

Concerned citizen

This submission comes from a non-scientist, non-affiliated citizen striving to understand the science of climate change on the back of a couple of distant years of undergraduate physics and a more recent exposure to statistical analysis. The deeper the delve, the more questionable does the IPCC's position become and the more the focus turns to the troubling thought that governments of the West's advanced democracies, led by the EU and lately including Australia, are preparing to go deeper into a costly, ineffective climate change strategy.

Uncertainty and complexity: Adapt or mitigate?

IPCC scientists tell us that we live in an age of self-induced dangerous climate change - dangerous in the sense that the rate of change far exceeds natural rates and that burning fossil fuels, which has done the damage, must be greatly reduced in short order. Economists tell us that forced de-carbonising of global economies to cool the planet will impose substantial costs on all people living through the process, the poorer the people the higher the cost. Scientists outside the IPCC, meanwhile, tell us that we can't know whether observed climate change during de-carbonising would be due to our painful enterprise or to natural variability beyond our control; or that people who inherit the de-carbonised economies would benefit climate-wise. This uncertainty makes deciding the allocation of resources between adapting to climate change and mitigating it problematic. It is the complex nature of the problem that costs and benefits fall on different people and on people in different eras and are subject to different degrees of computational confidence. What is clear, however, is that adapting to climate change is what all species have done throughout evolution and must continue to do until their inevitable extinction. De-carbonising economies won't stop climate change. These truths are not at issue. At issue is the IPCC's hypothesis that mankind would adapt to the current climate change at far greater cost to himself than mitigating it by de-carbonising global economies. It is the nature of the problem also that the hypothesis can't be proved or disproved empirically, it can only be tested by the predictive reliability of computer models derived from it, of which more later.

Fact, hypothesis and contradiction

That the climate is sensitive to natural variability is an incontrovertible fact: that it is sensitive to burning fossil fuels is a contested hypothesis. The IPCC has measured three variables since the beginning of the 20th century - CO₂ emissions, CO₂ atmospheric concentration and global surface temperature - and, finding all three to be increasing on trend, concludes on the basis of the physics of heat radiation absorption by CO₂ molecules that rising emissions cause rising temperatures. The IPCC claims to be *very certain* that natural variability cannot explain global warming over the last half century or so whilst conceding that its understanding of the role of clouds in climate is far from complete. If this is not a contradiction it implies that clouds play an immaterial part in climate which is patently false as Sydney's recent "summer" demonstrated.

Data doubts: IPCC unfazed

Other close-to-home facts at odds with the greenhouse hypothesis of global warming - the IPCC claiming that globally 11 of the 12 years to 2006 rank in the hottest 12 years on record - are available in the daily weather forecasts. For example, *The Australian*, hottest March 20 on record around the major cities: Darwin, 36.2 in 1897; Adelaide, 36.8 in 1913; Brisbane, 33.3 in 1927; Sydney, 31.7 in 1935; Hobart, 30.7 in 1982. (Data for Canberra, 34.7 in 1998; Melbourne, 38.7 in 1998; and Perth, 41.4 in 2004 are more in keeping with the hypothesis). Freak events may explain such apparent single day challenges to the hypothesis. However, bureau of meteorology climate data tell a similar story. For example, the hottest day in Sydney, during the period 1859-2007, occurred on January 14, 1939, at 45.3 degrees Celsius.

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|-----------|------------|----------|------|
| Sydney | 1859-2007 | 14/1/39 | 45.3 |
| Melbourne | 1855-2007 | 13/1/39 | 45.6 |
| Adelaide | 1977-2007 | 8/7/86 | 44.3 |
| Hobart | 1882-2007 | 4/1/76 | 40.8 |
| Perth | 1876-1992* | 23/2/91 | 46.2 |
| Brisbane | 1840-1994* | 26/1/40 | 43.2 |
| Darwin | 1941-2007 | 18/10/82 | 38.9 |

* Temperatures since then, recorded at other stations, have not exceeded those recorded here.

Monthly data for Sydney show hottest days occurring in a wide spread of years, as far back as 1919, four of the twelve occurring in the first half of the 20th century, one more than occurred since the mid -70s, and only one since 1998.

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|------|------|------|------|------|------|------|------|------|------|------|------|
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 1939 | 1926 | 1983 | 1986 | 1919 | 1931 | 1990 | 1995 | 1965 | 2004 | 1982 | 1957 |

An hypothesis which posits that surface temperature is predominantly sensitive to the concentration of carbon dioxide in the atmosphere would logically predict that temperatures in last century's thirties, say, when CO2 concentration was considerably lower than in this century's noughties, would be lower than now, not higher as the data show. Of course, these temperature data, which relate to a small portion of the planet's land surface, don't invalidate the IPCC's finding that, averaged over the entire surface of the planet, 70% of which is ocean, 11 of the 12 years to 2006 rank in the hottest 12 years on record. But they do introduce a measure of doubt about its validity. Recent revisions to the temperature record in the US compound the doubt. They show that 1934 was the hottest year on record there, 1921 the third hottest and six of the 10 hottest years occurred 55 years or more ago and only four since 1990.

(<http://data.giss.nasa.gov/gistemp/graphs/fig.D.txt>)

(<http://freestudents.blogspot.com/2007/08/warming-records-revised-downwards.html>)

Nor is it immediately obvious from the rankings that the later four were on average hotter than the earlier six. The IPCC's response to the revisions? They won't much alter the global average. A more reassuring response would have been to subject

temperature data from all global regions to the same scrutiny that exposed the errors in the US data. This is particularly so in the old Russian federation whose collapse resulted in a substantial reduction in instrumental coverage, including in cold Siberia with attendant potential for warming bias. Evidence for this bias appears in the consistent gap between instrumental and cooler satellite observations. (<http://icecap.us/images/uploads/MonthlyCO2vsTemps.jpg>).

The IPCC retreats: natural variation dominates CO2

Since 1998, while the rising trend in CO2 concentration looks to be strongly linear, the satellite surface temperature record seems to be somewhat cyclical, reflecting the influence of natural variability. Only between 1999 and 2003 do the trends for temperature and for atmospheric CO2 concentration align, approximately. Since 2003, the trends have diverged, demonstrating natural variability's dominance of CO2 as a driver of climate change. Moreover, regressions of the latest decadal plots from February 1998 to February 2008 of global temperatures on atmospheric CO2 concentration show zero correlation (D'Aleo, J, <http://icecap.us/index.php/go/joes-blog>.) http://vortex.nsstc.uah.edu/public/msu/t2lt/tltglhmam_5.2 Even the IPCC head Dr. Rajendra Pachauri has noticed the disconnect and acknowledged the need to see if natural forces were somehow countering greenhouse warming.

This is not the only incidence of IPCC confidence being dented. On the basis of the "hockey-stick" temperature record, displayed on the cover of the third assessment report in 2001, the IPCC claimed that current warming was outside the range of experience over the past 1,000 years. This report also claimed that pre-1940 warming was anthropogenic in origin. Its underlying analysis now discredited, the "hockey stick" has disappeared from the IPCC publication (but not from Al Gore's hyperbole *An Inconvenient Truth* nor its imprint on popular memory, one suspects). The IPCC now dates current warming from the little ice age in the 17th century and anthropogenic warming only from the mid-20th century.

Oceans drive climate change?

Unlike the rising linear trend of atmospheric CO2 concentration, the Pacific Decadal Oscillation is cyclical. Whereas D'Aleo found no correlation between temperature and atmospheric CO2 concentration over the decade to February 2008, he found one of 0.6 between temperature and ENSO, a product of PDO. The approximate 60-year cycle suggested by the revised US temperature record fits well with the Pacific Decadal Oscillation which switched in the mid 1970s from mainly cooling La Ninas to mainly warming El Ninos. Contrary to the logical implication of the IPCC's global warming hypothesis - continuing temperature rises - the flat to slightly declining temperature trend this century coupled with the current La Nina could signal the beginning of a few decades of cooling.

Or do cosmic rays?

A major criticism of the IPCC is that it limits its analysis of climate sensitivity to natural variation to variations in total solar insolation and disregards the solar wind which modulates the incidence of galactic cosmic rays in the atmosphere. Scientists claim from analysis of a stalagmite in a cave in Oman close correlation over a 3,000 year period between carbon-14 and oxygen-18, as proxies for galactic cosmic rays and temperature, respectively (www.sepp.org/publications/NIPCC page 11). The cosmic rays are thought to affect temperature through low-level cloud cover (Svensmark, from whose work the CERN laboratory CLOUD experiment grew). Contrary to expectations from the greenhouse hypothesis of global warming, research on tropical climate systems found that warming reduced high level cloud allowing more heat to escape to space (<http://www.uah.edu/News/newsread.php?newsID=875>).

<http://www.cru.uea.ac.uk/cru/data/temperature/hadcrut3vgl.txt><http://www.cru.uea.ac.uk/cru/data/temperature/hadcrut3vgl.txt>

Predictive skill

We must look to the predictive skill of climate models to test the validity of the anthropogenic greenhouse gas hypothesis of the current global warming. The models predict atmospheric temperature trends increasing with altitude to a maximum, at about 10km, almost twice the surface value. Satellite observations on the other hand show initial declines, then recovery to the surface value. (www.sepp.org/publications/NIPCC page 7). The deviation between prediction and observation probably reflects the models' positive water vapour feedbacks whereas NASA's aqua satellite project appears to be implying negative water vapour feedback.

(<http://www.weatherquestions.com/Roy-Spencer-on-global-warming.htm>)

(<http://www.abc.net.au/rn/counterpoint/stories/2008/2191714.htm> March 17, Marohasy)

An infeasible warming mechanism

As the cases for alternative global warming hypotheses strengthen, it is worth re-visiting the foundation of the IPCC's greenhouse gas hypothesis. This, essentially, is that some gases in the atmosphere absorb some heat radiated from the earth's land and ocean surfaces preventing it from escaping into space. This would result in the atmosphere warming and the surface cooling more slowly than otherwise would be the case. The trace gases radiate back to the surface part of the heat absorbed from it which further slows its cooling rate. The trace gases transmit the remainder of their acquired heat to the atmosphere in general which in turn radiates heat back to the surface slowing its cooling rate still further. The rates of change would be very slow, reflecting the minor presence (traces) of these gases in the atmosphere. Increasing the quantity of the trace gases, which is what burning fossil fuels does, would increase the rates of change but not their directions. That is, the atmosphere would be warming a bit faster and the surface cooling a bit slower than would be the case under de-carbonised economies. However, at some level of concentration of greenhouse gases, the surface cooling rate could slow to zero. This would occur when the sum of the energy the surface receives

from the sun and from the atmosphere equals the energy it radiates outwards; or, equivalently, the energy transmitted from the atmosphere to the surface equals the excess of the energy the surface radiates over what it receives from the sun. If the excess is a fraction "x" of the surface radiation, then a fraction greater than "x" of greenhouse gases in the atmosphere would be required to warm the surface. The IPCC's global energy balance implies a value of 0.12 for "x", assuming no loss of incoming radiation in the atmosphere (IPCC, AR4, WG1, page 94). The atmosphere would then contain just 18% oxygen, the medical definition of oxygen deficiency. But the surface is warming on trend as it has been doing since the little ice age in the 17th century and we still have the standard 21%-oxygen atmosphere. Something other than increasing concentrations of greenhouse gases has caused the warming. Finally, a bit of perspective. Al Gore says we dump 70 million tonnes of CO₂ into the atmosphere each day. He could equally say we load the atmosphere with CO₂ at the daily rate of half a gram per square metre of land surface.

Conclusion

I fear that the timing of the Garnaut Review has forced it prematurely to adopt the IPCC hypothesis of anthropogenic global warming as the basis for its recommendations to Australian governments on appropriate responses. I fear further that the Garnaut Review, having to uncritically accept that CO₂ emissions cause warming, and noting recent increases and likely continuing increases in the rate of emissions from rapidly developing, populous economies like China and India, will recommend faster rates of emissions reduction than the IPCC does. The Garnaut Review will be useful in identifying the difficulties and quantifying the costs of designing, implementing and sustaining over long time scales, equitably, efficiently and effectively, a global programme for de-carbonising the world's economies. But unresolved issues in climate science will render it unable to provide credible assurance that all of that effort would have any beneficial effect on climate for future generations. I would like the Garnaut Review to point to the benefit for Australian governments, in the form of enhanced understanding of climate science, of awaiting the outcome of experiments and analysis that the IPCC hasn't had the opportunity to consider, including the CERN laboratory CLOUD experiment and the analysis of data collected since 2002 by NASA's Aqua satellite. Early indications are that these outcomes will require the IPCC to retreat from its earlier position even further than it already has. If they also prompt the media to soothe the agitation their shrill voices and images have thus far induced in the public, so much the better.