



SENATOR THE HON KIM CARR

**MINISTER FOR INNOVATION, INDUSTRY,
SCIENCE AND RESEARCH**

The Hon Danna Vale MP
Member for Hughes
PO Box 443
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18 NOV 2010

Danna
Dear Ms Vale

Thank you for your letter of 15 September 2010 concerning CSIRO's Global Climate Model (GCM) and your congratulations on my reappointment. I am very pleased to be continuing my role in this portfolio.

I have previously provided several responses to you on the validity of the outputs from the CSIRO's GCM as tested against observations of past climate and on the issues you raised based on the papers by Wentz et al (2007) and Paltridge et al (2009). These responses are attached for the information of the Hon Dr Dennis Jensen MP.

CSIRO has considered your letter of 15 September 2010 and has informed me that there is no further evidence in this letter that would indicate the need to reconfigure the CSIRO's GCM or amend previous responses to the technical matters to which you refer.

As explained in the previous correspondence, both Wentz et al (2007) and Paltridge et al (2009) contain substantive observational results that are consistent with the theoretical underpinnings of current GCMs. There are some observational results in the two papers that would seem to indicate a discrepancy with current theory, but both papers include caveats by the authors about the validity and interpretation of these particular observations. There are no observations in the two papers that alone disprove the theories on which GCMs are based, nor do they invalidate the outputs from CSIRO's model which have been found to compare very well with climate observations of the recent past.

CSIRO has considered the current peer-reviewed scientific literature on the issues raised in these papers and advises that there is no evidence from that peer-reviewed literature that indicates their GCMs are invalid or that there is any reason to reconfigure the CSIRO GCM in the way you suggest.

CSIRO's GCM performs well in simulating the climate of the 20th century¹, and thus is unlikely to be exaggerating future trends. Furthermore, a process of continuous model improvement has been underway throughout the time CSIRO has been undertaking climate modelling. Specifically, CSIRO has informed me that:

¹ This assessment is based on Reichler and Kim (2008) who used CMIP-3 data, see: Reichler, T. and Kim, J. (2008), *How well do coupled models simulate today's climate? Bulletin of American Meteorological Society*, 89, 303 – 311.

- The CSIRO GCMs used in the IPCC Fourth Assessment and in the Garnaut Report have been assessed through the IPCC's science and peer-review process. CSIRO's Mk3.0 GCM also participated in the latest Coupled Model Intercomparison Project (CMIP-3)², which is an international activity that facilitates the intercomparison of GCMs and evaluates their ability to simulate the 20th century climate. Studies using the CMIP-3 data to evaluate the IPCC Fourth Assessment GCMs found that CSIRO's GCM performed as well as and often better than most in terms of simulating the climate of the 20th century³.
- The IPCC Fourth Assessment showed that the GCMs were able to reproduce the temperature record of the 20th century if they included all climate drivers, i.e. aerosols and the long-lived greenhouse gases from both anthropogenic and natural processes. Simulations of the 20th century temperature without anthropogenic forcing (i.e. human emissions of greenhouse gases) did not match the observed warming in the last 40 years of the 20th century.
- The available observational record provides clear evidence of global warming. Global air temperatures have been observed to increase by more than 0.7°C over the last century and this is consistent with a wide range of observations of other parts of the climate system, including ocean temperatures, sea level rise and changes in the cryosphere. The close match between GCM simulations and observed empirical data demonstrates that the predictions from global climate models are not exaggerating the observed trend in the 20th century and so there is no reason to expect them to do so when projecting likely future temperature.
- CSIRO and the Australian Bureau of Meteorology, through their partnership the Centre for Australian Weather and Climate Research (CAWCR), are developing a new global climate model called ACCESS. The process of model development involves ongoing evaluation of the model's performance, including assessments against available observations. This process is guided by many factors, including the discussions in the peer-reviewed scientific literature regarding the ability of GCMs to simulate the response of the global water cycle to global warming and whether any differences are a result of shortcomings in observations, or deficiencies in the climate modelling, or an "artefact arising from the brevity of the satellite records" (Allen and Liepert, 2010⁴).
- If substantiated implications for GCMs arise in the peer-reviewed scientific literature, or as a result of the ongoing model evaluation that CAWCR is undertaking, then CSIRO will take those findings into consideration and modify the ACCESS model accordingly. At this stage, CSIRO's assessment is that there is insufficient evidence to warrant reconfiguring the GCM in the way suggested in previous correspondence.

Your letter also raises concerns about the role of greenhouse gases in global warming. CSIRO does not accept the claim in your letter that "the attribution of most of the global warming in our recent past to increases in greenhouse gas emission [sic] are severely flawed...".

² A Working Group on Coupled Modelling set up under the World Climate Research Programme established the Coupled Model Intercomparison Project (CMIP) as a standard experimental protocol for studying the output of coupled atmosphere-ocean general circulation models (referred to here as GCMs). CMIP provides a community-based infrastructure in support of climate model diagnosis, validation, intercomparison, documentation and data access. Virtually the entire international climate modelling community has participated in this project since its inception in 1995 (from the CMIP Overview: <http://cmip-pcmdi.llnl.gov/> Accessed October 26, 2010).

³ Reichler, T. and Kim, J. (2008). How well do coupled models simulate today's climate? *Bulletin of American Meteorological Society*, 89, 303 – 311.

⁴ Allen, R.P. and B.G. Liepert (2010). Anticipated changes in the global atmospheric water cycle, *Environmental Research Letters*, 5, 1 – 2. doi:10.1088/1748-9326/5/2/025201

I would like to draw your attention to the recent publication by the Australian Academy of Science⁵ which concluded that "Human activities are increasing greenhouse gas levels in the atmosphere. It is very likely that most of the recent observed global warming is caused by this increase in greenhouse gases".

Thank you for raising these important matters with me.

Yours sincerely



Kim Carr

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⁵ The Science of Climate Change, Australian Academy of Science, August 2010.
www.science.org.au/policy/climatechange2010.html. P. 3