# THE DARWIN FIDDLE

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Abstract

Darwin temperature data has been subject to some analysis in recent years. There are two time series involved, one running to 1941 from the Post Office, and since 1941 from Darwin Airport. The two series do not align, and there have been attempts to allign ("homogenise") them to satisfy the climatologist's desire for seemingly smooth temperature profiles.
Warwick Hughes established that a Stevenson Screen existed, and was presumably in use, in 1890. [International Journal of Climatology, Vol 15, 231-234 (1995)].
Willis Eschenbach (WUWT December 20, 2009) exposed a problem with the GHCN interpretation of Darwin temperatures.
Now we have the Australian Bureau of Meteorology's new ACORN-SAT dataset, which has yet another interpretation of the combined timeseries.
All raw data comes from the Aust. BOM. Yet CRUTEM4 and ACORN-SAT each arrive at different conclusions concerning what the combined Darwin timeseries should look like.

## Background

On May 3, 2012 Ed Thurstan published a report in WUWT entitled "HAS CRUTEM4 BEEN FIDDLED WITH ?". In that report, it was observed that large blocks of CRUTEM4 temperatures had been constructed from CRUTEM3 data in such a way that each month of each year (for 20 to 50 years) had been adjusted by adding a single constant 12 element adjustment vector.
To clarify that issue, we had the following exchange with Prof. Phil Jones of the UEA.

*"Ed,*
*I take it that you have not read the CRUTEM4 paper? I'm attaching the paper from J. Climate. In this you will see (para 22 and elsewhere) that our emphasis with adjusting temperatures has changed a little. In the 2003 paper by Jones and Moberg we recommended that this work be best undertaken by National Met Services (NMSs). The NMS for a country has access to both more complete station histories and generally more local stations series. So for Australia, almost all of the data now used come from this web site (ftp://ftp.bom.gov.au/*
*anon/home/ncc/www/change/HQdailyT/HQdailyT_info.pdf).*
*A similar change was made for the contiguous United States, where we took data from the US HCN. For a number of other countries (e.g. Russia, Canada and many in Europe) we took data from NMS web sites and publications.*
*For Darwin, the apparent differences you have noticed come from adjustments we had made to Darwin in 1986. These were documented here http://www.cru.uea.ac.uk/st/. You'll be able to see that for Darwin the latest BoM data effectively undo what we had been using for Darwin up to the 2006 paper. The reasons we applied the adjustments in 1986 are discussed in the TR027 document which you can download. We were basing these on comparisons we made with stations in the region in 1985/86. Darwin is on p56.*
*I hope the above is clear.*
Best Regards
Phil

Prof. Phil Jones

**From:** Ed Thurstan [mailto:thurstan@bigpond.net.au]
**Sent:** Wednesday, May 09, 2012 5:12 AM
**To:** Philip Jones (ENV)
**Subject:** CRUTEM4
Dear Prof Jones,
Looking at CRUTEM4, DARWIN, WMO 941200, I calculated the difference CRUTEM4 minus CRUTEM3 on a monthly basis to see what, if any changes had occurred.
I noticed that there seem to be systematic adjustments to the data running from 1882 to 1939 which are constant for each month, as shown:

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1883** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |
| **1884** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |
| **1885** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |
| **1886** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |
| **1887** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |
| **1888** | -0.1 | -0.3 | -0.6 | -0.3 | -0.4 | -0.7 | -0.5 | -0.6 | -0.5 | -0.6 | -0.6 | 0 |

It is as though you have discovered that several differently calibrated thermometers were in use, rotated on a monthly basis for 58 years.
Now I realise that is an absurd proposition, but I am at a loss to surmise the reason behind this unusual set of adjustments.
Would you, or one of your staff provide me with an explanation please ?
Kind Regards,
Ed Thurstan
Sydney Australia"

Phil's response raises still more questions. This is an attempt to clarify those questions.
The TR027 report referenced by Phil was written under contract by Phil Jones et al in 1986. It contains data from many SH stations, including Darwin.

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941200:  DARWIN AIRPORT        AUSTRALIA      12.5S  130.9E    29m  1870-1980  20 1882
Sources:  A1

Notes:   A1: Means of 1/2(max + min). 1882-1940; alt = 97ft, 1941-1950 = 88ft. Prec
         data for 1921-1940 are adjusted to allow for defects found in the gauge,
         this makes their homogeneity rather doubtful. 1951-1960; alt = 27m,
         1961-1970; 12 25'S 130 52'E, alt = 31m. Reliability: compared with 943260,
         942870 & 940350 for the years 1882-1980, 1907-1980 & 1903-1980. Corrected
         for jumps 1939/1940 & 1964/1965. Correction Factors: Stations used:
         940350, 942870 & 943260. Calculation dates: 1907-1939, 1940-1964 &
         1965-1980. Correction dates: 1882-1939 & 1940-1964. Factors: i) 1882-1939,
         -1 -3 -6 -3 -4 -7 -5 -6 -5 -6 -6 0. ii) 1940-1964, 4 3 0 6 5 0 3 4 4 2 2 5.
```

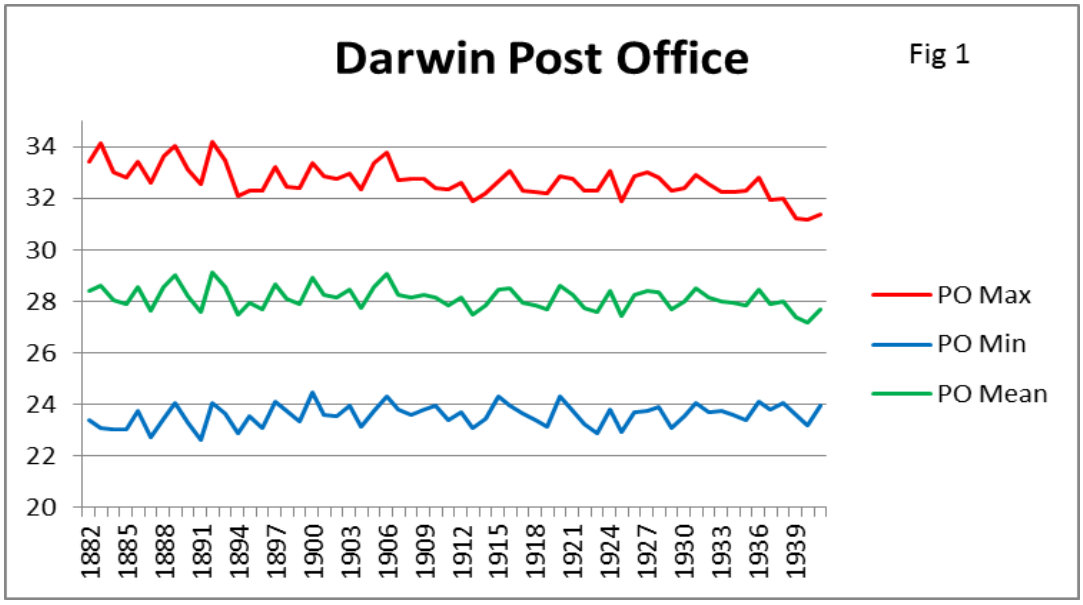
We noted that the "Correction Factors" cited here are exactly 10 X the differences calculated by Ed Thurstan as the difference between CRUTEM4 and CRUTEM3, and running for the same 1882 – 1939 period. However, the TR027 cited correction for 1940-1964 applies only for year 1940. We noted that where "Correction Factors" appear in TR027, they are replicated in the CRUTEM4/3 differences – for example Norfolk Island.
We therefore decided to review the whole history of Darwin.

## What CRU saw in 1986, when they wrote TR027.

They would have had raw Aust BOM data. The nearest approximation to this is at http://www.bom.gov.au/climate/data/
The new ACORN-SAT database gives the following information:

> "History
> Earlier observations were made at the Post Office (014016), in the central city area. This is on a peninsula in Darwin Harbour which means that the prevailing dry-season southeasterlies have a trajectory over Darwin Harbour (whereas at the airport they are over land). The site deteriorated progressively from the mid-1930s, becoming overshadowed by trees, especially after 1937."

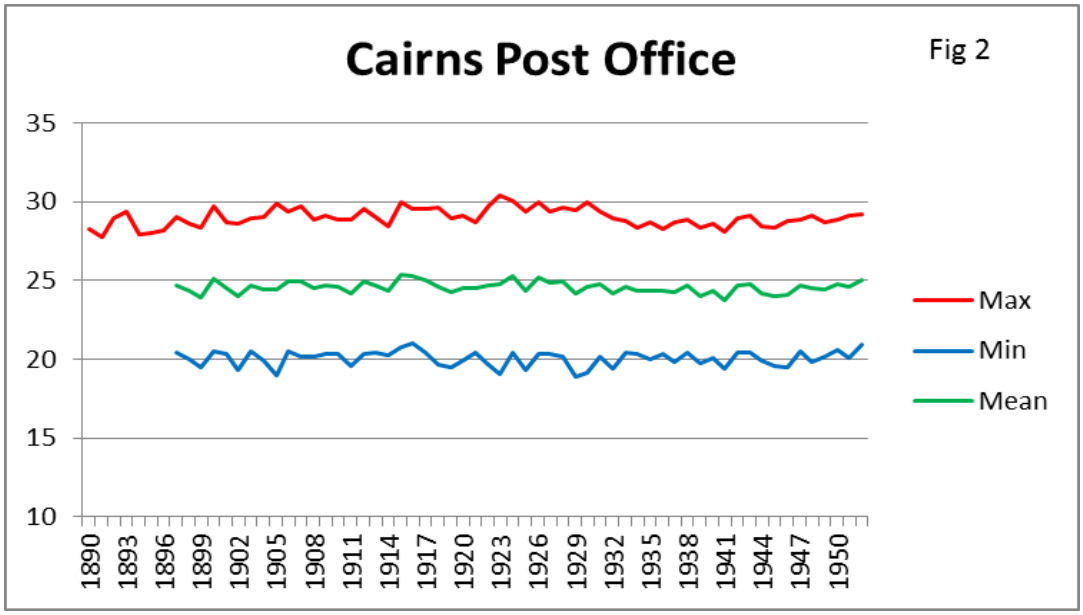
TR027 cites WMO 940350,942870 and 943620 (Port Moresby (NG), Cairns (Aus) and Alice Springs (Aus) as stations used for corrections. Jones would have seen Darwin Post Office:



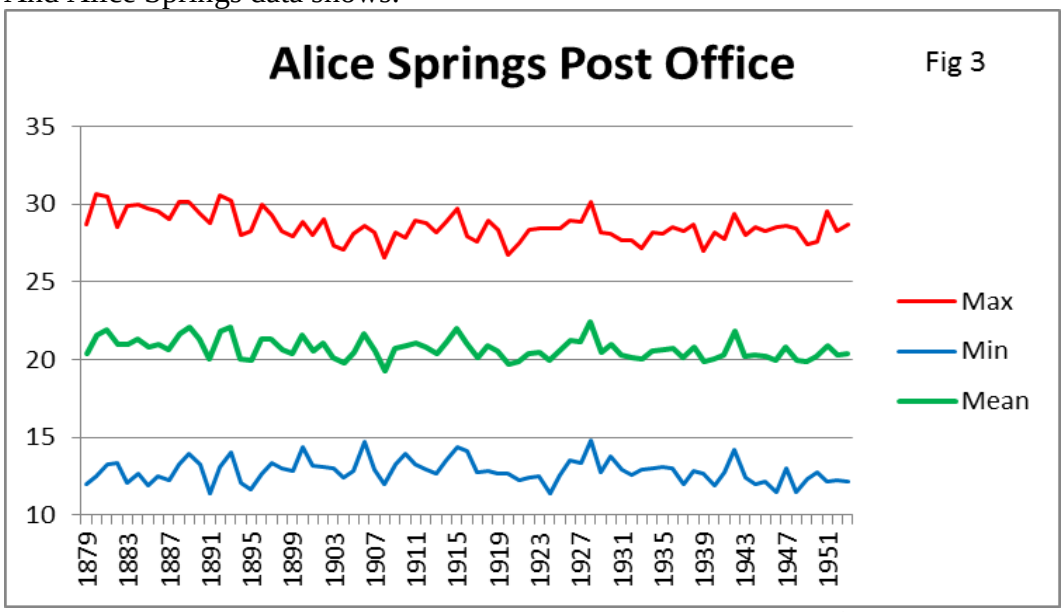

Minimums look close to constant, Maximums are falling, pulling Means down. The graphs fit the behaviour of a site being progressively overgrown by trees. ACORN notes mention tree cover worsening in last few years. That is evident in Maximums.

Port Moresby data is not accessible, even though it would have been collected by the BOM when PNG was an Australian Protectorate. It is 1800 km from Darwin.

Cairns data shows:



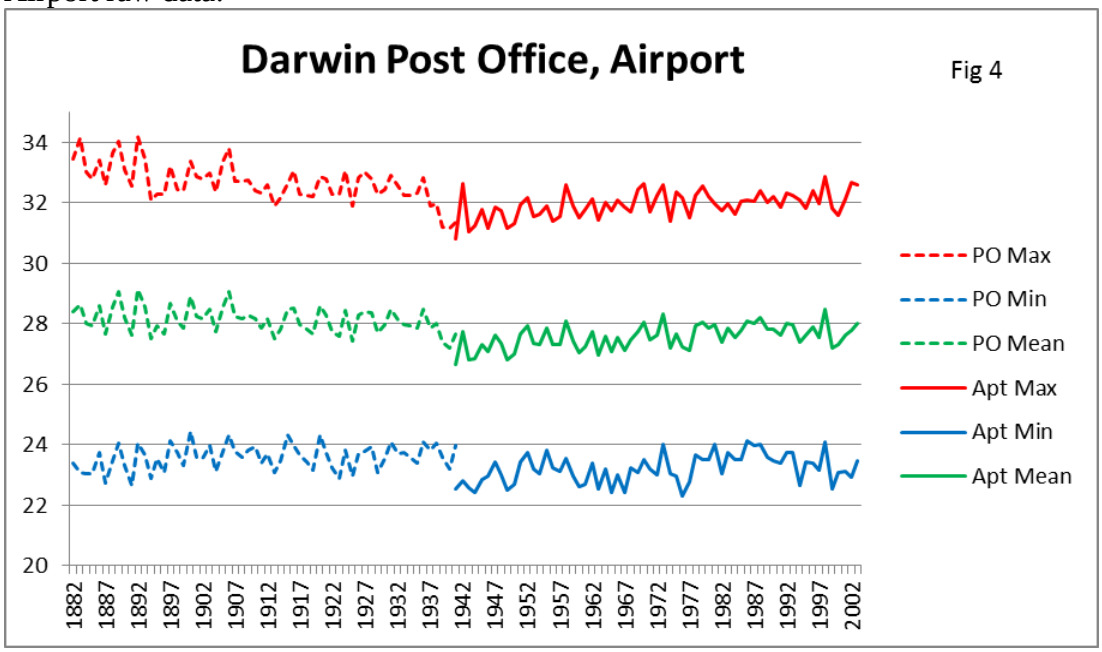
And Alice Springs data shows:




Cairns approximates Darwin in a climate sense, although about 4$^{o}$ further south, and 1700km from Darwin.
Alice Springs is a radically different desert climate, about 12$^{o}$ further south and 1300km from Darwin.
Looking at Annual data, it is difficult to see why Darwin needs "correction", and what bearing Cairns and Alice Springs temperatures might have on Darwin temperatures.

## Darwin After 1939

In 1941, Darwin observations moved to the airport. Here we have both the Post Office and Airport raw data:

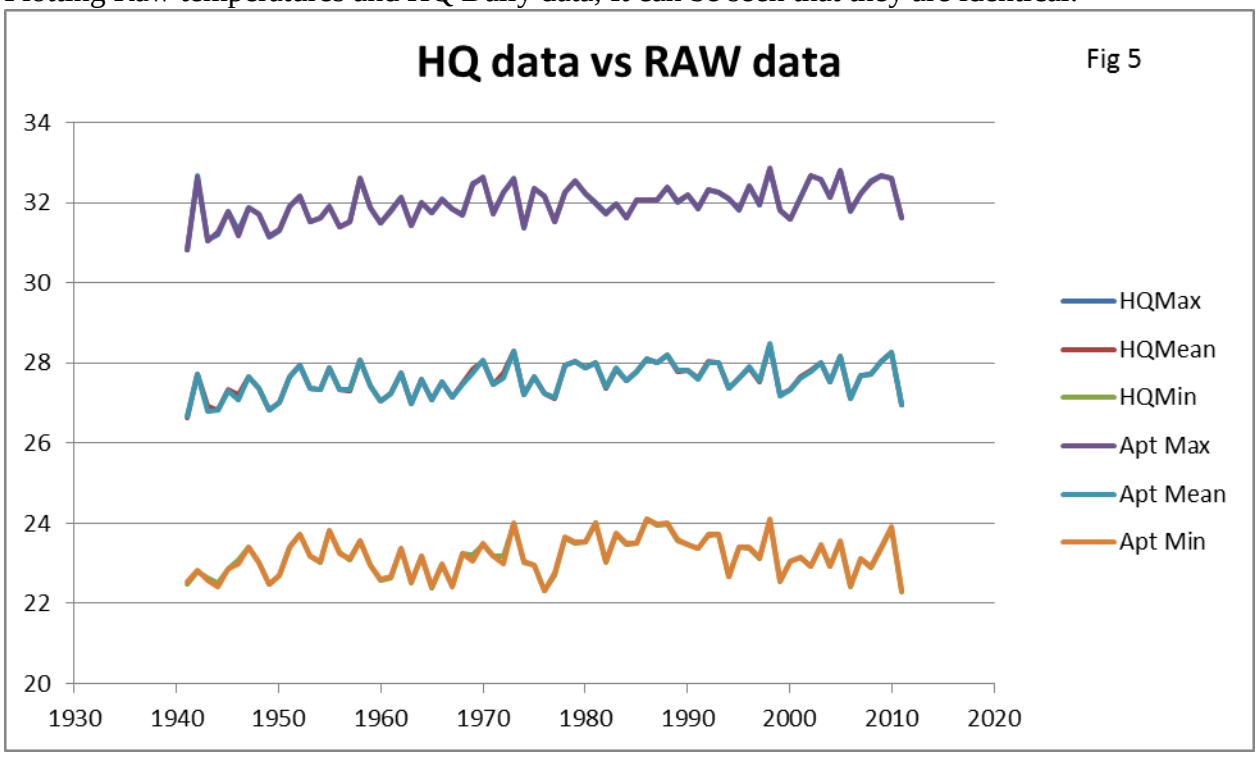



The above graph illustrates the problem CRU had. In the same way that "nature abhors a vacuum", climate scientists abhor discontinuities. They want to see a smooth join between the two stations to create "homogeneous" series. CRU, GISS, NOAA and the Aust. BOM all provide "homogenised", "value added" timeseries, purportedly to provide the "Best" estimate of temperature history.

## The Aust. BOM High Quality Series

Phil Jones said in his Email that most of his data for CRUTEM3 was based on the HQ series. That statement cannot be correct. The 1986 DoE report TR027 where he developed the adjustments applied in CRUTEM4 appeared about 10 years before the HQ Series was proposed. Furthermore, only about 25% of the stations appearing in CRUTEM3 are members of the HQ set. Still further, the earliest HQ time series starts at 1910, Darwin HQ data starts at 1941, while CRUTEM3 is reported for earlier years.

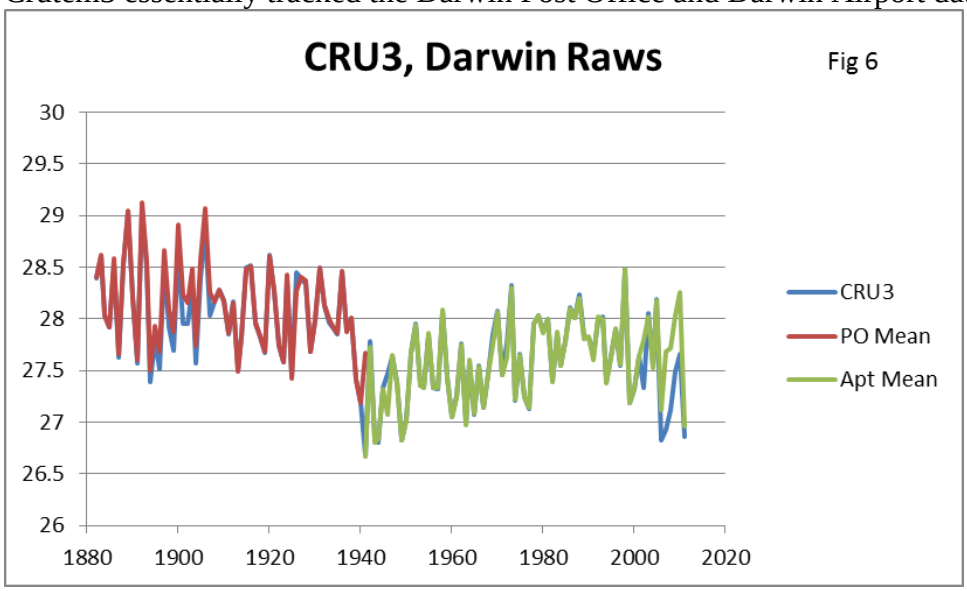
Plotting Raw temperatures and HQ Daily data, It can be seen that they are identical:




So the HQ data does not tell us much, except that it was, for more than 10 years, the "best" estimate of Darwin Airport temperature history. It could not have provided input to Phil Jones' calculations.

## CRUTEM3 Interpretation

Crutem3 essentially tracked the Darwin Post Office and Darwin Airport data.



Note that the “discontinuity” around 1939 is left intact by CRU3.

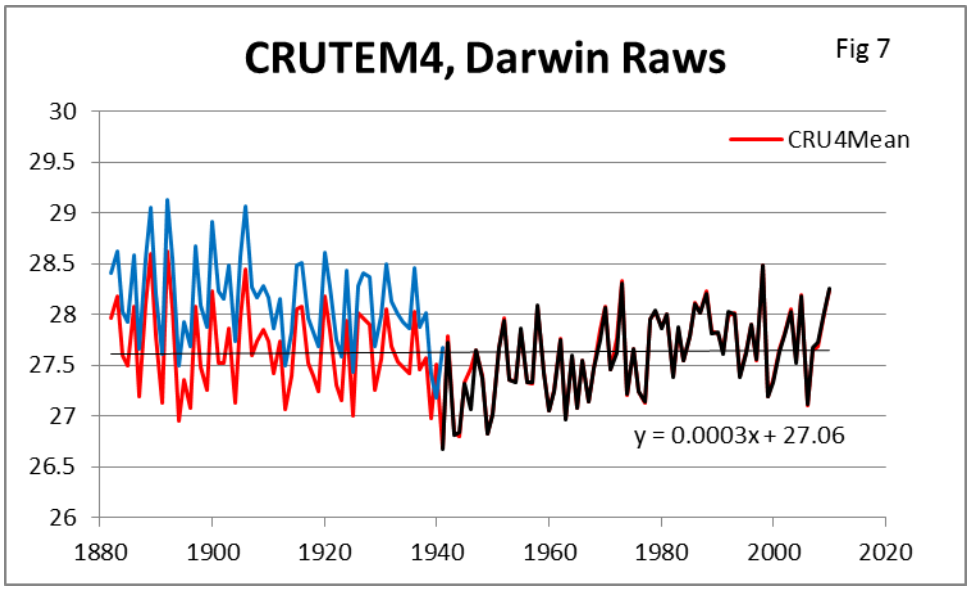
## CRUTEM4 Interpretation

Some time around 2010 CRU recognised that SH temperature adjustments recommended in 1986 by Phil Jones et al in DoE Report TR027, had not been made. Phil Jones mentioned this in relation to Darwin in his email above.

Phil says:

*"You'll be able to see that for Darwin the latest BoM data effectively undo what we had been using for Darwin up to the 2006 paper. The reasons we applied the adjustments in 1986 are discussed in the TR027 document which you can download."*

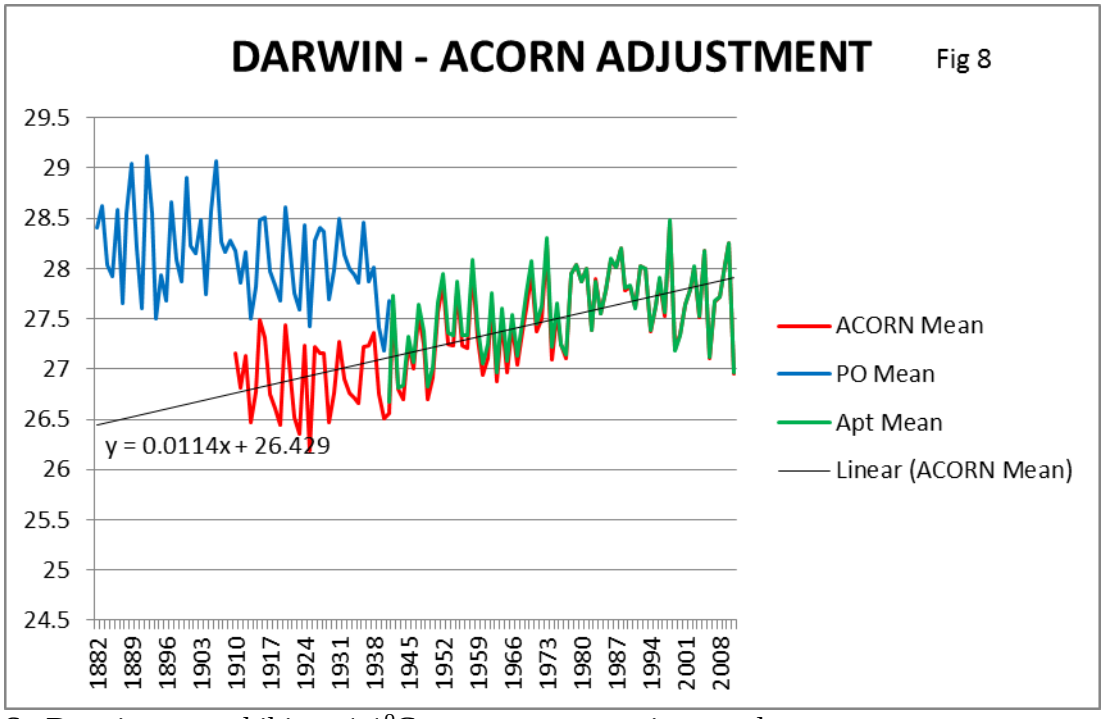
This statement by Phil Jones cannot be correct. There had been no adjustments up to 2006, as witnessed by CRUTEM3 data above. It is essentially the original raw data from the two Darwin stations. So at least for Darwin, and perhaps other SH stations, the 1986 adjustments had not been made 20 years later. So rather than reversing them, he applied them for the first time in CRUTEM4.



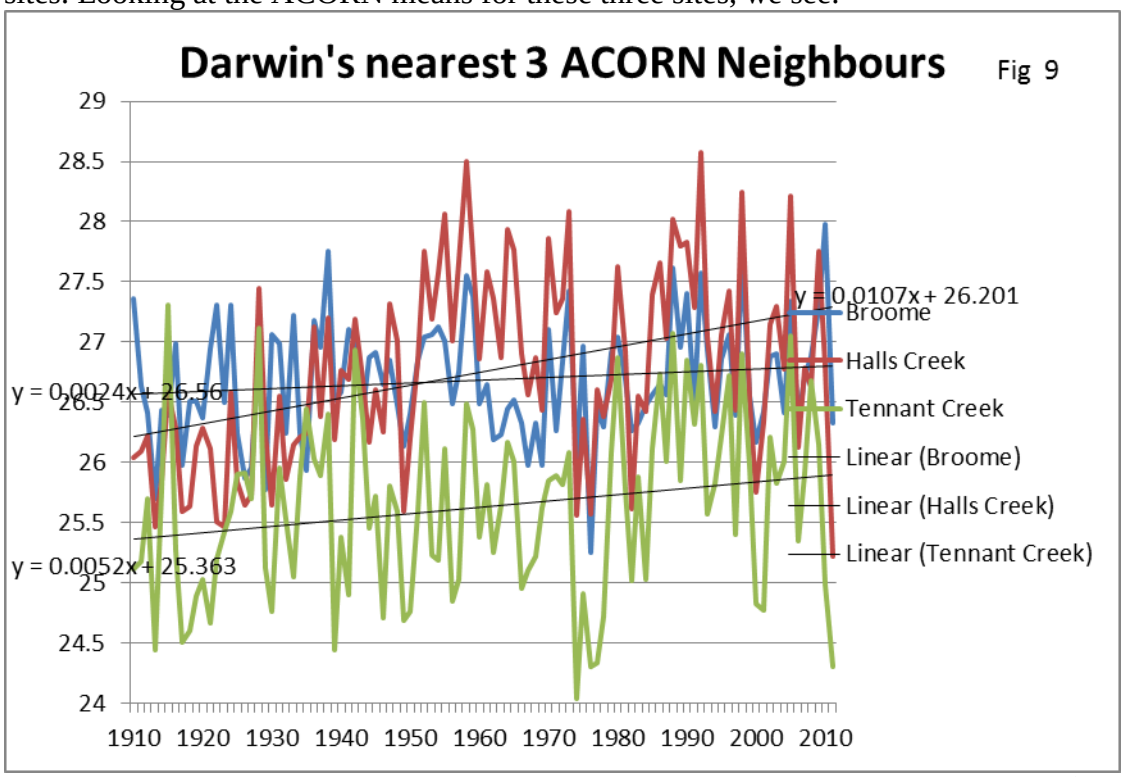

So the CRUTEM4 adjustment is the first attempt to remove those annoying highs in the late 1800s and early 1900s, and iron out the discontinuity at 1939. There is no linear trend worth mentioning.

## ACORN_SAT interpretation

The ACORN series, announced in 2012, replaces the HQ series. Here, BOM has adjusted the Darwin PO data substantially, lowering it and grafting it on to the Airport series. They get rid of the highs around 1900 by simply dropping them.



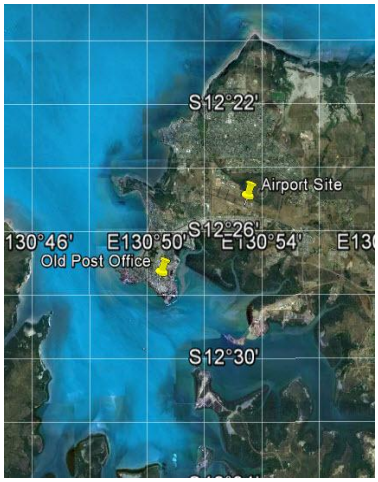

So Darwin now exhibits a 1.1°C per century warming trend.
We can see nothing in the Darwin data, or those stations near it, to justify that adjustment other than the fervent desire to show a smooth graph with a warming trend. The nearest stations with data back to 1910 are Halls Creek, Broome and Tennant Creek. All are ACORN sites. Looking at the ACORN means for these three sites, we see:




As graphs go, they are not good. But they suggest linear warming trends of 0.5 to 1°C per century. But ACORN (Fig 8) now shows a clear 1.1°C per century warming. Look back to Fig 4. How did that change come about ?
Furthermore, we are comparing Darwin with three ACORN stations which themselves may have had adjustments to their raw data sources.

## Discussion

What started as two discreet sites – Post Office and Airport – have become one. ACORN station notes imply they were different. One is on a peninsula with water on three sides. The other is further inland.




The much vaunted (but now obsolete) BOM High Quality handled that by ignoring the early Post Office data. The correct approach.

CRUTEM3 simply joined the two temperature series with no adjustments.

CRUTEM4 attempted to join and homogenise the two series, applying adjustments that Phil Jones thought had been applied 25 years ago.

Finally, ACORN pushed the Post Office temperatures down further, rotating that part of the series so that it now nicely lines up with the latter (airport) part of the series. ACORN now has what is prefers – a clear trend with no discontinuities.

So who do you believe ? - CRUTEM4, or ACORN ?. They are all different, yet derived from the same basic BOM data.

The ACORN representation best supports the Warmist interpretation.