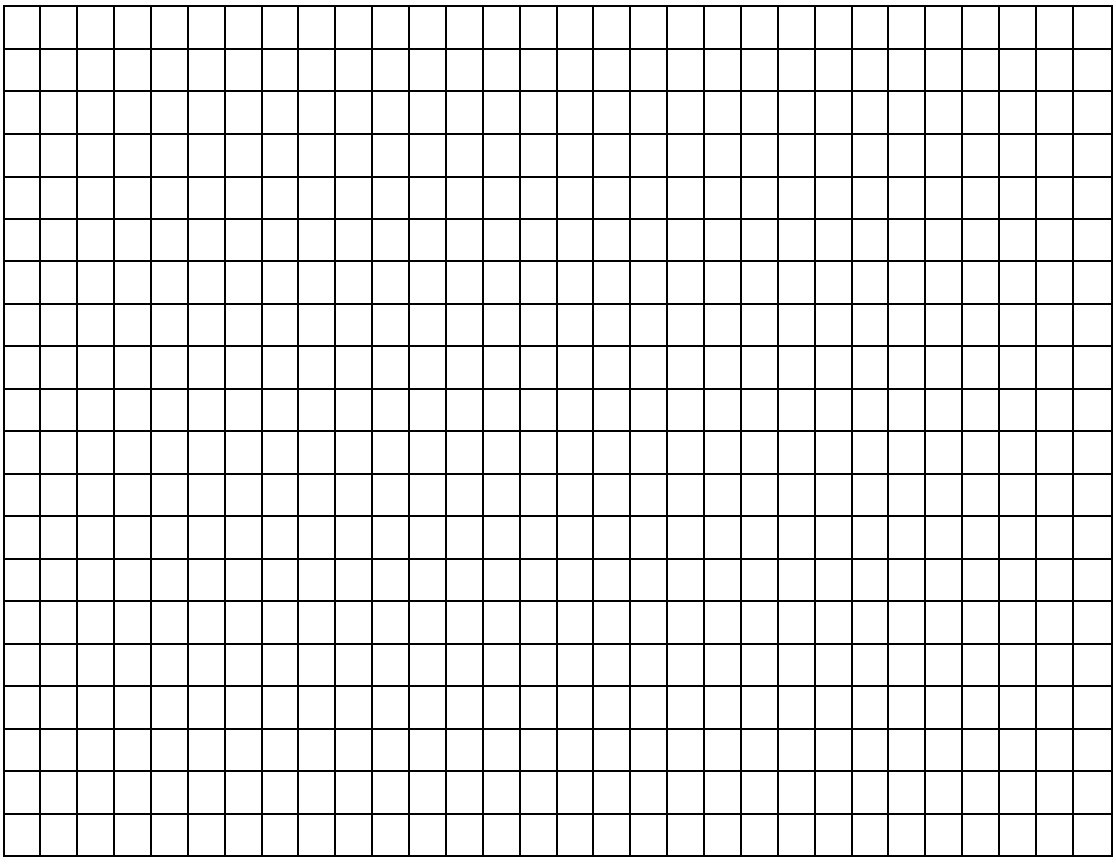
PART II HURRICANES

One of the anticipated effects of global warming is that hurricanes will increase in intensity. Below shows the number of major hurricanes (category 3 to category 5) that have occurred in each decade as per the National Hurricane Center.

DECADE	NUMBER OF MAJOR HURRICANES
1900's	12
1910's	14
1920's	18
1930's	22
1940's	19
1950's	32
1960's	28
1970's	18
1980's	17
1990's	25
2000's	36
2010's	30

Data Obtained From https://www.nhc.noaa.gov/climo/

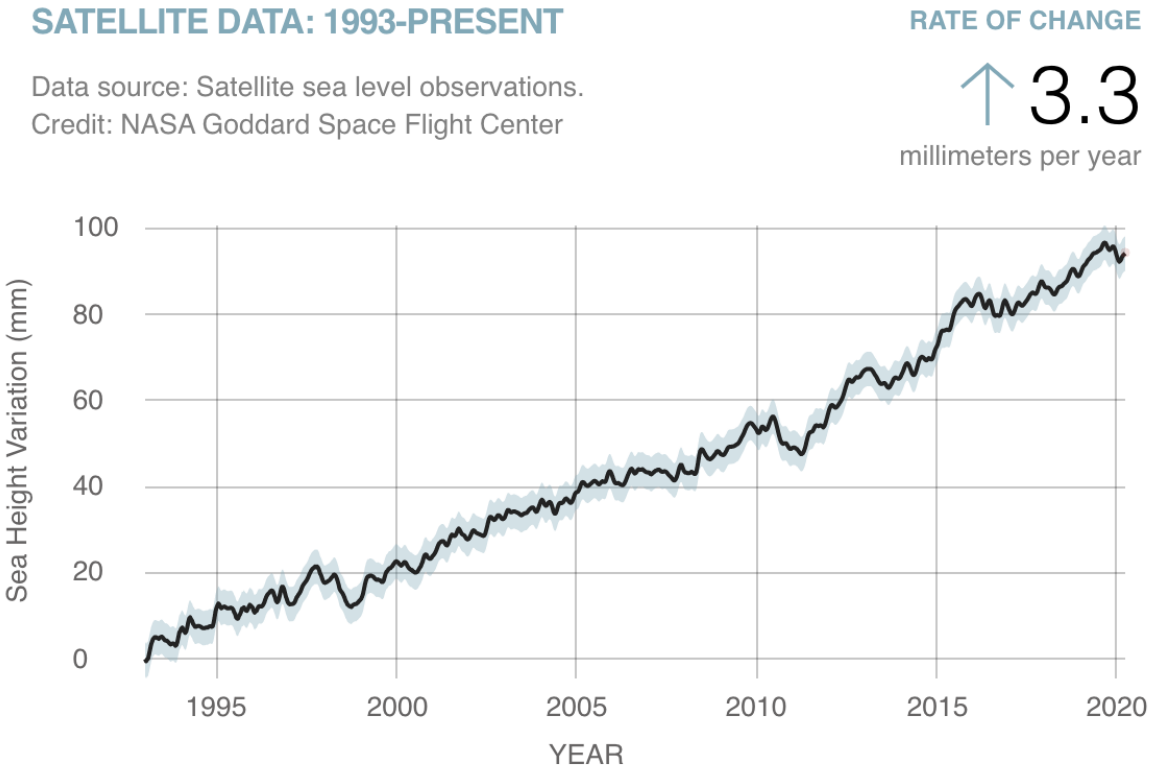
Graph the data in the table above, on the graph below. Be sure to label each axis and title the graph. (Construct a bar graph)



15. Based on your graph above, have the number of intense hurricanes increased, decreased or remain the same? Use data from the graph to support your answer.

PART III Climate and Sea Level

The level of the oceans has always fluctuated with changes in global temperatures. During ice ages when global temperatures were 9 °F lower than today, much of the ocean's water was tied up in glaciers and sea level was often over three hundred feet lower than today. On the other hand, during the last interglacial period (100,000 years ago) when temperatures were about 2 °F warmer, sea level was approximately 20 feet higher than today.



Data obtained from https://climate.nasa.gov/vital-signs/sea-level/

The graph above shows the average rate of sea level rise over a 27 year period.

16. What are several possible reasons why sea level is rising?

CONCLUSION

17. Based on what you've learned in this lab, explain what is causing the Earth to warm and what are the results of this? Refer back to the images of the Muir Glacier below and the data/graphs throughout the lab to enhance your explanation. *Be sure to include the following words in your explanation:* ***CO_2, temperature, sea level rise, hurricanes, glaciers.***

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