



Warming up in Rutherglen

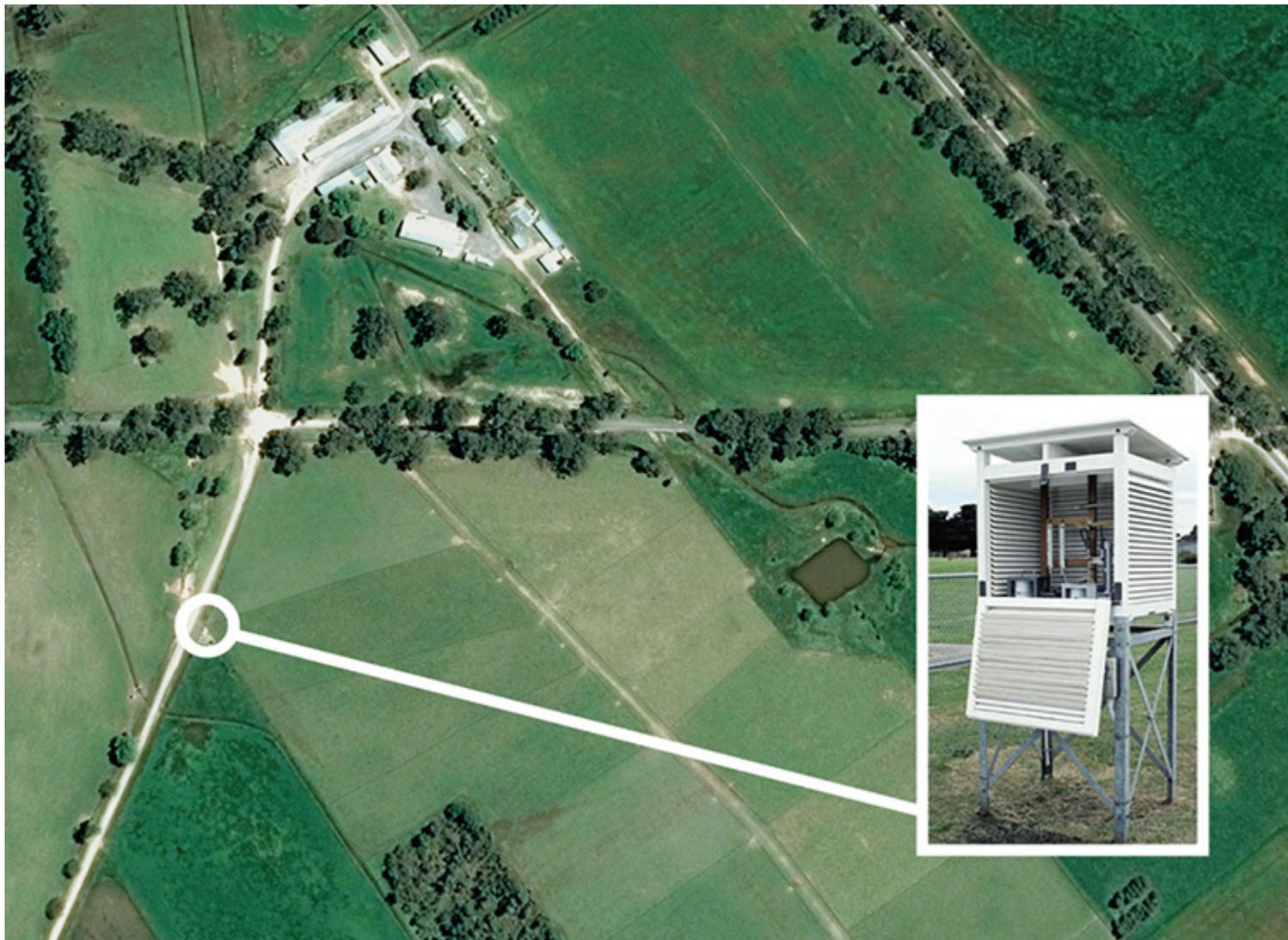
Publish Date:

August 2017

This article first appeared in the IPA Review July 2017

This year marks an important milestone in the ongoing battle for truth and objectivity in the science of climate change—the publication of the IPA’s latest book, *Climate Change: The Facts 2017*. Edited by IPA Senior Fellow Dr Jennifer Marohasy, the book includes contributions by Marohasy, Jo Nova, Tony Heller and Anthony Watts, and includes research showing how climate statistics from thousands of sites have been altered through a process called ‘data homogenisation’.

Several chapters draw on previously published research to examine cases where recorded temperatures are re-modelled to form a foundation for human-induced climate change. In a paper published online in late 2016, Marohasy focused on just one example of homogenisation in the north-eastern Victorian wine-growing town of Rutherglen. Her analysis demonstrated how the big picture of data homogenisation could be conveyed by focusing on one small example. This article recounts the story of Rutherglen and the resistance to scrutiny regarding homogenisation displayed by government.



A map detailing the location of the temperature recording equipment at Rutherglen and a standard Stevenson screen (inset).

MEASURING TEMPERATURE AND HOMOGENISATION

Surface air temperatures are measured by the Bureau of Meteorology (BOM) at almost 2000 Australian sites. Up to 112 of these measurements are weighted and combined to create various temperature averages. These measurements form the official Australian historical temperature record via a dataset referred to as the Australian Climate Observations Reference Network-Surface Air Temperature (ACORN-SAT). This also feeds into international datasets that are used to measure and predict climate change.

At first, this concept sounds straightforward. But this isn't the full story. Most people are surprised to find out that the figures on the official temperature record aren't always the temperatures that were actually recorded on the ground that day.

The accuracy of climate and temperature records is critical. The underlying trends and historical precedents of these measurements feed into predictions of the likely impact or intensity of

bushfires, droughts, rainfall and floods, which impacts economic development. Ostensibly to guarantee this accuracy, Australia's official temperature record is put through a process of 'homogenisation' to remove data imperfections caused by changes in the quality, location or amenity of the measuring equipment, or human error.

Few would argue that there are occasions when the finessing of temperature records may be necessary, such as site moves or equipment changes. This has often been the case in regional Australia, where temperatures were once recorded at post offices, but are now recorded at the local airport.

A further problem comes from the 'urban heat island effect', when temperatures become permanently elevated around the location of the measuring equipment. A classic example, and one highlighted by Dr Tom Quirk in *CCTF17*, is the weather station located until recently at the corner of La Trobe and Victoria Streets in central Melbourne. When the site was established in 1908 it was in largely open space, but 109 years later it is surrounded by asphalt roads, concrete, steel buildings and cars.

WHEN HOMOGENISATION ONLY GOES ONE WAY

Problems occur when the reasons for homogenisation at a particular location are unclear, not audited, inconsistently applied or difficult to justify. Indeed, this is particularly so when there is a consistent pattern of reducing the early-twentieth century minimum temperature record which has the effect of producing a warming trend.

Journalist Graham Lloyd, the Environment Editor at *The Australian*, published a series of articles on this issue in the second half of 2014, highlighting Marohasy's work. These articles revealed a troubling pattern: the homogenisation of selected site data was consistently changing a mild temperature cooling trend to a gradual warming trend.

Particular examples show the scale of the changes. At Amberley in Queensland, what was a cooling trend of 1.0 degree over the course of a century became a warming trend of 2.5 degrees. Similarly, at Deniliquin in New South Wales, cooling of 0.7 degrees over the course of a century was homogenised to warming of 1.0 degree. Forty years of data at Bourke in NSW was deleted, and not even adjusted, because the information wasn't collected using standard equipment. A 1.7 degree cooling trend over a century is now a mild warming trend, and the site high of 51.7 degrees in 1909 was simply disregarded despite a similar temperature the same day at nearby Brewarrina, and despite both being recorded in standard equipment.

When Lloyd asked the BOM to justify its adjustments in each location, the response was that its methodology had been published in peer-reviewed publications, and that homogenisation was world's best practice, also used in the US by the National Oceanic and Atmospheric Administration (NOAA) and NASA, and in the UK by the MetOffice.

TEMPERATURE CHANGE AT RUTHERGLEN

Sourcing and analysing temperature data at a specific location and understanding the impact of homogenisation is a time-consuming and often laborious task, and we should be grateful to those

who have undertaken this work in pursuit of the facts.

So why did Marohasy choose Rutherglen? Rutherglen was suitable as it was not subject to the 'urban heat island effect' and had been in the same rural location, with the same equipment, since November 1912. There had also been no equipment failure or data breaks in the century since. The purity of the data at Rutherglen should be gold standard.

Marohasy found that while the raw data for the minimum temperature record at Rutherglen showed a definite cooling trend of 0.3 degrees over the century—in line with nearby Benalla, Echuca and Deniliquin—the official temperature record had been adjusted to create a warming trend of 1.7 degrees over the same period. This has been achieved by reducing pre-1974 minimum temperatures, making the present appear warmer than the past. According to Marohasy, the homogenisation method applied to the individual time series in Rutherglen in particular is:

Not replicable, consistent, or even well-documented ... There is no consistency in the timing of the breakpoints, or the amount by which values have been adjusted, in the two different advisories issued by the Bureau for Rutherglen in August and September 2014.

Homogenisation involves making changes relative to trends at nearby locations. One report from the BOM claims the changes needed to be made to make the Rutherglen trend consistent with trends at nearby stations. Incredibly, this report shows the raw temperatures for Rutherglen charted with homogenised values from locations hundreds of kilometres away in Wagga, Deniliquin and Kerang. In the first of the BOM's responses to questions from Lloyd, it claimed that the change in recorded temperatures at Rutherglen was because of a site move. This, however, contradicted its own official Station Catalogue which claims 'no documented site moves during the site's history'.

FORMAL AUDIT ATTEMPTS

Unfortunately, attempts to ensure independent verification of the BOM's methodology, particularly on a site-by-site basis, have met with resistance.

Back in 2010, Perth-based science commentator Jo Nova attempted to have the Australian National Audit Office (ANAO) review the data and algorithms behind the BOM's assessment of domestic climate change. The BOM avoided ANAO scrutiny by announcing the revised ACORN-SAT method of data compilation which would be reviewed on an ongoing basis by a new 'Technical Advisory Forum'.

This forum was not actually established until four years later, when in response to Lloyd's articles, then Parliamentary Secretary to the Environment Minister, Bob Baldwin, announced in January 2015 that the members of a new Technical Advisory Forum would 'review and provide advice on Australia's official temperature data set'. But the forum didn't examine any specific examples of homogenisation. It only met once to listen to a day of presentations from existing BOM staff, and took a dim view of so-called 'unsolicited submissions' from the public.

In 2014, officials in the Department of Prime Minister and Cabinet under then Prime Minister Tony Abbott reportedly asked officials in the Department of the Environment to investigate the

possibility that the Bureau of Meteorology was exaggerating the estimates of global warming. However, nine days after the change of Australian Prime Minister on 15 September 2015, then Environment Minister Greg Hunt announced on ABC TV's *Lateline* program that the idea had been 'killed'. Two months later, in November 2015, Marohasy wrote to the Australian Auditor-General, Grant Hehir, to ask the ANAO to:

Undertake a performance audit of the procedures, and validity of the methodology, used by the Australian Bureau of Meteorology in the construction of the official historical temperature record for Australia.

The letter detailed some of the problems of current methodology, including the selective inclusion and exclusion of measurements from various sites and the flawed approach to homogenisation pursued at Rutherglen. Unfortunately, little more than one month later, the ANAO denied the request. In classic 'Yes Minister' fashion, the reply referred Marohasy back to the Technical Advisory Forum, which only meets once a year and doesn't take submissions.

WHERE TO NOW?

Data from 109 of the 111 sites used to create the ACORN record have been homogenised. Marohasy has also found that data from the Melbourne CBD has been used to help homogenise the temperature records from Cape Otway, 173 kilometres away on Victoria's south-west coast. She also discovered that the town of Cobar in central western New South Wales is used to homogenise temperatures thousands of kilometres away at Alice Springs, while data from across the Coral Sea is used to homogenise temperatures at Amberley in South East Queensland. As a result of this homogenisation, Australia's official temperature record shows an annual mean increase of 1.0 degrees since 1910, which is now in line with the official global temperature increase over the same period.

To be clear, Marohasy's research doesn't prove, or even seek to prove, that temperatures have not increased since 1910. Rather it demonstrates significant regional variation in temperatures which may be influenced by a number of factors and that the methodology that seeks to change the historical record should be open to independent scrutiny.

The stakes are too high for the calls for independent scrutiny of measurements to continue to be ignored. The classic warning from George Orwell's *1984*, 'He who controls the present controls the past' has never been so prescient.

[Click here to download the original version](#)

For further information see: Marohasy, J., *Temperature change at Rutherglen in South- East Australia, New Climate (2016)* can be found at <https://doi.org/10.22221/nc.2016.001>