# “The Echuca Temperature Story”

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Executive Summary

The Australian Bureau of Meteorology has presented data for Echuca Aerodrome that shows no change in temperature for 100 years. However the widely promoted Australian "high-quality climate data set" shows an apparent increase in temperature of 1.2 degree centigrade per century for exactly the same location. How can this be explained?

Historical temperature data is available for Echuca Aerodrome from the Australian Bureau of Meteorology (BOM), with the earliest records being in the 1880s. Echuca Aero has been classed as one of the "Australian high-quality climate data sites" and a plot of the annual mean temperatures can be viewed on the internet[1]. The Bureau of Meteorology graph (Figure 1) shows an upward temperature trend.

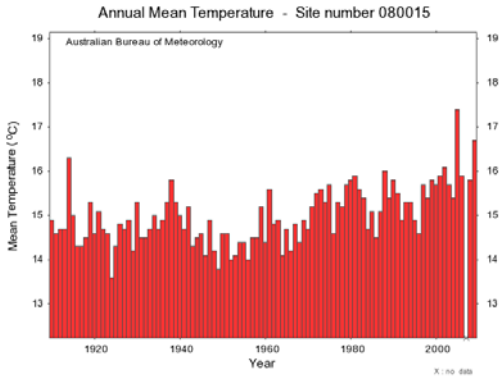



**Figure 1** Trend in Australian high-quality climate data shows an increase of 1.2 Degrees Centigrade per 100 years

However this graph **contradicts** the trends shown in the raw historical data from a different part of the Bureau of Meteorology web site - see footnote for the Mean Maximum temperatures[2] and Mean Minimum temperatures[3] for Echuca Aerodrome. These Maximum and Minimum data can be averaged to give the Annual Mean Temperature for Echuca Aero for over 100 years. The Bureau of Meteorology consider temperature measurements prior to 1910 as being somewhat erratic in some cases, due to non-standard placement of thermometers so data prior to 1910 has been ignored.

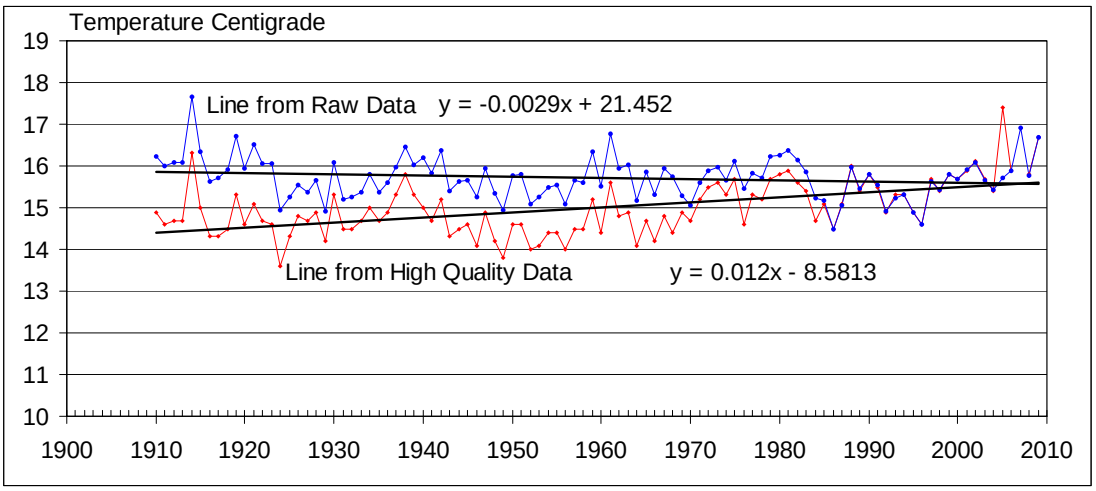



**Figure 2** The blue line is a plot of the BOM raw historical data with a cooling trend of 0.29 degrees per 100 years.

The red line is a plot of the Australian high-quality climate data with a warming trend of 1.2 degrees per 100 years.

[1] http://www.bom.gov.au/cgi-bin/climate/hqsites/site_data.cgi?variable=meanT&area=vic&station=080015&period=annual

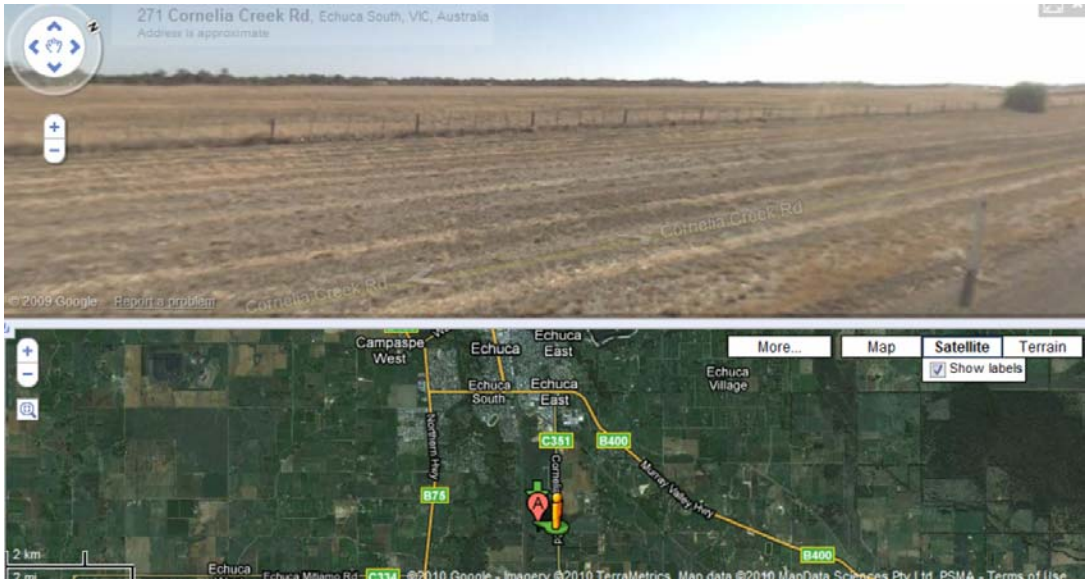
[2] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=36&p_display_type=dataFile&p_startYear=&p_stn_num=80015

[3] http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=38&p_display_type=dataFile&p_startYear=&p_stn_num=80015

In Figure 2 the 'High Quality' data (RED) is plotted on the same chart as the raw historical data (BLUE). Some puzzling questions arise.

1. The trend for the raw temperature data (blue) is flat or tending slightly towards lower temperatures in recent years (a cooling trend).
2. The trend for the high-quality climate data (red) suggests higher temperatures in recent years (a warming trend of 1.2 degrees per 100 years).
3. The differences between these two sources of records is clearly evident in the early 1900s but has virtually disappeared by 1990.
4. Even in the early period the two lines appear to move up and down together but there are times when this is not the case.
5. One notes that the dataset that shows the upward trend contains the word CLIMATE in its URL while the dataset that shows no trend, contains the word WEATHER in its URL. Is there a difference in the structure of the BOM that could explain this discrepancy?
6. Could the apparent upward trend in the high-quality climate data be spurious? Has the apparent upward trend been artificially generated by depressing the temperatures in the early 1900s?
7. Echuca is not the only example of this sort of data distortion. Who is doing the adjustments and on what basis are they being done?

Has the Australian High Quality data been 'adjusted' by the University of East Anglia's Climate Research Unit? If so, is the Bureau fully aware of methods used and the consequences of these adjustments? Is there a reproducible methodology which can be independently checked and verified?
Echuca aerodrome is classified as 'urban' by BOM, but it is arguably more 'rural' and is some distance from Echuca, itself an isolated country town - could this somehow explain the upwards trend which is similar to that expected in large urban centres like Melbourne? The picture and satellite image below, are courtesy of Google maps.




## The Authors

For over 30 years, Rick Dean has been in private business focusing on data and digital technologies and advancements in the music industry and has lectured throughout Australia regarding these uses. His interest in Climate/Weather was triggered when reading his Grandmothers daily dairy, composed in Melbourne from the 1800's to early 1900's. He then realized not much has actually changed.
Dr Sandy McClintock has more than 40 years experience in statistical analyses involving 'messy' data. He has worked as a senior scientist at the universities of New England and Sydney. He has been an industry and government consultant for more than 20 years.