

12.340x Geochemistry of other trace gases-- non-carbon dioxide greenhouse gases.

In this and the following sections, we will further explore greenhouse gases and their warming potential. We will now focus on the non-CO₂, the non-carbon dioxide greenhouse gases, and conclude with a discussion of CFCs.

As discussed in the last lecture, we can use these figures to visualize that greenhouse gas concentrations have varied over the last 20,000 years. There has been an unprecedented, substantial rise in the greenhouse gas concentration over the last two centuries, denoted by the red arrows in the figures. And this is due to anthropogenic activities.

This has also led to an unprecedented rise over this time period in the rate of change of radiative forcing, as shown in the figure at lower right. Anthropogenic CO₂ emissions are dominated by fossil fuel burning-- predominantly from energy production, industry, and transportation.

Methane and nitrous oxide-- although having less of a radiative impact-- are noteworthy since they come from agricultural activities. On a per year basis, methane and nitrous oxide are about 60% and 40%, respectively, due to anthropogenic emissions. The remainder is from natural sources.

Much like the Keeling curve for carbon dioxide, the atmospheric abundance of nitrous oxide is rising. These data are from the Advanced Global Atmospheric Gases Experiment, also known as AGAGE. We see an increasing concentration for this species from 300 to 320 parts per billion in the 25 years preceding 2005. These data were the most current used in the 2007 Intergovernmental Panel on Climate Change Report.