

# Cloudy with a Chance of Science!

## Week 3: Grades 6-8

### Day 5: Global Temperature Trends

#### Teacher/Parent Background:

Photosynthesis, respiration and CO<sub>2</sub> absorption/release from the ocean surfaces are all examples of natural fluxes of carbon through the Earth's systems. Human activities, particularly fossil fuel burning and deforestation, disrupt this natural flux by releasing CO<sub>2</sub> into the atmosphere. When we mine coal and extract oil from the Earth and then burn these fossil fuels for transportation, heating, cooking, electricity and manufacturing or when we clear-cut forests to support agriculture, we are effectively moving carbon more rapidly into the atmosphere than is being removed from the atmosphere naturally through the sedimentation of carbon. This causes the concentration of CO<sub>2</sub> in the atmosphere to increase and the CO<sub>2</sub> concentration in the atmosphere is now higher than it has ever been, which is causing global warming.

**Overview:** In this activity, adapted from Jet Propulsion Laboratory Education, students will use global temperature data to create models and compare short-term trends to long-term trends. They will then determine whether global temperature is rising based on the data.

#### Related Standards:

Construct and support an argument about how human consumption of limited resources impacts the biosphere.

#### Key Terms:

Climate- The set of weather conditions that prevail in a region year after year.

Data- Pieces of information.

Carbon Cycle- The continuous movement of carbon among the abiotic environment and living things.

Fossil Fuels- Fossil fuels such as coal, petroleum products and natural gas are the results of ancient biomass.

Greenhouse Gas- A gas that absorbs and emits radiant and thermal energy. Carbon dioxide is an example of a greenhouse gas.

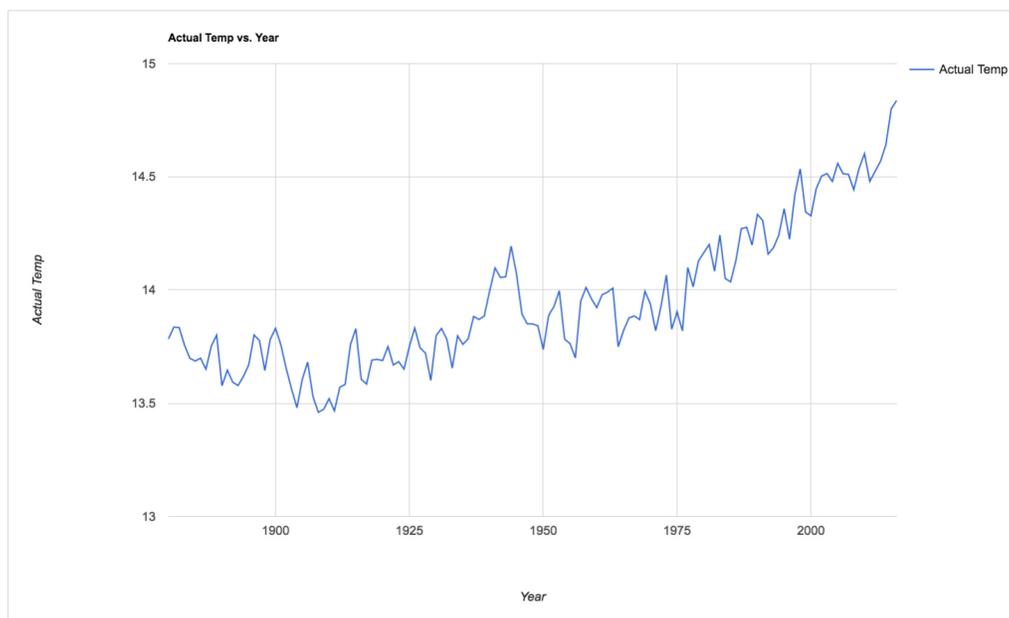
## Materials List:

- Pen/Pencil

## Activity Description:

Scientists have concluded that our climate is changing, that global temperatures are on the rise, and that there are serious consequences to these rising temperatures. But in an age of plentiful yet opposing information, how do students separate fact from fiction? Simple: Examine the source data and do the math. This activity allows students to examine real science data from NOAA and draw their own conclusions about trends in global mean temperature.

1. Have students follow directions on the Student Handout.
2. Completed student graphs should be similar to the image below. Students are graphing only 28 data points as compared to 137 on the graph below.



3. Once students have completed the graph and question on the Student Handout post [this video](#) explaining greenhouse gases and [this video](#) on our Earth's increasing global temperatures on google classroom.

## Closure:

Discuss the following with students:

*-What do you expect the graph to look like in 2020? 2025? It is expected that the line continues to move with an upward trend.*

*-How does the carbon cycle play a role in increasing global temperatures? Fossil fuels are carbon based and act as a carbon sink. When fossil fuels are extracted from the Earth and burned the carbon that was once part of an ancient living organism is emitted into the atmosphere as  $\text{CO}_2$ .  $\text{CO}_2$  is called a greenhouse gas because it absorbs heat. With increasing amounts of fossil fuels being burned, increasing amounts of  $\text{CO}_2$  is being emitted into our atmosphere which is causing increasing global temperatures.*

## Extension:

-Explore <https://climatekids.nasa.gov/> and play games, watch videos and learn more about climate change.

-Reading about [climate challenged pikas](#).

## Student Handout

You will be analyzing average temperatures measured on Earth for the past 140 years and then draw some conclusions about the data trends. Data source:

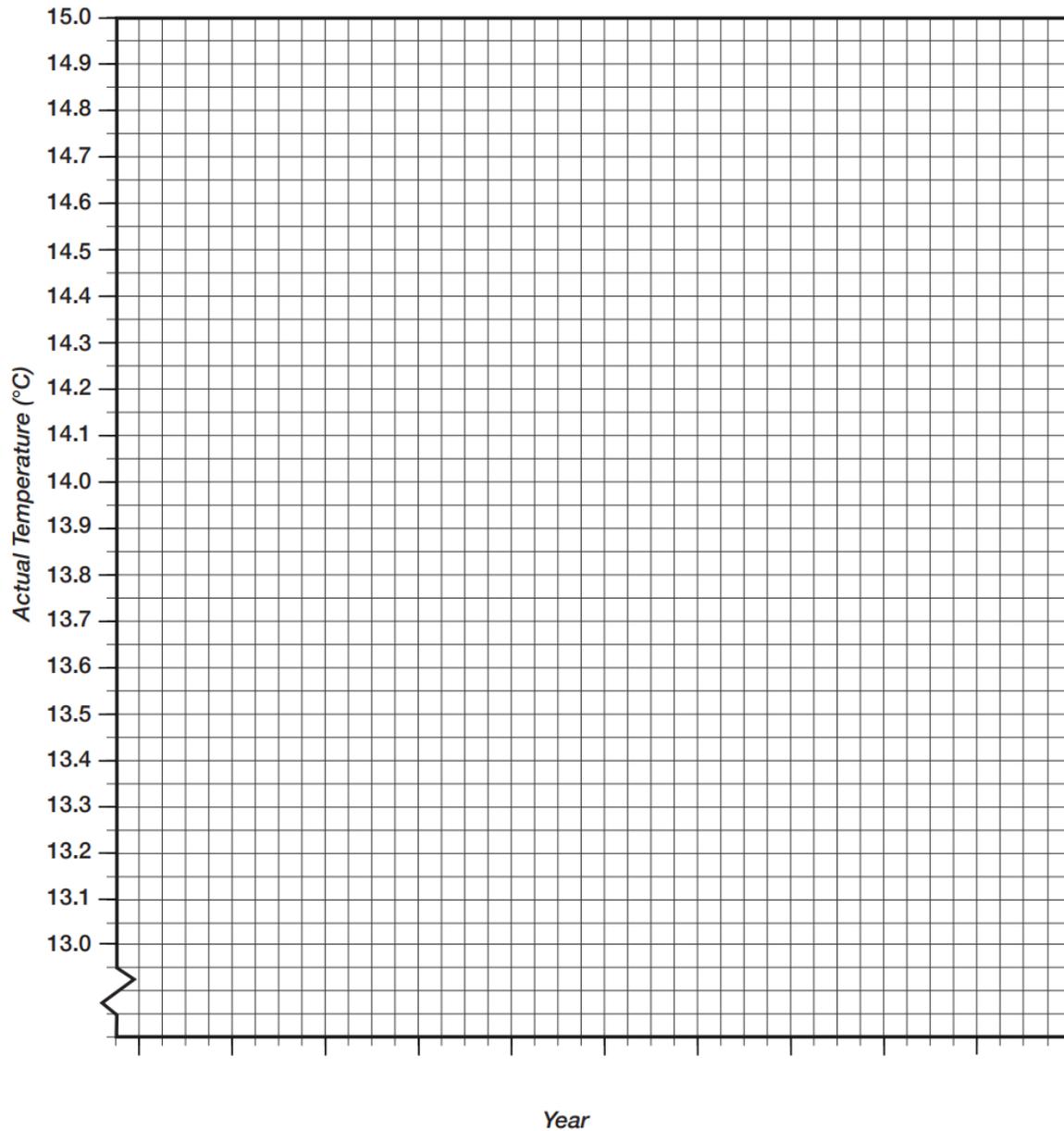
[https://www.ncdc.noaa.gov/cag/time-series/global/globe/land\\_ocean/1/12/1880-2016](https://www.ncdc.noaa.gov/cag/time-series/global/globe/land_ocean/1/12/1880-2016)

Global Annual Mean Temperature Data			
Year	Actual Temp.	Year	Actual Temp.
1880	13.7852	1950	13.8868
1885	13.6875	1955	13.7646
1890	13.578	1960	13.9204
1895	13.578	1965	13.822
1900	13.8321	1970	13.9372
1905	13.6826	1975	13.9034
1910	13.5211	1980	14.1637
1915	13.5211	1985	14.0342
1920	13.6895	1990	14.3328
1925	13.7519	1995	14.3577
1930	13.7997	2000	14.4473
1935	13.7608	2005	14.5585
1940	13.9947	2010	14.4788
1945	14.071	2015	14.7998

1. Graph the data onto the graphing sheet. Remember to evenly space the years along the horizontal axis.



## Graphing Global Temperature Trends Student Worksheet



2. Observe the trend you graphed above. Is there a trend of global temperature increase or decrease? Has this always been the case over the past 140 years? If not, when did the trend shift?

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