Economics Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation and Science Portfolio
2016 - 2017 Additional Estimates
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AGENCY: COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

TOPIC: NASA

REFERENCE: Question on Notice (Hansard, 2 March 2017, page 77-78)

QUESTION No.: AI-23

Senator ROBERTS: I would like to know why CSIRO has not done due diligence on the Bureau of Meteorology data, and I would also like to know why CSIRO relies upon the NASA Goddard Institute for Space Studies, because I have been communicating with NASA Goddard Institute for Space Studies director, Gavin Schmidt. He was very quick to respond to my first letter. In his response he admitted that the NASA Goddard Institute for Space Studies temperature data is the same as the NOAA data, and what we have known for a while but no-one has admitted is that there have been four datasets which are claimed to be independent but they are all the same dataset at heart. So CSIRO has not done any due diligence on that, we were told, yet they rely on it. We want to know why.
Dr Marshall: I am happy to take that on notice. We have a 50-year relationship with NASA, so it should not be hard to tackle.
Senator ROBERTS: Their database is severely compromised and questioned, and now we have just learned that a bill has been passed in the US Congress to remove—
CHAIR: Senator Roberts, you have got to ask a question.
Senator ROBERTS: Are you aware that the US Congress has passed a bill to remove NASA Goddard Institute for Space Studies from studying climate and get it back to science?
Dr Marshall: I was aware of that.
Senator ROBERTS: I would like to know if you are going to do any more due diligence or if you are actually going to start doing due diligence on the records that you use as the basis for your claims.
Dr Marshall: I am happy to take that on notice.

ANSWER

1. CSIRO's Due Diligence on the Bureau of Meteorology's Temperature Record

Key Points:

a) CSIRO supports and stands by the quality of the near surface air temperature record as measured and analysed by the Australian Bureau of Meteorology (the BoM).

b) This is based on CSIRO's understanding that the current methods used by the BoM have been through extensive review, including a dedicated, independent international peer review (IPR). The IPR found that the BoM's practices were sufficient and world leading. Additionally, another independent panel, the Technical Advisory Forum, has assessed that the data set is well maintained. These reviews confirm that the BoM's practices in preparing temperature data are sound, and amongst the best in the world.

c) Full information about these reviews is provided on the Bureau's website (http://www.bom.gov.au/climate/change/acorn-sat/#tabs=FAQs). In addition to these external reviews, CSIRO also notes that:
    - Multiple methods of preparing the data, both by Australian scientists and those overseas, and published in peer reviewed literature, achieve similar results.
    - The size of the trend in Australian mean temperature is large when compared to estimates of natural variability — and this holds true regardless of which historical dataset is used (for example: ACORN-SAT (adjusted), AWAP (unadjusted), NASA-GISS, HadCRUT).
    - An understanding of the significance of recent observed climate change is informed by multiple lines of evidence, and is not informed by changes in Australian mean temperature alone. For example, there are multiple lines of evidence that establish the likely dominance of the enhanced greenhouse effect on recent climate change. This science is discussed in Chapter 4 of the Climate Change in Australia Technical Report. The attribution methods and conclusions in the literature are not dependent on, or sensitive to, homogeneity adjustments in climate data. This includes Australian temperature data.
    - The largest uncertainties in Australian annual-mean temperature relate to the earliest part of the record, when the observing network is sparser. These uncertainties are small with respect to warming trends, and do not affect the scientific conclusions that have been published widely.

2. CSIRO's Reliance upon the NASA Goddard Institute for Space Studies for its claims about Climate Change

    a) CSIRO does not rely solely on global near surface air temperature records. We also use other observational data sets to inform our assessments and science. In particular, we use observations of ocean temperature and heat content that have been collected and analysed by CSIRO in collaboration with programs such as the Integrated Marine Observing System (IMOS: http://imos.org.au/) and global programs such as GOOS (http://www.goosocean.org/). This is because over 90 per cent of the additional energy resulting from increased concentrations of greenhouse gases (as measured by CSIRO and the Bureau at Cape Grim) is absorbed by the world's oceans. These data are quality controlled and assured, and the methods of analysis and results peer-reviewed. As shown in the 2016 *State of the Climate*, these observations clearly show that the Earth is warming.

    b) CSIRO accepts the analysis and synthesis of the global temperature record that is undertaken as part of the Intergovernmental Panel on Climate Change (IPCC) Assessments, the most recent of which was in 2013-14.
        - This IPCC Fifth Assessment was published in 3 volumes during 2013-14.
        - It involved 803 lead authors, who are among the world's most qualified climate scientists including experts from Australia and CSIRO, and assessed the peer-reviewed scientific literature and responded to over 140,000 comments from expert reviewers and governments.
        - The IPCC Fifth Assessment concluded that warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.

c) CSIRO does not rely on any single global temperature record from any single agency. Our science is based on the following most highly cited combined land temperature and sea surface temperature data sets (for mean, near surface global temperatures):

NOAA's MLOST	Merged Land-Ocean Surface Temperature Analysis
NASA's GISTEMP	NASA GISS
UK's HadCRUT	UK Met Office and Climate Research Unit (CRU) CRUTEM – land only
Berkeley Earth	Intended to provide an alternative, independent assessment of global temperature change. In contrast to other data sets incorporating records from roughly 5000-7000 land stations, the Berkeley data set incorporates approximately 37,000 records.

These data sets differ in the methods used to construct them, for example they differ in their spatial coverage, spatial resolution, starting year, and degree of interpolation. Yet numerous comparisons of global and hemispheric mean temperature anomaly time-series calculated from these data sets have been made, showing highly consistent trends. Importantly the magnitude of multi-decadal trend is large compared to differences between the data sets and the inter-annual variability.