

RELATIONSHIP BETWEEN AN INCREASE OF GREENHOUSE GASES WITH CLIMATE CHANGE IN INDONESIA

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ABSTRACT

The Greenhouse Effect is a natural phenomenon that warms up the earth. It works on the same principles as the ordinary garden glasshouse, which allows the light to get in, but does not allow the heat to get out. The earth is surrounded by a shield of atmospheric gases primarily nitrogen (78 %), and oxygen (21%). The remainder of the air composition is made up of what are called as "trace gases," which include carbon dioxide (CO₂), methane (CH₄) etc. The earth maintains its temperature through insulation with a 'thermal blanket' of greenhouse gases which allow penetration of the sun's rays but prevent some heat radiating back into space. Light from the sun penetrates the atmosphere and reaches the earth surface, warming it up.

The earth then radiates much of this heat in the form of infrared rays, which have a wavelength longer than that of visible light, and are thus absorbed by the greenhouse gases. This absorption of heat warms up the atmosphere, which in turn radiates some of the heat back to earth. Greenhouse gases related to human activity are increasing at an unprecedented rate leading to an overall warming of the earth's surface. The major greenhouse gases include carbon dioxide, tropospheric ozone, nitrous oxide, methane, CFCs, and water vapor. These gases are largely transparent to solar radiation but opaque to outgoing long wave radiation.

The earth's atmosphere, and in particular carbon dioxide (CO₂) and water vapor (H₂O), acts like a greenhouse, trapping heat and making the earth warmer. This is one of the earth's natural processes, without which the earth would be an icy 32°C colder! However, human activity is adding more CO₂ to the atmosphere, possibly enhancing the greenhouse effect and potentially resulting in global warming.

The burning of fossil fuels, like oil, coal and natural gases, are sources of energy that release CO₂ into the atmosphere. CO₂ is one of the primary greenhouse gases in the atmosphere which actually traps outgoing heat and warms the earth. Existing data (ref) shows that an increase of fossil fuel usage in Indonesia increases the CO₂ concentration, which in turn increases the average surface temperature, following a linear regression equation $y=0.014x - 27.3$, where x is the fossil fuel usage and y is the average surface temperature.

The increase in the amount of these greenhouse gases in the atmosphere would result in an increase in the amount of infrared radiation that is trapped, resulting in the rise of the average temperature of the earth. Computer predictions indicate that by the year 2050 the average temperature of the earth could rise by as much as 1.5°C - 4°C. Such a increase in temperature may sound small, but climatologists believe it could dramatically effect future climates.

Global temperatures are rising. Observations collected over the last century suggest that the average land surface temperature has risen 0.8-1.0°F (0.45-0.6°C) in the last century. The surface of the ocean has also been warming at a similar rate. Studies that combine land and sea measurements have generally estimated that global temperatures have warmed 0.5-1.0°F (0.3-0.6°C) in the last century. Surface temperature mean in Indonesia are not rising uniformly. Night-time low temperatures are rising on average about twice as rapidly as daytime highs. Urban areas are warming somewhat more rapidly than rural areas, because of both the changes in land cover and the consumption of energy that take place in densely developed areas.

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