



COMINO FOUNDATION

The Science is not Settled

Climate Change 2007, the fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change¹ (IPCC), and its associated documents were published to provide the most comprehensive and up to date information on climate change and be the standard reference document for everyone, worldwide, in academia, government and industry. The IPCC is associated with the United Nations and it is assumed by many policy makers across the world that its research work and resultant climate change projections are correct. Consequently, the content of AR4 has been widely accepted and is now the basis of political and fiscal policy in many countries. The substantial majority of views expressed in the media also accept the content of AR4 which is now known as the consensus view.

The scale of momentum behind this view is extremely strong and those who represent the IPCC, or support their views, consistently state that the science is settled. These organisations include the Royal Society and many science based organisations in the UK, the US and other countries. The well-established scientific method of scepticism, research, peer review and recognition of scientific advance is being ignored. Those who put forward conflicting scientific evidence, or views, are frequently labelled, and even vilified as, sceptics.

The conclusions of AR4 were said to be based on the scientific evidence and principles available before 2006. However, according to the scientific method, the development of scientific principles is never settled and, as one would expect, scientific research has continued to take place into what is actually happening in the atmosphere due to the anthropogenic increase in greenhouse gas emissions. Leading atmospheric physicists have recently published papers on research projects which demonstrate that the dynamics of the 'greenhouse effect' are not behaving as would be expected from previously accepted scientific principles.

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The outcomes of this research have a direct bearing on political and fiscal policies. Consequently, the IPCC and all organisations associated with climate change and global warming should accept that advances in understanding the science driving climate change will never be settled and that advances in climate science should be taken into account as they occur

In late 2009 it was reported that the Climate Research Unit at East Anglia University, who provided considerable data on global temperature to the IPCC AR4 report, had modified some data and statements in this report also drew on information regarding the melting of the Himalayan glaciers which was not proven scientifically. This has indicated that the IPCC procedures for reviewing climate science and making predictions on climate change need to be modified extensively to maintain public confidence.

Global warming to 2009

Climate Change 2007 states that warming of the climate system is unequivocal, as is evident from the IPCC's selected records of increases in global average air and ocean temperatures, melting of glaciers and arctic ice, and rising global average sea levels. They state that the records they have selected are supported by extensive numerical illustrations of climate change during the 20th century. It is implied that the rate of change that has taken place will be maintained and will probably accelerate if there is no mitigation of anthropogenic greenhouse gas emissions.

Although the level of carbon dioxide (CO₂) in the atmosphere has steadily increased, global warming of the climate system has not taken place in recent years. Since 1995, average global temperatures have not risen in a statistically significant way and since late 2001 the global temperature has actually fallen at a rate equivalent to 2^oC per century. In addition, the ARGO bathythermographs which have been deployed throughout the world's oceans since 2003 show that the top 400 fathoms of the oceans have been slightly cooling over the past six years. It is agreed by climate scientists that this is where at least 80% of all radiant energy retained in the climatosphere by manmade "global warming" should accumulate. Furthermore, a paper by Douglass and Knox in 2009³, which analyzed ocean heat-content data for the past 70 years, show that there has been no net accumulation of heat-energy in the upper layer of the world's oceans throughout this period.

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Against the science available in 2006 the scientists working with IPCC set their climate change models to predict that at altitude in the tropics 'global warming' should occur at three times the surface rate. But half a century of measurement, both by balloon-borne radiosondes and by satellites, has shown that that this predicted warming has not occurred. Though there are large uncertainties in measurement of temperatures at altitude, all datasets agree that the tropical upper troposphere has warmed at about the same rate as surface temperature. The tropical mid-troposphere 'hot spot' is a characteristic fingerprint of anthropogenic, as opposed to natural, global warming and its absence is indicating that the global warming that actually began back in 1695, towards the end of the Little Ice Age, is probably due to natural causes.

If all these temperature measurements are correct they indicate that the sensitivity of the climate to anthropogenic greenhouse gas emissions is significantly less than the forecasts made by the IPCC climate models.

Measurement of Arctic sea ice shows that the extent of sea ice at its summer minimum in 2009 has increased by 24% over the 2007 summer minimum and is now within the range that has been normal over the past decade. In 2007 and 2008, the extent of sea-ice during the September low season was less than the 30-year minimum with the lowest extent of coverage being in the late summer of 2007. This recent decline in the extent of coverage cannot have been caused by "global warming", because it occurred in the recent eight and a half year period of global cooling, which applied in particular to the oceans. NASA has attributed the 2007 decline in Arctic sea ice to unusual poleward movements of heat transported by currents and winds and, recently, there was seabed volcanic activity in the Arctic area with seabed temperatures rising to 574⁰F. The Arctic climate has long been known to be volatile.

In contrast sea-ice extent in the Antarctic reached its 30-year maximum at almost the same moment as summer sea-ice extent in the Arctic reached its 30-year minimum. Total global sea ice has shown a slight decline over 30 years which is chiefly attributable to loss of sea ice in the Arctic during the summer.

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In the last few years media comment has highlighted that shipping has navigated both the North West and North East Passages in the Arctic in summer and inferred that global warming is opening up more economic shipping routes from the Atlantic to Pacific oceans. In reality the North East Passage has been navigated since 1879 and is currently used by 160 Russian freighters on summer schedules. Use of the North West passage is less well developed although it is navigated regularly by smaller vessels through the Belliot Strait which was first navigated in 1858.

It is well documented that glaciers on all continents are retreating and manmade global warming is said to be the cause. Records show, however, that glacier coverage last peaked around 1740 at the end of the Little Ice Age and glaciers have been retreating, progressively, since this date. Since anthropogenic greenhouse gases were not significant for most of the time since 1740, scientists believe that glacier retreat is related to longer-term natural cycles.

Up to date key climate change measurements are recorded in the monthly CO₂ reports published on the Science and Public Policy Institute website². It is clear from extensive measurement that global warming has not happened as expected in the first decade of the 21st century and the science that drives climate change is not settled and requires far more understanding.

The changing dynamics of 'Greenhouse' science

Accepted scientific principles indicate that the increased greenhouse gases produced by mankind will accumulate in the upper atmosphere and restrict the escape of radiation from the earth to outer space. In addition, as the upper atmosphere warms, the Clausius-Clapeyron principle dictates that the space it occupies becomes capable of carrying near-exponentially more water vapour, a greenhouse gas which is far more significant than CO₂ and which is believed to amplify any original warming. The climate models used by the IPCC attempted to quantify the extent of this positive radiation feedback but, inevitably, a number of assumptions had to be made in constructing these models because proven scientific principles were not available. As published in AR4, these models calculated that the temperature of the earth may increase by 3.3⁰C in response to a doubling of today's CO₂ concentration, as is expected later in the 21st century.

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Recently, however, a study by Professor Garth Paltridge, an Australian atmospheric physicist, and others⁴ explains what is happening to water vapour in the upper atmosphere. Their research shows that the escape of radiation from the upper troposphere is not reducing as the climate models relied upon by the IPCC had been instructed to assume because the additional moisture created in the upper troposphere dries due to the rarefied atmosphere (subsidence drying). The moisture, because of its weight, then subsides to lower altitudes where the water vapour has less effect in trapping radiation because the principal absorption bands of water vapour at these lower altitudes are already largely saturated. Consequently this subsidence drying allows far more radiation to escape to space, unimpeded, than the IPCC's models had been instructed to assume. The research also concludes that the temperature of the tropical upper troposphere is changing at the same rate as the surface temperature.

These research findings are supported by the research outcomes published in 2009 by Richard Lindzen, the Professor of Meteorology at Massachusetts Institute of Technology. This research confirms that, based on the analysis of the observations taken by the satellites of the Earth Radiation Budget Experiment (ERBE) over 15 years, far more radiation is escaping to space than the IPCC models had been instructed to assume⁵. The 11 climate models used by the IPCC were programmed to assume that as the Earth's temperature rises the combined effect of additional CO₂ and additional water vapour in the tropical upper troposphere would reduce the amount of outgoing radiation from the earth and create positive feedback. Based on actual measurements Lindzen's research shows that a warmer planet increases, rather than reduces, the amount of outgoing radiation. This remarkable discrepancy demonstrates that the 'greenhouse effect' is not behaving as expected.

This research is currently being validated by Dr. Roy Spencer, a leading meteorologist at Huntsville University in Alabama, and other scientists. In combination, these recent research findings show that greenhouse gases are causing little, if any, positive radiation feedback and that anthropogenic greenhouse gases will have limited impact on global warming. Currently, Lindzen concludes that a doubling of CO₂ concentration would cause a harmless 0.6^oC increase in temperature, not the 3.3^oC that is the IPCC's central estimate.

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It is clear to many scientists that climate science is extremely complex. Consequently many atmospheric and climate scientists are currently engaged on a range of research projects on what is happening to the atmosphere at the various levels, the dynamics and impact of cloud formation and the consequent impact on global temperatures and the climate in various parts of the world.

Research findings will be published regularly as projects are completed and it must be expected that validated findings will demonstrate that the apocalyptic projections of global warming, as predicted by the IPCC in AR4, need significant downward revision. It will also be appropriate for the IPCC to recognise that scientists do not fully understand the science that impacts on global temperatures and climate change and that it is not possible to be definitive about climate change.

Changing the temperature of the earth

It is well established that changes in the orbit of the earth round the sun create major changes in the temperature of the earth. The earth's orbit changes from near circular, as at present, to elliptical over a period of approximately 100,000 years. During the last 650,000 years there have been four relatively short interglacial warm periods with ice ages, of varying severity being the norm as shown by ice core measurement in the Antarctic. Over the last 11,400 years mankind has experienced a temperate, interglacial period and great civilizations have emerged. However, today's temperature is at least 3^oC below the peak temperatures in each of the past four interglacial periods: indeed, today's temperature is cooler than it has been during most of the present interglacial period.

Research into the temperature of the earth over the last millennium demonstrates that there was a warm period, termed the Medieval Warm Period, in the 11– 1300s before the earth cooled for what is know as the Maunder Minimum, or Little Ice Age, in the 16 – 1700s. The research also shows that the temperature at the end of the 20th century was less than the temperature at the height of the Medieval Warm Period. Since there were no anthropogenic greenhouse gas emissions during either period many scientists have concluded that natural events must have played a major part in changing the earth's temperature.

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One natural phenomenon that changes the temperature of the earth are sunspots which are cool and comparatively dark regions of the Sun's surface. These sunspots occur regularly and are surrounded by regions of increased brightness known as faculae. When sunspots occur the Sun emits more radiance which increases the temperature of the earth. Sunspot activity has been measured in detail since 1600 and there is some evidence to show the level of sunspot activity in previous centuries. The evidence shows that there has been a close relationship between sunspot activity and the temperature of the earth for the last millennium. The level of sunspot activity in the Medieval Warm Period is known to have been relatively high and there were no sunspots at all during the 70 years of the Maunder Minimum. In the last 70 years of the 20th century, solar activity reached very high levels but then there were no sunspots at all during the years 2006 to 2009.

Many solar physicists believe that sunspot activity has contributed, as recent data records show, to the rise in the average temperature of the earth in the second half of the 20th century before falling rapidly for almost eight years since late 2001 and wiping out half the increase in temperature since 1980.

For some time the IPCC did not recognise the existence of the Medieval Warm Period possibly because it did not support their central thesis that anthropogenic increases in greenhouse gases are largely responsible for increasing the earth's temperature. The IPCC state in the AR4 summary that *'During the last 50 years the sum of solar and volcanic forcing would likely have produced cooling. Observed patterns of warming and their changes are simulated only by models that include anthropogenic forcing.'* Whilst volcanic forcing has no permanent impact on temperature, many scientists consider that the impact of solar activity has been undervalued.

Moving forward

History has shown that properly researched scientific principles cannot be swept aside and if scientific research proves that the greenhouse effect is not working as was expected it is inevitable that the principles governing climate science will be updated.

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If the IPCC and other organisations continue to maintain the position where they state that the science is settled and ignore scientific reality they will be seen to promote politicised science and lose their credibility, especially if global temperatures fail to rise as forecast. Following the publicity given to the 'climategate' scandal polls show that the public is losing faith in the organisation promoting apocalyptic global warming. This will increase as additional evidence shows that historical surface temperature records during the 20th century are suspect.

The science underpinning how and why the climate of the earth changes is very complex and may never be fully understood by scientists. Given the scale of momentum behind the rationale and forecasts of the IPCC AR4 report the only way that the consensus view will change quickly is for the IPCC to modify its rationale and projections as a result of taking an authoritative lead in monitoring climate science as it develops. All associated organisations will change their stated views given this lead by the IPCC.

Plans to review scientific evidence for the next IPCC Assessment Report (AR5), which is due to be published in 2014, have been published. They include a review of research into what is happening to radiation in the upper atmosphere. It will be essential to the credibility of AR5 that advances in understanding the 'greenhouse effect' are properly reviewed with the scientists with valid conclusions being taken into account.

It is important to people across the world that politicians are able to base their decisions on climate forecasts that are based on the most up to date scientific research. This can be best communicated by the IPCC who have the resources to carefully monitor and evaluate all research on climate science that is taking place across the world. They should accept that this area of science will never be settled and, regardless of political consequence, should modify their climate change models and global warming forecasts as necessary and advise the world community.

The current conclusions of the IPCC are driving the investment of billions of dollars into projects to reduce anthropogenic greenhouse gas emissions and avoid predicted apocalyptic global warming. If rising global temperatures are not a threat to mankind the world should have the option of re-developing its fiscal policies to address other global problems that threaten the well being of mankind such as population control, hunger and disease.

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Anthony Darbyshire MA (Oxon), FRSA,
Environment and Research Fellow,
The Comino Foundation,

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References

- ¹ Intergovernmental Panel on Climate Change - <http://www.ipcc.ch>
- ² Science and Public Policy Institute – <http://www.scienceandpublicpolicy.org>
- ³ Douglas and Knox – Ocean heat content and Earth’s radiation imbalance – Physics Letters A Volume 373 Issue 36 31 August 2009
- ⁴ Paltridge, Arking & Pook – Trends in middle- and upper-level tropospheric humidity from NECP reanalysis data - <http://www.climateaudit.org/pdf/models/paltridge.2009.pdf>
- ⁵ Lindzen and Choi – On the determination of climate feedbacks from ERBE data - <http://www.drroyspencer.com/Lindzen-and-Choi-GRL-2009.pdf> Physics

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