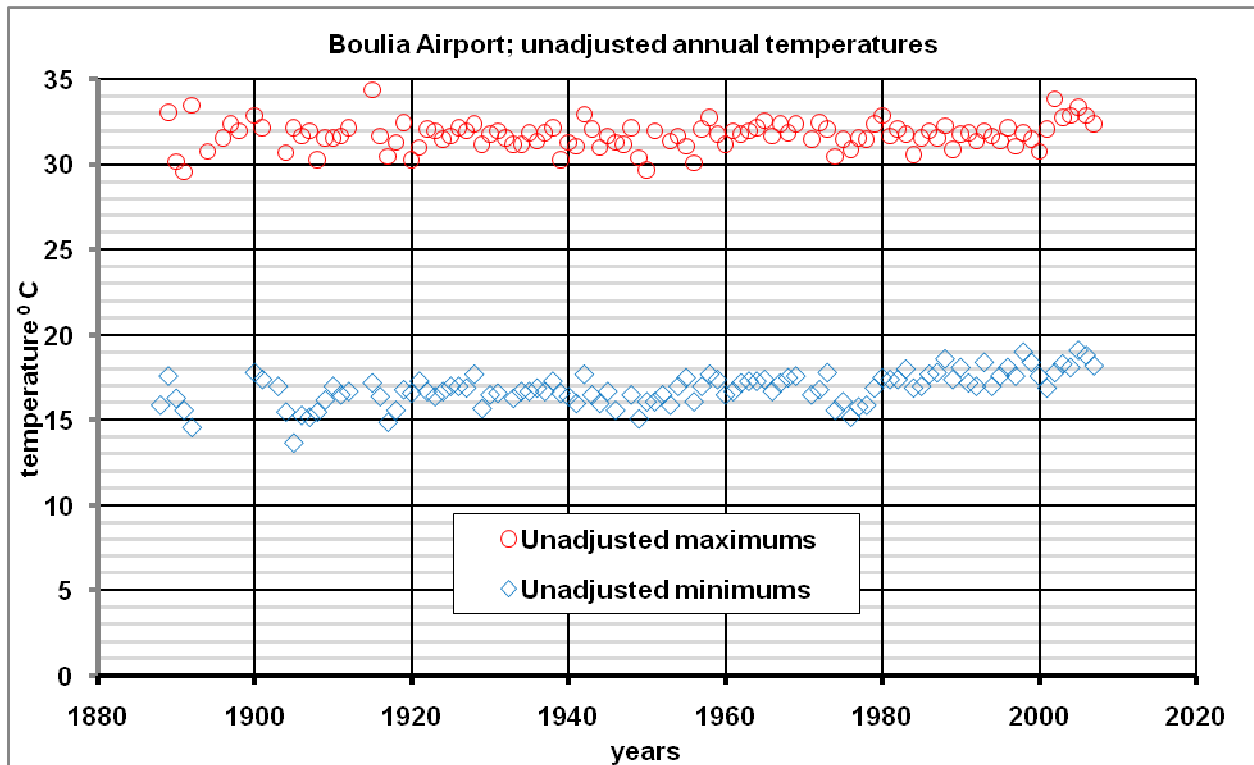


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APPENDIX 4(c): Formation of the Boulia Airport High Quality Dataset

Boulia is a remote location in Western Queensland that has had a more-or-less continuous temperature record back to 1886 (*BOM, 2009 b*).



For several reasons, long term meteorological records in remote locations like Boulia are prone to a higher degree of uncertainty than less remote sites:

- instrument loss or damage have often taken longer to be corrected (especially in the years before 1900 when delays in communication and transport were the norm)
- there are usually fewer trained observers and therefore a greater likelihood of missing records.
- distances from calibration thermometers in Regional Offices are greater
- there are fewer neighbouring stations available for inclusion in reference datasets

The **Metadata** for the Boulia temperature record up until 1993 was summarised by *Torok (1996)* from the official station correspondence as follows:

Record of Changes in temperature measurement at Boulia (BOM No. 038003)

1896 Mar: Stevenson Screen supplied.

1909 Aug: First official correspondence.

1916 Nov: Wind damage to screen and thermometers blown out.

1917 Mar: New large screen.

1957 Apr: Screen door blown off but not replaced for a month.

1965 Sep: New screen and small move.

1970 Jun: Possible move recently.

1993: Site shaded and soon to move.

(*Torok, 1996, Vol.2, p. 246*).

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Based on the above documented metadata and on a combination of objective and subjective analysis techniques described in *Torok and Nicholls (1996)*, the following adjustments to the long term Bouliia temperature record were carried out as documented in *Torok (1996) Vol 1 Table 7.1.1., on p.180.*

Year	Magnitude of this adjustment in °C	Accumulated adjustment in °C	Basis for calculation of correction	Overall description
Changes to the Minimum temperature series				
<1980	+0.8	+0.8	Objective test; Detect	0.8°C was added to all annual values prior to 1980 according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
<1970	-0.8	0.0	Objective test; Detect; Documented move	0.8°C was subtracted from all annual values prior to 1970 due to a move in the instrumentation; and according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
<1929	-0.8	-0.8	Objective test; Documented (inconclusive) Screen repair	0.8°C was subtracted from all annual values prior to 1929 due to the likely repairs to the Screen; and according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
=1894	+5.0	(+4.2)	Detect; Documented Stevenson Screen supplied	5.0°C was added to individual 1894 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations
=1893	+5.0	(+4.2)	Detect; Documented Stevenson Screen supplied	5.0°C was added to individual 1893 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations
Changes to the Maximum temperature series				
<1982	-0.4	- 0.4	Objective test; Detect	0.4°C was subtracted from all annual values prior to 1982 according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
<1957	- 0.2	-0.6	Objective test; Detect; Damaged Screen fixed	0.2°C was subtracted from all annual values prior to 1957 due to repairs to the damaged Stevenson Screen; and according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
<1947	+0.6	0.0	Objective test; Detect;	0.6°C was added to all annual values prior to 1947 according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
<1936	-0.4	-0.4	Objective test; Detect;	0.4°C was subtracted from all annual values prior to 1936 according to an objective estimation of the extent of discontinuity based on a neighbourhood reference set of stations
=1915	-1.0	(- 1.4)	Detect; Documented screen fixed	1.0°C was subtracted from the individual 1915 value due to repairs to the Stevenson Screen; as detected and estimated by comparison with nearby stations
=1894	+1.0	(+0.6)	Detect; Documented Stevenson Screen supplied	1.0°C was added to the individual 1894 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations
=1893	+1.0	(+0.6)	Detect; Documented Stevenson Screen supplied	1.0°C was added to the individual 1893 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations
=1892	+1.0	(+0.6)	Detect; Documented Stevenson Screen supplied	1.0°C was added to the individual 1892 value due to shift of instruments to a Stevenson Screen ; as detected and estimated by comparison with nearby stations

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=1891	+1.0	(+0.6)	Detect; Documented Stevenson Screen supplied	1.0°C was added to the individual 1891 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations
=1890	+1.0	(+0.6)	Detect; Documented Stevenson Screen supplied	1.0°C was added to the individual 1890 value due to shift of instruments to a Stevenson Screen; as detected and estimated by comparison with nearby stations

Since the work of *Torok and Nicholls (1996)*, the Boulia temperature data has been scrutinised and adjusted by further rounds of detection and estimation techniques (see, for example *Della-Marta et al. (2004)*).

It has been generally accepted by climatologists that, for Australia, the temperature record prior to 1910 is significantly less reliable than the subsequent record. So for the purposes of Climate Change research, the High Quality temperature Dataset for Boulia as for the other 133 Australian locations is based on a starting date of 1910.

The figure below shows the current values of the High Quality Temperature Dataset for Boulia Airport superimposed on the original unadjusted raw values (*BOM, 2009 b; BOM 2009 c*).

