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Factors Contributing to Increased Atmospheric Temperature

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ABSTRACT

Increased atmospheric temperatures are a prime factor contributing to changing the world climate, aroused by human and natural sources. Anthropogenic practices, such as deforestation, fossil fuel burning, and industrial secretions, predominantly enhance the greenhouse effect and give rise to pronounced levels of CO_2, CH_4, and N_2O. These gases prevent the escape of heat from the atmosphere to space and exaggerate global warming. Besides this, natural processes, for instance, solar radiation, volcanic eruptions, and ocean currents, also contribute to climate change. As atmospheric temperatures are increasing day by day, preventive measures are required to prevent drastic environmental changes. These efforts include promoting carbon sinks, and transmission to renewable energy sources that will reduce emissions of greenhouse gases in the environment. In addition to this, adaptive strategies including climate-smart agriculture, and resilient infrastructure are essential for encountering the inevitable effects of climate change. This article highlights the primary factors involving increasing atmospheric temperature and explores atmospheric temperature mitigating strategies.

Keywords: Climate, Temperature, Human activity

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Introduction

Climate change is among the most important environmental issues, with significant entanglement for humans, ecosystems, and global economies. Human activities are the major source of the past century's devastating increased temperature [1]. Apprehension of the factors contributing to high-temperature levels will help us mitigate these factors that will regulate the temperature towards a normal level. The objective of this article is to explore the factors that prompt rising temperatures, specifically natural and human-inducing factors (anthropogenic), and ultimately their mitigating strategies.

Natural Factors in Increased Atmospheric Temperature

Harmful Solar Radiations

Solar energy is the prime source of heat for the climate system of Earth. Any change in the solar radiation cycle will influence the temperature variations of the atmosphere.

Ocean Currents

Ocean Currents perform a crucial role in maintaining the climate through the distribution of heat on the whole planet. La Niña and El Niño events are the shifts in ocean circulation, involved in climate variation. Majorly, El Niño leads to disruption in ocean currents and decreases its property to absorb heat hence giving rise to a rise in global temperatures [2]. The Atlantic Meridional Overturning Circulation transfers heat from the equator to the northern latitudes, any destruction to this circulation, could cause marked and long-term temperature variabilities.

Volcanic Eruptions

Volcanic activity could affect the atmospheric temperature, these eruptions secrete SO_2, ash, and aerosols, reverting the solar radiation in space and producing a short-term cooling effect. Volcanoes also release some amounts of greenhouse gases, particularly CO_2, and contribute to temperature variations [3].

Human Factors

These anthropogenic factors contribute mainly to climate change.

Greenhouse Gases

A higher amount of greenhouse gases leads to the greenhouse effect, which involves enhanced atmospheric temperature. Normally, greenhouse gases trap some heat in the atmosphere, avoid escaping into space, and maintain the atmospheric temperature. Excessive emissions of these gases will lead to drastic effects by trapping all the heat in the atmosphere.

CO_2 is the main greenhouse gas, evacuated by human activities such as transportation, industrial work, fossil fuels burning (coal, natural gas, and oil), and deforestation [4]. This huge amount of CO_2 is about 415 ppm and prompts the greenhouse effect. This increased amount continuously warms the climate until there are reductions in these human activities. Methane is less common than CO_2 but potent and has a high global warming effect. CH_4 arises particularly from fossil fuel extraction (coal and natural gas mining), agriculture rice paddies, livestock digestion, and landfills [5]. CH_4 traps 25 times more heat in the climate as compared to CO_2.

Nitrous oxide is released by agricultural activities (synthetic fertilizers), fossil fuel burning, and other industrial activities. N_2O has 300 times more potential as compared to CO_2 to heat the atmosphere [6]. Using nitrogenous-based fertilizers rather than synthetic fertilizers and management of livestock waste could reduce the emission of N_2O. Fluorinated gases such as HFCs (hydrofluorocarbons), SF_6 (sulfur hexafluoride), and PFCs (perfluorocarbons) are artificial greenhouse gases applied to industries for air conditioning, insulation, and refrigeration. These synthetic gases have 1000 times more power to global warming as compared to CO_2. Globally, a strategy like the Kigali Amendment to the Montreal Protocol is implemented to block the application of HFCs and reduce the production of fluorinated gases in the atmosphere [7].

Industrial Revolution

Industrial activities such as energy production, construction, and manufacturing are influenced by factors in promoting global temperature. Factories and power plants on burn fossil fuels release significant amounts of CO_2 [8]. Aerosols are tiny practices that are released from industries and provide cooling effects by limiting sunlight away from the atmosphere. But these cooling effects are far overwhelmed by the global warming effects.

Land-Use and Deforestation

Forests are the major contributors to carbon absorption through the process of photosynthesis. Forests cutting reduce carbon usage and contribute to the greenhouse effect. Deforestation at large scale in Southeast Asia, the Amazon, and Africa, reduces the absorption capacity of carbon dioxide and releases CO2 in the environment [9]. Deforestation helps in the destruction of local weather by reducing rainfall and causing global warming.

Preventive Measures for Reducing Atmospheric Temperature

Increasing Carbon Absorption

Reforestation enforcement and preserving wetlands can improve the absorption of carbon dioxide. Continuous Agricultural practices like management of soil and agroforestry will help in offset in atmosphere and sinks by the biomass and soil.

Reduction in Greenhouse Gas Emissions

To improve the climatic conditions there is a demand for reducing the greenhouse effects and global warming. This can be done by using renewable sources rather than fossil fuels. These renewable energy resources are wind, solar, and geothermal energy sources that are important for mitigating carbon dioxide emissions [10]. Moreover, improvement in energy efficiency in transportation, buildings, and industrial practices could reduce potential greenhouse gas emissions.

Adapting to Climate Change

Along with mitigation strategies, adaptation measures are essential to combat the effects of climate variations. These adaptive measures include improving disaster preparedness, manufacturing resilient infrastructure, and leading climate-smart agriculture.

Conclusion

The factors comprising enhanced atmospheric temperature are both natural and anthropogenic. Human-related activities, prominently deforestation, burning of fossil fuels, and industrial processes, greatly outweighed the rapid temperature variations. Among natural factors, solar radiation and volcanic eruptions contributed. As the atmospheric temperature change is continuous, urgent strategies are the need of time to mitigate climate change by decreasing the greenhouse effect, increasing carbon sinks, and preparing for the unavoidable harmful impacts of heating the world. By considering these factors, scientists can make better strategic decisions to preserve and improve the climate.

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