ACORN-SAT station adjustment summary—Rutherglen (as at 24 September 2014)

Rutherglen is one of 112 ACORN-SAT stations used by the Bureau of Meteorology to assess changes in Australia's climate. The official long-term temperature record for Rutherglen is comprised of data from the research station site (station number 82039), approximately 6 km southeast of the town.

Observations at Rutherglen began in 1912. Comparison of the Rutherglen data with surrounding stations (neighbours), 23 of which have been used at various times, combined with the use of documentary records, reveals that there have been five significant breaks in the data. Documentary evidence is consistent with changes in site location or condition around the time of four of these breaks. The raw data series is a combination of several data series that must be adjusted to derive a single, consistent and accurate representation of temperature changes over time.

The ACORN-SAT record contains daily records of minimum (night-time) temperature (Min T) and maximum (daytime) temperature (Max T). The charts in this fact sheet show annual average values of Min T and Max T. The impacts of the daily adjustments on the annual average values are shown in the table below.

The changes that occurred at Rutherglen and the resulting impacts are summarised as follows:

1. 1 January 1938—breakpoint detected by statistical methods.
    - Daytime temperatures started to appear cooler relative to surrounding stations.
    - Max T changed by -0.62 °C. No detectable impact on Min T so no adjustments made.
2. 1 January 1950—breakpoint detected by statistical methods. A 1949 inspection reported that the site had become overgrown.
    - Daytime temperatures started to appear warmer relative to surrounding stations.
    - Max T changed by +0.62 °C (reversing the 1938 change). No detectable impact on Min T so no adjustments made.
3. 1 January 1965—breakpoint detected by statistical methods; various documentary evidence consistent with a likely move or station reconfiguration in 1965–66.
    - Daytime temperatures started to appear warmer relative to surrounding stations.
    - Max T changed by +0.39 °C.
4. 1 January 1966—breakpoint detected by statistical methods; various documentary evidence consistent with a likely move or station reconfiguration in 1965-66.
    - Night-time temperatures started to appear cooler relative to surrounding stations.
    - Min T changed by -0.72 °C.
5. 1 January 1974—breakpoint detected by statistical methods; various documentary evidence consistent with a likely move during 1974.
    - Night-time temperatures started to appear cooler relative to surrounding stations.
    - Min T changed by -0.61 °C. No detectable impact on Max T so no adjustments made.

Further details on the Rutherglen site history can be found on this page.

Charts 1 and 2 compare raw and adjusted data for annual average Min T and Max T when all relevant factors from 1910 onwards are included.

In Chart 1 the trend lines show the adjusted average Min T increasing whereas the raw data is decreasing. In this case, the adjustment has corrected the apparent, artificial cooling trend in the raw data.

In Chart 2 the trend lines show that the adjusted average Max T is decreasing whereas the raw data is increasing. In this case, the adjustment has corrected the weak warming trend indicated by the raw data.

Chart 3 shows a comparison of the raw minimum temperatures at Rutherglen with the adjusted data from three other ACORN-SAT stations in the region. While the situation is complicated by the large amount of missing data at Rutherglen in the 1960s, it is clear that, relative to the other sites, Rutherglen's raw minimum temperatures are very much cooler after 1974, whereas they were only slightly cooler before the 1960s.

Chart 1: Rutherglen annual average minimum temperatures (1910–2013)

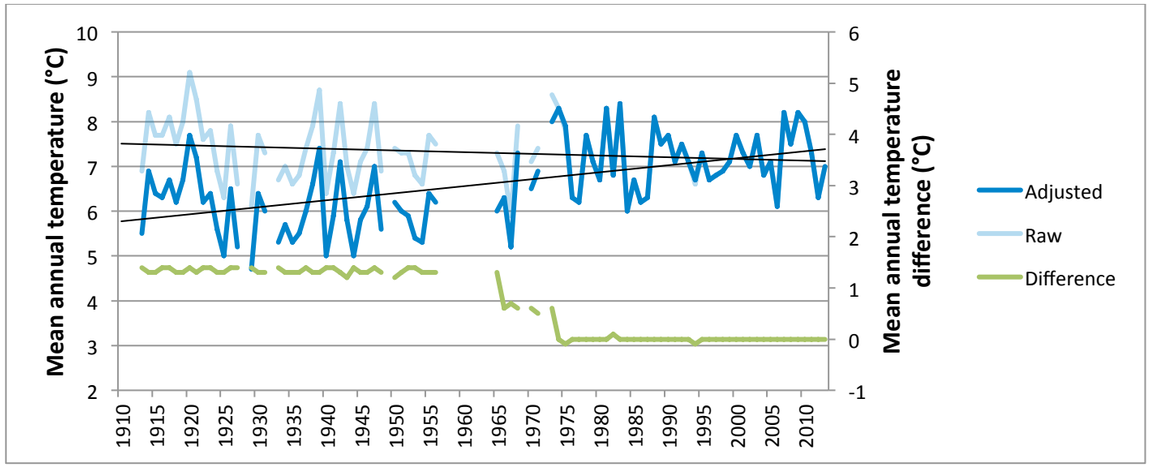


Chart 2: Rutherglen annual average maximum temperatures (1910–2013)

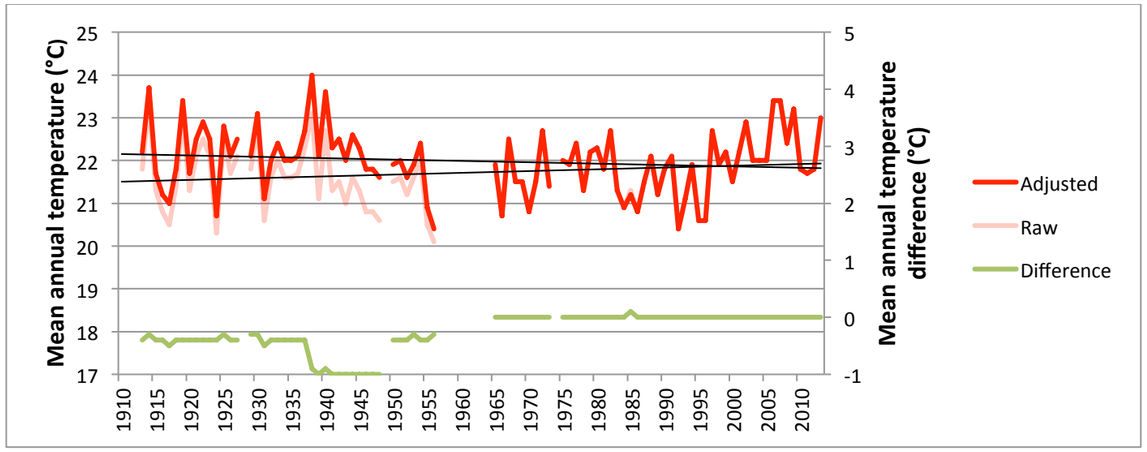
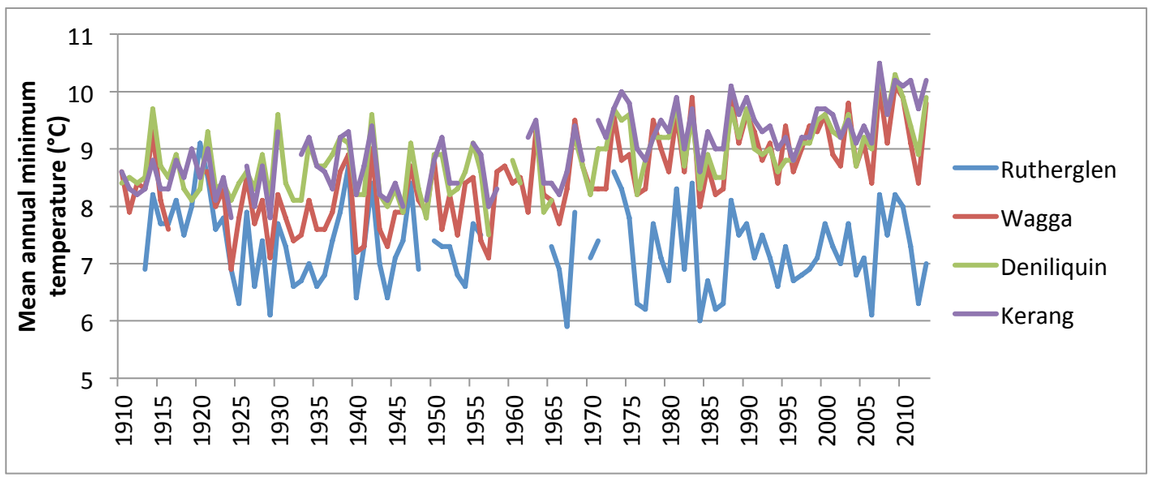


Chart 3: Comparison of Rutherglen with other sites in region



Rutherglen station temperature adjustments

Station name	Station number	Temperatures adjusted	Date (adjustment applied to all data prior to this date, unless stated)	Cause	Impact of adjustment (°C)	Seasonal (if applicable)	Comparative stations										Notes
Rutherglen	82039	Min	1/1/1974	Statistical	-0.61		74034	82053	82002	72097	82100	74106	81049	81084	72023	82001	Station documents suggest likely move c. 1974
Rutherglen	82039	Min	1/1/1966	Statistical	-0.72		82053	82002	82001	72150	74114	80015	74039	74062	74128	75032	Station documents suggest likely move c. 1966
Rutherglen	82039	Max	1/1/1965	Statistical	0.39		82053	72023	82001	82002	75028	75031	80043	72000	72150	80015	Station documents suggest likely move c. 1966
Rutherglen	82039	Max	1/1/1950	Statistical	0.62		82053	72023	82001	82002	75028	75031	80043	72000	72150	80015	Site reported as overgrown at 1949 inspection
Rutherglen	82039	Max	1/1/1938	Statistical	-0.62		82053	72023	82001	82002	75028	75031	80043	72000	82016	80015	

Comparative stations

Station number	Station name
72000	Adelong
72023	Hume Weir
72097	Albury Pumping Station
72150	Wagga Wagga Airport
74034	Corowa
74039	Deniliquin (Falkiner Memorial)
74062	Leeton
74106	Tocumwal
74114	Wagga Wagga Research Centre
74128	Deniliquin
75028	Griffith CSIRO
75031	Hay
75032	Hillston
80015	Echuca
80043	Numurkah
81049	Tatura
81084	Lemnos
82001	Beechworth
82002	Benalla
82016	Euroa
82053	Wangaratta
82056	Wodonga
82100	Bonegilla

Station temperature adjustment table legend

- Station name: name used in the national climate record
- Station number: the active ACORN-SAT station number as at 31 December 2011.
- Temperatures adjusted: this describes which aspect of the temperature record was adjusted—Max for daily maximum temperature; Min for daily minimum temperature.
- Date: all data prior to this date was adjusted for the reason (cause) cited.
- Cause: this describes why an adjustment was required.
  - Merge: data from two different station numbers are being merged, with overlap.
  - Move: a documented site move.
  - Move (n): a documented site move, together with a change of station number.
  - Screen: indicates a change or repair to the Stevenson screen.
  - Obs time: indicates a change in observation time (most often the 1964 change at some stations from a midnight to 9 am observation time).
  - Site env: a change has occurred in the local site environment (e.g. addition/removal of building nearby, change in vegetation).
  - Statistical: a change found by statistical methods without specific documentary support.
  - Statistical*: indicates some kind of documentary support which may be imprecise or subject to interpretation. This is further explained in the notes field.
  - AWS: installation of an automatic weather station; if there was an associated site move this is shown as ‘move’.
- Impact of adjustment: the overall impact of the daily adjustments made for the particular reason (cause) cited.
- Seasonal (if applicable): this applies where the adjustment was made on the basis of seasonal, rather than annual, criteria. In general the minimum threshold for adjustment is a 0.3 °C difference in the annual mean. Exceptions include:
  - where seasonal criteria are met (0.3 °C in two seasons, or 0.5 °C in a single season), in which case details are given; or
  - for the 1964 observation time change, which standardised the time for taking all observations at 9.00 am.
- Comparative stations: stations against which the station’s data was compared statistically.
- Notes: provides additional explanatory information.