# No “Greenhouse Effect” is possible from the way the Intergovernmental Panel on Climate Change define it.

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## ABSTRACT

This paper makes the following significant points: -

1) The IPCC definition of “Greenhouse Effect” on page 946 of their Report No. 4, 2007, is wrong and no “Greenhouse Effect” is possible from the way IPCC define it. The statement in this definition that downward atmospheric radiation “trap(s) heat” in the surface-troposphere system to result in higher temperatures and global warming is false.

2) Radiant energy reaching the Earth from the Sun is the only source of heat to maintain or vary global climate (assuming geothermal sources have negligible effect). Total radiant heat gained must establish equilibrium with total radiant heat lost. As in the past, global climate change can only be due to longer or shorter-term variations in solar radiation.

3) Solar radiation reaching the Earth varies according to the intensity of sunspots and their number, the extent of the sunspot activity on the side of the Sun facing the Earth and the proximity of the Earth to the Sun in the normal course of its elliptical orbit (maximum at perigee).

4) Sunspot activity in the magnetic gaseous plasma at the surface of the Sun is related to the “tide-like” gravitational influence of Jupiter. From 1947 Professor S.W. Carey, University of Tasmania, taught that this varies in complex uneven cycles as the other heavy planets are grouped on the same or opposite side as Jupiter or dispersed more or less evenly round it.

5) The open atmosphere cannot act like a glasshouse because there is no physical barrier to confine convective recirculation of air. Within a glasshouse air is warmed by surfaces and objects heated by solar radiation through the glass and it is confined to circulate convectively within the glasshouse.

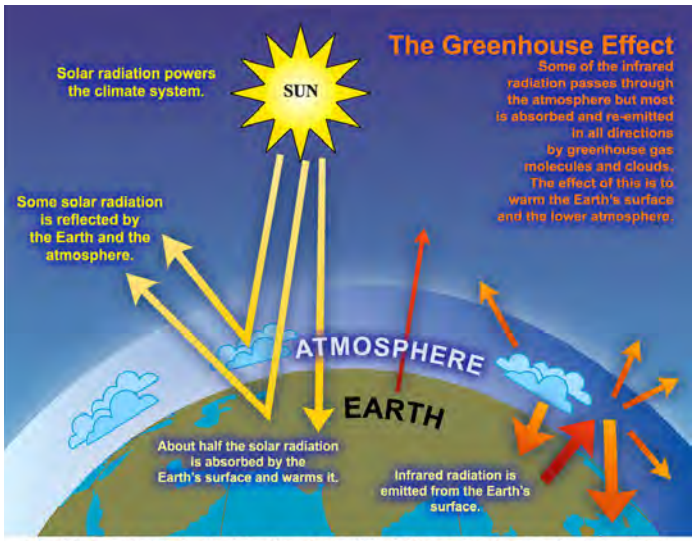

## The erroneous IPCC definition

Readers are invited to consider a fundamental error in physics in the IPCC Report No. 4, 2007. The definition of 'Greenhouse Effect' on page 946 **contains an erroneous statement that would invalidate the premise on which most of the report is based.**

This erroneous IPCC definition reads: -

**“Greenhouse effect Greenhouse gases effectively absorb thermal infrared radiation, emitted by the Earth's surface, by the atmosphere itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-troposphere system. This is called the greenhouse effect. Thermal infrared radiation in the troposphere is strongly coupled to the temperature of the atmosphere at the altitude at which it is emitted. In the troposphere, the temperature generally decreases with height.**

**Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average, -19°C, in balance with the net incoming solar radiation, whereas the Earth's surface is kept at a much higher temperature of, on average, +14°C. An increase in the concentration of greenhouse gases leads to an increased infrared opacity of the atmosphere, and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a radiative forcing that leads to an enhancement of the greenhouse effect, the so-called enhanced greenhouse effect.”**




**FAQ 1.3, Figure 1.** *An idealised model of the natural greenhouse effect.*

Figure 1. The incorrect popular cartoon-like diagram as IPCC published it on page 115 of their Report 4 to illustrate the "Greenhouse Effect"

We should have particular regard to the IPCC sentences that state: "Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-troposphere system."

The definition then goes on to explain that the temperature of the Earth's atmosphere decreases with height and the infrared radiation emitted to space originates from high altitude where the average temperature is -19°C in balance with the net incoming solar radiation.

The enveloping atmosphere keeps the Earth's surface at a much higher temperature as IPCC says averaging +14°C so there is a temperature gradient all the way up to the limits of our gaseous atmosphere with, on average, all higher parts of the column of air being at lower temperature than those below it.

This gradient is measured thousands of times each day as our aeroplanes climb to high altitude but of course the main transfer of heat to the upper atmosphere is by convection. This is quite violent at times with typhoons, hurricanes, or tropical thunderstorms each afternoon. Nevertheless, total radiant heat outward from the whole Earth must remain in equilibrium with the radiant heat inward from the Sun.

The IPCC definition claims that 'Greenhouse gases' ($CO_2$, methane, water vapour, etc.) absorb thermal infrared radiation emitted by the Earth's surface and by the atmosphere itself due to the same gases. Where the Earth's surface and lower atmosphere are at a higher temperature than greenhouse gases in the cold upper atmosphere it is certainly possible for them to do this.

The IPCC illustrate their definition of "Greenhouse effect" on page 115 of their Report No. 4, 2007, as it is reproduced in Figure 1.

No object in the universe can heat itself by its own radiation so that the source of radiant heat must always be at higher temperature than the object or substance absorbing the radiation. Greenhouse gases at all levels in the atmosphere are a minor component of an adiabatic gas in an open system that cannot be compressed other than by its own weight.

If a slightly higher concentration (from 0.0278% to 0.0387%) of greenhouse gas in the Earth's atmosphere absorbs more radiant heat than it otherwise would have done, this excitation simply expands the gas volume slightly. It does not heat or "trap heat" within the surface-troposphere system.

Clausius' simple statement of the 2nd Law of Thermodynamics says: *"No process is possible whose sole result is the transfer of heat from a body of lower temperature to a body of higher temperature."* Low-level heat in the cold upper atmosphere cannot result in heating or retention of heat to increase the temperature of the warmer atmosphere below it.

Heat cannot be effectively re-radiated downward from the colder upper atmosphere towards the warmer lower atmosphere and surface of the Earth to result in increasing its temperature. It is a common experience that heat radiates the other way from hot or warmer things to its colder surroundings.

Therefore no Greenhouse Effect is possible from the way IPCC define it. Increasing trace levels of $CO_2$ in the atmosphere, either from natural or anthropogenic sources, do not create a "Greenhouse Effect". Any such increase in $CO_2$ can not cause global warming or be the cause of climate change.

The erroneous concept in the IPCC definition and in the popular-type "cartoon" they have used to illustrate it is shown in the redrawn Figure 2.

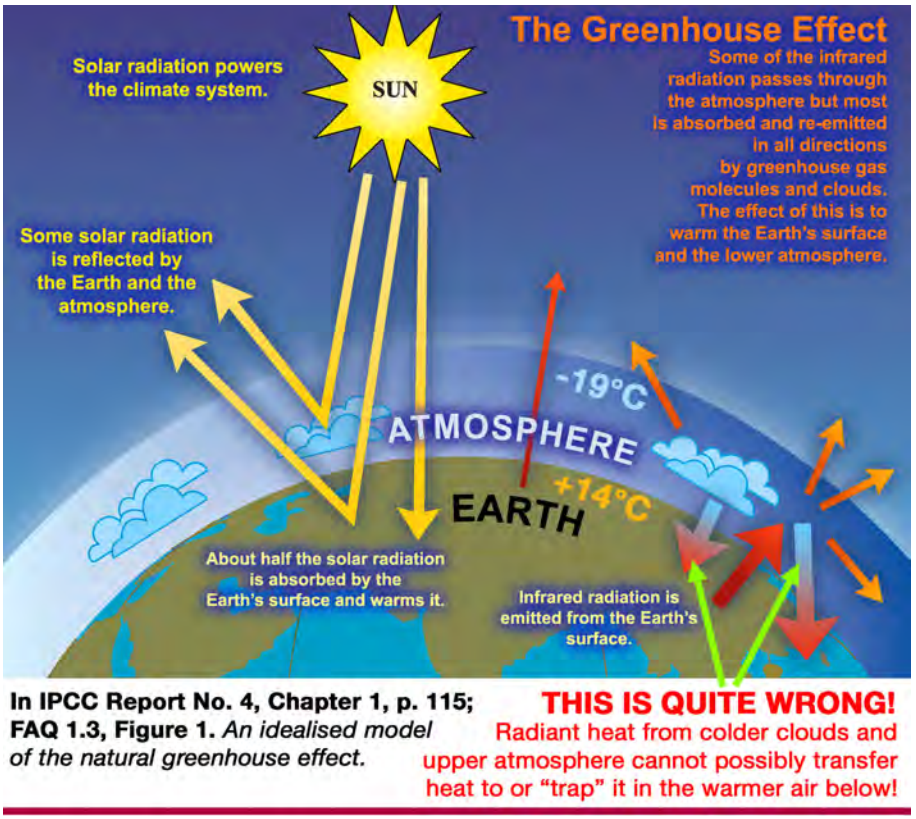



Figure 2. The cartoon-like IPCC diagram is redrawn to point out the incorrect concept of radiant heat from the cold upper atmosphere resulting in heating or "trapping" heat in the warmer atmosphere below.

## The nature of the IPCC investigation

The IPCC Report No. 4, 2007, is a selected assemblage of material using scientific terms and concepts to describe natural phenomena that may indicate the recent global warming period was due to industrial $CO_2$ emissions. The authors are predominantly meteorologists who appear to have abandoned the scientific method of hypotheses rigorously tested by experiment. Instead they have selected and assembled a large body of scientific opinion that supports the conclusions they are attempting to reach. Testing a scientific hypothesis is not a matter of consensus, as if scientific truth were something to be voted on. It is either true or not true. Scientific method requires the truth to be established by repeatable experiment.

Weather forecasting or predicting future trends in global climate change cannot be the result of any precise scientific procedure or measurements. Meteorologists have to "average" or consider large volumes of complex data and make "best estimates" or educated guesses! The IPCC reporting has therefore introduced a scale of "likelihood" that is used to assess the probability of certain outcomes.

The different IPCC working groups now include a very large number of highly qualified climatologists. Different groups of these 'specialists' now peer review each-others papers. With attention focused on the meteorological records and the "likelihood" of increasing $CO_2$ levels in the atmosphere causing global warming, the IPCC reviewers must have missed the simple error in physics or more precisely in the thermodynamics of adiabatic gases that occurs in their definition of "Greenhouse Effect" and diagrams.

There is no causal link between increasing $CO_2$ in the atmosphere and the recent warming period from 1950 to 1998 when IPCC have said average global temperatures increased by approximately 0.8°C.

## Earth energy fluxes must balance

The Earth cannot be out of thermal equilibrium with the Sun in the long term because the Sun is the only source of heat for the Earth plus surface-troposphere system (assuming negligible geothermal effects). The

only way to heat or cool the Earth in the long run is to change the amount of solar energy that is absorbed. The presence of greenhouse gases does not change the energy input and if the absorbed energy input remains unchanged, the output energy cannot change.

Every body that is not at absolute zero of temperature will radiate heat. The Earth will give off just as much power in radiation as it absorbs when it is in radiative thermal equilibrium with the Sun. At average radiative thermal equilibrium for the surface-troposphere system, the Earth's average surface temperature is the result of adiabatic temperature distribution of air in its gravitational field. Clearly there are some parts of the complex atmospheric layer round the Earth that are hotter, and some that are cooler, but the average can be used for the system as a whole.

## Radiant heat energy can only flow from hot to cold

Using the established theoretical laws of physics (Kirchhoff's Law and Stefan-Boltzmann Law), the average temperature at the bottom of the atmosphere can be calculated to be +14.5°C (Postma, J.E., 2011). This predicted average air temperature on the ground also corresponds to observed global average sea-level temperatures!

The total average equilibrium temperature for the surface plus atmosphere system at -18°C is therefore about 5 km above the surface but at the bottom of the atmosphere the average temperature is +14.5°C. The average temperature at which the whole system Earth and its surrounding atmospheric gases are in radiative equilibrium with the incoming energy with the Sun can also be calculated using established thermodynamic theory. This is -18 to -19°C as IPCC have used in their definition.

The average temperature of -19°C high in the atmosphere from which the Earth-atmosphere system is re-radiating the total heat gained from the Sun back into space may seem too cold. However, this result calculated from physical theory is confirmed as correct by direct measurements from satellites. -19°C or 254°K above absolute zero radiating outward is actually quite hot compared with no heat at all radiating inward from the cold reaches of outer space! Radiant energy from the Moon and stars is negligible so the Sun is the only real source of energy reaching the Earth.

Within the Earth's atmosphere it does not matter that some low-level thermal radiation is re-emitted back down towards the ground. There isn't a high enough radiative energy flux density to heat the warmer atmosphere and Earth's surface below it. Only radiant energy with greater energy flux density can induce further heating. The 2nd Law of Thermodynamics does not say thermal infrared radiation cannot be emitted towards a warmer body. It says no process is possible whose sole result is the transfer of heat from a body of lower temperature to a body of higher temperature. The sole result of the thermal infrared radiation from the Earth and anywhere in the atmosphere is to dissipate the heat absorbed from the Sun back into space to maintain thermal equilibrium of the whole system. Heat cannot be “trapped” within the open adiabatic gases of the surface-troposphere system.

The direction of heat flow is only from hot (the Earth's surface), to cold (upper atmosphere), and then by radiation into outer space. Infrared energy leaves the atmosphere in only a few milliseconds, even if it gets scattered by gases. However, this infrared radiation is merely a result of the existing temperature below it, not a cause of it, and therefore it cannot induce further heating upon its own source. The total absorption and radiation of heat from the troposphere has the effect of transferring heat from the warmer surface of the Earth towards cold outer space.

## The open atmosphere cannot act like a greenhouse

Water vapour or $CO_2$ in the atmosphere does not act like a glasshouse. A greenhouse or garden glasshouse gets warm because the glass panels prevent atmospheric convection. The radiant solar energy warms surfaces inside a greenhouse so that they warm the air in contact with them by conduction and internal convection. The glass panels prevent or restrict circulation so the warm air stays inside the greenhouse. There is no "radiative entrapment". In 1909 Professor Robert Wood conducted detailed experiments to demonstrate the way solar radiation warms the air inside a greenhouse. In view of the confusion created by inappropriate use of the term "Greenhouse Effect" to infer increasing $CO_2$ in the atmosphere traps radiant heat in the lower atmosphere like a greenhouse, Professor N.S. Nahle has rigorously repeated Wood's original experiments and these results were published on July 5th 2011.

Space does not return anything towards the Earth in infrared radiation. The energy balance is the solar flux reaching the Earth (mostly in the visible spectrum) on one side of it and infrared fluxes departing from the surface with a small fraction intercepted by the atmosphere that is also finally lost to the cold reaches of outer space. The cold upper atmosphere cannot "trap" radiant heat in the warmer atmosphere or surface of the Earth below it. No "Greenhouse Effect" is possible from the way IPCC define it.

There is no causal link between increased or decreased levels of $CO_2$ in the atmosphere and increases or decline in average global temperatures.

## Natural Climate Change Cycles

Before the false claim that a Greenhouse Effect "trapped" heat in the lower atmosphere to cause global warming, geoscientists were taught that natural climate change cycles are due to variations in solar radiation. These variations correspond to the repeated changes in sunspot numbers that have been observed since Thomas Harriot in 1610. Natural cycles of global warming and cooling result from natural variations in this sunspot activity and the way the Earth is exposed to the greater levels of heat radiation that are emitted from sunspots.

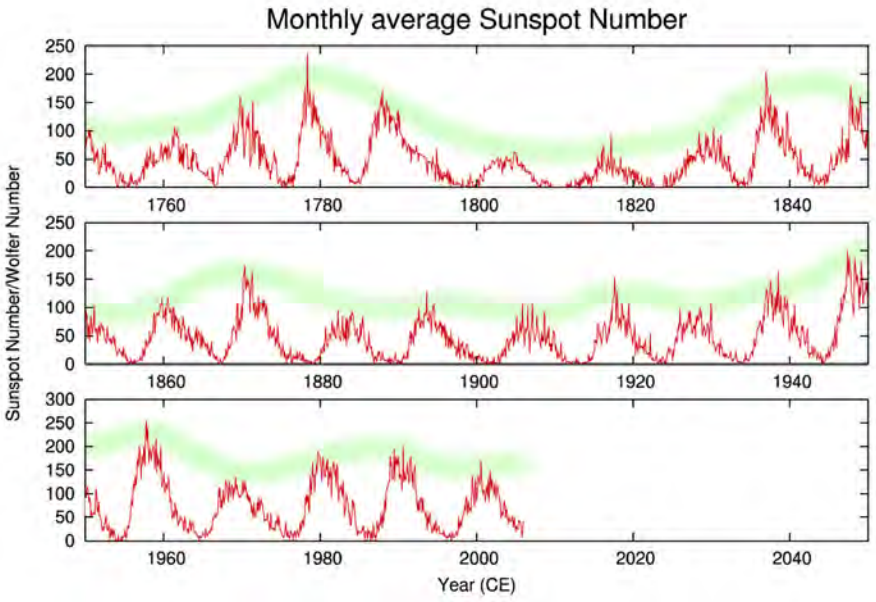



Figure 3. The record of monthly average sunspot numbers clearly shows a correlation with the orbital period of Jupiter. Changes in magnitude of these cycles reflect longer-term climate changes.

Sunspots are natural eruptive activity in the highly volatile magnetic gaseous plasma at the Sun's surface. All records of sunspot activity, sunspot numbers and areas of sunspots on the side of the sun facing the Earth show a very clear eleven-year cycle corresponding to the orbital period of Jupiter. This is shown in the record of monthly average sunspot numbers since 1750 illustrated in Figure 3.

The pattern of eruptive activity in the Sun's surface plasma follows the "tide-like" gravitational effect of the heavy planets orbiting the Sun.

This normal rotation of the heavy planets in their different orbital periods results in a complex cyclic pattern of longer-term variations in sunspot activity. This modulation of sunspot numbers and intensity exposes the Earth to the variable heat radiation that results in natural global warming and cooling periods. The varying green band in Figure 3 indicates the changes in sunspot activity that give rise to the Earth's natural climate change cycles.

Figure 4. Ice skating on the Thames in London, 1796.

The recent period of global warming from 1950 to 1998 is one of seven warm-cool periods of natural climate change that have occurred since 1000 AD. Before the false anthropogenic "Greenhouse gas" alarm, these were considered normal and given names. Starting and ending dates were estimated from historic records and proxies such as tree ring patterns, ice cores, etc. They were: Oort minimum cool period 40 years duration 1040 to 1080; Medieval warm period duration 150 years from 1100 to 1250; Wolf minimum cool period duration 70 years from 1280 to 1350; Spörer minimum cool period duration 100 years from 1450 to 1550; Maunder minimum cool period duration 70 years from 1645 to 1715; Dalton minimum cool period (sometimes referred to as the little ice age) duration 30 years from 1790 to 1820 (see Figure 4.); and Modern warm period duration 48 years 1950 to 1998.

## The present return to a cooling period through seasons of extremes

Because radiation from the Sun is the only source of energy that can result in warmer or cooler periods of global climate, it is logical that cooler periods occur when sunspot activity is minimal and the spectrum of solar radiation contains less heat. This certainly appears to have been the case in January 2011. NASA published an image of the side of the Sun facing the Earth on 11th January 2011. This showed a very quiet period with no sunspots (Figure 5) and it corresponded to the time that the British Isles were completely frozen over and covered with snow (Figure 6.).

The modern period of global warming, 0.7°C rise in average temperatures from 1950 to 1998, is consistent with the pattern of past natural climate change cycles. All of these occurred without industrial $CO_2$ emissions.

In the ten years from 1998 to 2008 two observatories, Hadley CRU and MSU satellite measurements, record strong fluctuations in global average temperatures and a slight decline over the whole period as in Figure 7. This pattern is consistent with previous extreme climate fluctuations, hot summers, very cold winters, floods, typhoons, etc., that Landscheidt has attributed to previous periods of change from global warming to global cooling.

## No correlation between $CO_2$ levels in the atmosphere and global warming

However, the observatory on Mauna Loa in Hawaii shows that trace level $CO_2$ in the atmosphere continues to rise. There is no correlation between these $CO_2$ levels measured high in the ocean atmosphere on a Hawaiian island and the variable slightly declining global average temperatures from 1998 to 2011. In the last period of global cooling from 1939 to 1949 the average temperature declined approximately 0.3°C (Figure 8). At this time there was also no relation between the cooling period and the sharply increased levels of $CO_2$ in the atmosphere that were measured by chemical methods.

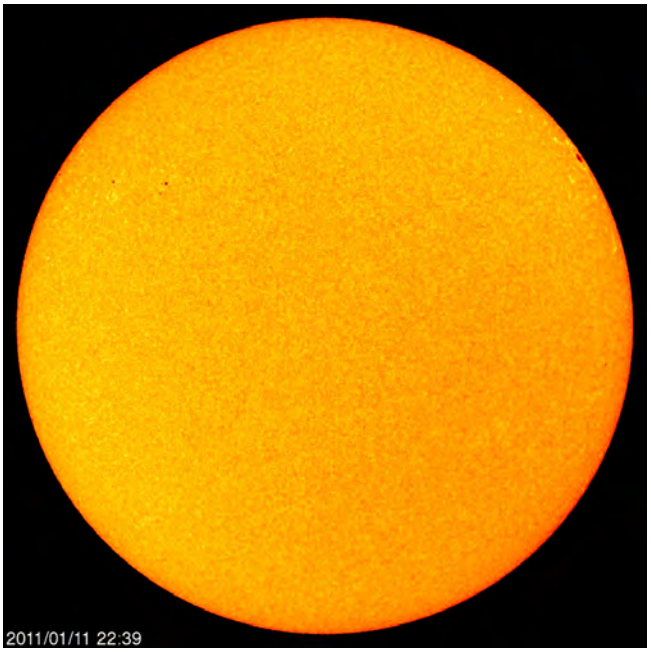



Figure 5. The Sun radiates much less heat when sunspot activity is minimal as on 11th January 2011.

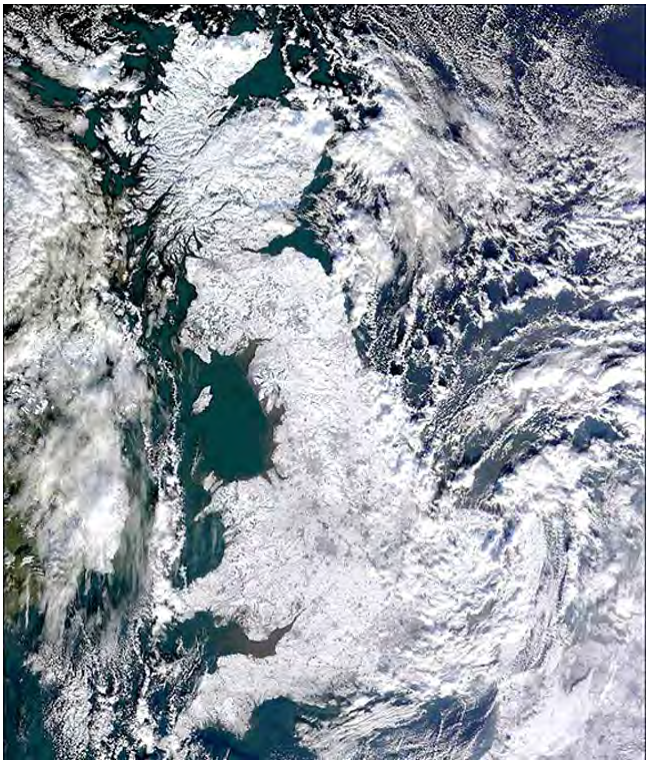


Figure 6. Great Britain was frozen over and completely covered by snow in January 2011.

In their reporting the IPCC have adopted the data published in G. Callendar's 1958 paper "On the Amount of Carbon Dioxide in the Atmosphere" (Figure 9). This shows a gradual increase in the $CO_2$ content of the atmosphere from about 285ppm to 310ppm at the beginning of World War II, then to 315ppm by 1949 and 322ppm in 1958 (grey zone in Figure 9). In the war years (green zone in Figures 8 and 9) a sharp increase in anthropogenic $CO_2$ emissions would certainly be expected.

This is clearly indicated by a large number of measurements by chemical methods that were recorded at a number of stations in Germany, Scotland, Helsinki and two in USA in Massachusetts and Alaska. They include readings up to 417ppm, which is much higher than the present level of 387ppm. Beck, May 2008, is critical of Callendar, 1958, and the IPCC report that also adopted Callendar's ±10% "corridor" of data (grey zone in Figure 9). Beck claims that Callendar rejected these chemical determinations of $CO_2$ in the atmosphere because they are more than ±10% from the mean of earlier and later values within his "acceptance corridor". Another explanation may be that Callendar,

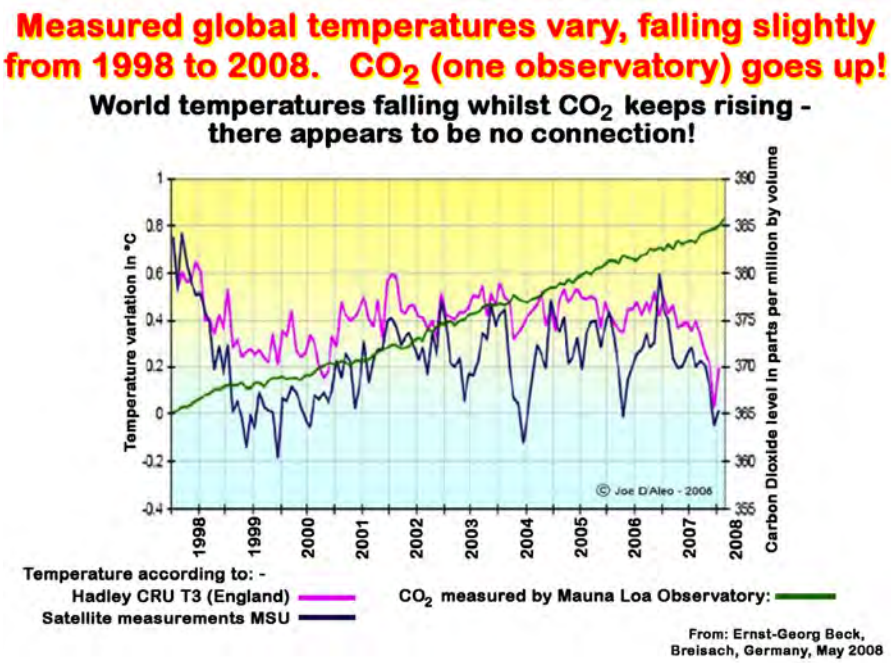



Figure 7. Fluctuating and slightly declining average global temperatures are unrelated to increasing trace levels of $CO_2$ in the atmosphere.

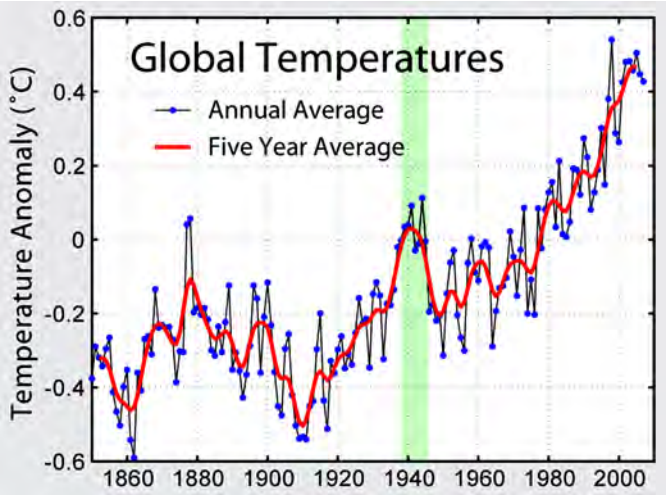



Figure 8. Average global temperatures declined in the period 1939 to 1949 that included the war years in which anthropogenig $CO_2$ emissions increased.

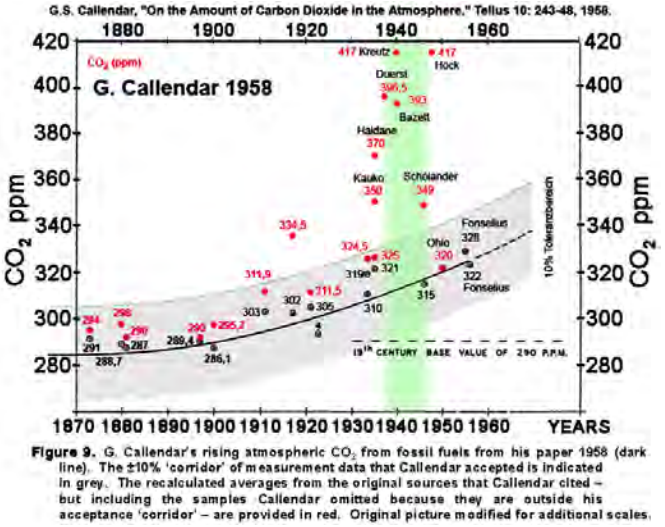



Figure 9. G. Callendar's rising atmospheric $CO_2$ from fossil fuels from his paper 1958 (dark line). The ±10% 'corridor' of measurement data that Callendar accepted is indicated in grey. The recalculated averages from the original sources that Callendar cited – but including the samples Callendar omitted because they are outside his acceptance 'corridor' – are provided in red. Original picture modified for additional scales.

Figure 9. High levels of atmospheric $CO_2$ in the war years should have resulted in higher average temperatures than today if it were the cause of global warming.

1958, was unaware of the measurements of $CO_2$ in the atmosphere made by chemical methods in Germany, Scotland and Helsinki during the war years. The determinations made in Massachusetts and Alaska at that time should have been known to him.

Beck points out that IPCC have disregarded all the recorded measurements by chemical methods because they would establish higher than present levels of $CO_2$ in the atmosphere during a period of decline in average global temperatures. Several such instances of the selective use of data in the IPCC reporting suggest IPCC is pursuing a political agenda rather than conducting a methodical scientific investigation.

## Natural variations in the strength of sunshine

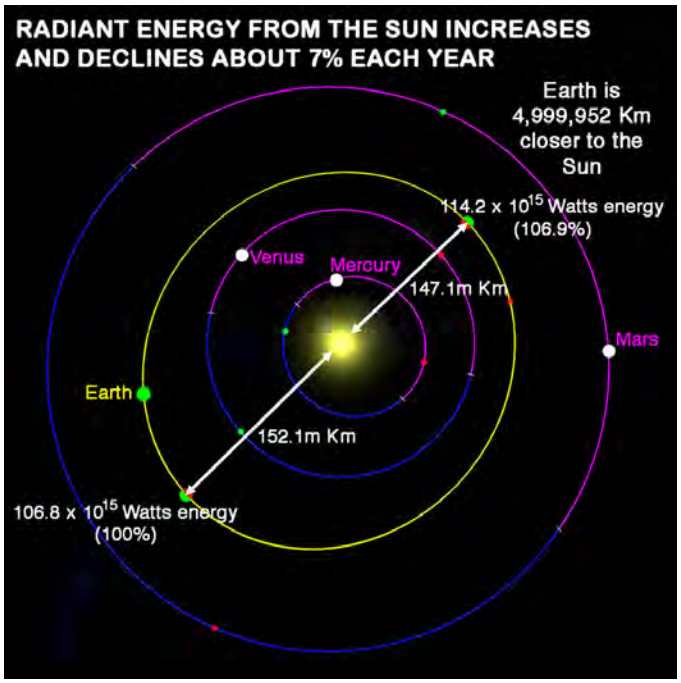



Figure 10. The strength of solar radiation intercepted is proportional to the inverse of the square of the distance between the Earth and the Sun. The mean distance Earth to Sun cannot be used.

Variations in the total solar radiation intercepted by the Earth (solar irradiance) have previously caused changes in global climate and continue to do so. This is not only due to natural fluctuations in the strength and nature of the solar radiation (spectral wavelengths emitted) but the solar radiation intercepted by the Earth is proportional to the inverse of the square of the distance between the Earth and the Sun. Due to the elliptical path of the Earth's orbit this distance changes five million kilometres each year between the Earth's closest approach to the Sun (at perigee) and furthest distance from it (at apogee). The change in distance therefore cannot be averaged when considering the Earths exposure to solar radiation.

The amount and nature of solar radiation emitted varies according to the number and area of sunspots (sunspot activity) on the side of the Sun facing the Earth. Sunspot activity is due to the "tide-like" effect of Jupiter on the highly volatile

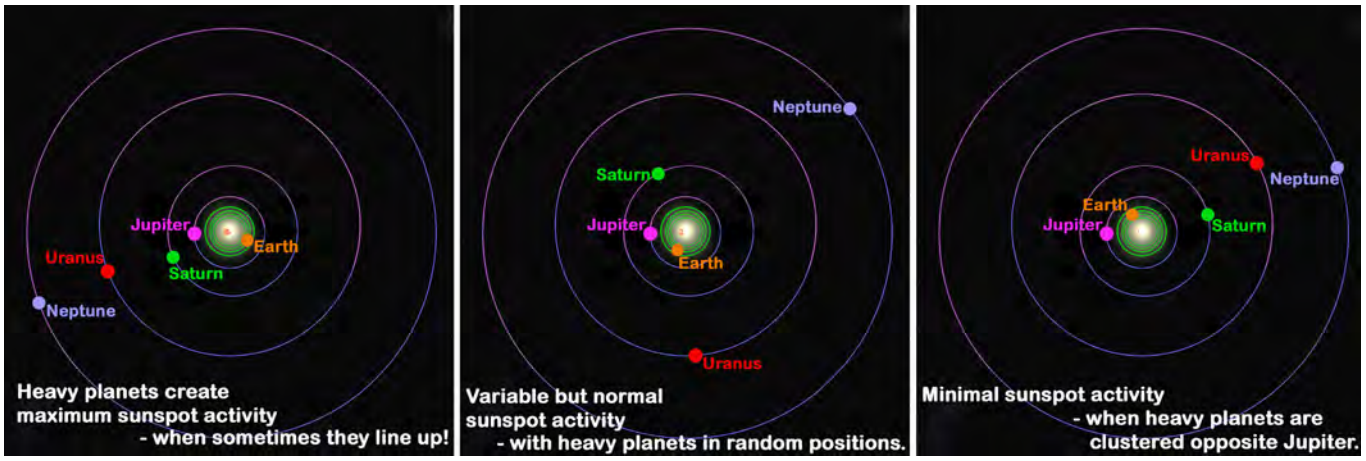



Figure 11. Sunspot activity is mainly due to the gravitational influence of Jupiter. This varies in complex uneven cycles as the other heavy planets are grouped on the same or the opposite side of the Sun to Jupiter or dispersed more or less evenly round it.

magnetic gaseous plasma at the surface of the Sun. This moves round the Sun every 11.86 years in accord with the orbital position of Jupiter and the Earth must pass it 10.86 times in the course of one orbital rotation of Jupiter. The number of sunspots on the side of the Sun facing the Earth varies strongly in accord with this eleven-year cycle as shown in Figure 3.

The effect of solar radiation on the Earth's climate is also dependent on whether the annual passage of the Earth past the area of maximum sunspot activity is at or near its perigee or apogee. This variation is because the strength of solar radiation intercepted is proportional to the inverse of the square of the distance between the Earth and the Sun. It would change about 7% if the variation were due to distance alone (Figure 10). Deliberately or unintentionally IPCC have failed to recognise this significant difference in irradiance due to distance. They use the mean distance of the Earth from the Sun as if the Earth's orbit were circular (IPCC Report 4, 2007, page 953).

Sunspot activity is primarily due to the gravitational influence of Jupiter but it is modified by the degree to which the other heavy planets, Saturn, Uranus, and Neptune, are clustered on the same side of the Sun as Jupiter (planetary conjunction), positioned more or less evenly round the Sun, or clustered on the opposite side to Jupiter. This planetary clustering or relatively even positioning of the heavy planets is indicated in Figure 11 but planetary conjunction or alignment of all four heavy planets on one side of the Sun is an extremely rare event in our solar system.

## Conclusions

No “Greenhouse Effect” is possible from the way IPCC define it and we may now look forward to a period of gently declining average global temperatures if Landscheidt's calculations predicting the orbital paths of the heavy planets are correct. The fact that low level radiant heat from the cold upper atmosphere cannot result in heating or “trapping” heat in the warmer atmosphere below it is apparent to everyone. Fortunately, politicians, economists, media attempts to suppress this information, and those with a strong vested interest in maintaining the “Greenhouse Gas” scare, will not be able to prevail against the inevitable cycle of natural changes in global climate.

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