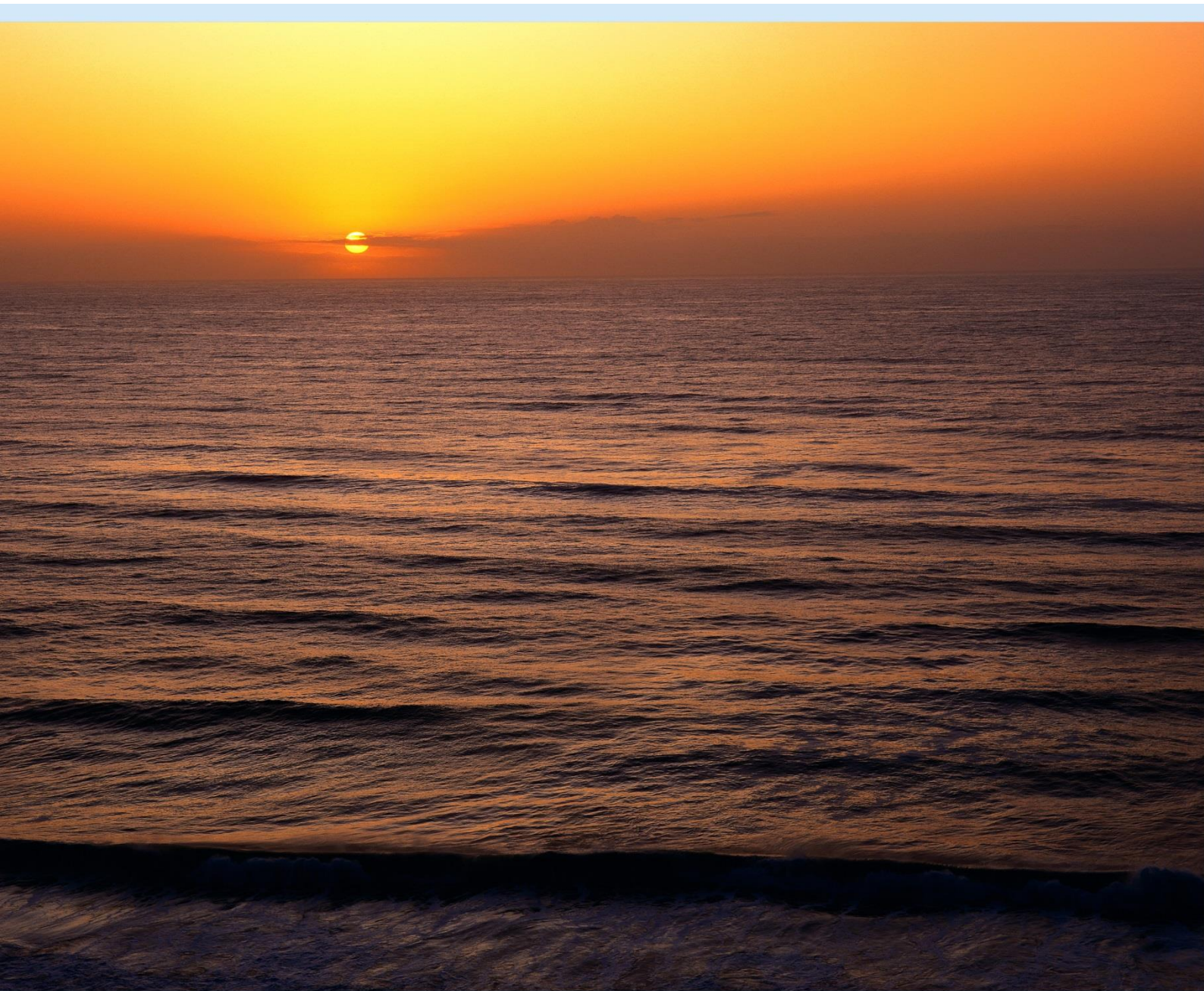




Australian Government
Bureau of Meteorology

Special Climate Statement 55 – prolonged March heatwave affects many parts of Australia

Updated 4 April 2016



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1 Summary of late February and March 2016 heatwave

A prolonged heatwave affected much of Australia during the course of late February and the first half of March 2016.

Abnormal heat developed over much of northern Australia, particularly interior areas, during the second half of February. The heat persisted through this region into the first week of March, and extended to cover almost all of the country by 2 March. The most extreme phase of the heatwave ended on 9–10 March, but temperatures remained generally above average subsequently until a more substantial change on 18 March brought rain and below-average temperatures to southeastern Australia.

The build up of heat across northern and inland areas was associated with weak monsoon activity, with most areas north of 20 °S having January-February rainfall that was significantly below normal (for example, Darwin had its driest January-February since 1965). Some record high temperatures were set during late February, especially in inland northern Queensland. Numerous March records were set in the first few days of the month in the Northern Territory and northern Western Australia, including NT record-high temperatures for both maximum and minimum temperature. Some rainfall in the tropics, particularly in the northern half of Queensland associated with the remnants of tropical cyclone *Winston*, saw conditions cool to near-normal levels from 5 March onwards.

The heatwave affected the southeast from 2 March onwards as high pressure became established in the Tasman Sea. This directed northerly to northeasterly flow over the region, elevating temperatures inland by as much as 12 °C above average. Whilst cold fronts periodically crossed Tasmania, cooling conditions in that State and temporarily moderating temperatures on the Victorian coast from time to time, persistent ridging south of the continent prevented any significant penetration of cooler air into inland areas, with northerly flow remaining in place inland throughout the period. This sequence was ended with the passage of a trough on 9–10 March ended the hottest phase of the heatwave in the inland southeast, but temperatures remained generally above average for the following week until a more substantial southwesterly change, associated with a low pressure system near Tasmania, cooled temperatures below March averages from 18 March.

Somewhat separate to this event, very persistent warm conditions occurred along the east coast over a period of several weeks, due to a combination of a lack of systems with cool southerly flow, and offshore sea surface temperatures that are well above normal. This period ended when southeasterly winds brought cool showery conditions to most of the New South Wales coast on 21 March.

Whilst numerous records have been set, both in northern and in southeastern Australia, for March temperatures (both maximum and minimum) at individual locations, the most notable aspect of this event has been its duration in the southeast. The persistence of the heat in northern Victoria and inland New South Wales has

exceeded any previous event in March, and in some areas has been approaching record levels for any time of year.

2 Notable features of the heatwave

2.1 Pattern of temperature anomalies during the event

The heatwave initially developed in northern Australia. Temperatures were well above normal from the second week of February onwards (for example, at Julia Creek, a run of 21 consecutive days of 40 °C or above began on 12 February), peaking in the last few days of the month when records were set in western Queensland. Over the final fortnight of February, maximum temperatures were 2 °C or more above average over almost all of tropical Australia, and were 4 °C to 6 °C above average over parts of northwestern Queensland (Figure 1a).

Over the period from 1 to 4 March, the heat remained in northern Australia while spreading to cover most of the continent (Figure 1b). This was the hottest phase of the heatwave in terms of area-averaged temperatures for Australia as a whole (see section 2.2). Over these four days, maximum temperatures were 4 °C or more above average over most of the continent, the main exceptions being the eastern half of Queensland and the southern half of Western Australia, and they were 8 °C to 12 °C above average over much of the southeast.

In the following phase of the heatwave, from 5 to 9 March, the heat became largely confined to the southeast quarter of the continent, with temperatures in the tropics returning to near to slightly above normal (Figure 1c). Most of northern Victoria and southern New South Wales west of the ranges had maximum temperatures 10 °C or more above average during this period.

Over the first nine days of March as a whole, the largest maximum temperature anomalies were in northern Victoria and southwestern New South Wales, where maximum temperatures were 10 °C to 12 °C above average (Figure 2). At a state level, they were 9.23 °C above average for Victoria and 7.35 °C above average for New South Wales. Minimum temperatures were also 6 °C to 8 °C above average over a large part of the southeast.

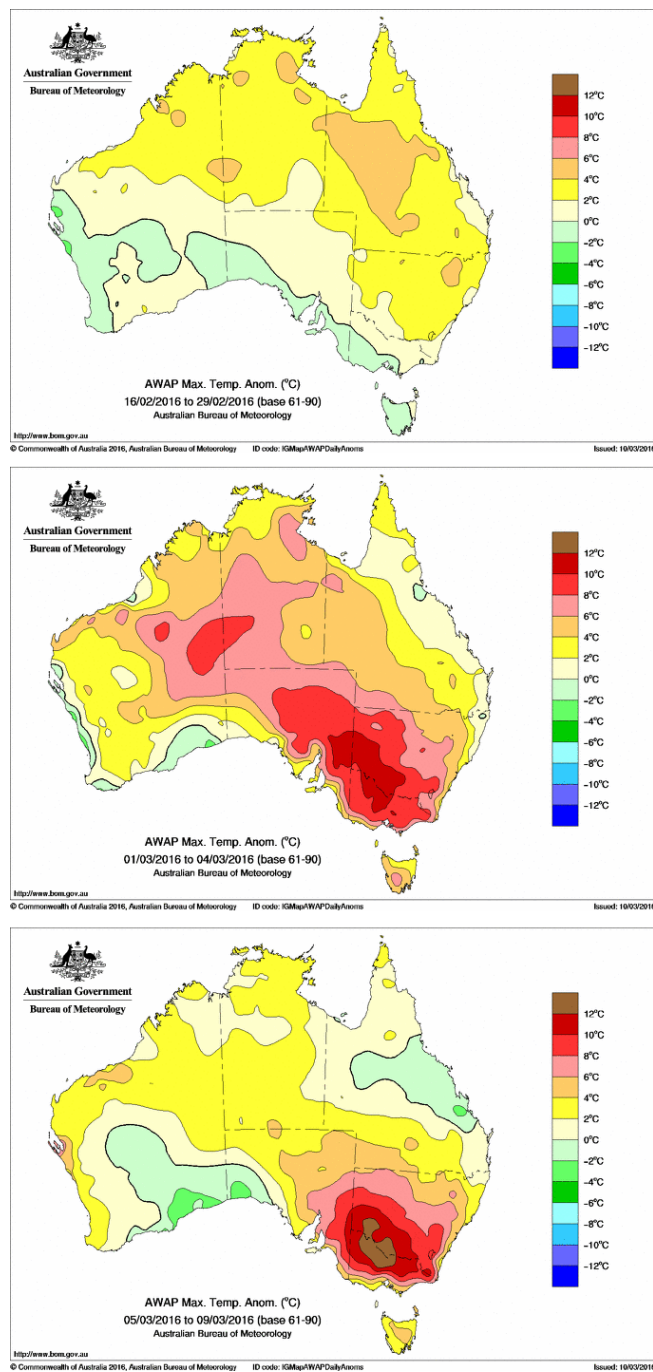


Figure 1. Maximum temperature anomalies (differences from 1961–90 average) for (a, top) 16–29 February 2016 (b, middle) 1–4 March 2016 (c, bottom) 5–9 March 2016.

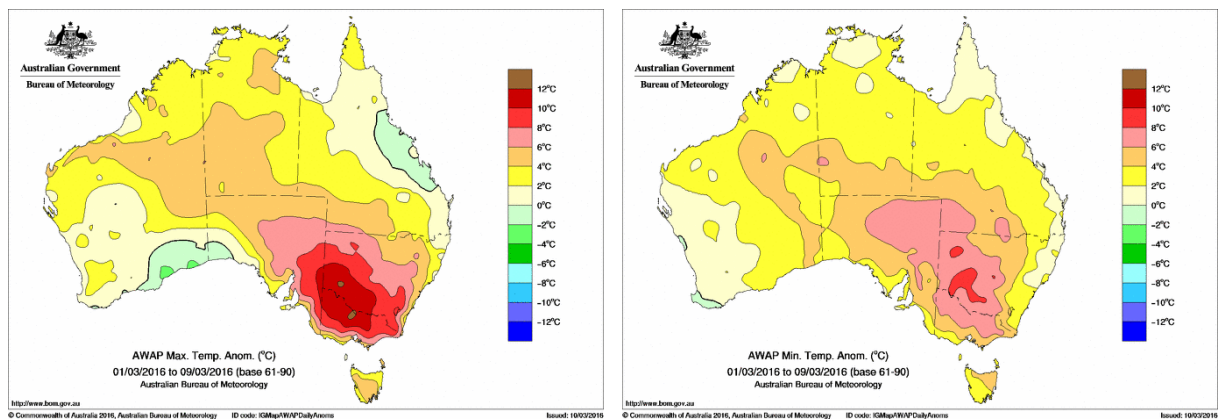


Figure 2. Anomalies for the period 1–9 March 2016 for (left) maximum and (right) minimum temperature.

2.2 Area-average records

The heatwave set numerous records at national and State/Territory level for the warmest March daily temperatures on record for area-averaged temperatures (Table 1).

Most significant amongst these were the national records that occurred on 2–3 March. The Australian area-averaged maximum temperature on 2 March was 38.14 °C, 0.98 °C above the previous record set on 1 March 1966. This is the highest value ever recorded on any date on or after 17 February (and would have ranked as the ninth-hottest February day on record had it occurred in that month). The values on 1 March (37.55 °C) and 3 March (37.59 °C) also surpassed the previous March record. The only previous precedent for a national record of this type being set by such a large margin was in July 1975, when the national area average (27.07 °C) was 1.19 °C above the next highest July value outside of 1975. The Australian daily mean temperature on 2 March was 0.83 °C above the pre-2016 record, whilst the minimum temperature of 3 March also set a record.

Records were also set for area-averaged daily mean and maximum temperatures for the Northern Territory, and for minimum temperature for Queensland. In the southeast, where the heatwave was more notable for its persistence over a number of days than for extremes on any individual day, no individual day ranked in the top ten for March for area-averaged maximum temperature for either Victoria or New South Wales.

2.3 Extremes on individual days

Significant record-high temperatures were first recorded during this event at the end of February. Three locations with long-term observations in western Queensland set February records, Julia Creek (46.1 °C on 29 February), Winton (45.5 °C on 28 February) and Longreach (44.4 °C on 28 February). Julia Creek's temperature was also its second-highest on record for any month.

The period from 1 to 3 March saw records set in parts of northern and central Australia (Figure 3), particularly in the interior of Western Australia on the 1st and the Northern Territory on the 2nd. Most significantly, Walungurru, near the western border of the Northern Territory, reached 44.4 °C on 3 March, setting a new Territory record for March (previously 43.9 °C at Finke on 16 March 1968). 44.3 °C there on 2 March also surpassed the previous record. Moomba's minimum of 30.6 °C on 2 March ranks equal-fourth for March in South Australia¹. Walungurru later also set a new Territory March record for the highest minimum temperature, with 31.1 °C on 5 March (previously 30.7 °C on 5 March 1999 at Watarrka). The highest temperature in Australia during this period was 46.5 °C at Marble Bar on 2 March². A few high minimum temperature records were also set in northern Australia from 4 to 6 March.

As noted in section 2.2, the heatwave in southeastern Australia was more noted for its duration than it was for temperature extremes on individual days, and the highest recorded temperatures of the event in the southeast (in New South Wales, 43.0 °C at Pooncarie on 6 and 8 March; in Victoria, 42.1 °C at Mildura on 6 March and Kerang on 7 March) fell somewhat short of the respective State records for March³. Nevertheless, March records were set at some locations, both for maximum and minimum temperature, mostly in northern Victoria in the period from 6 to 8 March. Some records were also set further south in Victoria on 8 March as northerly winds strengthened and brought the hot air out to the coast. On 10 March, the minimum of 30.5 °C at White Cliffs was a new record for New South Wales, surpassing the 30.3 °C, also at White Cliffs, on 1 March 1983.

A full list of individual-day records set at locations with long-term observations is contained in Tables 2 and 3, whilst a map of their locations is in Figure 4.

¹ The State record for March is 31.1 °C on 7 March 1983 at Oodnadatta.

² This is a record for the current Marble Bar site (station number 004106), but 46.7 °C was observed on 6 March 1932 at the previous Marble Bar site (004020).

³ For New South Wales, 45.0 °C at Tibooburra on 1 March 1951; for Victoria, 44.4 °C at Mildura Post Office on 11 March 1934 (it should be noted that the Post Office site was somewhat hotter than the current airport site).

Melbourne experienced a very hot night on 9 March, with an overnight minimum⁴ temperature (measured from 3 p.m. to 9 a.m.) of 27.7 °C. This is the highest overnight minimum temperature on record for Melbourne for March (previously 26.9 °C on 18 March 2008). However, the 24-hour minimum from 9 a.m. to 9 a.m. (which forms the basis of the Bureau's main official records) was only 20.8 °C, well short of record levels, because that was the temperature at 9 a.m. the previous day (Figure 5).

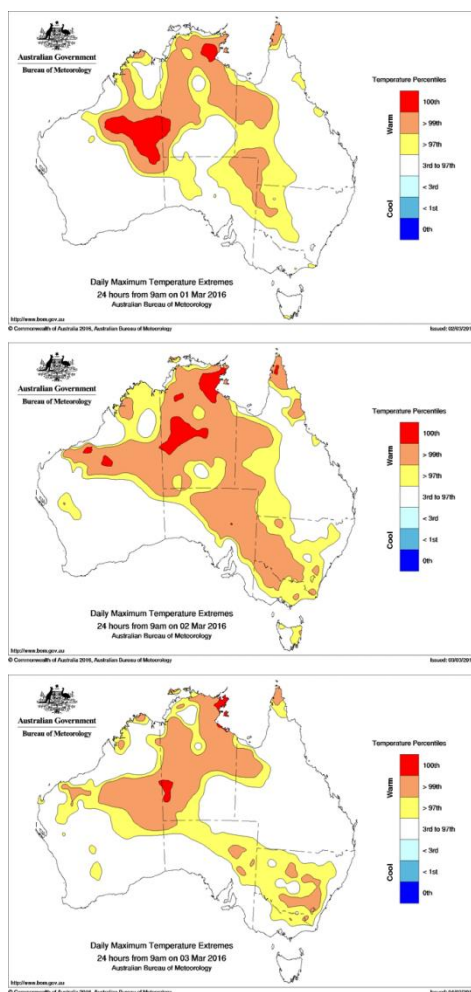


Figure 3. Temperature extremes over Australia on (top) 1, (middle) 2 and (bottom) 3 March. Areas where the highest March maximum temperature on record were observed are shown in red.

⁴ Melbourne is one of very few locations with long-term records of overnight minimum temperature using this definition. At most stations only the 24-hour minimum is available.

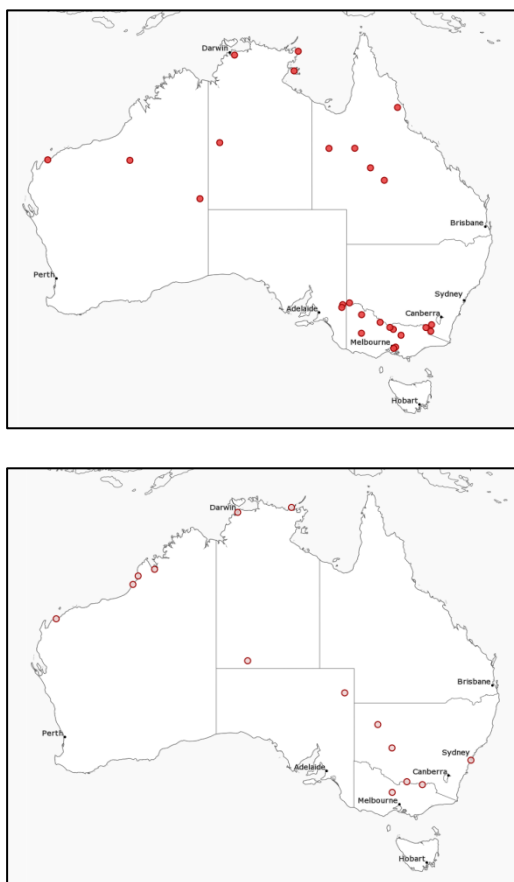


Figure 4. Locations with long-term observations which have set records during the March 2016 heatwave for (top) maximum and (bottom) minimum temperature.

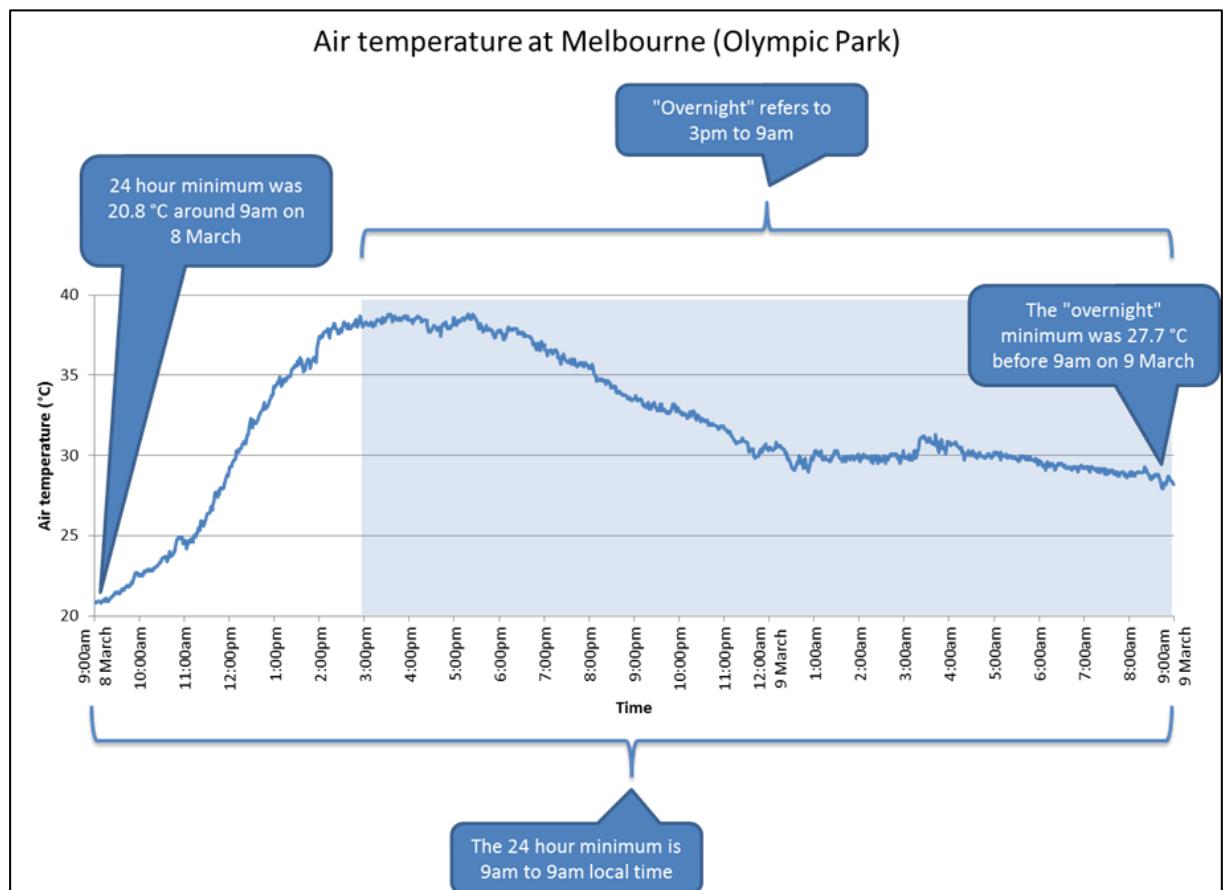


Figure 5. Temperatures at Melbourne (Olympic Park) on 8 and 9 March.

2.4 Prolonged heat concentrated in the southeast

Temperatures were well above normal through most of the inland southeast from 1 March onwards, until conditions moderated somewhat after the passage of a trough on 9–10 March. However, temperatures in the southeast remained generally above normal, especially overnight, until a stronger front crossed the region on 18 March.

In New South Wales, the area-averaged daily maximum temperature was above 35 °C on each of the nine days from 1 to 9 March, whilst in Victoria it exceeded 32 °C on each of those nine days. Both of these sequences are records for March; the previous New South Wales record was seven days (1–7 March 1938), whilst Victoria's previous record was eight days (1–8 March 1989). The Victorian sequence of days above 32 °C

is also the equal third-longest⁵ on record for any time of year, falling one day short of ten-day sequences from 6–15 January 1988 and 27 February–8 March 1989. New South Wales also set a record for extended high minimum temperatures in March with a sequence of 13 consecutive days with minima above 20 °C from 2–14 March, surpassing a nine-day period from 1–9 March 1989.

Many individual sites, mostly in Victoria and New South Wales, have set records for the greatest number of consecutive days and/or nights above given thresholds for March (Tables 4 and 5), with a few setting records for any time of year; for example, the eight days of 38 °C or above at Echuca and Tocumwal are records for any month. Also of particular note are the five consecutive nights of 25 °C or above at Hay from 5–9 March; there is no previous instance at Hay of two or more nights above 25 °C. Locations where March records were set for consecutive days of 40 °C or above include Menindee (nine), Wilcannia (six), Kerang, Swan Hill and Hay (five), and Echuca, Deniliquin and Mildura (four). Records for consecutive days of 35 °C or above were even more commonplace; amongst the most significant was at Albury, where there were ten consecutive days above that threshold, more than double the previous threshold of four⁶. In total, of the 26 long-term stations in a region encompassing north-central and northeastern Victoria and southern inland New South Wales⁷, 19 had record long March runs of consecutive days of 35 °C or above.

Whilst it is somewhat separate from the principal heatwave described in this statement, there have also been some very long sequences of warm days and nights at various locations on the east coast, and locally in inland New South Wales, associated with a marked lack of cool southerly outbreaks which, on the coast, has been combined with sea surface temperatures well above normal. Numerous records have been set at Sydney (Observatory Hill) for extended periods of warmth, most notably 39 consecutive days of 26 °C or above from 5 February to 14 March (the previous record was 19 days from 5–23 March 2014) and 25 consecutive nights of 20 °C or above from 19 February to 14 March (previous record 18 days from 30 January – 16 February 2010).. Brisbane had 17 consecutive days of 30 °C or above from 14 February to 1 March, its equal-third longest such sequence on record,⁸ while Melbourne also set a record with 26 consecutive nights of 15 °C or above from 22 February to 18 March. In inland New

⁵ Along with 14–22 February 1997.

⁶ Set on three previous occasions, most recently from 13–16 March 2008.

⁷ For these purposes, this covers Bureau rainfall districts 72, 73, 74 and 75 in New South Wales and 80, 81 and 82 in Victoria – bounded approximately by Bendigo to the southwest, Hay to the northwest, Grenfell and West Wyalong to the north, Burrinjuck Dam to the northeast, and the Australian Alps to the southeast. Locations above 800 metres elevation and those with missing data are excluded.

⁸ The Brisbane City record (combining station numbers 040214 and 040913) is 19 days from 26 January – 13 February 2002. No observations were made in central Brisbane between 1986 and 1999.

South Wales, Cobar (24 days), Nyngan (24 days) and Trangie (20 days) have set records for any month for consecutive days of 35 °C or above.

Records were also set for persistent warmth in the tropics, some of which were for runs which go back well into the summer, associated with the generally drier-than-normal wet season conditions. Port Hedland (20 days) had its longest sequence of consecutive days of 38 °C or above at any time of year, while 73 consecutive days of 30 °C or above is a record for Cairns.

2.5 Comparison with previous events

A comparison of the current event with some previous extended March heatwaves in southern Australia is shown in Figure 6.

The previous southern Australian March heatwave most directly comparable with the 2016 event was that of early March 1983 (which was also preceded by abnormal heat in northern Australia during February). Compared with the 2016 event, the 1983 event was slightly shorter and less continuous, although it featured some significant single-day temperature extremes, particularly on the last day of the event (9 March) when many eastern New South Wales locations, including Sydney, had their hottest March day on record. 1989 saw an event that covered similar areas to that of 2016, but was somewhat less intense, with the event's highest temperature only just exceeding 40 °C (40.2 °C at Wilcannia on 7 March 1989).

A heatwave in March 2008 was generally more significant for prolonged heat than the 2016 event in South Australia and western Victoria, whilst a March 2013 event was more significant in southern Victoria and Tasmania. Further information on these events is available in Special Climate Statements 15 and 45 respectively.

Many individual record high temperatures for March (at stations which were open at that time) in Victoria and southern inland New South Wales were set in the periods 11–14 March 1934 or 10–12 March 1940. The 1934 and 1940 events, however, were somewhat shorter than the 2016 heatwave (although subsequent extreme heat later in the month resulted in March 1940 being the hottest March on record over many parts of southern Australia).

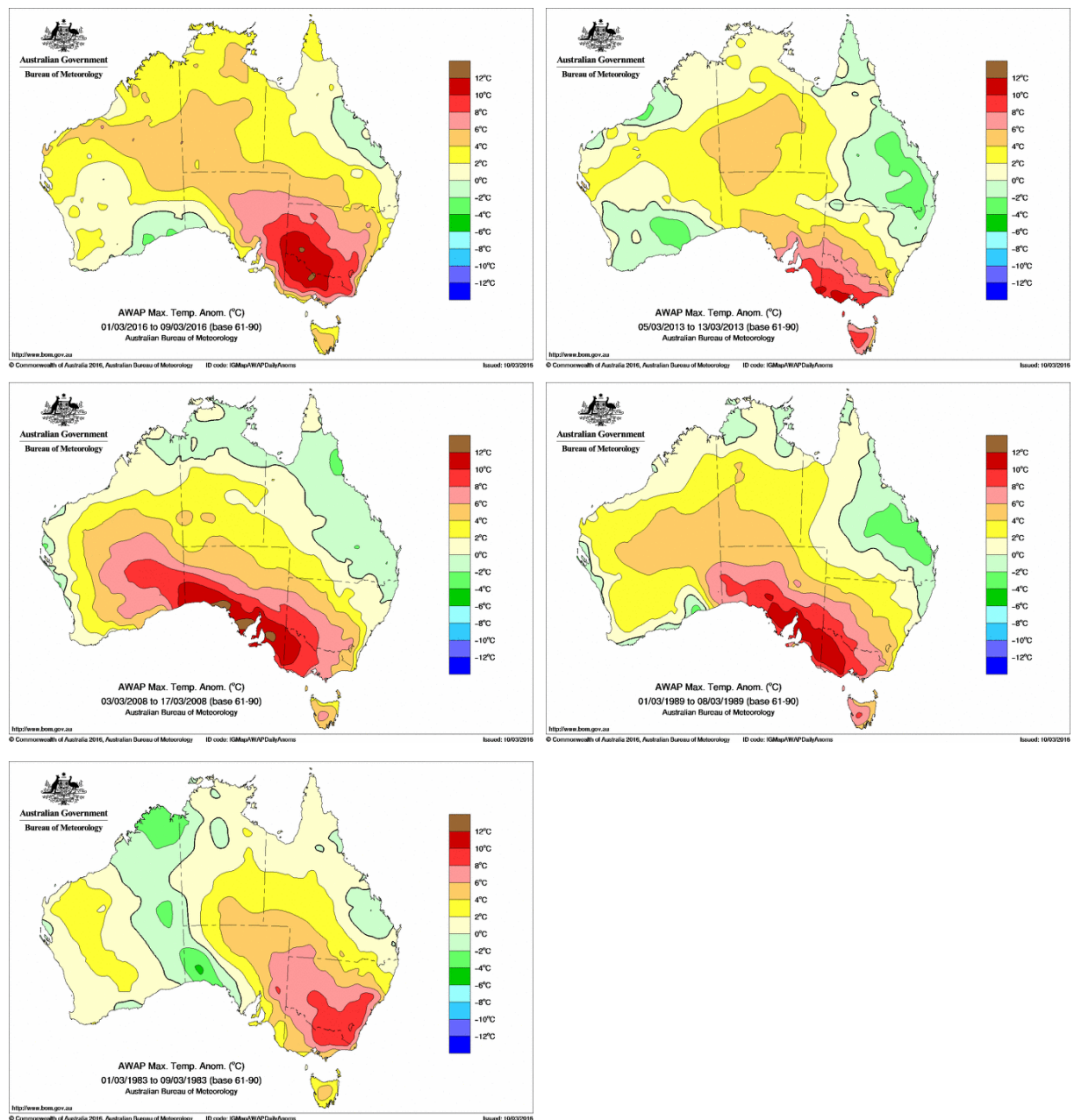


Figure 6. Maximum temperature anomalies for 1–9 March 2016 (top left) compared with previous events: (top right) 5–13 March 2013, (centre left) 3–17 March 2008, (centre right) 1–8 March 1989, (bottom left) 1–9 March 1983.

2.6 Mean monthly temperatures for March 2016

In the first half of the month, mean temperatures over many parts of southeastern Australia were on course to be above previous March monthly records (even allowing for the fact that the second half of March is typically cooler than the first).

The southwesterly change which crossed the region on 18 March led to a marked cooling over southeastern Australia, with maximum temperatures staying generally near or below normal for the remainder of the month. Maximum temperatures for the fortnight from 18 to 31 March were generally 2 °C to 4 °C below normal over most of South Australia and Victoria, and the southwestern half of New South Wales (whilst remaining above normal over most of the tropics). Minimum temperatures in southeastern Australia during this period were generally close to normal for the second half of March.

The cool finish to the month meant that few significant records were set for March mean maximum temperatures (Figure 7), being largely confined to the northern tropics and more exposed locations along the east coast. The mean daily maximum temperature averaged over Australia was the seventh-highest on record for March and the highest since 2005 (Table 6). Over New South Wales, they were the highest since 1998, but all other States were warmer in at least one of the years between 2013 and 2015.

March 2016, however, was notable for its warm nights through the month, and consequently high monthly mean temperatures. The monthly mean temperature for Australia⁹ was 1.70 °C above the 1961–90 average, the highest on record for March, narrowly surpassing the previous record set in 1986. New South Wales and Victoria also set records for the highest monthly mean temperature for March, breaking records set in 1940 and 1974 respectively. Mean temperatures were the highest on record over many parts of the northern tropics, in the Murray valley on both sides of the New South Wales–Victoria border, and in east Gippsland.

Overnight minimum temperatures for Australia in March 2016 were far above the previous record; they were 1.97 °C above the 1961–90 average and 0.83 °C above the previous highest, set in March 1983. Records were set for Queensland, New South Wales and the Northern Territory, with all other States ranking in the top four (Table 6). A substantial number of individual stations also set records (Table 7).

⁹ Maximum and minimum temperature combined.

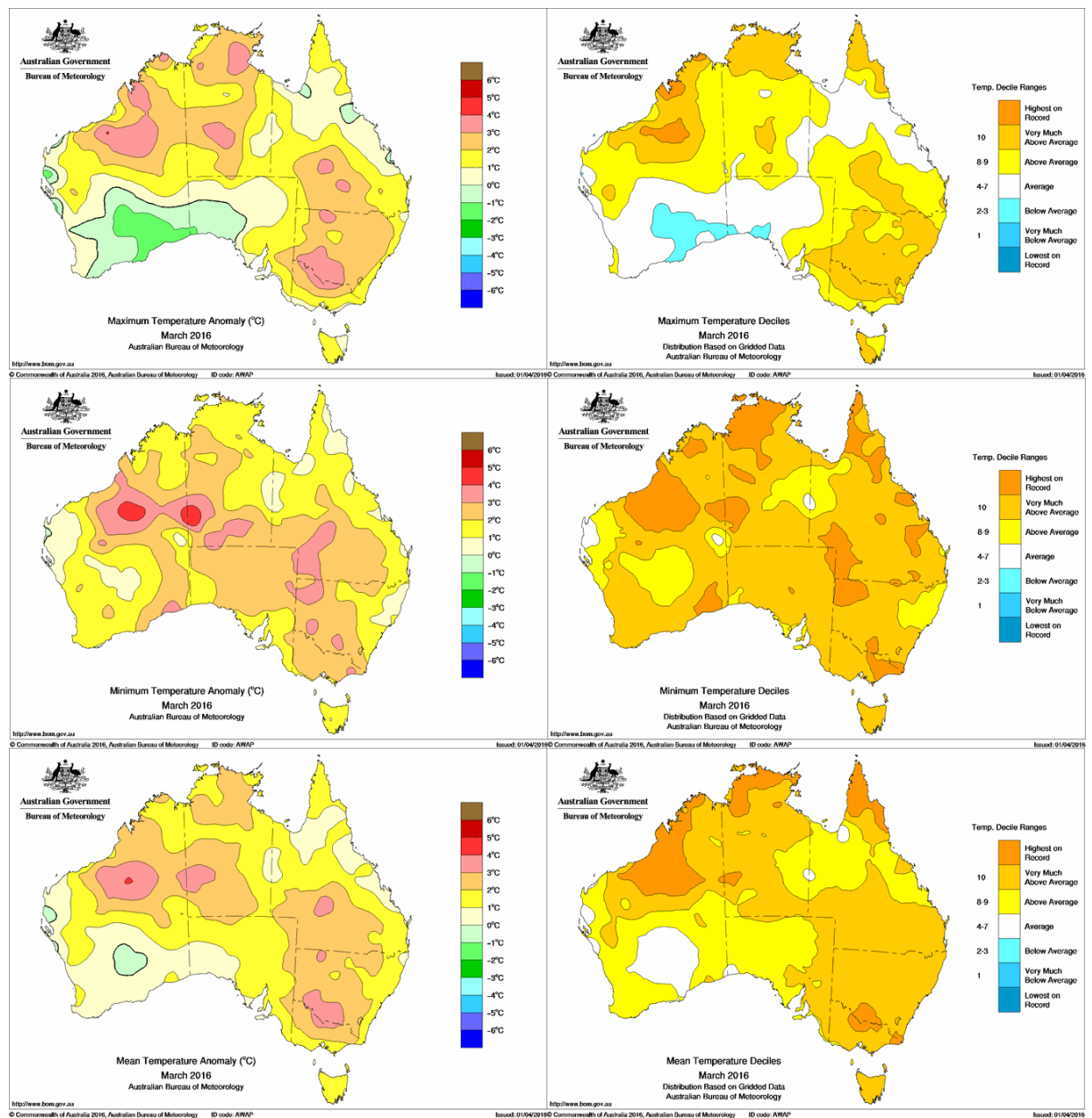


Figure 7. March 2016 monthly mean temperature anomalies (from 1961-90 average) (left) and deciles (right) for maximum (top), minimum (middle) and mean (bottom) temperature.

Region	Element	Value (°C)	Date	Previous record
Australia	Maximum	38.14	2 March	37.16 (1/3/1966)
Australia	Mean	30.55	2 March	29.73 (5/3/1990)
Australia	Minimum	23.45	3 March	23.44 (5/3/1990)
Northern Territory	Maximum	40.85	2 March	40.67 (19/3/2015)
Northern Territory	Mean	32.95	3 March	32.86 (4/3/1951)
Queensland	Minimum	25.14	3 March	24.95 (3/3/2015)

Table 1. Area-averaged daily records set during the heatwave.

Station number(s)	Location	State	Temperature (°C)	Previous record
003003	<i>Broome</i>	WA	30.6 (6 Mar)	30.5 (30/3/2010)
003030	Bidayadanga	WA	30.0 (=) (6 Mar)	30.0 (30/3/2010)
003032/003007	Derby	WA	29.5 (6 Mar)	29.4 (4/3/1988, 6/3/1996)
005017/005016	Onslow	WA	32.0 (4 Mar)	31.1 (22/3/1959)
014015	<i>Darwin</i>	NT	29.2 (=) (3 Mar)	29.2 (3/3/1988)
015511	Curtin Springs	NT	28.2 (3 Mar)	27.7 (12/3/1998)
017123/017096	Moomba	SA	30.6 (2 Mar)	30.2 (3/3/2009)
046129/046042	White Cliffs	NSW	30.5 (10 Mar)	30.3 (1/3/1983)
049000/049019	Ivanhoe	NSW	28.6 (3 Mar)	27.9 (8/3/1983)
066037	Sydney Airport	NSW	23.4 (=) (4 Mar)	23.4 (5/3/1980)
072160/072146/ 072097/072059	Albury	NSW	24.6 (10 Mar)	23.4 (4/3/1983)
074106	Tocumwal	NSW	25.1 (6 Mar)	24.2 (13/3/1985)
081123/081003	Bendigo	VIC	25.8 (9 Mar)	25.0 (3/3/1927)

Table 2. Locations with 40 or more years of data which set monthly record high minimum temperatures in the period from 28 February to 10 March 2016. ACORN-SAT locations (see References and Further Information) are shown in italics.

Station number(s)	Location	State	Temperature (°C)	Previous record
005017/005016	Onslow	WA	46.3 (3 Mar)	46.2 (7/3/1980)
<i>013017</i>	<i>Giles</i>	<i>WA</i>	<i>42.2 (=) (1 Mar)</i>	<i>42.2 (6/3/1959)</i>
013030	Telfer	WA	45.2 (1 Mar)	45.1 (4/3/1985)
014041/014090	Middle Point	NT	38.4 (=) (3 Mar)	38.4 (21/3/2015)
014508/014518	Gove	NT	36.1 (3 Mar)	35.9 (19/3/1990)
014512/014506/ 014507	Groote Eylandt	NT	38.6 (=) (3 Mar)	38.6 (2/3/1988)
<i>015666/015548</i>	<i>Rabbit Flat</i>	<i>NT</i>	<i>43.6 (2 Mar)</i>	<i>43.3 (18/3/2015)</i>
024024/024023	Loxton	SA	41.5 (6 Mar)	41.2 (12/3/2006)
024048/024016	Renmark	SA	42.2 (=) (6 Mar)	42.2 (6/3/1986)
029058/029025	Julia Creek	QLD	46.1 (29 Feb)	45.0 (18/2/1983)
029127	Mount Isa	QLD	41.9 (1 Mar)	41.4 (20/3/2015)
031108	Walkamin	QLD	35.0 (2 Mar)	34.3 (18/3/1992)
<i>036031</i>	<i>Longreach</i>	<i>QLD</i>	<i>44.4 (28 Feb)</i>	<i>43.6 (18/3/1983)</i>
037039/037051	Winton	QLD	45.5 (28 Feb)	45.0 (4/2/1960)
047016	Lake Victoria	NSW	41.5 (6 Mar)	41.2 (16/3/2008)
071041	Thredbo Village	NSW	28.9 (6 Mar)	28.5 (8/3/1983)
<i>072161/072091</i>	<i>Cabramurra</i>	<i>NSW</i>	<i>28.4 (8 Mar)</i>	<i>27.8 (15/3/2008)</i>
<i>076031</i>	<i>Mildura Airport</i>	<i>VIC</i>	<i>42.1 (6 Mar)</i>	<i>41.5 (12/3/1998)</i>
076047	Ouyen	VIC	41.9 (6 Mar)	41.5 (13/3/2008)
079028	Longerenong	VIC	40.7 (=) (8 Mar)	40.7 (16/3/2008)
080015	Echuca	VIC	41.8 (7 Mar)	40.5 (7/3/1986)
<i>080023</i>	<i>Kerang</i>	<i>VIC</i>	<i>42.1 (7 Mar)</i>	<i>41.7 (13/3/1934)</i>
080091	Kyabram	VIC	40.4 (7 Mar)	39.8 (7/3/1986)
082042	Strathbogie	VIC	36.3 (=) (7 Mar)	36.3 (3/3/1983)
082169/082011	Corryong	VIC	38.2 (8 Mar)	38.0 (8/3/1983)
086077	Moorabbin	VIC	40.8 (8 Mar)	40.5 (7/3/1991)
086104	Scoresby	VIC	39.8 (8 Mar)	39.6 (8/3/1991)

Table 3. Locations with 40 or more years of data which set monthly record high maximum temperatures in the period from 28 February to 10 March 2016. ACORN-SAT locations are shown in italics.¹⁰

¹⁰ Ballarat (37.9 °C on 8 March) and Bendigo (39.3 °C on 7 and 8 March) both had their highest temperatures of the post-1957 period but are excluded from these tables because of higher pre-1957 values not yet incorporated into main Bureau databases.

Station number(s)	Location	State	Threshold (°C)	Number of days	Previous record
004032	Port Hedland	WA	38	15 (1-15 Mar) (Mar) 20 (25 Feb – 15 Mar) (all mths)	14 (6-19/3/1949) (Mar) 15 (7-21/2/2015) (all mths)
017126/017031	Marree	SA	40	8 (1-8 Mar)	6 (1-6/3/1942)
031011	Cairns	QLD	30	73 (3 Jan – 15 Mar) (all mths)	65 (24/11/1981 – 27/1/1982) (all mths)
046012/046043	Wilcannia	NSW	40 38	6 (1-6 Mar) 9 (1-9 Mar)	5 (3-7/3/1986) 7 (2-8/3/1983)
048027	Cobar	NSW	35	13 (1-13 Mar) (Mar) 24 (19 Feb – 13 Mar) (all mths)	7 (3 times, most recent 9-15/3/2006) (Mar) 18 (3-20/1/1999, 5-22/2/2004) (all)
050017/073054	West Wyalong	NSW	35	10 (1-10 Mar)	6 (11-16/3/2008)
061363/061089	Scone	NSW	30	14 (1-14 Mar)	12 (6-17/3/2006, 18-29/3/2010)
063005	Bathurst	NSW	30	10 (5-14 Mar)	9 (1-9/3/1983)
067105/067033	Richmond	NSW	30	14 (1-14 Mar)	9 (1-9/3/1983)
070351/070014	Canberra	ACT	30	10 (1-10 Mar)	9 (1-9/3/1983)
072150	Wagga Wagga	NSW	35	10 (1-10 Mar)	8 (1-8/3/1983)
074258/074128	Deniliquin	NSW	40 38 35	4 (5-8 Mar) 8 (2-9 Mar) 13 (1-13 Mar)	3 (8-10/3/1940) 6 (9-14/3/1934) 8 (8-15/3/1934, 7-14/3/1940)
076031	Mildura Airport	VIC	40	4 (5-8 Mar)	2 (2-3/3/1965, 7-8/3/1991)
080023	Kerang	VIC	40	5 (4-8 Mar)	4 (13-16/3/2008)
082039	Rutherglen	VIC	38 35	4 (7-10 Mar) 9 (2-10 Mar)	3 (6-8/3/1983) 7 (8-14/3/1940)

Table 4. ACORN-SAT locations which have set records for the most consecutive March days with maximum temperatures at or above specified thresholds. Values which are records for any month are shown in bold.

Station number(s)	Location	State	Threshold (°C)	Number of days	Previous record
015590	Alice Springs	NT	20	19 (3-21 Mar)	17 (1-17/3/1983)
018012	Ceduna	SA	15	14 (5-18 Mar)	13 (1-13/3/1989, 2-14/3/2013)
023090/023000	Adelaide	SA	15	18 (1-18 Mar)	17 (3-19/3/2008)
030124/030018	Georgetown	QLD	25	5 (7-11 Mar)	3 (3 times, most recent 1-3/3/1997)
036031	Longreach	QLD	25	4 (10-13 Mar)	3 (3 times, most recent 1-3/3/2015)
043109/043034	St. George	QLD	20	18 (1-18 Mar)	16 (2-17/3/1989)
046012/046043	Wilcannia	NSW	20	14 (2-15 Mar)	12 (1-12/3/1989)
046126/046037	Tibooburra	NSW	25	5 (2-6 Mar)	4 (3 times, most recent 1-4/3/1963)
048027	Cobar	NSW	20	15 (1-15 Mar)	9 (3 times, most recent 3-11/3/1989)
048245/048239/048013	Bourke	NSW	20	18 (1-18 Mar)	16 (2-17/3/1949)
053115/053048/053027	Moree	NSW	20	12 (1-12 Mar)	11 (3-13/3/1956)
066062	Sydney	NSW	20	14 (1-14 Mar) (Mar) 25 (19 Feb – 14 Mar) (all mths)	10 (7-16/3/2006) (Mar) 18 (30/1-16/2/2010) (all)
076031	Mildura	VIC	20	9 (2-10 Mar)	7 (12-18/3/2008)
080023	Kerang	VIC	20	10 (3-12 Mar)	6 (11-16/3/1985) (Mar) 7 (3 times, most recent 28/1-3/2/2009) (all)
084145/084030	Orbost	VIC	15	12 (5-16 Mar)	11 (12-22/3/1985)
086338/086071	Melbourne	VIC	15	18 (1-18 Mar) (Mar) 26 (22 Feb – 18 Mar) (all months)	16 (9-24/3/1985) 25 (3-27/2/2013) (all)
091293/091057	Low Head	TAS	15	10 (5-14 Mar)	9 (1-9/3/1956, 1-9/3/1989)

Table 5. ACORN-SAT locations which have set records for the most consecutive March days with minimum temperatures at or above specified thresholds. Values which are records for any month are shown in bold.

Variable	Region	Anomaly (°C)	Rank	Previous record (if applicable)
Maximum temperature	Australia	+1.42	7	
	Queensland	+1.29	18	
	New South Wales	+2.50	6	
	Victoria	+2.05	6	
	Tasmania	+1.19	9	
	South Australia	+0.84	33	
	Western Australia	+0.99	19	
	Northern Territory	+2.07	10	
Minimum temperature	Australia	+1.97	1	+1.14 (1983)
	Queensland	+1.96	1	+1.62 (2015)
	New South Wales	+2.48	1	+2.25 (1983)
	Victoria	+2.78	2	
	Tasmania	+1.50	4	
	South Australia	+2.35	3	
	Western Australia	+1.67	2	
	Northern Territory	+1.80	1	+1.52 (1947)
Mean temperature	Australia	+1.70	1	+1.67 (1986)
	Queensland	+1.63	3	
	New South Wales	+2.49	1	+2.22 (1940)
	Victoria	+2.42	1	+2.36 (1974)
	Tasmania	+1.35	6	
	South Australia	+1.59	8	
	Western Australia	+1.33	6	
	Northern Territory	+1.94	4	

Table 6. State/Territory and national temperature anomalies (differences from 1961-90 average) for March 2016, and ranks (for period 1910-2016).

Station number(s)	Location	State	Temperature (°C)	Previous record
Maximum temperature				
027058/027022/ 027021	Horn Island	QLD	31.9	31.7 (1952, 1993)
040043	Cape Moreton	QLD	28.0	27.8 (2015)
060139/060026	Port Macquarie	NSW	27.7	27.5 (2015)
061078	Williamstown	NSW	28.5 (=)	28.5 (1983)
076031	Mildura	VIC	32.1	31.7 (2008)
Minimum temperature				
005026	Wittenoom	WA	27.2	26.8 (1959)
014015	Darwin	NT	26.2	25.5 (2015)
016001	Woomera	SA	19.8	19.5 (1971)
027058/027022/ 027021	Horn Island	QLD	26.1	25.7 (1941, 1999)
031011	Cairns	QLD	24.0 (=)	24.0 (2011, 2015)
034084/034002	Charters Towers	QLD	22.2	22.0 (1983, 1995)
036007	Barcaldine	QLD	24.0 (=)	24.0 (2015)
039083	Rockhampton	QLD	22.6	22.4 (1976, 2001, 2015)
040043	Cape Moreton	QLD	22.8 (=)	22.8 (1973)
042112/042023	Miles	QLD	19.4 (=)	19.4 (1956)
045025/045017	Thargomindah	QLD	23.3	23.0 (2006)
048027	Cobar	NSW	19.4 (=)	19.4 (2007)
053115/053048/ 053027	Moree	NSW	19.6	19.5 (1969)
066062	Sydney	NSW	19.7	19.6 (2006)
069018	Moruya Heads	NSW	17.1	16.8 (1934)
072161/072091	Cabramurra	NSW	11.1	10.3 (2006)
076031	Mildura	VIC	16.9 (=)	16.9 (1974)
084145/084030	Orbost	VIC	15.5	14.5 (1978)
085072	Sale	VIC	14.4 (=)	14.4 (1956)
087031	Laverton	VIC	15.3 (=)	15.3 (1974)
Mean temperature				
001019/001021	Kalumburu	WA	30.7	30.6 (2002)
005026	Wittenoom	WA	33.7 (=)	33.7 (1959)
027058/027022/ 027021	Horn Island	QLD	29.0	28.6 (1952)
031011	Cairns	QLD	27.9 (=)	27.9 (2015)
040043	Cape Moreton	QLD	25.4	25.3 (2015)
045025/045017	Thargomindah	QLD	29.3 (=)	29.3 (1986, 2015)
050017/073054	West Wyalong	NSW	24.4	23.8 (1983, 1986)
056242/056017	Inverell	NSW	22.9	22.6 (1933)

061078	Williamtown	NSW	23.0	22.9 (1983, 1998)
072150	Wagga Wagga	NSW	23.7	23.1 (1968)
072161/072091	Cabramurra	NSW	15.5	15.4 (2006)
074258/074128	Deniliquin	NSW	24.3	24.0 (1940)
076031	Mildura	VIC	24.7	23.5 (1974)
080023	Kerang	VIC	24.0	23.4 (1940)
082039	Rutherglen	VIC	22.4	22.0 (1940)
084016	Gabo Island	VIC	19.8	19.6 (1940)

Table 7. ACORN-SAT locations which set records in March 2016 for highest monthly temperature.

References and further information

Values in this statement are current as of 1 April 2016, and are subject to the Bureau's quality control processes.

The dataset from which area averages and spatial analyses are drawn from commences in 1911. The Australian Climate Observations Reference Network – Surface Air Temperature (ACORN-SAT) data set (<http://www.bom.gov.au/climate/change/acorn-sat/>) commences in 1910. Station data prior to national introduction of standardised instrument shelters in 1910 are used only if they are known to have been measured using standard equipment comparable with current standards. This matter is discussed further at <http://www.bom.gov.au/climate/change/acorn-sat/#tabs=Early-data>.

Further information is available from <http://www.bom.gov.au/climate>.