Yale-New Haven Teachers Institute
Description of Seminar for 2021
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The Earth's Greenhouse and Global Warming

The earth is warming at an unprecedented rate. The global community is pushing towards stabilizing warming at 2º C (~3.5º F). There are two major global processes that are critical to understanding the science of this warming. The first is the energy, or heat budget of the atmosphere, while the second is the controls on greenhouse gas concentrations in the atmosphere. This seminar for the New Haven Institute will focus on the dynamics of these two global phenomena in order to provide teachers with an understanding of the science behind climate change. Topics to be addressed will include:

Energy in the Atmosphere. Concepts covered in this unit will include short wave and long wave radiation, the major processes controlling how much of this radiation has been delivered to the earth through geological time, latent and sensible heat, the role of clouds, and albedo.

The Greenhouse Effect. Here we will review the 3 main radiatively active gases (CO_2, CH_4, and N_2O). We will discuss how they form the greenhouse effect.

Natural exchange of Carbon between the Atmosphere, Biosphere, and Oceans. This unit will track atmospheric CO_2 and how it moves through the earth's 3 major reservoirs through natural processes

Breaks in the cycles. This section will focus on how human disturbance has altered the energy and greenhouse gas budgets of the atmosphere.

Climate Change Feedbacks. This unit will cover the processes that are potential positive and negative feedbacks to warming, such as the warming of the permafrost.

Ocean Acidification. Here we will discuss how the uptake of human derived CO_2 leads to ocean acidification and the potential impacts on ocean environments.

Global Warming Myths. This unit will discuss misinformation around the science of climate change by introducing and discussing common myths around the physical science of climate change.

What you can do. In this final unit we will discuss potential ways that individuals and society can manage a warming earth.

The seminar will include readings from text books, climate primers, and summaries from IPCC publications. It will also include 4-5 hands on demonstration components. Each of the above units provides an opportunity for curriculum development by the Fellows.