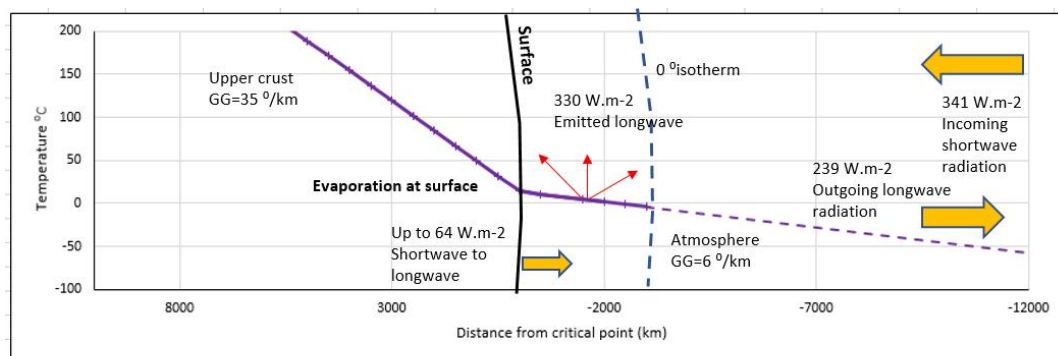


11 September 2020

## How Anthropogenic Global Warming Actually Works

I have previously documented the (overwhelming) evidence against the Greenhouse model and the conventional wisdom that carbon dioxide and methane are responsible for current climate trends (see docs on my website [www.kaurioilandgas.co.nz](http://www.kaurioilandgas.co.nz)). This note summarises the preferred alternative explanation which incorporates geology with the atmospheric component of climate science.

Most of the energy/heat in earth's atmosphere comes from within the earth. This energy is transferred by conductive transfer and convection, through water in the subsurface, then by air above the surface. This is the baseload heating for the atmosphere and varies by a few degrees over very long cycles – hence heatflow is very low and ignored in energy budgets by IPCC.



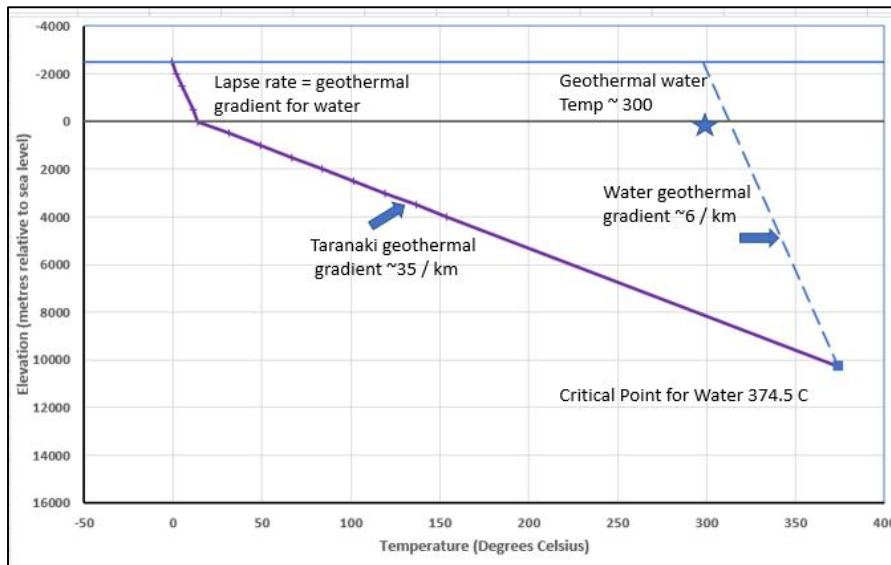
Conductive energy sets temperature profile through crust and troposphere



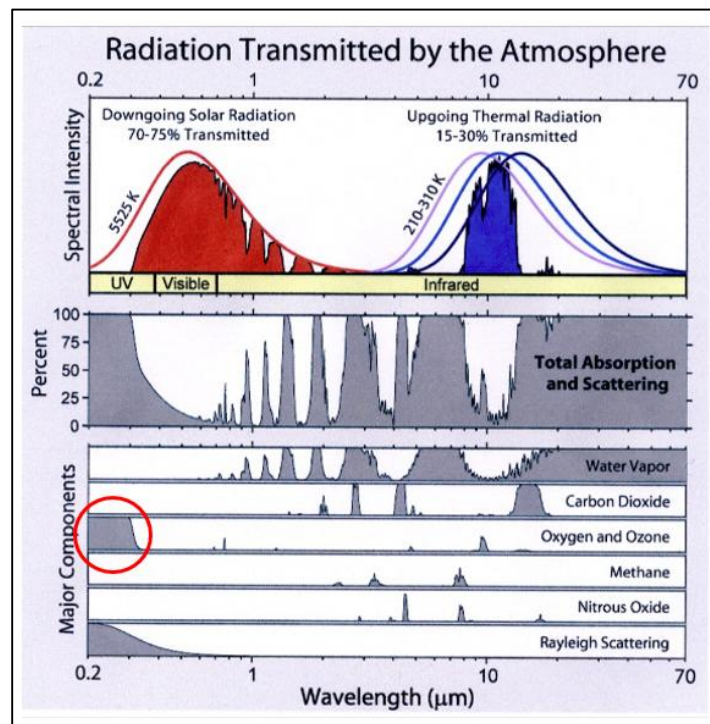
The lapse rate in the atmosphere (cooling rate with altitude) is an extension of the geothermal gradient in the subsurface. The gradient changes because the medium changes from rock and water to air. The atmospheric lapse rate is similar to geothermal areas where water density is the same as vapour.

Solar radiation provides peakload heating which varies by up to 40 degrees on a 24 hour on/off cycle (day/night) so heatflow is high.

Evaporation is an important part of the climate, cooling the surface by transferring warm water into the atmosphere. Evaporation is caused by incoming short wavelength radiation (UV) being absorbed by oxygen molecules, which then lift individual water molecules. Ultra Violet radiation is also absorbed by ozone.



*Geothermal gradients in the subsurface and atmosphere*

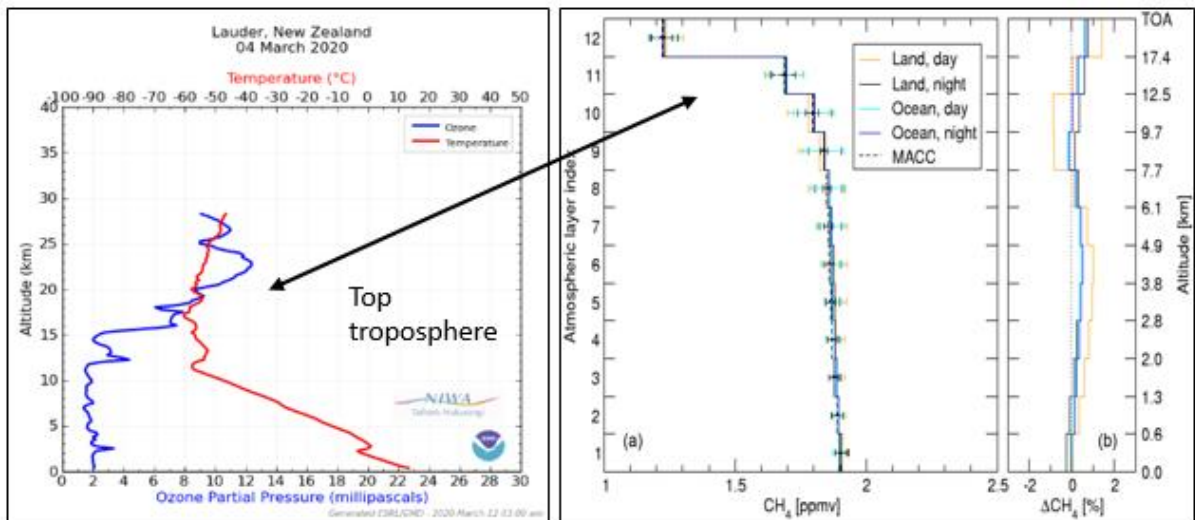


*Incoming spectra (red) showing absorption of UV wavelength by oxygen and ozone*

As water vapour rises, it cools by emitting long wavelength (infrared) radiation in all directions – this energy is what climate science claim as evidence of the Greenhouse Effect. The Greenhouse model requires  $64 \text{ W m}^{-2}$  of incoming shortwave solar radiation (the amount that is available at surface) to somehow be transformed into  $396 \text{ W m}^{-2}$  of outgoing longwave radiation. It is largely, in fact, energy from the earth’s crust, not solar radiation.

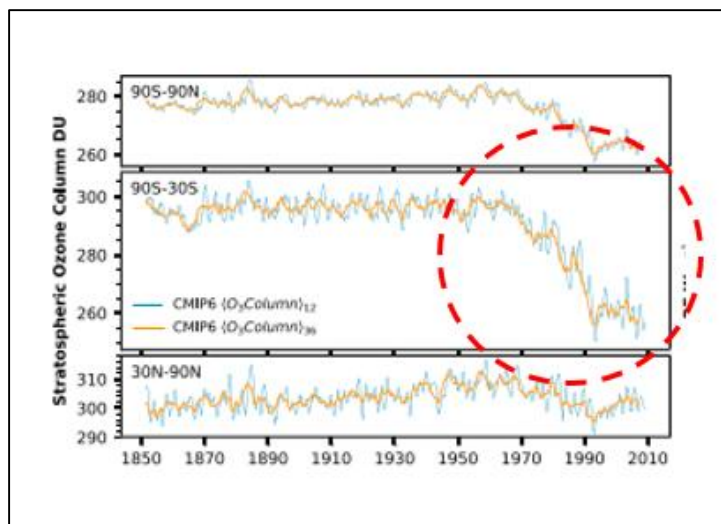
Ozone reacts with methane rising from the surface to generate water and CO2



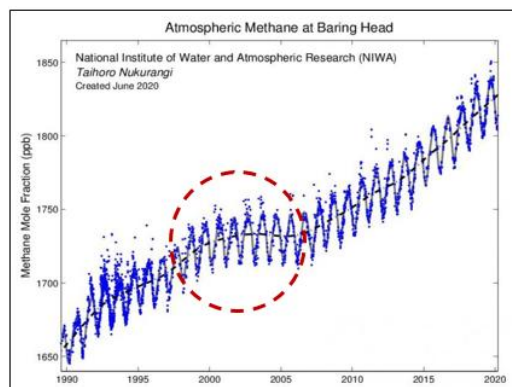


The troposphere is depleted in ozone (blue line on left graph). Where ozone increases, methane decreases (right hand graph, de Lange and Landgraf 2018).

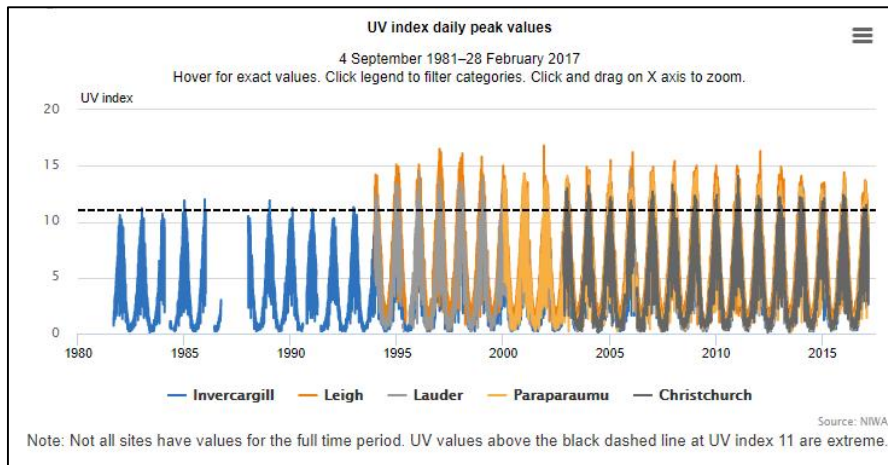
Chlorofluorocarbons (CFCs) deplete ozone, allowing more UV radiation to reach the surface, increasing evaporation. More crustal heat is transferred into the atmosphere (global warming)



Ozone column in southern hemisphere stratosphere (Checa-Garcia et al 2018)

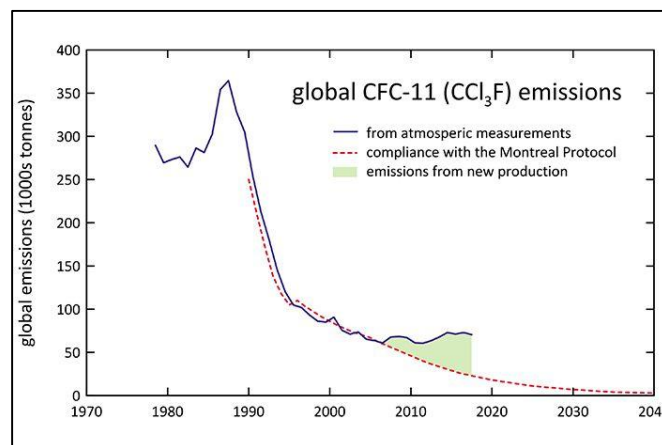


Methane concentrations, Baring Head. Note plateau during the 1990s, coincident with stabilised ozone.



*The UV Index in New Zealand has been Extreme since 1994*

The use of CFCs for refrigeration began in 1867. Ozone depletion started in the southern hemisphere in the 1950s and increased until the 1990s. CFCs were banned under the Montreal Pact of 1987. China resumed illegal emissions around 2008 and these have been increasing.

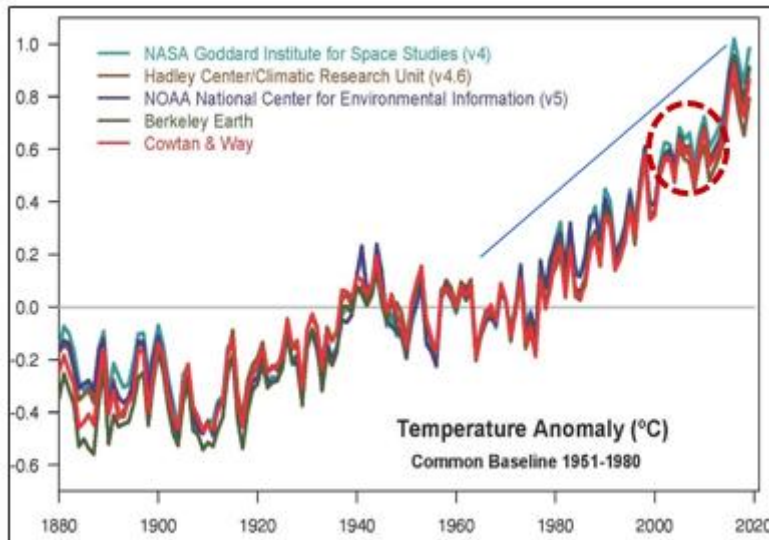


*Global CFC Emissions (Paul Krumell, CSIRO)*

In the presence of UV radiation, chlorine in the CFCs reacts with ozone and methane to generate water, carbon dioxide and hydrochloric acid (leading to ocean acidification).



**Methane + ozone + chlorine → carbon dioxide + water + Hydrochloric Acid**

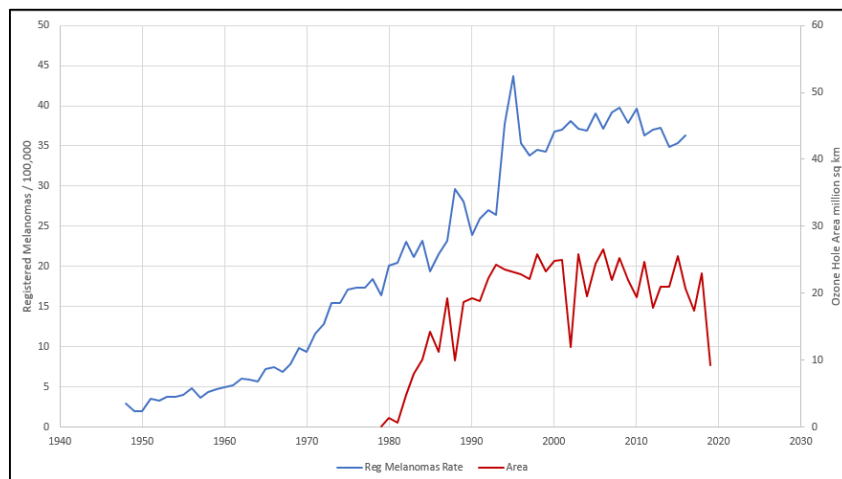


The current trend of increasing temperatures started in the 1950s and continues to the present day at a rate of around 0.12 °C per decade, except for the period 1998 – 2012 (the temperature hiatus) when it slowed to 0.05° C per decade.

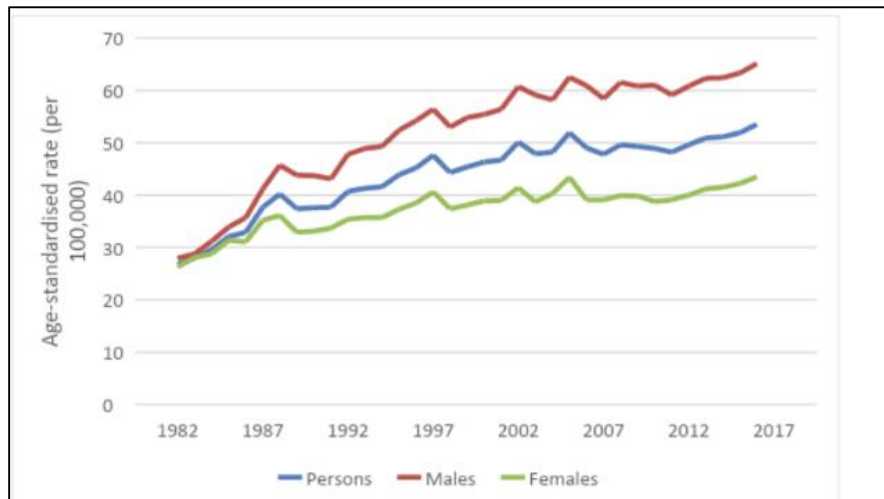
Climate scientists in NZ, Australia, UK, USA and elsewhere have been “correcting” pre-1950s temperature measurements to fit the steadily rising CO2 curve.

**Ozone depletion**, therefore, is the cause of accelerated temperature increase since the 1950s. The Greenhouse Effect is slight, if it exists at all, and carbon dioxide produced from combustion of fossil fuels is not responsible for current trends in climate.

The other consequence of ozone depletion is an increase in skin cancer rates – shown below for New Zealand and Australia.



*NZ melanoma rates (blue) and area of ozone hole (red)*



*Australia melanoma rates*