



2nd International Earth Science & Global Geology Conference

December 3-4, 2018 Dubai, UAE

Consequences of the Greenhouse Gases in an Earth Atmosphere

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A greenhouse gas is a gas in an atmosphere that absorbs and emits radiant energy within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, and ozone. Without greenhouse gases, the average temperature of Earth's surface would be about $-18\text{ }^{\circ}\text{C}$ ($0\text{ }^{\circ}\text{F}$) rather than the present average of $15\text{ }^{\circ}\text{C}$ ($59\text{ }^{\circ}\text{F}$). In the Solar System, the atmospheres of Venus, Mars and Titan also contain gases. Human activities since the beginning of the Industrial Revolution (around 1750) have produced a 40% increase in the atmospheric concentration of carbon dioxide (CO_2), from 280 ppm in 1750 to 406 ppm in early 2017. This increase has occurred despite the uptake of more than half of the emissions by various natural "sinks" involved in the carbon cycle. The vast majority of anthropogenic carbon dioxide emissions (i.e., emissions produced by human activities) come from combustion of fossil fuels, principally coal, oil, and natural gas, with comparatively modest additional contributions coming from deforestation, changes in land use, soil erosion, and agriculture. It has been estimated that if greenhouse gas emissions continue at their present rate, Earth's surface temperature could exceed historical values as early as 2047, with potentially harmful effects on ecosystems, biodiversity and the livelihoods of people worldwide. Recent estimates also suggest that at current emission rates the Earth could pass a threshold of $2\text{ }^{\circ}\text{C}$ global warming, which the United Nations' IPCC designated as the upper limit to avoid "dangerous" global warming, by 2036.