THE AUSTRALIAN

No sure bets in the climate debate

CHERYL JONES THE AUSTRALIAN APRIL 23, 2014 12:00AM

Icebergs — watched closely by scientists — formed from the Jakobshavn Glacier in Greenland near the village of Ilulissat. Source: Getty Images

Professor Brian Schmidt challenged Maurice Newman to a $10,000 bet. Source: News Limited

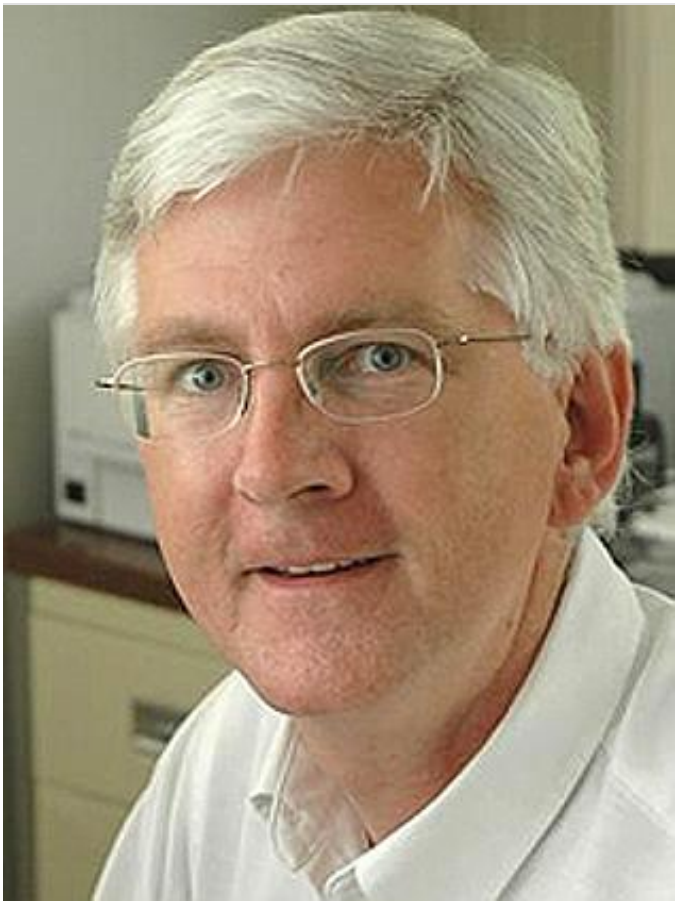
Eelco Rohling of the Australian National University. Source: News Corp Australia

LAST summer, Nobel laureate Brian Schmidt challenged Tony Abbott's chief business adviser Maurice Newman to bet $10,000 that the Earth's average surface temperature would be lower in 20 years than now.

The exchange, on these pages, started with an article by Newman in which he said that the "scientific delusion, the religion behind the climate crusade, is crumbling".

At the centre of the exchange between Schmidt and Newman is the latest battle in the climate wars – over a slowdown in the past 15 years in the increase of the global mean surface temperature despite rising atmospheric greenhouse gas concentrations.

Most of the climate models underpinning the Intergovernmental Panel on Climate Change's latest global warming projections failed to simulate the slowdown, often loosely called a "hiatus" or "pause", which followed a rapid rise in warming.



Climate scientist Roy Spencer is a strong critic of the models that underpin the IPCC's global warming. Source: TheAustralian

And there is a big spread in the value calculated by the models for a parameter called "climate sensitivity" – the increase in global mean surface temperature caused by a doubling of the carbon dioxide concentration relative to pre-industrial levels.

The models' spread in the value, put by the IPCC at between 2.1C and 4.7C, hampers the prediction of greenhouse impacts. The threshold to dangerous climate change has been put at 2C over pre-industrial levels but some scientists say it is lower.

While acknowledging that the models are imperfect, climate scientists say the sophisticated computer programs have performed well in projections covering longer timescales.

They say there is strong evidence, including ever-rising sea levels, that the planet continued to warm this century. Global mean surface temperature – the air temperature measured by convention 1.5 metres above the ground – is only one of many measures of climate change. But it is a major one used in international negotiations on limiting climate change, according Britain's Met Office Hadley Centre.

Meanwhile, a big palaeoclimatological study assessing environmental records of climate change in the deep past supports the models' climate sensitivity values.

But greenhouse sceptics, and those who reject that label but oppose the scientific consensus on global warming, have claimed that the deceleration in surface warming is evidence that the IPCC and wider climate science community have exaggerated the risks of climate change.

They have attempted to use the discrepancy between simulations and observations to discredit the models' projections.

The debate in the learned journals (the traditional ground for the formalised sparring of science), the media and the blogosphere has also entered the political realm.

"Global temperatures have gone nowhere for 17 years," wrote Newman, chairman of the Prime Minister's Business Advisory Council and former chairman of the Australian Securities Exchange and the ABC.

He continued with a quotation from a blog posted by climate scientist Roy Spencer, of the University of Alabama in Huntsville, a sceptic and strong critic of the models.

Although a blogger, Spencer does publish research in the scientific journals. He was not surprised that Newman had invoked his name. "I've testified in the United States Congress probably half a dozen times," he tells The Australian. "My name is out there."

The IPCC addressed questions surrounding the models' predictive accuracy in its report, "Climate Change 2013: the Physical Science Basis". The UN agency released the full report in January after issuing a summary for policy makers last year. The report says warming of the climate system is "unequivocal" and human influence on the climate system is clear. It forms part of the IPCC's Fifth Assessment Report, sections of which have been released progressively.

And the questions are the subject of a big research effort. Scientists have proposed mechanisms including unusually strong Pacific trade winds and unanticipated amounts of aerosols formed after volcanic eruptions as possible explanations for the attenuation of the surface temperature rise.

Climate change is driven by a multitude of forces acting at differing intensities and interacting on different timescales and over different regions, with complex feedbacks, some amplifying warming and others counteracting it. The most sophisticated computer models representing the system are run on supercomputers. Coupled climate models combine atmosphere and ocean models that exchange information during simulations.

The models differ in their resolution and treatment of feedbacks, such as clouds.

The IPCC report drew on simulations run on scores of climate models by groups around the world under a big program, the Coupled Model Intercomparison Project phase 5, or CMIP5.

Launched in 2008, this set of experiments followed plausible scenarios setting out estimates for input data such as aerosol levels and the 11-year solar cycle. Aerosols reflect solar radiation back into space, cooling the planet, while the solar cycle determines the amount of solar energy striking the Earth.

Gavin Schmidt, a climate modeller at NASA's Goddard Institute for Space Studies, in New York, tells The Australian that a lack of good observational data available when the experiments were conducted led to input values for aerosol concentrations that were probably too low.

He says a dramatic increase in particulate pollution from India and China during the past 15 years has raised aerosol levels greatly, and the models differ widely in how they handle aerosols.

And the current solar cycle has been less active than the last one, so the models overestimated the amount of incoming solar radiation.

"There is a case to be made that the modellers were unlucky in a bunch of different things, which has meant that in the very short-term trend in the last 10 years or so they (the models) are running slightly warm," he says.

Meanwhile, Benjamin Santer, of Lawrence Livermore National Laboratory in California, and co-workers, found that aerosols formed from gases blasted into the atmosphere in several small volcanic eruptions this century accounted for some of the temperature discrepancy between the models and observations. The scientists published their results in Nature Geoscience in February.

CSIRO oceanographer Wenju Cai says a pattern of natural climate variability called the Interdecadal Pacific Oscillation, which has cooled the planet since 1998, has generated "noise" that has drowned out the underlying surface "signal" of human-induced global warming. But the effect will be temporary, he says.

Cai is a member of a team led by Matthew England, professor at the University of NSW's Climate Change Research Centre, that found that a pronounced strengthening of the Pacific trade winds caused by the IPO was increasing the mixing between ocean layers in the tropical Pacific, boosting the heat taken up by deeper waters.

The effect could account for much of the slowdown in the rise of the global mean air surface temperature, and was not captured by climate models.

The scientists published their findings in Nature Climate Change in February. They say the pattern could persist for the rest of the decade but they expect rapid warming to resume when the trade winds abate.

Strong support for predictions made in the virtual world of the future comes from data from the real world of the past.

An international team of scientists led by palaeoclimatologist Eelco Rohling, of the Australian National University in Canberra and the University of Southampton in Britain, came up with a way to treat results from sets of environmental records covering 65 million years.

The aim of the Palaeosens project was to calculate the planet's climate sensitivity.

The archives include bubbles of carbon dioxide in Antarctic ice cores reaching back 800,000 years and measures of the gas in the exoskeletons of single-celled marine organisms called foraminifera. The organisms can also yield ocean temperature data.

Previously, palaeoclimatological studies had been difficult to compare because of differences in the methods used by researchers to measure and interpret parameters. The team got a climate sensitivity of a rise of 2.2C to 4.8C for a doubling of carbon dioxide, and published its results in Nature in late 2012. The result is close to the values obtained from the models. "The work was central to the validation of climate projections," Rohling tells The Australian.

The problem of the big spread in the values remains, but it might have been solved by a group led by Steven Sherwood, also a professor at the UNSW's Climate Change Research Centre.

The team found that the spread could be attributed largely to the various ways in which the models treated the feedback from clouds, which amplify the greenhouse effect in ways that have been poorly understood.

Sherwood's team traced the mechanism to atmospheric convective mixing, and published its results in Nature in January.

Sherwood tells The Australian the research implies that a doubling of carbon dioxide levels would trigger a temperature rise of more than 3C – relatively severe warming – so the values at the lower end of the range should now be considered suspect.

"We should always have been planning for the worst," Sherwood says. "I don't think our international policies have been really recognising the science anyway. No-one has really been taking the problem seriously enough but I think this result makes not doing so look even more ill-considered."

Roy Spencer is sticking to his position.

"I'm not saying that it can be proved that there's something seriously wrong with the models," he says. "They might eventually be shown to be correct in another 30 years if global warming returns with a vengeance.

"But ... the most logical conclusion from the available evidence at this point is that the climate sensitivity of those models is too high, probably by a factor of two."

Brian Schmidt says climate models are not perfect but they are "continually evolving and continually getting better".

He is yet to hear from Maurice Newman on the wager.

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