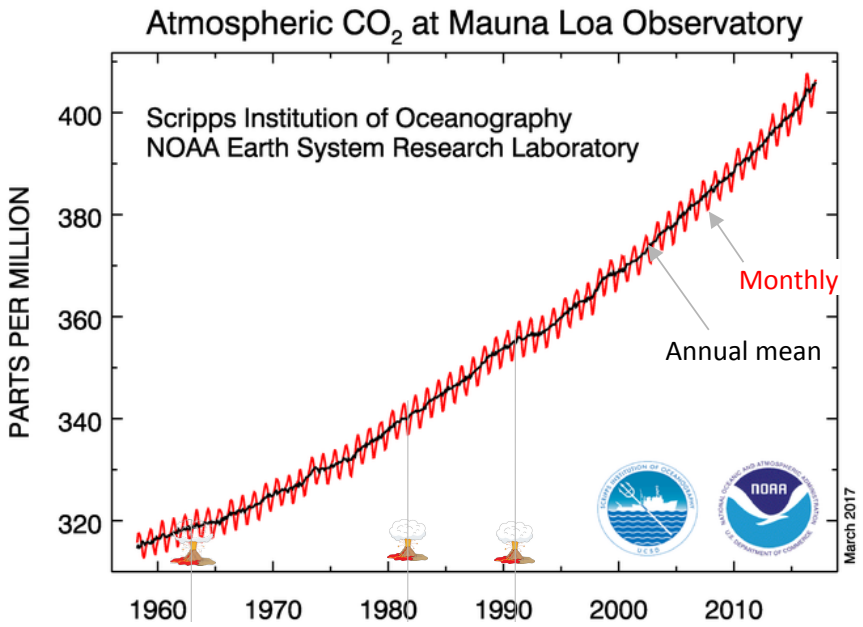

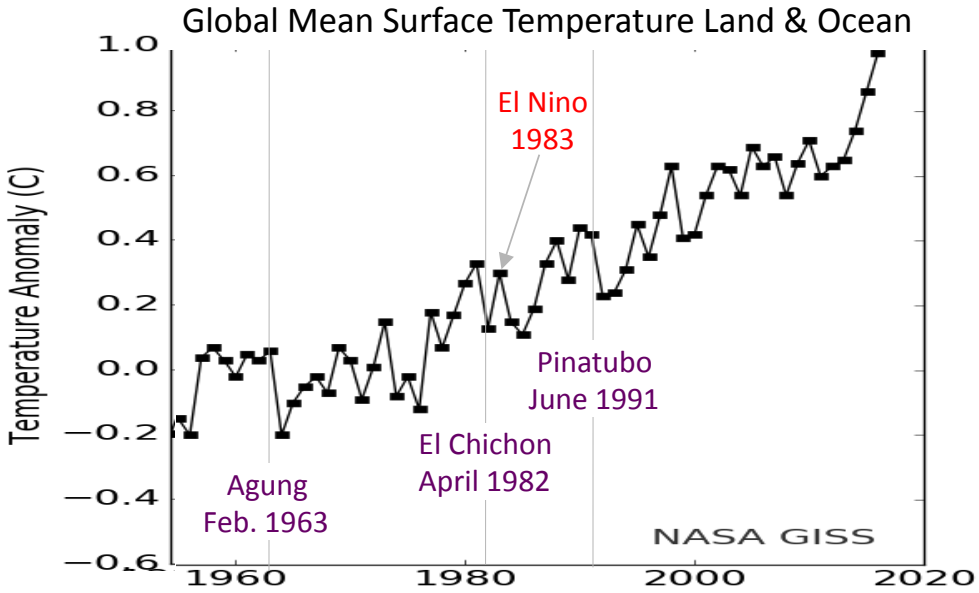

Do Volcanoes inject CO_2 into the atmosphere? Yes, Volcanoes emit large amounts of CO_2 *but it is insignificant compared to emissions from humans*. The top graph is Atmospheric CO_2 measured at Mauna Loa Hawaii which is representative of the global mean concentration in parts per million (ppm).

The gradual increase in CO_2 from 1957 to today (black trace) is largely from human activities. The saw tool pattern of the red monthly measurements is from the natural biogenic annual cycle: Plants suck CO_2 out of the atmosphere during summer and release it during winter.

Also shown are three major volcanic eruptions of the 20th Century. If these events injected significant amounts of CO_2 you would see a response (bump up) in the concentration after each volcano. Instead there is a steady CO_2 increase of 1-2 parts per million each year.

Do Volcanoes impact the climate? Yes, The three 20th century eruptions cooled the global mean atmospheric temperature about 0.2 C. There was a sharp drop in temperature after Agung and Pinatubo, but the response for El Chichon was complicated by a simultaneous strong El Nino event. During El Nino conditions the oceans pump massive amounts of heat energy into the atmosphere causing warming on the order of 0.1 C

Solar Radiation Management – GeoEngineering. If needed future generations can cool the climate by replicating a volcanic eruption. Fleets of aircraft would spray Sulfur dioxide (SO_2) into the upper atmosphere. The SO_2 would form small aerosol particles which would reflect sunlight and cool the climate. But this should only be done as a last resort.

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