Feature Article

Climate Change Mythconceptions: Some Incorrect, Irrelevant and Misleading Arguments Made by Climate Change Denialists

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Introduction

Is Climate Change contentious? Is the science settled? How strong are the arguments against anthropogenic climate change?

Here we examine some of the common claims made by climate change denialists. We show that these arguments do not follow accepted standards of *good scientific practice* and in some cases show an ignorance of basic chemistry. A curious layperson can find any number of web pages on the topic of climate change. Some of the denialist sites (often hard to identify) make some seemingly compelling arguments and relate *facts* incompatible with the position held by the Intergovernmental Panel on Climate Change (IPCC). But do these arguments really stack up? Here we take a close look at some of the common arguments that are used by denialist groups and individuals.

Recently, one of the authors was chatting with a manager at Natural History NZ (NHNZ) about environmental chemistry. Naturally the topic of climate change came up. This manager said that, while obviously they were not expert, as far as they could see there were equal *amounts* of argument both for and against. They felt, therefore, that this meant that there was still doubt and uncertainty about the *concept* of climate change. Aghast, we decided to write this article. It is a rebuttal of some of the common claims made about climate change by prominent groups of denialists. We want this to be a resource that NZIC members can direct friends and family to so it is written for the layperson. There are some references but most are to websites that at the time of writing were well designed and easily understandable.

The NHNZ manager's confusion is perhaps warranted given the perceived wisdom journalists have about balance. The idea is a manifestation of cultural relativism and holds that if there are two view points both are equally valid and should receive equal airtime. One of us recently wrote to a local paper about a similar case and pointed out that '*If the paper received a letter about pixies at the bottom of the garden they would throw the letter out. If the paper received a letter claiming a previously overlooked loophole made it legal to drink and drive, the paper would probably run the letter past a lawyer for comment before publishing*'. But the paper had no qualms about publishing an *opinion-editorial* article that was misleading nonsense about climate change. Why did the paper not avail itself of the huge expertise just down the road at the local tertiary institution? Why does the paper not integrate basic science into all stories, the way it does with politics and economics. Why does science languish in a small column on the same page as the horoscopes and comic strips?

We have selected several of the most common arguments that can be found on numerous *climate change* denial web sites. Search Google for climate change with *doubt*, *hoax* or *fraud, etc*., to see the range available.

For the most part the purpose of this article is to show that some of the claims made by the denialists are simply *bad scientific practice* – regardless of the truth of the claim. By this we do not mean the interpretation of the data is bad - although we certainly show that much of the interpretation of data by denialists is grievously flawed. *Bad practice* refers to flaws in the scientific method. For example, the claim that '*Without the Greenhouse Effect there would be no life on Earth*' is true but it is irrelevant and not disputed by anybody. To call this *a fact that they do not want you to know* is misleading as it implies that those who say human induced climate change is occurring argue otherwise. We believe that this reflects the general approach of denialists and leave it up to the reader to decide what credence to give other denialist claims.

Common Argument 1

Britain is 1ºC cooler now than it was at the time of the Domesday Book (1086)

This is not true (and would be irrelevant even if it were true). The temperature in Britain is currently the same as it was in the 11th Century. We assume the inference that readers are expected to draw is that if Britain is cooler now then no warming *anywhere* is occurring. Britain is ***not*** cooler. But would it matter to the case ***for*** climate change if it were? No! Firstly, the climate of Britain is ~5ºC warmer than it should be because of the heat delivered to the North Atlantic by the Gulf Stream and the North Atlantic Drift. The Gulf Stream is largely powered by the temperature *difference* between surface seawater near Iceland and in the Gulf of Mexico. This means that temperatures in Britain are only secondarily related to global temperatures. Secondly, we hate to have to be the ones to point it out, but the island of Britain represents a grand total of 0.15% of the land surface of the world. In *most* places global air and sea temperatures are increasing, but these very changes lead to changes in the way heat circulates, meaning that is simply wrong to look at the climate in a single location.

Since there were no thermometers in Britain back in 1086, how do we know what the temperature was then? The answer is that we rely on proxies, or stand-ins. For example, tree rings provide a record of past climate. By comparing recent written records of weather conditions with the rings of trees recently cut down, it is possible to get a very good idea of the exact relationship between factors such as the thickness of tree rings and the climactic conditions

while the tree was growing. By looking at different trees it is possible to overlap the sequence of rings and extend the record back a long time. For the very recent past, *i.e*. the last thousand years or so, written records of harvest yields also offer a good indication of climate. Since about 1850 there have been real thermometer readings and the number of stations making such measurements has increased with time. These direct temperature readings agree well with tree ring data and other proxies, so there is a high degree of confidence in the proxy estimates for the time before thermometer measurements.

One of the most comprehensive tree ring studies of recent times, the Moberg study, was published in the *Nature* in 2005.[1] *Nature* also published an introduction that highlighted the major findings and uncertainties of the Moberg study that is helpful for a lay reader.[2] The study presents tree ring data from around the world over the last 2000 years or so up to 1979. However, here we focus on the Northern Hemisphere as it is relevant to the claim about temperatures in Britain. The Moberg and other tree ring datasets do not go right up to today. In part this is due to a desire to use only mature trees and in part it results from the smoothing discussed below. The data from this study are plotted in Fig. 1. Here, the apparent y-axis distortion is deliberate so as to allow comparison with Fig. 2 (see below).

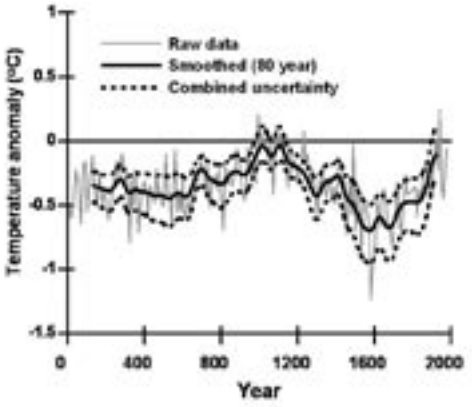

Fig. 1. Tree ring proxy-measured temperature anomaly (*ca*. 1960-1991) in the Northern Hemisphere from 133 – 1979 AD - data from Moberg ref. 1.

The data are plotted as temperature difference from the average during the 1961-1990 period. This is called the *temperature anomaly*. This period is used as a baseline and is a sort of *industry standard*. It was used by the IPCC in the development of the Kyoto Protocol and is commonly used to allow comparisons between different data sets. There are more than 2000 points for the raw, year to year data. To keep matters simple we have plotted every 10th year as the grey line (raw data). The study also used a smoothing technique (called *wavelets*) to take the wiggliness caused by the occasional very cold or very warm year out and this is given as the smoothed 80 year (thick black) line. Crudely put the smoothing uses proxies such as lake sediments that do not vary on a clearly defined yearly basis to dampen out the signal from occasional extreme year, *e.g*. the years following a big volcanic eruption, and is a sort of moving average. There are uncertainties in the proxy values and also in the smoothing procedure. These uncertainties are combined and shown by the dotted lines either side of the smoothed line.

A key point to keep in mind is that actual thermometer readings for the last 150 years show that while temperature in the whole Northern Hemisphere varies hugely from place to place, *cf*. Greenland *vs* Egypt, the *difference* (anomaly) at each place is consistent -with a few notable exceptions where temperature is affected by other factors. Thus, a temperature anomaly of +1ºC means that for pretty much the whole Northern Hemisphere, temperatures in each location were 1°C higher than the *same* location during the baseline 1960-1991 period.

The Moberg dataset shows that it is entirely wrong to say that Britain is about 1ºC cooler than at the time of the Domesday Book (1086). Look across the graph in Fig. 1. We have drawn in a line to show the tree ring zero temperature anomaly, *i.e.* the average for 1960-1991. In 1979, where the graph ends, the temperature was pretty much the same as it was during the 11th Century. The difference is certainly nowhere near 1ºC. Does this show that there has been no warming since 1086? No! The Moberg data show that temperature varied over a century timescale even before the industrial revolution when the large scale emission of CO_2 began. This is not denied. What causes concern is that the *rate* of change seen in very recent times has never been seen before.

The Moberg dataset ends at 1979. As noted above, there are excellent world-wide thermometer measurements of temperature that go back about 150 years. These actual measurements agree well with the proxies. Fig. 2 shows the thermometer data for the Northern Hemisphere collated by the Hadley Climate Centre.[3] Here, the average temperature in each month for the years 1850 onwards is compared to the average temperature in the same month for the years 1960-1991.

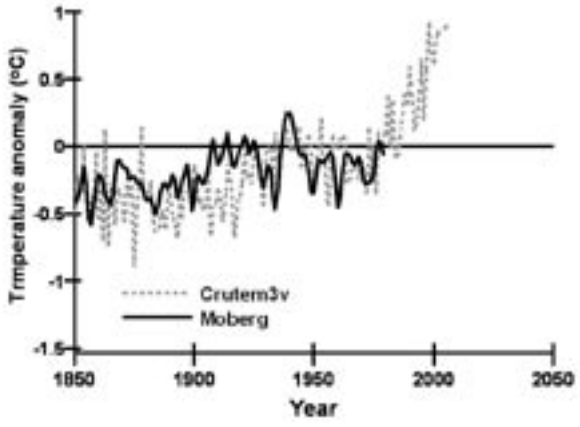

Fig. 2. Thermometer measured temperature anomaly (compared to 1960-1991) in the Northern Hemisphere from 1850 – 2007 AD overlaid with Moberg data. - source Hadley Centre.

For convenience we have not plotted all the data but instead have used yearly average differences, *i.e.* for each year the monthly differences were averaged to give a yearly value. For example, during 1905 the monthly differences (compared to the same months in 1960-1991) were

-0.65, -1.52, -0.57, -0.91, -0.39, -0.19, -0.16, -0.19, +0.01, -0.44 and +0.20ºC, thus giving an average difference for 1905 of –0.40ºC. Obviously, some months were warmer and some months were colder and using a yearly average has its pitfalls. However, the same trend is observed if you draw 12 separate monthly graphs for temperature anomaly compared to the same month in 1960-1991 so we can have confidence that the yearly approach works.

We see good agreement with the Moberg tree ring dataset during the period of overlap. We also see that over the last 15-20 years the temperature has, *in general*, shot up. Yes, some years have been colder but the temperature in the Northern Hemisphere has not been this warm in the last 2000 years. The discussion that follows below about Greenland shows the temperature has not been as warm as it is now at any time in the last 420,000 years.

Criticisms can certainly be made of the Moberg dataset but there are several other studies like the Moberg one. Some of the datasets are available free from the National Oceanic and Atmospheric Administration (NOAA), a scientific wing of the US Department of Commerce.[4] If you do not have the time to produce your own plots then a good compilation of 10 different studies has been plotted for Global Warming Art.[5] All the studies show the same three basic features: i) there was a temperature maximum between about AD 1000 and 1100 where the temperature was about the same as that during the baseline period of 1960-1991, ii) a minimum occurred at about AD 1600, and iii) over the last 15 years the temperature has increased rapidly and is currently warmer (by about 0.4ºC) than is has been at any time in the last 2000 years. Thus it is wrong to say that the temperature is now cooler than at the time of the Domesday Book but even if it were true it would be irrelevant.

Common Argument 2

Greenland got its name from the lush pastures that attracted the Norse in the 10th century. They carried on their normal way of life for 300 years until they were driven off by advancing ice and the Inuit took over. The ice and the Inuit are still there.

This is partly true but irrelevant. It is certainly possible that the Little Ice Age provided the *coup de grace* to the Norse but since the Inuit remained (and successfully inhabited lands further north) it was obviously survivable. Greenland got its name from spin doctoring to encourage Icelanders to go there. The best recent description for the general reader of the Norse settlements on Greenland is in *Collapse* by Jared Diamond.[6] There were only two small settlements in sheltered fjords with a total population of no more than 5,000. Diamond suggests that the Inuit are still there because they did indeed *carry on their normal way of life*. The problem is that their normal cattle farming way of life was well adapted to Norway but totally unsuited to Greenland and they quickly degraded the fragile artic soils. It even seems that the Norse refused to eat fish. The precise causes of the Little Ice Age are unclear, though the Gulf Stream was about 10% weaker than today. Speculation of a human cause as a contributing factor follows as: the Black Death killed a third to a half of Europe's farming peasants, because of which large areas of farmland reverted to forest. The forests soaked up CO_2 and prolonged (but probably did not cause) the Little Ice Age.[7]

As for the Greenland ice still being there, it now looks as if it will not survive for much longer. Ice loss increased from 90 km^3 during 1996 to 220 km^3 in 2005.[8] Two thirds of the loss was due to *ice dynamics, i.e*. the glaciers simply sliding off into the sea, and one third to melt run-off exceeding snow input. The sliding is most likely caused by warmer temperatures producing an increase in lubricating water under the glaciers. To be sure, Greenland's output of 220 km^3 adds only 0.6 mm per year to sea level and there is enough ice to last 11,000 years *if* the melting continues at the same rate without further acceleration.

Here is an experiment you can try at home: turn off your freezer and open the door. Estimate the volume of ice. Wait. After 20 min or so measure the amount of water dripping down. Using this value, show that it will take days for all the ice to melt. Wait a bit longer. Watch as large chunks of ice slide off the walls of the freezer and crash onto the floor where they quickly melt. Remember that if *all* the Greenland ice melts (either while in place or after sliding off and sinking a few cruise ships) the sea level will rise by 6.5 m. If the West Antarctic Ice Sheet is lost we will see another 7 m sea level rise. Both could happen *quickly* if large ice sheets slide off.

The unstated part of this common argument seems to be that ice ages come and go in natural cycles. And, yes they do, but the both the size and the rate of change seen in the last two decades are greater than any seen in the last 740,000 years. Lest we be accused in turn of setting up a straw man, the claim about natural climate variation is explicitly made in several documents, *e.g. Nine Facts About Climate Change* by Ray Evans of the Lavoisier Group,[9] an ironic name for a group that believes in the modern equivalent of phlogiston.

Many types of evidence show that ice ages come and go. Evidence includes glacial moraines (the rubble pile pushed in front of a glacier) and isotope measurements from ice cores. Heavy water has higher melting and boiling points and is denser than normal water. This means that the amount of heavy water that is evaporated from the sea and laid down later as snow and ice is related to the temperature. Therefore by looking at the amount of heavy water in deep ice-cores it is possible to calculate the temperature when the ice was formed. Other information can also be obtained from ice cores. For example, bubbles of air trapped in the ice contain CO_2, thus providing a record of CO_2 levels. There is, of course a caveat: until snow is compressed under more snow and forms hard ice, the bubbles are not locked in place and some exchange with the atmosphere occurs. This means the bubble record is smeared somewhat and lacks the fine time resolution of the isotope record. Dating of the core is also problematic and different methods give dates that vary by up to 5000 years for the bottom of the Antarctic Vostok core. Exact

dating is not especially critical to the arguments used here as it has no effect on the *sequence* of events.

Several good ice core records have been obtained from Antarctica. Two of the best long ice core records are those of the European Project for Ice Coring in Antarctica (EPICA) and a core taken at Vostok Station. The EPICA core goes back about 740,000 years and covers 8 ice ages (or *glacial cycles*) and the Vostok core goes back about 420,000 years, covering 4 glacial cycles. The Vostok core was drilled in 1996 and the EPICA core in 2004, and not all EPICA analysis is complete yet. However, there is complete temperature (from isotopes) and CO_2 data (from bubbles) available for Vostok so the discussion here uses only the Vostok measurements.

We have plotted (Fig. 3) the temperature difference from the baseline period of 1960-1991 (data and references to the original are available at NOAA). Please note that the scales of the two plots have been adjusted to be similar to make comparison easier. Temperature is given by the vertical axis on the left and covers a 15ºC range. CO_2 is given on the vertical axis on the right and covers a range of 160 ppm. Measurements of deuterium, the isotope used as a proxy for temperature, measurements (as proxy for temperature) were obtained continually throughout the core (over 3300 measurements), but for several technical reasons are discussed later, CO_2 measurements were only obtained at 365 points. The CO_2 datum points are separated by between 100-5000 years. In general, if it looked like the concentration was changing then samples were taken more closely by the researchers. It is possible that during the gap between samples the CO_2 fluctuated but the lack of fluctuations in deuterium argue strongly against this. To cut down on clutter in the graph, we have taken only every 10th deuterium point to give about the same number of points as the CO_2 dataset. All this is important for a point made below about synchronicity.

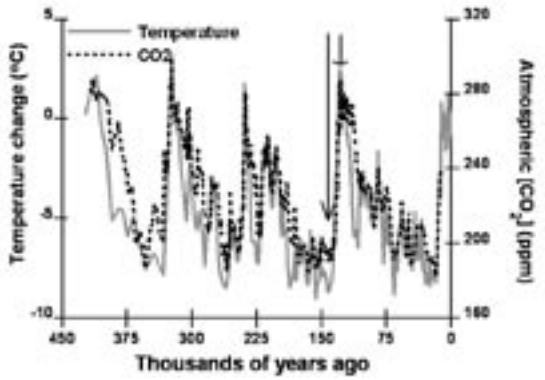

Fig. 3. Air bubble CO_2 and relative changes in proxy temperature (as given by deuterium) for the last 420,000 years from the Vostok ice core - data source NOAA.

The graph clearly shows that both temperature and CO_2 rise and fall naturally. Consider the time scale for the *start* of the glacier melting - when the temperature increases rapidly. The end of the last complete cycle (starting about 140,000 years ago) is indicated by arrows. The time taken for temperature to increase by 11.2ºC (from -8.7ºC below baseline average to +2.5ºC above baseline average) and the time taken for CO_2 to increase by about 100 ppm (from 190 to 287 ppm) was 14,000 years. Despite what was depicted in the movie *The Day After Tomorrow*, actual glacial cycles occur over thousands of years. The start and finish of each cycle is characterized by wiggles up and down like the 1ºC decrease seen between the 11th and 16th Centuries but with an overall trend in one direction. Table 1 gives the time for the increase phase of the other cycles.

Table 1. Periods of large temperature and CO_2 increase in last 420,000 years associated with the first phase of major deglaciations.

Start (y ago)	End (y ago)	Duration (y)	ΔT (°C)	Δ[CO2] ppm
18000	2000	15400	9.4	103
138000	128000	9900	12.0	84
251000	238000	12600	9.5	75
334000	324000	10100	11.2	98

Temperature and the concentration of CO_2 both change over cycles lasting several thousand years. Could it be that we are currently experiencing the high phase of one such cycle? We probably are **BUT** added to that is the effect of CO_2 released by humans from fossil fuel burning. It is hard to see from Fig. 3 but the Vostok ice core record stops about 2340 years ago. There is another Antarctic ice core dataset (the Law Dome - data at NOAA) that covers from about 1010 AD to 1975 and if we also add in the Mauna Loa data (from NOAA) we get Fig. 4, bringing us up to the present day.

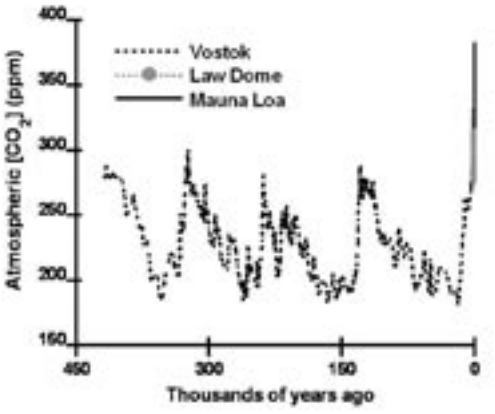

Fig. 4. Atmospheric CO_2 for the last 420,000 years. Data from the Vostok and Law Dome ice cores and Mauna Loa atmospheric station - data source NOAA.

Instantly we see that in the last few years the level of atmospheric CO_2 has broken out of the glacial-interglacial cycle it has been in for over 420,000 years. In fact, we see that the atmospheric CO_2 concentration first exceeded 280 ppm (the upper bound of all the previous cycles) about 250 years ago – just when the industrial revolution began. We have seen an increase in atmospheric CO_2 of 100 ppm in the 250 years since the start of the industrial revolution. This rate of change is 40-60 times faster than the fastest natural rate of change. It *is* natural for the climate to

cycle. But the human caused changes are way outside the bounds of the natural cycle.

Common Argument 3

Water vapour is the dominant greenhouse gas and contributes more to global warming than CO_2

In part this is true but it is irrelevant. The concentration of CO_2 is approaching 400 parts per million by volume (ppmv). The water concentration is enormously variable but a rough global average of 2000 ppmv will do here. These figures translate to there being roughly 5 water molecules for each CO_2 molecule. However, different molecules absorb energy (heat) differently and water is not as good at absorbing infrared as CO_2. Also, water vapour is indeed a potent greenhouse gas and it amplifies the effect of CO_2 *but* the water content of the atmosphere is a result of a *positive feedback* process and it is not a *forcing* agent while CO_2 is.

Normally ecosystems are in a *steady state* where input and output balance each other. Consider a large earthen dam holding back a sizeable lake. While the dam is intact all is well and the lake level can be stable for long periods. If something makes a small hole at the base of the dam (a forcing agent) then water begins to escape. The water then carries away some earth and enlarges the hole. This allows more water to pass through and widen the hole still further, allowing more water to pass through and so on (positive feedback process).

The resolution of Fig. 3 is insufficient to show that at the end of glaciations the temperature began to increase a few centuries before CO_2 begins to rise quickly. The end of the last pre-human glaciation is shown in Fig. 5. This *lag* is frequently said by denialists to show, therefore, that CO_2 does not cause warming.

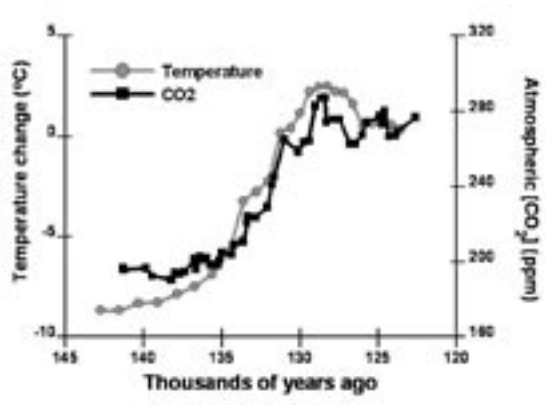

Fig. 5. Atmospheric CO_2 and proxy temperature for the end of the last pre-human glaciation showing that CO_2 lags the initial rise in temperature - data source NOAA.

Though real, the lag time is difficult to quantify. CO_2 is a well mixed gas. There are no significant variations in CO_2 from one part of the world to another. Conversely, if CO_2 has changed by 100 ppm in one part of the world (Antarctica) then it has changed by 100 ppm everywhere. However, temperature (heat) is not well mixed and a change of 10ºC in one part of the world does not mean that it changed by that amount everywhere (but it probably did change by some unknown amount everywhere). Also the smearing effect described already for CO_2 in bubbles further muddies the picture. But regardless, the lag is probably on the order of 600-800 years.

Some initial event causes a small rise in temperature and changes in CO_2 levels will follow (one of the blog sites charmingly calls the event *magic* for purposes of discussion). Milankovitch Cycles, a series of wobbles in the Earth's orbit with periods of many thousands of years, are as good a suspect as any. Regardless of the initial event, *afterwards* CO_2 feedbacks [and perhaps albedo changes (extent of reflection), *etc*.] cause the rest of the warming. Nobody denies that the initial small temperature rise at the end of a glaciation occurs before the concentration of CO_2 begins to occur. But in no way does it then follow that CO_2 does not cause the rest of the warming.

The removal of CO_2 from the atmosphere is difficult and occurs via photosynthesis and by dissolution in the ocean (and increasing ocean acidity). The slack in these CO_2 removal processes has largely been taken up. There is simply nowhere to put the 27,000 million tonnes of CO_2 annually generated by fossil fuel burning other than the atmosphere. So, even if we stopped producing CO_2 tomorrow, it would still take many centuries for the atmosphere to return to pre-industrial levels. Remember that the fossil fuels that are now being burnt were laid down over many millions of years, but humans are releasing all that CO_2 over a few centuries. There are perfectly good removal systems but they simply cannot cope with the deluge and that is why atmospheric CO_2 is increasing.

In contrast, there is no easy way for excess water to stay in the atmosphere. As it gets warmer there is more evaporation and more water enters the atmosphere. The extra water has a strong greenhouse effect and causes more warming and more evaporation. If the humidity gets too great then water droplets start to form and soon fall as rain thus removing the water from the atmosphere. What all this means then is that CO_2 *causes* an increase in temperature while water vapour *is caused by* an increase in temperature.

Common Argument 4

Without the Greenhouse Effect there would be no life on Earth

This is true and is not disputed, but it is utterly irrelevant. Essentially this means that without an atmosphere the Earth would be colder – no real surprise there then. Yes, the Earth is about 25-35°C warmer on average than it would be without greenhouse warming. Equally, however, life is impossible on Venus, where the average surface temperature 460°C. It is not just warmer because it is closer to the Sun; Venus receives about 1.7 times as much solar energy per square kilometre as does the Earth. Venus is hot because of a runaway Greenhouse Effect – the atmosphere is very dense (surface pressure about 90 times that on earth) and almost entirely (96.5%) made of CO_2.

A related objection, made by some denialists, is that Mars

is also warming and, therefore, this shows human released CO_2 is not responsible for any change on Earth.[10] The *evidence* is that the Martian polar caps of solid CO_2 and water ice have been shrinking for 3 Martian years in a row (each about twice as long as an Earth year). Somehow, as several blogs have noted, it is ironic that 3 local years of change at the Martian pole are taken as proof of global change on Mars but similar measurements for Earth going back several decades are dismissed as being part of a minor natural cycle. Mars has been closely studied (by orbiting craft) for only 15 Martian years so it is probably premature to say what constitutes normal on Mars. The atmosphere of Mars is very much thinner than that of Earth; the surface pressure is about 0.6% that on Earth. As such, the atmosphere takes very little to heat or cool and globally temperatures are strongly influenced by huge dust storms that occasionally sweep Mars. In 1971 the Soviet probes Mars 2 and 3 and the US probe Mariner 9 arrived at Mars to find the entire planet engulfed in a dust storm and it was several months before the atmosphere cleared sufficiently for photographs to be taken. The climate of Mars is so different to that of Earth that no comparisons can be made.

Common Argument 5

Temperature measurements by satellite and radiosonde balloons show no significant warming

It is true that there are difficulties in obtaining good quality temperature measurements and, for this reason, weather stations follow strict procedures. It is also true that the number of stations making measurements has increased from a handful in the 1850s to over 3000 during the baseline period 1960-1991. However, the upward trend in temperatures taken at the same stations under the same conditions is still clear.

The US government Climate Change Science Program (CCSP) said in the abstract of their executive summary report of February 2007 that previously reported discrepancies between the amount *of warming near the surface and higher in the atmosphere have been used to challenge the reliability of climate models and the reality of human induced global warming. Specifically, surface data showed substantial global-average warming, while early versions of satellite and radiosonde data showed little or no warming above the surface. This significant discrepancy no longer exists because errors in the satellite and radiosonde data have been identified and corrected. New data sets have also been developed that do not show such* discrepancies.[11] One hopes that this report will see an end to this particular common argument.

Common Argument 6

Computer models of the climate are worthless

In no way does this show climate change is not happening. Yes, models make assumptions based on limited data. Good models (and there are many) include uncertainties to take account of the assumptions so that the answer includes a range of probable results. Models are tested by inputting past conditions and seeing if they come up with something like the modern conditions. Many models have performed well in *predicting* the climate conditions of today based on past data. This surely is proof that the models work. Additionally, most of these models are beginning to converge and give similar answers for future conditions based on the data of today.

There is much confusion about what measures of accuracy should apply to climate models. Consider this: *The University of Otago is at 46°52' S, 170°31' E. The 24th of July 2007 was warm and many students wore t-shirts and other light clothing.* No climate model could have predicted this a month previously. Yet none of the students thus attired would be surprised if a climate model made in February predicted that: *Based on measurements of sun angle and day length, a period of coldness is on the way. Probably this will result in average temperatures in July being cooler than in February.* Similarly, larger scale climate models can not and do not pretend to predict the weather tomorrow. The models have a longer coarser focus and instead show good agreement for long term general regional trends in climate.

Common Argument 7

There is no* consensus. *Thousands of scientists, including 72 Nobel Laureates, signed the Heidelberg Appeal (1992), calling for a rational scientific approach to environmental problems and 19,000 scientists signed the Oregon Petition

These petitions and several others like the Leipzig Declaration have been seriously compromised. Do a quick search yourself. Other people have written at great length about this. Home for all these petitions is the Environmental Science and Policy project (SEPP).[12]

The Heidelberg Appeal (issued at the Rio Earth Summit in 1992) does not even mention climate. It is entirely made up of Barnum statements like 'We intend to assert science's responsibility and duties toward society as a whole. We do, however, forewarn the authorities in charge of our planet's destiny against decisions which are supported by pseudoscientific arguments or false and nonrelevant data'. The *Statement by Atmospheric Scientists on Greenhouse Warming* was also launched at the Rio summit. In the 15 years since then it has gather a massive 47 signatures including several TV weather presenters.

Here is a quote from an editorial sidebar in the October 2001 issue of *Scientific American* about the Oregon Petition: '*Scientific American* took a sample of 30 of the 1,400 signatories claiming to hold a PhD in a climate-related science. Of the 26 we were able to identify in various databases, 11 said they still agreed with the petition — one was an active climate researcher, two others had relevant expertise, and eight signed based on an informal evaluation. Six said they would not sign the petition today, three did not remember any such petition, one had died, and five did not answer repeated messages. Crudely extrapolating, the petition supporters include a core of about 200 climate researchers – a respectable number, though rather a small fraction of the *climatological community*'.[13]

Conclusion

Do not take our word for it that these are representative of the arguments used by many denialists – conduct your own research. We have shown that *these* common arguments used by denialists are false. Worse, they use *bad science*. Interested readers may wish to examine *other* denialist arguments and seek similar flaws. While it is valid to question, it is not valid to create misleading arguments of the type shown here to be false. The CO_2 already in the atmosphere will continue to cause change for many decades, even if no more is added. We can expect to see significant climate change in our own lifetimes.

References

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