Session **V042: Volcano-Atmosphere Interactions** at the AGU Fall Meeting 2015

Climate Throughout Geologic Time Was Cooled by Sequences of Explosive Volcanic Eruptions Forming Aerosols That Reflect and Scatter Ultraviolet Solar Radiation and Warmed by Relatively Continuous Extrusion of Basaltic Lava that Depletes Ozone, Allowing More Solar Ultraviolet Radiation to Reach Earth

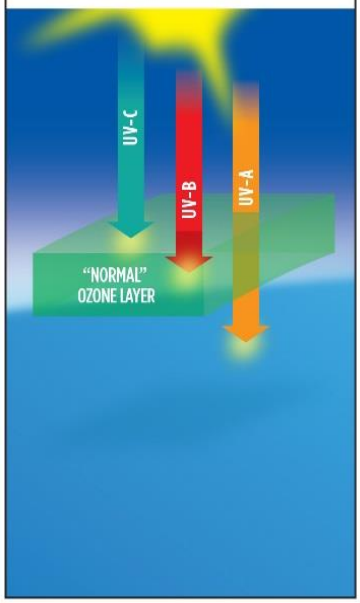
Active volcanoes of all sizes and eruptive styles, emit chlorine and bromine gases observed to deplete ozone. Effusive, basaltic volcanic eruptions, typical in Hawaii and Iceland, extrude large lava flows, depleting ozone and causing global warming. Major explosive volcanoes also deplete ozone with the same emissions, causing winter warming, but in addition eject megatons of water and sulfur dioxide into the lower stratosphere where they form sulfuric-acid aerosols whose particles grow large enough to reflect and scatter ultraviolet sunlight, causing net global cooling for a few years. The relative amounts of explosive and effusive volcanism are determined by the configuration of tectonic plates moving around Earth's surface. Detailed studies of climate change throughout geologic history, and since 1965, are not well explained by greenhouse-gas theory, but are explained quite clearly at OzoneDepletionTheory.info.

Ozone concentrations vary substantially by the minute and show close relationships to weather system highs and lows (as pointed out by Dobson in the 1920s), to the height of the tropopause, and to the strength and location of polar vortices and jet streams. Integrating the effects of volcanism on ozone concentrations and the effects of ozone concentrations on synoptic weather patterns should improve weather forecasting. For example, the volcano Bárðarbunga, in central Iceland, extruded 85 km^2 of basaltic lava between August 29, 2014, and February 28, 2015, having a profound effect on weather.

Most surprising, more than a week before the March 4 eruption of Eyjafjallajökull in 2010, substantial amounts of ozone were released in the vicinity of the volcano precisely when surface deformation showed that magma first began moving up from sills below 4 km depth. Ozone similarly appears to have been emitted 3.5 months before the Pinatubo eruption in 1991. Readily available daily maps of ozone concentrations may allow early warning of an imminent volcanic eruption.

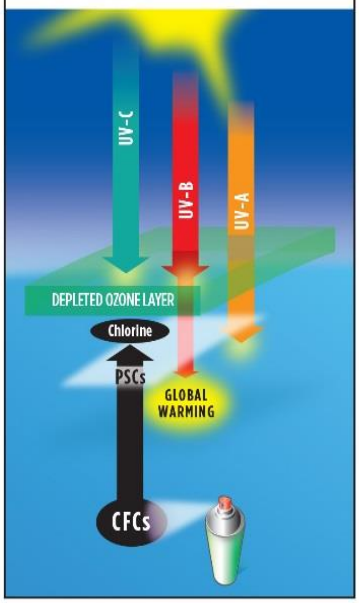
NORMAL CONDITIONS

UV-C keeps atmosphere warm
UV-B keeps ozone layer warm
UV-A & sunlight keeps Earth warm



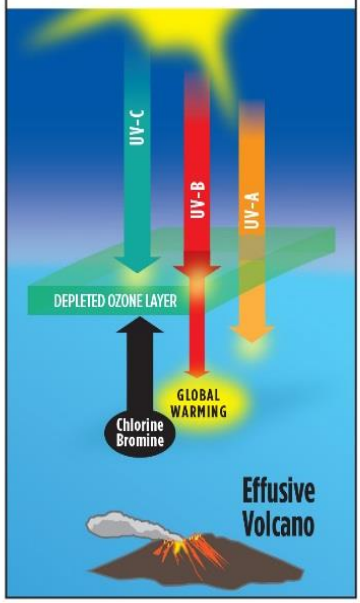
GLOBAL WARMING

CFCs in polar stratospheric clouds (PSCs) release chlorine depleting ozone cooling ozone layer & warming Earth



GLOBAL WARMING

Volcanoes release Chlorine & Bromine depleting ozone cooling ozone layer & warming Earth



GLOBAL COOLING

Explosive volcanoes also eject Sulfur Dioxide into stratosphere forming aerosols that reflect & disperse sunlight causing net cooling of Earth