

CFC Destruction of Ozone Major Cause of Recent Global Warming!

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Abstract

There has been a lot of discussion about global warming. Some say anthropogenic carbon dioxide (CO₂) emissions caused the earth to warm. Others say there is no abnormality at all, that it is just natural warming. As you will see from the data presented and analyzed, a greater than normal warming did occur in recent times but no measurements confirm an increase in CO₂ emissions, whether anthropogenic or natural, had any effect on global temperatures. There is however, strong evidence that anthropogenic emissions of chlorofluorocarbons (CFCs) were the major cause of the near recent abnormal warming.

CFCs have created both unnatural atmospheric cooling and warming based on these facts:

- CFCs destroyed ozone in the lower stratosphere/upper troposphere causing these zones in the atmosphere to cool 1.37 °C from 1966 to 1998. This time span was selected to eliminate the effect of the natural solar irradiance (cooling-warming) cycle effect on the earth's temperature.
- The loss of ozone allowed more UV light to pass through the stratosphere at a sufficient rate to warm the lower troposphere plus 10" of the earth by 0.48 °C (1966 to 1998).
- Mass and energy balances show that the energy that was absorbed in the lower stratosphere/upper troposphere hit the lower troposphere/earth at a sustainable level of 1.71×10^{18} Btu more in 1998 than it did in 1966.
- Greater ozone depletion in the Polar Regions caused these areas to warm up some two and one-half (2 ½) times that of the average earth temperature (1.2 °C vs. 0.48 °C). This has caused permafrost to melt, which is releasing copious quantities of methane. Methane in the atmosphere slowly converts to CO₂ and water vapor and its release has contributed to higher atmospheric CO₂ concentrations.
- There is a temperature anomaly in Antarctica. The Signey Island landmass further north, warmed like the rest of the Polar Regions; but south at Vostok, there has been a cooling effect. Although the cooling at Vostok needs to be analyzed in more detail, because of the large ozone hole there, black body radiation from Vostok (some 11,400 feet above sea level) to outer space is most likely the cause. Especially, since this phenomenon occurred over the same period that stratospheric ozone destruction took place.

No Empirical Evidence for CO₂ Causing Global Warming

Some say historically, that increased CO₂ levels in the atmosphere have created periods of global warming throughout our history. They cite the Vostok, Antarctica ice core data (1) as proof of this – see Figure 1. However, the problem is that whoever came up with that analysis had the cause and effect reversed. If you look closely at the graph, it is obvious that global warming always comes first. A temperature (blue line) spike always comes before the CO₂ concentration (red line) spike. After a

temperature spike from the sun, the oceans start to warm and eventually liberate more CO₂ due to its reduced solubility in seawater at higher temperature. Another relevant question is, what other mechanism could possibly cause CO₂ concentrations to increase other than a solar spike from the sun? Where else could the CO₂ come from, especially during those times before the industrial age?

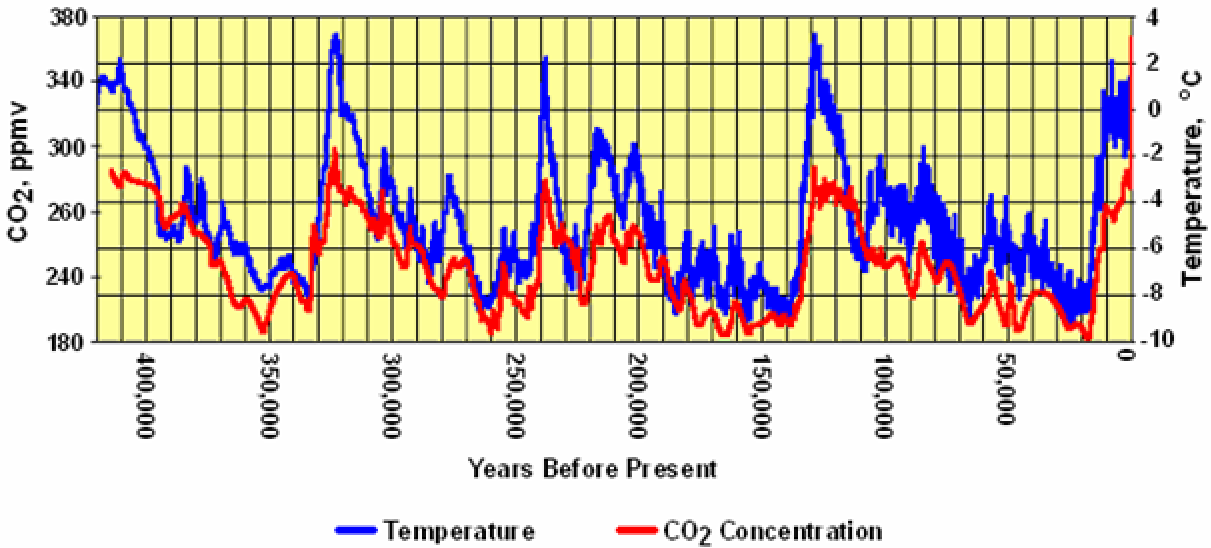


Figure 1. Vostok Antarctica Ice Core Data (420,000 years Back from Present)

Recent empirical data (2) show that atmospheric CO₂ concentrations have no discernible effect on global temperature, see Figure 2. The temperature plots shown are from two sources; the National Aeronautics and Space Administration's (NASA) Microwave Sounding Unit (MSU) and the United Kingdom's (UK) Hadley Climate Research Unit. The CO₂ plot is from the Mauna Loa Observatory in Hawaii.

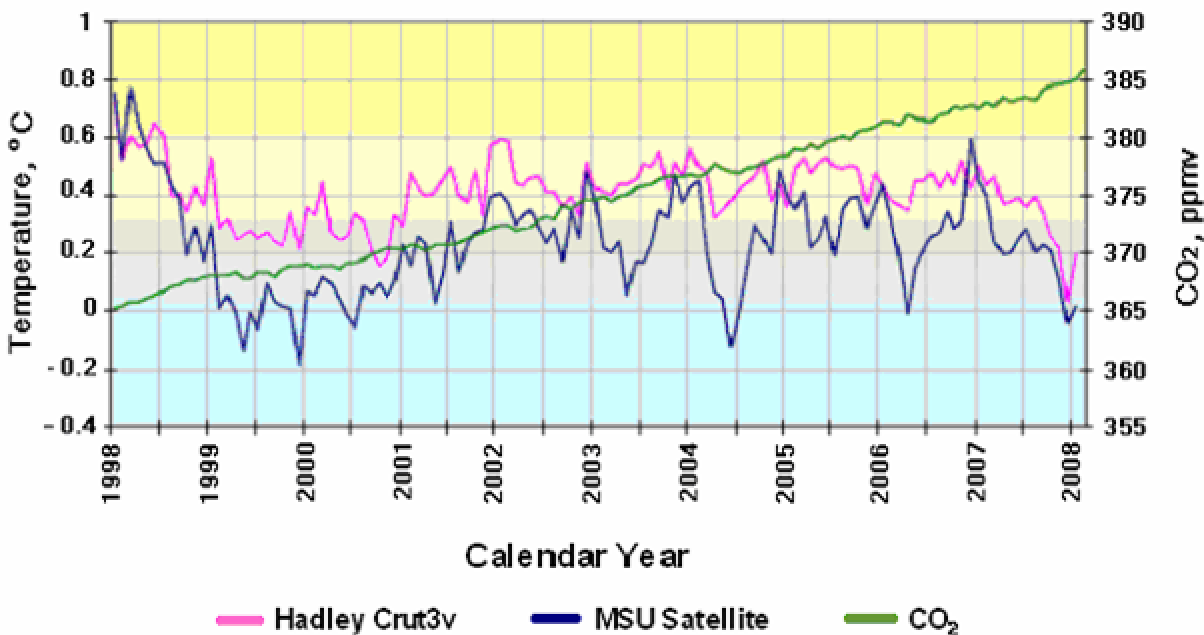


Figure 2. Earth temperature and CO₂ concentration 1998-2008

While CO₂ levels increased some 20 ppmv over the past 10 years, global temperatures did not increase as predicted by the IPCC models - they fell! The earth's temperature from 1998 to 2008 dropped by 0.65 - 0.78 °C depending on which temperature set is chosen.

Besides a carbon dioxide increase in the atmosphere, atmospheric concentrations of methane have increased 2.5 times from pre-industrial time (700 ppbv) to 1,745 ppbv in 1998 (3). In 1966, the methane concentration was around 1400 ppbv. In 2000, methane concentrations leveled off at 1755 ppbv and currently are slowly dropping. Two years earlier, stratospheric CFC concentrations leveled off and started to drop slowly, so methane emissions looks like they are tied to depletion of ozone. Where is the methane coming from? A recent study (4) showed that the permafrost is melting in North Siberia and is releasing methane from the surface of thawing lakes that has been sequestered there since the Pleistocene era (10,000 to one million years ago). Further, the researchers' estimate that methane carbon is being emitted at a rate some 100 times the rate of carbon dioxide released from the burning of fossil fuels. Methane (CH₄) slowly converts to CO₂ in the atmosphere and this is the most likely cause for increased CO₂ concentrations in the atmosphere.

Ozone Loss Effect

Ozone exists in two major layers of the atmosphere (5), see Figure 3. The layer closest to the earth's surface is the troposphere. The natural background levels of ozone in the troposphere play a beneficial role to the ecosystem. Ozone aids in the oxidation of many pollutants, such as carbon monoxide (CO) and methane (CH₄) and plays a key role in ecosystem cleansing. The downside of tropospheric ozone, often called "bad ozone", is the damage it can do when it comes into direct contact with living organisms. It is harmful to breathe, damages vegetation, and is a main ingredient in the creation of urban smog. The troposphere generally extends from the earth's surface to a height of about 9.6 km, where it meets the second layer, the stratosphere.

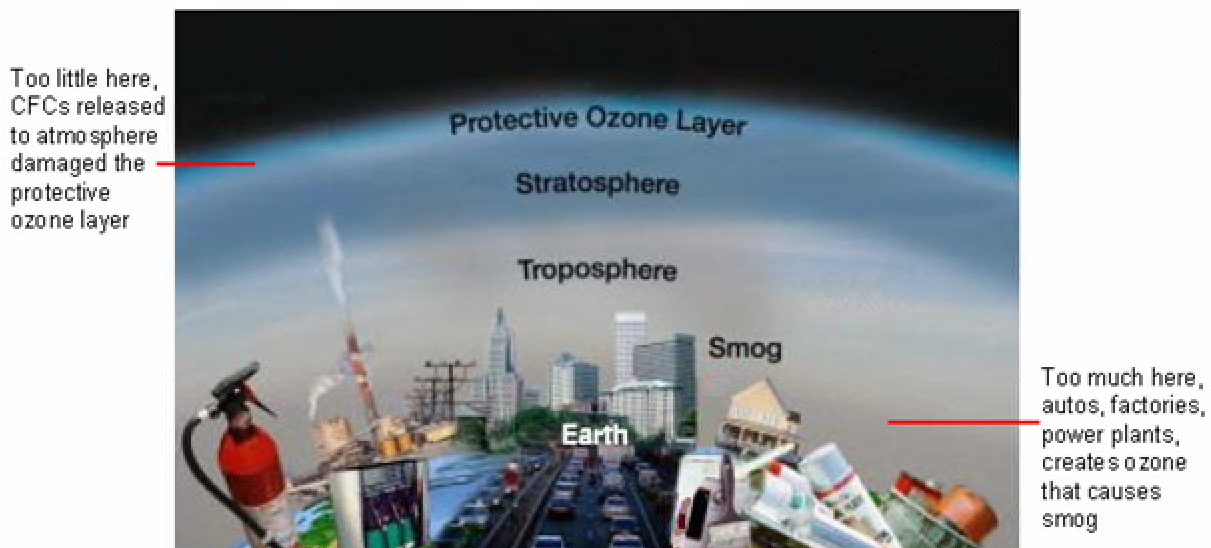


Figure 3. Ozone in the atmosphere.

The stratosphere or "good ozone" layer extends from about 9.6 km up to 48 km and protects life on earth from the sun's harmful ultraviolet (UV) rays. Stratospheric ozone has been diminished by CFCs and other refrigerants-propellants released into the atmosphere. These compounds are broken down by the sun's UV rays and release chlorine and bromine molecules that destroy the "good ozone". Scientists estimate that one chlorine atom can destroy 100,000 ozone molecules over its life in the stratosphere. With less

ozone in the stratosphere, more UV rays hit earth, warming it up and increasing the risk of skin cancer. The protective ozone layer extends from 8 km (upper troposphere) up throughout the whole stratosphere.

In 1966, the mean October stratospheric ozone concentration above Antarctica (6) was measured at the British Antarctic Survey Station in Halley Bay (Latitude 76 south, Longitude 26 west). It was at 319 Dobson Units (standard measurement of ozone concentration). In 1998, the mean value was 90 Dobson Units, showing a drop of 72% from 1966. Although not as severe ozone concentrations, north of the Arctic Circle, have dropped dramatically as well.

It is well known that the warming of the stratosphere is caused by the reaction of ultraviolet light with ozone. Energy is absorbed and ozone (O_3) converts to diatomic (O_2) and (O) nascent oxygen. Conversely, ozone loss decreases the amount of UV light absorbed and thus causes the stratosphere to cool. The direct effect of ozone concentration on temperature is shown in Figure 4(7). Excluding the volcanic eruptions of El Chichon, Pinatuba, and others, whenever stratospheric ozone concentration drops, the temperature drops with it and vice versa. This effect is shown clearly from 1995 to 2005.

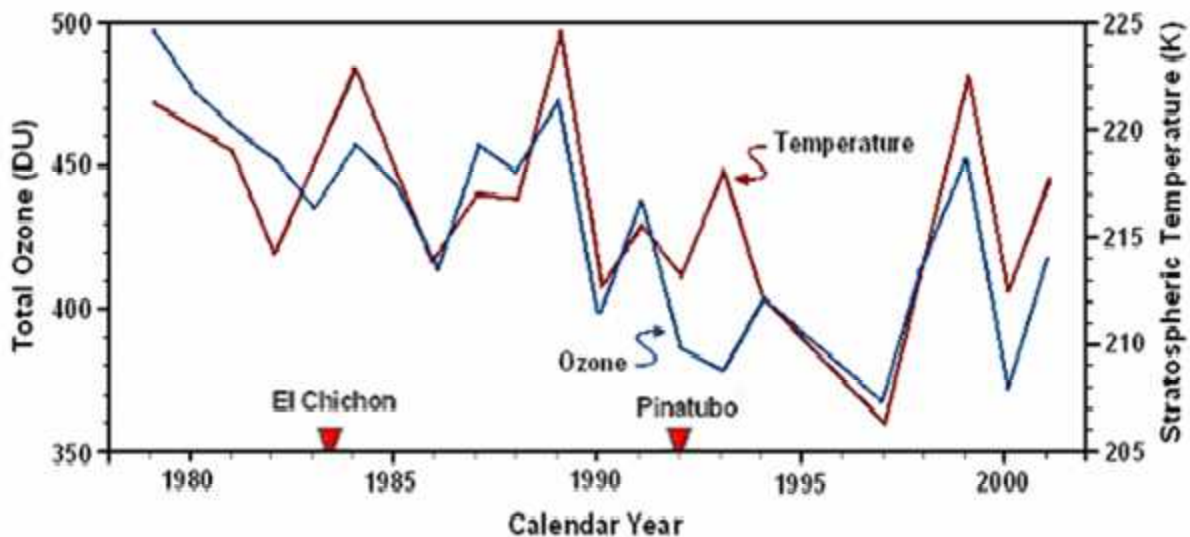


Figure 4. Ozone concentration versus stratospheric temperature.

The legendary hypotheses (8) of Paul Crutzen, Sherwood Rowland, and Mario Molina led to CFCs being banned because they were destroying stratospheric ozone. In 1978, the USA banned the use of CFCs in hair sprays and other aerosols. Then in 1987, the world governments, through the United Nations Environment Programme (UNEP), agreed to limit the production and release of a variety of CFCs. The protocol to implement this occurred at a meeting in Montreal, Canada and has since the agreement has become known as the Montreal Protocol. Since the original protocol, its provisions were amended in mid-1998; the amendments were then ratified or accepted by 120 and 78 countries, respectively. CFC production was stopped in developed countries. However, it has not been stopped in developing countries. It will be produced in China and other developing countries until 2010.

Others have recognized that CFCs caused cooling and warming effects in the atmosphere. During the middle 1990s, NASA scientists developed a model that showed the relationship between global warming and ozone depletion. A team led by Drew Shindell (9) at the Goddard Institute for Space Studies created

the first atmospheric simulation that included ozone chemistry. They found that the greenhouse effect was responsible not only for heating the lower atmosphere, but also for cooling the upper atmosphere. They called it a greenhouse effect because CFCs are also categorized as greenhouse gases, but this was clearly a misnomer. Greenhouse gases are those that absorb and radiate radiant energy. Destruction of ozone is not a greenhouse mechanism but it was the cause for abnormal global warming.

CFC's and CCl_4 are nearly inert in the troposphere and have lifetimes of 50-200+ years. The hydrogen-containing halocarbons like HCl are more reactive and tend to be removed in the troposphere by reactions with [OH] radicals. However, this process is slow and some destructive halogens live long enough to reach the stratosphere. Total stratospheric organic chlorine is currently a little over 3 ppbv. Methyl chloride (CH_3Cl) is the only ozone-depleting chlorocarbon from a major natural source and makes up around 0.5 ppbv of the total. Organic bromides and iodides also destroy ozone.

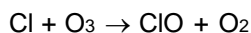
It is different in the stratosphere; the major source of CFC decomposition there is photolysis (10) reaction with ultraviolet (UV) light radiation. Ultraviolet light has wavelengths in the 200-400 nanometer (nm) range.

UV-A light is a low energy light with wavelengths between 320-400 nm. Only about 5% of the UV-A light is absorbed by ozone and most reaches the surface of the Earth. UV-B light is of moderate energy and has wavelengths between 290-320 nm. Ozone absorbs most of the UV-B light before it reaches the surface of the Earth. UV-C light is a high energy UV light with wavelengths in the range of 200-290 nm. Both ozone and oxygen molecules absorb the UV-C light before it can reach the Earth's surface. Therefore, when there is low stratospheric ozone, more UV (A, B & C) light from the sun passes through the atmosphere to hit earth and heat it up.

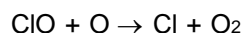
The initial products from high energy UV-C light hitting a CFC molecule are a chlorine atom and an organic radical, considering CFC-11 (trichlorofluoromethane):



The free chlorine atom is broken off and can then react with ozone to form ClO:



The ClO in turn will react with nascent oxygen (O) to release a chlorine atom; thus, a continuous destruction of ozone occurs because the chlorine atoms are not sequestered into stable compounds:



CFC chlorine can take other reaction paths, but this is believed to be the predominant ozone destruction cycle. Though the concentration of CFCs is only around 3 ppbv in the stratosphere, one chlorine atom can destroy some 100,000 ozone molecules during its lifetime there. Since the 1960's the stratosphere has cooled (11), see Figure 5. The data suggest that the cooling is primarily due to a loss of ozone.

When CFC refrigerants and aerosols started to be produced and released into the atmosphere in the sixties, the stratosphere started to cool. The exceptions to cooling occurred during the times of the major volcanic eruptions of Agung, El Chichon and Mt. Pinatubo. In 1980, Mt. St. Helens erupted but had only a slight warming effect.

In 1998, the stratosphere was 1.37 °C cooler than it was in 1966. This 1966 to 1998 time span was chosen for analysis to negate the solar irradiance cycle and large volcanic eruption effects. The increase in stratospheric temperature from major volcanic eruptions lasts only two to three years; then the temperature goes back to where it would have been if there were no eruptions. Therefore, temperatures recorded in 1966 and 1998 would not show an effect from a large volcanic eruption.

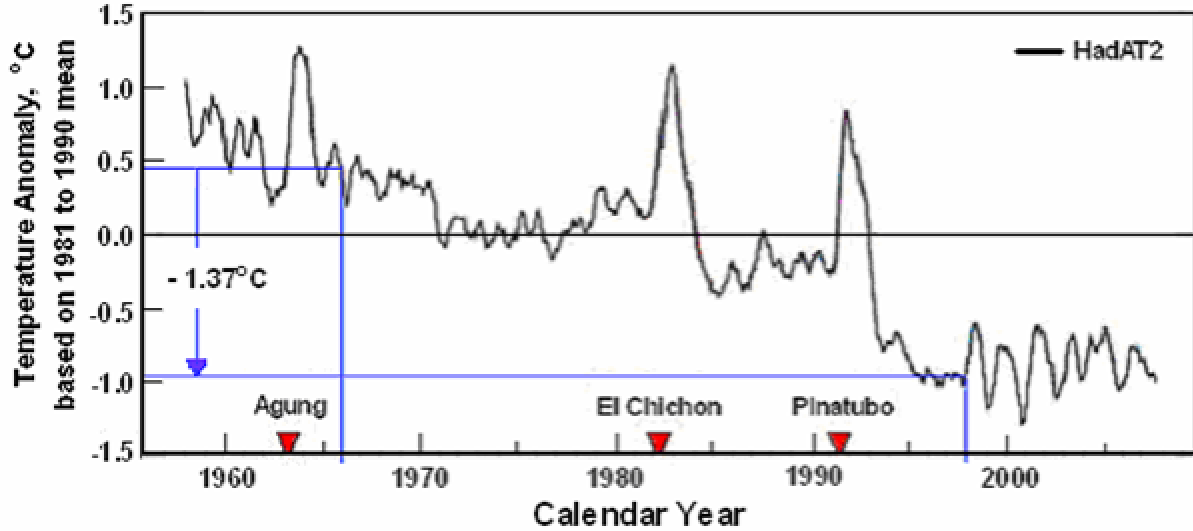


Figure 5. Global lower stratospheric anomalies from 1958 to 2008.

As the lower stratosphere and upper troposphere cooled (1966 to 1998), the troposphere and earth warmed (12) by 0.48 °C see Figure 6. The zero temperature line in Figure 6 is from a different mean average than that in Figure 5 but since only temperature change is being considered here, the zero temperature reference is not relevant.

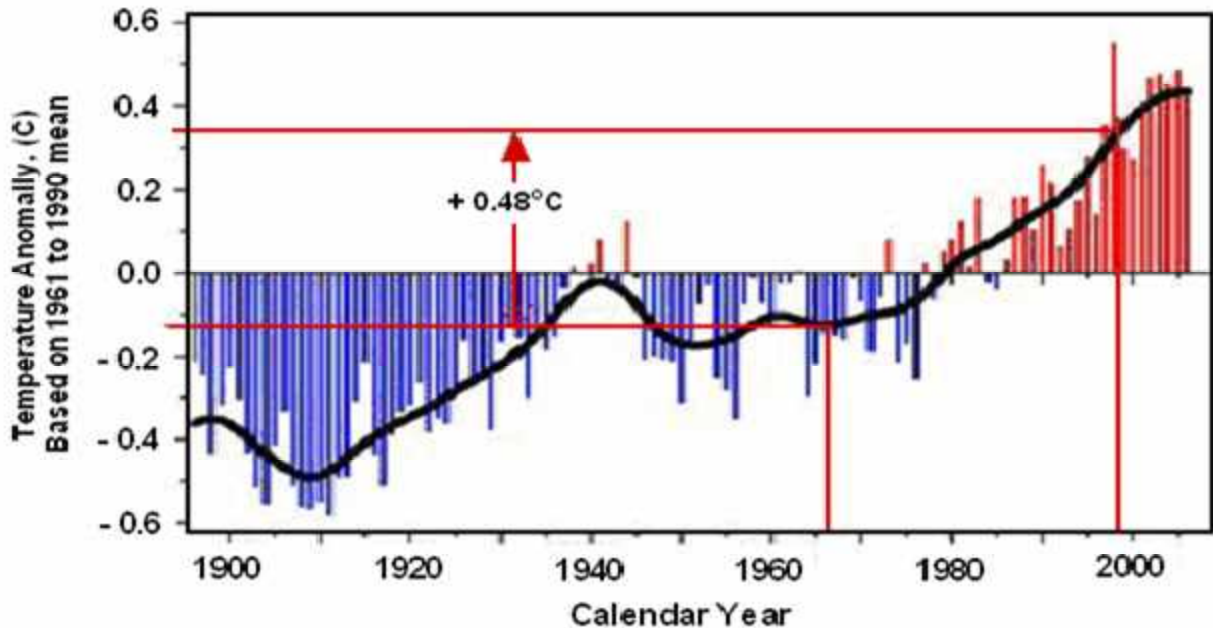


Figure 6. Near earth surface global temperature change with time.

In the Arctic, from 1966 to 1998 (13), the surface temperature increased 2 ½ times the average global temperature (1.2 °C vs. 0.48 °C), see Figure 7. The much colder than normal stratospheric temperatures cause even a greater loss of ozone and thus make the Polar Region stratospheres even cooler. This in turn allows more UV light to hit the earth's surface and warm it up. What happens is that during winter the air temperature drops, and clouds of ice crystals with mixtures of hydrochloric, sulfuric and nitric acids, form in the stratosphere. The ice crystals provide a surface for chemical reactions that change chlorine compounds that do not react with ozone (e.g. hydrogen chloride) into more active forms that do:

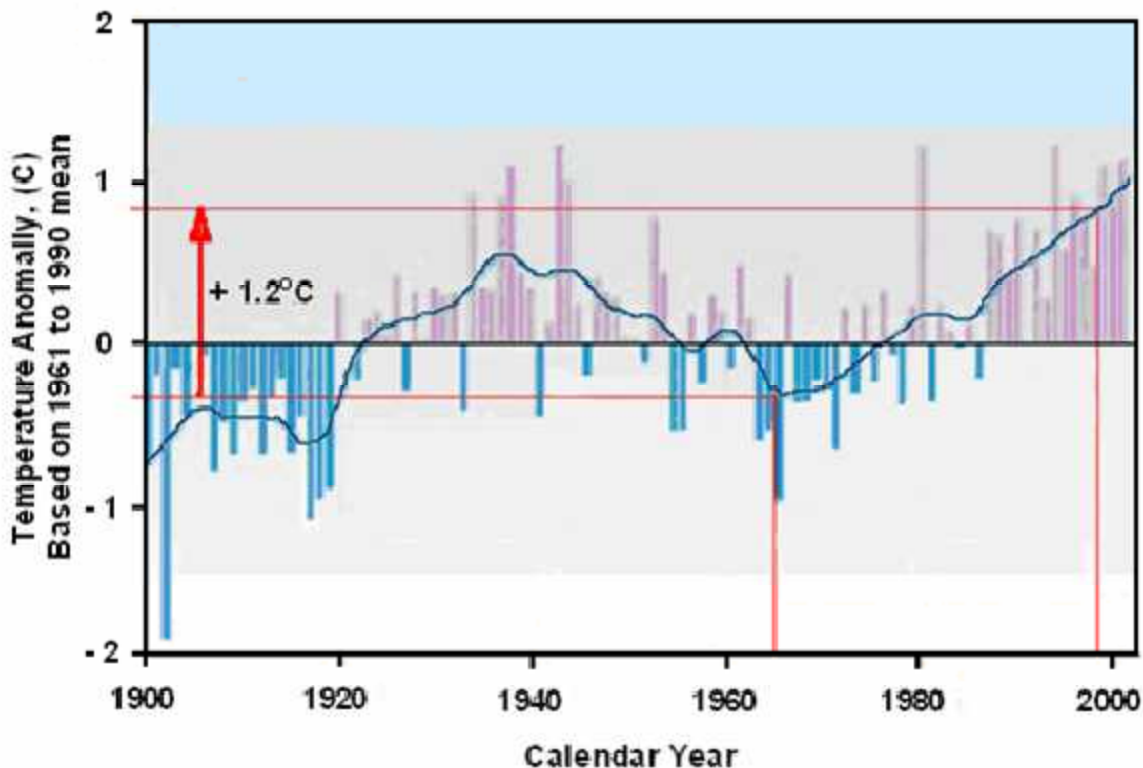


Figure 7. Observed Arctic temperature change.

In addition, the very cold air creates vortices of fast-moving air that effectively insulate the Polar Regions from the rest of the atmosphere. Most stratospheric ozone is created in the tropics because of the greater intensity of solar radiation. Stratospheric air currents from the tropics transport ozone to the Arctic and Antarctica. However, because of the strong and stable wind vortices, migration of ozone into the Polar Regions is curtailed. This is why polar landmasses have warmed more than the rest of the earth.

The change in ozone depletion chemicals in the stratosphere versus time (14), including future concentration projections is shown in Figure 8. Because of the Montreal Protocol implementation, CFC concentrations peaked in the late nineties and then started dropping slightly. The contribution of methyl bromide is split into anthropogenic (A) and natural (N) components and the natural ozone-depleting substance methyl chloride is included. The line at 2 ppb corresponds to the time when ozone depletion was first detected (1980). It also shows when major ozone recovery is anticipated (2050 to 2060).

Although not shown, chloroform (CHCl_3), dichloromethane (CH_2Cl_2), and a range of other chlorinated solvents contribute a further 0.1 ppb to stratospheric chlorine.

Figure 9 shows a correlation of CFC concentration, average stratosphere temperature and average earth temperature plotted versus time. As shown by the arrows, in a logical sequence, CFC concentration started to drop first causing a reduction in stratospheric cooling and then a reduction in earth warming. When one sees like trends, it is a good indication that the trends are related to one another.

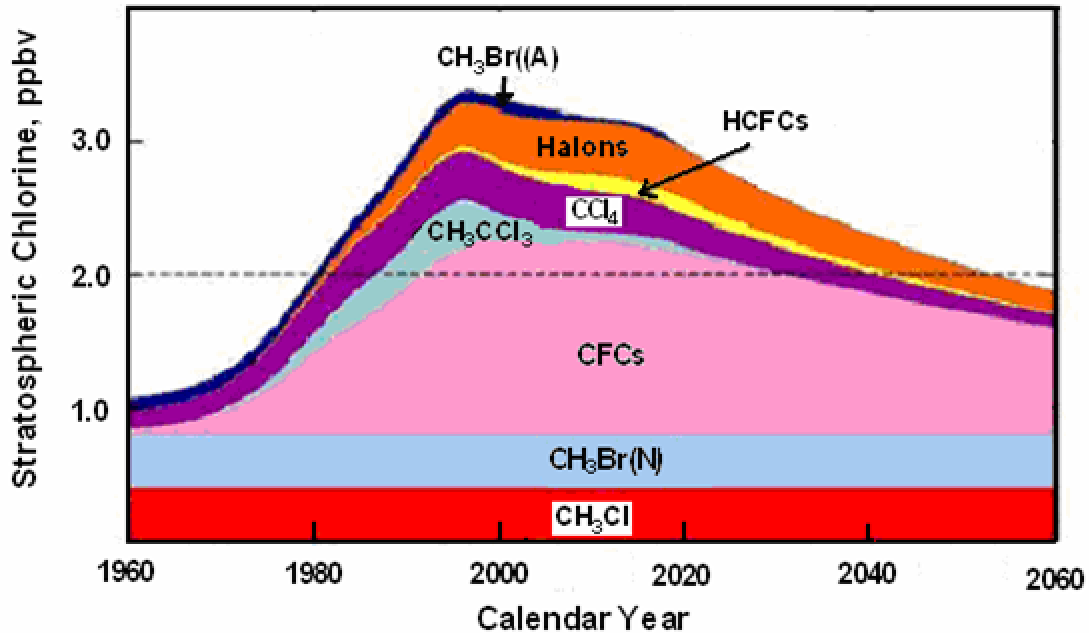


Figure 8. Ozone depletion chemicals in the stratosphere.

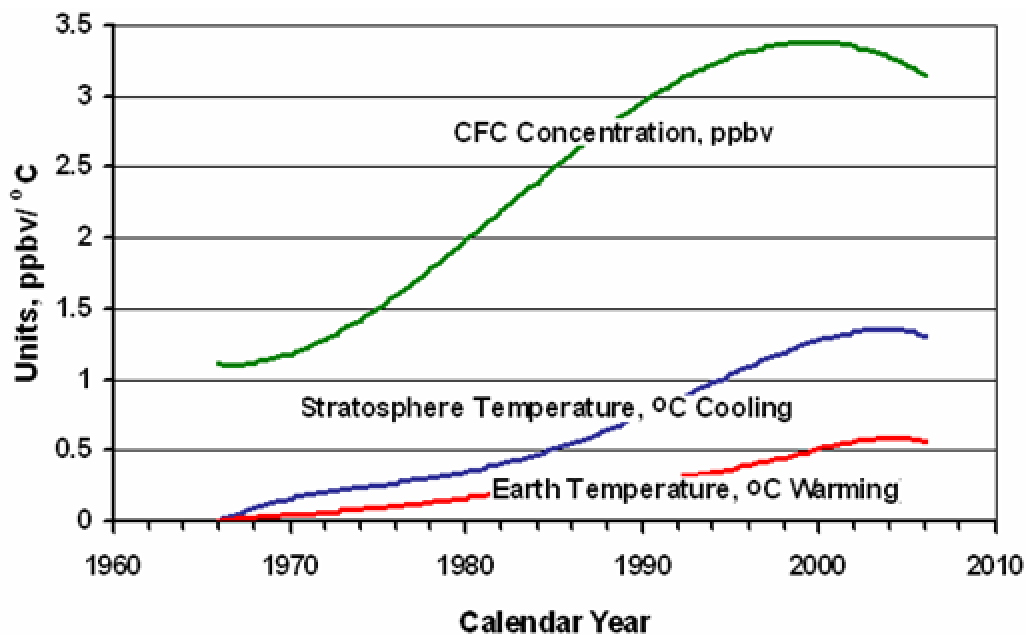


Figure 9. Earth warming, stratospheric cooling and CFC concentration.

Large solar heating-cooling cycle variations occur every 80,000 to 110,000 years, but the sun's thermostat also changes in shorter term cooling-warming cycles of approximately 11 years (15), see Figure 10. The period chosen for analysis to negate this effect as mentioned previously was from 1966 to 1998. At these two points in time, the solar irradiance hitting the earth was approximately the same (1368.8 W/m^2).

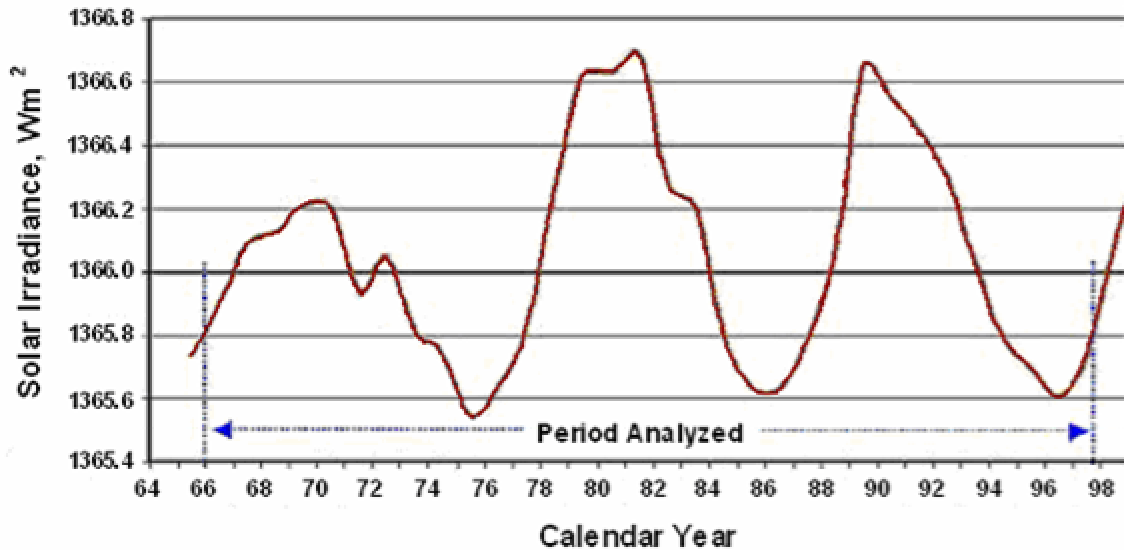


Figure 10. Solar irradiance cycle effect on earth.

According to NASA (16), the lower stratosphere and upper troposphere, both of which have cooled together, extends from 19 km down to 8 km above the surface of the earth with the lower troposphere being in the 0 to 8 km elevation. Knowing how much the lower stratosphere-upper troposphere cooled and how much the lower troposphere-earth warmed, mass and energy balances could be made to determine how much more radiant energy hit the earth in 1998 compared to 1966.

Table 1 show mass and energy balances for the lower stratosphere-upper troposphere (19 km down to 8 km above sea level). The balances were made by first calculating the mass of gas in the lower stratosphere-upper troposphere. Then the recorded average temperature for the lower stratosphere-upper troposphere for 1966 and 1998 was used. The lower stratosphere-upper troposphere was 1.37°C cooler in 1998 than it was in 1966. By subtracting the energy in the lower stratosphere-upper troposphere found in 1966 from that found in 1998 the loss in UV light energy absorption could be calculated. The amount of stratospheric heating from UV-B light in 1998 was 1.7123×10^{18} Btu less than it was in 1966.

The mass and energy balance in Table 2 shows the effect of that additional energy being absorbed by the troposphere/earth in 1998 compared to 1966. The lower troposphere temperature in 1966 (484°R) was used as a base and the added UV light (1.7123×10^{18} Btu) energy passing through the lower stratosphere/upper troposphere was added to the earth/troposphere. Using that increase in UV light energy, after heating the lower troposphere up by 0.48°C there was enough energy left over to heat up ten inches of earth/water by 0.48°C . This matches the recorded earth temperature rise from 1966 to 1998. The author does not know when the earth warms how deep that effect goes down into the earth and water. The temperature rise in reality would be warmer on the earth's surface and cooler the deeper down one goes so the overall effect would be for more than 10 inches of earth. Does the added UV light account for the entire temperature rise? The author is not completely sure but the added UV light for certain has played the most dominant role.

TABLE 1. UV-B LIGHT PASSING THROUGH STRATOSPHERE IN 1966 COMPARED TO 1998

Mass and Energy Balance					
Lower Stratosphere/Upper Troposphere (19 km down to 8 km above sea level)					
Basis: 0°R and H ₂ O(l)					
1966:		Temp. °R	Total Lb	Btu/Lb	Total Btu
Air	wt%	419.000			
O ₂	23.24		7.0900x10 ¹⁷	91.4	6.4833x10 ¹⁹
N ₂	76.76		2.3418x10 ¹⁸	104.8	2.4538x10 ²⁰
H ₂ O	0.00 (No moisture above 6.4 km)				
Total	100.00		3.0508x10¹⁸		3.1021x10²⁰
1998:					
Air	wt%	416.554			
O ₂	23.24		7.0900x10 ¹⁷	90.9	6.4475x10 ¹⁹
N ₂	76.76		2.3418x10 ¹⁸	104.2	2.4402x10 ²⁰
H ₂ O	0.00 (No moisture above 6.4 km)				
Total	100.00		3.0508x10¹⁸		3.0850x10²⁰
UV energy not absorbed in 1998 compared to 1966 resulted in 2.446 °R cooling					1.7122x10¹⁸

TABLE 2. UV LIGHT HEATING OF LOWER TROPOSPHERE AND EARTH IN 1998

Mass and Energy Balance					
Earth (10" deep from surface) plus atmosphere from 0 km to 8 km above sea level)					
Basis: 0°R and H ₂ O(l)					
1966:		Temp. °R	Total Lb	Btu/Lb	Total Btu
Air	wt%	484.000			
O ₂	23.24		1.4494x10 ¹⁸	105.0	1.5223x10 ²⁰
N ₂	76.76		4.7859x10 ¹⁸	120.3	5.7567x10 ²⁰
H ₂ O	0.11		6.8664x10 ¹⁵	1273.1	8.7417x10 ¹⁸
Total	100.00				
Earth/Water (10" deep)		484.000	5.6818x10 ¹⁷	484.0	2.7500x10 ²⁰
Added UV Energy hitting earth/lower troposphere in 1998 compared to 1966					1.7122x10¹⁸
Total			6.8104x10¹⁸		1.0134x10²¹
1998:					
Air	wt%	484.863			
O ₂	23.24		1.4494x10 ¹⁸	105.2	1.5250x10 ²⁰
N ₂	76.76		4.7859x10 ¹⁸	120.5	5.7666x10 ²⁰
H ₂ O	0.11		6.8664x10 ¹⁵	1273.5	8.7443x10 ¹⁸
Total	100.00				
Earth/Water (10" deep)		484.863	5.6818x10 ¹⁷	484.9	2.7549x10 ²⁰
Total			6.8104x10¹⁸		1.0134x10²¹
Added UV light hitting earth accounts for observed warming from 1966 to 1998 (0.48 °C or 0.863 °R)					

Ozone Signature Present but No Greenhouse Signature

Temperature in the atmosphere has been measured for decades using radiosondes, which is a technique where weather balloons with thermometers radio back the air temperature as the balloon ascends through the atmosphere. Actual Hadley Centre radiosonde temperature measurements (17) for 2006-2007 are shown in Figure 11. The vertical axis shows the height in the atmosphere in kilometers (km) and the pressure in hectopascals (hPa). The actual measurements show mostly warming in the troposphere and on earth with cooling in the stratosphere.

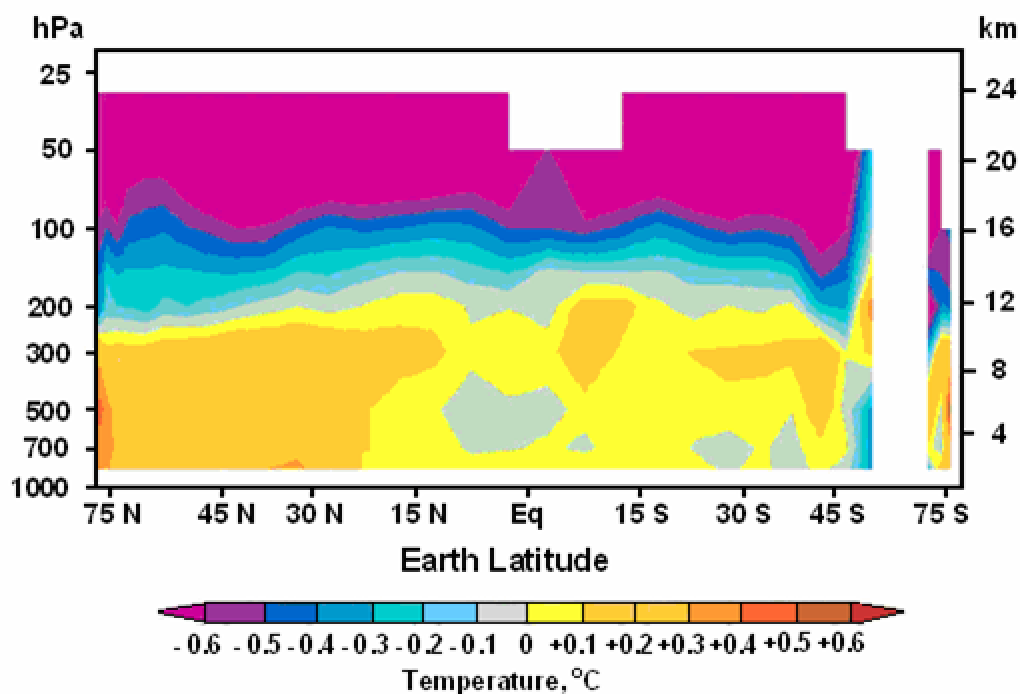


Figure 11. Observed signature from actual measurements.

There are several possible causes of global warming (18), and each cause will warm the atmosphere at different latitudes and altitudes producing a distinct pattern of hot spots in the atmosphere, leaving its “signature”. The IPCC developed models for five warming signatures. The axes for the observed temperatures shown above in Figure 11 are the same as that shown in the signature diagrams developed by the IPCC (Figure 12). The differences are that in the actual measurement graph, the horizontal axis only goes from 75 degrees north to 75 degrees south and there is no data in the 60 degrees south region. Further, the vertical axis only goes up to 24 km and there was no data above 20 km for the equator zone.

The theoretical computer generated signatures developed by the IPCC (19) are shown in Figure 12(a) through (f). These signatures are from the IPCC's most authoritative document for those who believe carbon emissions have caused global warming. In each diagram, left to right, the horizontal axis is the latitude, from the North Pole through the equator to the South Pole. The colored regions on each diagram show where the temperature changes occur for each possible cause. The vertical axis, like in Figure 10 shows the elevation in kilometers (km) and the atmospheric pressure in hectopascals (hPa).

(a) Signature for increased solar irradiation. If this signature were present, the warming would be moderate through most of the stratosphere and troposphere. This effect is not seen.

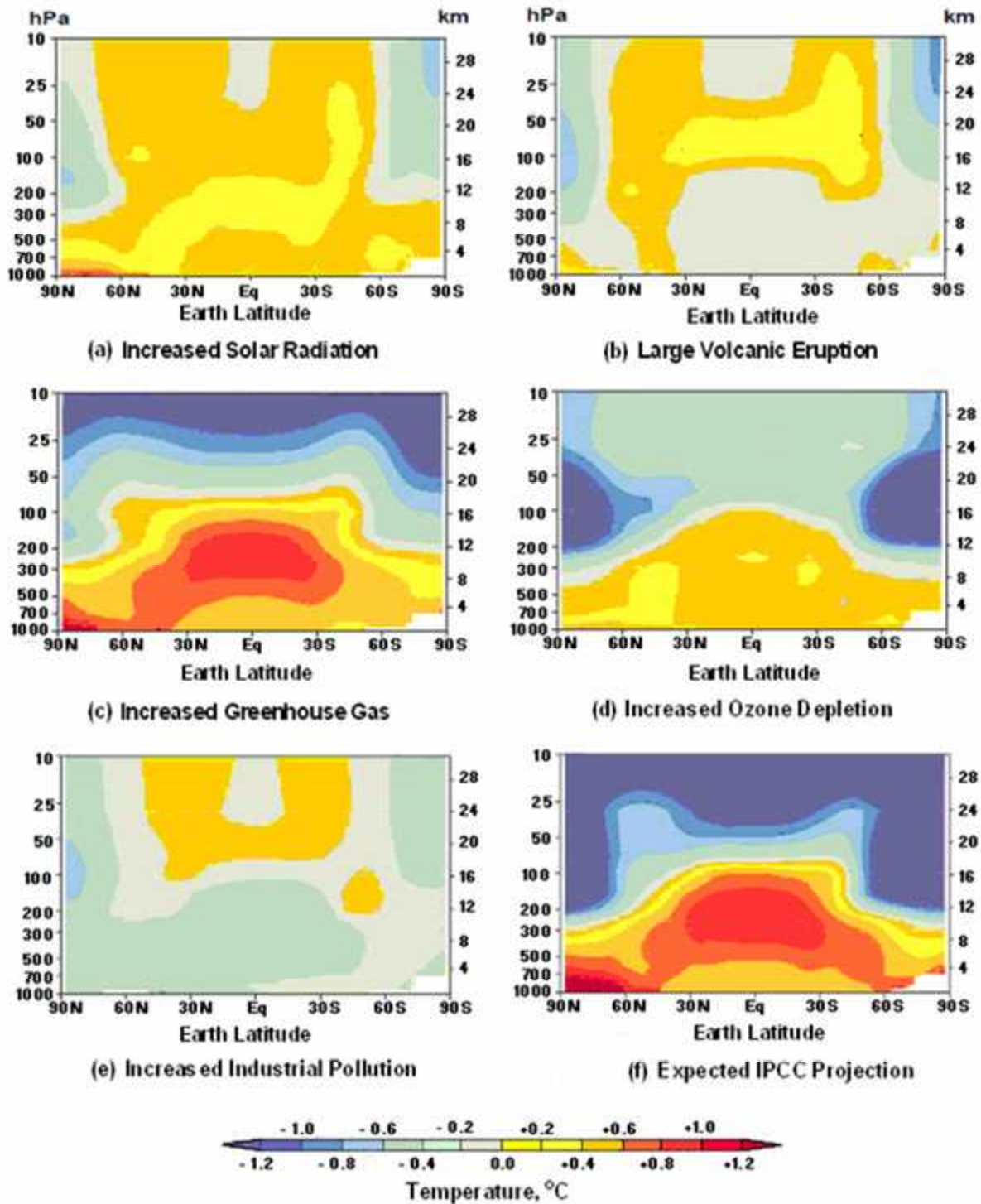


Figure 12. IPCC projected climate change signatures.

(b) Signature of a large volcanic eruption producing huge clouds of ash and fumes. If this signature were present, there would be moderate warming above 14 km, and moderate cooling below that. The opposite of this effect is seen.

(c) Signature of an increase in greenhouse gases. If this signature were present, warming would be concentrated in a distinct "hot spot" about 8 to 12 km up over the tropics, with less warming further away, turning to cooling above 18 km. This effect is not seen - no "hot spot" exists!

(d) Signature of increased ozone depletion (both tropospheric and stratospheric). The ozone signature shows moderate warming below 12 km and moderate cooling above 12 km. This effect is seen and was probably more pronounced in 1998 when it was hotter on the earth than it was in 2006-2007 when the actual measurements were taken. This signature is the closest to the actual warming signature. It is not an exact fit for the observed signature all over the globe but clearly appears to play the dominant role. The ozone depletion signature also shows greater warming of the North Polar Region surface as currently seen. The ozone depletion signature showed no projection for the South Polar Region surface temperature.

(e) Signature of increased industrial pollution, specifically sulfate aerosols. If this signature were present, there would be moderate cooling below 14 km mainly in the northern hemisphere and moderate warming above 14 km over the tropics. This effect is not seen.

(f) Signature that was expected by the IPCC was developed by combining the five signatures. The combination was made in the proportions the IPCC believed those causes contributed to global warming. The distinct "hot spot" at 8 to 12 km high over the tropics due to increased greenhouse warming dominates the theoretical combined signature. Actual measurements do not show this effect.

After the greenhouse signature was found to be missing, alarmists objected by saying the readings of the radiosonde thermometers might not be accurate and maybe the hotspot is there but went undetected. The uncertainties in the temperature measurements from one radiosonde are large enough to miss the hotspot; however, hundreds of radiosondes have given the same answer, so statistically it is not possible that they collectively failed to notice the hotspot.

Conclusion

Many factors can influence the earth's temperature. However, from a scientific analysis, there is not a greenhouse signature in the atmosphere as implied by the IPCC. The non-effect of CO₂ is also clearly shown, by an earth temperature drop of around 0.65 to 0.78 °C from 1998 to 2008 during a period when CO₂ concentration in the atmosphere increased some 20 ppmv. It should be obvious to everyone who has analyzed climate change that climate-driving forces, other than CO₂ control the temperature.

Chlorofluorocarbon destruction of stratospheric ozone can be correlated nicely with both the global cooling and warming temperature anomalies seen over the time span from 1966 to 1998. Although the atmosphere is intricate in how it acts and reacts, CFCs appear to be the dominant cause of greater than normal earth warming. One can account for most, if not all of the 0.48°C rise in earth's temperature from 1966 to 1998 with the additional UV light that hit the earth due to loss of ozone in the stratosphere. The ozone depletion signature is there as predicted by the developed mass and energy balances. Unless the CFCs are removed from the atmosphere, the whole earth could continue to be warmer than normal and higher concentrations of CO₂ (from permafrost release of methane) will exist until the CFCs in the stratosphere slowly disappear naturally over the next 50-100 years.

The exceptions that would alter this are large volcanic eruptions or weather modification techniques as proposed by physicist Freeman Dyson, wherein fine particulate, such as bauxite (Al₂O₃), is sprayed into the stratosphere and absorbs more UV light to cool the earth much like the effect seen with a large volcanic eruption.

China and other developing countries will phase out CFC production in 2010. Some CFC production plants have been shutdown ahead of schedule in developing countries and this is very beneficial. However, it would not be that difficult to remove existing CFCs from the stratosphere and the earth's temperature could be brought back to normal much quicker.

Einstein (20) once said, "*The grand aim of all science is to cover the greatest number of empirical facts by logical deduction from the smallest possible number of hypotheses or axioms*". One can do that here using CFC destruction of ozone to explain all of the observed recent earth and atmosphere temperature anomalies from 1966 to 1998.

The United States Congress is currently considering a carbon dioxide cap and trade system; if implemented this would make the increase in cost of energy in mid 2008 look pale in comparison to the cost it will be after such a tax is imposed. Taxing carbon would do nothing for the environment and would reduce plant growth slightly due to reductions in photosynthesis (less CO₂). Taxing carbon makes absolutely no sense and would dramatically hurt the economy of every country that implements such taxes.

Acknowledgements

I would like to thank Lord Christopher Monckton and Dr. David Evans for their support and suggestions.

Note: * The paper was peer reviewed twice by Chemical Engineering Progress and the editor relayed that the paper would be published, but at the last moment cancelled it. One reason given was that CEP had not taken a position on global warming. (That's science?) The American Chemical Society had taken a position that carbon dioxide was causing warming and would not publish papers to the contrary.

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