

## V TEN PHYSICS FACTS – SETTING THE RECORD STRAIGHT

26 April 2011

Based on Mr Puckerclust's "[physics-trumps-right-wing-ideology](#)":

*"Global warming deniers know as much about climate science as they do about brain surgery. Would you let them tell your doctor what to do about that tumor?"*

*Why do I – a professional physicist and lifetime member of the American Physical Society – accept the reality of human-caused global warming? Because I accept the following top-ten list of physics facts, which have never been disputed in the scientific literature.*

*This is also why the American Physical Society of 47,000 physicists says "The evidence is incontrovertible: Global warming is occurring"."*

Before we set the record straight about those ten supposed physics facts, let's also set the record straight on some preliminary information that Mr Puckerclust would like us to believe.



[from Puckerclust's Author page](#)

(a) The APS statement on climate change was not drafted or confirmed by "47,000 physicists" of the APS, but by the APS council.

(b) Many members of the APS have criticized the statement, incl. [Harold Lewis](#) who resigned in protest. [Lewis' analysis](#) of the motivations behind the APS council position on climate change is better than anything we could come up with.

(c) Even APS editor [Jeffrey Marque](#) had to make the public admission "There is a considerable presence within the scientific community of people who do not agree with the IPCC conclusion that anthropogenic CO2 emissions are very probably likely to be primarily responsible for global warming that has occurred since the Industrial Revolution."

(d) Furthermore, even if there was "consensus" on AGW by APS or any other institution this wouldn't make the theory valid - unless Puckerclust is also willing to accept that the Sun had revolved around the Earth prior to 1543.

(e) The snide title of Puckerclust's essay implies that those on the political left could not possibly dispute his opinions. That alone is far from the truth.

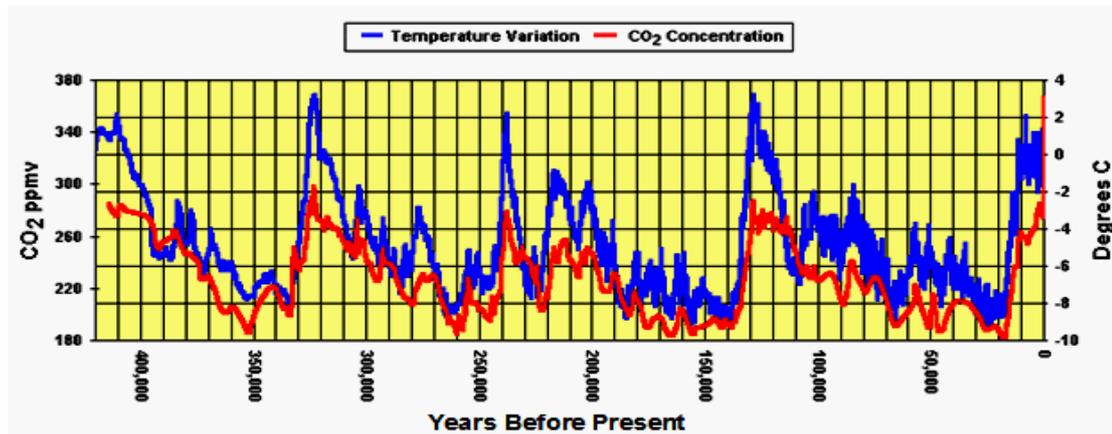
(f) By the way, nobody is denying that global warming occurred during the last decade of the last century, it's just that the emissions of carbon dioxide have nothing to do with it.

Now for our point by point response, not just one, but all ten.

- **PHYSICS FACT #1:** *The atmospheric carbon dioxide concentration has increased rapidly since the beginning of the industrial revolution, after being nearly constant for thousands of years.*

FACT: If the "beginning of the industrial revolution" is defined as mid-18th century, this is NOT true. There are [published measurements](#) of aerial concentration of CO<sub>2</sub> above 400 ppmv in the 1800s. A further illustration of the [variability of atmospheric carbon dioxide](#) can be learnt from Ernst-Georg Beck's accurate chemical analysis covering 180 years.

Carbon dioxide cycles with temperature spikes as evidenced by the graph below. A temperature spike is **followed** by a CO<sub>2</sub> increase as ocean temperatures rise and the solubility of CO<sub>2</sub> decreases.



Vostok Ice core data

Petit, J.R., et. al., "Climate and Atmospheric History of the past 420,000 years from the Vostok Ice Core, Antarctica", *Nature* 399: 429-436, June 3, 1999.

Raw [Antarctic ice core measurements](#) from Siple show 328 ppmv for 1897 – the value reached in Mauna Loa measurements of "rapid increase" only in 1970. See: *Climate Change: Incorrect information on pre-industrial CO<sub>2</sub>*; March 19, 2004; Statement of Prof. Zbigniew Jaworowski, Chairman, Scientific Council of Central Laboratory for Radiological Protection, Warsaw, Poland.

- **PHYSICS FACT #2:** *The surplus carbon dioxide has an isotope composition that can only come from fossil fuels. The increase in concentration is not natural; it comes from human activities.*

Now suddenly the reported increase is a "surplus"?

FACT: The whole idea of a definitive human isotope signal is based on one paper only, the Prentice Study, which was entirely an inside UN IPCC job, not peer-reviewed and containing a fatal error: Prentice wrongly assumed that human emissions of CO<sub>2</sub> from burning hydrocarbon fuels are responsible for the claimed isotope depletion. In fact, *all* plant carbon is similarly isotope depleted through natural decay, thus adding greatly to the total. As such the purported "human signature" is based upon a false premise and Prentice vastly exaggerated the contribution from humans. As an aside, *all* C<sub>3</sub>-type plant carbon is equally C<sub>13</sub>-depleted as carbon from fossil fuels and C<sub>3</sub>-type plants make for 95% of all existing green plants; CO<sub>2</sub> from plant decay is a magnitude greater than all human emissions. The "signature" of human emissions is completely lost in the noise of natural CO<sub>2</sub> emissions.

For further details see [Carbon cycle modelling](#) by Tom Segalstad.

As a corollary to the isotope change, the relatively low amount of C<sub>13</sub>-depleted carbon in the air points to a rather fast natural turnover rate, a residence time in the neighborhood of only 5 years, not the hundreds of years that is commonly supposed. This low-ball estimate of an anthropogenic impact is roughly consistent with [IPCC/DOE figures](#) which show a yearly human CO<sub>2</sub> contribution of only about 3%, with Nature providing the other 97%. Combustion alone cannot explain the (reported) 105 ppm increase of CO<sub>2</sub> since 1850. The isotope record says different.

Further information available upon request.

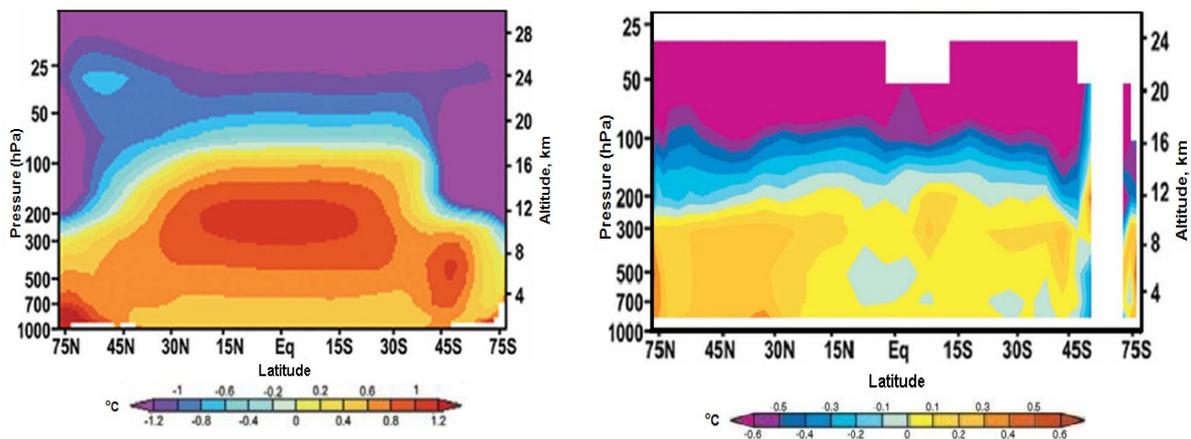
**PHYSICS FACT #3:** *The radiative properties of carbon dioxide have been measured by physicists in the laboratory: It absorbs thermal infrared (heat) radiation.*

FACT: Carbon dioxide absorbs and immediately **emits** radiant energy, in fact emits this energy at a longer wavelength than it is able to respond to again. A physicist who claims to understand the earth's main climate parameters should understand this.

Besides which, CO<sub>2</sub> only absorbs-emits a very small fraction of the IR spectrum, and therefore can never warm up to the same temperature as the radiation source. In other words, if warmed by radiation alone, CO<sub>2</sub> will ALWAYS be far cooler than a heat source that's radiating a continuous spectrum. In Earth's atmosphere, CO<sub>2</sub> warms just like every other gas does – by contact with the ground and by colliding with other air molecules. The scattering of IR by CO<sub>2</sub> cannot increase the temperature beyond this.

- **PHYSICS FACT #4:** *Because carbon dioxide has this heat-absorbing physical property, the increase in its concentration has increased the infrared opacity of the Earth's atmosphere and blocks the outward radiation of heat.*

FACT: Heat absorption does not imply heat blocking. Indeed, if you're overly hot you'll naturally seek out a heat-absorber to cool you – for instance, an ice cube. By direct contrast, a heat blocker would obviously impede your ability to cool off. If one imagines that heat absorption does mean heat blocking, however, this will probably lead one to believe that so-called greenhouse gases must create an insulative hot spot, as the IPCC predicted there had to be. But these two charts show the difference between prediction and reality.



Intergovernmental Panel on Climate Change (IPCC), 2007, p. 675, based on Santer et al, 2003.

See also IPCC, 2007, Appendix 9C) and

David Evans, "[Carbon Emissions Don't Cause Global Warming](#)", November 28, 2007,

Rather than a menacing hot spot hovering over the equator, there's a pleasant cool spot instead.

To repeat, absorption doesn't mean blocking.

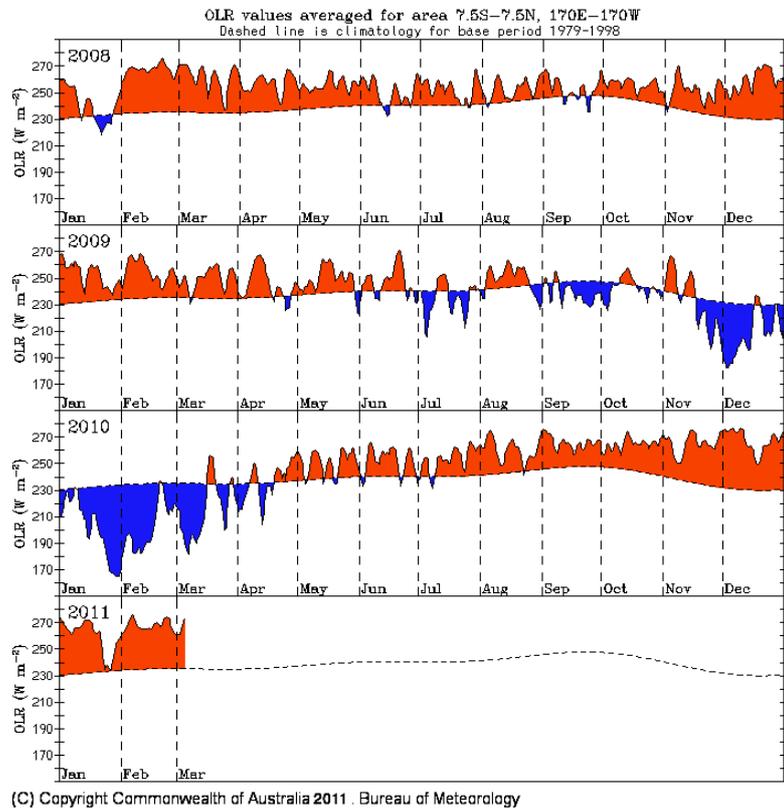
Despite questionable alarmist reports like #5 below, in fact, the earth has long been observed to emit the SAME magnitude of energy as it gets from the sun.

There is no evidence of blocking.

- **PHYSICS FACT #5:** *More net energy is now coming into the Earth's atmosphere from sunlight than is going back out to space as heat radiation.*

First of all, formulating an energy budget involves approximately 342 watts per square meter to start with and encompasses at least a year of observations that include variables like solar output, cloud cover, albedo changes, convective currents, and the like. No instrument or method is perfect and a disparity of a few watts per square meter is to be expected.

Secondly, outgoing (IR) longwave radiation (OLR) is a rather undulatory phenomenon...



so it's always hard to assess whether an actual trend is occurring.

Third, this recent NASA report (September 2010) seems to indicate that nothing outside the norm is noteworthy anyway.

**Annual Global Mean TOA Radiation Budget**

Parameters (Wm <sup>-2</sup> )	Ensemble Mean	Abs. SD (1-sigma)	Rel. SD (1-sigma)	Range (Min, Max)
Solar Incoming	341.3	0.7	0.2%	340.0, 341.8
Longwave	238.3	1.8	0.8%	235.6, 240.5
Shortwave	99.9	3.2	3.2%	96.6, 105.2
Net	3.2	3.2	100.0%	-0.4, 7.0
Clear Longwave	266.1	2.7	1.0%	262.0, 268.0
Clear Shortwave	52.0	1.9	3.6%	49.2, 54.5
Clear Net	23.1	3.3	14.3%	18.1, 26.2

- Agreement: LW within 1%, SW within 3.6% of the ensemble mean
- Disagreement: Largest relative SD for Net due to small Net value; smallest for solar incoming

NASA Langley Research Center / Science Directorate

Source: [Comparisons of Top-of-atmosphere Radiation Budget from Multiple Data Sets](#)

If Mr Puckerclust has proof to back up his claim, then, we'd like to see it.

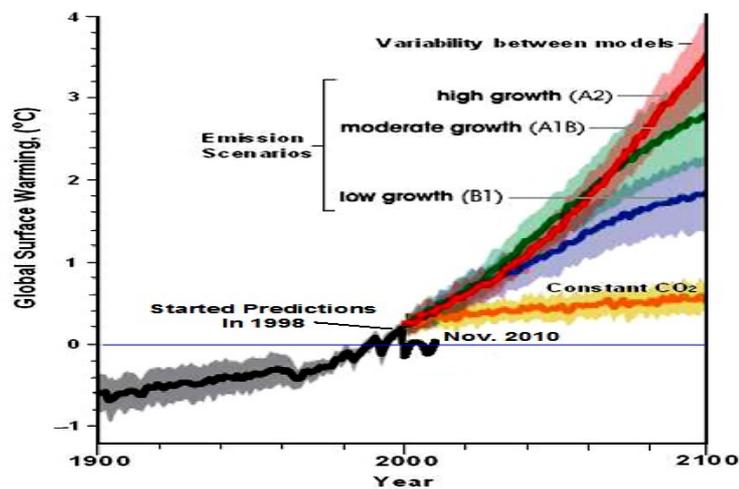
- **PHYSICS FACT #6:** *Conservation of energy is a fundamental law of physics. When more energy comes in than goes out of a system, it warms up.*

Translation: If outward energy (loss) doesn't equal inward energy (gain), a system heats up in order to MAKE them equal. That old superstition was formerly believed to explain why glass greenhouses get warm inside. Sadly, though, the radiative selectivity of glass – it's transparent to visible light but opaque to infrared -- has been found to have nothing to do with heating in a greenhouse. Or anywhere else for that matter. Yet many people still consider the antiquated notion of heating via "radiative equilibrium" as a fact.

- **PHYSICS FACT #7:** *The Earth's temperature is increasing by an amount that is consistent with predictions, based on the laws of physics and the well known heat-absorbing properties of the excess carbon dioxide*

FACT: The most unbiased and un-tampered-with temperature record, that from satellites, shows no warming trend at all for several years.

Look at predictions versus actual temperatures below.



Intergovernmental Panel on Climate Change (IPCC), 2007, p. 675, based on Santer et al, 2003. See also IPCC, 2007, Appendix 9C). Authors added actual temperature data from 1998 to Nov. 2010.

The black line is actual temperature, way lower than predicted.

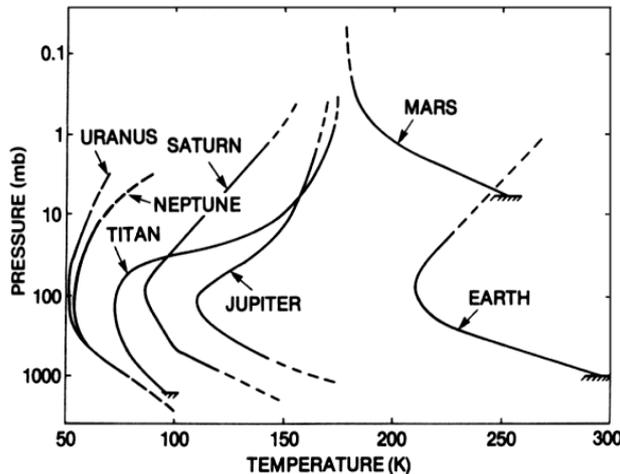
- **PHYSICS FACT #8:** *Measurements show that night-time temperatures are increasing faster than daytime temperatures, just as physicists predicted. The excess carbon dioxide causes a warmer night-time sky which is the main source of heat at night, but does not affect the brightness of the sun, which is the main source of daytime heat.*

FACT: True physicists are seldom involved in such predictions. IPCC stooges and the like perform them instead.

And no, a warmer night-time trend has only been observed where the UHI (urban heat island) effect is involved. In other words, the heat-retaining factor is traceable to the cityscape itself, not to CO2.

- **PHYSICS FACT #9:** *Measurements show that the top of the atmosphere is getting colder, just as physicists predicted, because the excess carbon dioxide in the lower atmosphere is blocking the heat from below.*

FACT: As noted above, CO<sub>2</sub> doesn't "block" anything. It releases thermal energy as soon as it absorbs it, and what it emits is of a longer wavelength than it is capable of absorbing again. But a prediction based on theory must ultimately face the facts. Theory has it that IR-interactive gases like carbon dioxide form a radiative blanket, an insulative cover (see #4 above) that makes the lower atmosphere warmer and the upper atmosphere cooler than it would be otherwise. Thus the familiar experience of cooler temperatures as you climb in altitude, a phenomenon called the lapse rate. Theory also has it, then, that an increase of gases like carbon dioxide will cause this thermal discontinuity to increase as well, making the lower atmosphere even warmer and the upper colder still.



Unfortunately for the theory and those "physicists", however, this temperature gradient has got nothing to do with so-called greenhouse gases. That's a fact. Real physicists understand that gravity impacts the atmosphere such that warm air, being lighter, is pushed upward and expands, thereby growing cooler – while cool air, being heavier, compresses as if falls and thereby grows warmer. This necessarily generates a pattern of lower temperature by altitude. Beyond a pressure of 100 millibars, it is a pattern common to every planet.

The lapse rate has nothing to do with trace gases and everything to do with gravity and pressure.

- **PHYSICS FACT #10:** *Heat-sensing instruments on satellites have measured a reduction in the amount of infrared radiation coming from the atmosphere, at the exact wavelengths predicted by physicists. Anybody who calls themselves a "skeptic" must refute one or more of these physics facts by publishing the extraordinary evidence for their claim. Otherwise, it the word "denier" is appropriate.*

FACT - The earth has cooled since 1998.

Near surface air temperature records, corrected for the Urban Heat Island effect (which is mainly nocturnal, expanding of city warming as cities have grown) show that the globe is actually cooling.

It is basic physics that we all understand: a cooler object radiates less than a warmer object.

This includes the frequencies Puckerclust refers to.

The reduction he notes, "reduction in the amount of infrared radiation coming from the atmosphere, at the exact wavelengths predicted by physicists" is misrepresented, as he does not mention whether other frequencies have also reduced (which they have).

This is in line with what "we" would expect from standard, accepted thermodynamics: if an object cools, it radiates less.

The reduction (misleadingly) noted by Mr Puckerclust is merely confirmation at a planetary level that a cooler object radiates less thermal energy than a warmer one across the wavelength spectrum.

A rather less alarming (and physically correct) picture than Puckerclust has tried to portray.

## CONCLUSION

Is it a coincidence that Mr Puckerclust's purported facts are so misleading? Readers can judge for themselves. But it's clear enough that the suppositions and assumptions that he cites are not facts at all – indeed, they're little more than the details of a flimsy and deceptive argument.

Please note that we have refuted all ten of your points, not just one ....

## Any more PHYSICS FACTS Mr Puckerclust?

With kind regards from the [Slayers of the Sky Dragon](#) and like-minded scientists from around the world.