

Paper 1- Carbon Dioxide and Global Warming

The Earth, as being the third planet from the sun, experiences temperature changes due to the fact that certain gases trap energy from the sun in the greenhouse effect. One of these gases is carbon dioxide, which is a colorless gas. Without the greenhouse, Earth would be uncomfortably cold. The increase in the average temperature of the Earth is called global warming, which affects the world's climate to possibly cause catastrophic events in the Earth's atmosphere. Recent hurricane events such as Hurricane Katrina that destroyed many homes and lives in New Orleans may possibly be related to global warming. Future hurricanes are expected to be even more intense than Hurricane Katrina, which might be probably caused by temperature increase in the Earth's atmosphere in global warming but studies are not entirely positive. The idea of human caused climate change is still one of the biggest controversies in the world today. I will calculate and observe the amount of CO₂ concentrations from Mauna Loa in Hawaii in my data to indicate whether global warming is truly a danger to our environment.

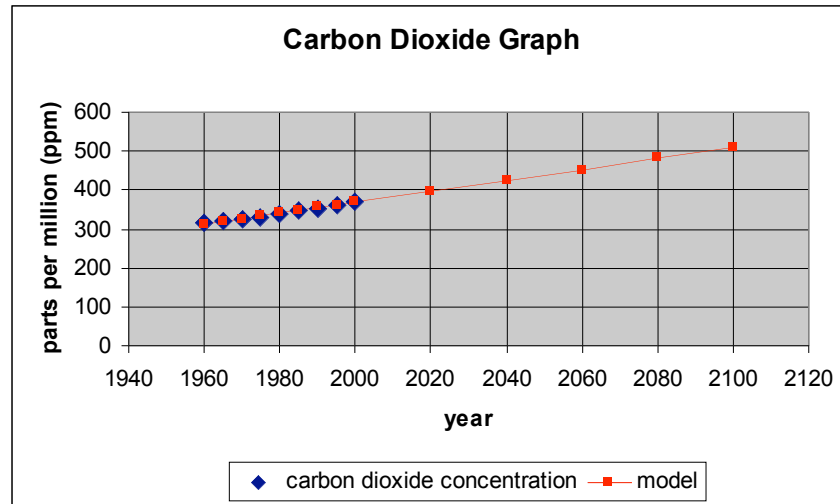
We will be making predictions for the levels of increase of carbon dioxide in the twentieth century and predict the level of carbon dioxide in the year 2020. Also, we will predict what year carbon dioxide level will reach 500 parts per million using the table and graph. The data below shows levels of carbon dioxide from 1960 to the present. It also shows the data that C.D. Keeling, T.P. Whorf, and the Carbon Dioxide Research Group at the Scripps Institution of Oceanography has obtained. The data shows that carbon dioxide concentrations are increasing through approximated 5 year intervals. We will construct a linear model and use a spreadsheet to construct a graph to draw conclusions about global warming. To find the model, we choose ordered pairs (yrs. since 1960, data). The data points are (5,320) and (40,369) corresponding to 1965 and 2000 to build our model. The model definitely tells me that the slope is 1.4 and it gives us the y-intercept 313. It also seems to indicate that as the years since 1960 increases, the level of carbon dioxide may also increase. The linear model is:

$$f(x) = 1.4x + 313$$

| yrs. Since 1960 | year | carbon dioxide concentration | model |
|-----------------|------|------------------------------|-------|
| | | | |
| | | | |
| 0 | 1960 | 317 | 313 |
| 5 | 1965 | 320 | 320 |
| 10 | 1970 | 326 | 327 |
| 15 | 1975 | 331 | 334 |
| 20 | 1980 | 339 | 341 |
| 25 | 1985 | 346 | 348 |
| 30 | 1990 | 354 | 355 |
| 35 | 1995 | 361 | 362 |
| 40 | 2000 | 369 | 369 |

| | | | |
|-----|------|--|-----|
| 60 | 2020 | | 397 |
| 80 | 2040 | | 425 |
| 100 | 2060 | | 453 |
| 120 | 2080 | | 481 |
| 140 | 2100 | | 509 |

The graph below shows the plots of the table above. By using the model and the graph, the level of carbon dioxide in 2020 will be 397ppm and the year carbon dioxide will reach 500ppm is about 2099.



The generalization “If global warming is occurring, there’s probably not much we can do about it anyway” states that we as humans have no ability to either decrease or increase possible dangers of global warming or any factor at all. The conclusions I have from my model seem to be mostly inconsistent with this statement. Carbon dioxide, one of the gases in the greenhouse effect, can be released by human activities such as gasoline and coal. An increase in carbon dioxide might affect the greenhouse effect to possibly cause global warming, although no one is positively sure. As the generalization stated above says that there’s not much we can do about global warming, it is contradicted with the fact from my table and graph, as the industrial revolution occurred more over the years, carbon dioxide levels have increased. With less use of gasoline and other burning of fuels, we might be able to decrease the amount of carbon dioxide released into the Earth’s atmosphere. Human activities have consequently possibly increased the amount of carbon dioxide concentration, which might possibly have an effect on global warming. In order to prove or disprove this statement, more information is needed such as facts about what would actually cause global warming and whether it human activities hat release carbon dioxide has a negative impact on it.

Another generalization is that “The IPCC (Intergovernmental Panel on Climate Change, a group of more than 2,500 scientists) has provided that the world community with first class assessments of the soaring temperatures the world is facing, the devastating impacts of these rises and the ways in which we can try and avoid the worst effects of global warming. We now know climate change is real and the hand of

humankind in this warming is becoming clearer and clearer.” This generalization states that global warming is real and that human caused climate change is also real and a danger. It is also saying that the impacts of global warming will be disastrous if not avoided. The conclusions that I can draw from my model is not entirely consistent with this generalization. Although the graph shows that the amount of carbon dioxide levels are increasing over the years, it does not prove that global warming is real or explains the causes of global warming to be devastating. The model just shows the amounts of levels of increase of CO₂ during time intervals. In order to prove this generalization, more information or evidence is needed that global warming might be real and actual proof of what climate changes might occur from it.

Drawing unreasonable conclusions rapidly is a common mistake we usually make in difficult situations. The issue of whether global warming is a real danger or not should not be one of the issues where conclusions are drawn rapidly from. From my examination of the data of carbon dioxide, I've learned that indeed the concentration of CO₂ is increasing over the years and that human activities such as using gasoline increases the amount of CO₂ released in the atmosphere. My examination does not, however, give evidence that carbon dioxide released is actually having a negative impact or a positive impact. There is no available proof that global warming is a danger, and there is no proof that global warming will not cause catastrophic events either. Global warming will remain as a controversy over years to come, unless sufficient evidence proves one way or the other.

Appendix

The appendix contains the mathematical details of making the linear model.

We use the data corresponding to the years 1965 and 2000 to find a linear model for the data in the form $f(t) = At + B$ by choosing the points (5,320) and (40,369). First, we find

the slope of the data points: $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$m = (369 - 320) \div (40 - 5) = 49 \div 35 = 1.4$$

Then, we plug in 1.4 in the point-slope equation as the slope with one of the data points serving as x and y to find the model:

$$\begin{aligned}y_2 - y_1 &= m(x_2 - x_1) \\y - 320 &= 1.4(x - 5) \\y - 320 &= 1.4x - 7 \\y &= 1.4x + 313\end{aligned}$$

$$\boxed{f(x) = 1.4x + 313}$$

Use the linear model to approximate:

- Predict the CO₂ concentration in the year 2020

To approximate answers for predicting the CO₂ concentration in the year 2020, we use the years since 1960 from the graph for the year 2020, which is 60, as x in our model equation:

$$\begin{aligned}f(x) &= 1.4x + 313 \\f(x) &= 1.4(60) + 313 \\f(x) &= 84 + 313 \\f(x) &= 397 \\&\text{or} \\f(60) &= 397\end{aligned}$$

So therefore, the concentration of CO₂ in the year 2020 will, according to the model, be 397.

- Predict the year in which the CO₂ concentration will reach 500 ppm

$$\begin{aligned}500 &= 1.4x + 313 \\187 &= 1.4x \\x &= 133.57\end{aligned}$$

133.57 is the approximate years since 1960.

$$\begin{aligned}\text{Years since 1960} + 1960 &= \text{year} \\133.57 + 1960 &= 2094\end{aligned}$$

So therefore, CO₂ concentration will be 500 ppm in approximately the year 2094.

Use the graph to approximate:

- Predict the CO₂ concentration in the year 2020.

From the graph, carbon dioxide concentration in the year 2020 would approximately be 397.

- Predict the year in which the CO₂ concentration will reach 500 ppm

From the graph, carbon dioxide concentration will reach 500 ppm between years 2080 and 2010.