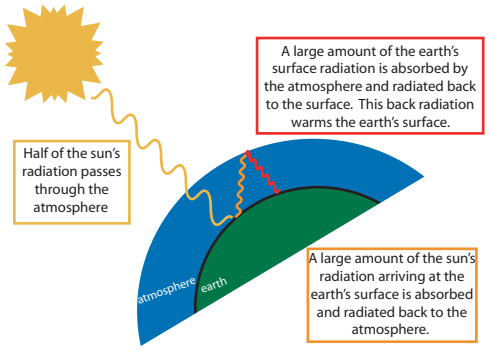
Global Climate Change Primer

What is the greenhouse effect?

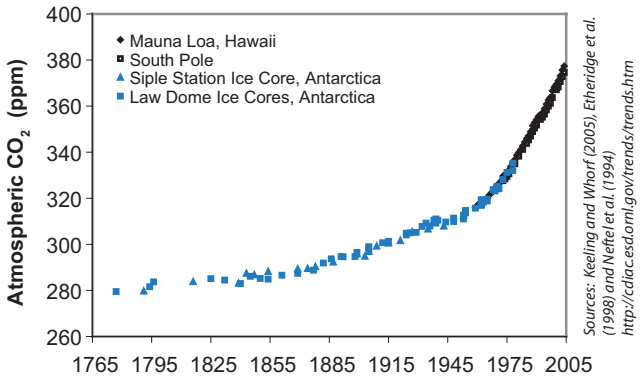
Greenhouse gases in the atmosphere increase the Earth's surface air temperature by absorbing and reemitting radiation from the Earth's surface. Without atmospheric greenhouse gases such as water vapor, carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (NO_2), the globally averaged surface air temperature would be 0 ˚F instead of the currently observed globally averaged surface air temperature of around 59 ˚F.



Sources: Figure based on IPCC Figure 1.2.

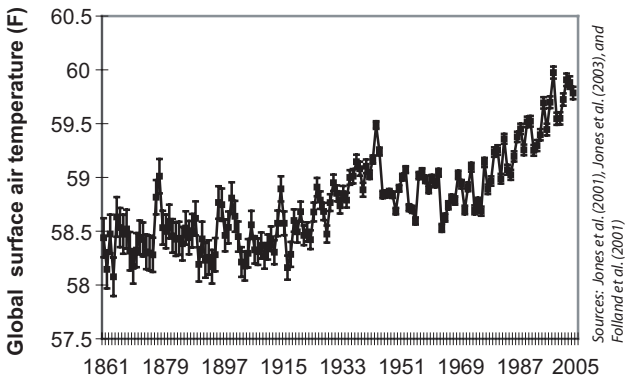
Radiation pathway for the greenhouse effect

RECENT CHANGES RELATED TO THE GREENHOUSE EFFECT



Sources: Keeling and Whorf (2005), Etheridge et al. (1998) and Neftel et al. (1994) http://cdiac.esd.ornl.gov/trends/trends.htm

Atmospheric CO_2 increases over the last 240 years



Sources: Jones et al. (2001), Jones et al. (2003), and Folland et al. (2001)

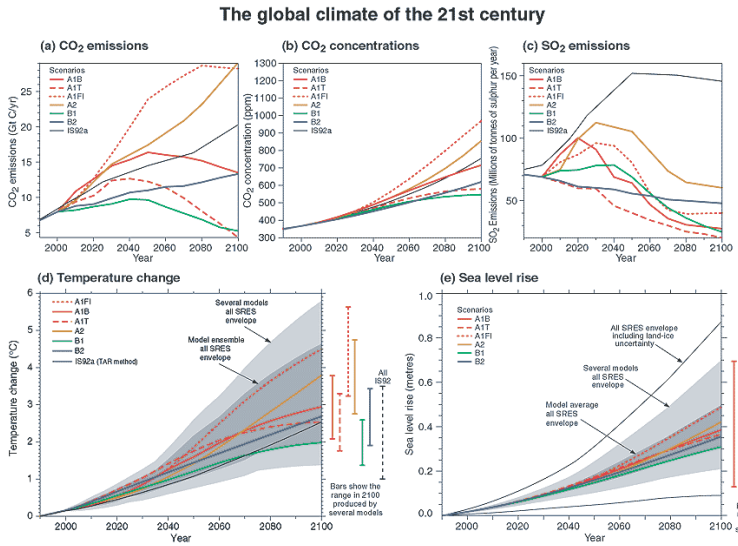
Global surface air temperature increases over the last 144 years

Humans are increasing the concentration of greenhouse gases in our atmosphere. Since the industrial revolution began in 1750, atmospheric CO_2 has increased 34%, atmospheric CH_4 has increased 154%, and atmospheric N_2O has increased 22%. The burning of fossil fuels, forest clearing, and other human activities are largely responsible for these increases. Because of their long lifetimes, these gases will be in our atmosphere for decades to centuries.

In the past century, global surface air temperatures rose 1 ˚F and global average sea level rose 4-8 inches. It is very likely that these global changes are related to increases in greenhouse gases, especially over the last 50 years. Observed global warming has regional variability.

PROJECTIONS OF FUTURE GLOBAL CLIMATE

The 2001 Intergovernmental Panel on Climate Change (IPCC) assessment projects that global surface air temperature could increase by 2.5 to 10.4 ˚F and global sea level could rise 4-35 inches between 1990 and 2100. The amount of projected climate change varies from place to place around the world. Future climate will depend on both natural changes and the response of the climate system to human choices about emissions.



Sources: .Figure 5 from the IPCC 2001 Assessment Working Group I Summary for Policymakers.

Future climate depends on natural changes and human activities.

Prepared by Jennifer Kay, Joe Casola, Amy Snover, and the Climate Impacts Group (CIG) at the University of Washington for King County's October 27, 2005 Climate Change Conference. This and other conference materials are available at: http://www.cses.washington.edu/cig/outreach/workshops/kc2005.shtml