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Deliberate misrepresentation of the rainfall patterns of Australia: There are norainfall reductions in Australia caused by the globally increasing anthropogenic carbon dioxideemission

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ABSTRACT

This work presents the truly measured rainfall patterns of Australia. Two recent works by Delworth and Zeng[1] and by Karoly[2] have wrongly claimed a reduction in rainfall for selected areas of Australia, allegedly caused by increasing anthropogenic carbon dioxide emission. Here we show that the rainfall pattern of Australia is actually quite stable when compatible time windows are compared and the rainfall is globally increasing. Since climate parameters oscillate with a quasi 60 years interval it makes sense to compare periods related to these 60 years periodicities rather than select a peak with a valley of the same oscillation. Even if the map of the measured rainfalls does not show any general sign of rainfall reduction, it is possible that selected sub-regions may show such a reduction. Such a local effect may result from many possible causes including change of land use, urbanization and water management, and there is no reason to suppose from the start that it is related in any way to global carbon dioxide emissions. We also show here that measurements of carbon dioxide fluxes show Australia is a top sequestering rather than a top emitting country. The predictions of Delworth and Zeng[1] and of Karoly[2] are based on models rather than observations and are a false explanation of a problem that does not exist.

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THERE IS NO RAINFALL REDUCTION IN AUSTRALIA BECAUSE OF THE GLOBALLY INCREASING ANTHROPOGENIC CARBON DIOXIDE EMISSION

A genuine attempt to understand of physical phenomena of rainfall calls for: 1) collection of observational evidence; 2) assessment of reliability and accuracy of the data; 3) analysis of the data, possibly with the help of validated numerical methods. Unfortunately this practice has not been followed in Australia, where rainfall has become a political rather than a scientific subject.

Karoly[2] commentsin Nature Geoscience in support of the work by Delworth and Zeng[1] in the same journal, in what is just one of a long series of misinterpretation of the observational evidence, cherry picking of incidental similarities, and alleged correlations between mostly unrelated phenomena. Karoly has his facts wrong, and his explanation is not only unnecessary but mistaken.

"*The southwest corner of Australia is usually slightly wetter, but has been affected by a pronounced drying trend over the past forty years. Writing in Nature Geoscience, Delworth and Zeng[1] conclude, from simulations with a high-*

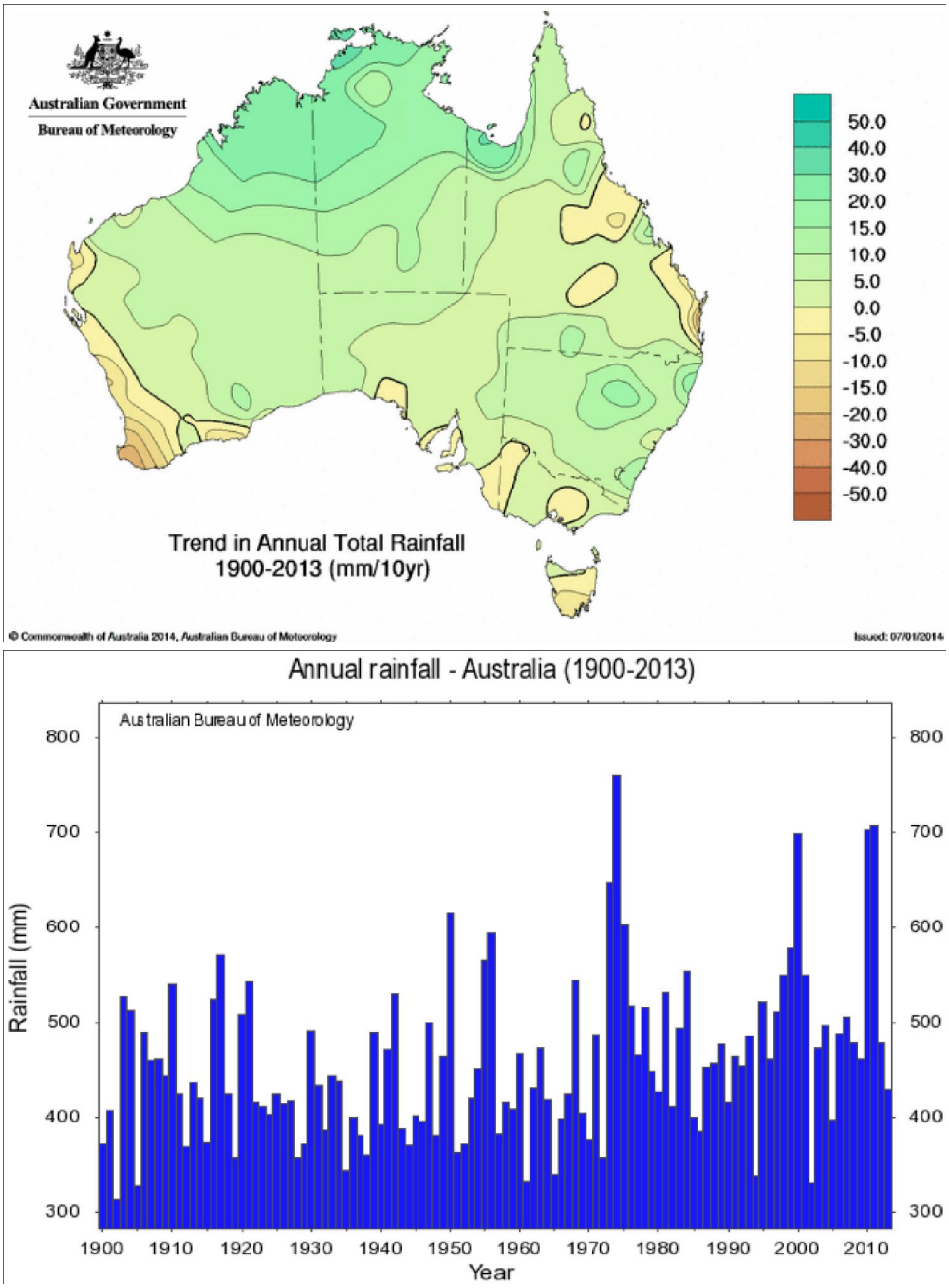

Figure 1 : Australian annual total rainfall average map and time series 1900 to present (from http://www.bom.gov.au/climate/change/index.shtml#tabs=Tracker&tracker=trend-maps, image downloaded August 14, 2014). Over the century, the rainfall is not reducing but actually increasing.

resolution global climate model, that human influences associated with increasing greenhouse gases in the atmosphere and stratospheric ozone depletion are the most likely cause of the observed rainfall decline in the southwest of Australia. The study is one of the very few instances where regional rainfall changes have been linked to human-caused climate change."

The atmospheric circulation exhibits well known natural variability over many time scales. The existence of a quasi-60 years oscillations in temperatures, sea levels and rainfalls should not be doubted[3-13].

It is very well known that temperature, the most studied climate parameter, oscillates with quasi-60 years' periodicity detected in the instrumental records[3-10]. A quasi-60 years' periodicity is also detected in the sea levels[3-5,9-11]. Monsoon rainfall cycles have a quasi-60 years' period, even detected in ancient Sanskrit

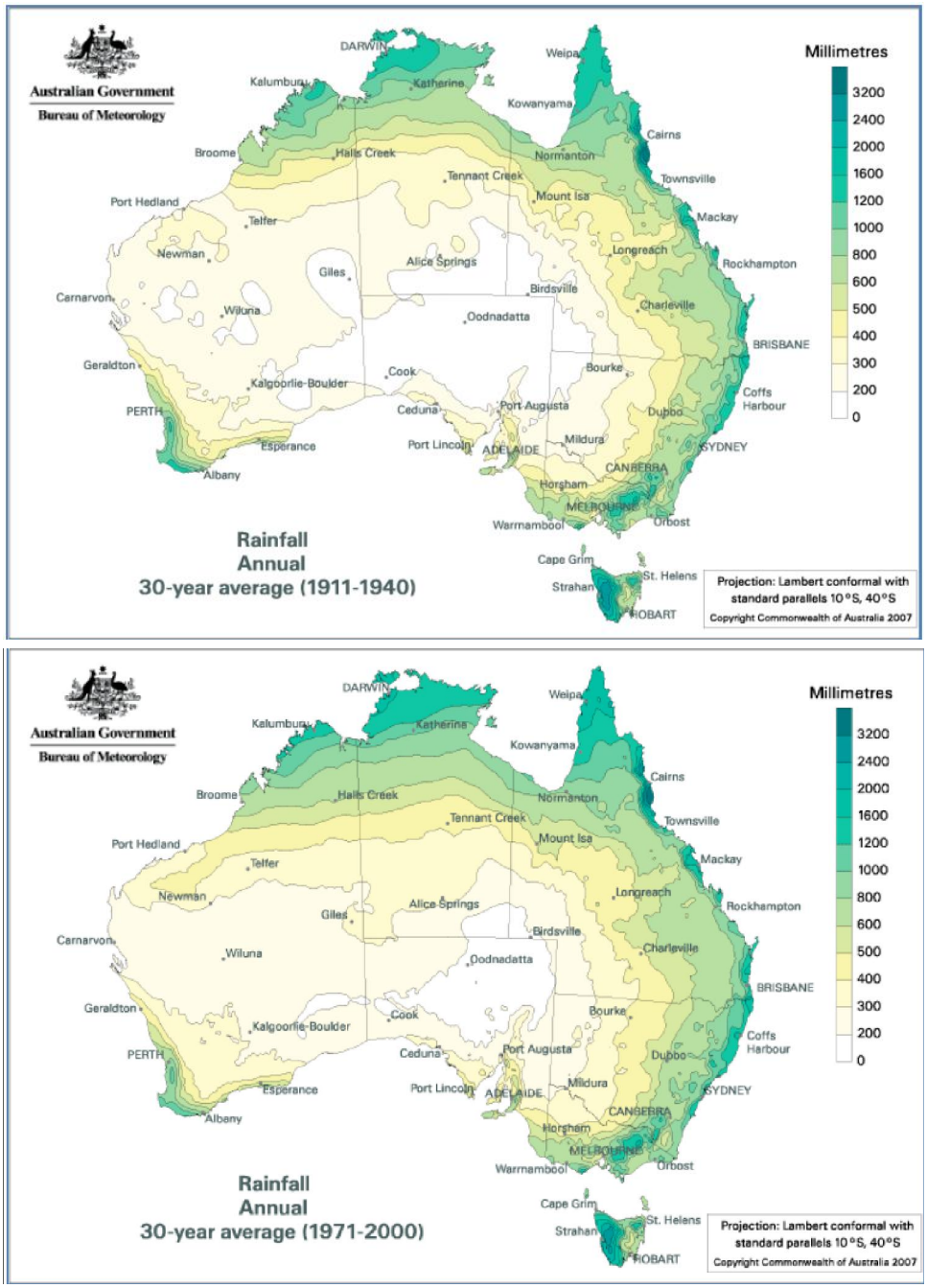

Figure 2 : Decadal and multi-decadal rainfall maps for Australia. The 30 years averages 1911-1940 were actually not higher than the 30 years average 1971-2000. (Images reproduced from http://www.bom.gov.au/jsp/ncc/climate_averages/decadal-rainfall/index.jsp, downloaded August 1, 2014)

texts[12,13]. There is no reason the rainfall over Australia should not exhibit a quasi-60 years' oscillation.

While it is open to discussion if these oscillations are superimposed to a longer term trend driven by natural forcing, it is a matter of fact that the climate models have failed to match observations, including the lack of warming of the past 14 years[3,10]. The "*high-resolution global climate model"* proposed by Karoly and co-workers[1,2] is no exception. Once the observational data is properly considered, including the natural oscillations when using short time windows, or when using all the data, the measured rainfall for Australia on a regional scale has not been reducing over the last century.

Karoly should not question the reliability of the Australian Government Bureau of Meteorology (BOM hereafter) rainfall maps on a decadal or multi-decadal

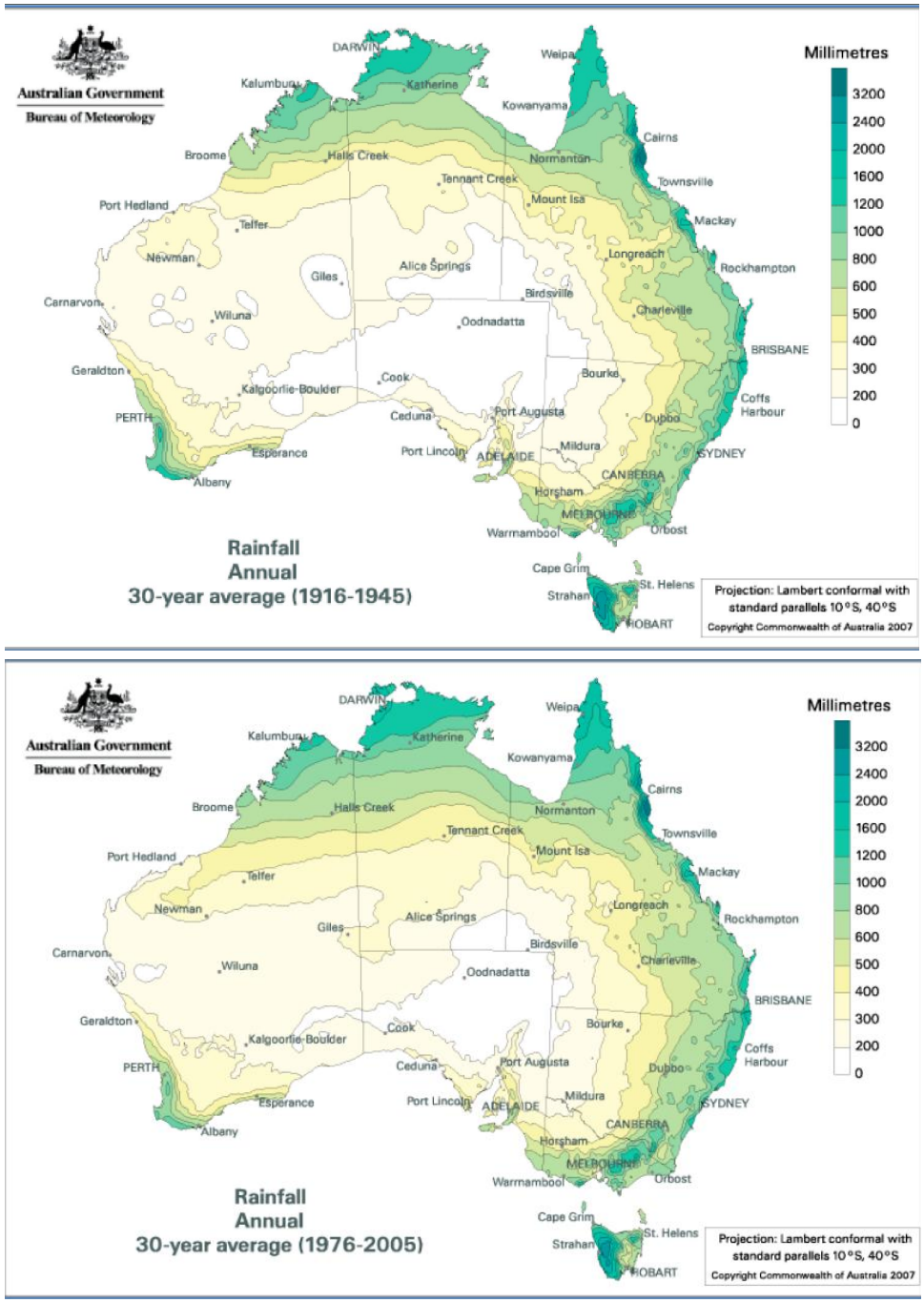

Figure 3 : Decadal and multi-decadal rainfall maps for Australia. The 30 years averages 1916-1945 were actually not higher than the 30 years average 1976-2005. (Images reproduced from http://www.bom.gov.au/jsp/ncc/climate_averages/decadal-rainfall/index.jsp, downloaded August 1, 2014)

scale and rainfall trends. The rainfall maps are available over time windows of 10, 20 and 30 years starting not earlier than 1910 and ending not later than 2005. The rainfall trends are available as trend map and trend time series starting in the year 1900 up to the present with the shortest time window being 1970 to present.

We know that temperatures in Australia and worldwide trended down from about 1880 to 1910, 1940 to 1970 and 2000 to now, while temperatures have trended up from 1910 to 1940 and 1970 to 2000[3,10]. Therefore, if we want to understand a trend, we should consider time windows long enough to avoid the effect of this multi decadal oscillation.

Figure 1 shows the annual total rainfall average map

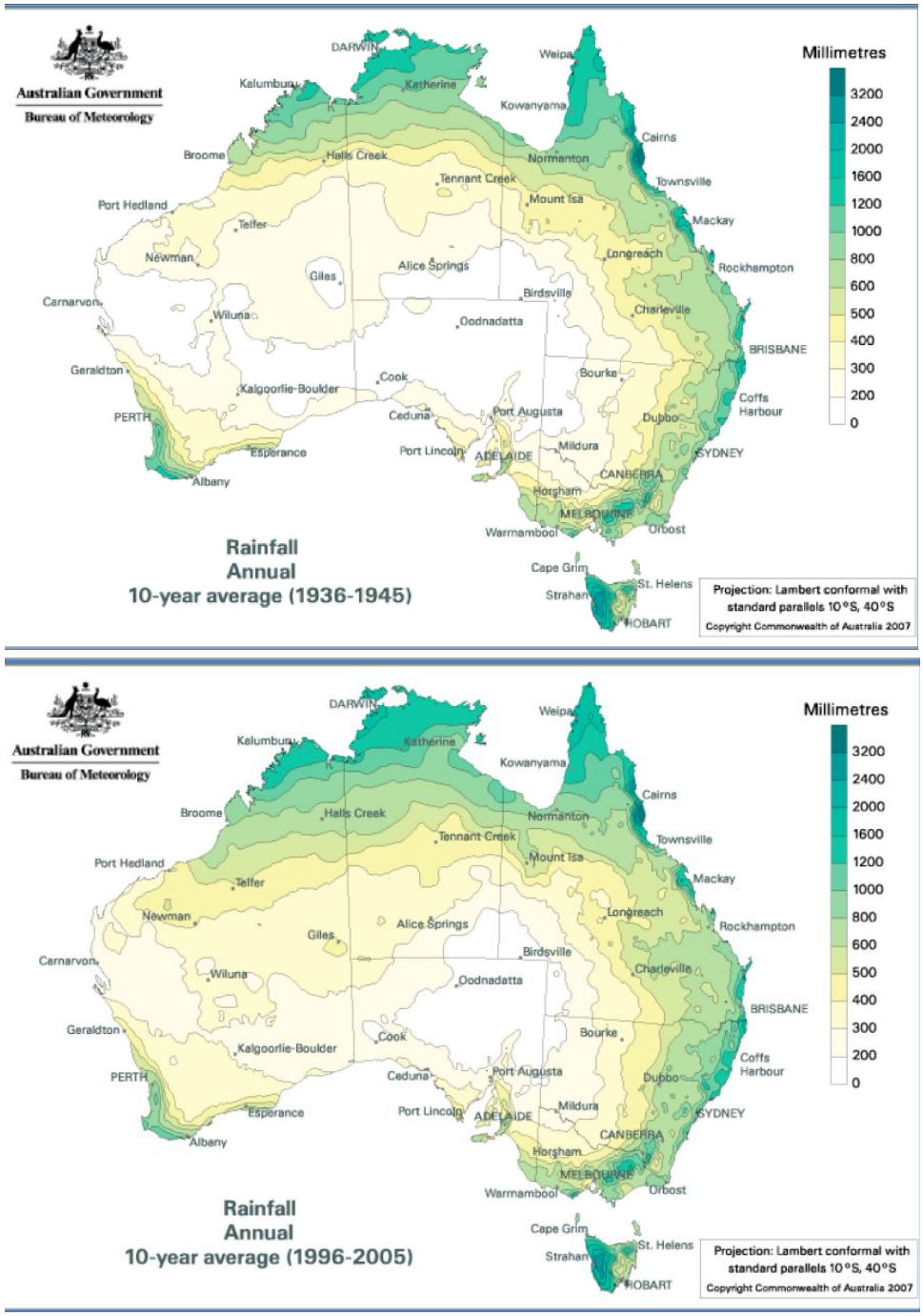

Figure 4 : Decadal and multi-decadal rainfall maps for Australia. The decadal average 1936-1945 was not higher than the decadal average 1996-2005. (Images reproduced from http://www.bom.gov.au/jsp/ncc/climate_averages/decadal-rainfall/index.jsp, downloaded August 1, 2014)

and time series 1900 to present. The map and the time series clearly indicate that the rainfall of Australia has not been reducing during the last century, but actually increasing.

Figures 2 to 4 present the decadal and multi-decadal rainfall maps for Australia. It is interesting to compare the 30 years trend of 1911 to 1940 with the 30 years trend of 1971 to 2000 or even the multi decadal trend 1916 to 1945 with the decadal trend 1995 to 2005. The 30 years average 1911-1940 was not higher than the 30 years average 1971-2000, the 30 years average 1916-1945 was actually not higher than the 30 years average 1976-2005, and finally the decadal average 1936-1945 was not higher than the decadal

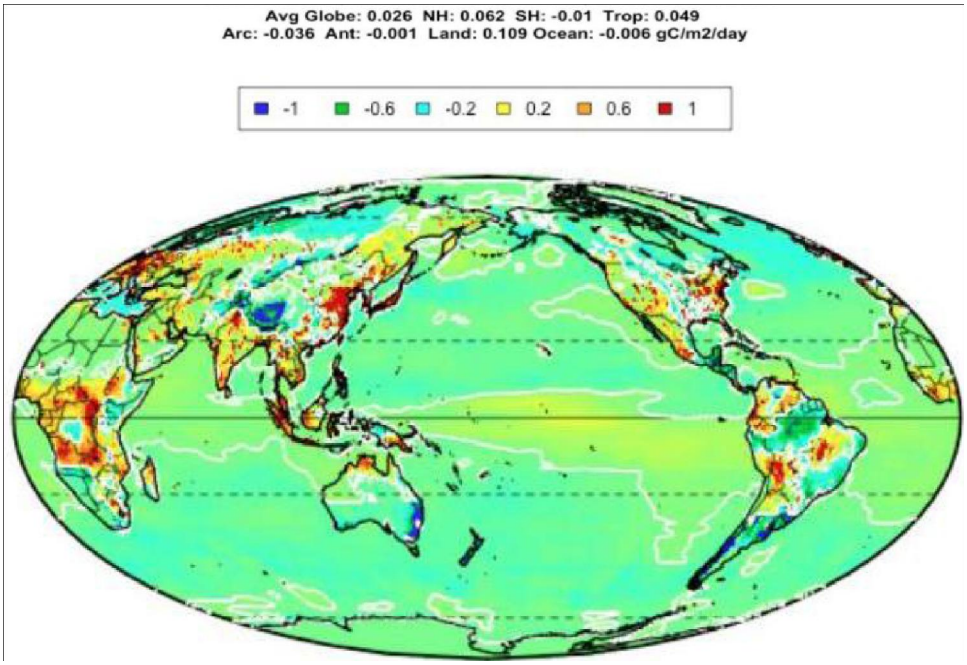

Figure 5 : Geographycal distribution for the year 2010 of GOSAT net (emitted less sequestrated) CO_2 fluxes. The white colored contour lines show 0 gC/m²/day separating net emitting from net sequestering zones. The Figure is reproduced fromwattsupwiththat.com/2014/07/05/the-revenge-of-the-climate-reparations/#more-112572. Courtesy of Willy Eschembach. Australia is with Brazil, Argentina and Canada a top sequestring country

average 1996-2005. Spatially, the pattern is surprisingly stable.

It is no surprise that over compatible time windows the measured rainfall has not been lower in the more recent period than the previous one, both nationally and locally for the southern and south-western areas of Australia, and over a century the total rainfall has actually been increasing. The total rainfall 2000-2014 is much higher than the total rainfall 1900-1914. Therefore, the experimental evidence does not leave space to any alarmist claim of draught induced by the global anthropogenic carbon dioxide emission.

Figures 1 to 4 presents observational results that are subject to reliability and accuracy issues, like anything in physics. To be specific, the measuring stations do not cover Australia uniformly with satisfactory resolution, many areas being still poorly covered,and the coverage is much worse in the past.

In February 2009 the BOM produced a survey of Australian stations measuring maximum air temperature with more than 50 years of data and 80% complete record (file www.bom.gov.au/climate/how/long_T_sites.csv, still available on August 14, 2014). There aretotal 175 stations listed. However, if we limit our attention to the stations already open in 1940 and still open in 2009, the number drops drastically to 34. The stations already open in 1930 and still open in 2009 are only 22, and those open in 1910 and still open in 2009 only 17. Requiring completeness > 95%, this number drops to 12. Considering Australia has a total surface area (sq. km) of 7,741,220, the actual data coverage is clearly insufficient. The definition of trends such as those of Figures 1 to 4 certainly suffersfrom the many assumptions introduced to "*guess*" the missing measuring points in space and time. However, this is the best information available, and models should be always validated before any use could be made versus these experiments rather than being used non-validated to replace the experiments.

In addition to these accuracy issues due to the unavailability of data, the reliability of the trends proposed by BOM is further reduced by their '*correction*' of real, truly measured data, and the inclusion and exclusion of selected stationsused in preparing the map with the purpose of magnifying the effects of global warming[14,16].

We may conclude that Figures 1 to 4 are certainly not exaggeratingthe increasing rainfall. The rainfall of Australia has not been reducing over the last century but has significantly increased with a 95%

certaintyalmost everywhere. The very few small pockets of reducing rainfall are surrounded by overwhelming areas of increasing rainfall. This is the only evidence that should be discussed in scientific papers.

DISCUSSION

The rainfall pattern of Australia is fairly stable, with a trend to of increasing, and not decreasing rainfall over the century. This isdespite many changes in land use, urbanization water management and other environmental changes. The results shown in Figures 1 to 4 do not support any claim of reduction in rainfall due to global warming, and there is no evidence whatsoever of any influence of the global carbon dioxide in the atmosphere.

Zooming on the Southern part of Western Australia it is possible to detect some small areas that experienced some rainfall decrease, but this should not be extended to conclusions about all Australia or the world. Not surprisingly, nobody blames the global anthropogenic carbon dioxide emission for the regional and sub-regional increased rainfall. It seems to pure nonsense to blame global carbon dioxide emission for a decrease in rainfall in some small area, while ignoring the increase in rainfall over much larger areas, and neglecting all the other factors that might affect rainfall.

Rainfall reduction is a non-event, and there is no point in seeking a cause. To further support our claim the models of[1,2] have no value, the measured carbon dioxide fluxes of Figure 5 show Australia is actually not a net emitting but a net sequestering country. This makes it even harder to believe that the global anthropogenic carbon dioxide emission is responsible for any detectable change in the Australian climate.

CONCLUSION

Karoly and co-workers want us to believe that precipitation over selected subregions of Australia is reducing because of the global anthropogenic carbon dioxide emission. In reality the regional trend is one of increased rainfall. The very few sub regions of reduced rainfall are surrounded by much larger regions of increased rainfall (Figures 1 to 4).

A model that explains the small areas by the effect of the global anthropogenic carbon dioxide emission has problems accounting for the much larger area of increasing rainfall. Besides, Australian carbon dioxide fluxes show more sequestration than emission (Figure 5). Beyond the modelling Karoly and co-workers have therefore all their facts wrong. Australian rainfalls are not reducing but increasing, and Australia is a sink rather than a source of CO_2.

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