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

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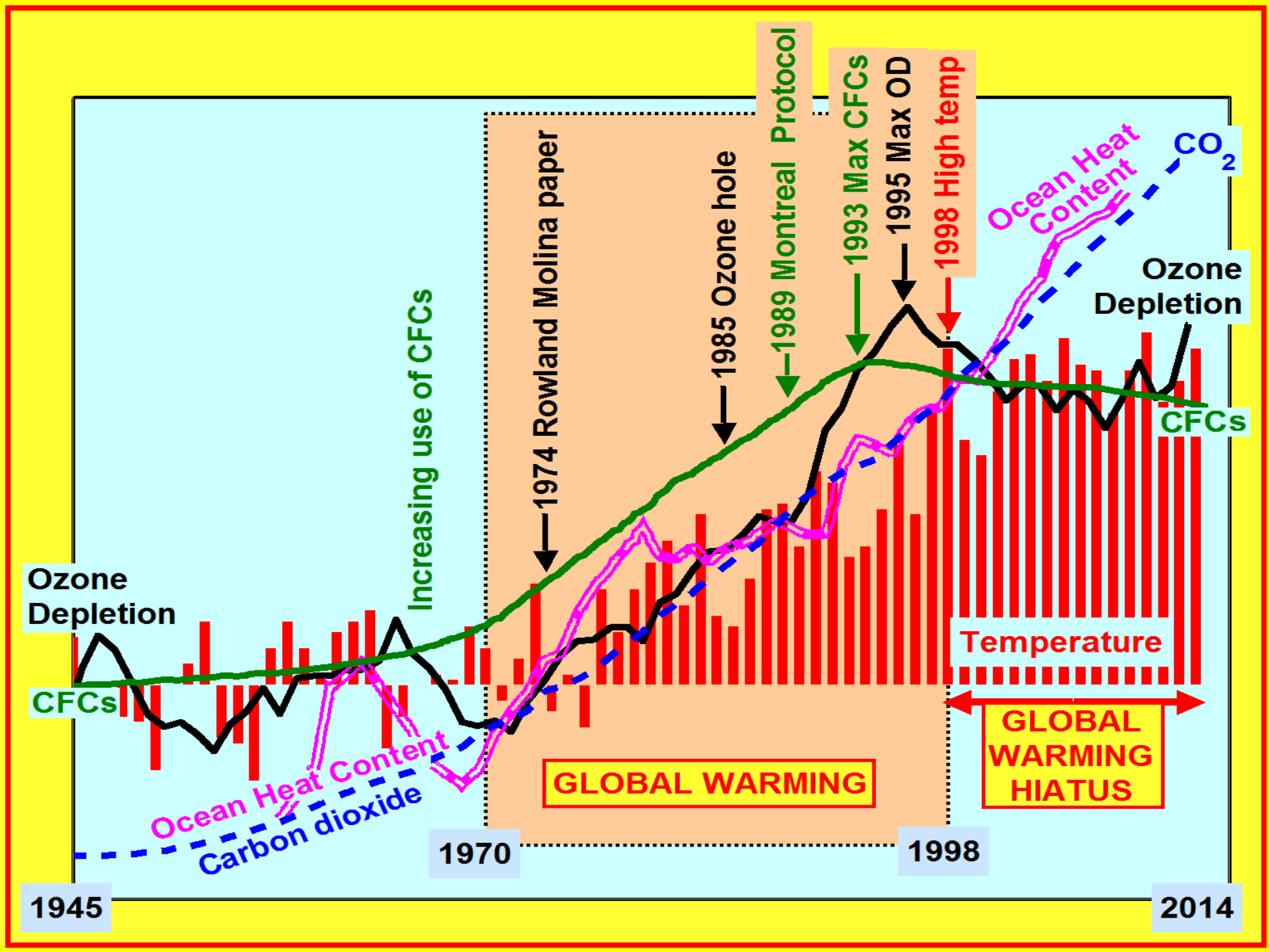

Ozone Depletion
CFCs
Increasing use of CFCs
1974 Rowland Molina paper
1985 Ozone hole
1989 Montreal Protocol
1993 Max CFCs
1995 Max OD
1998 High temp
Ocean Heat Content
CO_2
Ozone Depletion
CFCs
Temperature
Ocean Heat Content
Carbon dioxide
GLOBAL WARMING
GLOBAL WARMING HIATUS
1945
1970
1998
2014

Why Did Global Warming "Stop" in 1998?

Because it was caused by ozone depletion due to ChloroFluoroCarbons, not by greenhouse gases

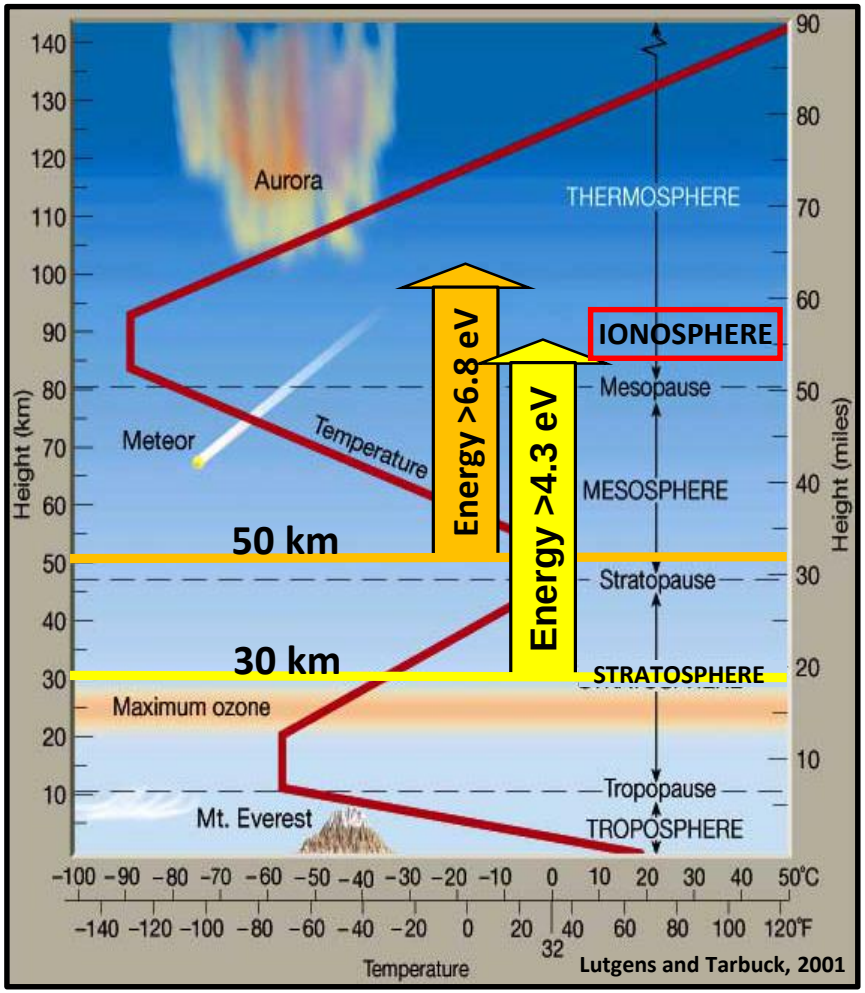
Increased use of CFCs as propellants, refrigerants, and solvents beginning in the late 1960s led to ozone depletion, causing warming

The Montreal Protocol on Substances that Deplete the Ozone Layer in 1989 led to reduction of CFCs, stopping increases in ozone depletion and warming

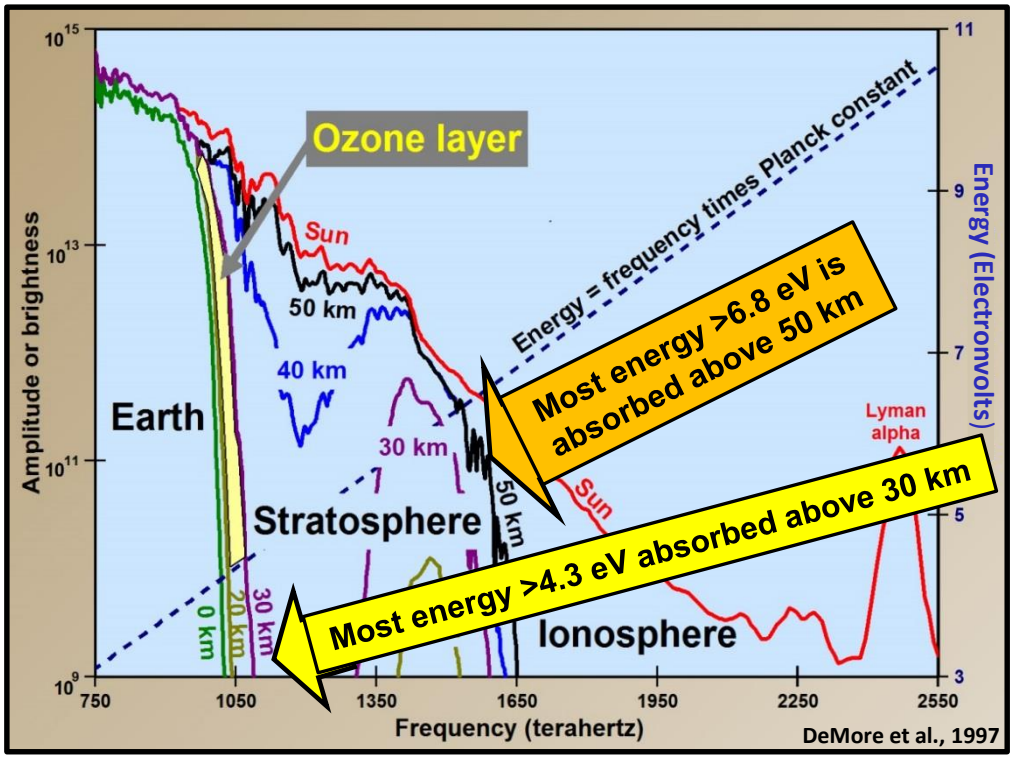
Ocean heat content continues to rise because ozone remains depleted relative to pre-1970 levels

Is CO_2 simply a proxy for ocean temperature?

The Energy Structure of the Atmosphere



Temperature in the atmosphere is set by the highest energy solar radiation to penetrate to a given altitude and associated photochemical reactions



When ozone is depleted, more high-energy UV-B solar radiation reaches Earth

The temperature of Earth is determined primarily by how energetic the solar radiation is that reaches Earth

For electromagnetic radiation (light):

Thermal energy equals frequency times a constant

Frequency (cycles per second) (Hz)

10^4 10^8 10^{12} 10^{15} 10^{16} 10^{18} 10^{20}

Radiation type Radio Microwave Infrared Visible Ultraviolet X-ray Gamma ray

LOW ENERGY **Energy = frequency times the Planck constant** **HIGH ENERGY**

Energy (electron volts)

0.000004 0.0004 0.04 4.0 40 4000 400,000

Greenhouse gases

Photosynthesis

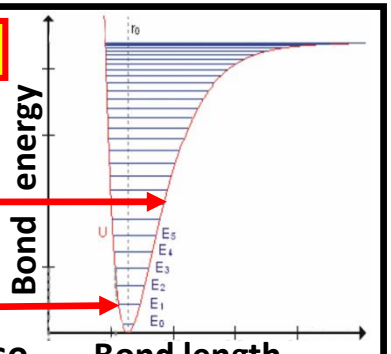
Sunburn Ozone depletion Vitamin-D

Dissociate oxygen Ionize nitrogen

Destroy cancer cells

Nuclear radiation

Frequency of oscillation of molecular bonds between electrostatic **attractive forces** when atoms are close and **repulsive forces** when atoms are too close



Temperature of objects at which this radiation is the most intense wavelength emitted

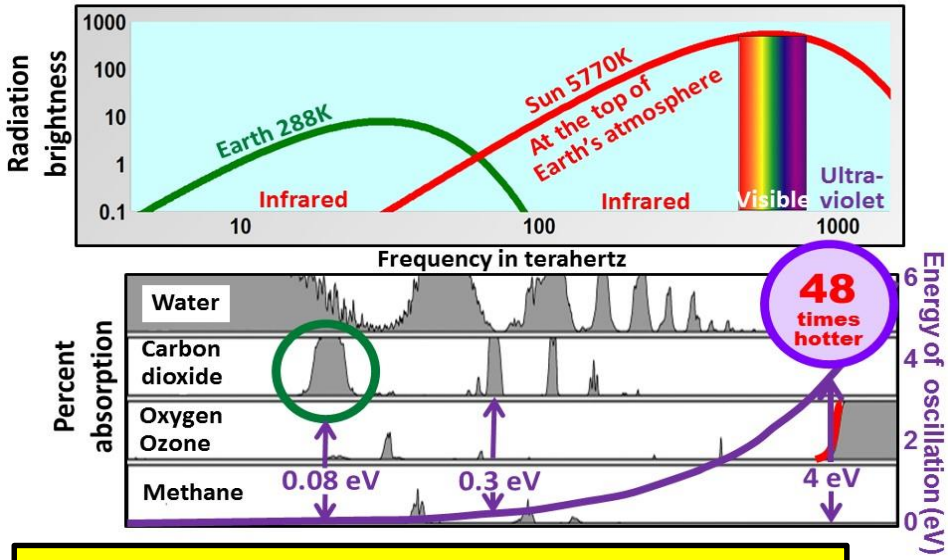
1 K 100 K 10,000 K 10,000,000 K

Your body temperature 310 K

Sun 5,570 K

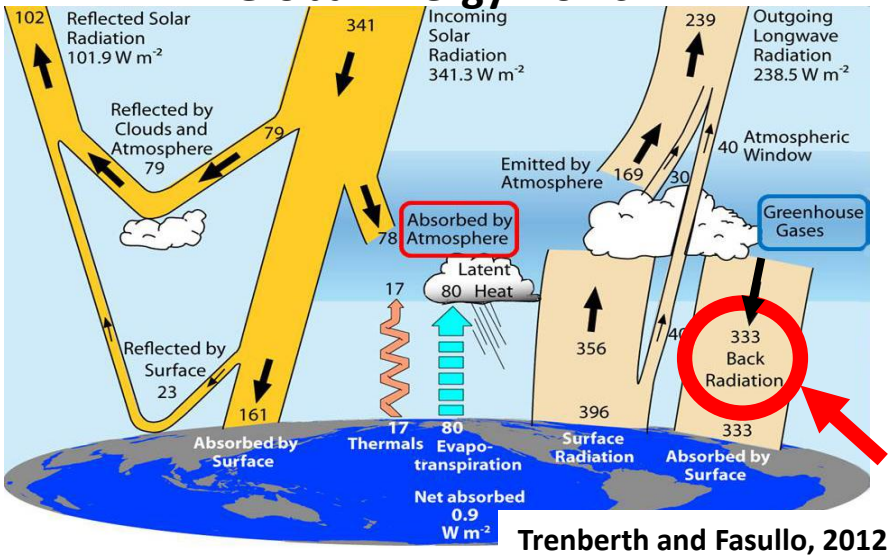
Problems With Greenhouse-Gas Theory

Radiant thermal energy is a function of frequency, not amplitude, wavelength, or bandwidth as assumed by greenhouse-gas theory



Radiant heat flows from hot to cold. If the back radiation shown below were real, then you could get warm by standing next to a COLD stove

Global Energy Flows

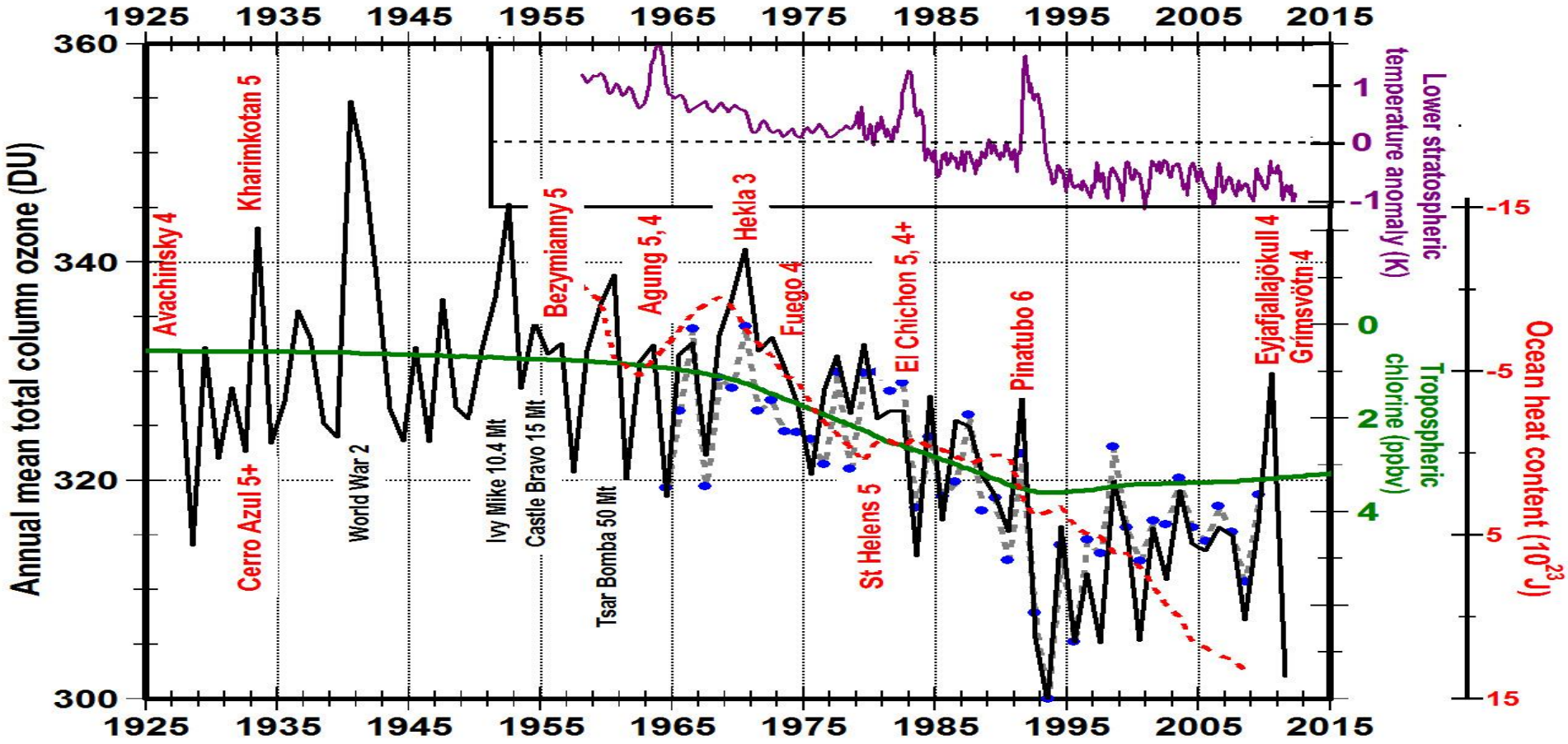


Trenberth and Fasullo, 2012

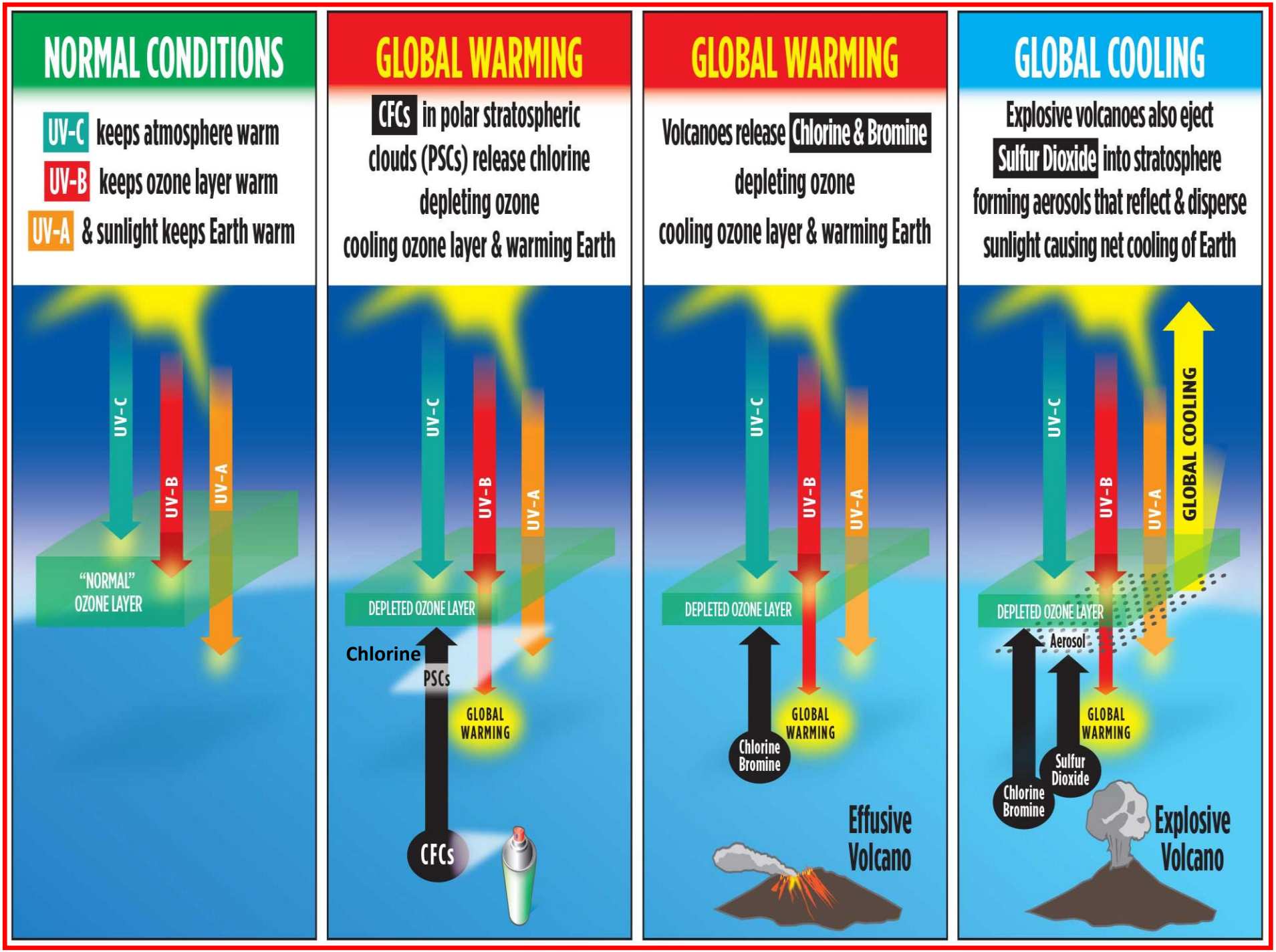
Energy of ultraviolet radiation reaching Earth when ozone is depleted is at least 48 times hotter than energy absorbed by greenhouse gases

According to Planck's law, radiation from Earth does not contain high-enough amplitudes and frequencies of oscillations to warm Earth's surface

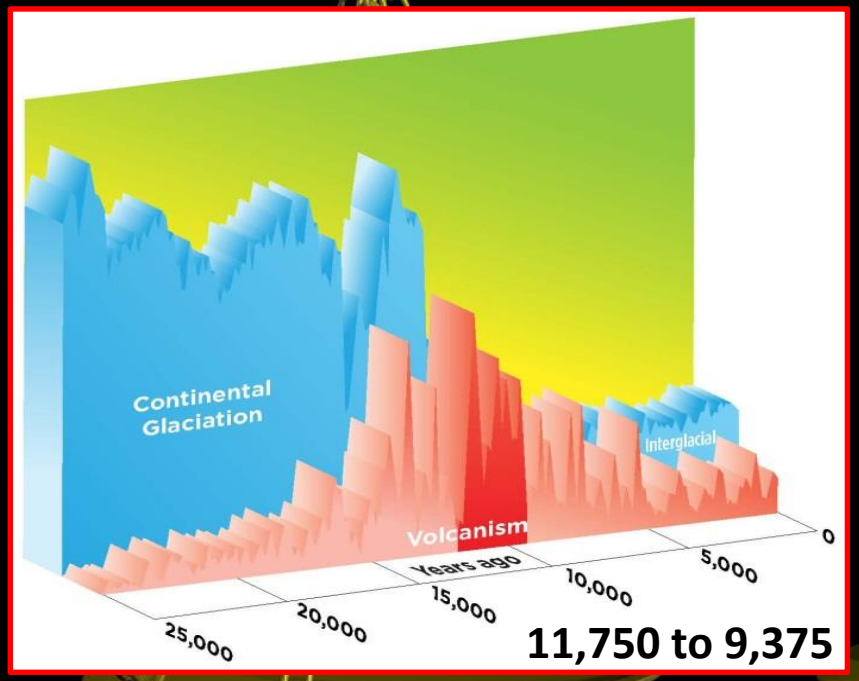
Volcanic Eruptions Also Deplete Ozone

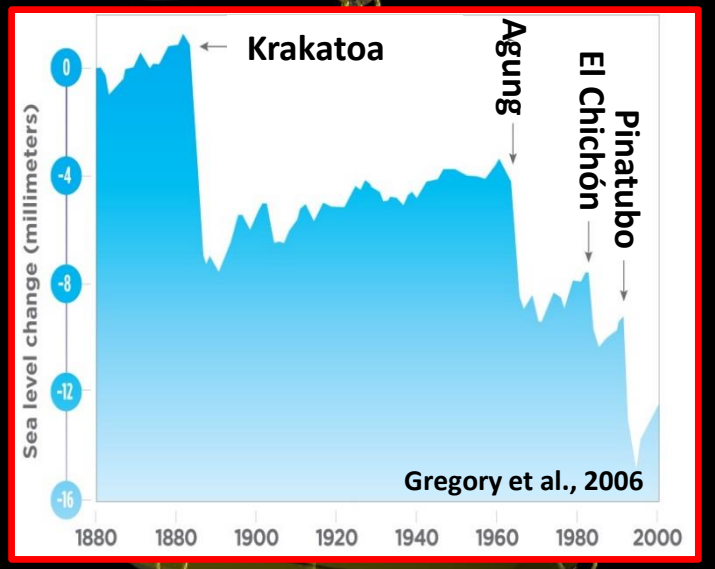


Annual mean total column ozone (black line, Dobson Units) peaks during years with major volcanic eruptions and then drops precipitously by up to twice as much during the following year, causing a cooling in the lower stratosphere (purple line) and warming of Earth. The green line shows annual mean tropospheric chlorine (y-axis inverted). The dashed red line shows increase in ocean heat content (y-axis inverted).


NORMAL CONDITIONS
UV-C keeps atmosphere warm
UV-B keeps ozone layer warm
UV-A & sunlight keeps Earth warm
UV-C
UV-B
UV-A
"NORMAL" OZONE LAYER
GLOBAL WARMING
CFCs in polar stratospheric clouds (PSCs) release chlorine depleting ozone cooling ozone layer & warming Earth
UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
Chlorine
PSCs
GLOBAL WARMING
CFCs
GLOBAL WARMING
Volcanoes release Chlorine & Bromine depleting ozone cooling ozone layer & warming Earth
UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
GLOBAL WARMING
Chlorine Bromine
Effusive Volcano
GLOBAL COOLING
Explosive volcanoes also eject Sulfur Dioxide into stratosphere forming aerosols that reflect & disperse sunlight causing net cooling of Earth
UV-C
UV-B
UV-A
GLOBAL COOLING
DEPLETED OZONE LAYER
Aerosol
GLOBAL WARMING
Sulfur Dioxide
Chlorine Bromine
Explosive Volcano

The Delicate Balance Between Global Warming & Global Cooling





Effusive volcanism

Eruption height: generally < 2 km

Duration: years to millennia

Explosive volcanism

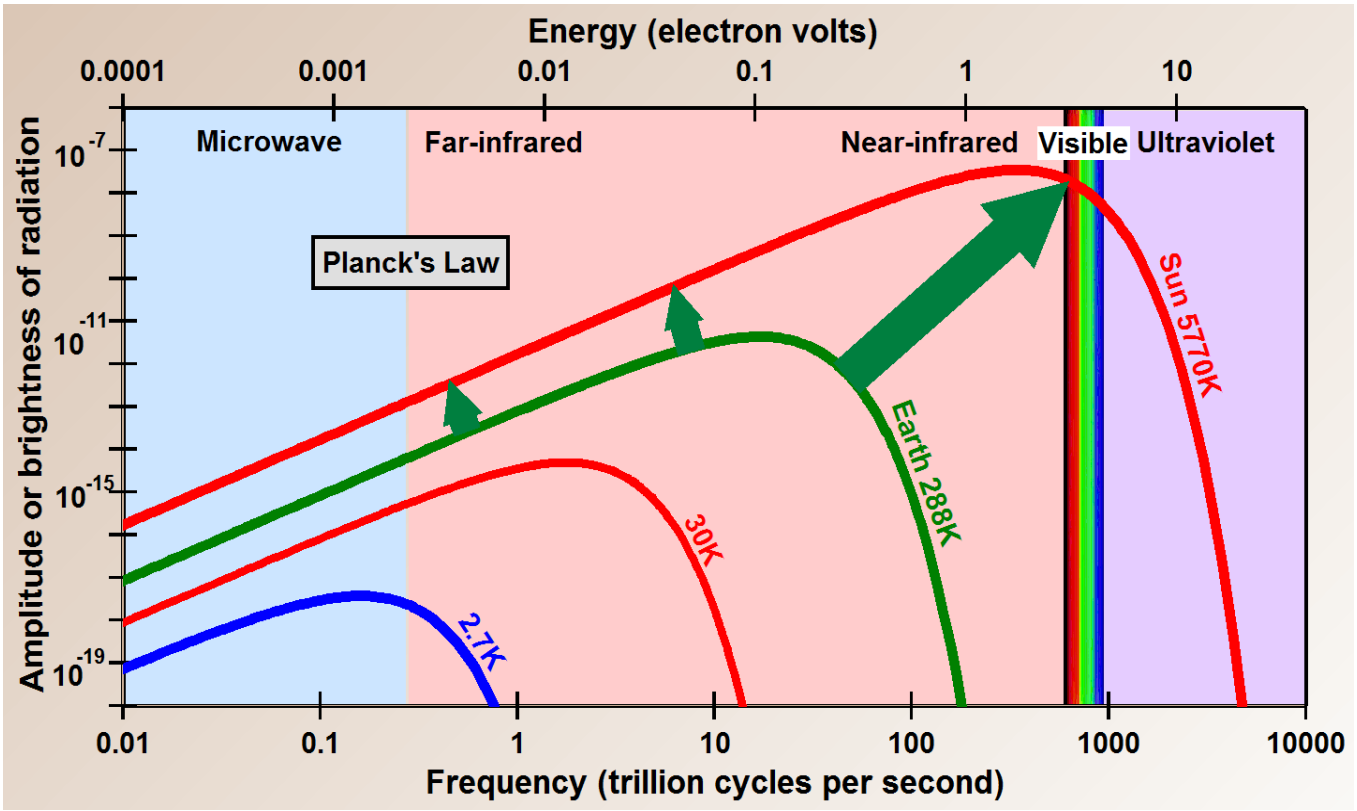
Eruption height: up to 36 km

Duration: hours to days

Forms an aerosol in the lower stratosphere

The Physics of Global Warming

1. The microscopic bonds holding matter together oscillate between attractive and repulsive electrostatic forces, giving rise to macroscopic temperature.
2. The heat capacity of matter is dependent primarily on the number of degrees of freedom of these oscillations.
3. When matter reaches thermal equilibrium, the spectrum of frequencies and associated amplitudes on its surface are described by Planck's Law.



4. Heating matter increases the amplitude of these oscillations at all frequencies and shifts the peak frequency to a higher value (green arrows).
5. These oscillations on the surface of matter induce an electromagnetic field in space containing the same frequencies (colors) and amplitudes (brightness) flowing away from the surface in much the same manner as a radio station transmits its frequency and amplitude.
6. Frequencies in an electromagnetic field do not interact with each other and do not change as they propagate over galactic distances except for Doppler effects. Amplitudes (intensities, brightness), on the other hand, decrease by one over the square of the distance traveled as they spread out over the surface of an expanding sphere.

7. **Oscillations in matter and in space constitute thermal energy. In space, radiant energy at each frequency is equal to the frequency times the Planck constant. In space, many frequencies coexist over a broad spectrum but they do not interact. Neither frequencies nor energies are additive.**

8. **The solar, ultraviolet thermal energy that reaches Earth when ozone is depleted is at least 48 times more energetic – at least 48 times hotter – than infrared energy absorbed by greenhouse gases.**

There simply is not enough thermal energy absorbed by greenhouse gases to have a major effect on global warming.

9. **Computer programs used to quantify greenhouse-gas theory overestimate infrared energies because they assume that thermal energy travels in space as waves for which energy is a function of amplitude squared, that energies are additive over bandwidth, and that frequencies interact and change over distance – all properties that are very different from the observed behavior of radiation in space described above.**

10. **Heat flows from hot to cold. Heat cannot flow from a colder layer in the atmosphere to a warmer Earth, as assumed by greenhouse-gas theory. You cannot get warmer by standing next to a cold stove.**

11. **According to Planck's Law, radiation from a body of mass does not have high enough frequencies or amplitudes to warm that body as assumed by greenhouse-gas theory. Warming radiation must come from a warmer body.**

More details at ozonedepletiontheory.info
YouTube Video at tinyurl.com/ozone-depletion-theory

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Global Warming Is Caused by Less O_3 – Not More CO_2

Less ozone in the stratosphere allows more high-energy, solar ultraviolet radiation to reach Earth – cooling the stratosphere, warming the oceans