

# **Volcanoes Rule Climate Change While Greenhouse-Warming Theory is Rapidly Becoming the Most Expensive Mistake Ever Made in the History of Science**

Peter L. Ward

U.S. Geological Survey retired, Jackson, WY [peward@wyoming.com](mailto:peward@wyoming.com)

Since 120 ka, detailed data from Greenland ice cores document 25 erratic sequences of rapid warming followed by slow incremental cooling over millennia. The greatest warming (12 to 9.5 ka) was contemporaneous with the greatest volcanic sulfate measured in the same cores. Could volcanism be causing warming? How? Large explosive volcanic eruptions are well-observed to cause global cooling of  $\sim 0.5$  °C for 2 to 4 years.

Warming of 0.6 °C from 1975 to 1998 has been traced to CFC gases depleting the ozone layer in winter, allowing more very hot UV-B radiation to reach Earth. The 1987 Montreal Protocol limited manufacturing of CFCs, stopping their increase by 1993, stopping the increase in ozone depletion by 1995 and stopping the increase in temperature by 1998.

The greatest known depletion of ozone followed the 1991 eruption of Pinatubo, which ejected megatons of chlorine into the stratosphere. Temperatures rose as much as 3.5 °C that winter. But explosive eruptions also form aerosols in the lower stratosphere that eventually grow large enough to reflect and scatter sunlight, causing net global cooling.

Major effusive, basaltic eruptions emit 10-times more halogens, do not form aerosols and are observed throughout Earth history to occur with major warming—the more extensive the basalt flow, the greater the warming. Basaltic volcanism in Iceland was most active from 12 to 9.5 ka and in 2014-15 making 2016 the hottest year on record.

Basalts covering 7 million km<sup>2</sup> of Siberia warmed oceans to hot tub temperatures around 251 Ma, causing the greatest known mass extinction and ending the Paleozoic era. Major effusive basaltic eruptions and related warming typically end geologic time periods and are most extensive when continental rifting is widespread. Major explosive volcanic eruptions and related cooling are most frequent when subduction is widespread. Plate tectonics rules volcanism. Volcanism rules climate.

Greenhouse gas emissions correlate poorly with warming throughout Earth history. Greenhouse-warming theory is based on numerous assumptions about heat made in 1798, 1822, 1859, and 1896 that turn out to be mistaken. It is physically impossible for greenhouse gas emissions to cause global warming (Physically-Impossible.com). Greenhouse-warming theory is becoming the most expensive mistake ever made in the history of science.