Emissions

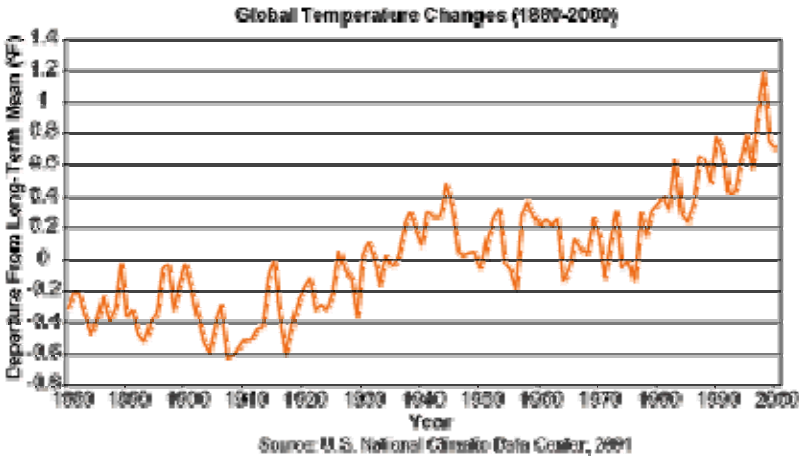
Since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased nearly 30%, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15%. These increases have enhanced the heat-trapping capability of the earth's atmosphere. Sulfate aerosols, a common air pollutant, cool the atmosphere by reflecting light back into space; however, sulfates are short-lived in the atmosphere and vary regionally.

Why are greenhouse gas concentrations increasing? Scientists generally believe that the combustion of fossil fuels and other human activities are the primary reason for the increased concentration of carbon dioxide. Plant respiration and the decomposition of organic matter release more than 10 times the CO_2 released by human activities; but these releases have generally been in balance during the centuries leading up to the industrial revolution with carbon dioxide absorbed by terrestrial vegetation and the oceans.

What has changed in the last few hundred years is the additional release of carbon dioxide by human activities. Fossil fuels burned to run cars and trucks, heat homes and businesses, and power factories are responsible for about 98% of U.S. carbon dioxide emissions, 24% of methane emissions, and 18% of nitrous oxide emissions. Increased agriculture, deforestation, landfills, industrial production, and mining also contribute a significant share of emissions. In 1997, the United States emitted about one-fifth of total global greenhouse gases.

Estimating future emissions is difficult, because it depends on demographic, economic, technological, policy, and institutional developments. Several emissions scenarios have been developed based on differing projections of these underlying factors. For example, by 2100, in the absence of emissions control policies, carbon dioxide concentrations are projected to be 30-150% higher than today's levels

Global mean surface temperatures have increased 0.5-1.0°F since the late 19th century. The 20th century's 10 warmest years all occurred in the last 15 years of the century. Of these, 1998 was the warmest year on record. The snow cover in the Northern Hemisphere and floating ice in the Arctic Ocean have decreased. Globally, sea level has risen 4-8 inches over the past century. Worldwide precipitation over land has increased by about one percent. The frequency of extreme rainfall events has increased throughout much of the United States.

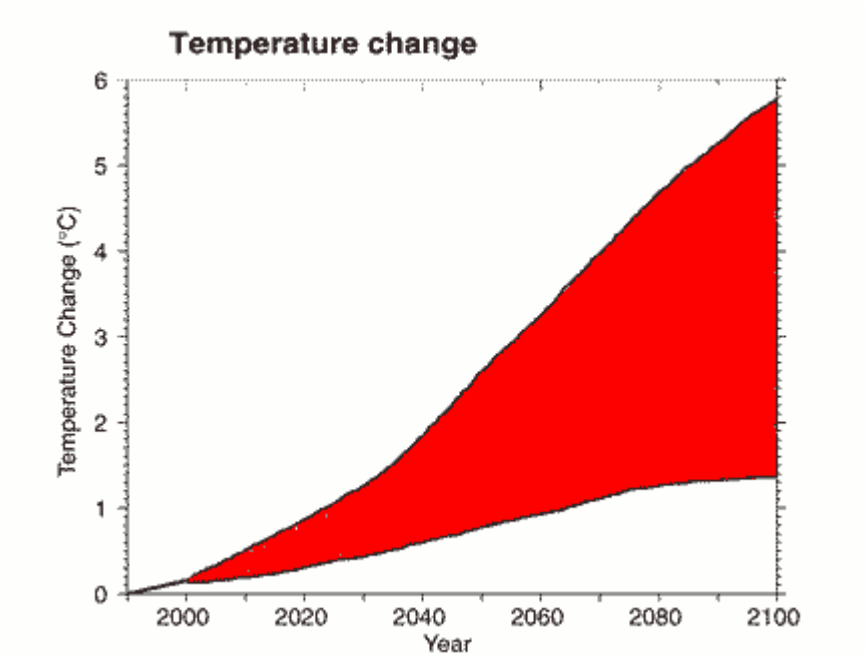


Increasing concentrations of greenhouse gases are likely to accelerate the rate of climate change. Scientists expect that the average global surface temperature could rise 1-4.5°F (0.6-2.5°C) in the next fifty years, and 2.2-10°F (1.4-5.8°C) in the next century, with significant regional variation. Evaporation will increase as the climate warms, which will increase average global precipitation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Sea level is likely to rise two feet along most of the U.S. coast.

Calculations of climate change for specific areas are much less reliable than global ones, and it is unclear whether regional climate will become more variable.

Since 1979, scientists have generally agreed that a doubling of atmospheric carbon dioxide increases the earth's average surface temperature by 3-8°F (1.5-4.5°C). More recent studies have suggested that the warming is likely to occur more rapidly over land than the open seas. Moreover, the warming in temperatures tends to lag behind the increase in greenhouse gases. At first, the cooler oceans will tend to absorb much of the additional heat and thereby decrease the warming of the atmosphere. Only when the ocean comes into equilibrium with the higher level of CO_2 will the full warming occur.

The Intergovernmental Panel on Climate Change estimates that the concentration of CO_2 will double from pre-industrial levels by the mid- to late 21st century. Currently, the panel projects a global average warming of 1.0-4.5°F (0.6-2.5°C) in the next fifty years and 2.5 to 10.4°F (1.4 to 5.8°C) by the year 2100, compared with the global average temperature in 1990. The wide range in projected temperatures is due to varying assumptions about future trends in greenhouse gas emissions and sulfate aerosols.



This background information is from the Environmental protection Agency

For more information see:

http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html