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Planetary Heat Sink Uncouples Temperature Increase from Rising CO2: Climate Change Hiatus Explained

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Abstract

The current hiatus in terms of global climate change has been linked to a greater phenomenon of a change in climate than seen in previous historical trends. The globe was rising in temperature throughout the beginning of the 21st century, but has entered into a hiatus, a period where the CO2 levels continue to rise but the global temperature is remaining constant. It is predicted that temperatures will continue to rise once this hiatus passes. The main cause of this hiatus, known as planetary heat sink, is the concept that the ocean is absorbing more heat to offset the increasing amount of carbon dioxide in the atmosphere (see figure 1), and this explains why atmospheric temperatures are not changing (see figure 2).

Introduction

Once we enter out of the hiatus, the current atmospheric greenhouse gas levels will cause an increase in atmospheric temperature due to the fact greenhouse gases are not currently affecting global temperature due to this concept of planetary heat sink. However, the current greenhouse gas concentrations are still producing a negative effect on the globe. The increasing levels have built up a blocking ridge in the atmosphere hovering over the subtropical pacific between California and Hawaii to the coast of the Arctic Ocean north of Alaska. This high pressure ridge has diverted and re-routed most of the winter storms that have led to the increase in drought away from California, Oregon, and parts of Washington and instead up to Alaska and the Arctic Circle. This explains the anticipated colder weather hitting the Arctic going into 2015.As this colder flow hits the north it will keep the globe in this hiatus but with the current level of CO2 in the atmosphere (385 ppmv) ascending at an exponential rate due to human activity, it will push the globe out of its state of hiatus. If the carbon dioxide concentration in the atmosphere reaches between 450-600 ppmv, irreversible dry seasons, reduction in rainfall, and large rises in sea level will occur. If carbon dioxide levels reach over 600 ppmv rising sea levels will become irreversible

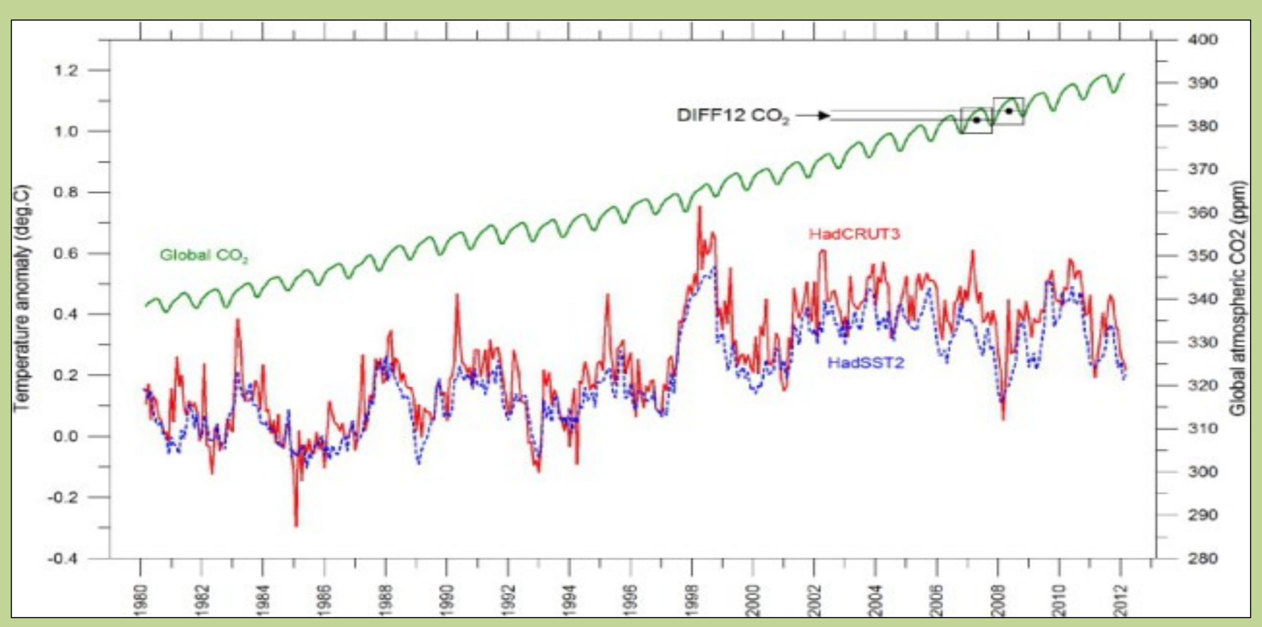

Figure 1: Atmospheric temperature and levels of CO_2 in the atmosphere
Humlum, O., Solheim, J., and Stordahl, K. (2013). The phase relation between atmospheric carbon dioxide and global temperature. Global and Planetary Change, 100. (51-69).

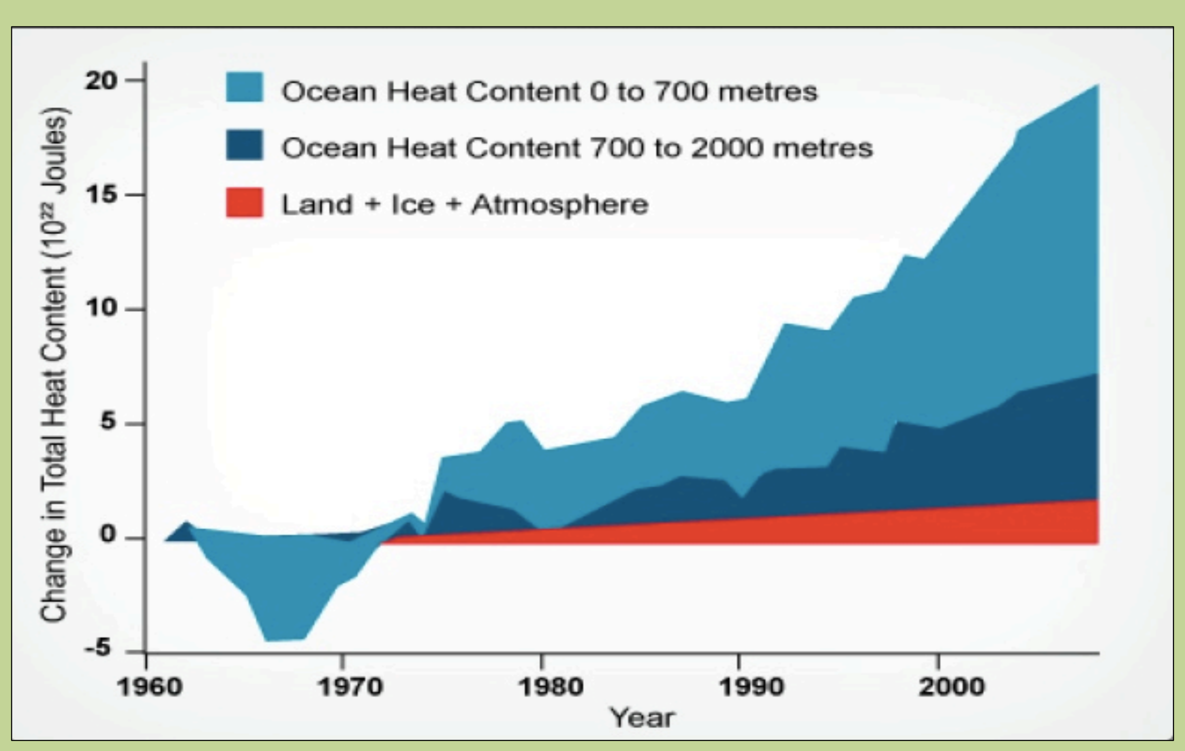

Figure 2: Change in ocean heat content
Nuccitelli, D., Way, R., Painting, R., Church, J., & Cook, J. (2012). Ocean heat content and Earth's radiation imbalance. II. Relation to climate shifts. *Physics Letters A, 376*(45), 3466-3468.

Hypothesis

We hypothesize that the level of carbon dioxide in the atmosphere will continue to rise as temperature maintains constant during this period of hiatus, and once this period passes, atmospheric temperatures will continue to increase as it has been over the course of the twenty-first century.

Methods

We measured the carbon dioxide level at Seaver College using the Li-6200 gas-exchange system also known as the Li-Cor Portable Photosynthesis System. Instead of measuring the amount of carbon dioxide being respired and transpired by a leaf, we looked at the CO_2 ppm in the atmosphere. We first started by measuring the CO_2 level in our classroom, and then moved on to test the CO_2 level outside in the middle of the Seaver College Campus. We took this data and compared it to the current atmospheric CO_2 concentration in Mauna Loa, Hawaii (see figure 4).

Week beginning on October 12, 2014:	395.56 ppm
Weekly value from 1 year ago:	393.60 ppm
Weekly value from 10 years ago:	374.23 ppm

Last updated: October 20, 2014

Figure 4: NOAA

Results

First, we measured the CO_2 level in the classroom where there were roughly about fifteen people, and the level was around 450ppm. This is higher than the average level in the atmosphere out in the middle of the Pacific Ocean. The average level of CO_2 in the atmosphere in the middle of the Pacific Ocean is around 397ppm. Furthermore, the CO_2 level was expected to be higher in the classroom than in the Pacific Ocean because of the close proximity of students and their breathing out of carbon dioxide. We know that this human interaction has contributed to the higher level of CO_2 because we breathed directly onto the carbon dioxide detector, and the level quickly rose to 1285ppm. Outside of the classroom, we took the machine into the middle of the Seaver College campus. Seaver College is relatively close to the ocean and therefore, there was a nice breeze. The breeze made the CO_2 levels fluctuate between 394ppm to 402ppm, giving us the average of 398ppm, which is equivalent to that of what was measured at Mauna Loa Observatory for October 14, 2014, which was 395 ppm (Figure 4). This adds to the current data that is being observed at Mauna Loa, which is capturing the amounts of CO_2 in the Pacific Ocean (Figure 5).

Location Comparisons of Atmospheric CO2

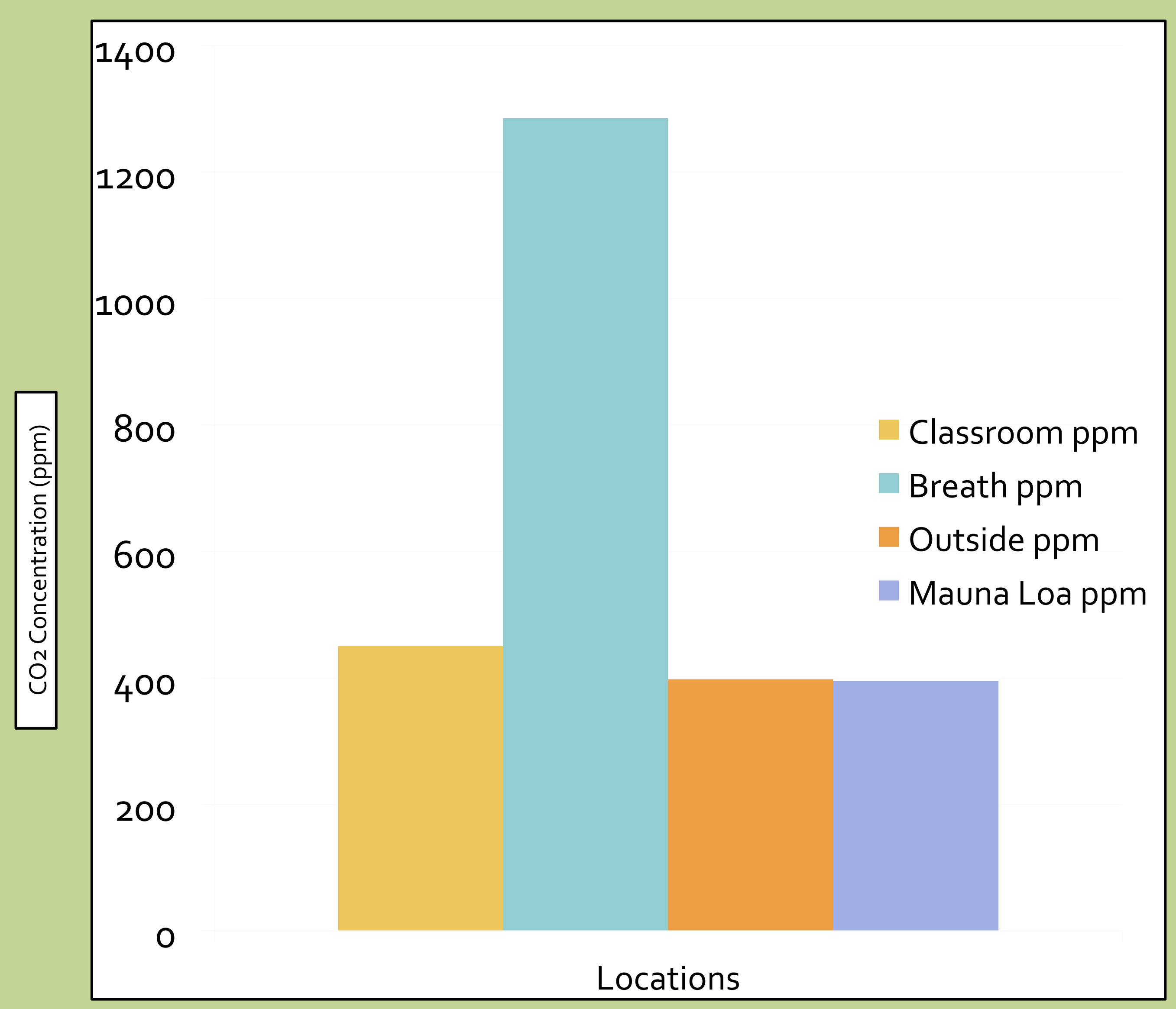

Figure 5

Discussion

Our observations from the data collected on the CO_2 ppm levels connect with our research because the levels we recorded are very similar to the data taken in Mauna Loa, Hawaii (Figure 3). Our data was collected on a breezy day in Malibu with an offshore wind, which is comparable to the environment in Mauna Loa. We used the data from the classroom to compare the CO_2 levels in a city. As the population density increases, more carbon is emitted into the atmosphere increasing CO_2 levels. When the CO_2 from our breath was measured the ppm levels increased dramatically. We believe that this is comparable to what will happen in the future as CO_2 levels become more concentrated as humans continue to emit carbon dioxide into the atmosphere. Then when the hiatus comes to an end, the increased CO_2 will cause a dramatic increase in global temperature.

Conclusion

In conclusion, the global temperature is not rising due to the planetary heat sink causing the hiatus, which is removing heat from the atmosphere and storing it within the depths of the ocean. The CO2 atmospheric levels are continuing to rise and will cause the globe to once again increase in atmospheric temperature after the hiatus comes to an end.

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