The Global Warming Hiatus Is Explained Quite Directly by the Ozone-Depletion Theory of Global Warming

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Life on Earth, as we know it, can exist only because the highest-energy, DNA-damaging, ultraviolet thermal radiation from the sun is absorbed in the ionosphere and stratosphere, maintaining temperatures at the stratopause (50-55 km above Earth) approximately 55°C warmer than at the tropopause (9-17 km). Much of this warming comes from photodissociation of oxygen and ozone in the Chapman cycle that is continually recreating the very dynamic ozone layer in the lower stratosphere. When ozone is depleted, more ultraviolet-B radiation in the range of 290-330 nanometers (900-1034 terahertz) (3.7-4.3 electron volts, eV) reaches Earth. While infrared radiation barely penetrates the surface of the ocean, ultraviolet radiation penetrates depths of more than 10 meters and thus its thermal energy is not radiated back into space at night. Oceans, covering 71% of Earth, contain the vast majority of the heat capacity in the ocean/atmosphere system.

Greenhouse-gas theory assumes that thermal energy travels through space as waves so that energy is proportional to the square of the wave amplitude. Most climatologists therefore conclude that the broad bands of infrared energy absorbed by greenhouse-gases contain much more thermal energy than the narrow band of ultraviolet energy reaching Earth due to ozone depletion. But waves deform the bonds that hold matter together. There is no matter in space, and there are no bonds. Thermal energy is space is simply frequency transmitted just like radio signals by oscillations on the surface of matter. Max Planck showed in 1900 that radiant energy (E) is equal to frequency (ν, the Greek letter nu) times the Planck constant (h). $E=h\nu$ is a quantity used widely in photochemical equations and explains why visible light is much more energetic than infrared radiation so that it can cause photosynthesis, why ultraviolet radiation is much more energetic than visible light so that it can cause sunburn and skin cancer, and why X-rays and nuclear radiation are even more energetic, causing death when absorbed in sufficient quantities. The ultraviolet thermal energy reaching earth when ozone is depleted (4 eV) is approximately 50 times the infrared energy absorbed by greenhouse gases (0.08 eV) and it is not a function of bandwidth. Global temperatures are determined primarily by the optical thickness of the ozone layer. More ozone warms the lower stratosphere and cools Earth. Less ozone cools the lower stratosphere and warms Earth.

Mean global temperatures on Earth were relatively constant from 1945 to 1970, rose approximately 0.23°C per decade from 1970 to 1998, and have remained relatively constant since 1998. Meanwhile concentrations of carbon dioxide have continued to rise since 1945 at ever increasing rates. In the late 1960s, chlorofluorocarbons (CFCs) began to be used widely as refrigerants, propellants, and solvents. In 1974, Rowland and Molina suggested that these very stable compounds could be broken down when exposed to ultraviolet energy in very cold environments, releasing chlorine that depletes ozone very efficiently, interrupting the Chapman cycle. Concentrations of chlorine in the troposphere began increasing rapidly in the late 1960s. Ozone depletion and global temperatures began increasing by 1970. Discovery of the Antarctic ozone hole in 1984 added urgency to negotiate the Montreal Protocol on Substances that Deplete the Ozone Layer by 1989.

Anthropogenic CFC emissions began declining in 1994, ozone depletion began slowing in 1995, and temperatures have remained relatively constant since 1998. Temperatures rose as ozone depletion increased but have leveled off as ozone depletion slowly declines. Meanwhile continuing ozone depletion allows more ultraviolet-B radiation to be absorbed by the ocean. Ocean heat content has risen substantially since 1995 and should continue to rise until ozone levels are returned to their pre-1965 levels, most likely within the next 50 years.

While anthropogenic CFCs have depleted ozone approximately 3% for 50 to 100 years, volcanic eruptions deplete ozone up to 6% for less than a decade. Effusive, basaltic eruptions, typical of sub-aerial ocean ridges and island chains found in Iceland and Hawaii, cause global warming. Major explosive eruptions of evolved magmas typical of circum-Pacific volcanoes, on the other hand, also eject 10-20 megatons of sulfur dioxide into the lower stratosphere where it forms sulfuric-acid aerosols whose particles grow large enough to reflect and diffuse solar radiation. While explosive eruptions deplete ozone, causing winter warming, the aerosols cause a net cooling of approximately 0.5°C for up to three years. Climate throughout geologic time has been controlled by the rate of major explosive volcanism during periods of plate convergence and the rate of effusive basaltic volcanism during times of sub-aerial ocean plate creation. The geologic record is replete with evidence of very sudden global warming, within one or two decades, that is very hard to explain using greenhouse-gas theory.

The greatest global warming since 1945 has been observed over the Antarctic Peninsula, site of the greatest ozone depletion. In 2012, 14% depletion of ozone was observed over Toronto Canada, most likely caused by 3% ozone depletion due to anthropogenic CFCs, 6% caused by the effusive eruption of Eyjafjallajökull in Iceland in 2010 and 6% caused by the effusive eruption of Grímsvötn in Iceland in 2011. Temperatures over central eastern North America reached record high levels accompanied by the most severe drought since the 1930s. Record warming of the North Atlantic Ocean in 2012 most likely led to the observed major increase in rain and flooding in Great Britain.

Ozone concentrations change radically every day especially in sub-polar regions where they show some relationship to the jet streams, the polar vortex, and high and low pressure weather systems. Integrating extensive ozone observations into routine weather forecasting models may improve accuracy.

The ozone depletion theory of global climate change implies that over the next many decades the ocean will continue to get warmer and the earth-atmosphere system will gradually reach equilibrium with the warming caused by anthropogenic CFCs. But the major global warming predicted by greenhouse-gas theory is highly unlikely to occur and reducing emissions of carbon dioxide and other greenhouse gases is highly unlikely to affect the rate of global warming. More detailed information is available at www.ozonedepletiontheory.info.