" Global Agriculture In Green House Gases"

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Introduction

The greenhouse effect is a process by which thermal radiation from a planetary surface is absorbed by atmospheric greenhouse gases, and is re-radiated in all directions. Since part of this re-radiation is back to words the surface and the lower atmosphere, it result in an elevation of the average surface temperature above what it would be in the absent of the gases.

Solar radiation at the frequencies of visible light largely passes though the atmosphere to warm the planetary surface, which then emits this energy at the lower frequencies of infared thermal radiation. Infrared radiation is absorbed by greenhouse gases, which in turn re-radiated much of the energy to the surface and lower atmosphere . The mechanism is named after the effect of solar radiation passing through glass and warming a greenhouse , but the way it retains is fundamentally so different as a greenhouse works by reducing airflow , isolating the warm air inside the structure so that heanis not lost by convection.

If an ideal thermally conductive blackbody were same distance from the sun as the Earth is it would have a temperature of about 5.3 C However, since the Earth reflects about 30% of the incoming sunlight , this idealized planet's effective temperature (the temperature of a blackbody that would emit the same amount of radiation) would be about -18 C. [7] [8]. The surface temperature of this hypothetical planted is 33 C. below Earth's actual surface temperature of approximately 14 C. [2]. The mechanism that produces this difference between the actual surface temperature and he effective temperature is due to the atmosphere and is known as the greenhouse effect.

Earth's natural greenhouse effect makes life as we know it possible. However, human, activities, primarily the burning of fossil fuels and clearing of forests, have intensified the natural greenhouse effect. Causing global warming.

History.

Main article: History of climate change science

The existence of the greenhouse effect was argued by Joseph Fourier 1824. The argument and the evidence was further strengthened by Claude Pouillet in 1827 and 1838, and reasoned from experimental observations by john Tyndall in 1859 , and more fully quantifield by svante Arrhenius in 1896.

In 1997 Alexander Graham Bell wrote Bell wrote [The unchecked burningof fossil fuesls] would have a sort of greenhouse effect", and "The net result is the greenhouse becomes a sort of hot – house." Bell went on to also advocate for the use of of alternate energy sources, such as Solar Energy.

Mechanism

The Earth receives from the Sun in the from UV, visible and near IR radiation , most of which passes through the atmosphere without being absorbed, og the total amount of energy avalible at the top of the atmosphere (TOA) , about 50 % is absorbed at the Earth's surface, Because it is warm , the surface radiates far IR thermal radiation that consists of wavelengths that are predominantly much longer than the wavelengths that were absorbed (the overlap between are incident solar spectrum and the terrestrial thermal spectrum is small enough to be neglected for most purposes). Most of this thermal radiation is wahigher equilibrium temperature than if the atmosphere were absent.

Greenhouse Gases

Main article : Greenhouse gas

By their percentage contribution to the greenhouse effect on Earth the four major gases are.

Water vapor36 -70
Carbon dioxide4-9
Methane4-9
Ozone 3-7

The major non-gas contributor to the greenhouse effect, clouds, also absorb and emit infrared radiation and thus have an effect on radiative properties of the atmosphere.

Role in climate change

Main article : Global Warming

Atmospheric gases only absorb some wavelengths of energy but are transparent to other. The absorption patterns of water vapor (blue peaks) and Carbon dioxide (pink peaks) overlap in some wavelength. Carbon dioxide is not as strong a greenhouse gas as water vapor, but it absorbs energy in wavelength (12-15 micrometers) that water vapor does not,

partially closing the "window" through which heart radiated by the surface would normally escape to space.(illustration NASA, Robert Rohde)

Strengthening of the greenhouse effect through human activities is known as the enhanced (or anthropogenic) greenhouse effect. This increase in radiative forcing from human activity is attributable mainly to increased atmospheric carbon dioxide levels. According to the latest Assessment Report from the intergovernmental Panel on Climate Change, "most of the observed increase in globally averaged temperatures since the min 20^{th} century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations"

Co_2 is produced by fossil fuel burning and other activities such a cement production and tropical deforestation. Measurement of Co_2 from the Mauna Loa about 389ppm in 2010. it reached the 400ppm milestone on May 9, 2013. The current observed amount of co_2 exceeds the geological record maximam(-300ppm) from ice core data. The effect of combustion produced carbon dioxide on the global climate, a special case of the greenhouse effect first described in 1896 by Svante Arrhenius, has also been called the called the Callendar effect.

Over the past 800,000 years, ice core data shows that carbon dioxide has varied from values as low as 180 parts per million (ppm) to the pre-industrial level of 270ppm. Paleoclimatologists consider variations in carbon dioxide concentration to be a fundamental factor influencing climate variations over this time scale.

Real greenhouses

The "greenhouse effect" of the atmosphere is named by to greenhouse which get warmer in sunlight , but the mechanism by which the atmosphere retains heat is different. A greenhouse works primarily by allowing sunlight to warm surface inside the structure but then preventing absorbed head from leaving the structure through convection, i.e. sensible heart transport. The "greenhouse effect" heats the Earth because greenhouse gases absorb outgoing radiative energy, Heating the atmosphere which then emits radiative with some of it going back towards the Earht.

A greenhouse is built of any material that passes sunlight, usually glass, or plastic. It mainly hearts up because the sun warms the ground inside, which then warms the air in the greenhouse. The air continues to heart because it is confined within the greenhouse, unlike the environment outside the greenhouse where warm air near the surface rises amd maxis with cooler air aloft. This can be demonstrated by opening small window near the roof of a greenhouse the temperature will drop considerably it has also been demonstrated experimentally (R.W. Wood, 1909) that a "greenhouse" with a cover of rock salt (which is transparent to infra red) heats up an enclosure similarly to one with a glass cover. Thus greenhouse work primarily by preventing convective cooling.

In contrast, the greenhouse effect heart the Earth because rather retaining (sensible)heart by physically preventing movement of the air, greenhouse gases act to warm the Earth by re-radiating some of the energy back towards the surface . This process may exit in real greenhouse, but comparatively unimportant there.

Bodies other than Earth

In the Solar , Mars, Venus, and the moon Titan also exhibit greenhouse effect that on Venus is particularly large, due to its atmosphere, which consists mainly of dense carbon dioxide. Titan has an anti-greenhouse effect in that its atmosphere absorbs solar radiation but is relatively transparent to infrared radiation. Pluto also exhibits superficially similar to the anti-greenhouse effect.

A runway greenhouse effect occurs if positive if feedbacks lead to the evaporation of all greenhouse gages into the atmosphere. A runway greenhouse effect involving carbon dioxide and water vapor is through to have occurred Venus.

Reference

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2. Jump up to A concise description of the greenhouse effect is given in the intergovernmental Panel on Climate Change Assessment Report, "What is the greenhouse Effect?" FAQ 1.3-AR4 Chapter 1 : Historical Overview of climate change science, IIPCC Fourth Assessment Report, Chapter 1, Page 115 : "To balance the absorbed incoming {solar} energy, the Earth must, on average, radiate the same amount of energy back to space. Because the Earth is much colder than the sun, it radiates at much longer wavelength, primarily in the infrared part of the spectrum (see Figure1) Much of this thermal radition emitted by the land and ocean is abosorbed by the atmosphere, including clouds, and reradiated back to earth. This is called the green house effect."
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