

Special Climate Statement 68—widespread heatwaves during December 2018 and January 2019

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Version number/type	Date of issue	Comments
1.0	17 January 2019	
1.1	24 January 2019	Updated with ongoing heatwave event
1.2	13 February 2019	Updated with late stages of heatwave, January monthly values
1.3	14 March 2019	Update for end of summer



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Cover image: Ben Hague, Sunrise at Uluru-Kata Tjuta National Park, 2018

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Executive summary

- An unusual extended period of heatwaves over much of Australia began in early December 2018 and continued through January 2019. February was less extreme but still substantially hotter than average.
- The 2018–19 summer was the hottest on record for Australia by a margin of 0.86 °C, and was also the hottest for New South Wales, Victoria, Western Australia and the Northern Territory. January 2019 was the hottest month on record nationally by a margin of 0.99 °C, and was also the hottest month on record for every State and Territory except South Australia and Western Australia. New South Wales broke its previous record by more than 2 °C.
- For nationally averaged mean maximum temperature, Australia had its hottest December day on record and third-hottest for any month. This was followed by an unprecedented sequence of five consecutive days with nationally averaged mean maxima above 40 °C from 12 to 16 January, including the 15th, which recorded the second-warmest day on record for any month.
- There were 28 days this summer on which nationally-averaged mean temperature has exceeded the 99th percentile for the month, easily exceeding the previous record of 11 such days in a summer.
- Numerous locations, including Adelaide, reported their highest daily maximum temperature on record, with some locations exceeding their previous records by large margins. Many records were also set for consecutive days above thresholds, including Canberra recording four consecutive days above 40 °C for the first time.
- A new record was set in New South Wales for the highest minimum temperature ever observed in Australia, and State/Territory records were also set for South Australia, Queensland and the Northern Territory.
- These widespread heatwaves during December and January followed an extreme heatwave that affected the tropical Queensland coast during late November 2018.

Introduction

An unusual extended period of heatwaves over much of Australia began in early December 2018 and continued through most of January 2019. Whilst the heatwave had three peak phases – in late December and early January, mid-January and late January, each of which saw numerous records set – above-average temperatures persisted over most of the continent for several weeks. Many locations, particularly in South Australia, inland New South Wales and parts of central Australia, experienced their highest temperatures on record, and records were also set for the duration of the heatwave in many regions. Temperatures in February were generally less extreme, particularly in southern Australia, but were still significantly above average in many areas.

Both December and January were the hottest on record averaged over Australia. January was especially hot, breaking the previous record for the hottest month on record in Australia by nearly a degree. It was also the hottest month on record for every State and Territory except South Australia and Western Australia, with New South Wales more than 2 °C above its previous record. 21 of the 24 reporting ACORN-SAT locations in New South Wales had their hottest January on record. February was the fourth-hottest on record nationally, resulting in the summer being the hottest on record nationally, and for New South Wales, Victoria, Western Australia and the Northern Territory.

These widespread heatwaves during December and January followed an extreme heatwave that affected the tropical Queensland coast during late November¹ as the heatwave conditions began an anticlockwise loop around the country.

Rainfall was below average over the Pilbara and Kimberley region of Western Australia for several months towards the end of 2018. Into December, the region had seen little thunderstorm activity and no monsoonal activity, and thus little cloud or moisture influencing the weather. With the summer solstice occurring on 22 December, the sun during this period was almost directly overhead,² providing the maximum amount of solar radiation. Weather patterns over northern Australia tended to be static, with heat lows persisting and no significant synoptic systems to change the air mass. This provided near-ideal conditions for heat build-up. Despite intermittent thunderstorm activity in places, rainfall over most of northern Western Australia and the Northern Territory for the wet season-to-date remained far below average through late January, and monsoon onset did not occur at Darwin until 23 January, more than three weeks after the average date and only two days earlier than the record latest date in 1973. Even after monsoon onset, rainfall remained below average in the region, with the Northern Territory ultimately having its driest summer since 1982–83. Northwestern Queensland was also dry until the onset of an extreme rainfall event at the end of January.³

The progression of troughs and other weather systems from west to east across Australia, and northwesterly winds ahead of the troughs, dragged the hot air east and south periodically over the Northern Territory, South Australia, western Queensland, New South Wales, and Victoria.

1. Evolution of the heatwave

November 2018 ended with the extreme heatwave conditions that had been affecting the tropical Queensland coast contracting and shifting to the northwest. Temperatures nonetheless remained warmer than average in eastern and northern Queensland, with continued long runs of above average temperatures at locations such as Cairns, Townsville, and Rockhampton.

Maps of the daily mean sea level pressure (MSLP) analyses for December and January can be seen in Figures 1 and 2, showing the persistent low pressure system over Western Australia and low pressure trough over northern and central Australia. A notable feature of this period was the absence of strong fronts to cool the country. High pressure was often prominent over the Tasman Sea, particularly in January when monthly mean pressure over the central Tasman was 4 to 5 hPa above average.

¹ For further information see [Special Climate Statement 67—an extreme heatwave on the tropical Queensland coast](#)

² For further information see [Solstices and equinoxes: the reasons for the seasons](#)

³ A separate Special Climate Statement will be issued on the extreme rainfalls in northern Queensland in late January and early February.

Figure 3 shows the large area of the country that exceeded 40 °C on 27 December 2018, Australia's warmest December day on record for maximum temperature. Figure 4 shows areas that exceeded 40 °C on 15 January 2019, Australia's second-warmest day on record for any month.

Maps of daily maximum temperature anomalies (differences from average) can be seen in Figures 5 and 6 and maps of daily minimum temperature anomalies can be seen in Figures 7 and 8.

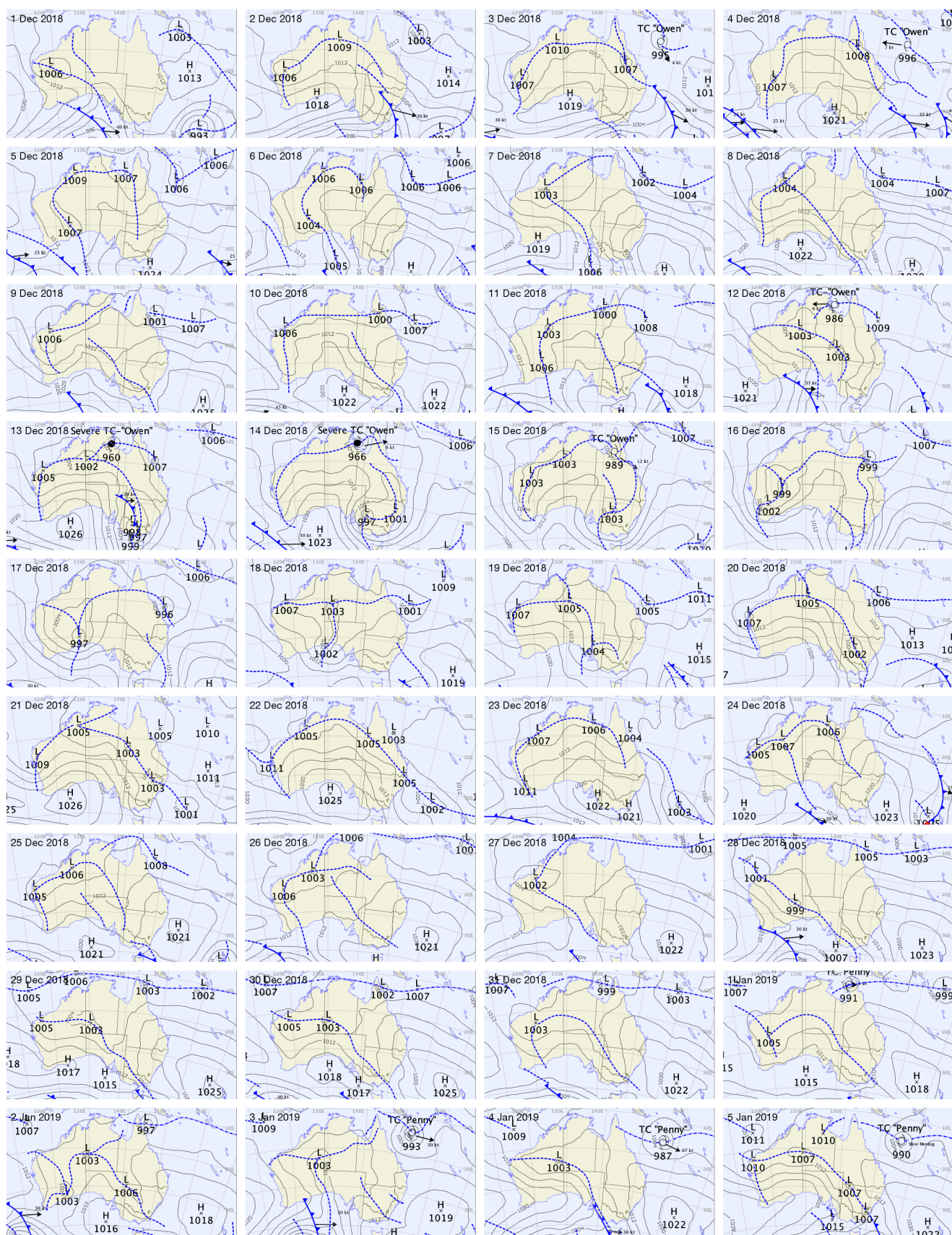


Figure 1: Mean sea-level pressure (MSLP) analyses for 1 December 2018 to 5 January 2019.

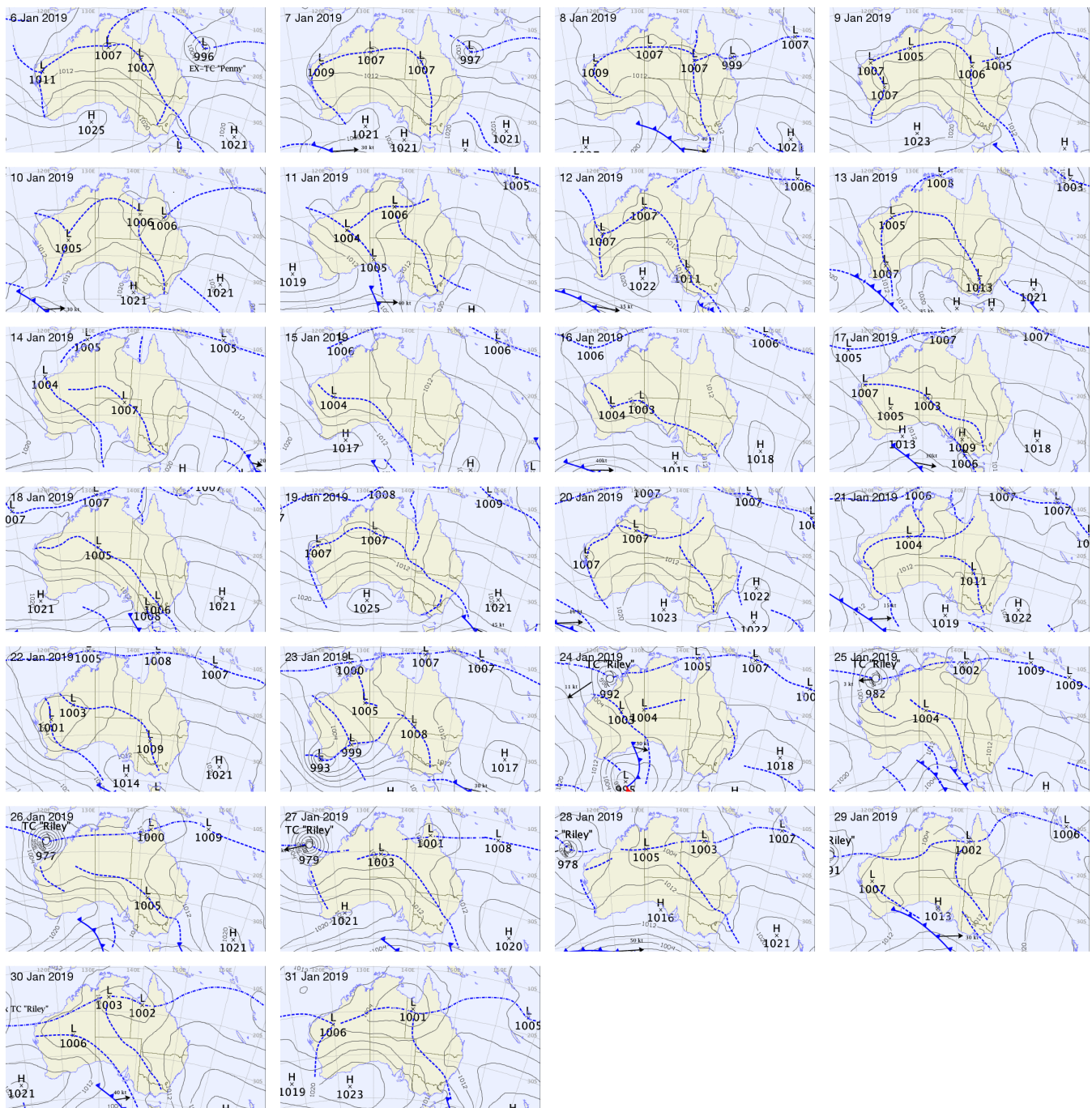


Figure 2: Mean sea-level pressure (MSLP) analyses for 6 to 31 January 2019.

1 to 8 December 2018

After the northern tropics coastal heatwave in late November, elevated temperatures spread into the interior of Queensland and northern parts of the Northern Territory, resulting in a large area of severe to locally extreme heatwave conditions across Australia's tropical north. These persisted through much of the week. Heat lows and troughs persisted over northwestern Australia throughout this period.

Above-average temperatures affected much of eastern Australia on the 1st, and again from the 5th to the 7th, with maximum temperatures near 40 °C over many parts of southern South Australia and Victoria over this period. The passage of a front saw high temperatures retreat to inland New South Wales from the 8th.

The remnants of the former tropical cyclone *Owen* were off the Queensland coast over the Coral Sea but drifted towards the mainland late in the week. Moist onshore flow around the system produced showers and thunderstorms in the following days for most Queensland coastal regions and adjacent inland areas.

9–16 December

Areas of severe intensity heatwave persisted over parts of northern and western Australia during this week, with larger areas of low intensity heatwave covering much of northern and central Australia at times. The Pilbara was consistently hot, with Marble Bar experiencing eight consecutive days of 45 °C or above from 7 to 14 December, whilst unusually hot conditions also affected the Top End of the Northern Territory including a record high minimum of 30.0 °C at Darwin on the 12th, the city's first ever 30 °C minimum. Moisture extended from the tropics into southeastern Australia late in the period, culminating in a significant rain event on 13 and 14 December, with the most intense falls in northern Victoria.

17–24 December

In New South Wales, after days of intense thunderstorm activity and dust storms, daytime temperatures increased and large areas of the State reached severe heatwave intensity conditions as a hot air mass moved in from central Australia.

Towards the end of this period, there was the return of severe to locally extreme heatwave conditions over much of the interior of Queensland, with hot temperatures extending into the southeast. The heat combined with humidity in the State's southeast to make for conditions negatively affecting human health.

25 December to 4 January

The first of three phases where heatwave conditions extended over large parts of the country began on 25 December, and extended into early January. This period was characterised by a persistent blocking high pressure system over the Tasman Sea, directing north to northwest flow over many parts of eastern Australia, and a heat low and trough over northwestern Australia, initially located near the northwest coast but moving slowly southwards into the interior of Western Australia over the following days.

Christmas Day 2018 was Australia's overall warmest Christmas Day since national records began in 1910, with a mean temperature of 30.61 °C surpassing the previous warmest Christmas Day from 1980 of 30.53 °C. Boxing Day was also Australia's warmest Boxing Day on record, with a national mean temperature of 31.48 °C, surpassing 26 December 1980 (30.93 °C). Australia's mean maximum temperature of 39.95 °C was the fourth-warmest December day on record. Extreme heat began to build in southeast Australia over this period.

On the 27th, a very hot air mass over central Western Australia was advected towards southeastern Australia. The subtropical ridge of high pressure was south of the continent, acting to weaken cold fronts as they approached. This enabled the start of consecutive runs of days of 40 °C or more at population centres including Mildura, Albury, and Alice Springs. Minimum temperatures remained 6 °C to 14 °C above average, and overnight temperatures did not drop below 20 °C to 25 °C. Extreme heat on the 27th reached as far south as Adelaide, with a maximum temperature of 43.7 °C at Kent Town, a December record for that site.

Severe to extreme heatwave conditions covered an area extending from central Western Australia, through southern Northern Territory, the northern Pastoral districts of South Australia, much of southern and western New South Wales, and into Victoria. The Pilbara heatwave peaked on this day, including 49.3 °C at Marble Bar, the highest temperature observed during this phase of the event. Australia's mean maximum temperature of 40.19 °C on the 27th was the country's warmest December day on record and the second-highest for any month (behind 40.30 °C on 7 January 2013). The national mean temperature of 31.76 °C was Australia's second-highest on record for December (behind 31.86 °C on 21 December 1972). The national mean temperature of 31.72 °C on the 28th was also Australia's third-warmest December day on record.

27 December

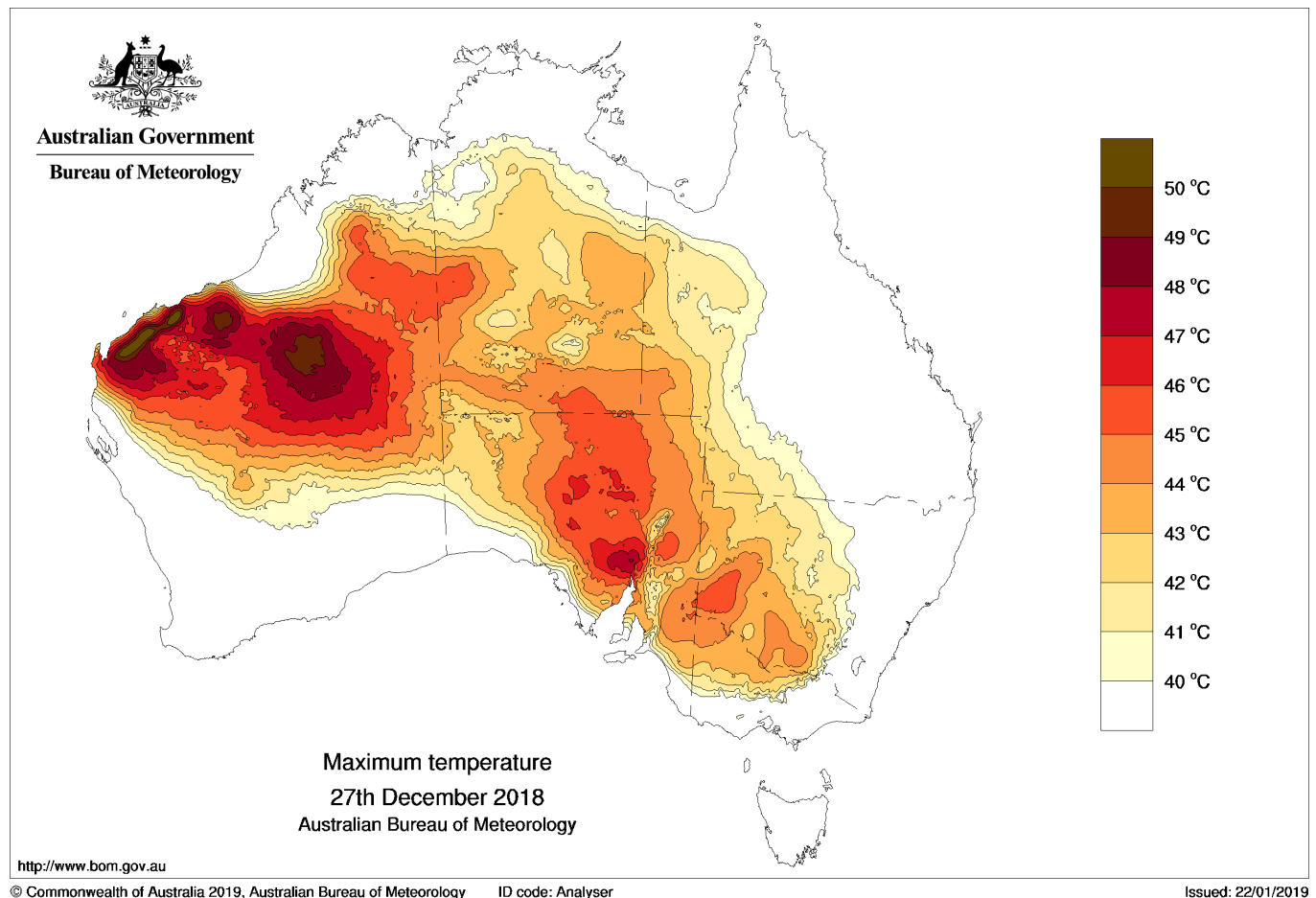


Figure 3: Map of areas exceeding 40 °C on 27 December 2018, Australia's warmest December day on record for maximum temperature.

Conditions moderated slightly in Western Australia and along the southern coast from the 29th, leading to a slight fall in nationally-averaged temperatures, but it remained very hot in much of inland Australia, particularly in regions extending from central Australia to much of New South Wales. This was also a period of persistent heat along parts of the New South Wales coast.

Extreme heat returned to southern coastal areas from 2 to 4 January as a northwesterly flow became re-established, initially affecting the Nullarbor coast on 2 January before extending to South Australia on the 3rd and Victoria on the 4th. Adelaide reached 42.3 °C on the 3rd, and Melbourne reached 42.6 °C, Canberra 38.1 °C, and Hobart 34.0 °C on the 4th. It was also very hot in central Australia, with the Northern Territory as a whole recording its warmest day on record with a mean maximum of 42.93 °C, just exceeding the 42.91 °C recorded on 27 December 1990. A trough and front crossed southeastern Australia on the 4th and 5th, ending this phase of the heatwave.

5 to 10 January

The low pressure system over the Pilbara in Western Australia persisted into January, with severe to locally extreme heatwave conditions continuing to affect large areas of the country at times. Conditions moderated slightly from 5 to 10 January, with temperatures across much of inland Australia returning to near-average. It remained very hot in the northwest, with a second eight-day run of days of 45 °C or above starting at Marble Bar on the 6th.

11 to 18 January

The extreme heat spread southeast again from the 11th onwards, as a high became established in the Tasman Sea directing a north to northwesterly flow into southeastern Australia. With very little change in the pattern from the 14th to the 18th, this resulted in a prolonged period of extreme heat over most of the inland southeast, including New South Wales, northern Victoria and much of South Australia, as well as western Queensland and the southern Northern Territory. Seabreezes moderated conditions in coastal areas of Victoria and New South Wales. The most extensive heat nationally was from 12 to 16 January, with the nationally-averaged maximum temperature exceeding 40 °C on each of these days, whilst 16 January was the hottest day on record nationally for both minimum and daily mean temperatures. Western Australia cooled somewhat on the 17th and 18th, but these were the peak days of the heatwave in some areas further east, particularly in New South Wales. Canberra had a record run of four consecutive days of 40 °C or above from 15 to 18 January.

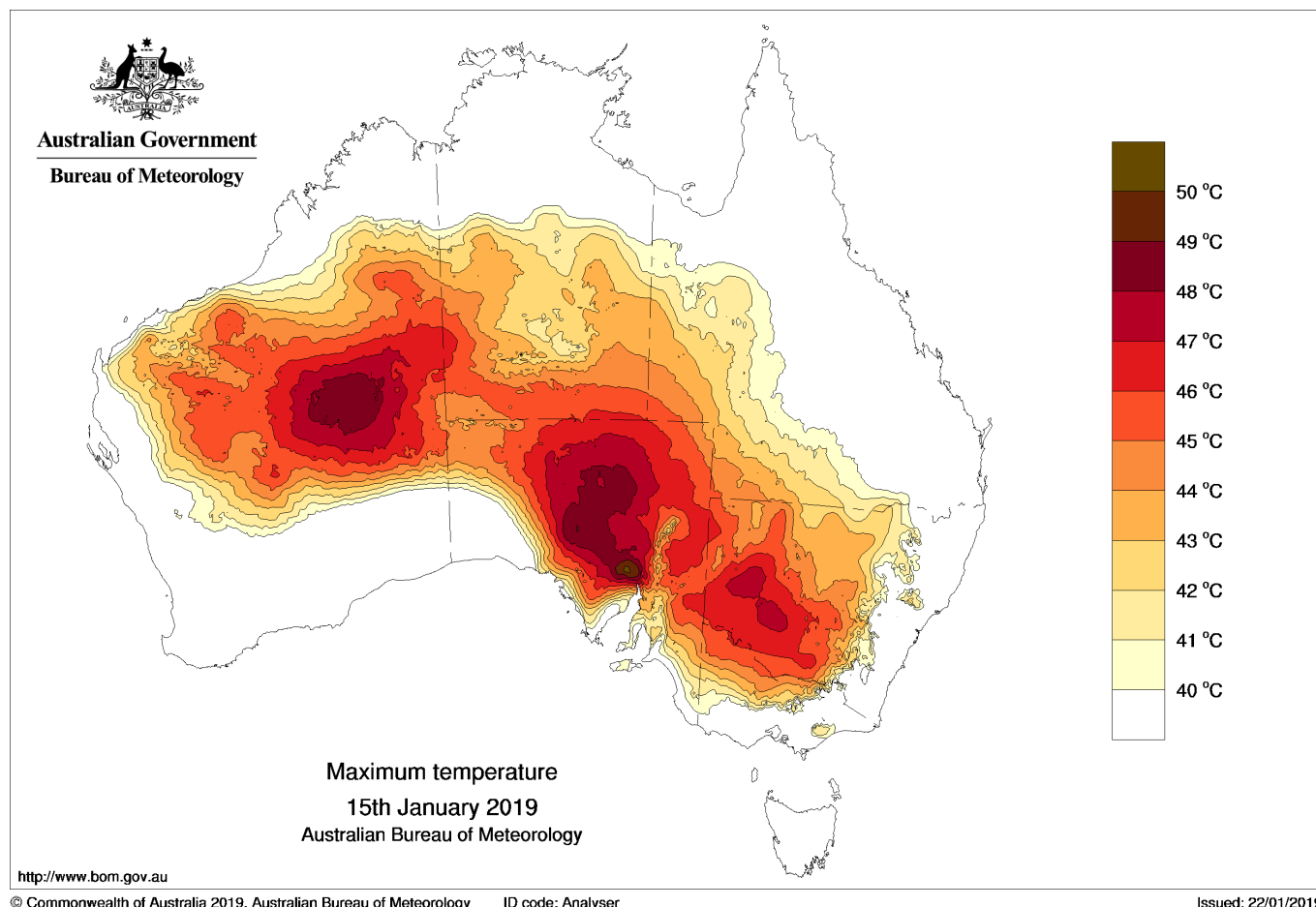


Figure 4: Map of areas exceeding 40 °C on 15 January 2019, Australia's second-warmest day on record for maximum temperature for any month.

19 to 31 January

A trough crossed southeastern Australia on the 18th and 19th. This returned temperatures to near average in Victoria and southern South Australia. In inland areas, whilst temperatures were somewhat less extreme than they had been the previous week, they were still several degrees above average, with maxima remaining above 40 °C in northwestern New South Wales. The heatwave continued largely unabated in western Queensland, northern South Australia, and the Northern Territory.

The heat intensified and extended southwards again from the 22nd. Overnight temperatures were particularly high, resulting in the six-day-old records for national minimum and mean temperatures both being broken; it was the first time that the Australian area-averaged minimum temperature had exceeded 25 °C. This set the scene for the most intense phase of the heatwave in southern coastal Australia as northerly winds returned. Red Rocks Point, on the Nullarbor coast south of Mundrabilla, reached 49.1 °C on the 23rd, with very high temperatures also extending to

western South Australia. The 24th was an extremely hot day across much of South Australia. Adelaide had its hottest day on record (46.6 °C at West Terrace/ngayirdapira, 47.7 °C at Kent Town), and records, including some long-standing ones dating from the 1939 heatwave, were broken at most sites in the Adelaide region, the Mid-North, the Eyre Peninsula and Kangaroo Island. The highest temperature of the month, 49.5 °C at Port Augusta, occurred on this day.

The next day, the focus of the heat shifted to northern Victoria and inland New South Wales. Some further records were set, particularly in north-central Victoria, where Kerang's 47.6 °C was a new Victorian state record for January. Menindee reached 48.8 °C, the highest temperature of the month in New South Wales. Whilst no records were set, very high temperatures also occurred in southern Victoria (42.8 °C at Melbourne, the highest since 2014) and Tasmania (40.1 °C at Hobart Airport, the second-highest on record there).

The passage of a trough moderated conditions in the south from 26 January onwards, but it remained hot in inland areas, with exceptionally high minimum temperatures in western New South Wales and adjacent parts of South Australia and Queensland on the 26th and 27th. These regions cooled slightly in the last few days of the month; above-average temperatures returned to the southern states, although they were well short of those observed the previous week.

In the last few days of January the very hot air mass also extended across the Tasman to New Zealand, with record high temperatures set at numerous locations in both the North and South Islands, including Wellington and Hamilton.⁴

⁴ For further information on the New Zealand heatwave, see the January 2019 monthly climate summary of the National Institute for Water and Atmospheric Research (NIWA): https://www.niwa.co.nz/files/Climate_Summary_January_2019web.pdf.

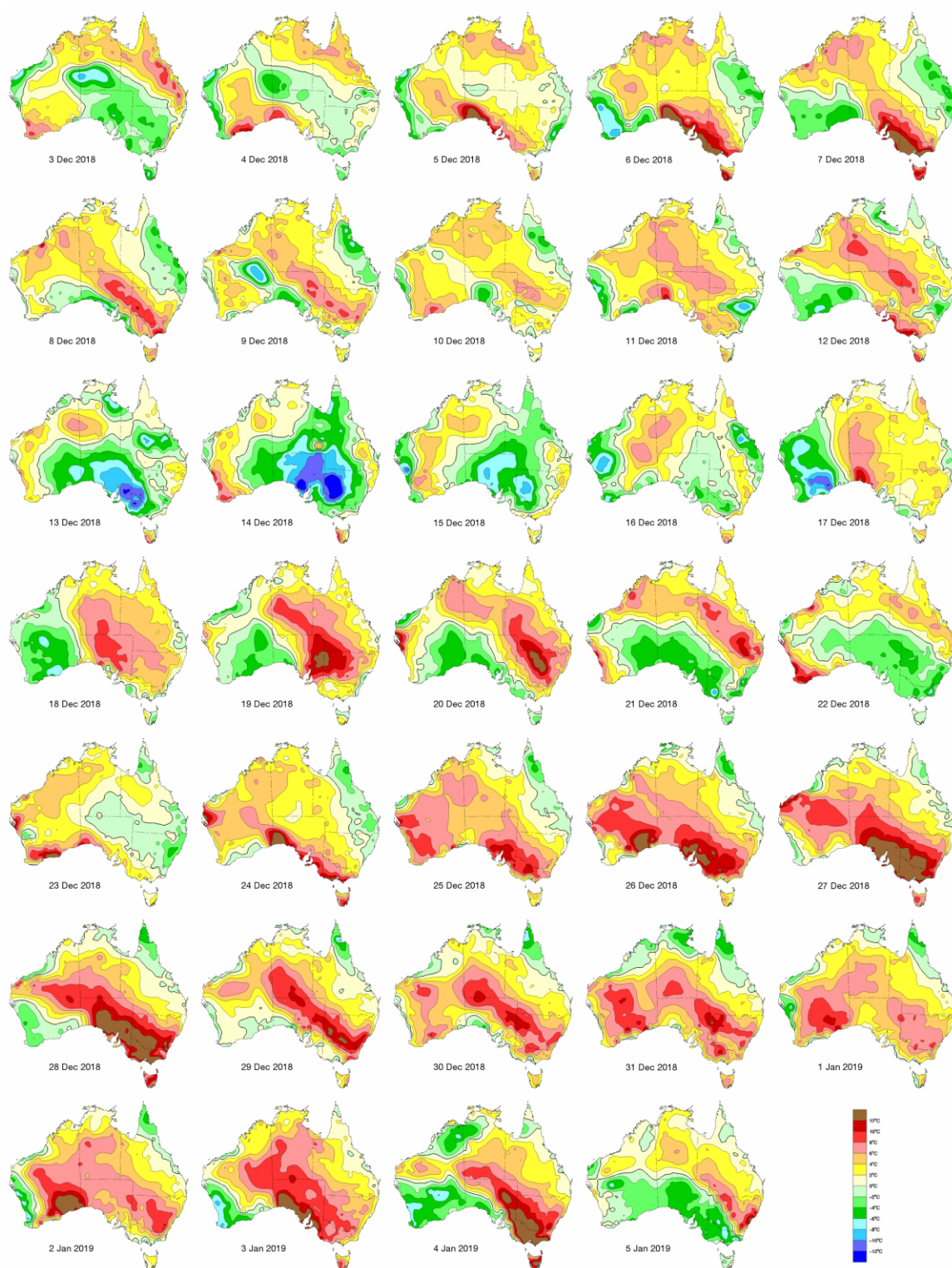


Figure 5: Daily maximum temperature anomalies for 3 December 2018 to 5 January 2019.

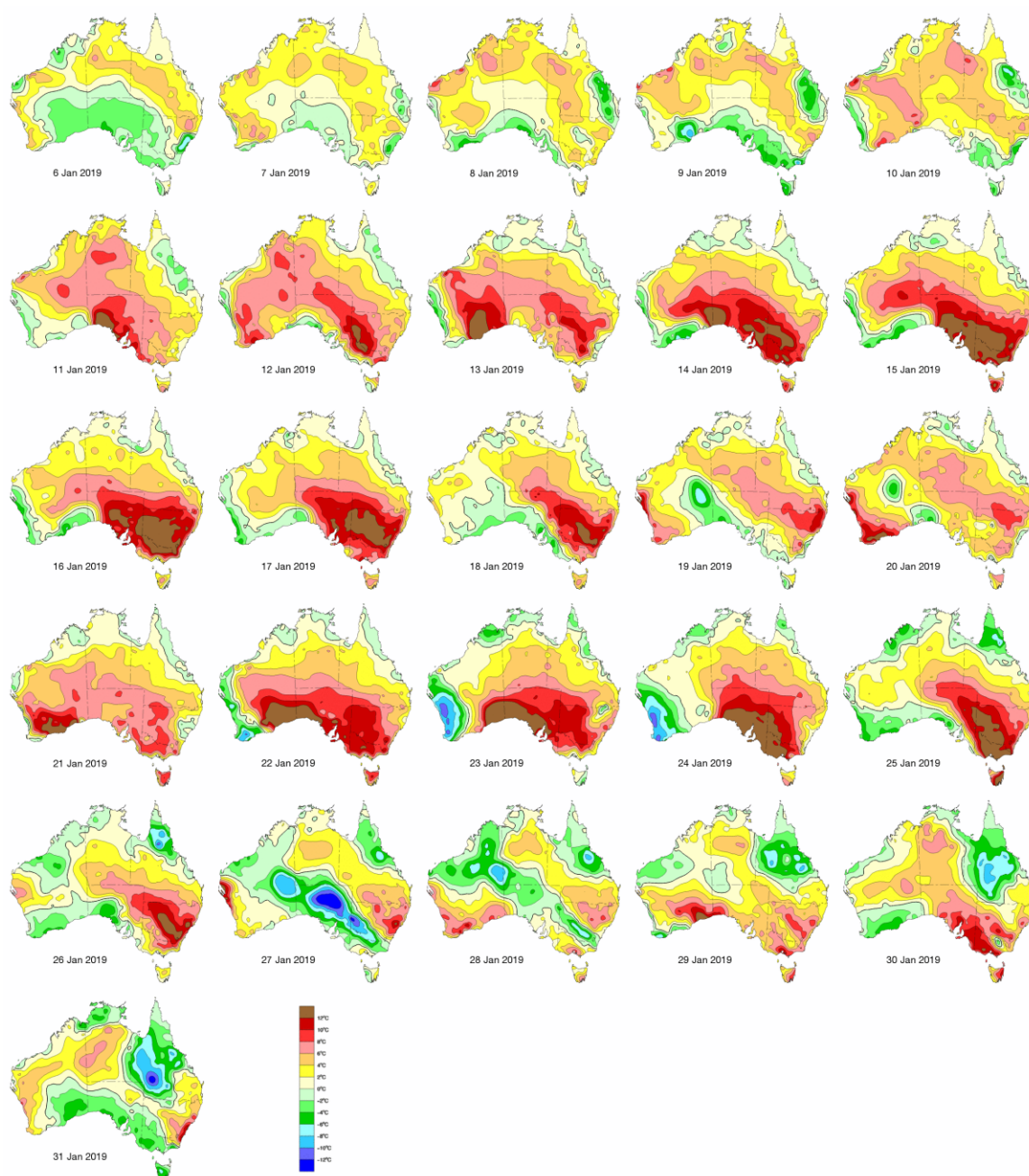


Figure 6: Daily maximum temperature anomalies for 6 to 31 January 2019.

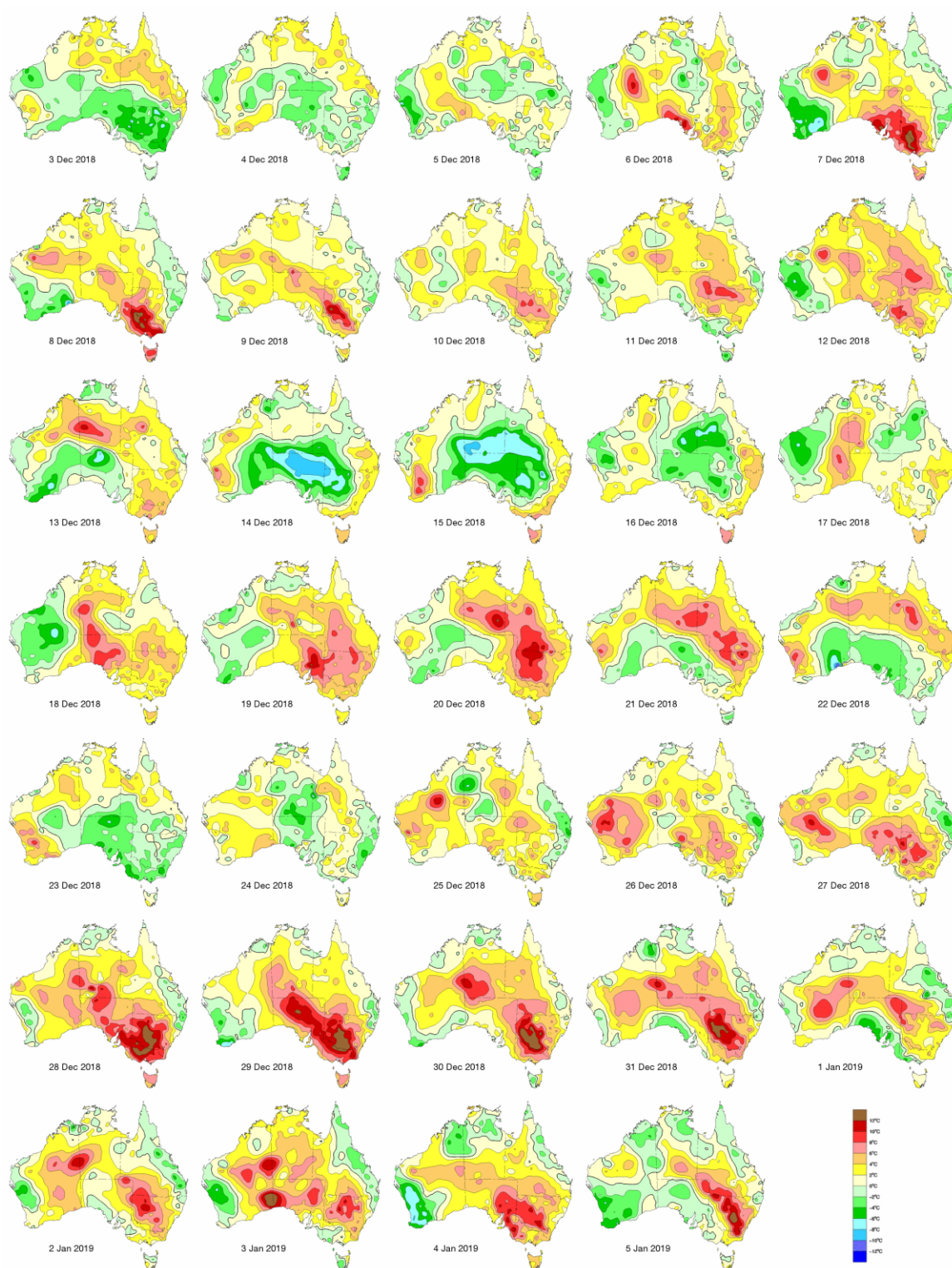


Figure 7: Daily minimum temperature anomalies for 3 December 2018 to 5 January 2019.

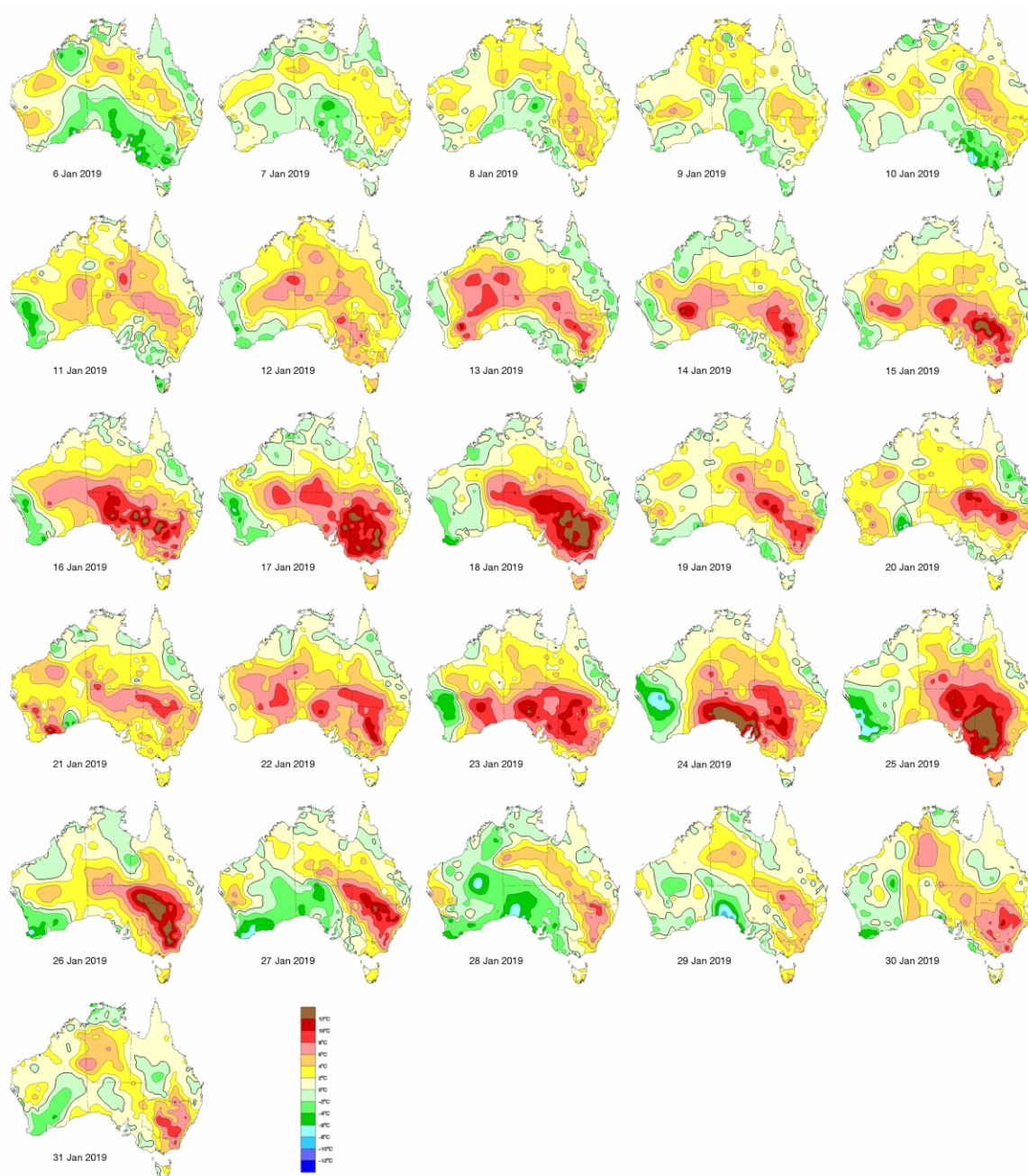


Figure 8: Daily minimum temperature anomalies for 6 to 31 January 2019.

2. Persistent December heat in northern Australia

Daily temperature records were exceeded in early December across Australia's tropical north.

Daily maximum temperature records for December were exceeded during the first week of the month at Doongan (41.9 °C), Gove (38.7 °C), Groote Eylandt (40.7 °C), Borroloola (44.6 °C), and Normanton (43.9 °C).

Night time temperatures were also warmer than average, with Ngayawili (30.5 °C) in the Top End exceeding its previous record high minimum temperature for December on the 7th. Darwin recorded a high minimum temperature of 30.0 °C on the 12th, the city's first 30 °C minimum.

There were record long runs of days of 40 °C or more at locations including Fitzroy Crossing (Western Australia), Rabbit Flat (Northern Territory) and Mount Isa (Queensland). Mount Isa and Rabbit Flat were to break these records again from early January.

Kalumburu in the Kimberley region of Western Australia had 16 days of 42 °C or more in the 76 years before 2018, but had nine from October to December 2018, including four of its eight warmest days on record.

Rabbit Flat had its three hottest days on record (each separated by a week or more) during December 2018, as part of a record run of 33 consecutive days of 40 °C or above from 2 December to 3 January; at the time this was the second-longest run of such days in the Northern Territory behind 35 consecutive days at Walungurru in 2007.

Marble Bar (Western Australia) had runs of eight consecutive days of 45 °C or above from 7–14 December⁵. This was the longest on record at the current site, although, there were ten-day runs at the old site in January 1910 and January 1985. Subsequently, there was a run of six such days at the site from 23–28 December (part of a run of nine consecutive days of 44 °C or above).

In many areas, that exceptional heat continued throughout December and into early January.

Cooling degree days can provide a good indication of the consistency of the heat and include both daytime and night-time temperatures. They sum the amount by which the mean daily temperature was above a specified threshold. Figure 9 shows a decile map of cooling degree days above 24 °C, with large areas of highest on record degree days covering much of northern and northwest Australia, western New South Wales, neighbouring areas of South Australia and Queensland, and northeast Victoria.

⁵ Marble Bar had another run of eight such days from 6–13 January 2019.

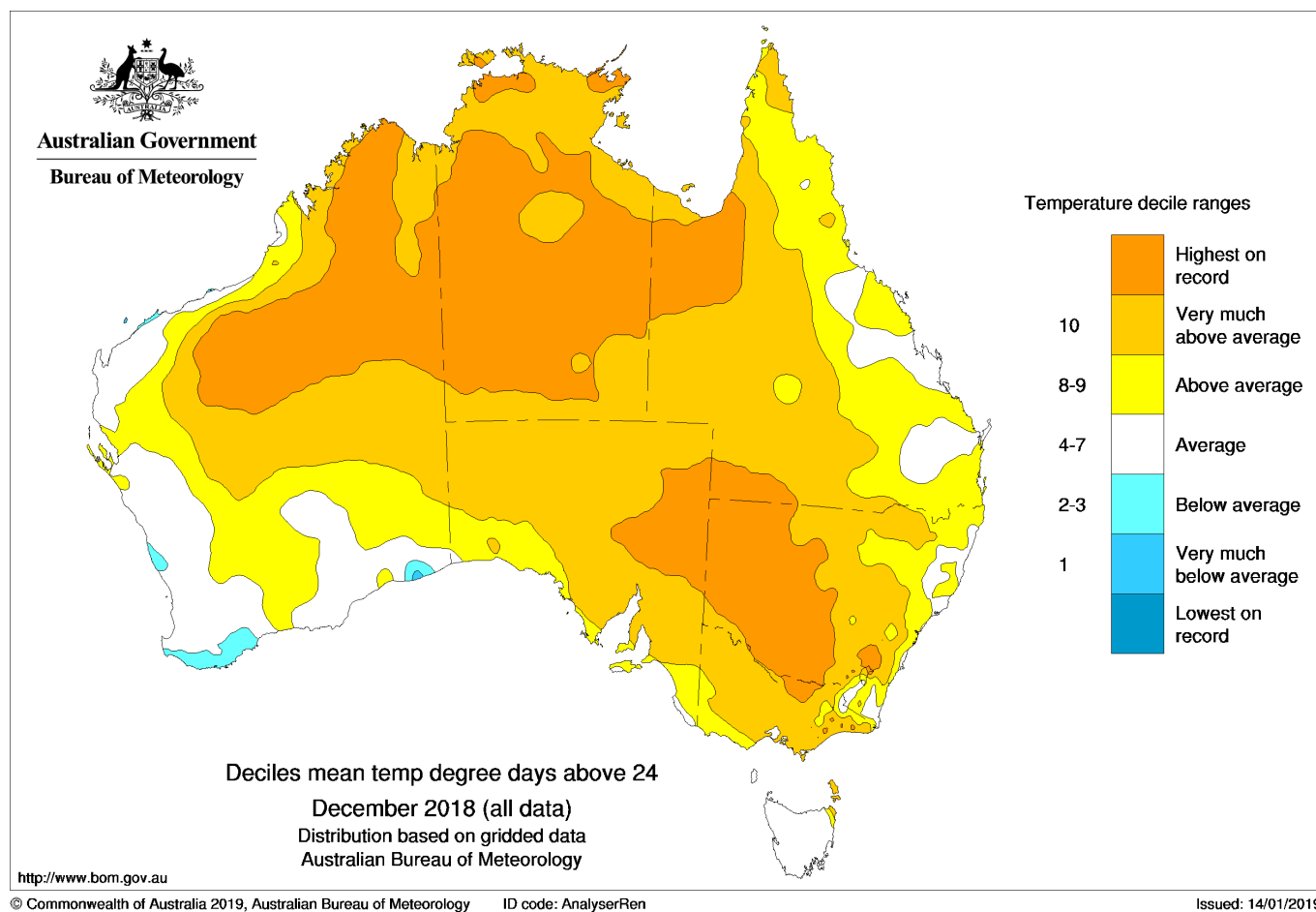


Figure 9: Decile map of cooling degree days above 24 °C for December 2018 (based on all available data since 1910).

3. Widespread heatwave during Christmas and New Year

Exceptionally and persistently high temperatures occurred across much of Australia from the lead-up to Christmas into early January.

The country experienced widespread heatwaves during the last week of December into early January, with temperature records exceeded across a large area from northwest Western Australia to southeastern Australia.

Figure 10 shows a map of the highest three-day heatwave category for the period from 22 December 2018 to 4 January 2019. Most of the country experienced at least a low intensity heatwave, with severe to extreme heatwave conditions experienced by much of Western Australia, southern parts of the Northern Territory, most of South Australia, New South Wales, and Victoria, with some areas of Queensland and Tasmania also affected by severe heatwaves. Only coastal Queensland and the southwest of Western Australia were largely unaffected.

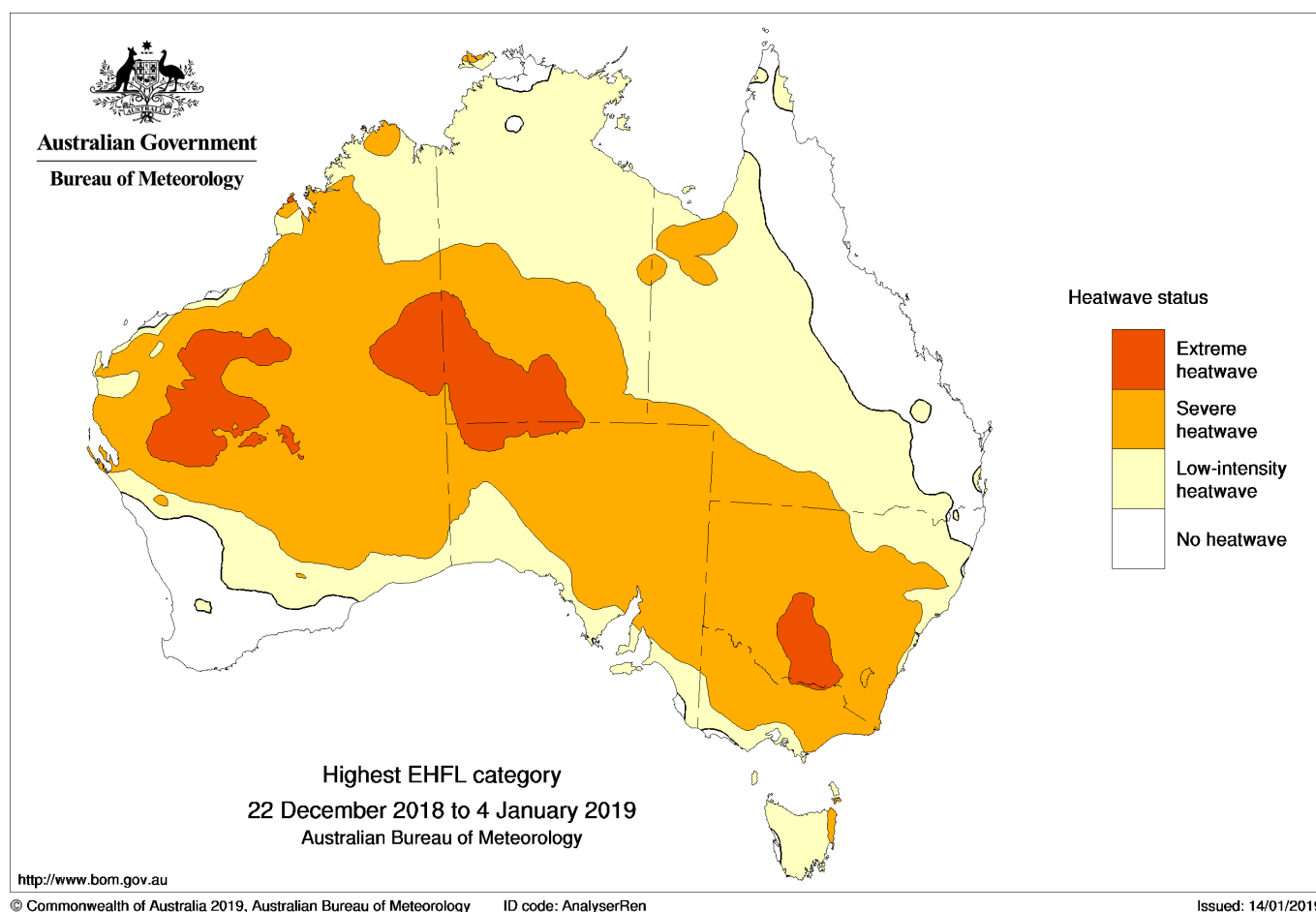


Figure 10: Map of the highest three-day heatwave category for 22 December 2018 to 4 January 2019.

The Australian mean daily maximum temperature of 40.19 °C on 27 December 2018 was the highest on record for December, and at the time, the second-highest for any month.

Australia's mean maximum temperature exceeded 39 °C on four consecutive days from 25 to 28 December, a run that was second in length (at the time) only to the seven consecutive such days in early January 2013. There were only a total of 21 such days since national records began in 1910 to the end of the 2017–18 summer.

Australia's mean daily minimum temperature of 24.16 °C on 28 December was the highest on record for December, with 23.66 °C the following night on the 29th being the second-warmest.

Five of Australia's ten highest December mean daily minimum temperatures occurred in 2018: on the 20th (tenth-warmest), 28th (warmest), 29th (second-warmest), 30th and 31st (both equal third-warmest).

The national mean temperature of 31.76 °C on 27 December was the second-warmest on record for December (behind 31.86 °C on 21 December 1972), and the 31.72 °C on the 28th was the third-warmest. The national daily mean temperature exceeded 31 °C on nine consecutive days from 26 December to 3 January, surpassing the previous record of six days in January 2013.

Around the States and Territories, South Australia's mean maximum of 43.52 °C on 27 December was the second-warmest on record for December (behind 21 December 1972), whilst the 43.51 °C on 28 December was the State's third-warmest December day. This was followed by a 44.56 °C on 3 January which, at the time, was the State's fourth-warmest on record for any month. The heat extended south into Victoria where a number of records were set in the State's north on the 4th (Table 3).

Western Australia's mean maximum of 42.36 °C on 26 December was the second-warmest on record for December (behind 31 December in 1972), whilst the 41.91 °C on 25 December was the State's third-warmest December day. The highest temperature of the summer to date, 49.3 °C at Marble Bar, occurred on the 27th.

Three of the Northern Territory's ten warmest December days occurred in 2018: 42.28 °C on the 18th (sixth-warmest), 42.22 °C on the 19th (seventh-warmest), and 42.18 °C on the 29th (equal ninth-warmest).

In the new year, the Northern Territory's warmest mean maximum January day on record occurred on 3 January 2019, with 42.93 °C exceeding the Territory's previous record of 42.60 °C from 2 January 1960; this also just exceeded the previous record for the warmest day for any month of 42.91 °C, from 27 December 1990.

Looking at specific days of the year, Christmas Day (25 December) 2018 was Australia's overall warmest Christmas Day on record, with a mean temperature of 30.61 °C, surpassing the previous warmest Christmas Day from 1980 of 30.53 °C.

Boxing Day (26 December) 2018 was the warmest Boxing Day on record, with a mean temperature of 31.48 °C surpassing 1980 with 30.93 °C, and Australia's third-warmest December day on record.

Figure 11 shows a map of the highest temperature observed between 22 December 2018 and 4 January 2019. Large areas of western, inland, and southern Australia had one or more days with maximum temperatures of 40 °C or more.

Figure 12 and Figure 13 show maps of the areas that recorded new highest daily maximum and minimum temperatures respectively for December since national records began in 1910.

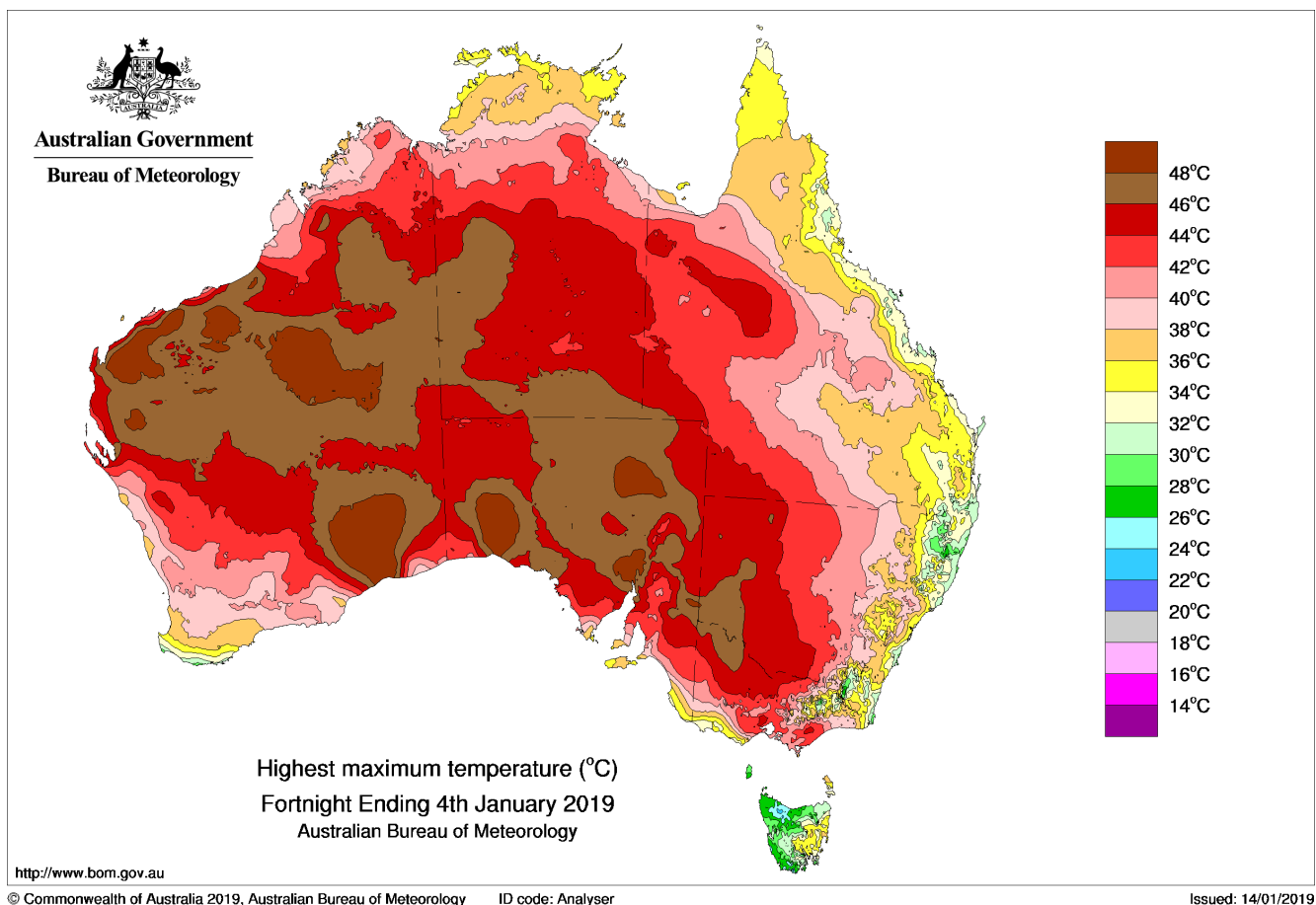


Figure 11: Map of highest maximum temperature observed on any day from 22 December 2018 to 4 January 2019.

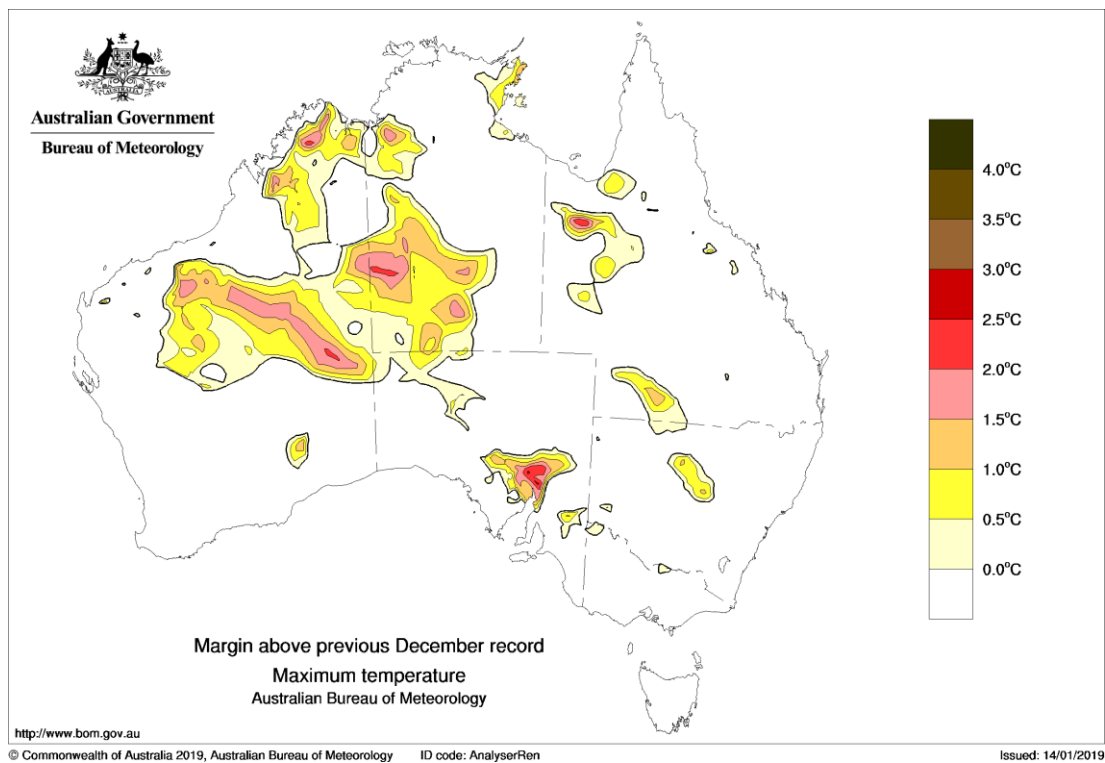


Figure 12: Map of areas recording a new highest maximum temperature in December 2018 (compared with data from 1910 to 2017).

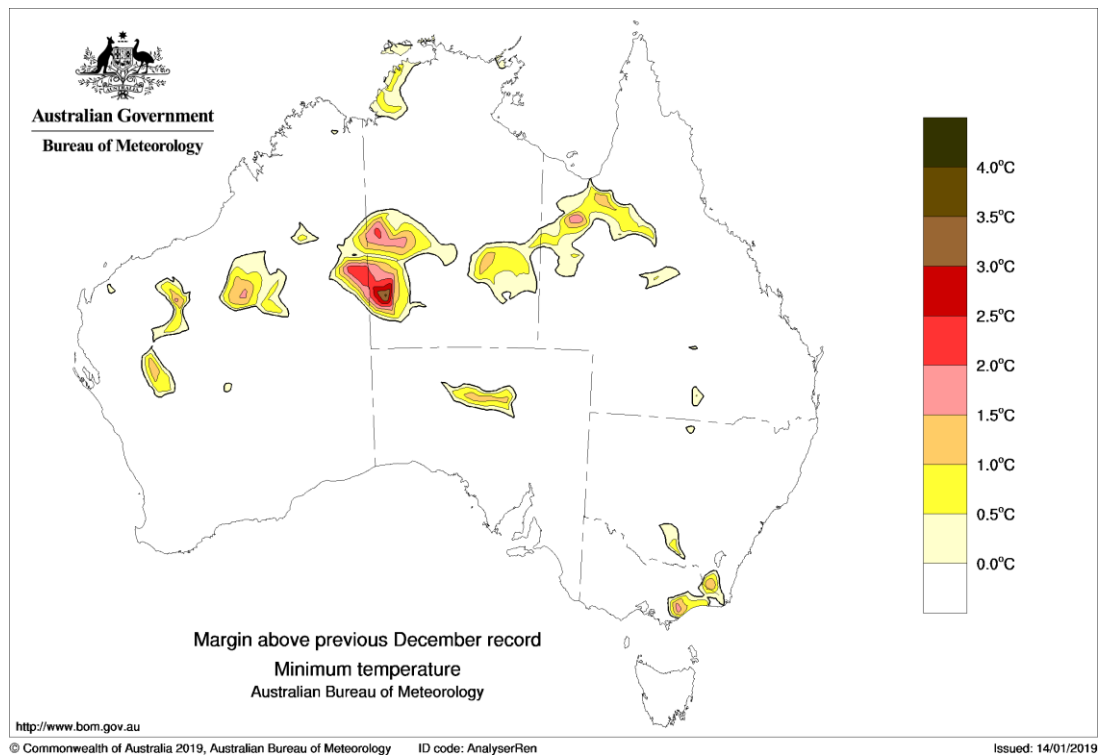


Figure 13: Map of areas recording a new highest minimum temperature in December 2018 (compared with data from 1910 to 2017).

4. Exceptionally warm December overall

The heat in late December ensured that December mean temperatures were very high across most of the country, especially in the Northern Territory and northern inland Western Australia. Figure 14 shows a map of mean temperature deciles for December 2018, with above average to record warm temperatures across much of Australia.

Australia's overall mean temperature for December was the highest on record, 2.13 °C above the 1961–1990 average and more than 0.3 °C warmer than the previous record from 1972.⁶

Record high State and Territory averaged mean temperatures were also seen in New South Wales, Victoria, Tasmania, and the Northern Territory; Western Australia and South Australia were second-warmest, and Queensland was third-warmest.

Australia's mean maximum and mean minimum temperatures for December were also record warm, with the mean minimum more than half a degree above the previous record from 1972.

Mean maximum and mean minimum temperatures for all States and the Northern Territory were in the warmest five Decembers (apart from Queensland's mean maximum, which was ninth-warmest); several were warmest on record.

The Northern Territory's mean maximum temperature was 3.28 °C above average, which is 1.40 °C warmer than the previous record from 1972.

For northern Australia (north of 26°S inclusive), December was the warmest month on record for any time of the year. The previous record warmest month for mean temperature across northern Australia was December 1972, with the December 2018 mean temperature approximately one standard deviation above the previous record. Figure 14 shows the December mean temperature anomaly (difference from average) for northern Australia for each year from 1910.

A number of locations also set records for the greatest number of hot days (Table 11) or nights (Table 12) in December.

⁶ See the [December 2018 Climate Summary for Australia](#)

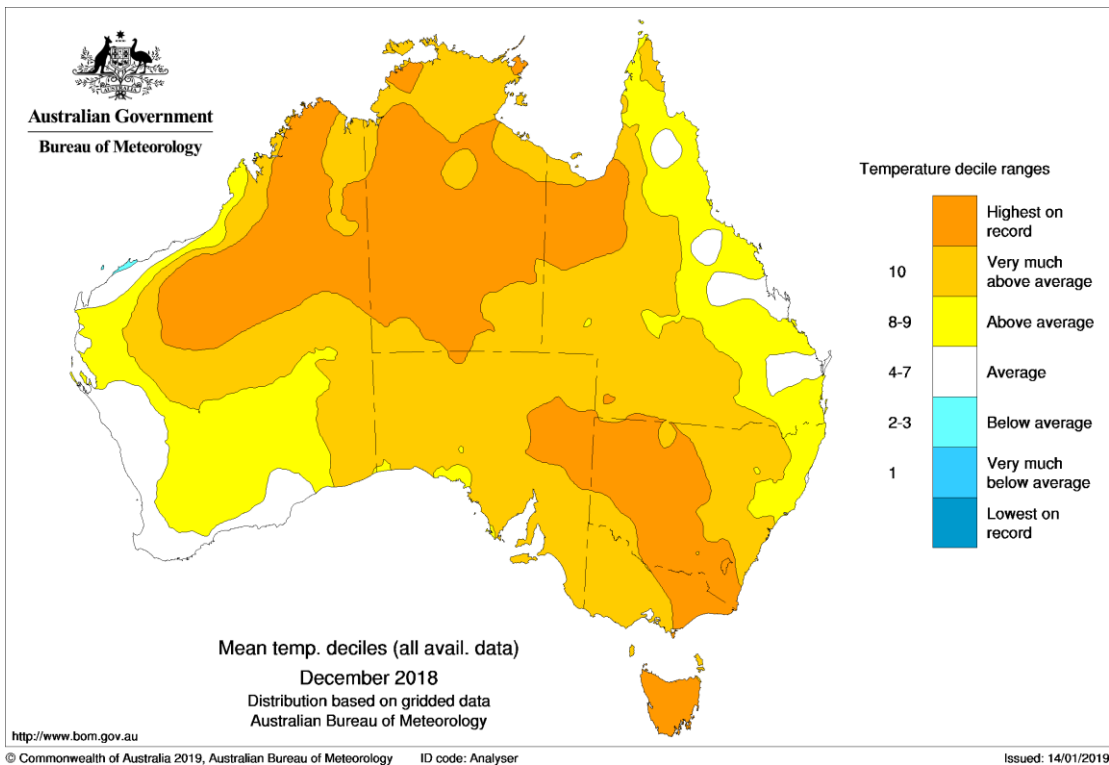


Figure 14: Map of mean temperature deciles (all available data since 1910) for December 2018 showing above average to record warm temperatures across most of Australia.

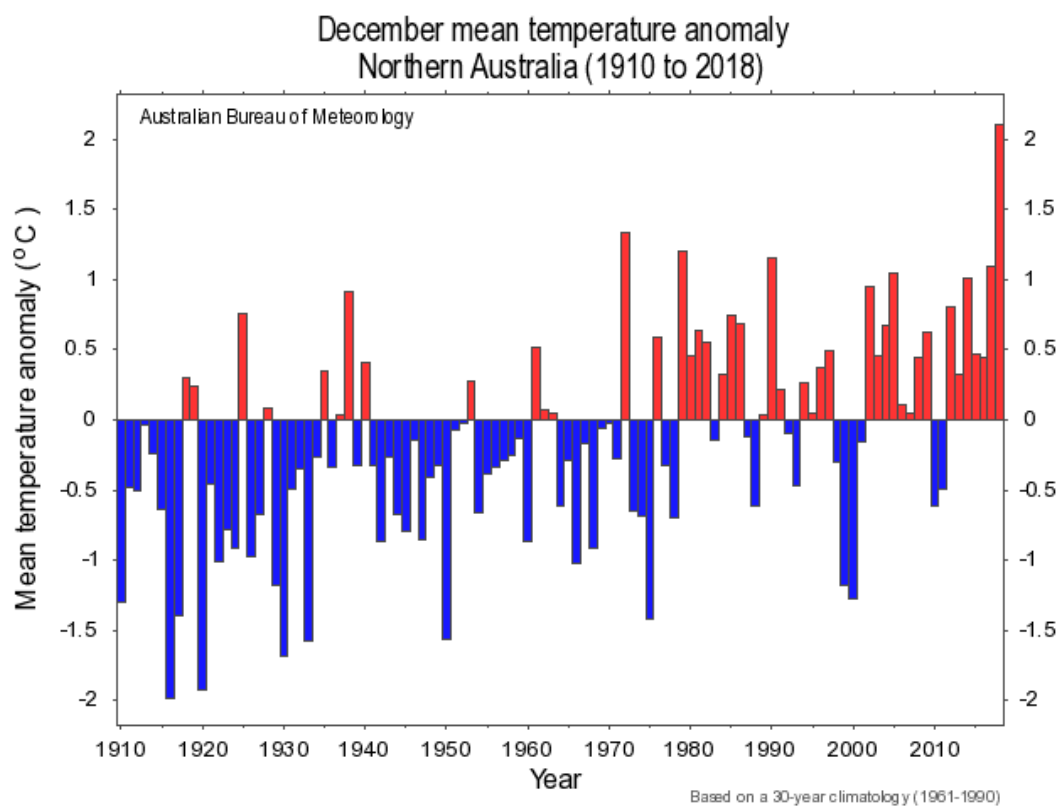


Figure 15: Time series graph of December mean temperature anomalies (differences from average) for northern Australia (north of 26°S inclusive) for the period 1910–2018.

5. Widespread heatwave conditions return in mid-January

Widespread heatwave conditions returned to large areas of Australia in mid-January, affecting many parts of the country (Figure 17). This was the peak of the event at the national scale, with temperatures over large areas slightly higher than those of late December and early January.

The initial peak of the event at a national scale was from 11 to 18 January, although heat persisted for longer in central and eastern areas. The Australian nationally-averaged mean temperature reached 40 °C on five consecutive days from 12 to 16 January. Prior to the 2018–19 summer, there had only been four days in total in 108 years (two in 1972 and two in 2013) when maximum temperatures had reached this level; this now means that seven of the ten hottest days on record averaged over Australia have occurred in the 2018–19 summer, five of them consecutively. Eight of the ten hottest daily mean temperatures, and six of the ten hottest nationally-averaged minimum temperatures, have also occurred this summer (Table 1). This makes this period clearly the most significant multi-day heatwave on record at the national scale.

The seven consecutive days above 39 °C from 11 to 17 January equalled the record from January 2013; after 21 such days in 108 years, there have been 18 so far this summer (as of 22 January).

Nationally, the hottest day was 15 January, when average maximum temperatures were 40.26 °C, falling just short of the record of 40.30 °C on 7 January 2013. 16 January saw records set for national averages for both minimum temperature (24.94 °C, previously 24.69 °C on 23 January 1982) and mean temperature (32.48 °C, previously 32.29 °C on 8 January 2013), but these were subsequently broken on 22 January with 25.09 °C and 32.63 °C respectively. The national mean temperature was above 32 °C on three consecutive days from 15 to 17 January and from 21 to 23 January (previous record two days in January 2013) and above 31 °C on eight consecutive days from 11 to 18 January, second only to the run of nine days in late December and early January. Minimum temperatures were above 23 °C for 16 consecutive days from 11 to 26 January, breaking the record of 12 days set in February 2004, whilst the five consecutive nights above 24 °C from 21 to 25 January breaks the record of three nights in February 2004 and January 2018 (there was also a four-day sequence from 15 to 18 January). At the State area-averaged level, relatively few records were set for consecutive days above thresholds, the most notable being a 15-day run above 40 °C for the Northern Territory (10 to 24 January), which breaks the record of 12 days set earlier this summer and in January 2013 and December 1972 – January 1973, and three days above 43 °C in South Australia from 14 to 16 January and 22 to 24 January, the first time this has occurred (there have been eight instances of two consecutive days, most recently in January 2013).

Whilst very high temperatures affected multiple States, the most relatively extreme values occurred in New South Wales and South Australia (Figure 16). New South Wales had five consecutive days (14 to 18 January) with State averages above 40 °C, the last four above 41 °C. These were short of the records set in January 1939 (when there were runs of eight and five days respectively), but well ahead of any other heatwave, with no other instance of more than three days above 40 °C. The 16th was the fourth-hottest day on record for New South Wales, and the 14th at the time the third-hottest for South Australia. A number of locations in both States exceeded 48 °C, including 49.0 °C at Tarcoola and 48.9 °C at Port Augusta on the 15th, while three separate locations in New South Wales reached 48.2 °C: White Cliffs and Pooncarie on the 16th, and Tibooburra on the 17th. The highest temperature in Australia during this period was 49.1 °C at Marble Bar on 13 January.

A feature of this period in New South Wales, and to a lesser extent in adjacent States, was extremely high minimum temperatures in the western half of the State. These peaked on 18 January, when the minimum temperature at Noona (between Cobar and Wilcannia) was 35.9 °C. This was at the time the highest minimum temperature ever recorded in Australia, surpassing the previous record of 35.5 °C, which had been set on 24 January 1982 at Arkaroola (SA) and equalled on 21 January 2003 at Wittenoom (WA). Borrona Downs (near Wanaaring) also broke the previous record with 35.6 °C. (Earlier in the week, 34.6 °C at Borrona Downs on the 14th was, at the time, a New South Wales State record). Three other sites, Tibooburra, White Cliffs and Delta, all had minima of 34.2 °C on the 18th, which equalled the pre-2019 New South Wales record. The 18th was the hottest night on record averaged over the State, with an average of 27.22 °C, well above the previous record of 26.79 °C on 15 February 2004.

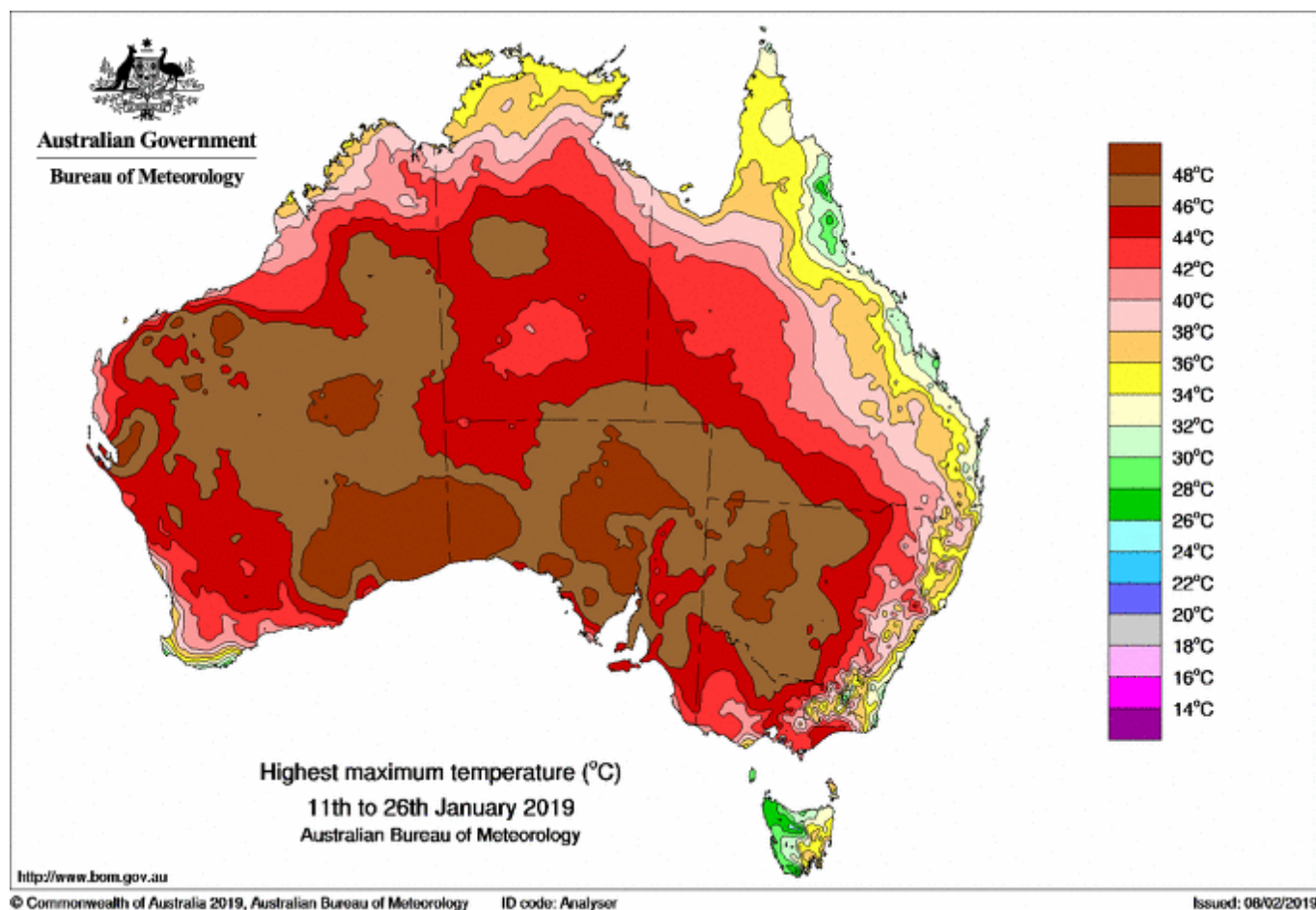


Figure 16: Map of highest maximum temperature observed on any day from 11 to 26 January 2019.

Except in South Australia, the extreme heat during mid-January was largely confined to inland areas, with seabreezes moderating conditions on the coasts. Neither Sydney nor Melbourne reached 35 °C during this period, although temperatures exceeding 40 °C occurred in northern and eastern suburbs of Melbourne on the 14th and 15th, and in western Sydney on the 17th and 18th.

Apart from the night of 18 January, the heat during this period was more notable for its extent and duration than for extremes on individual days, with only relatively small numbers of single-day records being set (Figure 18 and Figure 19).

The final phase of the heatwave peaked from 22 to 27 January. This saw the largest number of individual extremes, with temperatures exceeding 48 °C over parts of the Nullarbor, the Eyre Peninsula and outback regions (and locally around Adelaide) in South Australia, and western New South Wales. The heat was particularly extreme in South Australia, which had its two hottest area-averaged days on record with average maximum temperatures of 45.69 °C and 45.67 °C on the 24th and 23rd respectively (previously 45.25 °C on 2 January 1960), relegating 14 January to fifth-hottest, and extended throughout the State with only a handful of the most exposed coastal stations failing to reach 40 °C on 24 January.

The 25th saw extreme heat focused on Victoria and southern New South Wales. In Victoria, the most relatively extreme temperatures occurred in north-central areas, with locations such as Swan Hill, Kerang and Bendigo surpassing their 1939 records, as did Deniliquin on the New South Wales side of the border. Another area of extreme heat was in Gippsland, where Sale equalled its record set during the 2009 heatwave.

Extreme high minimum temperatures (discussed further in section 6) occurred in New South Wales and adjacent areas of South Australia and southwest Queensland on the 26th, with many records set, including a new national record of 36.6 °C at Borrona Downs. The 27th was only slightly cooler. Whilst temperatures in many areas remained well above average, the last four days of January were less extreme with values well below record levels.

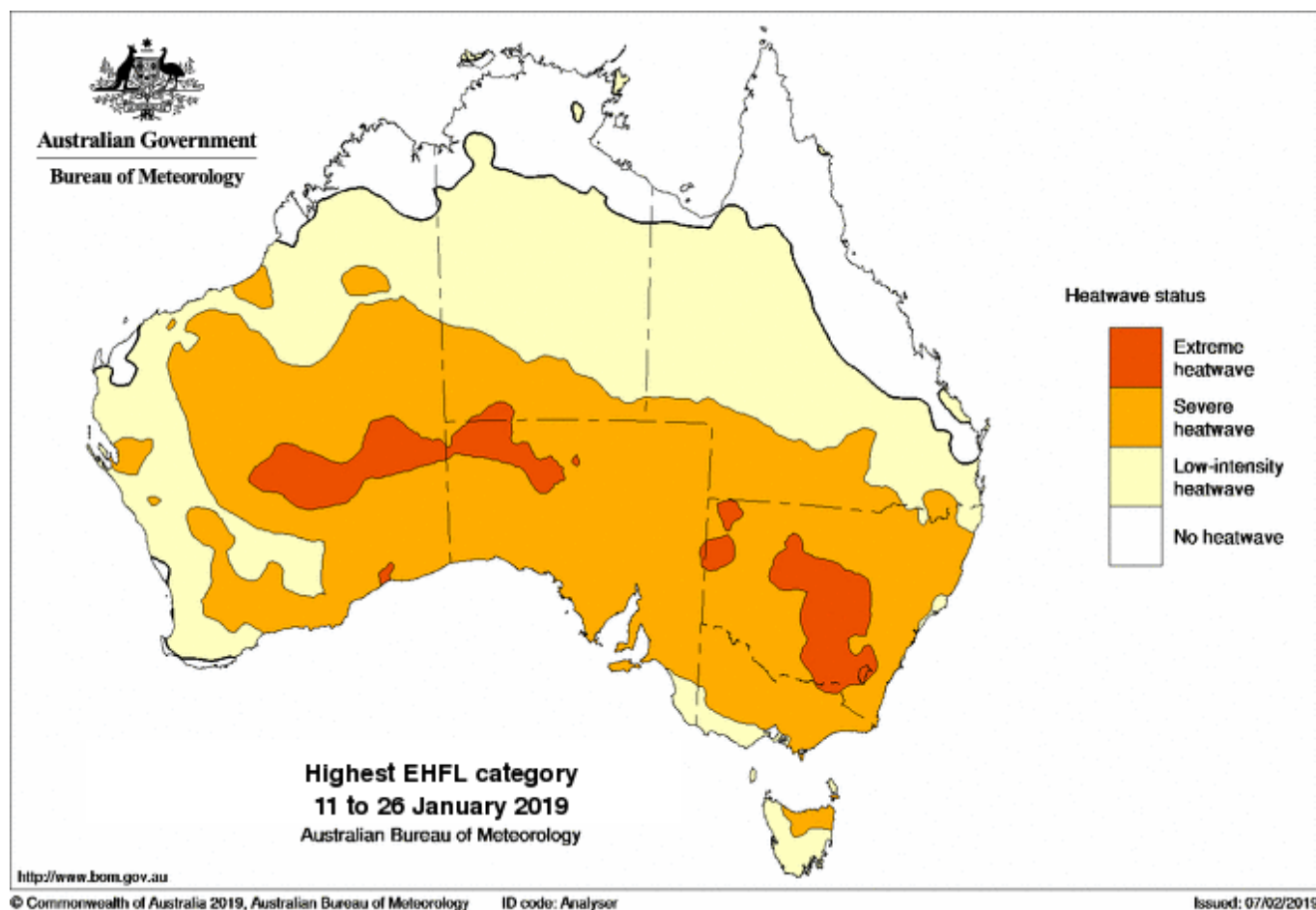


Figure 17: Map of the highest three-day heatwave category for 11 to 26 January 2019.

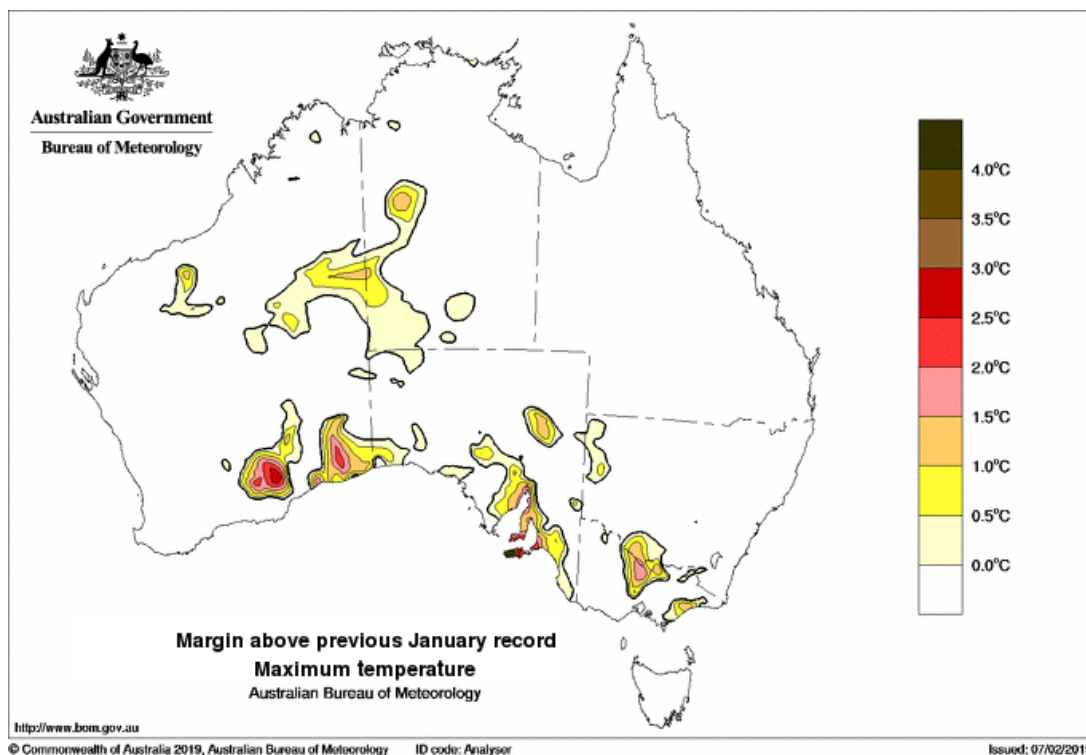


Figure 18: Map of areas recording a new highest maximum temperature in January 2019 (compared with data from 1910 to 2018).

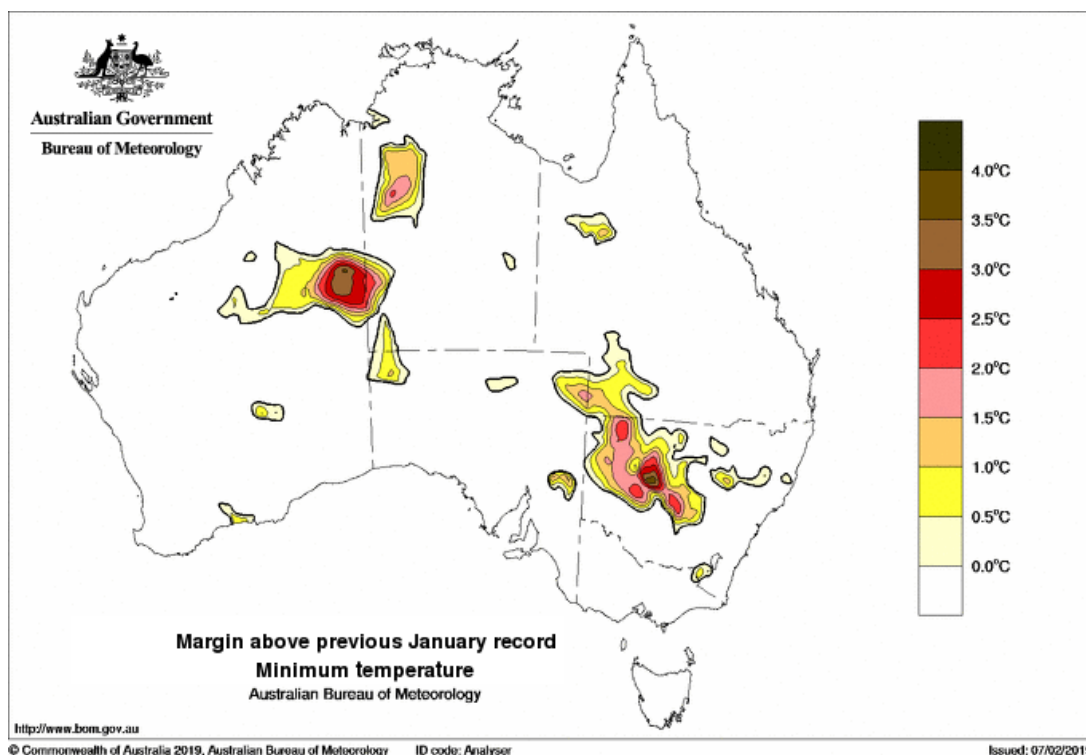


Figure 19: Map of areas recording a new highest minimum temperature in January 2019 (compared with data from 1910 to 2018).

6. Record high temperatures at individual locations

The first stage of the event was more notable for the persistence and areal extent of the heat than for individual extreme high temperatures, but many individual locations, mostly in western and central Australia, set new high December temperature records; some broke the previous record several times, and a few broke previous annual records. There were some further records in the first part of January, particularly for high minimum temperatures in New South Wales, before the most intense phase of the heatwave, which saw many records broken in South Australia and parts of Victoria and New South Wales. Conditions were less extreme in most of February, although a few records were set in northern Australia, particularly tropical coastal Queensland. There was then another period of extreme heat which affected parts of southern Australia, particularly Tasmania, at the start of March.

Site records for locations with 40 years or more of data are shown in Tables 2 to 7 and in Figure 20.

Marble Bar (Western Australia) reached an annual record of 49.3 °C on 27 December after also exceeding its previous December record on the 26th. It also reached 49.1 °C on 13 January, 0.1 °C short of its January (and previous annual) record.

Marble Bar's 49.3 °C on 27 December was, at the time, the highest temperature recorded in Australia since Moomba reached 49.6 °C on 12 January 2013 (Moomba also reached 49.3 °C on 2 January 2014).

Wittenoom (Western Australia) reached an annual record 47.8 °C on 27 December, one of four days in the month that exceeded its previous December record of 46.2 °C on 31 December 1972.

Alice Springs (Northern Territory) reached an annual record 45.6 °C on both 29 December and 3 January, also exceeding its previous December record (44.2 °C on 23 December 1972) on the 30th.

The five warmest December minimum temperatures recorded in the Northern Territory occurred in 2018, with the highest 33.8 °C at Walungurru on the 30th. Walungurru went on to have a minimum of 34.3 °C on 3 January, a record for the Northern Territory for any time of year (previously 33.7 °C at Jervois on 5 January 2006), and on the same day reached a maximum of 47.4 °C, the highest at any Northern Territory site since 1960.

Eyre (Western Australia) reached a new annual record 48.5 °C on 2 January 2019 (47.7 °C on 2 January 2013).

Lajamanu Airport (Northern Territory) on 3 January equalled its annual record of 46.2 °C (set just the previous month on 12 December 2018), also exceeding its previous January record (44.5 °C on 3 January 2014) on the 2nd. Also in the Northern Territory on 3 January, new annual records were set at Yulara Airport (46.8 °C) and Kulgera (47.0 °C).

In the second phase of the heatwave in mid-January, record high temperatures were set at a number of locations, mostly in southern inland New South Wales and northern Victoria (although very few of the locations that set records in those areas have data extending as far back as 1939). There were also some records set in South Australia. Record high minimum temperatures were set widely across inland New South Wales, particularly on the 18th.

The third phase of widespread record high temperatures occurred from 23 to 27 January. This stage of the event saw the greatest occurrence of individual record high temperatures. Many records were set in South Australia on 24 January, including at the ACORN-SAT locations of Adelaide, Port Lincoln (which set a record by more than 2 °C), Snowtown, Ceduna and Nuriootpa, with conditions particularly exceptional in coastal and near-coastal regions from the Eyre Peninsula to the Adelaide region. The next day, the extreme heat moved east with a number of records set in north-central Victoria (including 47.6 °C at Kerang, a Victorian record for January) and southern border areas of New South Wales. The highest temperature during this period was 49.5 °C at Port Augusta on 24 January. This was the highest temperature in Australia since January 2013, and the highest on record at a near-coastal site in Australia outside the tropics.

Over the following two days, whilst daytime temperatures moderated slightly, overnight minimum temperatures were exceptionally high in many parts of inland eastern Australia. The Australian record high minimum temperature, set only the previous week at Noona, was broken at Borrona Downs (near Wanaaring) with an overnight low of 36.6 °C on 26 January. The same night, Moomba (36.1 °C) also exceeded the previous Australian record and set a new South Australian record, whilst Ballera (35.1 °C) set a new record for Queensland.

Overall, during the course of the 2018–19 summer, new State/Territory high minimum temperature records have been set for New South Wales, South Australia, Queensland and the Northern Territory. In total, the pre-2018 New South Wales record (of 34.2 °C at White Cliffs on 11 February 2017) has been surpassed nine times and equalled on three more occasions. Whilst some of these have occurred at relatively new sites (such as Borrora Downs and Noona, both of which opened in 2017), others have occurred at locations with a substantial observations history (often at two or more sites), such as Tibooburra, White Cliffs and Fowlers Gap.

A final phase of widespread extreme temperatures occurred at the end of February and in early March. This was most extreme in Tasmania, where Dover reached 40.1 °C on 2 March, 2.1 °C above the previous Tasmanian March record. Eight other locations exceeded the previous State record that day, and the 39.0 °C at Cape Bruny Lighthouse equalled the record at that site for any month. March records were also set on the Nullarbor and in parts of coastal South Australia.

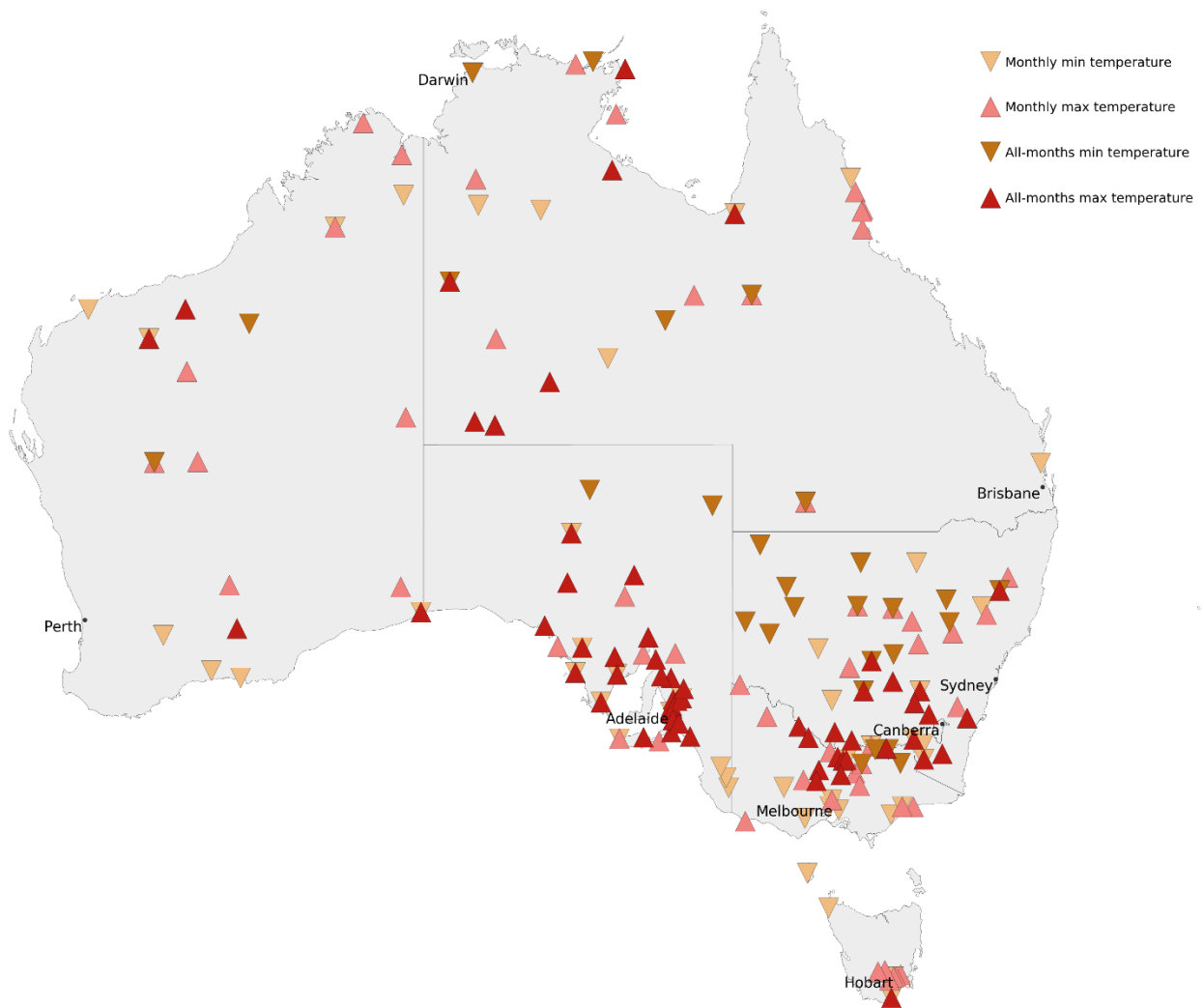


Figure 20: Map of locations with 40 years or more of data that set new records for daily high maximum and minimum temperatures from 1 December 2018 to 6 March 2019.

7. Persistently hot weather at individual locations and over large areas

The event was characterised as much by persistently high temperatures as by individual hot days. An indication of the persistence of the heat is that the mean daily temperature for Australia was above the 1961–1990 average every day from 16 December 2018 to 8 February 2019, with 14 and 15 December being the only below-average days since 25 November.

In the earlier stages of the event, Alice Springs (Northern Territory) reached 45 °C four times in the week from 29 December to 4 January. It had only reached 45 °C three times in total in the previous 76 years of observations at the airport (twice in 1960, and once in 2004).

Later, a range of sites, mostly in inland New South Wales and southern Queensland, had record runs of hot days through mid-January. This included a run of four consecutive days of 40 °C or above in Canberra from 15 to 18 January; Canberra had only reached 40 °C nine times in total in the first 94 years of observations there from 1913 to 2006 (and did not reach 40 °C at all between 1973 and 1998). Other noteworthy record-breaking runs during this period included five days above 42 °C at Wagga Wagga, five days above 45 °C at Hillston and ten days above 45 °C at Birdsville (the last of these is a record for any Queensland site). However, in general, runs of extreme hot days in inland New South Wales were slightly shorter than the equivalents in the 1939 heatwave for those sites that were operating then.

Numerous sites, particularly in inland New South Wales, had a record number of consecutive days during one or both of these phases with a maximum temperature of 35 °C or more or 40 °C or more, or nights of 25 °C or more (see **Figure 21**). Hillston had five consecutive days of 45 °C or above from 14 to 18 January, having not previously had more than two.

There were extremely long runs of hot days at some sites in northern Australia. In the early stages of the event, Rabbit Flat (Northern Territory) reached 40 °C for 33 consecutive days from 2 December to 3 January; the previous longest run was 25 days at the former site in 1997–98. This fell just short of the then Northern Territory record of 35 days, set at Walungurru in 2007. After a day of 39.4 °C on 4 January, Rabbit Flat then commenced a new run of 41 consecutive days of 40 °C or above from 5 January to 14 February. Walungurru itself, however, extended its record with a run of 43 consecutive days of 40 °C or above from 16 December to 27 January. Tennant Creek also had a record 23-day run ending on 15 January, whilst Mount Isa has broken its record for consecutive 40 °C days (previously 13) twice in this event; first a 16-day run from 16 to 31 December, then (after 39.8 °C on 1 January), a 23-day run from 2 to 24 January. Cloncurry had a 43-day run of 40 °C or above from 16 December to 27 January, easily surpassing the previous record for any Queensland site of 31 days (set on a number of occasions), whilst Bourke set a New South Wales record of 21 days of 40 °C or above from 9 to 29 January, exceeding its own State record of 17 days from January 1939.

Whilst Tasmania was only briefly affected by extreme heat during this event, it has experienced a prolonged period of warm and dry conditions. An indicator of this has been a record run of 31 consecutive days of 20 °C or above at Hobart from 23 December to 22 January. Another region which saw little extreme heat but persistent above-average temperatures is southeast Queensland, where Brisbane had 46 consecutive days of 30 °C or above from 10 January to 24 February, a record for a central Brisbane site.⁷

Nights were also warm, with a few sites, mostly in inland New South Wales and southern Queensland having a record number of consecutive nights with minimum temperatures of 20 °C or above or 25 °C or above. Ballera (Queensland) had 12 consecutive nights of 30 °C or above from 16 to 27 January, above the previous Australian record of nine nights at Oodnadatta in February 2004. Cunnamulla (Queensland) had 34 consecutive nights above 25 °C from 28 December to 30 January, surpassing the previous record there of 22 nights in 2005–06.

⁷ This incorporates site numbers 40214 (to 1986) and 40913 (from 1999). There was no observing site in central Brisbane between 1986 and 1999.

Earlier, Walungurru had seven consecutive nights of 30 °C or above from 28 December to 3 January, the last six of which reached 32 °C. The run of 32 °C nights is a record for any Australian site (prior to the 2018-19 summer, the record was four⁸ at Oodnadatta (SA) during the February 2004 event).

Girilambone had 22 nights of 25 °C or above from 13 January to 3 February, well above the previous New South Wales record of 18 nights at Tibooburra in January 2001, with Delta (21 nights) and Borrona Downs (20 nights) also exceeding the previous record. Moomba, with 18 consecutive nights of 25 °C or above from 10 to 27 January, equalled its own South Australian record.

Marble Bar (Western Australia) had a December mean maximum temperature of 44.1 °C, surpassing the national December record of 43.9 °C set there in 1961, 1986, and 2015. The national all-months record for a reasonably complete month is 44.9 °C at Marble Bar in February 2007.

Rabbit Flat in December had the highest monthly mean maximum temperature on record for a Northern Territory site; 43.7 °C, exceeding the previous record of 42.9 °C at Walungurru in January 2013. State records were set in January for Queensland (44.0 °C at Birdsville) and New South Wales (43.1 °C at Wanaaring). January monthly mean minimum temperatures at Birdsville (29.6 °C) and Borrona Downs (29.3 °C) fell short of the national record of 30.0 °C, set at Birdsville in January 2006, although Borrona Downs set a State record for New South Wales.

The extent and duration of the extreme heat has also led to very large numbers of extreme hot days in terms of Australian area-averages. Six of the ten hottest days on record for Australia for maximum temperature have occurred during this summer; for minimum temperature, eight of the ten hottest days (including the six hottest) have occurred in 2018–19, and for mean temperature eight of the hottest ten, including the hottest three (**Table 1**). In total there had only been 21 days with an Australian area-averaged maximum temperature of 39 °C or above from 1910 to November 2018; there have been 19 so far this summer. There have been 28 days to date in the 2018–19 summer with Australian area-averaged mean temperature above the 99th percentile for a month (**Figure 22**), far in excess of the previous record of 11 such days for a whole summer.

⁸ Sequences of four consecutive nights of 32 °C or above also occurred later in the 2018–19 summer at Fowlers Gap (NSW), Tibooburra Airport (NSW) and Ballera (Queensland), in addition to the six-night run at Ballera mentioned in the text.

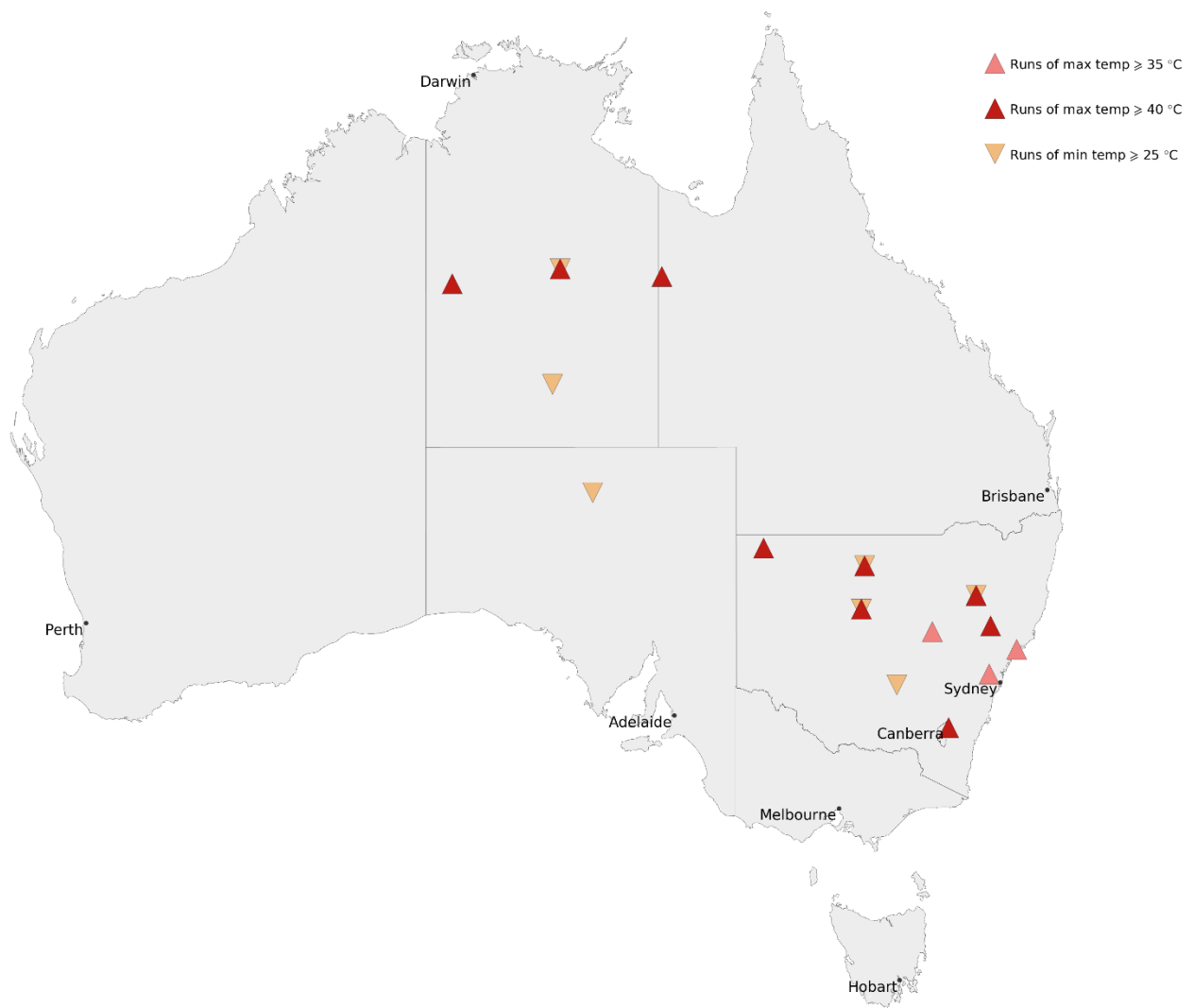


Figure 21: Map of sites with 40 years or more of data that reported new record runs of consecutive days with maximum temperatures over 35°C or 40°C , or minimum temperatures over 25°C , during December 2018 and January 2019.

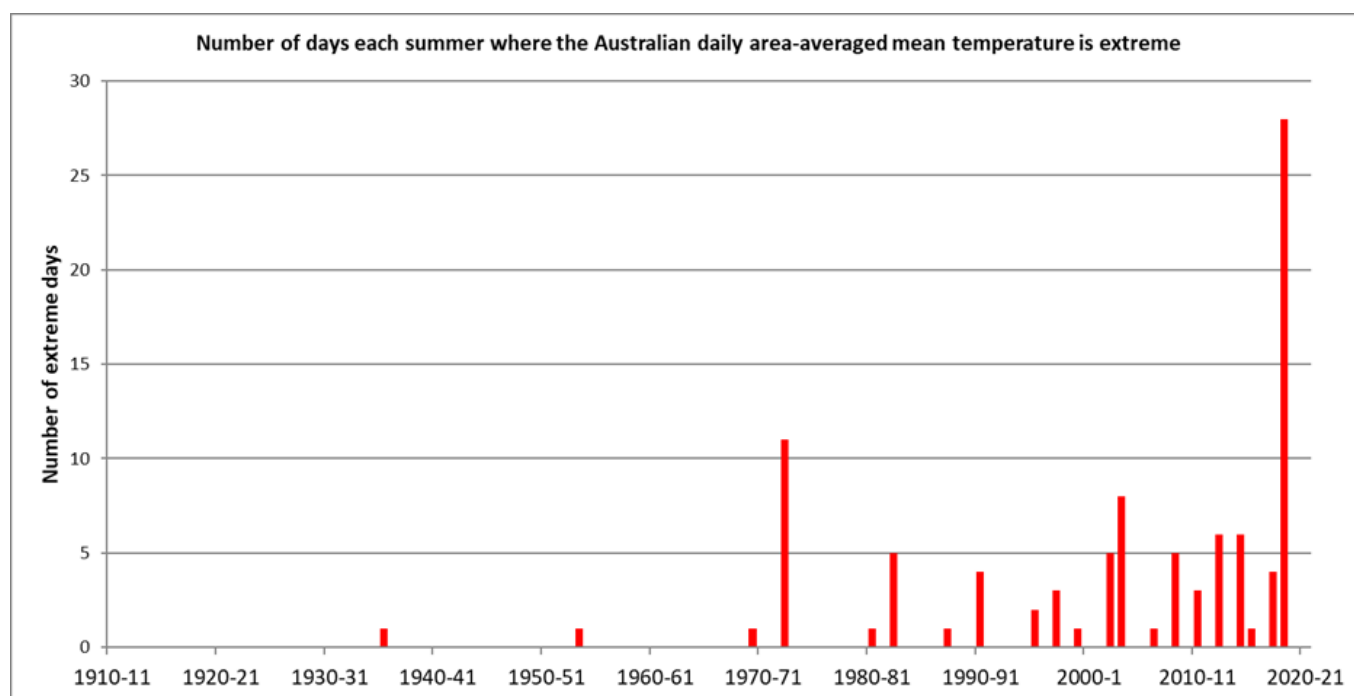


Figure 22: Number of days each summer in which the Australian area-averaged mean temperature exceeds the 99th percentile for the month.

8. Australia's hottest January on record

January 2019 was clearly Australia's hottest month on record (**Table 9**). Several major heatwaves occurred during the month, and even between the peaks of these events, temperatures remained high; the Australian area-averaged mean temperature was above the 1961–90 average every day from 16 December to 8 February.

The monthly mean temperature for Australia was 2.90 °C above the 1961–90 average (**Figure 23**). This was 0.98 °C above the temperature in January 2013, which had previously been Australia's hottest month on record, and made it the first month on record in which the Australian mean temperature had exceeded 30 °C. It is also the second-largest monthly mean anomaly on record for any month (**Table 10**), behind only October 2015. January 2019 and December 2018 (which ranks ninth-largest) are the first two instances of national monthly mean temperature anomalies above 2 °C in a summer month. In total, 9 of the 18 instances of monthly mean anomalies of 2 °C or above have occurred since September 2013. National maximum and minimum temperature anomalies were also the highest on record for January by substantial margins.

January was also the hottest on record for every State and Territory except South Australia and Western Australia. The heat was particularly extreme in New South Wales, where monthly mean temperatures were 5.86 °C above average, making it the State's hottest month on record by more than 2 °C. This was also the largest State anomaly on record for any month, ahead of the +4.90 °C, also in New South Wales, in November 2009. The State's area-averaged maximum (6.15 °C above average) and minimum (5.56 °C above average) temperatures were also monthly records for any State or Territory (previously 5.91 °C in South Australia in October 2015, and 4.94 °C in New South Wales in November 1914, respectively). The Northern Territory broke its monthly mean temperature record by more than 1 °C for the second-successive month, and the monthly mean anomalies for the Northern Territory, Tasmania, Victoria and South Australia all ranked among the four largest for any month (**Table 10**).

It was the hottest January on record over almost all of New South Wales and southwest Queensland, as well as over much of eastern and northern Victoria, the eastern half of Tasmania, and the southern half of the Northern Territory and adjacent areas of northwest Queensland and the interior of Western Australia (**Figure 23**). The only parts of Australia which were not significantly hotter than normal in January were eastern Queensland and the west and southwest coast of Western Australia.

In total, 42 of the 107 operating ACORN-SAT locations have had their hottest month on record during 2018–19 (**Table 15**), one in November, six in December and 35 in January. This included 21 of the 24 operating locations in

New South Wales, the only three exceptions being the exposed coastal sites of Yamba, Point Perpendicular and Moruya Heads. Numerous locations in inland New South Wales broke previous records for monthly mean temperature by around 2 °C, including West Wyalong (2.3 °C), Bourke (2.1 °C), Canberra (2.0 °C), Dubbo (1.9 °C) and Bathurst (1.9 °C). Two indicators of the extreme nature of the monthly anomalies in New South Wales are that the monthly mean temperature in January 2019 in Cabramurra in the Snowy Mountains was similar to that of an average January in Canberra, more than 900 metres lower, whilst the January 2019 average maximum and minimum temperatures in Condobolin, in central New South Wales, were similar to those of an average January in Marble Bar.

Many locations also set records for the greatest number of hot days (**Table 13**) or nights (**Table 14**) in a month. Some have already broken their records for the most very hot days in a calendar year; for example, Birdsville had 16 days of 45 °C or above in January, above their previous record of 13 such days in a year (set in 2017 and 2018). Canberra's 5 days of 40 °C or above is also an annual record, whilst the 8 nights (to date) of 20 °C equals the annual record set in 1973. Whilst Tasmania generally escaped the most extreme heat until the early March event, records were set in places for large numbers of hot days. Hobart's 7 days in January of 30 °C or above is a record for any month, whilst the 6 days of 30 °C or above at Irapuna (Eddystone Point), on the northern East Coast, is already a record for a calendar year.

The persistent blocking highs led to dry conditions in many parts of southeastern Australia, particularly Tasmania (which had its driest January on record) and southern Victoria and South Australia (where no measurable rain fell at Adelaide (West Terrace/ngayirdapira) from 16 December to 8 February). It was also a very dry month in southeast Queensland and northeast New South Wales. Underneath the core of the Tasman Sea blocking high, it was also exceptionally dry at Lord Howe Island, where December and January were each the driest on record, and the total December–January rainfall of 9.2 mm was far below the previous record low, set in 2016–17, of 49.8 mm, while Norfolk Island (12.2 mm) had its second-driest December–January after 1899–1900. However, regular thunderstorm activity resulted in near- or above-average rainfall in parts of the Central and Southern Tablelands districts of New South Wales, with Bathurst having its wettest January since 1984.

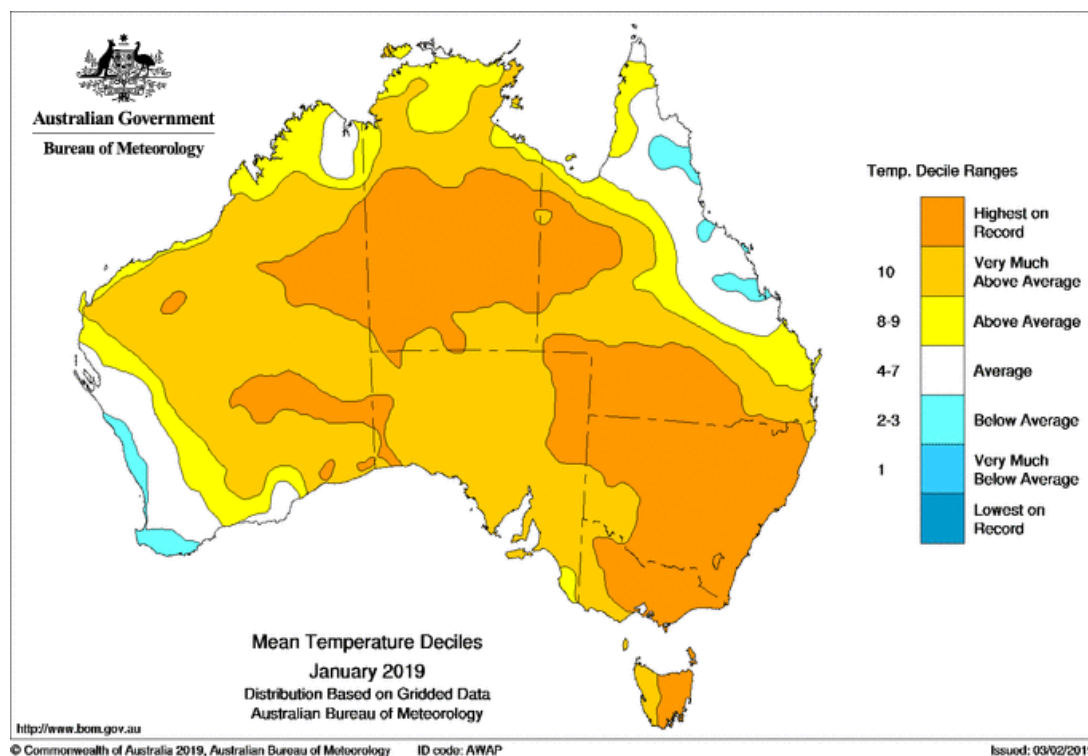


Figure 23: Mean temperature deciles for January 2019.

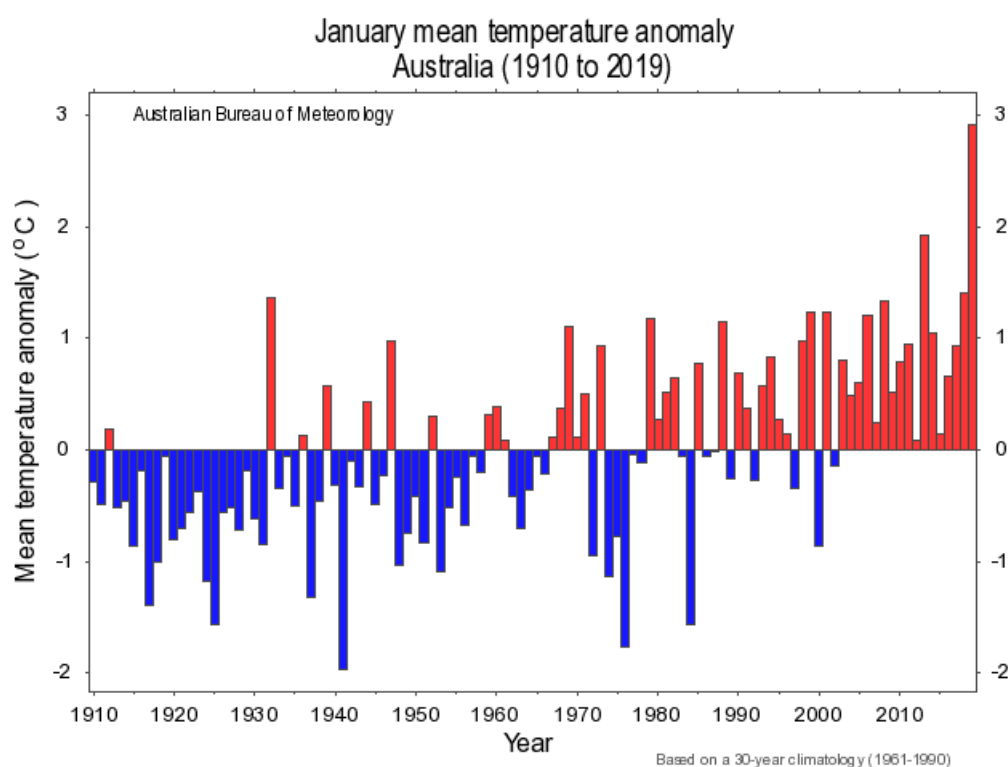


Figure 24: Mean January temperature anomalies for Australia, 1910 to 2019.

9. Australia's hottest summer on record

The summer of 2018–19 was clearly Australia's hottest on record. December and January were each the hottest on record, and February the fourth-hottest. Australian mean temperatures for the summer were 2.14 °C above the 1961–1990 average, 0.86 °C above the previous record set in 2012–13 (**Table 11**). It was also the first time that seasonal mean Australian temperatures had been more than 2 °C above average in any season. It was also the hottest summer on record for New South Wales, Victoria, Western Australia and the Northern Territory, which was 1.35 °C above its previous record. South Australia and Tasmania had their second-hottest summers on record, and Queensland its third-hottest.

Both daytime and nighttime temperatures were at record-breaking levels and followed broadly similar geographic patterns, although maximum temperatures (2.60 °C above average) were more extreme than minimum temperatures (1.67 °C above average).

Summer temperatures were above average over almost all of Australia, except for the western coastal strip of Western Australia south of the tropics, and locally in tropical eastern Queensland. They were more than 4 °C above average in parts of northwestern New South Wales and the west-central Northern Territory, and at least 3 °C above average over most of inland New South Wales and a large area in inland northwestern Australia.

It was the hottest summer on record over two major areas (**Figure 25**). The first covered much of southeastern Australia, including most of inland New South Wales, northern and eastern Victoria, and some border areas of southwest Queensland and northeast South Australia. The second covered much of the northwestern quarter of Australia away from the west coast, including most inland parts of the Northern Territory and northern Western Australia. In total, 26 of the 104 reporting ACORN-SAT locations had their hottest summer on record for mean temperatures (**Table 19**), with 31 setting records for maximum temperature and 24 for minimum temperature. Many locations also set records for the greatest number of days in a summer with maximum (**Table 17**) or minimum (**Table 18**) temperatures above set thresholds.

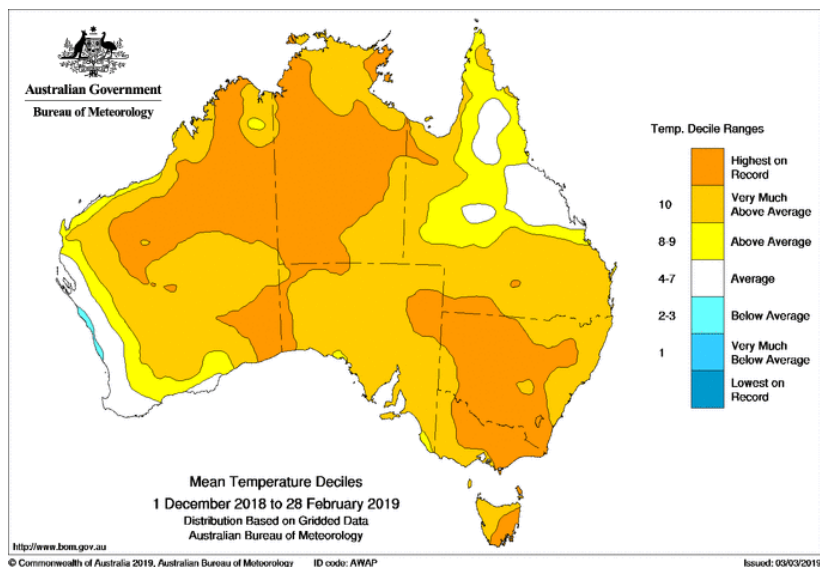


Figure 25: Mean temperature deciles for Australia for summer 2018-19.

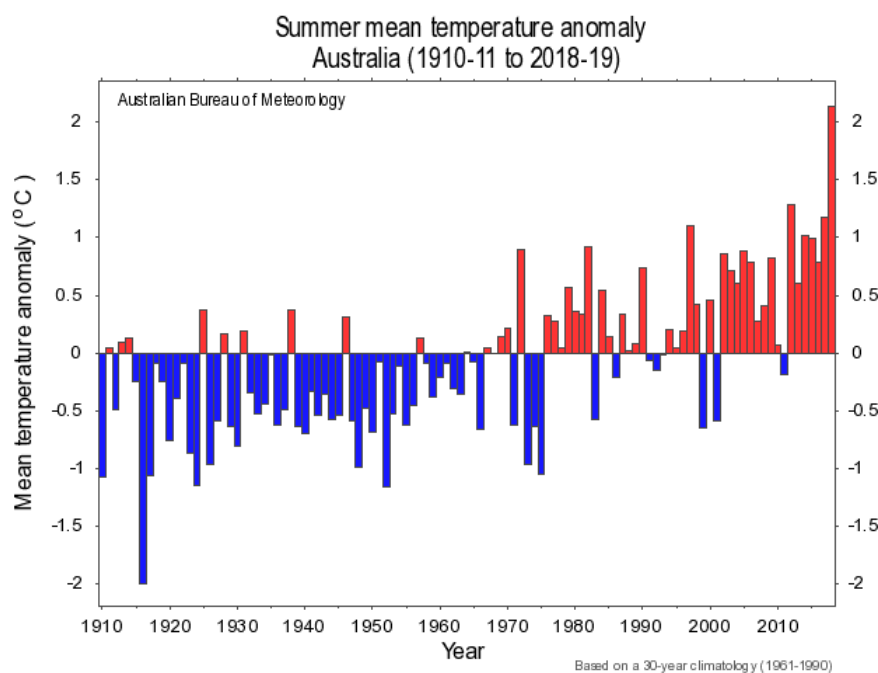


Figure 26. Mean summer temperature anomalies for Australia, 1910 to 2019.

10. Climate drivers

Tropical Pacific Ocean sea surface temperatures reached El Niño levels during late 2018. However, atmospheric indicators such as cloud patterns, the Southern Oscillation Index (SOI) and trade winds did not show consistent or sustained signs of El Niño.

A positive Indian Ocean Dipole (IOD) event was active from early September to December, but had weakened and was nearing its end before these widespread heatwave conditions. The positive IOD likely contributed to the antecedent dry conditions which affected Australia during the previous winter and spring.

Whilst individual days of extreme heat in summer are more likely during El Niño years in much of eastern Australia, particularly New South Wales and Queensland, the effect of large-scale climate drivers on extended heatwaves of the type experienced in 2018–19 is much less consistent. Whilst some notable extended heatwaves, such as

1972–73, have occurred during El Niño years, the 1939 and 2009 heatwaves occurred during cool neutral or weak La Niña conditions.

While all exceptional climate events have proximate (local) causes in antecedent and concurrent weather conditions, long-term trends also play a role. Australia's annual mean temperature has warmed by over 1 °C since 1910,⁹ and summer has warmed by a similar amount. Australia's annual warming trend is consistent with that observed for the globe.

11. Previous notable large-scale events

2012–13

An exceptionally extensive and long-lived heatwave affected large parts of Australia in late December 2012 and the first weeks of January 2013.¹⁰ Whilst the heat was most extreme and persistent in the central and southern interior of the continent, most of Australia experienced extreme heat at some stage during the event: 40 °C was reached at least once in every capital city except Brisbane and Darwin.

The 2012–13 event coincided with a late onset of the northern Australian monsoon, preventing moisture and cloud from moderating inland temperatures.

The heat was notable for the extent, with records set in every State and Territory, and the nationally averaged daily temperature rose to levels never previously observed, and did this for an extended period. The heatwave was a major factor in January 2013 being the warmest month on record for Australia.

Australia's hottest day on record was set during the event (mean maximum temperature of 40.30 °C on 7 January 2013), exceeding the previous record from the 1972–73 event (39.79 °C on 1 January 1973); the current 2018–19 event set a new December record (40.19 °C).

1972–73

Record hot conditions continued for an extended period across much of Australia from late 1972 to early 1973. Until 2013, the 1972–73 heatwave saw the only instances of daily area-averaged Australian maximum temperatures above 40 °C. Unlike the 2013 event, the most extreme heat was generally confined to inland areas.

As with January 2013 and 2019, the 1972–73 heatwave coincided with a late onset of the northern Australian monsoon.

January 1960

Extreme heat affected large parts of central Australia at the start of 1960. The heat was particularly extreme in outback South Australia and the southern Northern Territory. Oodnadatta reached 50.7 °C on 2 January, the highest temperature on record for Australia under standard conditions, whilst Finke set a Northern Territory record of 48.3 °C¹¹. At Whyalla, 49.4 °C is the highest temperature on record for a near-coastal site in Australia. The extent and duration of this event were less than that of other events discussed in this Statement; it was largely confined to the week 29 December 1959 to 4 January 1960, and temperatures above 40 °C in the southeastern States were largely confined to the western half of New South Wales and the northwest of Victoria. Conditions also did not differ significantly from average in the Pilbara.

⁹ For further information see [State of the Climate 2018](#)

¹⁰ For further information see [Special Climate Statement 43—extreme heat in January 2013](#)

¹¹ The Finke site closed in 1980 and no site at a comparably low elevation has existed since in the southern Northern Territory.

January 1939

For New South Wales as a whole, four of the five hottest days on record prior to 2019 were in January 1939.

The second week of January 1939 is regarded as the most extreme heatwave to affect southeast Australia during the twentieth century. The event culminated in the Black Friday fires of 13 January 1939. It remains the most significant heatwave on record in southern inland New South Wales and adjacent areas of northeast Victoria, as well as in parts of South Australia. Many of the temperature records set during the 1939 heatwave were broken in 2009 in Victoria, and in one or more of 2013, 2014 or 2017 in northern and eastern New South Wales. Most of the remaining 1939 records in South Australia were broken on 24 January 2019, but those in southern New South Wales mostly still stand.

In general, the 1939 heatwave was of comparable intensity to, and slightly longer than, the peak phase of the 2019 heatwave in inland southeastern Australia, and affected Melbourne and Sydney to a greater extent than the 2019 heatwave did. However, the 1939 heatwave affected a much smaller area than 2019, and had little or no effect on Western Australia, the Northern Territory, or most of Queensland. Heat also did not extend through the remainder of the month in 1939 to the same extent that it has in 2019.

12. Tables of new records

Table 1: The ten warmest days on record for area-averaged maximum, minimum and daily mean temperatures for Australia. Values set during the 2018-19 summer are shown in bold.

Maximum temperature (°C)	Date	Minimum temperature (°C)	Date	Mean temperature (°C)	Date
40.30	7 Jan 2013	25.09	22 Jan 2009	32.64	22 Jan 2019
40.26	15 Jan 2019	24.93	16 Jan 2019	32.47	16 Jan 2019
40.19	27 Dec 2018	24.89	23 Jan 2019	32.45	15 Jan 2019
40.18	22 Jan 2019	24.89	25 Jan 2019	32.30	8 Jan 2013
40.17	21 Dec 1972	24.76	18 Jan 2019	32.21	7 Jan 2013
40.10	8 Jan 2013	24.69	17 Jan 2019	32.17	17 Jan 2019
40.06	12 Jan 2019	24.69	23 Jan 1982	32.07	23 Jan 2019
40.01	16 Jan 2019	24.64	24 Jan 2019	32.04	3 Jan 2019
40.01	13 Jan 2019	24.64	15 Jan 2019	32.03	12 Jan 2019
40.01	12 Dec 1972	24.53	28 Jan 2018	32.02	21 Jan 2019

Table 2: December high maximum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in italics. Records for any month are shown in bold.

Station number	Station name	State	New record (°C)	Date of new record	Previous record (°C)	Date of previous record
1006 / 1013 / 1005	Wyndham	WA	45.8	2018-12-12	45.4	2009-12-07, 1985-12-19
<i>1019 / 1021</i>	<i>Kalumburu</i>	WA	42.6	<i>2018-12-20</i>	42.3	<i>1969-12-08</i>
3093 / 3006	Fitzroy Crossing	WA	46.7	2018-12-25	46.5	1966-12-21
4106 / 4020	Marble Bar	WA	49.3	2018-12-27	48.4	2011-12-21 (Dec)
					49.2	1922-01-03 (all)
5026	Wittenoom	WA	47.8	2018-12-27	46.2	1972-12-31 (Dec)
					47.6	1998-01-02 (all)
7045	<i>Meekatharra</i>	WA	46.0	2018-12-26	45.3	1997-12-31
7176 / 7151	Newman	WA	46.7	2018-12-30	46.0	1990-12-25
13012	Wiluna	WA	47.0	2018-12-31	46.9	1990-12-25
<i>13017</i>	<i>Giles</i>	WA	45.1 (=)	2018-12-28	45.1	2014-12-05
14404 / 14402	Milingimbi	NT	39.2	2018-12-10	38.7	2009-12-03
14508	Gove	NT	38.7	2018-12-04	38.0	1967-12-16, 2015-11-10
14518 / 14507 / 14506	Groote Eylandt	NT	40.7	2018-12-06	40.3	1990-12-31
14723 / 14710	Borroloola	NT	44.6	2018-12-05	44.4	1969-12-06, 1965-11-09
<i>14825</i>	<i>Victoria River Downs</i>	<i>NT</i>	<i>44.7</i>	<i>2018-12-11</i>	<i>44.2</i>	<i>1985-12-19</i>
15511	Curtin Springs	NT	46.9	2018-12-30	45.9	1981-12-06
15528	Yuendumu	NT	44.8	2018-12-29	44.6	2007-12-02
15590 / 15540	Alice Springs	NT	45.6	2018-12-29	44.4	1925-12-18 (Dec)
					45.2	1960-01-02 (Jan)
15635 / 15527	Yulara	NT	46.1	2018-12-29, 2018-12-30	46.0	1981-12-04
15666 / 15548	Rabbit Flat	NT	47.1	2018-12-12, 2018-12-19	47.0	1990-12-28
16001	<i>Woomera</i>	SA	46.2	2018-12-28	45.5	2017-12-18
18040	Kimba	SA	44.6	2018-12-29	44.0	2005-12-30
18120 / 18103	Whyalla	SA	46.8	2018-12-27	45.8	2015-12-19

18201 / 16092 / 19036 / 19066	Port Augusta	SA	47.7	2018-12-28	47.2	2015-12-19
19062	Yongala	SA	41.9	2018-12-28	41.5	1972-12-21
21139 / 21118 / 21043	Port Pirie	SA	46.6	2018-12-28	45.6	2015-12-19 (Dec)
					46.3	1979-01-04 (all)
23083	Edinburgh RAAF	SA	43.9	2018-12-27	43.5	2015-12-19
23090	Adelaide (Kent Town)	SA	43.7	2018-12-27	43.4	2013-12-19
23343	Turretfield Res Ctr	SA	44.4	2018-12-27	43.6	2013-12-19
23373 / 23321	Nuriootpa	SA	42.2	2018-12-27	41.8	2005-12-30
29058 / 29025	Julia Creek	QLD	46.4	2018-12-22	45.8	2006-12-01
29063 / 29041	Normanton	QLD	43.9	2018-12-04	43.3	1967-12-17 (Dec)
					43.9	1916-10-26 (all)
29127	Mount Isa	QLD	45.3	2018-12-21	45.1	2006-12-01
45025 / 45017	Thargomindah	QLD	47.2	2018-12-20	45.6	1996-12-01
47016	Lake Victoria Storage	NSW	44.7	2018-12-27	44.5	1994-12-19
48027	Cobar MO	NSW	45.6	2018-12-20	44.1	2005-12-31, 2005-12-23
50031	Peak Hill	NSW	42.9	2018-12-20	42.2	1972-12-22, 1965-12-30
51039	Nyngan	NSW	45.5	2018-12-20	44.4	1994-12-22
51049	Trangie	NSW	44.6	2018-12-20	43.3	1981-12-05
72160 / 72146 / 72097 / 72059	Albury	NSW	43.2	2018-12-27	42.2	2005-12-31
74034	Corowa	NSW	44.0	2018-12-27	42.5	1972-12-22
81125 / 81084 / 81044	Shepparton	VIC	43.2	2018-12-27	42.8	2005-12-31

Table 3: January high maximum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in italics. Records for any month are shown in bold.

Station number	Station name	State	New record (°C)	Date of new record	Previous record (°C)	Date of previous record
11003	Eucla	WA	48.6	2019-01-23	48.2	2013-01-03
12009 / 12065	Norseman	WA	46.5	2019-01-13	46.0	1990-01-22
15511	Curtin Springs	NT	46.5	2019-01-04	46.4	2013-01-11
15590 / 15540	<i>Alice Springs</i>	<i>NT</i>	45.6	2019-01-03	45.2	1960-01-03
15635 / 15527	Yulara	NT	46.8	2019-01-03	46.4	2013-01-11, 2011-01-28
16065	Andamooka	SA	48.1	2019-01-24	47.8	2011-01-25
16090 / 16007	Coober Pedy	SA	47.8	2019-01-16	47.4	2014-01-01 (Jan)
					47.8	1972-12-30 (all)
16098 / 16044	<i>Tarcoola</i>	<i>SA</i>	49.1	2019-01-24	48.9	2014-01-01, 1949-12-27
18012	<i>Ceduna</i>	<i>SA</i>	48.6	2019-01-24	47.9	1990-01-02
18040	Kimba	SA	47.0	2019-01-24	46.0	2013-01-04
18069	Elliston	SA	44.3	2019-01-23	43.2	2014-01-14 (Jan)
					44.0	2009-11-19 (all)
18116 / 18014	Cleve	SA	47.0	2019-01-24	46.1	2013-01-04
18192 / 18070	<i>Port Lincoln</i>	<i>SA</i>	48.3	2019-01-24	46.1	2006-01-21
18195 / 18052	Minnipa	SA	48.0	2019-01-24	47.2	2001-01-13
18201 / 16092 / 19066 / 19036	Port Augusta	SA	49.5	2019-01-24	48.3	1960-01-02
21131 / 21014	Clare	SA	44.9	2019-01-24	43.7	2009-01-28
21133 / 21046	<i>Snowtown</i>	<i>SA</i>	47.3	2019-01-24	46.3	1939-01-12
21139 / 21118 / 21043	Port Pirie	SA	48.6	2019-01-24	46.3	1979-01-04
22841 / 22807	Kingscote	SA	45.4	2019-01-24	43.8	2009-01-29, 2014-02-02
23000	<i>Adelaide (W Terrace/ ngayirdapira)</i>	<i>SA</i>	46.6	2019-01-24	46.1	1939-01-12
23013	Parafield	SA	47.7	2019-01-24	46.4	2003-01-25
23083	Edinburgh	SA	47.5	2019-01-24	46.2	1981-01-23
23090	Adelaide (Kent Town)	SA	47.7	2019-01-24	45.7	2009-01-28
23122 / 23020	Roseworthy	SA	48.3	2019-01-24	46.7	2009-01-28
23343	Turretfield	SA	47.2	2019-01-24	46.4	1968-01-31
23373 / 23321	<i>Nuriootpa</i>	<i>SA</i>	46.0	2019-01-24	44.1	2009-01-28

23804 / 23751	Victor Harbor	SA	46.2	2019-01-24	45.6	2009-01-28
23887 / 23814	Kuitpo Forest	SA	44.0	2019-01-24	42.7	2009-01-28
24511	Eudunda	SA	45.0	2019-01-24	43.5	2009-01-28 (Jan)
					43.9	2009-02-07 (all)
24518	Meningie	SA	46.1	2019-01-24	45.1	2009-01-28
24580 / 23747	Strathalbyn	SA	46.7	2019-01-24	46.3	2009-01-28
50017 / 73054	West Wyalong	NSW	46.3	2019-01-17	45.5	2018-01-07 (Jan)
					46.3	2017-02-11 (all)
55136	Woolbrook	NSW	38.7	2019-01-16	37.5	2014-01-03 (Jan)
					38.0	2006-02-03, 2017-02-12 (all)
56037 / 56002	Armidale	NSW	37.4	2019-01-19	37.1	2014-01-03
61051	Murrurundi	NSW	41.6	2019-01-16	41.2	2014-01-03
62013	Gulgong	NSW	42.7	2019-01-16	42.3	2014-01-03
69128 / 69049	Nerriga	NSW	40.8	2019-01-17	40.4	2018-01-07 (Jan)
					40.5	2017-02-11 (all)
70263 / 70037	Goulburn	NSW	40.7	2019-01-26	40.1	2003-01-18, 2003-01-30
70278 / 70094	Cooma	NSW	39.5	2019-01-16	39.4	1968-01-31
71075 / 71072	Perisher Valley	NSW	30.1	2019-01-16	28.9	2013-01-06 (Jan)
					29.8	2009-02-02 (all)
72043	Tumbarumba	NSW	40.8	2019-01-16	40.5	2014-01-16, 2017-02-10
72160 / 72146 / 72097 / 72059	Albury	NSW	45.3	2019-01-16	44.6	1990-01-03 (Jan)
					45.1	1968-02-01 (all)
73007	Burrinjuck Dam	NSW	43.1	2019-01-17	42.5	2014-01-16, 2007-01-12
73138 / 73056	Young	NSW	43.5	2019-01-26	42.6	1973-01-03, 2013-01-18 (Jan)
					43.0	2017-02-11 (all)
73142 / 73009	Cootamundra	NSW	43.6	2019-01-17	43.5	1973-01-03
74106	Tocumwal	NSW	46.5	2019-01-25	45.8	1990-01-03
74258 / 74128	Deniliquin	NSW	47.2	2019-01-25	46.3	1939-01-13, 1990-01-03
75032	Hillston	NSW	47.0	2019-01-16	46.0	2006-01-01, 1973-01-03
75039	Lake Cargelligo	NSW	47.7	2019-01-17	47.0	1973-01-03
75041 / 75028	Griffith	NSW	46.4	2019-01-16	46.0	2001-01-23

76047	Ouyen	VIC	46.7	2019-01-04	46.6	1968-01-31
77094 / 77042	Swan Hill	VIC	47.5	2019-01-25	46.7	1939-01-10 (Jan)
					46.9	2009-02-07 (all)
80015	Echuca	VIC	45.7	2019-01-04	45.6	2016-01-13
80023	Kerang	VIC	47.6	2019-01-25	46.1	1939-01-10 (Jan)
					46.9	2009-02-07 (all)
80091	Kyabram	VIC	47.1	2019-01-25	44.8	2016-01-13 (Jan)
					46.6	2009-02-07 (all)
81049	Tatura	VIC	44.8	2019-01-25	43.5	2009-01-31 (Jan)
					44.8	2009-02-07 (all)
81123 / 81003	Bendigo	VIC	45.9	2019-01-25	44.3	1939-01-10 (Jan)
					45.4	2009-02-07 (all)
81125 / 81084 / 81044	Shepparton	VIC	46.2	2019-01-25	44.4	1968-01-31 (Jan)
					46.1	2009-02-07 (all)
82042	Strathbogie	VIC	41.9	2019-01-16	41.5	1982-01-24
82170 / 82002	Benalla	VIC	44.8	2019-01-25	44.3	2009-01-31
84150 / 84083	Lakes Entrance	VIC	44.6	2019-01-25	43.8	1982-01-24
85279 / 84108 / 84080	Bairnsdale	VIC	45.8	2019-01-25	44.6	2014-01-17
86282	Melbourne Airport	VIC	46.0	2019-01-25	44.6	2003-01-25
88023	Lake Eildon	VIC	43.3	2019-01-25	43.0	2009-01-31
88043	Maryborough	VIC	44.8	2019-01-25	43.8	2014-01-14
88109	Mangalore	VIC	46.3	2019-01-25	44.6	2009-01-31 (Jan)
					46.1	2009-02-07 (all)
88110 / 88014	Castlemaine	VIC	45.0	2019-01-25	43.7	1968-01-31 (Jan)
					43.9	2009-02-07 (all)
90171 / 90162	Portland Airport	VIC	42.5	2019-01-24	42.1	2013-01-04

Table 4: February and March (to 5 March) maximum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in italics. Records for any month are shown in bold.

Station number	Station name	State	New record (°C)	Date of new record	Previous record (°C)	Date of previous record
7176/7151	Newman	WA	43.6	2019-03-01	43.3	2007-03-04
<i>11003</i>	<i>Eucla</i>	WA	<i>46.9</i>	<i>2019-03-01</i>	<i>44.2</i>	<i>1986-03-19</i>
<i>11052/11004</i>	<i>Forrest</i>	WA	<i>46.5</i>	<i>2019-03-01</i>	<i>45.3</i>	<i>1986-03-05</i>
<i>12038</i>	<i>Kalgoorlie</i>	WA	<i>45.3</i>	<i>2019-02-28</i>	<i>44.9</i>	<i>2007-02-03, 2007-02-04</i>
14508	Gove Airport	NT	36.7	2019-02-22	35.7	1990-02-11
18079	Streaky Bay	SA	42.8	2019-03-01	42.6	1986-03-05
22803	Cape Willoughby	SA	38.5	2019-03-01	37.2	1989-03-01
<i>22823/22801</i>	<i>Cape Borda</i>	SA	<i>35.5</i>	<i>2019-03-01</i>	<i>35.2</i>	<i>2008-03-08</i>
<i>23090</i>	<i>Adelaide (Kent Town)</i>	SA	<i>42.2</i>	<i>2019-03-01</i>	<i>41.9</i>	<i>1986-03-06</i>
24518	Meningie	SA	40.8	2019-03-01	40.5	2008-03-17
<i>31011</i>	<i>Cairns Airport</i>	QLD	<i>39.5</i>	<i>2019-02-21</i>	<i>38.9</i>	<i>1969-02-12</i>
32004	Cardwell	QLD	41.8	2019-02-21	40.4	1969-02-12
32025	Innisfail	QLD	40.8	2019-02-21	38.8	1969-02-13
32037	South Johnstone	QLD	40.5	2019-02-21	39.6	1992-02-12
80091	Kyabram	VIC	40.4 (=)	2019-03-04	40.4	2016-03-07
81125/81084/81044	Shepparton	VIC	40.3	2019-03-04	40.1	1986-03-07
82170/82002	Benalla	VIC	39.5	2019-03-04	39.4	1983-03-07
94008	Hobart Airport	TAS	38.1	2019-03-02	37.0	2008-03-14
94010	Cape Bruny	TAS	39.0	2019-03-02	35.2	1998-03-12 (Mar)
					39.0 (=)	1982-02-15 (all)
<i>94029</i>	<i>Hobart</i>	<i>TAS</i>	<i>39.1</i>	<i>2019-03-02</i>	<i>37.3</i>	<i>2008-03-14</i>
94087	kunanyi (Mount Wellington)	TAS	28.4	2019-03-02	26.1	2013-03-12
<i>94220/94069</i>	<i>Grove</i>	<i>TAS</i>	<i>38.3</i>	<i>2019-03-02</i>	<i>37.3</i>	<i>1966-03-07</i>
95003	Bushy Park	TAS	38.6	2019-03-02	37.6	1966-03-07
95063/95011	Maydena	TAS	35.7	2019-03-02	35.7	2013-03-12

Table 5: December high minimum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in *italics*. Records for any month are shown in **bold**.

Station number	Station name	State	New record (°C)	Date of new record	Previous record (°C)	Date of previous record
5008	Mardie	WA	32.2	2018-12-28	31.0	1987-12-19
<i>5026</i>	<i>Wittenoom</i>	WA	34.0	2018-12-27	33.6	<i>1987-12-19, 1972-12-17</i>
<i>7045</i>	<i>Meekatharra</i>	WA	31.9	2018-12-26	31.7	1997-12-30
13030	Telfer	WA	33.7	2018-12-25	33.1	2015-12-12 (Dec)
					33.4	2016-01-04 (all)
14015	Darwin Airport	NT	30.0	2018-12-12	29.7	5 times, most recent 2014-12-17
14517 / 14504	Ngayawili	NT	30.5	2018-12-07	30.3	1990-12-24, 2007-12-02 (Dec)
					30.4	1983-02-20 (all)
15602	Jervois	NT	32.7	2018-12-20	32.5	2017-12-29
15666 / 15548	Rabbit Flat	NT	33.5	2018-12-13	32.2	2009-12-09
16090 / 16007	Cooper Pedy	SA	31.6	2018-12-29	29.9	2005-12-31, 1995-12-17
29058 / 29025	Julia Creek	QLD	31.5	2018-12-22	31.0	1972-12-28
37058 / 37043	Urandangi	QLD	32.6	2018-12-21	32.0	1972-12-27
40988 / 40282	Nambour	QLD	25.6	2018-12-03	25.5	2001-12-26
71075 / 71072	Perisher Valley	NSW	18.8	2018-12-29	16.7	3 times, most recent 2015-12-20
72023	Hume Reservoir	NSW	28.4	2018-12-29	26.4	1994-12-21 (Dec)
					28.2	1973-02-06 (all)
<i>72161 / 72091</i>	<i>Cabramurra</i>	<i>NSW</i>	<i>19.1</i>	<i>2018-12-28, 2018-12-29</i>	<i>19.0</i>	<i>1994-12-21</i>
74034	Corowa	NSW	27.0	2018-12-28, 2018-12-29	26.5	1994-12-20
75041 / 75028	Griffith	NSW	30.1	2018-12-29	30.0	4 times, including 2009-12-24
81125 / 81084 / 81044	Shepparton	VIC	27.0	2018-12-28	26.8	1990-12-07
82170 / 82002	Benalla	VIC	25.5	2018-12-28	24.7	1994-12-21
<i>85072 / 85133</i>	<i>Sale</i>	<i>VIC</i>	<i>22.6</i>	<i>2018-12-08</i>	<i>22.2</i>	<i>1932-12-01</i>
85279 / 84108 / 84080	Bairnsdale	VIC	21.9	2018-12-08	21.5	1980-12-11

Table 6: January high minimum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in *italics*. Records for any month are shown in **bold**.

Station number	Station name	State	New record (°C)	Date	Previous record (°C)	Date of previous record
7045	<i>Meekatharra</i>	WA	33.0	2019-01-15	32.9	2004-01-03
9789 / 9541	<i>Esperance</i>	WA	25.3	2019-01-21	24.4	1934-01-13
10568	Hyden	WA	26.5	2019-01-13	26.3	1977-01-05
12281 / 12044	Munglinup	WA	26.3	2019-01-21	25.1	1997-01-03
14840	Wave Hill	NT	31.1	2019-01-30	30.0	2013-01-08
17043 / 17114	<i>Oodnadatta</i>	SA	34.3	2019-01-25	34.2	2011-01-28
17123 / 17096	<i>Moomba</i>	SA	36.1	2019-01-26	34.8	1982-01-24 (Jan)
					35.0	2004-02-17 (all)
29058 / 29025	Julia Creek	QLD	31.3	2019-01-20	31.1	1967-01-30
37058 / 37043	<i>Urandangi</i>	QLD	32.9	2019-01-11	31.5	2014-01-25 (Jan)
					32.0	1972-12-27 (all)
45025 / 45017	<i>Thargomindah</i>	QLD	34.2	2019-01-27	33.4	2003-01-29 (Jan)
					34.1	2006-02-04 (all)
46012 / 46043	<i>Wilcannia</i>	NSW	33.6	2019-01-25	32.8	1960-01-03 (Jan)
					33.4	1994-12-21 (all)
46126 / 46037	<i>Tibooburra</i>	NSW	34.8	2019-01-26	33.9	1964-01-08, 1964-01-07
46129 / 46042	<i>White Cliffs</i>	NSW	34.8	2019-01-25	33.3	1982-01-24
47019	<i>Menindee</i>	NSW	33.4	2019-01-25	31.7	3 times, most recent 1952-01-24
47048 / 47007	<i>Broken Hill</i>	NSW	33.6	2019-01-25	33.2	1965-12-30, 2006-01-01
48027	<i>Cobar MO</i>	NSW	32.6	2019-01-18	32.1	2006-01-01
48245 / 48239 / 48013	<i>Bourke</i>	NSW	33.7	2019-01-27	33.3	1939-01-13
49000 / 49019	Ivanhoe	NSW	33.6	2019-01-25	31.6	2010-01-12
50052	<i>Condobolin Ag Res</i>	NSW	32.0	2019-01-18	30.7	2003-01-18, 2018-01-07 (Jan)
					31.4	2009-02-07 (all)
51039	<i>Nyngan</i>	NSW	32.0	2019-01-18	30.7	2006-01-01 (Jan)
					32.0	2006-02-02 (all)
52088	<i>Walgett</i>	NSW	31.8	2019-01-27	31.1	1939-01-11

55049	Quirindi	NSW	27.8	2019-01-27	27.0	2017-01-14
55136	Woolbrook	NSW	23.9	2019-01-27	23.0	1993-01-24
64008	Coonabarabran	NSW	25.6	2019-01-27	25.0	2017-01-18, 1964-01-07 (Jan)
					25.1	1987-12-28 (all)
64009	Dunedoo	NSW	29.8	2019-01-18	27.0	2017-01-18 (Jan)
					29.0	2017-02-12 (all)
71075 / 71072	Perisher Valley	NSW	18.8	2019-01-05	18.4	1979-01-10
72023	Hume Reservoir	NSW	28.9	2019-01-26	26.3	1979-01-10 (Jan)
					28.2	1973-02-06 (all)
72043	Tumbarumba	NSW	25.9	2019-01-05	25.2	2010-01-23
<i>72161 / 72091</i>	<i>Cabramurra</i>	<i>NSW</i>	<i>21.7</i>	<i>2019-01-26</i>	<i>21.2</i>	<i>2009-01-31</i>
73138 / 73056	Young	NSW	24.9	2019-01-18	24.5	1985-01-15
75019 / 75031	Hay	NSW	31.2	2019-01-25	31.0	2013-01-08
75039	Lake Cargelligo	NSW	33.9	2019-01-18	32.8	1969-01-08
75041 / 75028	Griffith	NSW	30.5	2019-01-25	30.0	4 times, including 2013-01-08
82039	Rutherglen	VIC	29.3	2019-01-25	29.0	1982-01-12 (Jan)
					29.2	1942-12-24 (all)
82076	Dartmouth Reservoir	VIC	25.1	2019-01-26	24.4	1982-01-25
82170 / 82002	Benalla	VIC	27.5	2019-01-25	26.7	1982-01-12 (Jan)
					26.8	1968-02-21 (all)

Table 7: February and March (to 6 March) minimum temperature records at locations with 40 years or more of data. ACORN-SAT locations are shown in italics. Records for any month are shown in bold.

Station number	Station name	State	New record (°C)	Date of new record	Previous record (°C)	Date of previous record
2032	Warmun	WA	30.2	2019-02-15	30.1	1964-02-06
3093/3006	Fitzroy Crossing	WA	29.8	2019-02-16	29.5	1979-02-06
<i>11003</i>	<i>Eucla</i>	<i>WA</i>	<i>27.5</i>	<i>2019-03-01</i>	<i>27.1</i>	<i>2013-03-26</i>
15131	Elliott	NT	29.2	2019-02-12	28.9	1970-02-18
<i>15666/15548</i>	<i>Rabbit Flat</i>	<i>NT</i>	<i>31.8</i>	<i>2019-02-08</i>	<i>29.5</i>	<i>2012-02-17</i>
18014	Cleve	SA	29.3	2019-03-02	28.8	1965-03-03
18069	Elliston	SA	26.0	2019-03-02	25.7	2000-03-02
<i>18192/18070</i>	<i>Port Lincoln</i>	<i>SA</i>	<i>23.4</i>	<i>2019-03-02</i>	<i>23.3</i>	<i>1962-03-16</i>

18195/18052	Minnipa	SA	29.0	2019-03-02	28.6	1978-03-11
22823/22801	Cape Borda	SA	26.4	2019-03-02	26.2	1989-03-01
23000	Adelaide (West Terrace/ ngayirdapira)	SA	29.3	2019-03-02	29.1	1942-03-04
23373/23321	Nuriootpa	SA	26.3	2019-03-02	25.2	1985-03-13
26091/26045	Coonawarra	SA	25.0	2019-03-02	24.1	2004-03-04
26099/26023	Naracoorte	SA	26.0	2019-03-02	25.0	2008-03-14
26100/26089	Padthaway	SA	25.5	2019-03-02	24.7	1985-03-13
29063/29041	Normanton	QLD	29.3 (=)	2019-02-20	29.3	1928-02-18
31037	Low Isles	QLD	29.3	2019-02-21	29.2	1990-02-03
86077	Moorabbin	VIC	24.4	2019-03-04	24.0	2008-03-18
86282	Melbourne Airport	VIC	25.4	2019-03-01	24.3	2013-03-13
87031	Laverton	VIC	26.3	2019-03-01	25.8	2008-03-18
89085/89000	Ararat	VIC	23.5	2019-03-03	23.4	1985-03-14
90035/90022/90174/ 90147	Colac (Mt Gellibrand)	VIC	24.4	2019-03-02	23.0	2013-03-07
91223	Marrawah	TAS	20.0 (=)	2019-03-02	20.0	2013-03-12
94010	Cape Bruny	TAS	19.5	2019-03-02	19.2	1990-03-27
94087	kunanyi (Mt Wellington)	TAS	18.3	2019-03-02	16.2	1966-03-08
98017/98001	King Island Airport	TAS	21.8	2019-03-02	20.6	1942-03-05

Table 8: Record number of consecutive days of 35 °C or above at ACORN-SAT locations.

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
48027/48030	Cobar	NSW	31	9 Jan – 8 Feb 2019	24	29 Dec 1938 – 21 Jan 1939, 19 Feb – 13 Mar 2016
55024	Gunnedah Res Ctr	NSW	27	25 Dec 2018 – 20 Jan 2019	17	11-27 Jan 1952, 28 Jan – 13 Feb 2017
61078	Williamstown	NSW	5	27-31 Dec 2018	5	9 times, most recent 31 Jan – 2 Feb 2011
65070/65012	Dubbo	NSW	27	25 Dec 2018 – 20 Jan 2019	18	23 Jan – 9 Feb 2009
67105/67033	Richmond	NSW	8	26 Dec 2018 – 2 Jan 2019	7	30 Jan – 5 Feb 2011

Table 9: Record number of consecutive days of 40 °C or above at ACORN-SAT locations.

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
15135/15087	Tennant Creek	NT	23	24 Dec 2018 – 15 Jan 2019	21	16 Dec 1938 – 5 Jan 1939
15666/15548	Rabbit Flat	NT	41	5 Jan – 14 Feb 2019	25	25 Dec 1997 – 18 Jan 1998
37010	Camooweal	QLD	40	16 Dec 2018 – 24 Jan 2019	22	25 Jan – 15 Feb 1986
46126/46037	Tibooburra	NSW	17	10-26 Jan 2019	16	1-16 Jan 1979
48027/48030	Cobar	NSW	15	12-26 Jan 2019	14	19 Jan – 1 Feb 1932
48245/48239/48013	Bourke	NSW	21	9-29 Jan 2019	17	6-22 Jan 1939
55024	Gunnedah Res Ctr	NSW	5	15-19 Jan 2019	4	23-26 Jan 1952
61363/61089	Scone	NSW	5	15-19 Jan 2019	4	26-29 Nov 1997, 19-22 Nov 2009
70351/70014/70099	Canberra	ACT	4	15-18 Jan 2019	3	6-8 Feb 2009

Table 10: Record number of consecutive nights of 25 °C or above at ACORN-SAT locations

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
15135/15087	Tennant Creek	NT	49	16 Dec 2018 – 2 Feb 2019	24	2-25 Jan 1971
15590/15540	Alice Springs	NT	14	14-27 Jan 2019	12	11-22 Jan 2006
17043/17114	Oodnadatta	SA	16	11-26 Jan 2019	15	19 Jan – 2 Feb 1973, 7-21 Feb 2004
48027/48030	Cobar	NSW	15	13-27 Jan 2019	12	26 Jan – 6 Feb 1915, 6-17 Jan 1939
48245/48239/48013	Bourke	NSW	22	13 Jan – 2 Feb 2019	14	10-23 Jan 1939
50017/73054	West Wyalong	NSW	5	15-19 Jan 2019	4	13-16 Feb 2004, 5-8 Feb 2009
55024	Gunnedah Res Ctr	NSW	6	26-31 Jan 2019	4	20-23 Nov 2009

Table 11: National and state/territory area-average temperature records broken during the 2018-19 summer.

Region	Element	Value (°C)	Previous record (°C)	Year of previous record
December 2018				
Australia	Maximum	+2.41	+2.30	1972
	Minimum	+1.85	+1.32	1972
	Mean	+2.13	+1.81	1972
Queensland	Minimum	+1.99	+1.91	2005
New South Wales	Minimum	+2.94	+2.42	1914
	Mean	+2.93	+2.55	1990
Victoria	Minimum	+3.23	+2.39	2015
	Mean	+3.06	+3.02	2015
Tasmania	Minimum	+1.96	+1.92	2017
	Mean	+2.39	+1.93	2015
Northern Territory	Maximum	+3.28	+1.88	1972
	Minimum	+2.47	+1.49	1990
	Mean	+2.88	+1.42	1990
January 2019				
Australia	Maximum	+3.35	+2.46	2013
	Minimum	+2.45	+1.84	2006
	Mean	+2.90	+1.92	2013
Queensland	Minimum	+2.53	+2.45	2006
	Mean	+2.46	+2.22	2013, 2018
New South Wales	Maximum	+6.15	+4.11	1939
	Minimum	+5.56	+3.83	2006
	Mean	+5.86	+3.79	1939
Victoria	Maximum	+4.61	+3.69	1981
	Minimum	+3.32	+3.10	2001
	Mean	+3.97	+3.30	2001
Tasmania	Maximum	+3.22	+2.99	1961
	Mean	+2.50	+2.24	1961
South Australia	Maximum	+4.66	+4.50	2001
Western Australia	Maximum	+2.28	+2.21	2008

Northern Territory	Maximum	+3.70	+2.88	2013
	Minimum	+2.82	+1.61	2013
	Mean	+3.26	+2.25	2013
Summer 2018-19				
Australia	Maximum	+2.60	+1.64	2012-13
	Minimum	+1.67	+1.09	2017-18
	Mean	+2.14	+1.28	2012-13
New South Wales	Maximum	+3.61	+3.05	2016-17
	Minimum	+3.21	+2.33	1980-81
	Mean	+3.41	+2.67	2016-17
Victoria	Maximum	+2.74	+2.46	1980-81, 2000-01
	Minimum	+2.33	+2.01	1980-81
	Mean	+2.54	+2.24	1980-81
South Australia	Maximum	+3.09	+2.87	2000-01
Western Australia	Maximum	+2.50	+1.99	2009-10
	Mean	+1.72	+1.47	2009-10
Northern Territory	Maximum	+3.25	+1.76	2012-13
	Minimum	+2.08	+1.14	2005-06
	Mean	+2.67	+1.32	1985-86, 2012-13

Table 12: The 10 largest monthly mean temperature anomalies (°C) for any month for Australia and selected States/Territories.

Australia	New South Wales	Victoria	Tasmania	Northern Territory	South Australia
+3.03 (Oct 2015)	+5.86 (Jan 2019)	+4.59 (Nov 2009)	+2.77 (Nov 2017)	+3.52 (Sep 2013)	+4.80 (Oct 2015)
+2.90 (Jan 2019)	+4.89 (Nov 2009)	+4.08 (Oct 2015)	+2.57 (Nov 2000)	+3.49 (Jun 1996)	+4.36 (Sep 2013)
+2.84 (Sep 2013)	+4.55 (Oct 2015)	+3.97 (Jan 2019)	+2.50 (Jan 2019)	+3.26 (Jan 2019)	+4.06 (Jan 2001)
+2.76 (Apr 2005)	+4.48 (Nov 1914)	+3.30 (Jan 2001)	+2.39 (Feb 2007)	+3.04 (Aug 2009)	+3.86 (Jan 2019)
+2.55 (Aug 2009)	+3.79 (Jan 1939)	+3.21 (Oct 1914)	+2.39 (Dec 2018)	+2.97 (Apr 2005)	+3.83 (Jun 1957)
+2.48 (Apr 2018)	+3.71 (Jan 2006)	+3.21 (Jan 1981)	+2.28 (Feb 1972)	+2.88 (Dec 2018)	+3.78 (Jan 2006)
+2.38 (Jun 1996)	+3.55 (Sep 2013)	+3.12 (Nov 2017)	+2.24 (Jan 1961)	+2.78 (Jul 2017)	+3.54 (Apr 2018)

+2.18 (Oct 1988)	+3.52 (Apr 2018)	+3.06 (Dec 2018)	+2.19 (Aug 2011)	+2.71 (Sep 2005)	+3.51 (Apr 2005)
+2.13 (Dec 2018)	+3.49 (Jan 2017)	+3.02 (Dec 2015)	+2.18 (Mar 2013)	+2.71 (May 2016)	+3.04 (Aug 2009)
+2.11 (Apr 2016)	+3.32 (Nov 2002)	+2.99 (Nov 1914)	+2.17 (May 2007)	+2.70 (Sep 1936)	+3.02 (Nov 2009)

Table 13: Record counts of days in December with maximum temperature over thresholds at ACORN-SAT locations. Values setting a record for any month are shown in bold.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
1019/1021	Kalumburu	WA	40	13	8	1969
4106/4020	Marble Bar	WA	45	14	13	1961
5026	Wittenoom	WA	45	7	5	2015
14825	Victoria River Downs	NT	40	25	17 (Dec), 24 (all)	1970 (Dec), Nov 2009 and Nov 2014 (all)
15135/15087	Tennant Creek	NT	40	28	22	1938
15666/15548	Rabbit Flat	NT	45	8	5	1990
			40	30	27 (Dec), 28 (all)	1992 (Dec), Jan 2013 (all)
16001	Woomera	SA	45	2	1	1949, 2017
37010	Camooweal	QLD	40	27	24	3 times, including Dec 1981
50017/73054	West Wyalong	NSW	40	4	3	5 times, most recent 2013
80023	Kerang	VIC	40	5	4	4 times, most recent 1990

Table 14: Record counts of days in December with minimum temperature over thresholds at ACORN-SAT locations. Values setting a record for any month are shown in bold.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
15135/15087	Tennant Creek	NT	25	30	27	1979
17126/17031	Marree	SA	25	14	10	1941
27045/27042	Weipa	QLD	25	17	15 (Dec), 16 (all)	2014 (Dec), Jan 1998 (all)
37010	Camooweal	QLD	25	23	22	2005
38003	Boulia	QLD	25	23	22	2005
46126/46037	Tibooburra	NSW	25	15	13	1990
76031/76077	Mildura	VIC	20	12	10	4 times, most recent 2015
80023	Kerang	VIC	25	3	2	5 times, most recent 2016
82039	Rutherglen	VIC	20	7	4	5 times, most recent 1982

Table 15: Record counts of days in January with maximum temperature over thresholds at ACORN-SAT locations. Values setting a record for any month are shown in bold.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
15135/15087	Tennant Creek	NT	40	29	21	1943
15590/15540	Alice Springs	NT	40	22	21	2013
15666/15548	Rabbit Flat	NT	45	4	2	1991
			40	30	28	2013
17043	Oodnadatta	SA	45	14	11	2018
37010	Camooeweal	QLD	40	26	24	1971, 1994
38026/38002	Birdsville	QLD	45	16	9	2013
43109/43034	St. George	QLD	35	30	29	2017
46012/46043	Wilcannia	NSW	45	10	6	2013
			40	19	17	2006
46126/46037	Tibooburra	NSW	45	10	7	2013
			40	23	20	2018
48027/48030	Cobar	NSW	40	20	17	1939
			35	29	27	1952, 1981, 2001
48245/48239/48013	Bourke	NSW	40	26	20	1939
50017/73054	West Wyalong	NSW	45	3	1	Most recent 2018
			40	13	10	2001
			35	25	22	1981, 2001, 2006
55024	Gunnedah Res Ctr	NSW	40	8	6	1952
			35	29	27	1952
56242/56017	Inverell	NSW	30	30	29	5 times, most recent 2018
59151/59040	Coffs Harbour	NSW	30	12	9 (Jan), 10 (all)	1994, 2004 (Jan), Nov 1968, Dec 1979 (all)
61078	Williamtown	NSW	35	14	9	2017
			30	24	18	2018
61363/61089	Scone	NSW	40	8	7	2018
			35	25	22	2018
63005	Bathurst	NSW	35	13	10	1932, 2014
65070/65012	Dubbo	NSW	35	29	23	1932

70351/70014/70099	Canberra	ACT	40	5	4	1939
			35	19	11	1939
			30	25	23	1929, 2017
72150/72151	Wagga Wagga	NSW	40	12	11	1939
			35	23	21	1932, 1939
74258/74128	Deniliquin	NSW	45	4	3	1939
			40	12	9	2014
			35	22	20	1981
76031/76077	Mildura	VIC	40	13	11	1939
78015/78031	Nhill	VIC	40	7	6	4 times, most recent 2014
80023	Kerang	VIC	45	4	3	2009, 2014
			35	22	19	1939
82039	Rutherglen	VIC	40	10	7	1939, 2014
			35	20	19	1981
92045	Larapuna (Eddystone Point)	TAS	30	6	2 (Jan), 4 (all)	7 times (Jan), Mar 1940 (all)
94029	Hobart	TAS	30	7	5 (Jan), 6 (all)	4 times (Jan), Dec 1897 and Dec 1994 (all)

Table 16: Record counts of days in January with minimum temperature over thresholds at ACORN-SAT locations. Values setting a record for any month are shown in bold.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
4106/4020	Marble Bar	WA	25	30	29	7 times, most recent 2008
15135/15087	Tennant Creek	NT	25	31	28	1988
15666/15548	Rabbit Flat	NT	25	23	22	1980
37010	Camooeal	QLD	25	26	25	1990, 2008
43109/43034	St. George	QLD	25	23	18	2017
44021/44022	Charleville	QLD	25	25	23	2006
46012/46043	Wilcannia	NSW	25	20	13	2006
48030/48027	Cobar	NSW	25	20	17	1939
48245/48239/48013	Bourke	NSW	25	28	19	1939
50017/73054	West Wyalong	NSW	25	13	5	2006, 2007
			20	25	22	1981
52088/52026	Walgett	NSW	20	31	30	1981, 2006
53115/53048/53027	Moree	NSW	20	31	30	1981
55024	Gunnedah Res Ctr	NSW	25	13	5 (Jan), 6 (all)	2013 (Jan), Dec 1957 (all)
			20	31	25	1981
59151/59040	Coffs Harbour	NSW	20	27	24	2006
60139/60026	Port Macquarie	NSW	20	21	20	1978, 1993, 2017
61078	Williamstown	NSW	20	23	19	1969
61363/61089	Scone	NSW	25	4	2 (Jan), 3 (all)	1967, 1983, 2017 (Jan), Feb 2011 (all)
			20	23	13	1991
63005	Bathurst	NSW	20	8	7	1939
65070/65012	Dubbo	NSW	25	7	6	1939
			20	29	27	1981
66062	Sydney	NSW	20	29	25	2017
67105/67033	Richmond	NSW	20	24	16	2017
68072/68076	Nowra	NSW	20	16	7 (Jan), 8 (all)	1991, 2017 (Jan), Feb 1998 (all)

68151/68034	Point Perpendicular	NSW	20	22	16	1991
69018	Moruya Heads	NSW	20	16	8	1991, 2018
70351/70014/70099	Canberra	NSW	20	8	4	1973
72150/72151	Wagga Wagga	NSW	25	8	6	1939
			20	22	21	1939

Table 17: Record counts of days in summer 2018-19 with maximum temperature over thresholds at ACORN-SAT locations.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
2079/2012/2011	Halls Creek	WA	35	88	86	1928-29
4106/4020	Marble Bar	WA	45	32	30	1909-10
7045/7046	Meekatharra	WA	45	6	5	2006-07
10092/10093	Merredin	WA	30	80 (=)	80	1931-32, 1997-98, 2014-15
11052/11004	Forrest	WA	45	4 (=)	4	1978-79, 2012-13
13017	Giles	WA	45	3	2	2012-13
			40	45	36	2014-15
14825	Victoria River Downs	NT	40	41	36	1984-85
			35	88	84	1995-96
15135/15087	Tennant Creek	NT	40	70	48	1935-36
			35	89	86	1991-92
15590/15540	Alice Springs	NT	45	4	2	1959-60
			40	43	36	2017-18
15666/15548	Rabbit Flat	NT	45	13	7	1990-91
			40	87	59	1991-92
			35	90	87	1987-88, 1995-96, 1997-98
16001	Woomera	SA	45	8	7	2017-18
16098/16044	Tarcoola	SA	45	9	7	1978-79, 2003-04
17043	Oodnadatta	SA	45	17	13	2017-18
			40	52	50	2000-01
18012	Ceduna	SA	45	4 (=)	4	1972-73, 2013-14
21133/21046	Snowtown	SA	40	17	16	2013-14
23373/23321	Nuriootpa	SA	45	1	0	No previous instances
31011	Cairns Airport	QLD	35	11 (=)	11	1971-72
32040	Townsville	QLD	40	2 (=)	2	1995-96
38026/38002	Birdsville	QLD	45	20	15	2017-18
			35	84	83	1979-80
46012/46043	Wilcannia	NSW	45	12	7	2017-18
			40	38	34	1980-81

46126/46037	Tibooburra	NSW	45	11	10	1938-39
			40	45	40	2017-18
48245/48239/48013	Bourke	NSW	30	88 (=)	88	1928-29, 1943-44, 2015-16
50017/73054	West Wyalong	NSW	45	3	1	5 times, most recent 2017-18
			40	17	15	2013-14
55024	Gunnedah	NSW	35	54	48	2016-17
56242/56017	Inverell	NSW	30	79	75	1918-19
60139/60026	Port Macquarie	NSW	30	41	35	2016-17
61078	Williamstown	NSW	35	25	20	2016-17
			30	52	41	2016-17, 2017-18
65070/65012	Dubbo	NSW	35	52 (=)	52	1938-39
70351/70014/70099	Canberra	ACT	40	5	4	1938-39
74258/74128	Deniliquin	NSW	45	4	3	1938-39
			35	44	43	1980-81
76031/76077	Mildura	VIC	35	47	46	1960-61
80023	Kerang	VIC	35	43	41	1938-39
			30	67 (=)	67	1980-81
85072/85133	Sale	VIC	30	28	26	1927-28, 1942-43
85096	Wilsons Promontory	VIC	35	5 (=)	5	1958-59
92045	Irapuna (Eddystone Point)	TAS	30	8	3	1933-34, 1967-68, 2009-10

Table 18: Record counts of days in summer 2018-19 with minimum temperature over thresholds at ACORN-SAT locations.

Station number	Station name	State	Threshold (°C)	Count of days	Previous record count	Year of previous record
14015	Darwin Airport	NT	30	1	0	No previous instances
14825	Victoria River Downs	NT	30	4	2	1970-71, 2009-10, 2016-17
15135/15087	Tennant Creek	NT	30	7	6	1990-91
			25	82	69	2007-08
15666/15548	Rabbit Flat	NT	30	13	5	1990-91
			25	60	49	1979-80
30045	Richmond	QLD	30	2 (=)	2	1919-20
37010	Camooweal	QLD	30	6 (=)	6	1990-91
44021/44022	Charleville	QLD	20	80	78	1945-46, 1980-81
46012/46043	Wilcannia	NSW	30	6	4	2003-04
			25	29	26	1980-81
46126/46037	Tibooburra	NSW	30	13	10	2003-04, 2016-17
48027/48030	Cobar	NSW	30	7	6	1938-39
48245/48239/48013	Bourke	NSW	30	7	6	1938-39
			25	40	33	1938-39
			20	77	76	1980-81
50017/73054	West Wyalong	NSW	30	2	1	1994-95, 2005-06
			25	16	8	2008-09
			20	44	38	1990-91
52088/52026	Walgett	NSW	30	4	3	1965-66
			25	27	26	2016-17
			20	67 (=)	67	1980-81
55024	Gunnedah	NSW	25	15	10	2016-17
			20	58	57	2016-17
59151/59040	Coffs Harbour	NSW	20	58	54	1990-91, 2005-06
61363/61089	Scone	NSW	25	4	3	2010-11, 2016-17
			20	34	27	1990-91
65070/65012	Dubbo	NSW	25	8 (=)	8	1938-39
68072/68076	Nowra	NSW	20	19	18	2016-17

68151/68034	Point Perpendicular	NSW	20	33	30	2000-01
69018	Moruya Heads	NSW	20	24	16	2009-10
72150/72151	Wagga Wagga	NSW	25	10	7	1938-39, 2008-09
76031/76077	Mildura	VIC	20	32	30	1960-61
80023	Kerang	VIC	25	6	5	1996-97, 2013-14
82039	Rutherglen	VIC	20	24	19	1972-73, 2017-18

Table 19: ACORN-SAT locations which had their highest average summer maximum, minimum or mean temperatures on record in 2018-19.

Station number	Station name	State	Element	Value (°C)	Previous record (°C)	Date of previous record
2079/2012/2011	Halls Creek	WA	Maximum	39.8	39.1	2004-05
			Mean	32.7	32.2	1935-36, 1991-92
4106/4020	Marble Bar	WA	Maximum	43.7	43.4	2004-05
5026	Wittenoom	WA	Maximum	42.4	42.2	1997-98
			Mean	34.7 (=)	34.7	2004-05
11003	Eucla	WA	Maximum	28.2 (=)	28.2	1990-91, 2006-07
11052/11004	Forrest	WA	Maximum	34.4	34.1	1976-77, 2006-07
			Mean	25.5 (=)	25.5	2000-01
13017	Giles	WA	Maximum	39.3	38.9	1990-91
14015	Darwin Airport	NT	Maximum	33.3	33.2	2012-13
			Minimum	26.1	26.0	1985-86
			Mean	29.7	29.3	4 times, most recent 2015-16
14825	Victoria River Downs	NT	Maximum	39.5	38.4	1984-85, 1991-92
			Minimum	26.0	25.8	1970-71
			Mean	32.7	32.0	1984-85
15135/15087	Tennant Creek	NT	Maximum	40.9	39.0	1935-36, 1951-52
			Minimum	27.5	26.4	2007-08
			Mean	34.2	32.6	2007-08
15590/15540	Alice Springs	NT	Maximum	39.3	38.2	2017-18
15666/15548	Rabbit Flat	NT	Maximum	43.0	40.6	1991-92
			Minimum	26.3	24.9	1979-80
			Mean	34.7	32.2	1985-86, 1997-98, 2012-13
16098/16044	Tarcoola	SA	Maximum	36.9	36.6	1990-91, 1996-97
27045/27042	Weipa	QLD	Minimum	24.8 (=)	24.8	1990-91, 1997-98
44021/44022	Charleville	QLD	Minimum	24.1 (=)	24.1	2005-06
46012/46043	Wilcannia	NSW	Maximum	38.2	38.0	2000-01
			Minimum	22.4	22.1	1980-81
			Mean	30.3	29.7	1980-81, 2000-01
46126/46037	Tibooburra	NSW	Maximum	39.1	38.4	2005-06, 2017-18

			Minimum	25.1	24.7	2005-06
			Mean	32.1	31.5	2005-06
48027/48030	Cobar	NSW	Maximum	37.4	37.2	1938-39
			Minimum	23.0	22.3	1938-39, 2005-06
			Mean	30.2	29.8	1938-39
48245/48239/48013	Bourke	NSW	Minimum	24.1	23.5	2016-17
			Mean	31.5	31.4	2016-17
50017/73054	West Wyalong	NSW	Maximum	35.1	34.7	2005-06
			Minimum	20.1	19.1	1980-81
			Mean	27.6	26.5	1980-81
52088/52026	Walgett	NSW	Minimum	22.3	22.1	1980-81, 2016-17
55024	Gunnedah	NSW	Maximum	35.3 (=)	35.3	2016-17
			Minimum	21.0	20.9	2016-17
			Mean	28.1 (=)	28.1	2016-17
56242/56017	Inverell	NSW	Maximum	33.3	33.0	1938-39
59151/59040	Coffs Harbour	NSW	Maximum	28.7	28.5	1990-91, 2016-17
			Mean	24.5 (=)	24.5	2016-17
60139/60026	Port Macquarie	NSW	Maximum	29.5	29.4	2016-17
61078	Williamtown	NSW	Maximum	31.1	31.0	2016-17
61363/61089	Scone	NSW	Minimum	18.5	18.2	1980-81
			Mean	26.5	26.4	2016-17
65070/65012	Dubbo	NSW	Mean	27.5	27.4	1913-14
68151/68034	Point Perpendicular	NSW	Minimum	18.9 (=)	18.9	2014-15
69018	Moruya Heads	NSW	Minimum	17.6	17.4	1990-91, 2016-17
70351/70014/70099	Canberra	ACT	Maximum	31.0	30.5	1938-39
			Minimum	14.8 (=)	14.8	1980-81
			Mean	22.9	22.2	1938-39, 2005-06
72150/72151	Wagga Wagga	NSW	Minimum	18.8	18.5	1938-39
74258/74128	Deniliquin	NSW	Maximum	34.6	33.5	1938-39
			Mean	26.0	25.6	1980-81

80023	Kerang	VIC	Maximum	34.5	33.5	1938-39
			Minimum	16.9	16.8	1980-81
			Mean	25.7	25.0	1980-81
82039	Rutherglen	VIC	Maximum	33.8	33.5	1938-39
			Minimum	16.2	15.6	1972-73
			Mean	25.0	24.3	1938-39
84016	Gabo Island	VIC	Maximum	22.9	22.8	2000-01
85072/85133	Sale	VIC	Maximum	27.6	27.0	2000-01
			Minimum	14.3 (=)	14.3	1980-81
			Mean	20.9	20.4	1920-21
85096	Wilsons Promontory	VIC	Maximum	22.2	22.0	2000-01
			Mean	19.1	18.9	2000-01, 2017-18
91293/91057	Low Head	TAS	Minimum	15.0 (=)	15.0	2015-16
94010	Cape Bruny	TAS	Maximum	20.0	19.9	2015-16
			Mean	16.4 (=)	16.4	2015-16
94029	Hobart	TAS	Maximum	23.7	23.3	1899-1900, 2012-13
			Minimum	13.7 (=)	13.7	2015-16
			Mean	18.7	18.3	2000-01, 2015-16
94220/94069	Grove	TAS	Maximum	23.8	23.7	1960-61
			Mean	16.9 (=)	16.9	2015-16

Table 20: ACORN-SAT locations which set records in the period November 2018 to January 2019 for monthly average maximum, minimum or mean temperatures for any month. (No such records were set in February 2019).

Station number	Station name	State	Element	Value (°C)	Previous record (°C)	Date of previous record (to October 2018)
November 2018						
27045/27042	Weipa	QLD	Mean	30.7	30.5	Nov 2008
December 2018						
1019/1021	Kalumburu	WA	Mean	32.9	32.2	Dec 1969
2079/2012	Halls Creek	WA	Maximum	41.6	41.2	Dec 1986
			Minimum	27.1 (=)	27.1	Nov 1990
			Mean	34.3	34.1	Dec 1986
14015	Darwin	NT	Mean	30.5	30.5	Dec 1985
14825	Victoria River Downs	NT	Mean	34.1	33.7	Nov 1990
15666/15548	Rabbit Flat	NT	Maximum	43.7	42.7	Nov 1990
			Mean	35.0	33.7	Jan 1998
29063/29041	Normanton	QLD	Maximum	39.2	39.0	Nov 1913
			Minimum	27.6	27.4	Dec 1990
			Mean	33.4	32.5	Dec 1967
January 2019						
13017	Giles	WA	Maximum	40.5	40.4	Feb 2007
15135/15087	Tennant Creek	NT	Maximum	41.6	41.0	Dec 1938
			Minimum	28.3	27.3	Feb 1986
			Mean	34.9	33.7	Feb 1986
15590/15540	Alice Springs	NT	Maximum	41.5	40.0	Jan 1986
			Mean	33.3	33.1	Jan 1986
15666/15548	Rabbit Flat	NT	Minimum	26.6	26.1	Jan 1998
17126/17031	Marree	SA	Maximum	42.4	42.0	Jan 2006
30045	Richmond	QLD	Minimum	25.6	25.5	Jan 1994
38003	Boulia	QLD	Minimum	28.6	27.8	Jan 2006
			Mean	35.0 (=)	35.0	Jan 2013
38026/38002	Birdsville	QLD	Maximum	44.0	43.3	Jan 2013
			Mean	36.8	36.5	Jan 2006

43109/43034	St. George	QLD	Minimum	25.8	25.4	Jan 2017
			Mean	32.3	32.1	Jan 2017
44021/44022	Charleville	QLD	Minimum	26.4	25.8	Jan 2006
			Mean	32.9	32.5	Feb 1926
46012/46043	Wilcannia	NSW	Maximum	41.5	41.4	Jan 1939
			Mean	33.5 (=)	33.5	Jan 1939
46126/46037	Tibooburra	NSW	Maximum	42.5	40.8	Jan 1932
			Minimum	28.5	26.6	Jan 2006
			Mean	35.5	33.4	Jan 2006
48027/48030	Cobar	NSW	Maximum	41.3	40.1	Jan 1939
			Minimum	26.9	25.2	Jan 1939
			Mean	34.1	32.7	Jan 1939
48245/48239/48013	Bourke	NSW	Maximum	42.6	41.0	Jan 1932
			Minimum	27.8	25.7	Jan 1939
			Mean	35.2	33.1	Jan 1939
50017/73054	West Wyalong	NSW	Maximum	39.3	37.0	Jan 2006
			Minimum	23.6	21.4	Jan 2006
			Mean	31.5	29.2	Jan 2006
52088/52026	Walgett	NSW	Minimum	25.9	24.7	Jan 1939
			Mean	33.3	31.9	Jan 2017
53115/53048/53027	Moree	NSW	Minimum	24.3	23.8	Jan 1939
			Mean	31.1	30.8	Feb 1926, Jan 2017
55024	Gunnedah Res Ctr	NSW	Maximum	38.1	37.3	Jan 1952
			Minimum	24.0	22.0	Jan 1981
			Mean	31.1	28.9	Jan 1952
58012	Yamba	NSW	Maximum	28.9	28.8	Feb 2017
59151/59040	Coffs Harbour	NSW	Maximum	29.7	29.5	Jan 1994
			Minimum	21.8	21.6	Feb 1981
			Mean	25.7	25.2	Jan 2017
60139/60026	Port Macquarie	NSW	Maximum	31.2	30.0	Feb 2017
			Mean	25.7	24.9	Jan 2017
61078	Williamstown	NSW	Maximum	33.3	31.5	Jan 2017

			Minimum	21.0	20.2	Jan 2017
			Mean	27.1	25.9	Jan 2017
61363/61089	Scone	NSW	Maximum	37.5	35.8	Feb 2017
			Minimum	21.7	19.2	Jan 2017
			Mean	29.6	27.1	Jan 2017, Feb 2017
63005	Bathurst	NSW	Maximum	34.0	32.8	Jan 1929
			Minimum	18.4	16.8	Jan 1939
			Mean	26.2	24.3	Jan 2017
65070/65012	Dubbo	NSW	Maximum	39.0	37.6	Jan 1932
			Minimum	23.0	22.3	Jan 1981
			Mean	31.0	29.1	Jan 1939
66062	Sydney	NSW	Maximum	29.6 (=)	29.6	Jan 2017
			Minimum	21.7	21.6	Jan 2017
			Mean	25.7	25.6	Jan 2017
67105/67033	Richmond	NSW	Minimum	21.1	20.0	Jan 2017
			Mean	27.5	27.1	Jan 2017
68072/68076	Nowra	NSW	Minimum	19.7	18.4	Feb 1983
			Mean	24.5	23.8	Jan 2017
68151/68034	Point Perpendicular	NSW	Minimum	20.1	19.9	Jan 2017
69018	Moruya Heads	NSW	Minimum	19.5	18.6	Feb 2010
70351/70014/70099	Canberra	ACT	Maximum	34.5	32.8	Jan 2017
			Minimum	17.7	16.6	Jan 1981
			Mean	26.1	24.1	Jan 1981
72150/72151	Wagga Wagga	NSW	Maximum	37.9	37.7	Jan 1939
			Minimum	22.2	21.0	Jan 1939
			Mean	30.1	29.3	Jan 1939
72161/72091	Cabramurra	NSW	Maximum	25.6	24.5	Jan 2006
			Minimum	15.5	14.2	Feb 2000
			Mean	20.5	19.1	Jan 2006
74258/74128	Deniliquin	NSW	Maximum	37.8	36.7	Jan 1939
			Mean	28.5	27.8	Jan 1939
78015/78031	Nhill	VIC	Maximum	34.6	34.2	Jan 1999

80023	Kerang	VIC	Maximum	37.5	36.6	Jan 1939
			Mean	28.1	27.1	Jan 1939
82039	Rutherglen	VIC	Maximum	37.2	35.8	Jan 1939
			Minimum	18.5	18.0	Jan 1939
			Mean	27.9	26.9	Jan 1939
84016	Gabo Island	VIC	Maximum	23.7	23.6	Jan 2001, Feb 2016
			Minimum	18.5	18.2	Feb 2018
			Mean	21.1	20.7	Feb 2010
85072/85133	Sale	VIC	Maximum	29.5	29.2	Feb 1968
			Mean	22.5	21.6	Feb 2007
85096	Wilsons Promontory	VIC	Minimum	16.8	16.5	Jan 2018
			Mean	20.3	20.2	Feb 2000
92045	Larapuna (Eddystone Point)	TAS	Maximum	25.3	24.3	Jan 2010
			Mean	20.3	19.9	Feb 2007
94029	Hobart	TAS	Maximum	25.9	25.0	Feb 2001, Jan 2003
			Mean	20.3	19.7	Feb 2001
94220/94069	Grove	TAS	Maximum	26.0	25.6	Feb 2001
			Mean	18.3 (=)	18.3	Feb 1972

References and further information

In general, records quoted for extreme high temperatures are for the period since 1910, when standard equipment was in place across most of the Australian network. Extremes prior to 1910 are reported only where it is known that the observations were made using equipment consistent with more recent standards (e.g. at Adelaide from 1887 and Hobart from 1895).

This statement in general covers information available as of 6 March 2019. Records set in northern Australia later in March will be covered by separate reporting.

Links

Detailed information about the extreme heatwave in late November can be found in:

[Special Climate Statement 67—an extreme heatwave on the tropical Queensland coast](#)

More detail about solstices and equinoxes can be found in:

[Solstices and equinoxes: the reasons for the seasons](#)

Further information about Australia's changing climate can be found in:

[State of the Climate 2018](#)

Further climate information is available from:

www.bom.gov.au/climate

Further information on the Bureau of Meteorology's heatwave service for Australia is available from:

www.bom.gov.au/australia/heatwave/

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