

A: Atmosphere from space. This image shows where Earth's atmosphere starts and ends. Earth's atmosphere starts at the surface and goes out approximately 75 miles towards space, gradually getting progressively thinner. Greenhouse gases are present throughout Earth's atmosphere.

B: Where does CO₂ and other carbon in the atmosphere come from? A number of human activities affect the amount of CO₂ in Earth's atmosphere. Combustion of fossil fuels for transportation to run the engines of cars and planes accounts for 14.3% of additional CO₂ in the atmosphere; power plants producing electricity account for 25%; and deforestation accounts for around 11.3% of human-caused global emissions of CO₂. Limestone heated to make cement also releases CO₂ into the atmosphere. Other sources of carbon in the atmosphere include decomposition of living things, and methane production from cows and other ruminants.

C: Photosynthesis and the carbon cycle. The process of photosynthesis is responsible for the largest single flow of carbon in the carbon cycle on Earth. Photosynthesis is a chemical process by which plants, algae, and many types of bacteria use energy from the sun to convert CO₂ and water to organic compounds, especially sugars and carbohydrates.

D: Light or heat energy is absorbed, reflected, or transmitted. When photons (light or heat) from the Sun encounter something, they may be transmitted (pass through), reflected (bounce off), or absorbed (hit and not released). However, no substance behaves exclusively in just one way when it encounters light or heat energy from a source such as the Sun. For example, most substances that transmit light also reflect and absorb some light.

E: What happens to solar radiation in Earth's atmosphere? When solar radiation enters the atmosphere some of it is reflected by the atmosphere and Earth's surface. However, about half of the solar radiation is absorbed by Earth's surface, converted to heat energy, and emitted back to the atmosphere as infrared radiation. Most of that infrared radiation is absorbed and re-emitted by heat-trapping gas molecules, while some of it passes through the atmosphere out into space.

F: Electromagnetic spectrum. The term "light" typically refers to specific wavelengths or electromagnetic radiation on the electromagnetic spectrum that are visible to the human eye. In physics, the term "light" often also includes the adjacent non-visible wavelengths of the electromagnetic spectrum, such as infrared and ultraviolet light. In this greenhouse effect investigation, photons coming from visible wavelengths of light are referred to as "light" and the photons from the invisible infrared wavelengths are referred to as "heat".

G: Keeling Curve. The Keeling curve is a graph that plots the change in the concentration of atmospheric CO₂ since 1958. It is based on continuous measurements taken at the Mauna Loa Observatory in Hawaii. The fluctuations in CO₂ concentrations over a year reflect seasonal growth of plants and amounts of photosynthesis. The graph shows an overall increase in CO₂, as well as an increase in the rate of change.

