

Evidence from Graphs

Graph 1 • CO₂ and Temperature Ice Core Data

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #1 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?



 $\ensuremath{^*\text{with}}$ reference to the mean recent time value

Data: Petit, J.R., et al., 2001, Vostok Ice Core Data for 420,000 Years, IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series #2001-076. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA. https://www1.ncdc.noaa.gov/pub/data/paleo/icecore/antarctica/vostok/deutnat.txt, .../co2nat.txt

Graph 2 • Global Temperature Changes

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #2 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?



*Anomaly means "different from normal."

Source: IPCC 2007: WGI-AR4

Graph 3 • Global Temperature and Carbon Dioxide

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #3 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?



Source: zFacts.com/p/226.html

Graph 4 • Global Carbon Emissions from Burning Fossil Fuels*

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #4 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?

*Examples of fossil fuels are coal, oil, natural gas, gasoline.



Global Carbon Emissions from Fossil Fuels, 1900–2011

Source: Boden, T.A., G. Marland, and R.J. Andres. 2015. Global, Regional, and National Fossil-Fuel CO₂ Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2015

Graph 5 • Methane Emissions*

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #5 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?

*Methane is from the production and transportation of fossil fuels, breakdown of wastes in our landfills (dumps), and cow flatulence.



Methane Emissions

Source: NOAA

Graph 6 • CO₂ Levels versus Volcanic Eruptions

- 1. Examine the graph.
- 2. Discuss with your group what the graph is showing and answer the following questions in the Graph #6 section of the Climate Change Evidence Analysis Chart.
 - What are the units on each axis of the graph?
 - When did scientists start gathering this data?
 - When was the last sample recorded on this graph?
 - What pattern(s) do you notice in the graph?
 - What can you learn about greenhouse gases from this graph?



Agung is a volcano in Bali, Indonesia. El Chichón is a volcano in southern Mexico. Pinatubo is a volcano in the Philippines.

Data: NOAA ESRL; NASA GISS

Evidence 7 • Products of Burning Fossil Fuels



https://www.newsghana.com.gh/nigeria-may-not-be-able-to-entirely-free-itself-from-fossil-fuel/

We know that humans are currently burning more fossil fuels for factory production, driving cars, heating homes, etc. We also know from previous graphs that there is more carbon dioxide in the atmosphere than ever before. How are these two things connected?

- 1. Watch the *Products of Burning Fuels* video using the following link: <u>https://www.youtube.com/watch?v=FfFs4q6PSaU</u>
- 2. Discuss with your group what the graph is showing and answer the following questions:
 - What fuel is being burned in the video?
 - What product of burning fuel is shown in the very last tube? (Hint: cloudy bubbles)
 - What product of burning fuel is shown in the middle tube? (Hint: like breathing on a window)
 - What is the connection between burning fossil fuels and carbon dioxide?