



Australian Government
Bureau of Meteorology

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

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1.0	17 January 2019	
1.1	24 January 2019	Updated with ongoing heatwave event



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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 into January 2019.
- 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.
- Numerous locations reported their highest daily maximum temperature on record for December or January, 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 for the highest minimum temperature ever observed in Australia.
- It was Australia's warmest December on record.
- Every State and Territory was affected by heatwave conditions at some stage during the event.
- These widespread heatwaves during December and January followed an extreme heatwave that affected the tropical Queensland coast during late November 2018.
- The current heat event is continuing and this Special Climate Statement will be updated at the end of January.

Introduction

An unusual extended period of heatwaves over much of Australia began in early December 2018 and continued into January 2019. The Australian mean daily maximum temperature on 27 December 2018 was the highest on record for December, and the third-highest for any month, while 15 January 2019 recorded the second-highest for any month. Numerous locations reported their highest December or January daily maximum temperature on record, with some locations exceeding their previous records by large margins. Overall, it was Australia's warmest December on record. After briefly retreating into northwestern Australia in early January, the extreme heat returned over much of the continent through the middle of the month, setting many further records.

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.²

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,³ 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 Australia for the wet season-to-date remains far below average and monsoon onset had not yet occurred at Darwin as of 22 January.

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 early January can be seen in Figure 1 and Figure 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 has been the absence of strong fronts to cool the country.

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 Figure 5 and 6 and maps of daily minimum temperature anomalies can be seen in Figure 7 and 8.

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

² This statement does not cover, in detail, the extreme heat that occurred from 22 January onwards. This will be covered by an update to be issued later.

³ For further information see [Solstices and equinoxes: the reasons for the seasons](#)

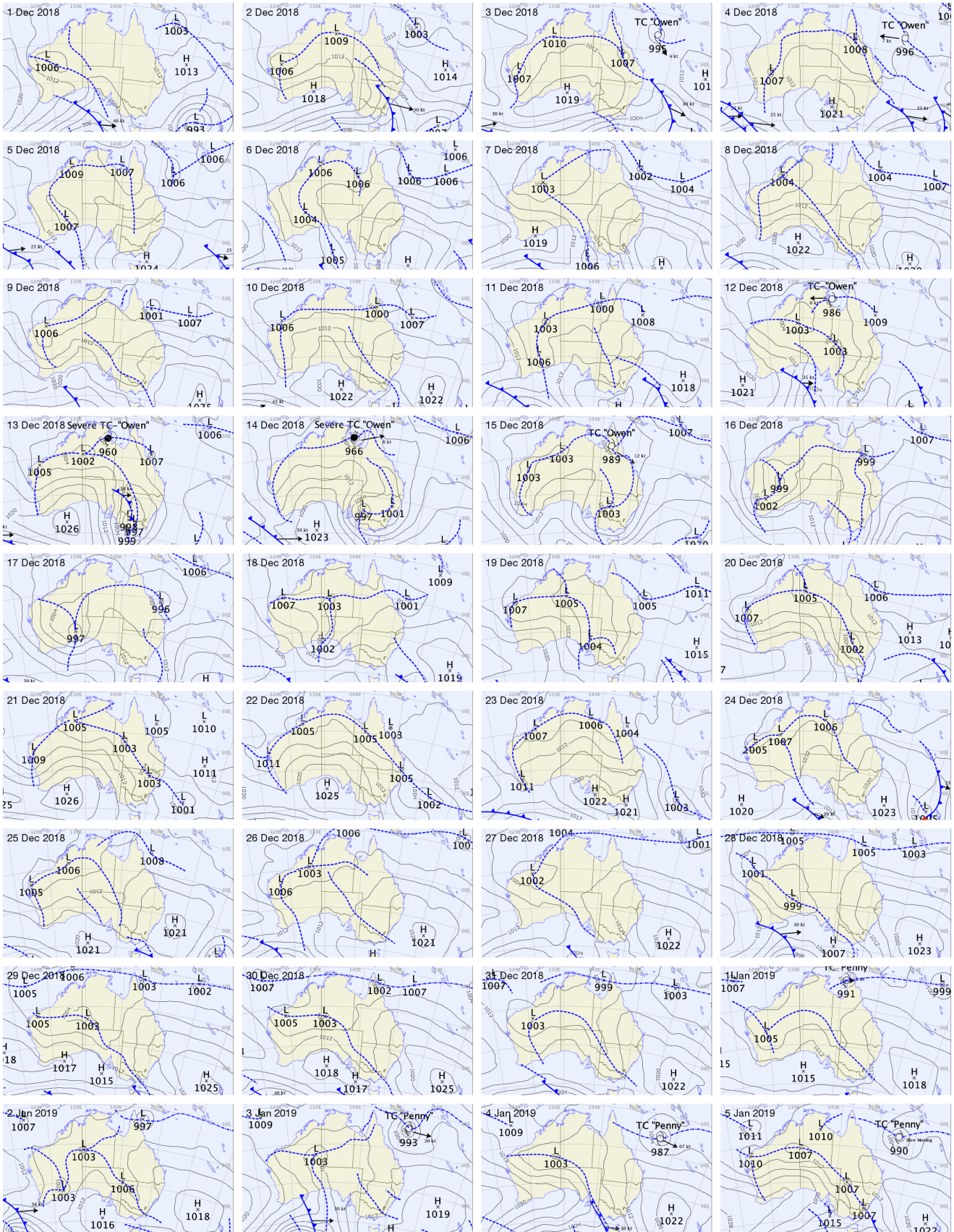


Figure 1: Mean sea-level pressure (MSLP) analyses for 1 December 2018 to 5 January 2019.

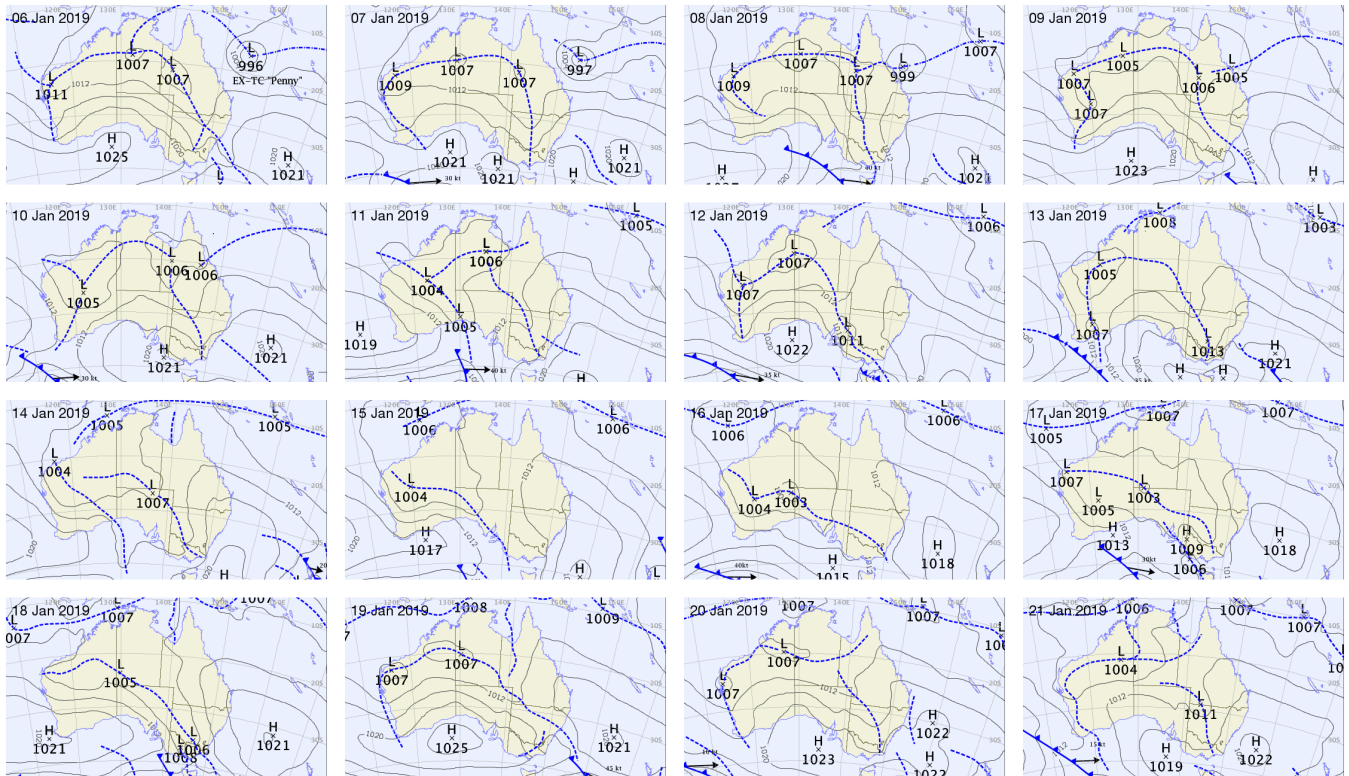


Figure 2. Mean sea-level pressure (MSLP) analyses for 6 to 21 January 2019.

1 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.

A low pressure system situated over central Western Australia, with multiple troughs extending from its centre, triggered scattered thunderstorms from the Kimberley region down through eastern Western Australia into northern South Australia, marking the western edge of the heatwave conditions. A trough extending across the central districts of the Northern Territory maintained hot and humid westerly winds across the Territory's north.

Almost all of eastern Australia experienced above average maximum temperatures: more than 4 °C above average for much of Queensland, up to 10 °C above average in southern Victoria.

Some coastal regions of Queensland saw the return of sea breezes, with humidity also increasing along the east coast. Particularly in the far north, these humid conditions exacerbated the heat and posed a health risk.

2 December

A cold front moved across Victoria, bringing cooler conditions to southeastern Australia. However, a surface trough crossing Queensland brought a moderate northwesterly windflow and maintained high to very high fire dangers over much of the State. Daytime temperatures were more than 8 °C warmer than average in southeast Queensland and areas of coastal New South Wales.

As the warm air mass extended into inland Australia, minimum temperatures also increased and were 3 °C to 7 °C above average through much of the Northern Territory, western Queensland, and central New South Wales.

3 December

Severe to extreme heatwave conditions surrounded the Gulf of Carpentaria, extending west around Darwin to Kalumburu.

4 December

Severe to extreme heatwave conditions continued building in the Top End of the Northern Territory and northern parts of Western Australia.

A persistent low pressure system over the Gascoyne region of Western Australia continued directing warm air over southern Western Australia and adjacent areas of western South Australia. A low pressure trough extended across northern Australia to another low pressure system over northern Queensland. Maximum temperatures were more than 6 °C above average in Queensland's Gulf Country and Central Coast districts.

Severe fire weather conditions were experienced through inland areas of Western Australia including the Gascoyne Inland and Goldfields with the hot, dry, and windy conditions.

5 December

Across northern Australia, the severe to locally extreme heatwave conditions continued to shift west into northern and western areas of the Northern Territory and northern Western Australia. In southern Australia, the area of severe heatwaves moved east into South Australia and Victoria.

A high pressure system began to dominate the weather across Australia's eastern seaboard, bringing a cooler, more humid onshore airflow helping to ease the fire dangers along the east coast. However, elevated fire dangers continued for parts of Western Australia.

6 December

A cold front brought cooler temperatures to southwest Western Australia, but a high pressure system over the Tasman Sea directed hot northerly winds over southeastern Australia, with some areas of South Australia, Victoria, and Tasmania experiencing maximum temperatures more than 12 °C warmer than average.

Heatwave conditions eased in Queensland, with temperatures across large parts of Queensland and northeastern New South Wales returning close to or below average.

7 December

The high pressure system over the Tasman Sea dominated the weather across the eastern seaboard, bringing a cooler, more humid onshore airflow. Further south and inland, there were severe heatwave conditions developing in parts of Victoria and southern New South Wales, with elevated fire dangers in those areas. Severe to extreme heatwave conditions in the Northern Territory and northern parts of Western Australia continued.

8 December

A broad low pressure trough remained slow moving across the Northern Territory and northern parts of Western Australia. The weather patterns maintained a very hot east to northeasterly airstream over this region and severe heatwave conditions continued. A cool change moved across the far southeast of the country, easing heatwave conditions near these coastal areas.

The remnants of the former tropical cyclone *Owen* were off the Queensland coast over the Coral Sea but drifted towards the mainland. Moist onshore flow around the system produced showers and thunderstorms in the coming 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.

17–22 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.

23–24 December

The low pressure trough extended across northern tropical Australia as a high pressure system moved over southern Australia and the Tasman Sea.

Temperatures were warmer than average for much of Western Australia and along Australia's southern coast, but most of New South Wales experienced near-average to cooler than average conditions.

25 December

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.

26 December

Boxing Day 2018 was 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.

27 December

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).

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 the event to date.

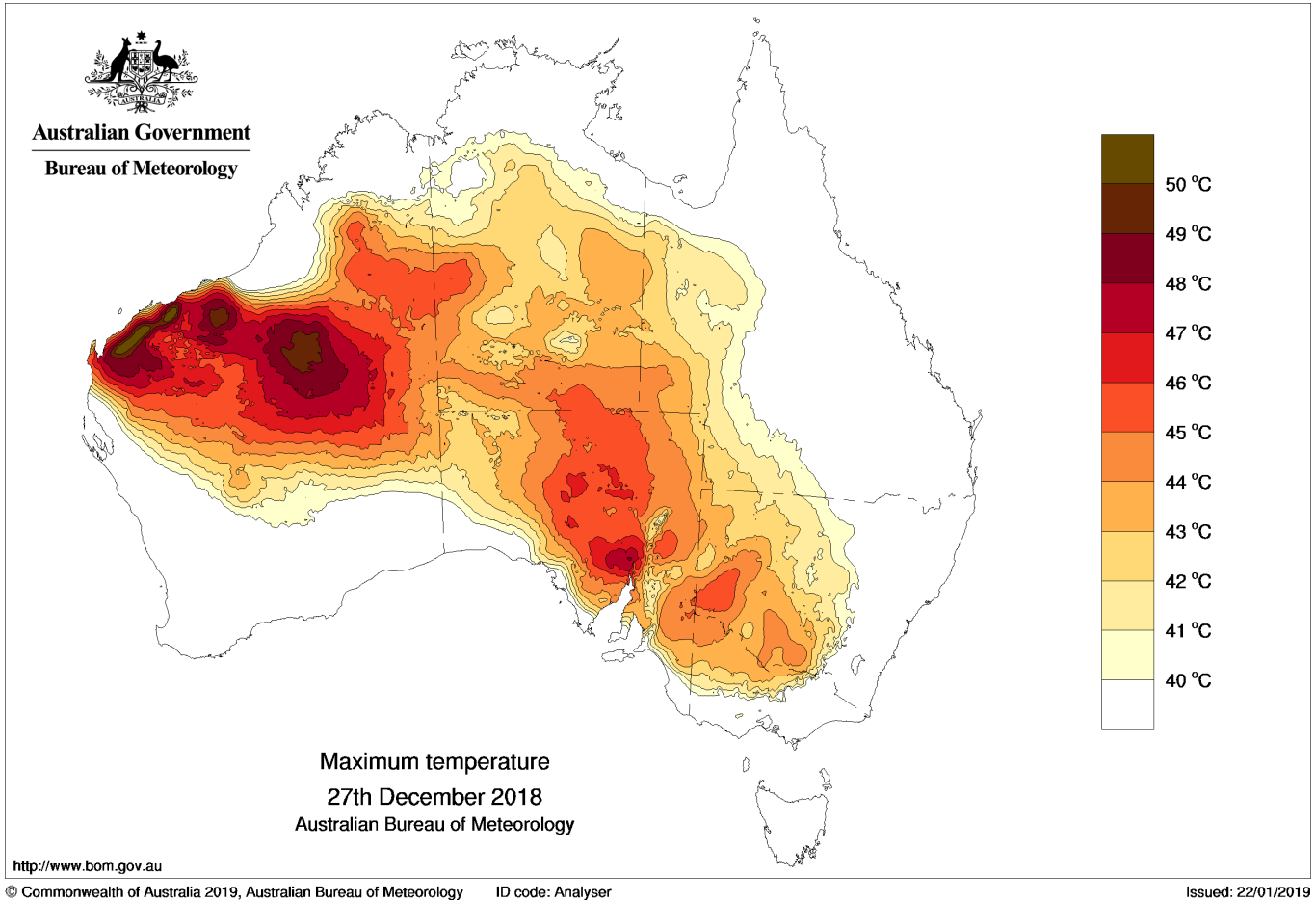


Figure 3: Map of areas exceeding 40 °C on 27 December 2018, Australia's warmest December day on record for maximum temperature.

28 December

A very hot air mass extended from central Western Australia to the southeast of Australia. A high pressure system over the Tasman Sea remained slow moving and directed northerly winds and extremely hot conditions inland.

The national mean temperature of 31.72 °C on the 28th was Australia's third-warmest December day on record.

29 December

An inland surface pressure trough extended from the Pilbara through northern South Australia, and down across northern and eastern Victoria.

Severe to locally extreme heatwave conditions continued across inland Australia.

30 December

A long-lasting, very hot air mass extended from the Pilbara region of Western Australia, through central Australia, to New South Wales, and heat started building through the southwest interior of Queensland.

A slow-moving high pressure system over the Tasman Sea maintained northerly winds and extremely hot conditions inland.

Severe heatwave conditions persisted through central Australia, inland New South Wales and the interior of Queensland. Sea breezes moderated conditions for coastal locations of New South Wales and Queensland.

Cooler conditions persisted for coastal locations of southern Australia due to southerly winds.

31 December

A low pressure system was over the Pilbara region of Western Australia and a surface trough extended through the central Northern Territory and down over western and southern New South Wales.

Almost all of Australia south of the tropics had a warm to hot day, with maximum temperatures up to 12 °C warmer than average in the western districts of New South Wales.

Most of the country reached at least low intensity heatwave status, with isolated patches of extreme heatwave conditions in Western Australia and the Northern Territory.

1 January 2019

A cold front crossed southern Tasmania, and the centre of the low pressure system over Western Australia moved south over the Gascoyne region.

Severe to locally extreme heatwave conditions continued over large inland areas of the country. Daytime temperatures for Western Sydney eased to the mid 30's, but parts of the Hunter remained around 40 °C during the day. Sea breezes moderated conditions for coastal locations of New South Wales and Queensland.

2 January

Extreme heat returned to southeastern Western Australia and adjacent areas of South Australia. Daytime temperatures were above average across most of Australia away from the country's southwest and northeast.

Maximum temperatures were into the mid 30's for Adelaide, while Melbourne and Hobart remained mild through these days with daytime temperatures in the mid 20's.

3 January

The extreme heat moved over central Australia, with much of South Australia's south more than 12 °C warmer than average and Adelaide reaching 42.3 °C. The Northern Territory as a whole recorded its warmest day on record with a mean maximum of 42.93 °C, just exceeding the 42.91 °C recorded on 27 December 1990.

4 January

The centre of the low pressure system over Western Australia drifted west into the Gibson Desert and the low pressure trough extended from the Pilbara through southern parts of the Northern Territory and down into southeastern South Australia.

A cold front crossed southeastern South Australia, bringing cooler conditions there. Ahead of the cool change, it was a very hot day across most of Victoria, southern New South Wales, and Tasmania.

Melbourne reached 42.6 °C, Canberra 38.1 °C, and Hobart 34.0 °C.

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. 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.

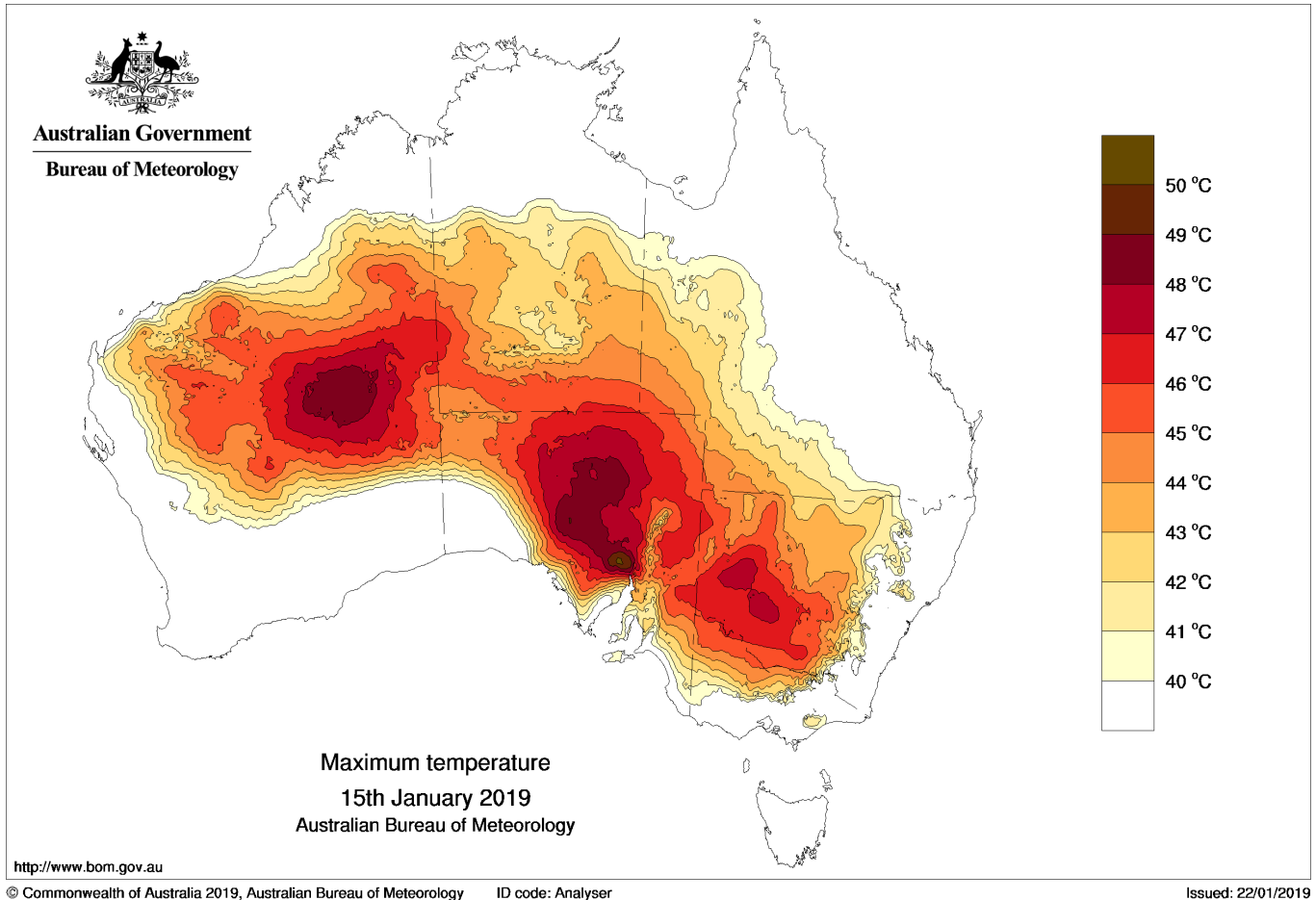


Figure 4: Map of areas exceeding 40 °C on 15 January 2019, Australia's second-warmest day on record for maximum temperature for any month.

19 January onward

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.

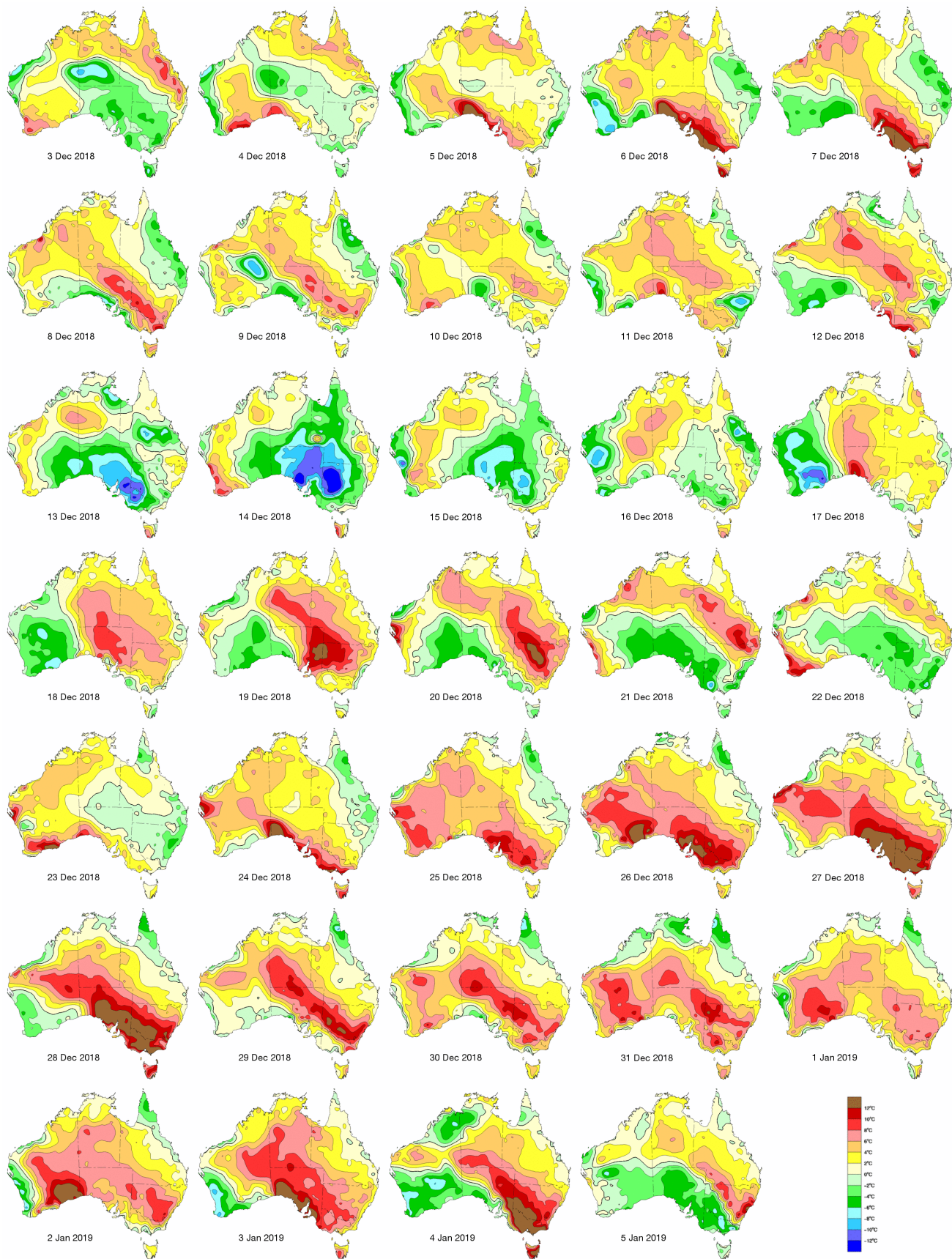


Figure 5: Daily maximum temperature anomalies for 3 December 2018 to 5 January 2019.

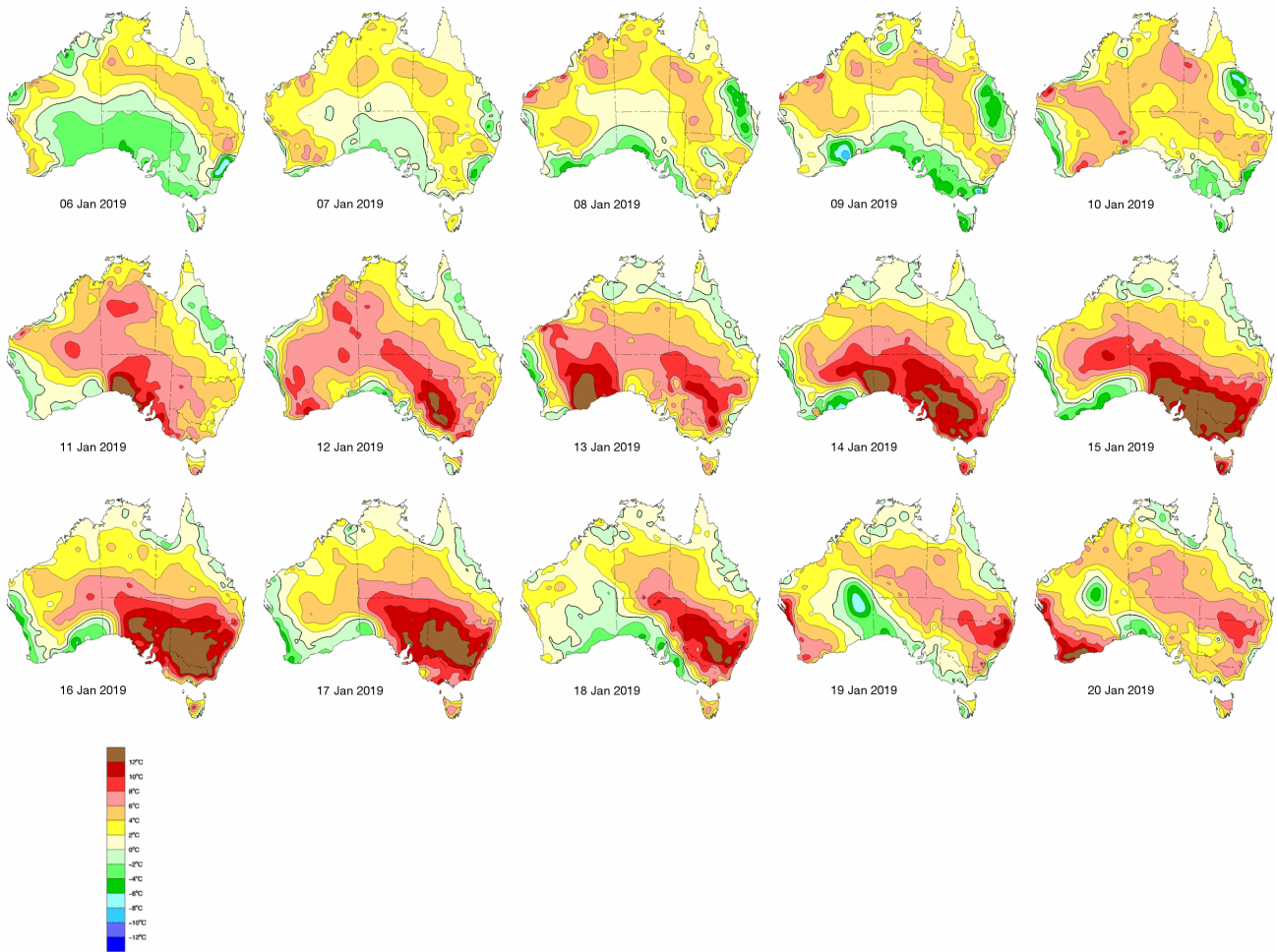


Figure 6. Daily maximum temperature anomalies for 6 to 20 January 2019.

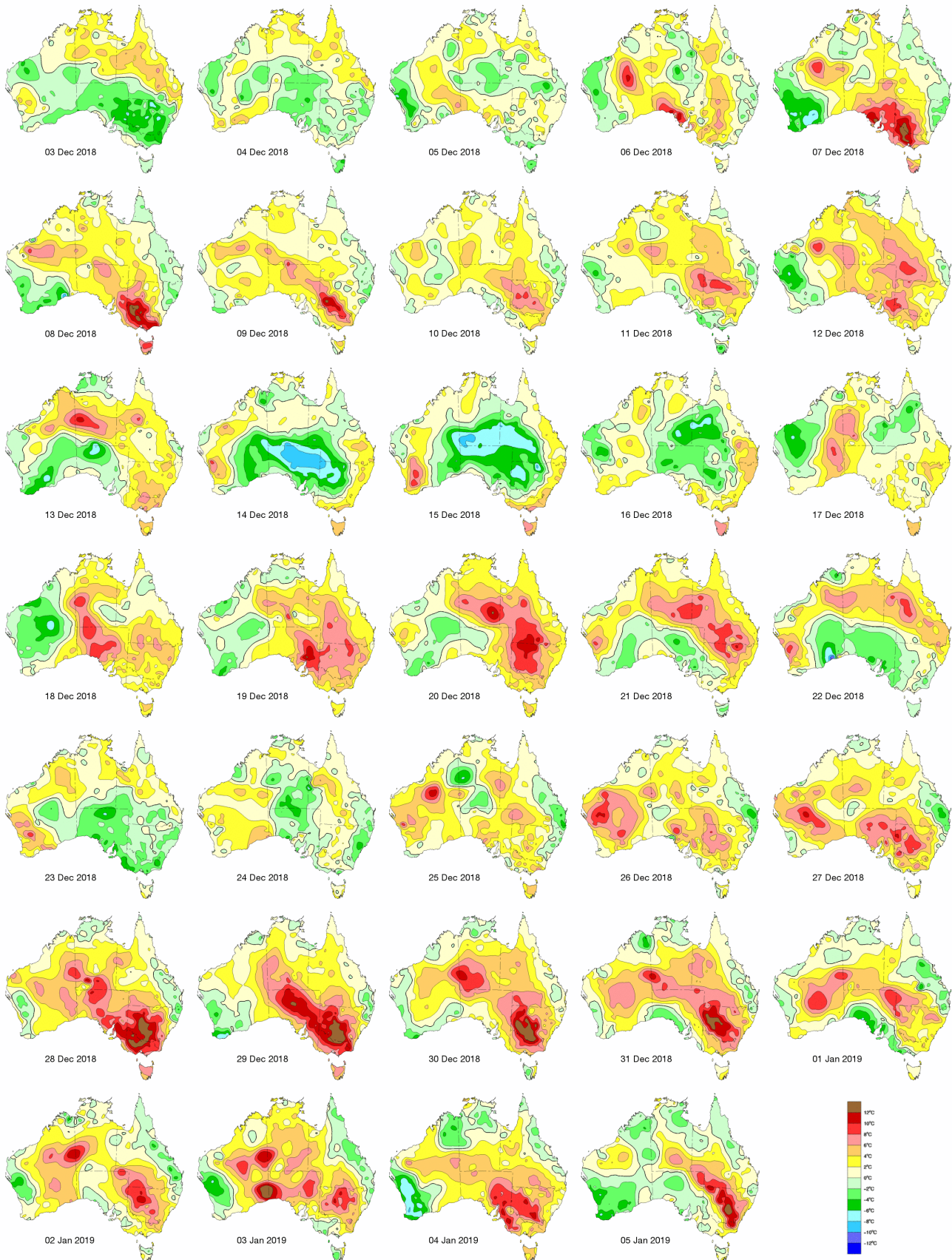


Figure 7: Daily minimum temperature anomalies for 3 December 2018 to 5 January 2019.

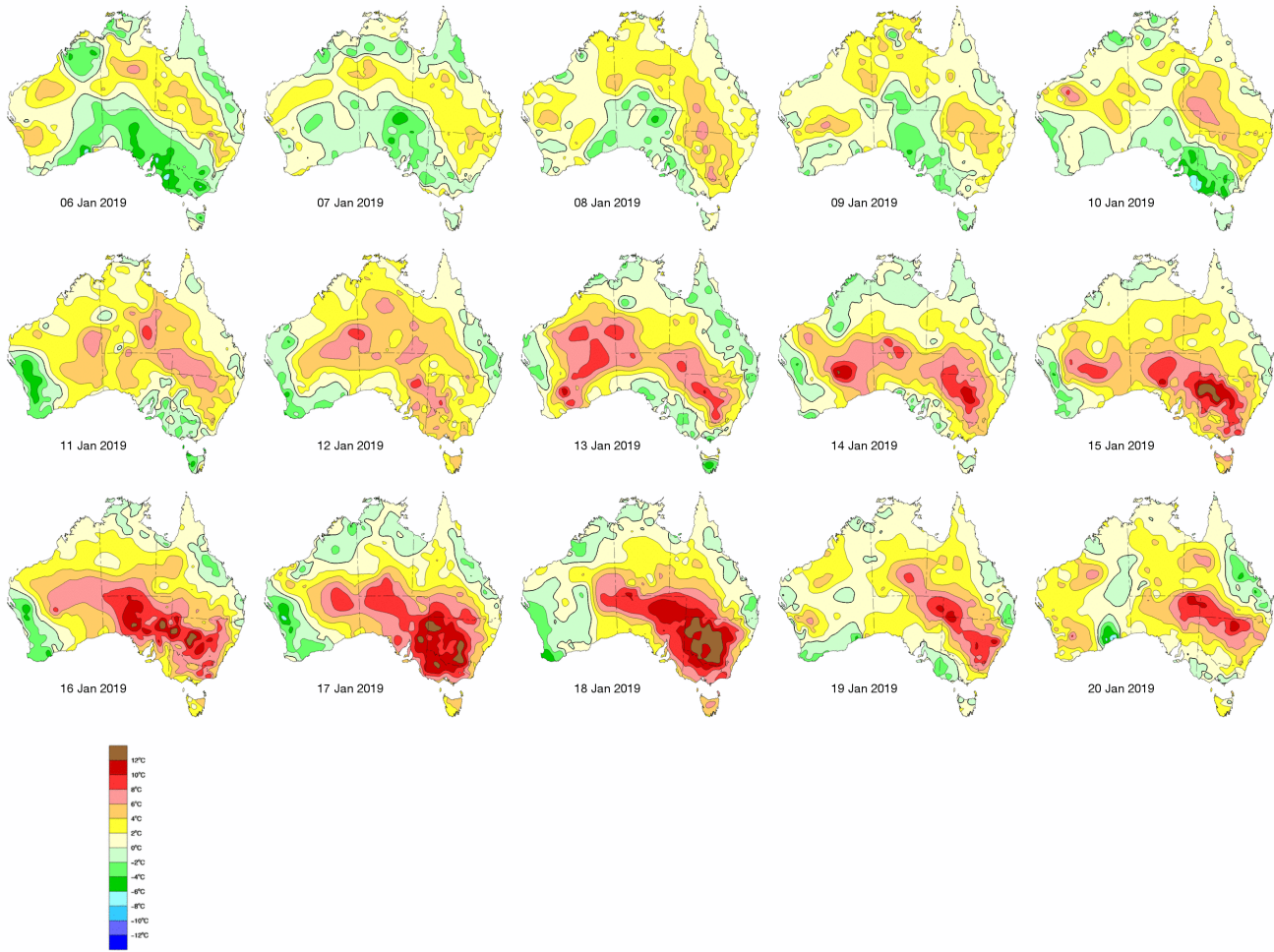


Figure 8: Daily minimum temperature anomalies for 6 to 20 January 2019.

2. Persistent 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 was to break this record again in 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; 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 December⁴. 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.

⁴ Marble Bar had another run of eight such days from 6–13 January 2019.

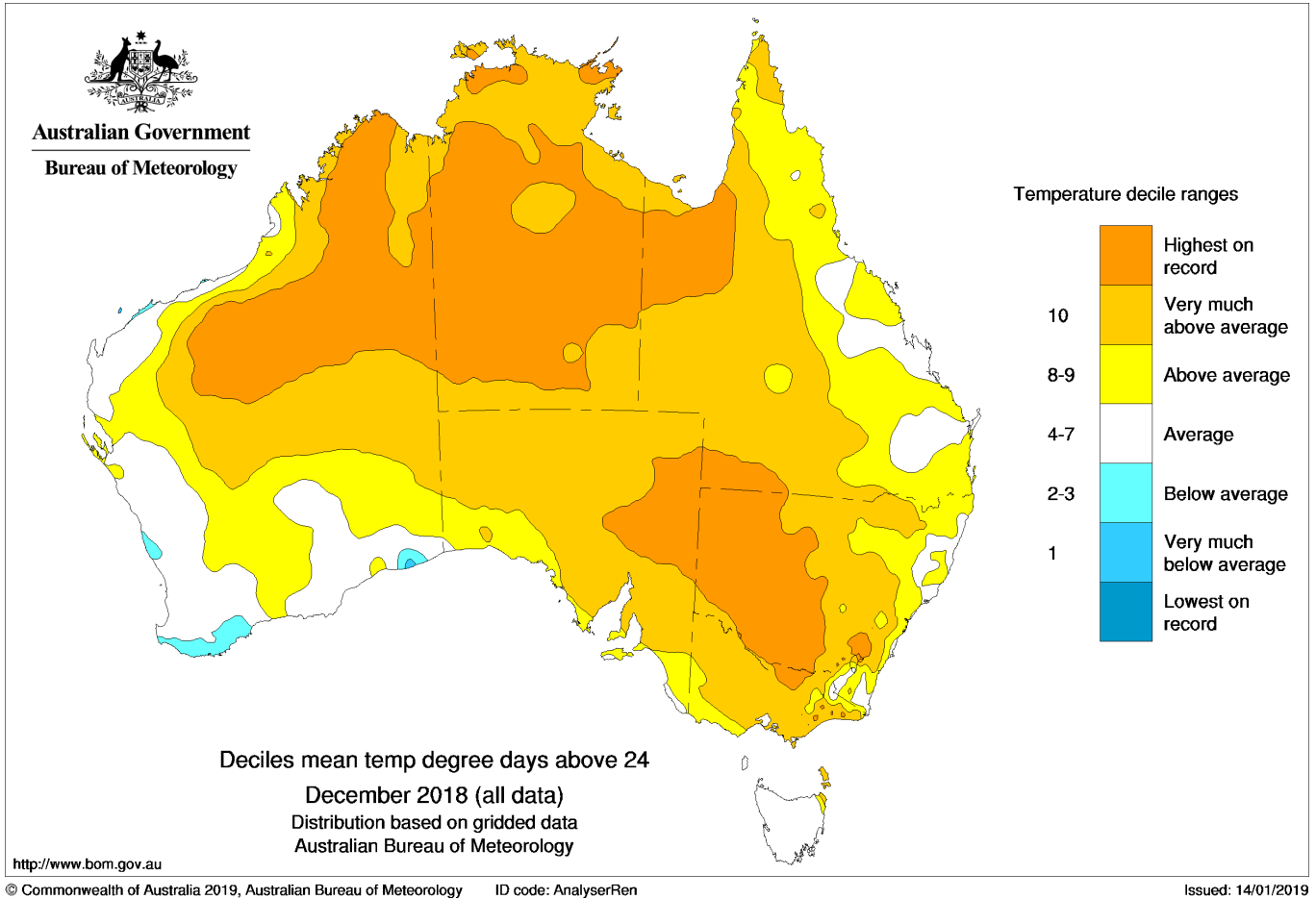


Figure 9: Decile map of cooling degree days above 24 °C for December 2018 (based on all available data since 1910).

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.

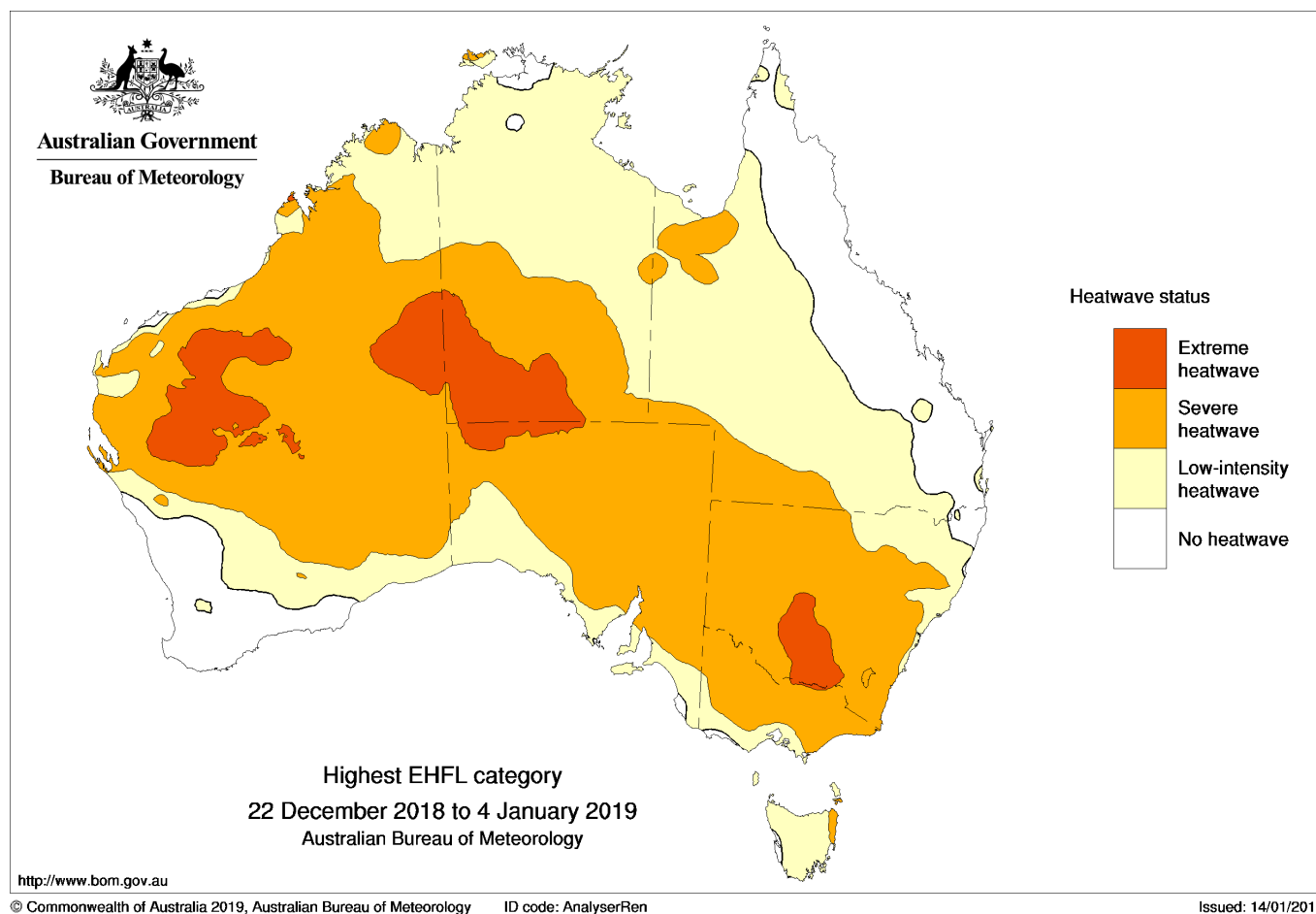


Figure 10: Map of the highest three-day heatwave category for 22 December 2018 to 4 January 2019.

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.

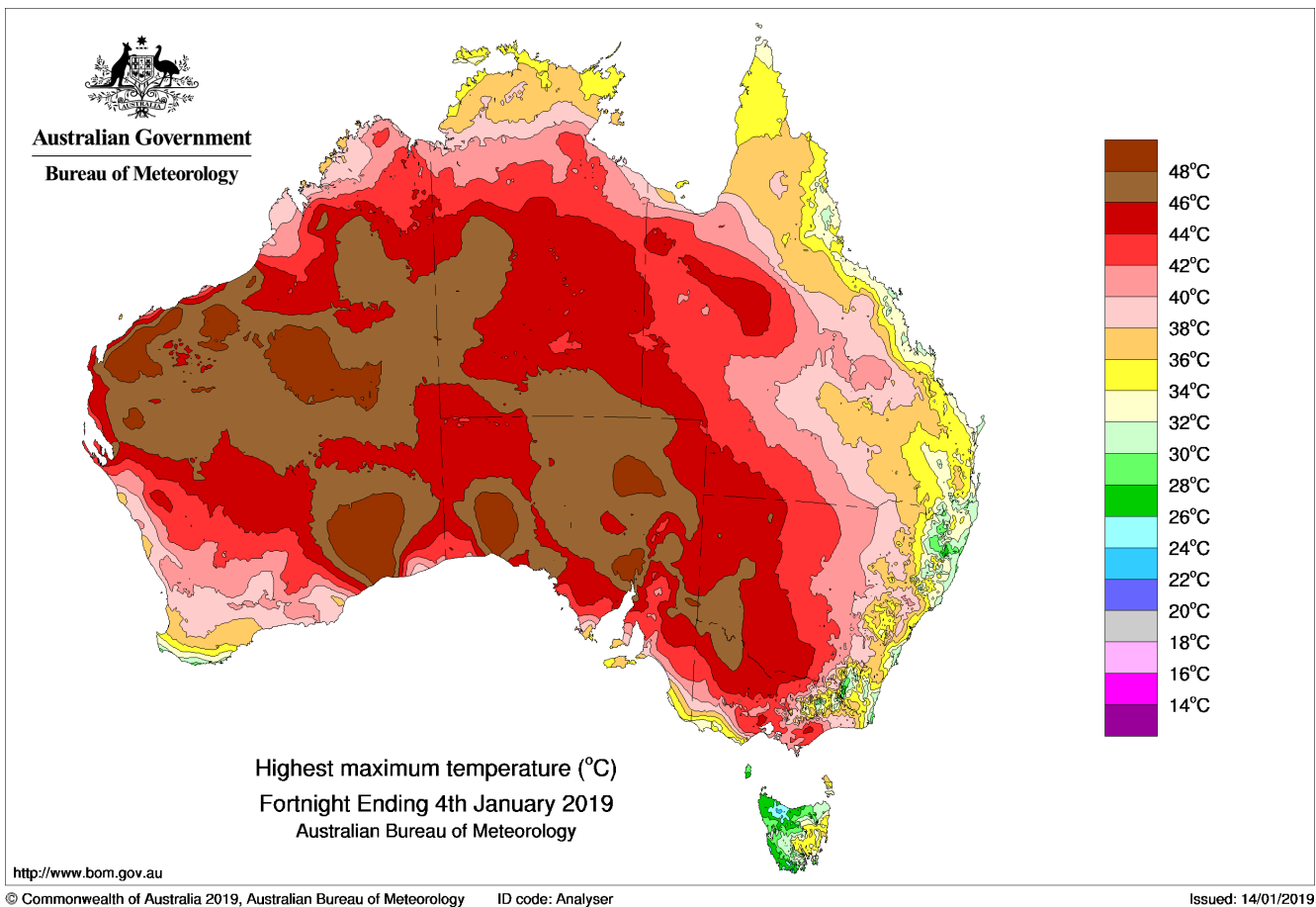


Figure 11: Map of highest maximum temperature observed on any day from 22 December 2018 to 4 January 2019.

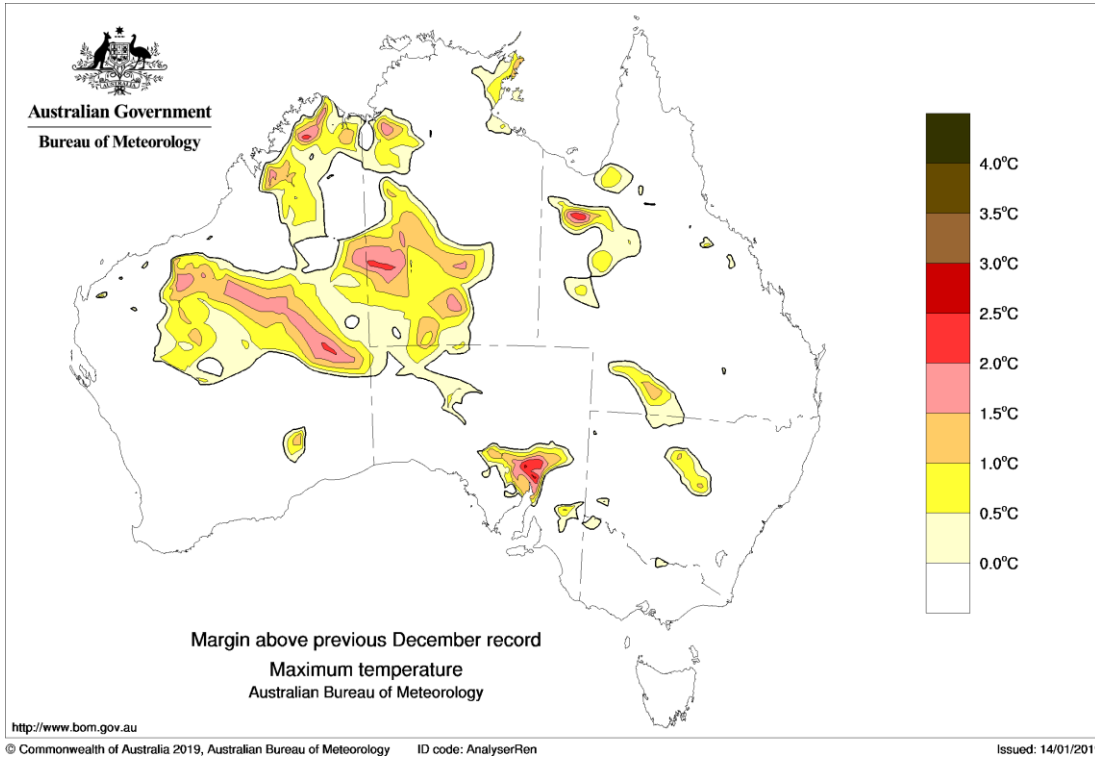


Figure 12: Map of areas recording a new highest maximum temperature in December 2018 (compared with data from 1910 to 2017).

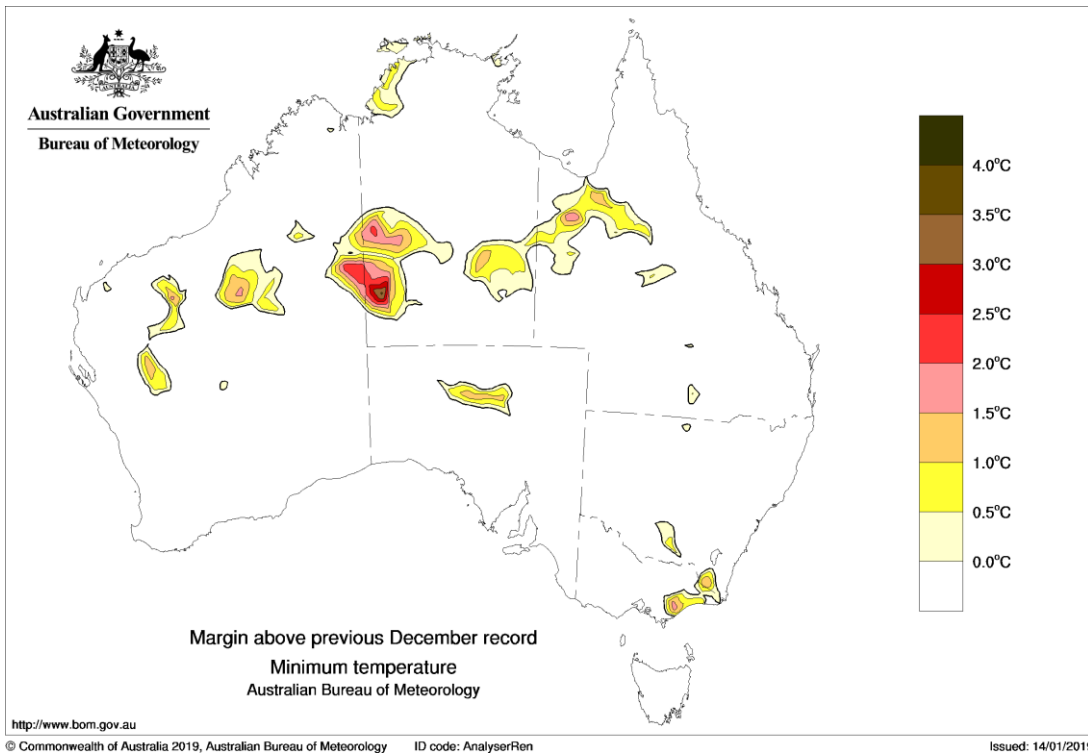


Figure 13: Map of areas recording a new highest minimum temperature in December 2018 (compared with data from 1910 to 2017).

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 1972.⁵

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 15 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 days in December above 40 °C (Table 9) or 42 °C (Table 10).

⁵ See the [December 2018 Climate Summary for Australia](#)

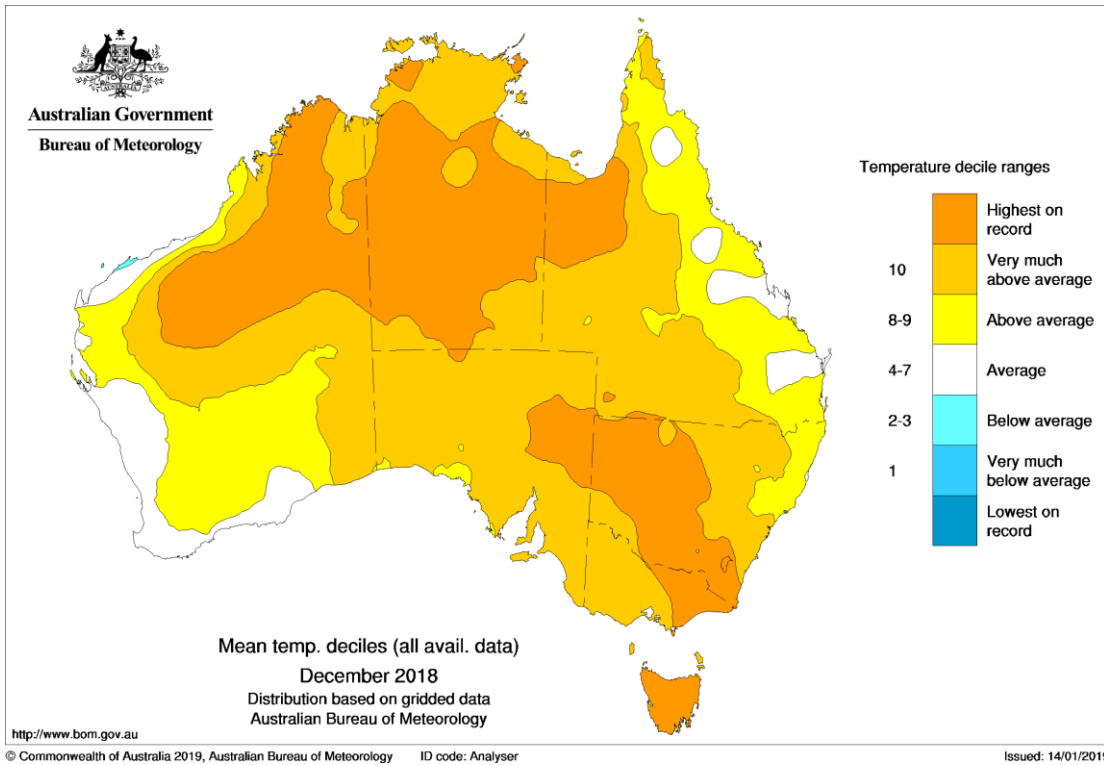


Figure 14: Map of mean temperature deciles (all available data since 1910) for December 2018 showing above average to record warm temperatures across most of Australia.

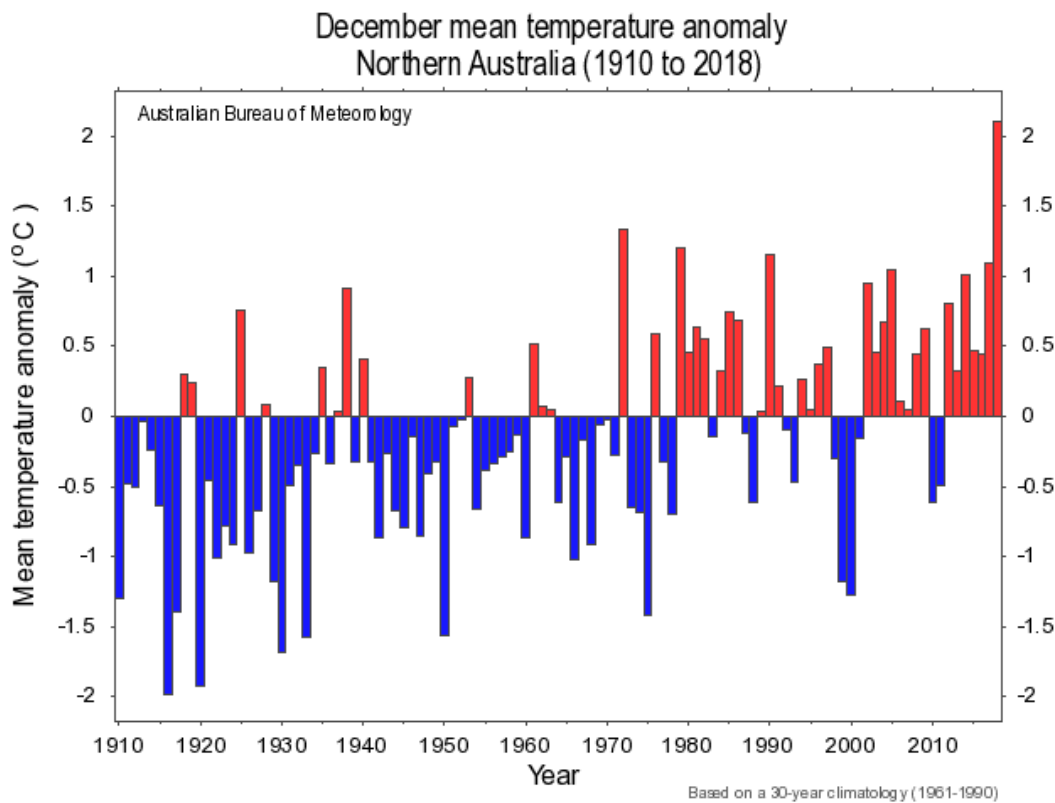


Figure 15: Time series graph of December mean temperature anomalies (differences from average) for northern Australia (north of 26°S inclusive) for the period 1910–2018.

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 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 40.28 °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 (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 have been above 23 °C for 13 consecutive days as of 23 January, breaking the record of 12 days set in February 2004, whilst the four consecutive nights above 24 °C from 15 to 18 January breaks the record of three nights in February 2004 and January 2018. At the State area-averaged level, relatively few records were set for consecutive days above thresholds, the most notable being a 13-day run above 40 °C for the Northern Territory (ongoing as of 22 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, 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 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 (the latter is the second-highest temperature on record at an Australian coastal site outside the tropics, after 49.4 °C at Whyalla on 2 January 1960), 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 is 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 Wittenoorn (WA). Borrora Downs (near Wanaaring) also broke the previous record with 35.6 °C. (Earlier in the week, 34.6 °C at Borrora 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 (in total, seven of the nine instances of minima of 34 °C or above have occurred in 2019). The 18th was the hottest night on record averaged over the State, with an average of 27.21 °C, well above the previous record of 26.79 °C on 15 February 2004.

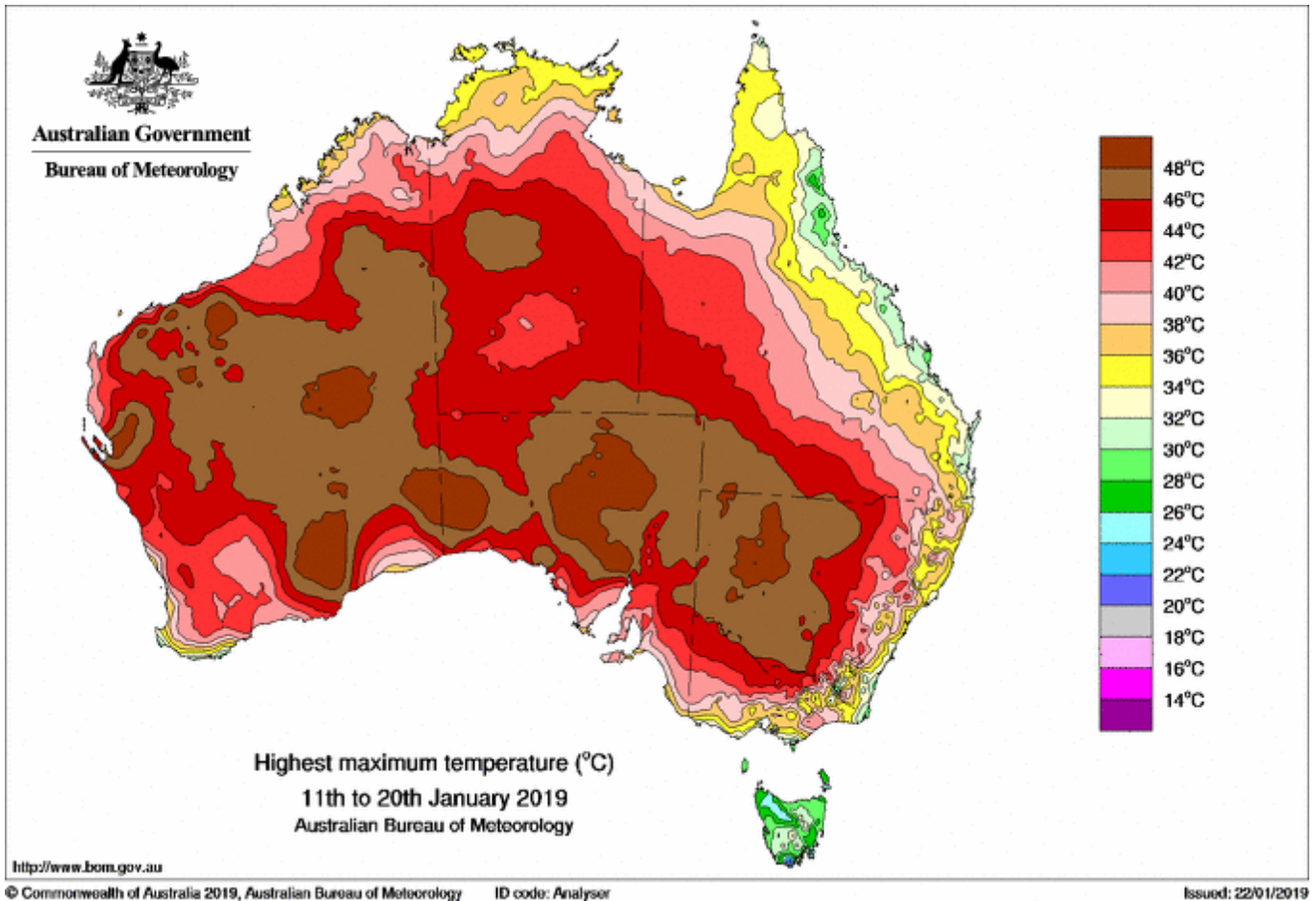


Figure 16: Map of highest maximum temperature observed on any day from 11 to 20 January 2019.

Except in South Australia, the extreme heat 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 17 and Figure 18).

This phase of the heatwave eased in southeastern Australia after the 18th. However, temperatures in inland areas remained significantly above average, particularly from central New South Wales northwards. Further north, the heat continued largely unabated with maximum temperatures remaining above 42 °C at Alice Springs through the 22nd.

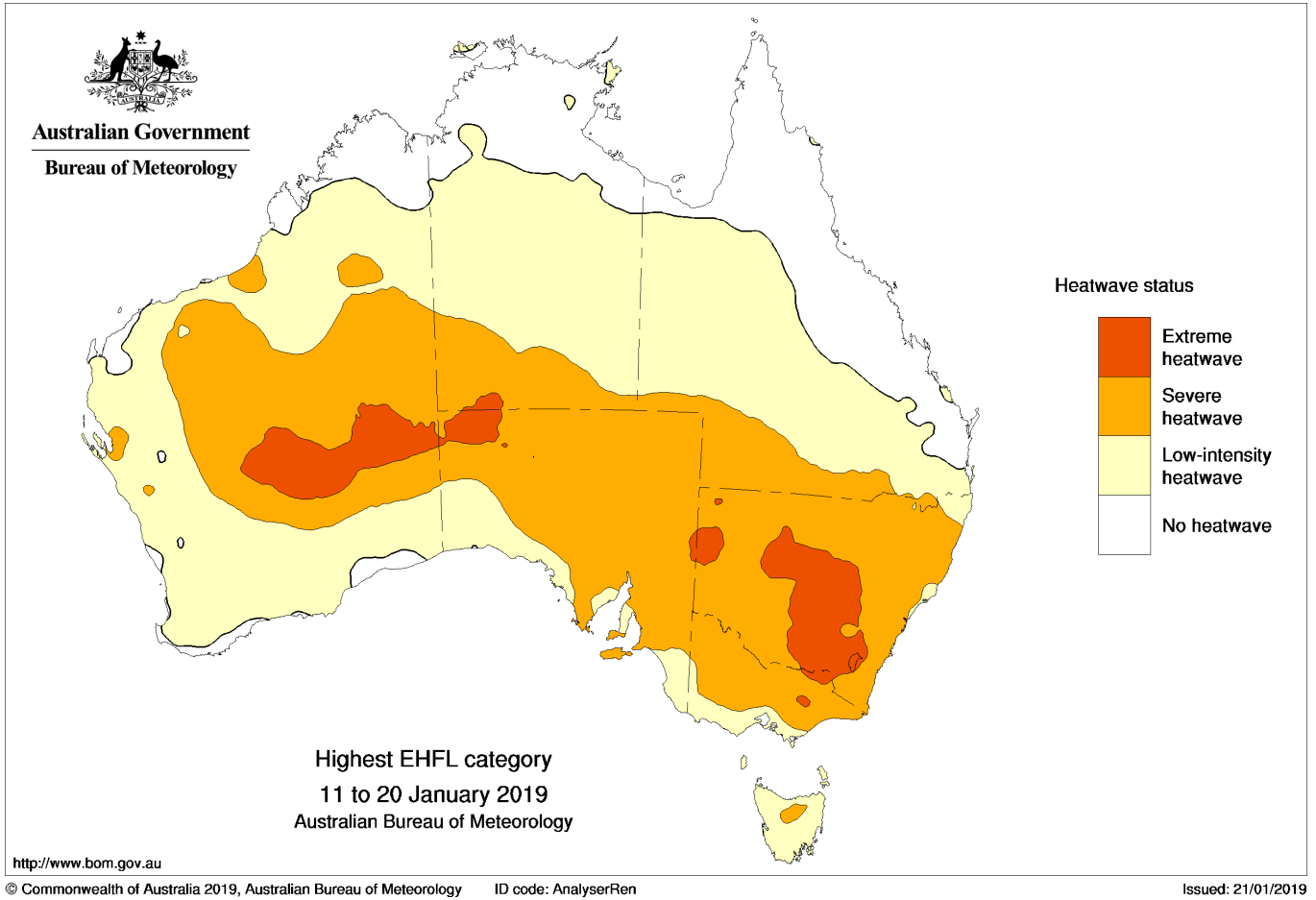


Figure 17: Map of the highest three-day heatwave category for 11 to 20 January 2019.

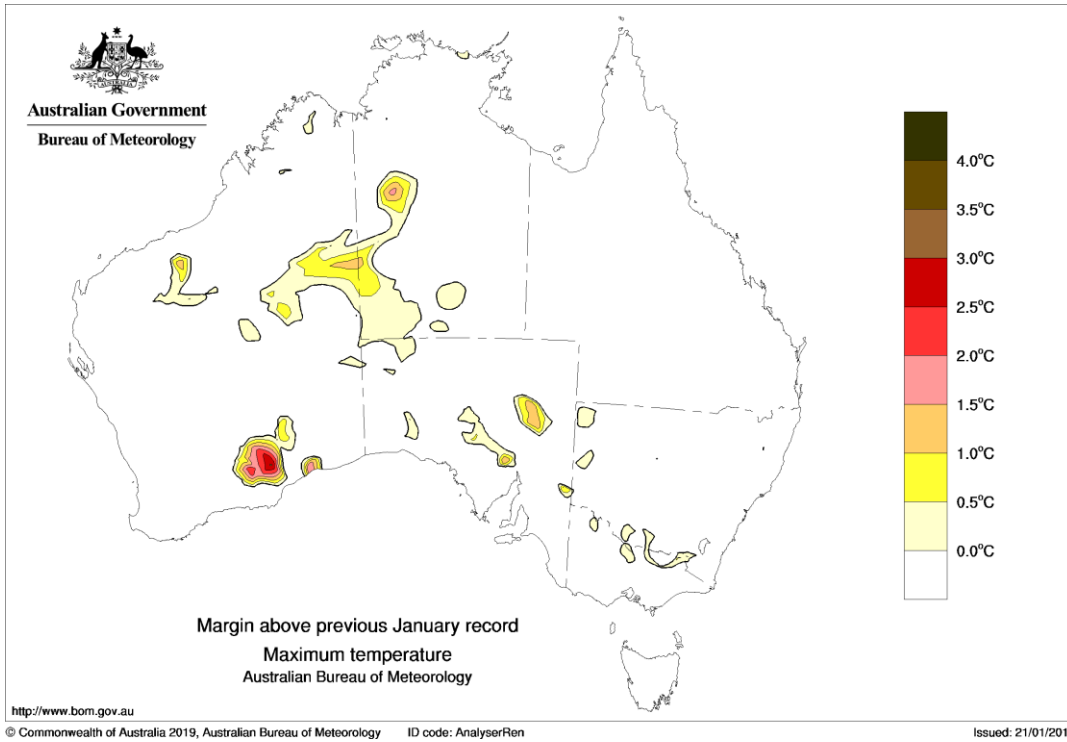


Figure 18. Map of areas recording a new highest maximum temperature in January 2019 (compared with data from 1910 to 2018).

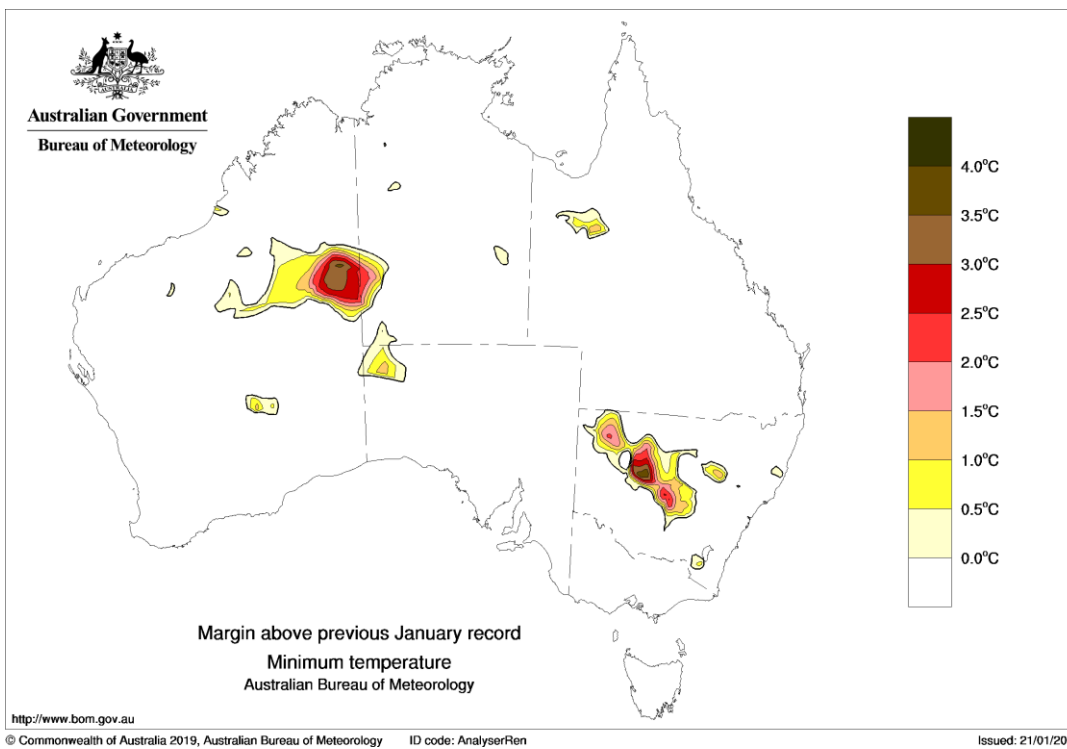


Figure 19. Map of areas recording a new highest minimum temperature in January 2019 (compared with data from 1910 to 2018).

6. Record high temperatures at individual locations

Although the event has been more notable for the persistence and areal extent of the heat than for individual extreme high temperatures, 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 January, particularly for high minimum temperatures in New South Wales. Site records for locations with 40 years or more of data are shown in Tables 2 to 5 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 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.

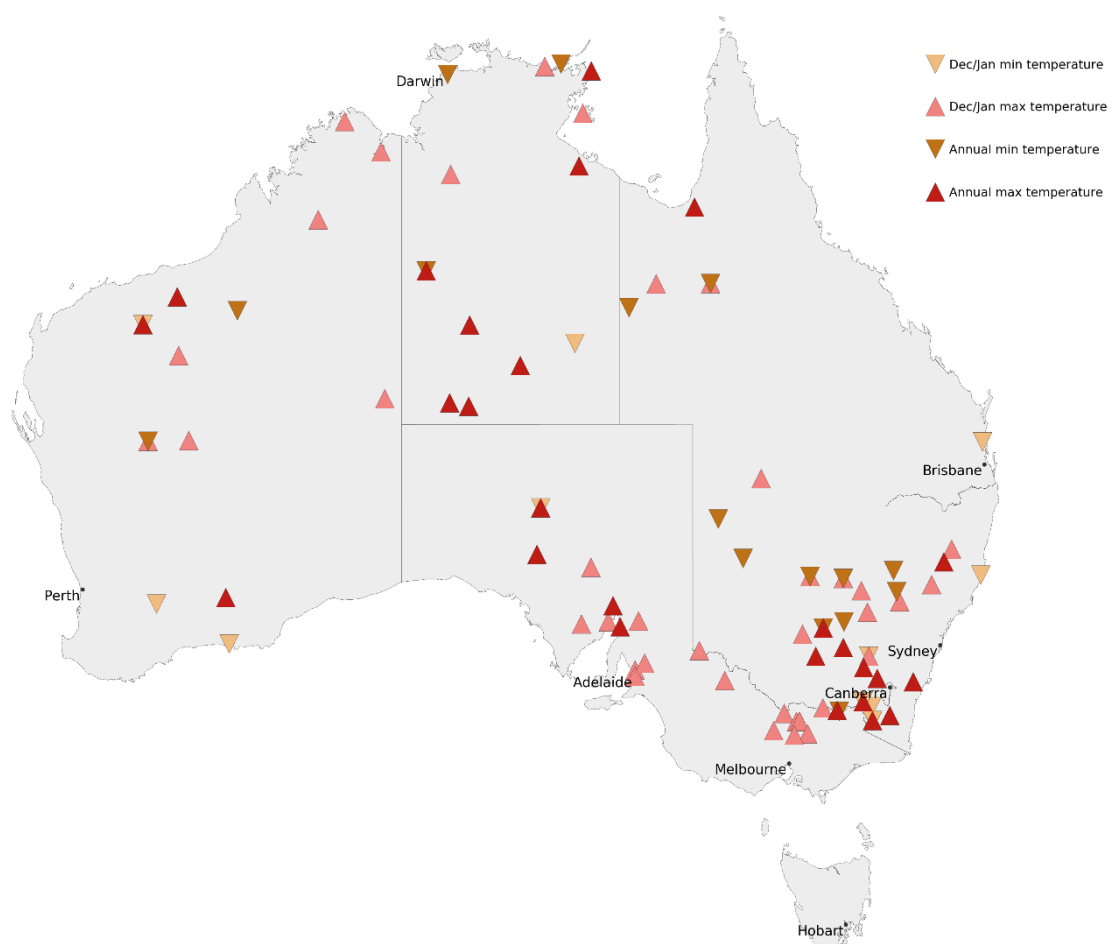


Figure 20: Map of locations with 40 years or more of data that set new records for daily high maximum and minimum temperatures from 1 December 2018 to 21 January 2019.

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 (ongoing as of 21 January 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

January⁶; 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 40 °C or more, 42 °C or more, or 45 °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 Northern Territory record of 35 days, set at Walungurru in 2007. Later in the event, 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), an ongoing 21-day run from 2 to 22 January. Camooweal and Cloncurry each have ongoing 38-day runs of consecutive 40 °C in progress as of 22 January, surpassing the previous record for any Queensland site of 31 days (set on a number of occasions).

Whilst Tasmania has been 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 (ongoing as of 22 January) of 20 °C or above at Hobart.

Nights were also warm, with a few sites mostly in inland New South Wales having a record number of consecutive nights with minimum temperatures of 20 °C or above or 25 °C or above. Cunnamulla (Queensland) had had 27 consecutive nights above 25 °C as of 23 January, surpassing the previous record of 22 nights in 2005–06. 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 four⁷ at Oodnadatta (SA) in February 2004), whilst the 30 °C sequence ranks equal second behind a nine-night run at Oodnadatta, also in the February 2004 event.

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 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.

⁶ The sequences at Canberra (sites 70099, 70014 and 70351) and Birdsville (38002 and 38026) contain data from multiple sites and hence do not appear in Figure 21 or Tables 6 or 8.

⁷ 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).

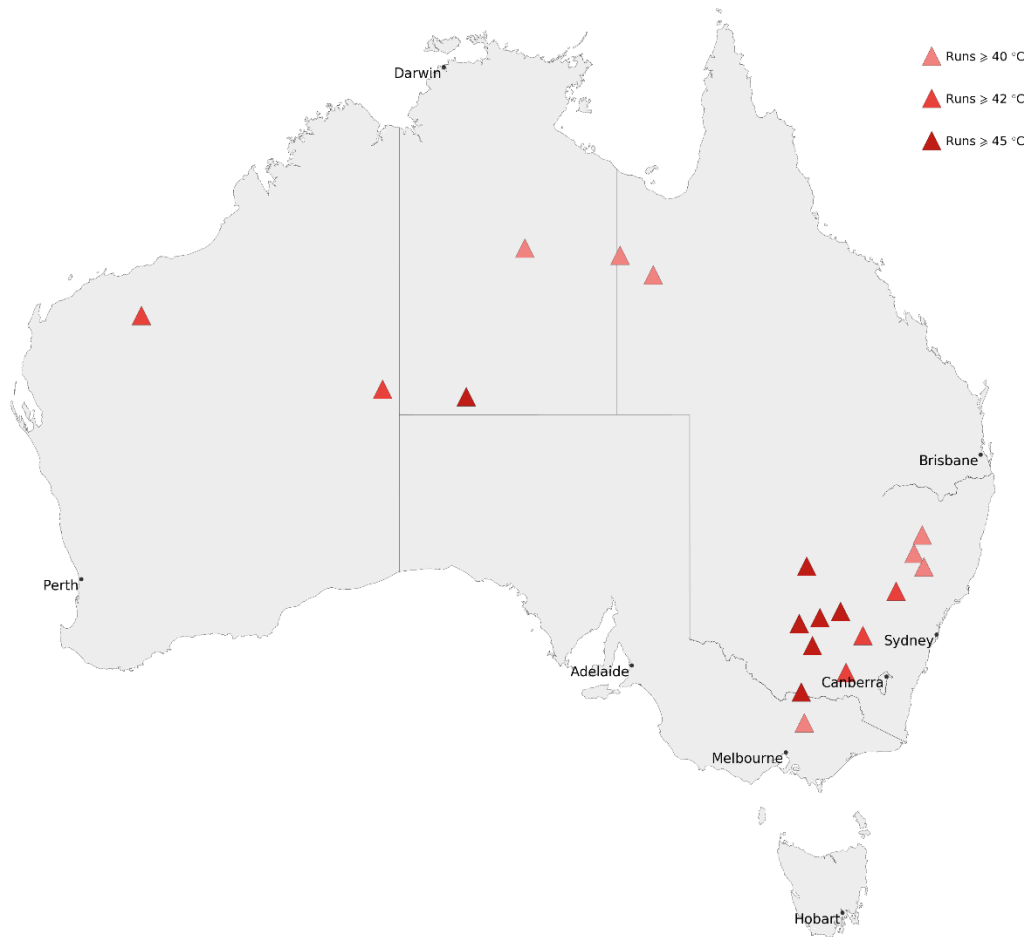


Figure 21: Map of sites with 40 years or more of data that reported new record runs of consecutive days with maximum temperatures over 40 °C, 42 °C or 45 °C during December 2018 and January 2019.

8. 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 causes in antecedent and concurrent weather conditions, long-term trends also play a role. Australia's annual mean temperature has warmed by just over 1 °C since 1910,⁸ and summer has warmed by a similar amount. Australia's annual warming trend is consistent with that observed for the globe.

9. 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 2013.⁹ 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 2012–3 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. Unlike the 2013 event, the most extreme heat was generally confined to inland areas.

As with January 2013, 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 °C¹⁰. 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.

⁸ For further information see [State of the Climate 2018](#)

⁹ For further information see [Special Climate Statement 43—extreme heat in January 2013](#)

¹⁰ 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 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.

In general, the 1939 heatwave was of comparable intensity to, and slightly longer than, the 2019 heatwave in inland southeastern Australia, and affected the major cities (particularly 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.

10. 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	32.63	22 Jan 2019
40.28	15 Jan 2019	24.94	16 Jan 2019	32.48	16 Jan 2019
40.21	27 Dec 2018	24.92	23 Jan 2019	32.45	15 Jan 2019
40.17	21 Dec 1972	24.75	18 Jan 2019	32.29	8 Jan 2013
40.17	22 Jan 2019	24.69	23 Jan 1982	32.21	7 Jan 2013
40.10	8 Jan 2013	24.66	17 Jan 2019	32.16	17 Jan 2019
40.06	12 Jan 2019	24.62	15 Jan 2019	32.04	3 Jan 2019
40.05	13 Jan 2019	24.49	8 Jan 2013	32.04	12 Jan 2019
40.03	14 Jan 2019	24.44	27 Jan 2018	32.03	13 Jan 2019
40.02	16 Jan 2019	24.44	28 Jan 2018	32.00	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
1019 / 1021	<i>Kalumburu</i>	WA	42.6	2018-12-20	42.3	1969-12-08
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
13017	<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
14825	<i>Victoria River Downs</i>	NT	44.7	2018-12-11	44.2	1985-12-19
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	Woomera	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
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
<i>15590 / 15540</i>	<i>Alice Springs</i>	<i>NT</i>	<i>45.6</i>	<i>2019-01-03</i>	<i>45.2</i>	<i>1960-01-03</i>
15635 / 15527	Yulara	NT	46.8	2019-01-03	46.4	2013-01-11, 2011-01-28
16090 / 16007	Cooper Pedy	SA	47.8	2019-01-16	47.4	2014-01-01 (Jan)
					47.8	1972-12-30 (all)
<i>16098 / 16044</i>	<i>Tarcoola</i>	<i>SA</i>	<i>49.0</i>	<i>2019-01-15</i>	<i>48.9</i>	<i>2014-01-01, 1949-12-27</i>
18201 / 16092 / 19066 / 19036	Port Augusta	SA	48.9	2019-01-15	48.3	1960-01-02
<i>50017 / 73054</i>	<i>West Wyalong</i>	<i>NSW</i>	<i>46.3</i>	<i>2019-01-17</i>	<i>45.5</i>	<i>2018-01-07 (Jan)</i>
					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)
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	42.8	2019-01-17	42.6	1973-01-03, 2013-01-18
73142 / 73009	Cootamundra	NSW	43.6	2019-01-17	43.5	1973-01-03
75032	Hillston	NSW	47.0	2019-01-16	46.0	2006-01-01, 1973-01-03
75039	Lake Cargelligo	NSW	47.7	1973-01-03	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
80015	Echuca	VIC	45.7	2019-01-04	45.6	2016-01-13
81049	Tatura	VIC	43.6	2019-01-04	43.5	2009-01-31
81123 / 81003	Bendigo	VIC	44.5	2019-01-04	44.3	1939-01-10
81125 / 81084 / 81044	Shepparton	VIC	44.6	2019-01-04	44.4	1968-01-31
82042	Strathbogie	VIC	41.9	2019-01-16	41.5	1982-01-24
88109	Mangalore	VIC	44.8	2019-01-16	44.6	2009-01-31

Table 4: 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
5026	<i>Wittenoom</i>	WA	34.0	2018-12-27	33.6	1987-12-19, 1972-12-17
7045	<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	Coober 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)
72161 / 72091	<i>Cabramurra</i>	<i>NSW</i>	19.1	2018-12-28, 2018-12-29	19.0	1994-12-21
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
85072 / 85133	<i>Sale</i>	<i>VIC</i>	22.6	2018-12-08	22.2	1932-12-01
85279 / 84108 / 84080	Bairnsdale	VIC	21.9	2018-12-08	21.5	1980-12-11

Table 5: 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
<i>9789 / 9541</i>	<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
29058 / 29025	Julia Creek	QLD	31.3	2019-01-20	31.1	1967-01-30
37058 / 37043	Urandangi	QLD	32.9	2019-01-11	31.5	2014-01-25 (Jan)
					32.0	1972-12-27 (all)
46126 / 46037	<i>Tibooburra</i>	NSW	34.2	2019-01-18	33.9	1964-01-08, 1964-01-07
46129 / 46042	White Cliffs	NSW	34.2	2019-01-18	33.3	1982-01-24
48027	<i>Cobar MO</i>	NSW	32.6	2019-01-18	32.1	2006-01-01
50052	Condobolin Ag Res	NSW	32.0	2019-01-18	30.7	2003-01-18, 2018-01-07 (Jan)
					31.4	2009-02-07 (all)
51039	Nyngan	NSW	32.0	2019-01-18	30.7	2006-01-01 (Jan)
					32.0	2006-02-02 (all)
<i>60139 / 60026</i>	<i>Port Macquarie</i>	<i>NSW</i>	<i>24.0 (=)</i>	<i>2019-01-20, 2019-01-21</i>	<i>24.0</i>	<i>2004-01-08</i>
64008	Coonabarabran	NSW	25.5	2019-01-18	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)
<i>71075 / 71072</i>	<i>Perisher Valley</i>	<i>NSW</i>	<i>18.8</i>	<i>2019-01-05</i>	<i>18.4</i>	<i>1979-01-10</i>
72043	Tumbarumba	NSW	25.9	2019-01-05	25.2	2010-01-23
<i>73138 / 73056</i>	<i>Young</i>	<i>NSW</i>	<i>24.9</i>	<i>2019-01-18</i>	<i>24.5</i>	<i>1985-01-15</i>
75039	Lake Cargelligo	NSW	33.9	2019-01-18	32.8	1969-01-08

Table 6: Record number of consecutive days of 40 °C or above at sites with 40 or more years of data.

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
15135	Tennant Creek	NT	23	24 Dec 2018 – 15 Jan 2019	19	5-23 Jan 2008
29127	Mount Isa	QLD	20	2-21 Jan 2019	13	7-19 Dec 2017
37010	Camooweal	QLD	37	16 Dec 2018 – 21 Jan 2019	22	25 Jan – 15 Feb 1986
54003	Barraba	NSW	6	15-20 Jan 2019	2	3 times, most recent 22-23 Nov 2014
55024	Gunnedah Res Ctr	NSW	5	15-19 Jan 2019	4	23-26 Jan 1952
55049	Quirindi	NSW	5	15-19 Jan 2019	3	7 times, most recent 20-22 Jan 2018
82042	Strathbogie	VIC	2	15-16 Jan 2019	1	4 times, most recent 5 Jan 2013

Table 7: Record number of consecutive days of 42 °C or above at sites with 40 or more years of data.

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
5026	Wittenoom	WA	26	22 Dec 2018 – 16 Jan 2019	17	10-26 Dec 1976
13017	Giles	WA	9	27 Dec 2018 – 4 Jan 2019	7	8-14 Jan 1979, 5-11 Jan 2013
50052	Condobolin Ag Res	NSW	6	14-18 Jan 2019	5	11-15 Feb 2004
62013	Gulgong	NSW	2	16-17 Jan 2019	1	8 times, most recent 11 Feb 2017
72150	Wagga Wagga AMO	NSW	5	14-18 Jan 2019	3	6-8 Feb 2009
73014	Grenfell	NSW	2	17-18 Jan 2019	1	16 times, most recent 7 Jan 2018
75032	Hillston	NSW	7	12-18 Jan 2019	5	5-9 Jan 1979, 19-23 Jan 2018

Table 8: Record number of consecutive days of 45 °C or above at sites with 40 or more years of data.

Station number	Station name	State	Number of days	New record dates	Previous record	Previous record dates
15511	Curtin Springs	NT	4	14-17 Jan 2019	3	4-6 Jan 2013
48027	Cobar MO	NSW	3	14-16 Jan 2019	1	12 times, most recent 11 Feb 2017
50052	Condobolin Ag Res	NSW	2	16-17 Jan 2019	1	9 times, most recent 7 Jan 2018
74106	Tocumwal	NSW	2	15-16 Jan 2019	1	5 times, most recent 13 Jan 2016
75032	Hillston	NSW	5	14-18 Jan 2019	2	31 Dec 2005 – 1 Jan 2006, 10-11 Feb 2017
75039	Lake Cargelligo	NSW	4	15-18 Jan 2019	2	10-11 Feb 2017
75041	Griffith	NSW	4	14-17 Jan 2019	2	10-11 Feb 2017

Table 9: Record counts of days in December over 40 °C at sites with 40 or more years of data.

Station number	Station name	State	Count of days	Previous record count	Year of previous record
14825	Victoria River Downs	NT	25	17	1970
15135	Tennant Creek	NT	28	16	1972
15590	Alice Springs	NT	15	13	1972
15602	Jervois	NT	20	18	2017
16065	Andamooka	SA	13	11	1972
37010	Camooweal Township	QLD	27	24	1981
47019	Menindee	NSW	11	9	2002
80023	Kerang	VIC	5	4	1990

Table 10: Record counts of days in December over 42 °C at sites with 40 or more years of data.

Station number	Station name	State	Count of days	Previous record count	Year of previous record
2012	Halls Creek	WA	15	11	1986
15085	Brunette Downs	NT	21	10	1979
15135	Tennant Creek	NT	10	6	1990
15590	Alice Springs	NT	9	7	1972
16065	Andamooka	SA	8	7	2002
47019	Menindee	NSW	7	6	2002
75032	Hillston	NSW	4	3	2005
75041	Griffith	NSW	3	2	2005
80015	Echuca	VIC	2	1	2015
80091	Kyabram	VIC	2	1	2005

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.

This statement in general covers information available as of 23 January 2019. Events after that date will be covered in a future update of this statement.

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/

References

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