We must challenge ourselves

Those who would continue arguing against the theory of global warming must be informed by the facts, as **BRIAN SCHMIDT** writes

Described by Prime Minister Kevin Rudd as "the greatest moral challenge of our time", the climate change debate is proving to be just that. It has transformed policy makers into would-be scientists, and scientists in to would-be policy makers, with the resulting mess providing no long-term benefits for anyone in Australia.

The tools of astronomy are largely the same used in modelling climate, albeit applied in a different regime than the Earth. I do not work directly on climate change, but I feel myself a reasonably dispassionate judge of the scientific work being done. The Australian Academy of Science has produced a document which in my opinion provides an excellent description of the current state of our knowledge and uncertainties with respect to climate change. It is available at http://www.science.org.au/policy/climatechange2010.html

Everyone in Australia, citizens, scientists and policy makers alike, should read this document – it is a consensus view of what is happening in climate change from Australia's most prestigious scientific body.

This document's conclusions can be summarised as follows:

The current increased CO_2 content of the atmosphere is almost entirely from anthropological sources.

The science of how carbon dioxide traps heat in the Earth's atmosphere is well established, but how the Earth's atmosphere, oceans, ice-sheets, and plants react to this trapping of heat and increase carbon dioxide is complicated, and remains an area of intense research. Nonetheless, most scientists believe the fundamental physics is well understood, and that the current generation of models are appropriate for making useful predictions on the affects on Earth of increased CO_2 in the atmosphere. These models predict that the increased levels of CO_2 should have had a moderate warming affect on the Earth over the past century.

Observations of the Earth's average temperature indicate that it has risen appreciably over the last century. Models which include the known drivers of natural change such as the solar output, volcanoes, and the Earth's orbit indicate that the rise of temperature over the past century is best explained in these models as due to the enhancement of CO_2 in the atmosphere. Although there are still significant uncertainties within these climate models, they are unanimous in their conclusion that increasing CO_2 in the atmosphere induces significant change in the Earth's climate, with an overall warming of the globe. While the models and observations suggest a moderate amount of warming over the past century, they predict considerably more warming in the future, the exact amounts depending on the amount of CO_2 emissions, and the assumptions of each model.

What science does not allow one to say is that any specific weather event can be attributed to CO_2 emissions, and it doesn't prescribe a policy reaction to CO_2 emissions. Also, because the local affects of climate change are not well predicted by the models, and humans, flora and fauna's ability to adapt are difficult to quantify, there remains considerable uncertainty about the consequences of climate change, even if its effects on the weather were exactly known.

Science makes progress by challenging itself, looking for failed predictions, inconsistencies, or alternative ways to approach a problem. Few scientists become famous by towing the party line, it is by finding fault with the status quo, and improving it that scientists make their mark. So it is no wonder that there is not unanimity in any area of science – climate change is no different. The vast majority of scientists who study climate change believe anthropogenic CO_2 is leading to a warming of the Earth, but there are still some who challenge this assertion. Long may this continue – but only if these challenges are based on a fundamental understanding of the science at hand, and not some anecdotal or highly limited form of phenomenological evidence.

Classic examples of these unscientific approaches are, "Europe was warmer back from 800-1300", or "the Earth went through a mini-ice age from 1500-1800". While both might well be true, they highlight the inherent variation of the Earth's

climate due to natural reasons, they do not address the specific effects due to CO_2 which are based on our understanding of physics.

Some scientists, to counter what they view as a poorly informed debate in the media and political circles, have resorted to hyperbole, over-simplification, unrealistic assertions about the certainty of the science, and the indiscriminate mixing of science and policy. This approach undermines science's responsibility in the climate debate by taking it out of the role of trusted impartial advisor. Science needs to stick dispassionately by the facts, so that policy makers can argue about what to do, not what is going on.

As a voter and taxpayer, I want our elected officials and public servants to take the conclusions (and the associated uncertainties) as presented by science and focus their efforts on a significant policy response. Policy makers should not be debating the science – if questions remain, then commission a purely scientific advisory board for advice. Such a board could inform governmental agencies such as the Climate Change Commission in an objective fashion, so that they can concentrate on the policy response.

I believe the scientific evidence is extremely strong that continuing to increase CO_2 levels will almost certainly lead to an accelerated change to the Earth's climate, but I admit the overall implications for Australia are less clear. Since change is expensive – either by weaning ourselves off carbon, or adapting to climate change, I hear it argued that the uncertainties are such that we should just take a wait-and-see approach. Such people argue that our advanced economy means we probably have the ability to adapt to most change, and that some countries like Canada and Russia may benefit from the change as huge tracts of tundra potentially open up to become arable land.

But much of the rest of the world will likely be less fortunate, with third world economies able to adapt to significant change poorly, with an outcome of wide scale war, pestilence, and mass starvation not inconceivable. Overall, most would agree that significant climate change will have an overall detrimental effect on humanity compared to the status quo. But we face a classic prisoner's dilemma – if Australia acts to restrict climate change before the rest of the world it will have a limited effect on the Earth's climate, and will be potentially economically expensive for our country in the short term. It is only working together with the countries of the world that Australia can both have a substantive effect on emissions, and not be economically disadvantaged. But change is needed, and figuring out how to get not just Australia, but the rest of the world, around this dilemma is the great moral challenge of our time, a challenge which policy makers must not just take up, but deliver on.

■ Brian Schmidt is an Australian Research Council laureate professor and astronomer at Mount Stromlo Observatory. This piece was written after listening to the gala dinner speech by James Halliday at the seventh Symposium of Wine at University House on May 21.