

Effects of Volcanic Eruptions on Stratospheric Ozone Recovery

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The significant ozone losses observed after the eruption of Mount Pinatubo have been shown to be caused by an enhancement in the sulfate aerosol levels. It has been suggested that the aerosols produced as a result of large volcanos in a future climate made colder due to greenhouse gas emissions could strongly affect future ozone recovery. The effect of future volcanic eruptions on ozone recovery has been studied with an interactive 2D chemistry-radiation-dynamics model, which takes into account the time varying chlorine loading as well as cooling due to increasing carbon dioxide. Long model runs out to the year 2050 have been carried out, in which volcanos having the characteristics of the Mount Pinatubo volcano were erupted in the model at ten year intervals. Compared to a nonvolcanic run, transient reductions of globally averaged column ozone of 2-3% were computed as a result of each of these eruptions, with the ozone recovering to that computed for the nonvolcanic case in about five years after the eruption. Computed springtime Arctic column ozone losses of from 10 to 18% also recovered to the nonvolcanic case within five years. These results suggest that the long term recovery of ozone would not be strongly affected by volcanic eruptions. Of note is the fact that the response of stratospheric ozone to volcanic eruptions computed here disagrees with the results of Tie and Brasseur [1995], who computed ozone increases after large volcanic eruptions during future years with reduced chlorine loading.