Climate C.H.A.N.G.E.:
Concepts Having Anthropogenic & Natural Global Evidence: You Decide

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Abstract

As part of the Research Experience for Teachers (RET) program at MIT Haystack Observatory in Westford, MA, we describe a teaching unit on climate change in the lower and in the upper atmosphere. Climate C.H.A.N.G.E. gives students the skills to interpret and draw conclusions from scientific data using actual climate data. This teaching unit attempts to be as neutral and unbiased as possible in order to allow students to arrive at their own conclusions from the data. Atmospheric concepts are introduced as needed, so the students have the background information to understand and interpret the data.

Lesson Sequence

The Launch
Compare and contrast key terms

Analyzing Data
Examine data with a critical eye

Earth's Atmosphere
Comprehend there is more then one way of looking at Earth's atmosphere

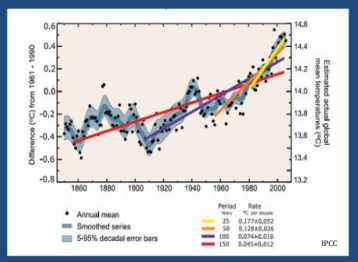
Natural Variability
Understand that Earth has been and always be changing

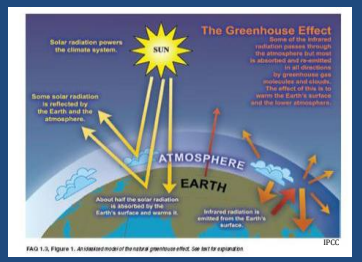
Greenhouse Effect
Identify that variations in GHG concentrations modify the greenhouse effect

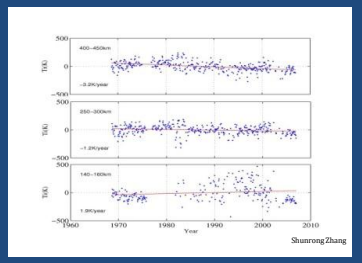
Carbon Dioxide
Identify the connection between CO_2 and temperature variations

Climate Change Indicators: Lower Atmosphere
Discuss that a small increase in global temperature can have many ramifications

Climate Change Indicators: Upper Atmosphere
Discover that change is occurring at higher altitudes by being given an inside look into an active area of research







Questions Addressed By This Unit

- How big a role does CO2 play in the increase in temperature?
- What if there were no greenhouse gases in Earth's atmosphere?
- What if the concentration of greenhouse gases continues to rise?
- What is a baseline?
- What time interval is long enough to denote a trend? 20 years? 50? 100? 1000?
- How is temperature data taken?
- What can tree rings and ice cores tell us?
- Has the worldwide temperature ever been higher than it is currently?
- Can a small increase in temperature have far reaching effects?
- How is data taken on the upper atmosphere?
- What is radiative cooling?
- What is albedo and its role in climate change?
- What cycles occur naturally and do they have a role in climate change?

Though this unit is meant to be taught as a whole, there are some parts which could be used to supplement a high school physics, chemistry, or mathematics curriculum.

We appreciate any comments or suggestions about this teaching unit.

It will be available at www.haystack.mit.edu by the end of summer 2012.

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