Reference

Scientific studies of aerosols

Aerosol particles may be solid or liquid; they range in size from 0.01 microns to several tens of microns. For example, cigarette smoke particles are in the middle of this size range and typical cloud drops are 10 or more microns in diameter. Under normal circumstances, the majority of aerosols form a thin haze in the lower atmosphere (troposphere), where they are washed out of the air by rain within about a week. Aerosols are also found in a part of the atmosphere just above the troposphere (called the "stratosphere"). A severe volcanic eruption, such as Mount Pinatubo in the Philippines in 1991, can put large amounts of aerosol into the stratosphere (Figure 3). Since it does not rain in the stratosphere, these aerosols can remain there for many months, producing beautiful sunsets around the globe, and possibly causing summer temperatures to be cooler than normal. Scientists estimate that Mount Pinatubo injected about 20 million tons of sulfur dioxide into the atmosphere, cooling average global temperatures over the following year by about half a degree.

During the last 30 years, scientist have identified several major aerosol types and they have developed general ideas about the amount of aerosol to be found in different seasons and locations. Still, key details about the amount and properties of aerosols are needed to calculate even their current effect on surface temperatures; so far, it has not been possible to make these measurements on a global scale.

"Aerosols are one of the least understood influences on global climate"

Aerosols & Climate Change

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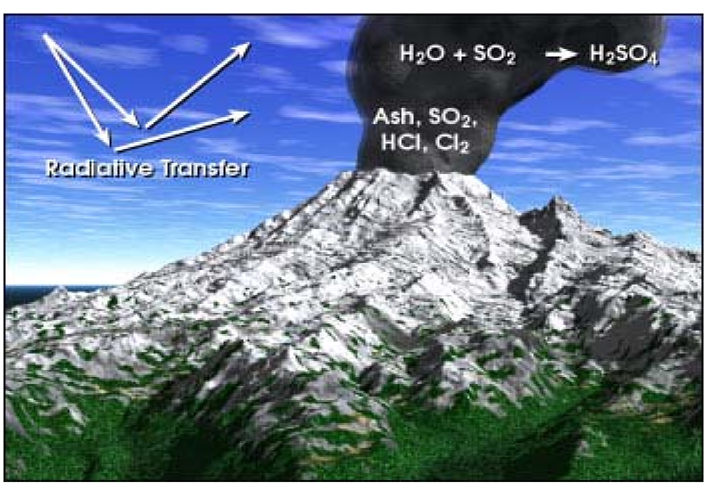

Figure 3. As volcanoes erupt, they blast huge clouds into the atmosphere. These clouds are made up of particles and gases, including sulfur dioxide (SO2). Millions of tons of sulfur dioxide gas from a major volcanic eruption can reach the stratosphere. There, with the help of water vapor (H2O), the sulfur dioxide converts to tiny persistent sulfuric acid (H2SO4) aerosols. These aerosols reflect energy coming from the sun, thereby preventing the sun's rays from heating Earth's

surface. Volcanic eruptions are thought to be responsible for the global cooling that has been observed for a few years after a major eruption. The amount and global extent of the cooling depend on the force of the eruption and, possibly, on its location relative to prevailing wind patterns. (Graphic by Robert Simmon, Goddard DAAC)

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