



# Climate Really Can Be Elementary!

June 2018

## Climate Basics...Climate Really Can Be Elementary!

The purpose of this fact sheet is to present an outline to assist in beginning a discussion on climate at a very basic and elementary level.



**Basic climate questions addressed in this fact sheet are:**

1. What do we mean by “weather” and “climate”?
2. What do “climate variability” and “climate change” mean?
3. Has the Earth’s climate ever changed?
4. Why does climate change?
5. Is the Earth’s climate changing now because of natural causes?
6. How do scientists explain the increases in the Earth’s temperature for about the last 100 years?
7. What does all of this mean?

### 1. What do we mean by “weather” and “climate”?

Let’s use an example. You’re getting ready for school. How do you decide what to wear that day? Yes, you have to base your decision on what’s in your closet, but just as important, you have to have an idea about how hot or cold it’s going to be or whether it’s going to rain or not. Right? So what do you do? You try to find out what to expect that day. Weather is what you expect to happen that day based on forecasts, or even by just looking out the window.

What about buying clothes for next month or next season? How would you know what to buy? – that would involve knowing something about the climate in your area.

Okay. Then what’s the real difference between weather and climate? Time! The difference is the length of time.

- Weather is a short length of time (up to about a week)
- Climate is based on a longer length of time (month, year, and beyond)

### 2. What do “climate variability” and “climate change” mean?

Climate variability describes changes we expect to happen with the seasons or changes that we expect to occur every few years. A statement like, “instead of our normal hot, humid summers, our area had a cooler-than normal summer this year,” would be describing climate variability.

Climate change refers to how our climate is changing over a longer period of time, such as changes in temperature over the past 30 or more years. If someone said, “the annual temperature in our area has been higher than normal for the past 10 years,” they’d be talking about climate change.

So, just as with weather versus climate, the biggest difference between the two terms (climate variability and climate change) has to do with the length of time each describes.



### 3. Has the Earth's climate ever changed?

Yes — climate change has been happening for as long as the Earth has been around. If you need proof that the climate has changed on the Earth in the past, just think about some of the creatures that we know used to live on our planet like the dinosaurs or the woolly mammoths. It doesn't take much to realize that these two species couldn't have lived in the same environment, and, since they're extinct now, something must have happened at different times in Earth's history to change the environments they lived in.



### 4. Why does climate change?

If you remember we said earlier that the Earth's climate has changed throughout its history. Why? Basically because the Earth itself has experienced changes through time. Things like a large asteroid hitting the Earth or changes in the amount of energy the Earth receives from the Sun or volcanic eruptions are all events or natural causes that can change the Earth's climate and have changed it in the past.

### 6. Then how do scientists explain the increases in the Earth's temperature for the last 100 years?

In order to try to explain this, we need to take two small trips back in time and look at some history.

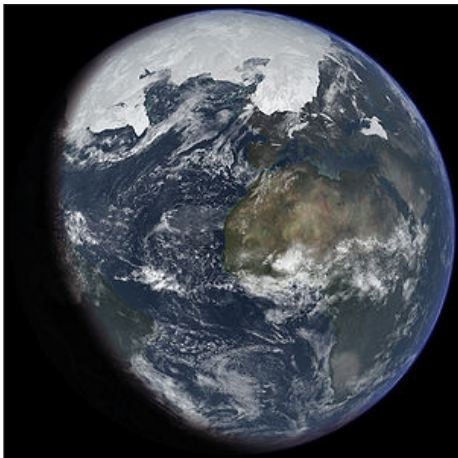
Our first trip back in time takes us to 1760, which marked the beginning of manufacturing changes – from things being made by hand to being made by machine. The source of energy to make such products and run the new machines also changed -- from wood to coal (and later to natural gas and oil).

### 5. Is the Earth's climate changing now because of natural causes?

Natural causes are certainly a part of the current picture. But scientists have determined, through observations and the study of Earth systems, that the effects from natural causes have stayed relatively the same during the last 100 years.



Our second trip back in time takes us to 1896, when a man by the name of Svante Arrhenius became interested in ice ages (ice ages are times in the past when glaciers almost completely covered the land on Earth). He wanted to know why and how ice ages had happened. Arrhenius was the first to work out how changes in the amount of carbon dioxide in the air can affect the Earth's surface temperature – this idea became known as the Greenhouse Effect. Today we include gases beyond carbon dioxide like water vapor, methane, nitrous oxide, and ozone, which are all called greenhouse gases or GHGs. Without greenhouse gases, the Earth would be too cold for us to live on.



### 7. What does all of this mean?

In the words of Dr. Jane Lubchenco, former Under Secretary of Commerce for Oceans and Atmosphere Administrator, National Oceanic and Atmospheric Administration (NOAA):

***“Climate change is real. It is here, and it is happening now, in our backyards and around the globe.”***

For more information, please visit [www.climate.gov](http://www.climate.gov)