DISCUSSION OF THE "HOTTEST YEAR ON RECORD" IN AUSTRALIA

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ABSTRACT: The global temperature trends provided by the Australian Bureau of Meteorology are artificially exaggerated due to subjective and unidirectional adjustments of recorded values. The present paper aims to promote the use of the raw stations' data corrected only for urban heat island formation. The longer temperature records of Australia exhibit significant oscillations with a strong quasi-60 years' signature of downward phases 1880 to 1910, 1940 to 1970 and 2000 to present, and upwards phases 1910 to 1940 and 1970 to 2000. A longer oscillation with downward phase until 1910 and an upwards phase afterwards is also detected. The warming since 1910 occurred at a nearly constant rate. Over the full length of the long Australian records since the end of the 1800s, there is no sign of warming or increased occurrence of extreme events. The monthly highest and mean maximum temperatures do not exhibit any positive trend. The differences between monthly highest and lowest, or monthly mean maximum and mean minimum temperatures, are all reducing because of urban heat island formation.

KEY WORDS: tem perature warming, urban heat island, Australia, extreme events

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Introduction

Raw temperature data of historical stations not affected by large urban heat islands show temperatures have not warmed since the end of the 1800s (Boretti 2013, Parker 2013a, b, Watts 2013, JoNova 2014, Parker 2014a, b, Parker, Ollier 2015a, b, c, Parker 2016, Marohasy 2017, WAclimate 2017). The list of the non-warming stations includes Alice Spring, Darwin, Cape Otway, Wilsons Promontory, Echuca, Horsham, Orbost, Gabo Island, Rutherglen, Newcastle, Bathurst, Burke, Amberley and Deniliquin and many others. In the case of historical stations with large urban heat islands, as for example Melbourne, Sydney, Perth, Adelaide and Brisbane the minimum temperatures have warmed significantly more than the maximum temperatures. The warming vanishes moving to the country side, as for example moving from Melbourne to Ballarat or other unaffected locations of regional Victoria as shown by Parker (2013b).

Technicalities such as the installation of Stevenson screens and more recently the installation of automatic weather stations using thermistors rather than mercury or alcohol thermometers

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affect the temperature readings for the average. Thermistors are much more sensitive to temperature changes and suggest larger fluctuations. Stevenson screens shield thermometer from direct heat radiation and may affect the maximum temperatures. Other factors affecting the temperature measurements include smaller urban heat island effect, change of land use, more localised effects linked to heat release and storage processes close to the thermometer location (such as the presence of an air conditioning unit, a car park, a glass tram stop or heavy traffic), and air motion due to buildings. Changes of location of the measuring equipment as Town to Airport or simple relocation of the thermometer will also affect the measurements.

The Australian Bureau of Meteorology (BOM) is well known for its continuous adjustments of the recorded values of temperatures to produce warming trends resembling those required to support the concept of global warming caused by anthropogenic carbon dioxide emission. The pinnacle of these administrative corrections has been the definition of the latest Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT) data set. This exercise has permitted the BOM to magnify the warming trends by reducing the temperatures of the past and to magnify the frequency of extreme events by increasing the summer temperatures while reducing the winter temperatures. The warming trend is computed from the time series of the average temperatures, the occurrence of extreme events is somehow linked to the time series of the difference between maximum and minimum temperatures. Reducing the temperatures of the past increases the warming, and increases the difference between maximum and minimum temperatures for same average temperature increases. Extreme events are become more frequent. The engineered warming has been shown in peer review papers (Boretti 2013, Parker 2013a, b, Parker 2014a, b, Parker, Ollier 2015a, b, c, Parker 2016) and blogs. The subtler differential seasonal warming has been shown so far only in the blog (JoNova 2014) in which Ken Stewart compared the ACORN and the Australian Water Availability Project (AWAP) temperature data set to find that Australian summer maximums have been warmed by 200% with the ACORN data.

Parker (2014b) presents the raw temperature data measured in Alice Spring and the latest ACORN reconstruction. Alice Spring is not considered in the present analysis. The time window end of the 1800s to present is actually covered not by one single station but by two stations, with a change of site from the Post Office to the Airport location. The significant overlapping in between the two records does not pose any issue in deriving a composite record as shown in Boretti (2013) and Parker (2014b). The reconstructed ACORN and the raw measured minimum and maximum temperatures do not agree. The time window of the reconstructed data magnifies the warming. The reconstructed data also increase the warming by making lower the temperatures of the past. The measured values show no warming at all since 1888, and a much smaller warming of 0.46 and 1.1°C/century of minimum and maximum temperatures since 1910. Legitimate homogenizations of the Alice Spring record are not easy, as there are no surrounding stations to average with. The supporting data of Parker (2014b) were downloaded from Australian Government Bureau of Meteorology (BOM 2014a, b). Climate Data Online (CDO) provides access to a range of statistics, recent weather observations and climate data from the Australian Data Archive for Meteorology (ADAM), a database which holds weather observations dating back to the mid-1800s for some sites. The climate change trends computed by the Bureau of Meteorology are based on selected subsets of data that have been changed many times in the recent years with raw temperature measurements mostly arbitrarily corrected or neglected. Analysis of the raw temperature data has always returned patterns completely different from those claimed by the BOM in their state-of-the-climate reports.

Kenskingdom (2014) presents the mysterious correction for Rutherglen, a rare long rural temperature record where measurements had come from the same place since 1913. Rutherglen was one of the temperature recording stations that was subject to large adjustments which turned a slight cooling trend into a strongly warming one. The official notes showed that the site did not move and was a continuous record. Retired scientists who worked at times at Rutherglen confirm the official thermometer had not moved. The original cooling trend of -0.35°C/century

was transformed into a +1.73°C/century warming after homogenization justified by the BOM as the result of an unrecorded shift.

JoNova (2014) presents the result of the analysis performed by Ken Stewart of the adjustments used to create the all-new ACORN dataset compared with the other BOM dataset called AWAP. Since summer maxima are the ones used to generate the most headlines in Australia, the trend in average summer maximums has been tripled by adjustments. Ken Stewart splits the data into months, and compares the trends in maxima in the AWAP and ACORN datasets, across the entire nation. Most of the adjustments happen to data from the hottest months of the year, October to March. Even though the measured maxima in February and March are possibly cooler now than they were in the early 1900s, they have been adjusted to show warming trends. Adjustments grossly exaggerate monthly and seasonal warming. The supporting data was downloaded from Australian Government Bureau of Meteorology (BOM 2014b, c).

Watts (2013) presents Australian summer (December to February) surface air temperatures over the satellite era. This time the source of information is not a BOM data set but the Remote Sensing Systems (RSS 2017) and University of Alabama in Huntsville (UAH) data base. Microwave sounding unit temperature measurements have been obtained from the troposphere since 1979, when they were included within the National Oceanic and Atmospheric Administration (NOAA) weather satellites. Satellites measure radiances in various wavelength bands, which is then mathematically processed to obtain indirect inferences of temperature. Different groups analysed the satellite data. Among these groups are RSS and UAH. The Australian temperatures from the RSS and UAH groups show that there was nothing unusual about the 2012 summer. The supporting data were downloaded from KNMI (2014).

Parker, Ollier (2015b) asked the question *which causes more warming, carbon dioxide or Bureau of Meteorology (BOM) adjustments?* and concluded the warming of Australia is mostly an artefact of BOM *adjustments*. Another fundamental research question was *which causes more summer heatwaves: carbon dioxide or Bureau of Meteorology (BOM) adjustments?* The answer by Ken Stewart was that the heat waves of Australia are likewise mostly an artefact of BOM *adjustments*.

The present paper shows that the use of raw data provides a superior estimate of the actual warming trends than the unnaturally exaggerated global temperature trends provided by the Australian Bureau of Meteorology. This superior estimate shows the repeated claims that almost every year is the **hottest year on record** are not trustworthy. The warming in the world top net sequestering country for carbon dioxide, Australia (Parker, Ollier 2015d) is conclusively substantially overrated.

Data and methods

The conclusions of Parker, Ollier (2015b) and Ken Stewart are further supported here by the analysis of the time series recorded in the 30 stations of longest record included in the BOM list of long temperature records (BOM 2009). The supporting data were downloaded from Australian Government Bureau of Meteorology (BOM 2014a).

Considering the presence of a quasi-60 years' oscillation in the climate with upwards phases 1910–1940 and 1970–2000 and downward phases 1880 to 1910, 1940 to 1970 and 2000 to present (Parker 2013b), a proper assessment of the warming trends requires 60 or even better 120 years of data collected without any perturbing event. The oscillations up to the quasi-60 years are superimposed on a trend with downward phase (1880 to 1910) and upward phase (1910 to present) that may be a longer term oscillation (Parker 2013b). The warming claimed to start in 1970 actually started in 1910.

The warming trend is computed by linear fitting. If an experimental distribution $\{x_j, y_j\}$ j=1, …, m represents the m monthly average temperature observations y_j at the time x_j, the classic estimation of the time rate of change is based on the linear fitting:

$$y^+(x) = (y_0^+ + a^+ \times x) \qquad (1)$$

where:
y^+ – the temperature,
x – the time, and
y_0^+, a^+ – the fitting coefficients
a^+ – linear warming rate.

To study the influence of the multi-decadal oscillations, the fitting with a line and sines of expression:

$$y^*(x) = \left(y_0^* + a^* \cdot x\right) + \sum_{i=1}^{n} \left[A_i \cdot \sin\left(\pi \cdot \frac{x - x_{c,i}}{w_i}\right)\right] \quad (2)$$

where:

y^* – the temperature,

x – the time,

n – the number of sines, and

y_0^*, a^*, A_i, $x_{c,i}$, w_i – the fitting coefficients may be used,

a^* – linear warming rate, and

A_i, $x_{c,i}$, w_i – the amplitudes, phases and periods of the oscillations.

Results

Figure 1 presents the temperatures in Cape Otway Lighthouse:

– monthly values of average maximum and average minimum with 36 months' average and linear trends;

– monthly highest and lowest values with 36 months' average and linear trends;

– 36 months' average and linear trends of monthly average maximum and minimum, highest and lowest.

There is no sign of warming or increasing occurrences of extreme events. The Cape Otway (1864 to 2014) trends in [°C/year] are: highest –0.0084, mean maximum –0.0148, mean minimum 0.0065, and lowest 0.0058. Cape Otway is significantly cooling over the time window in the highest and mean maximum temperatures less affected by modified heat storage and heat release processes around the thermometer location. The much smaller warming of the mean minimum and lowest temperatures is mostly due to extremely low values (outliers) measured in the mid-1860s. Starting in 1870, trends for mean minimum and lowest temperatures further reduces to 0.0038 and 0.0037°C/year respectively. Similarly, significantly reducing are the differences between highest and lowest temperatures or mean maximum and mean minimum temperatures.

Considering that what makes headlines in Australia is the daily maximum temperature, it may be interesting to compare the daily maximum temperatures truly measured which can be obtained from Australian Government Bureau of Meteorology (BOM 2014a) with the manipulated ACORN data which can be downloaded from Australian Government Bureau of Meteorology (BOM 2014d).

Figure 2 presents a comparison of truly measured and ACORN manipulated daily maximum temperatures in Cape Otway Lighthouse:

– all the years of data;

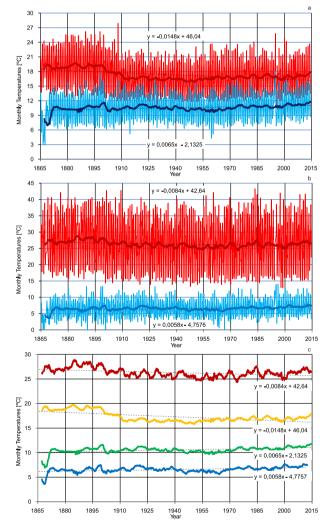– 1910 to present. A significant cooling is transformed into a significant warming by neglect-

Fig. 1. Temperatures in Cape Otway Lighthouse: a) monthly values of average maximum and average minimum with 36 months average and linear trends; b) monthly highest and lowest values with 36 months average and linear trends; c) 36 months average and linear trends of monthly average maximum and minimum, highest and lowest. Data from Australian Government Bureau of Meteorology (BOM 2014a) accessed October 10, 2014.

ing the data collected prior of 1910 which do not help the 'highest on record' claim, plus massaging the data 1910 to present by reducing past temperatures and so almost double the warming.

The massaging for Cape Otway Lighthouse is not as huge as other stations such as Rutherglen but is still substantial.

Figure 3 presents another analysis of the temperatures at Cape Otway Lighthouse:

– measured monthly average maximum temperatures month-by-month;
– measured monthly highest month-by-month;
– yearly average of daily maximum temperatures.

The year 2013 is not the year with the largest monthly average maximum temperature – that was 1908, nor the year with the highest absolute temperature recorded – that was 1982. The year average of the maximum temperature of the year 2013 was not the largest on record, as there were another 38 years in between 1870 and 1902 where the average of the daily maximum temperatures was larger than in 2013, even 2.29°C.

Figure 4 presents one more analysis of the temperatures in Cape Otway Lighthouse:

– measured monthly average maximum and results obtained by a fitting with a line and sines with 36 months' average trends;
– time rate of change of the monthly average maximum measured and fitted as a function of time;
– time rate of change of the monthly average maximum measured and fitted as a function of the record length.

The perfectly oscillating model describes the measured pattern well. The temperatures are oscillating, with a quasi-60 years' oscillation of upwards phases up to 1880, 1910 to 1940 and 1970
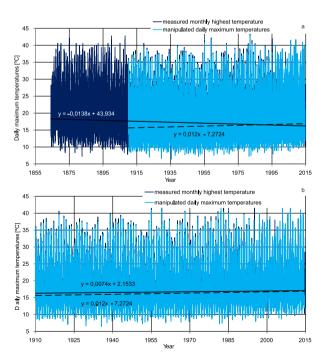

Fig. 2. Comparison of truly measured and ACORN manipulated daily maximum temperatures in Cape Otway Lighthouse: a) all the years of data; b) 1910 to present. Data from Australian Government Bureau of Meteorology (BOM 2014a, d) accessed October 10, 2014.
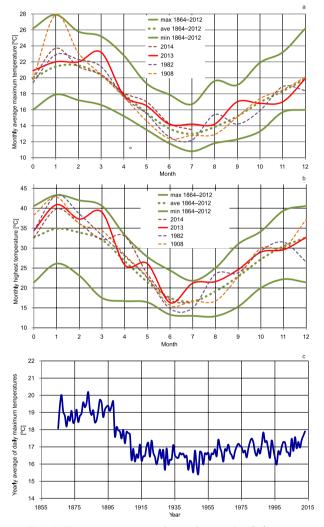

Fig. 3. Temperatures in Cape Otway Lighthouse: a) measured monthly average maximum temperatures month-by-month; b) measured monthly highest month-by- month; c) yearly average of daily maximum temperatures. Data from Australian. Government Bureau of Meteorology (BOM 2014a) accessed October 10, 2014.

to 2000 and downward phases 1880 to 1910, 1940 to 1970, and 2000 to present. The model indicates the presence of a longer term oscillation with downward phase up to 1910 and upward phase afterwards that appears also in the reconstructions of global temperatures (Parker 2013b).

The analyses of Figures 1–4 produce the same conclusion, namely that there has been not too much warming since the 1800s and not too much increase of extreme events. The present warming is very probably natural or mostly natural as it started in 1910. The same conclusions may be drawn from the data for most of the 30 locations considered, with remarkable differences only in case of the capital cities where the build-up of large heat islands produces an increased warming rate at the same time as this build-up. The oscillatory pattern of Figure 4 is also presented by the reconstructions of global temperatures as the NASA Goddard Institute for Space Studies (GISS) Surface Temperature (Hansen et al. 2010, GISTEMP Team 2017).

Figure 5 presents an analysis of the monthly mean GISS 1200 T2m/SST global temperature
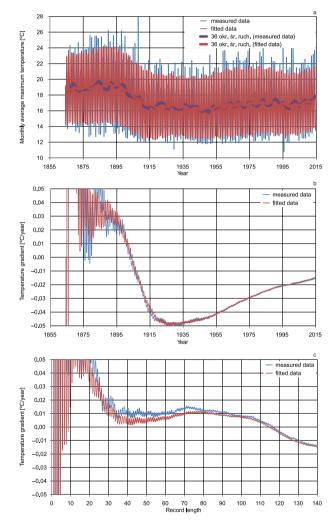

Fig. 4. Temperatures in Cape Otway Lighthouse: a) measured monthly average maximum and results obtained by a fitting with a line and sines with 36 months average trends; b) time rate of change of the monthly average maximum measured and fitted as a function of time; c) time rate of change of the monthly average maximum measured and fitted as a function of the record length. Data from Australian Government Bureau of Meteorology (BOM 2014a) accessed October 10, 2014.

Fig. 5. Analysis of the monthly mean GISS 1200 T2m/SST global temperature anomaly index: a) reconstructed monthly mean and results obtained by a fitting with a line and sines with 36 months average trends; b) time rate of change of the monthly mean measured and fitted as a function of time; c) time rate of change of the monthly mean measured and fitted as a function of the record length. Data from KNMI (2014) accessed October 12, 2014.

anomaly index (Hansen et al. 2010, GISTEMP Team 2017):

– reconstructed monthly mean and results obtained by a fitting with a line and sines with 36 months' average trends;
– time rate of change of the monthly mean measured and fitted as a function of time;
– time rate of change of the monthly mean measured and fitted as a function of the record length.

Data from KNMI (2014) downloaded on October 12, 2014.

The perfectly oscillating model well describes the measured pattern. The temperatures are oscillating, with a quasi-60 years' oscillation of upwards phases up to 1880, 1910 to 1940 and 1970 to 2000 and downward phases 1880 to 1910, 1940 to 1970, and 2000 to present. The model indicates the presence of a longer term oscillation with downward phase up to 1910 and upward phase afterwards. The global warming trend starts in 1910 and not in 1970 and it is therefore natural rather than driven by anthropogenic carbon dioxide emission.

Table 1. Warming trend for the 30 longest temperature records of Australia having data collected in a single location, with measurements started before 1900 and ended after 1985. Data from Australian Government Bureau of Meteorology (BOM 2014a) accessed October 10, 2014.

Station data					Temperature trends [°C/year]				Notes
Station name	Station No.	Start year	Last year	Years of data	Mean Max	Mean Min	Highest	Lowest	
Bathurst Gaol	63004	1858	1983	126	–0.0158	0.0078	–0.0129	0.0033	
Boulia Airport	38003	1888	2014	127	0.0027	0.0151	–0.0006	0.0179	
Bourke Post Office	48013	1871	1996	126	–0.0092	0.0054	–0.0143	0.0062	
Brisbane Regional Office	40214	1887	1986	100	0.0000	0.0157	–0.0014	0.0209	
Bundaberg Post Office	39015	1892	1990	99	–0.0050	0.0143	–0.0033	0.0249	
Burdekin Shire Council	33001	1892	1986	95	0.0036	0.0154	0.0029	0.0355	
Burketown Post Office	29004	1890	2009	120	0.0079	0.0111	0.0041	0.0160	
Cape Otway Lighthouse	90015	1864	2014	151	–0.0148	0.0065	–0.0084	0.0058	
Charters Towers Post Office	34002	1893	1992	100	0.0002	0.0095	–0.0007	0.0074	
Dalby Post Office	41023	1893	1992	100	–0.0084	0.0098	–0.0086	0.0161	
Deniliquin (Wilkinson St)	74128	1858	2003	146	–0.0173	0.0124	–0.0165	0.0089	
Echuca Aerodrome	80015	1858	2014	157	0.0005	–0.0063			highest/lowest since 1957
Forbes (Camp Street)	65016	1873	1998	126	0.0031	0.0082	0.0295	–0.0079	
Gabo Island Lighthouse	84016	1877	2014	138	–0.0019	0.0076			highest/lowest since 1957
Gayndah Post Office	39039	1893	2009	117	0.0009	0.0191	–0.0026	0.0245	
Goondiwindi Post Office	41038	1891	1991	101	–0.0025	0.0136	–0.0065	0.0192	
Gunnedah Pool	55023	1876	2011	136	–0.0140	0.0108	–0.0162	0.0081	
Hobart (Ellerslie Road)	94029	1882	2014	133	0.0059	0.0087	0.0081	0.0090	
Inverell Comparison	56017	1874	1997	124	0.0108	–0.0029	0.0144	–0.0071	
Low Head (Comparison)	91057	1895	2001	107	0.0182	0.0087	0.0273	0.0115	
Melbourne Regional Office	86071	1855	2014	160	0.0070	0.0151	0.0038	0.0187	
Nhill	78031	1897	2008	112	0.0009	–0.0033	0.0026	–0.0077	
Perth Regional Office	9034	1897	1992	96	0.0161	0.0162	0.0179	0.0194	
Port Lincoln	18070	1892	2002	111	0.0037	0.0143	0.0024	0.0241	
Richmond Post Office	30045	1893	2014	122	0.0013	0.0133	–0.0005	0.0155	
Robe Comparison	26026	1884	2014	131	0.0057	0.0072	0.0002	0.0051	
Sydney (Observatory Hill)	66062	1859	2014	156	0.0125	0.0097	0.0138	0.0097	
Tewantin Post Office	40264	1895	1996	102	–0.0020	0.0308	0.0051	0.0375	
Walgett Council Depot	52026	1878	1993	116	0.0054	0.0041	0.0073	0.0060	
Wilsons Promontory Lighthouse	85096	1872	2014	143	–0.0022	0.0112			highest/lowest since 1957
average values					0.0004	0.0103	0.0017	0.0129	

The global reconstructions as GISS (Hansen et al. 2010, GISTEMP Team 2017) are artificially biased upwards to reproduce the carbon dioxide emission trend, as shown by Parker (2013a), but the strong natural oscillation signal prevails. The very likely overrated warming rate since 1880 is 0.00654°C/year or 0.654°C/century. This rate increases to 0.00851°C/year or 0.851°C/century by considering the data only since 1910. The warming rate cleared of the oscillations is about constant since the 1940s.

Table 1 presents the warming trend for the 30 longest temperature records of Australia collected in a single location, with measurements started before 1900 and continued until after 1985.

The maximum temperature is less affected by the heat release and heat transfer processes about the thermometer location and it is the parameter to consider when assessing if there is any warming. In the 30 locations, the monthly mean maximum temperature is warming 0.0004°C/year, or 0.04°C/century. That means there is no change within the limits of accuracy of the measurements. The monthly mean minimum temperature is warming 0.0103°C/year, or 1.03°C/century. Similar trends are shown by the monthly highest and monthly lowest, warming 0.0017°C/year or 0.17°C/century and 0.0129°C/year or 1.29°C/century respectively, with highest temperatures warming one order of magnitude less than the lowest.

From the worldwide data, Figure 5, temperatures are subject to multi-decadal oscillations with a very clear periodicity of quasi-60 years having downward phases 1880 to 1910, 1940 to 1970 and 2000 to present, and a possible longer term oscillation of downward phase up to 1910 and upward phase afterwards. Because the GISS temperature record is biased upwards, as many supporting stations have upwards biased temperatures rather than the actual thermometer reading, the Byrd station in Antarctica or Alice Spring in Australia just to name a few, the magnitude of the warming that is occurring since 1910 is difficult to assess, but it is certainly less than the 0.00851°C/year or 0.851°C/century of the GISS signal 1910 to present.

The limited data available suggest phasing of quasi-60 years' and longer term oscillation of periodicity quasi-120 years. Computing linear trends starting in a valley of the peaks & valleys

oscillation as 1910 or 1970 is only a trick to over-rate the warming trend. With time windows shorter or longer the warming rate reduces considerably. Over the last 10–15 years the warming is very close to zero.

From the long term Australian data, Figure 1–4 – examples and Table 1 – summary, the Australian temperatures follow pretty much the same oscillations as the global temperatures. Because the temperature records are more likely biased upwards than downward by the heat release and heat storage processes about the thermometer location embedded in the urbanization strong especially for the minimum temperatures, the magnitude of the warming that is occurring since 1910 is difficult to assess. However, if we do consider the maximum temperature as the indicator, it is certainly much less than the 0.00851°C/year or 0.851°C/century of the GISS global signal 1910 to present. The data since the start of the record in the late 1800s show no warming at all.

Without being very selective on the time window, and without manipulating the thermometer reading to reduce the temperatures of the past or increasing the differences between summer and winter values for the present by arbitrary correction, over the full time of the record there is no sign of warming or increased extreme events for the Australian long term stations.

Discussion

It is certainly possible to find few papers in the peer reviewed literature that supports the BOM homogenization process (Trewin 2013, Ashcroft et al. 2014, Ayers 2016, Davis, Hanna 2016). There are also papers that criticize this process (Boretti 2013, Parker 2013, 2014a, b, Parker 2016). They cannot be all right. What is important is to look at the measurements and apply the scientific method. As there is no way to perform a better measurement going back in the past, there is no legitimate way to correct recorded data of the past. Therefore, we should stick to the raw data. A definitive statement about the BOM procedure is provided by Parker (2016).

The Global Historical Climatology Network (GHCN) v2 temperature time series (GISS Surface Temperature Analysis, 2012) in Alice Spring and all the 36 other stations located in a circle of 1,000

km from Alice Spring do not show any warming. There are stations covering different time windows having very close patterns of temperatures. In this circle of 3,141,593 km² (roughly 50% of Australia) that is mostly underdeveloped, none of the stations supposed to support the +2°C warming per century – Australia's largest warming rate – claimed by BOM actually has a warming trend. Figure 2 of Parker (2016) presents the area of concern and the individual temperature time series for the 37 stations within the 1,000 km circle (images from GISS Surface Temperature Analysis, 2012). It is therefore only an artefact by BOM to produce the warming. Homogenization is supposed to be used to account for upwards biases such as Urban Heat Island, not to introduce upwards biases. As noticed by Parker (2015a), the ACORN adjustments of Australian temperatures are in the wrong direction, inevitably in the direction to produce a warming much larger than the legitimate.

In the centre of Australia, all the stations available in a circle of radius 1,000 km were showing very little or no warming, as still acknowledged in the GHCN v2 data set up to October 2011 (Fig. 6). To move from a scattered population of stations with unequal time coverage and many missing data but both uniformly not warming to produce the largest warming trend for Australia as depicted by the BOM it only requires many administrative corrections and the development of an ad-hoc procedure to compute spatial trends. The analysis of the temperatures for the area at the centre of Australia proposed by Mearns (2015) and Parker (2016). As noticed by Humlum (2017), as the past does not change, any record undergoing continuing changes cannot describe the past correctly all the time. Humlum operates with three quality classes for global temperature records, with quality class 1 representing the highest quality level, the satellite records (UAH and RSS); quality class 2 – the HadCRUT surface record; and quality class 3 – the NCDC and GISS surface records. As the past should not change continuously, the latest BOM ACORN data set and the further computations done to derive the warming trend maps qualify well above quality class 3 for Humlum's standards.

The above analysis permits to assess if the claims almost every year of the **hottest year on record** are trustworthy. In case for example of

the *Australia's extremes of 2013*, our conclusions are completely opposed to the views of the researchers of the Australian Research Council Centre of Excellence for Climate System Science (ARCCSS) who computed the influence of global warming on Australia's climate. Their alleged "fingerprints of climate change" referred to the Australia's extremes of 2013 are wrong. According to a chief investigator of the centre (UNSW School of Biological, Earth and Environmental Sciences, 2014) *we often talk about the fingerprint of human-caused climate change when we look at extreme weather patterns* but *if we were climate detectives, then Australia's hottest year on records in 2013 wasn't just a smudged fingerprint at the scene of the crime, it was a clear and unequivocal handprint showing the impact of human-caused global warming*. According to the researchers of the centre, January 7 was the hottest day on record, January 2013 was the hottest month on record, December–February 2013 was the hottest summer on record, September–November 2013 was the hottest spring on record, 2013 was the hottest year on record, and there are extreme summer events and drought in Eastern Australia.

Apart from the exaggerations, they link every climate event to anthropogenic carbon dioxide emission, without proof. The method they use involves the suppression of observations that do not support the theory of anthropogenic global warming, and manipulating real data to manufacture increasing temperatures and increasing extreme events.

We should also consider the role of the Bureau of Meteorology. The climate trend maps compiled by Bureau of Meteorology in their climate change section are completely unreliable, as the alleged increasing temperature is obtained by lowering temperatures of the past by "adjustments". The longest of the Australian temperature records that were considered the most reliable by Bureau of Meteorology on February 2009 (BOM 2009) are still available as raw temperatures in the climate data online section and consistently show no warming and no increased extreme events within the limit of accuracy of measurements. Figure 7 shows the air temperatures global, northern and southern hemisphere since 1979 from satellite observations. The warming trend since 1979 is not exactly global, as it is the northern hemisphere to warm at a rate of 1.8°C/century, while the southern hemisphere is only warming 0.9°C/
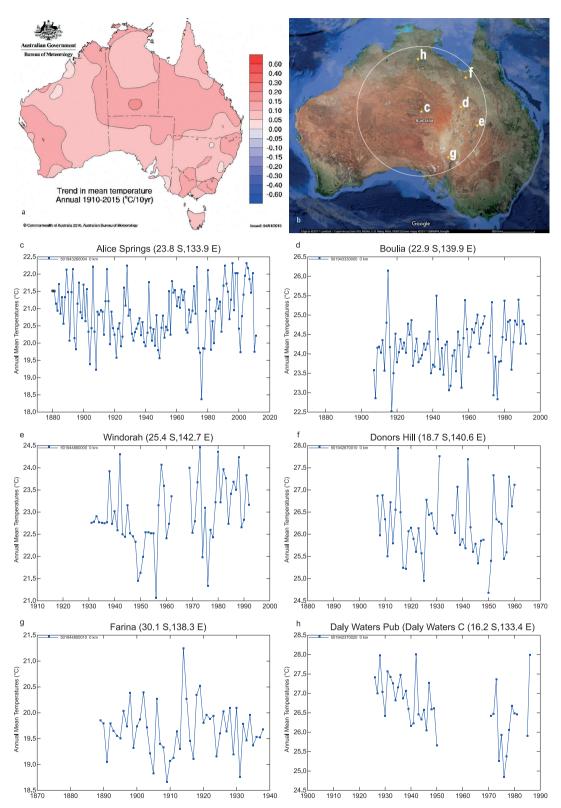
Fig. 6. a – Latest trend map 1910 to present by the Australian Government Bureau of Meteorology. (BOM 2017).
The BOM suggest that at the center of Australia, around Alice Spring, there is a warming of up to 2 °C/century.
b – the actually non-warming center of Australia within the radius of 1,000 km circle as still acknowledged in the
Global Historical Climatology Network (GHCN) v.2 of October 2011. Some of selected individual temperature
time series for the 37 stations within the Central Australia – the longest – are from GISS Surface Temperature
Analysis (2017a): c – Alice Springs, d – Boulia, e – Windorah, f – Donors Hill, g – Farina, h – Daly Waters Pub. The
BOM trend map is incompatible with the already massaged individual records of the GHCN v.2 (cf. Parker 2016).

century. As the time window includes more years of the positive rather than the negative phase of the multi-decadal oscillations, the actual warming rate is indeed quite small for the less developed southern hemisphere and possibly motivated by the Urban Heat Island and change of land use in addition to sun activity than affected by the carbon dioxide emissions.
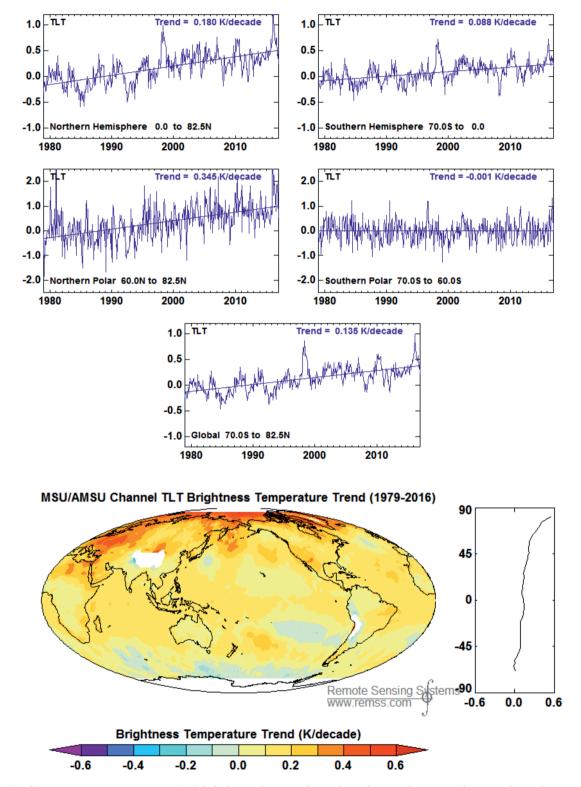

Fig. 7. Satellite temperatures since 1979 (global, northern and southern hemisphere, northern and southern polar). Images from RSS (2017). Warming of northern and southern hemispheres is different.

Conclusion

We suggest that priority should be given to real observed data, and data analysis should use standard statistical techniques. On this basis we find that over the full time since records were collected there is no appreciable sign of warming or increase in extreme events in Australia. There is no cause for alarm if the normal scientific method of observation – hypothesis – testing is retained. Revising the raw temperature data of the past is an unscientific process that lies somewhere between dubious and fraudulent. Any link between the Australian temperature data and carbon dioxide emission is utterly speculative.

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