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Bureau of Meteorology

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SPECIAL CLIMATE STATEMENT 33

Coldest autumn for Australia since at least 1950.

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National Climate Centre
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Autumn 2011 – coldest since at least 1950

Australia has experienced its coldest autumn since at least 1950[1,2] for mean temperatures (average of maximum and minimum temperatures across the nation) with an Australian average of 20.9ºC. This was 1.15ºC below the historical average[3], and 0.2ºC below the previous coolest autumn in 1960. It was also the coldest autumn since at least 1950 for Queensland and the Northern Territory.

Large parts of the country recorded temperatures more than 2ºC below the autumn average (figure 1) with about half the country ranking in the coldest 10% of years (figure 2). The season was marked by consistent below-normal temperatures in most areas, with only a few individual areas recording their coldest autumn on record. These areas were in northern and central Australia including the east Kimberley, the central Northern Territory and small parts of northern Queensland.

The cool conditions experienced in autumn 2011 are largely a result of the strong 2010/11 La Niña event which brought heavy rainfall and cool daytime temperatures to Australia, before decaying in late autumn. Of particular significance was March 2011 – Australia's coldest and wettest March on record for maximum temperatures and third wettest month on record (for any calendar month).

Historically La Niña events result in above average rainfall and cooler than average daytime temperatures over large parts of Australia with the historically cold autumns of 1917, 1949, 1955, 2000 and 2011 all occurring at the end of, or during, a La Niña event.

Cool daytime temperatures in autumn 2011

The daytime temperature averaged over Australia during autumn was 27.0ºC which is significantly cooler than average (by 1.4ºC) and ranked as the second coldest autumn on record for maximum temperatures since 1950. Parts of Australia were up to 4ºC below average with most of Australia recording maximum temperatures at least 1ºC below average and ranked in the coldest 10% of records (figures 3 and 4). Parts of the east Kimberley and the Northern Territory (equating to 8.4% of Australia's total area) experienced their coldest autumn maximum temperatures on record with the Northern Territory as a whole experiencing its coldest autumn on record. SA recorded its second coldest autumn on record with Victoria recording its fourth coldest. Some sites recorded their coldest autumn for average maximum temperatures (table 2).

Overnight temperatures were also cooler than average during autumn 2011, but not to the same extent as daytime temperatures. The nation-wide average for autumn was 14.8ºC which is 0.9ºC below the historical average. Most of northern and central Australia recorded minimum temperatures more than 1ºC below average (figure 5) with the season ranking as the fifth coldest on record for Australia. A substantially smaller 13.5% of Australia recorded minimum temperatures in the coldest 10% of years (figure 6) during autumn compared with 63.3% of Australia which recorded maximum temperatures in the coldest 10%.

[1] Based on Australia averaged temperatures available from 1950 to present.
[2] Newly digitised data available to the Bureau suggest that 1917 was cooler than 2011, and 1929, 1946 and 1949 were similar, but are not included in routine analyses at this time.
[3] The standard reference period for calculation of long-term normals is 1961-90, unless otherwise stated. State area-averaged temperature anomalies commence in 1950.

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The Northern Territory recorded its second coldest autumn for minimum temperatures with Queensland recording its equal fourth coldest autumn. The Northern Territory was particularly cold in May, including a Territory record for May of −4.2°C at Arltunga on the 31st, and a May record five consecutive nights below 0°C at Alice Springs from 27-31 May. A list of sites which broke their autumn daily and average minimum temperatures is available below (tables 3 and 4).

In stark contrast, the western areas of Western Australia recorded above average temperatures during autumn with most of the west coast recording maxima and minima in the warmest 10% of records. Rainfall has also been below average in the area with many western areas of the state receiving less than 60% of their autumn average rainfall (figure 7). Currently, southwest Western Australia is the only area to have severe long-term rainfall deficiencies since the start of 2010 (see Bureau's May drought statement: http://www.bom.gov.au/climate/drought/archive/20110504.shtml). These dry and warm conditions are partly due to the warm sea surface temperatures in the Indian Ocean off the west coast of Western Australia.

Fourth wettest autumn on record

A major driver for the cool conditions in autumn was unusually heavy rainfall. Rainfall averaged over Australia in autumn 2011 was 68% above the autumn average of 120.5 mm and ranked as Australia's fourth wettest autumn on record. This was strongly influenced by the wet conditions in March 2011 where Australia recorded rainfall 141% above the March average. March 2011 ranked as Australia's wettest March on record and the third wettest month (of any calendar month) on record. April was also above average (by 18%); however, with the decay of the 2010/11 La Niña the influence on Australia's rainfall dropped off with below average rainfall recorded in May (by 46%). It was the wettest autumn on record for the Northern Territory, and ranked seventh in Queensland and tenth in South Australia. Areas that recorded well above average autumn rainfall include large parts of northern and central Australia. The western areas of Western Australia, as well as western Tasmania and other scattered areas across Australia, had well below average rainfall (figure 8). A number of sites had record rainfall in autumn with some sites recording rainfall over 500% of their autumn mean (table 5).

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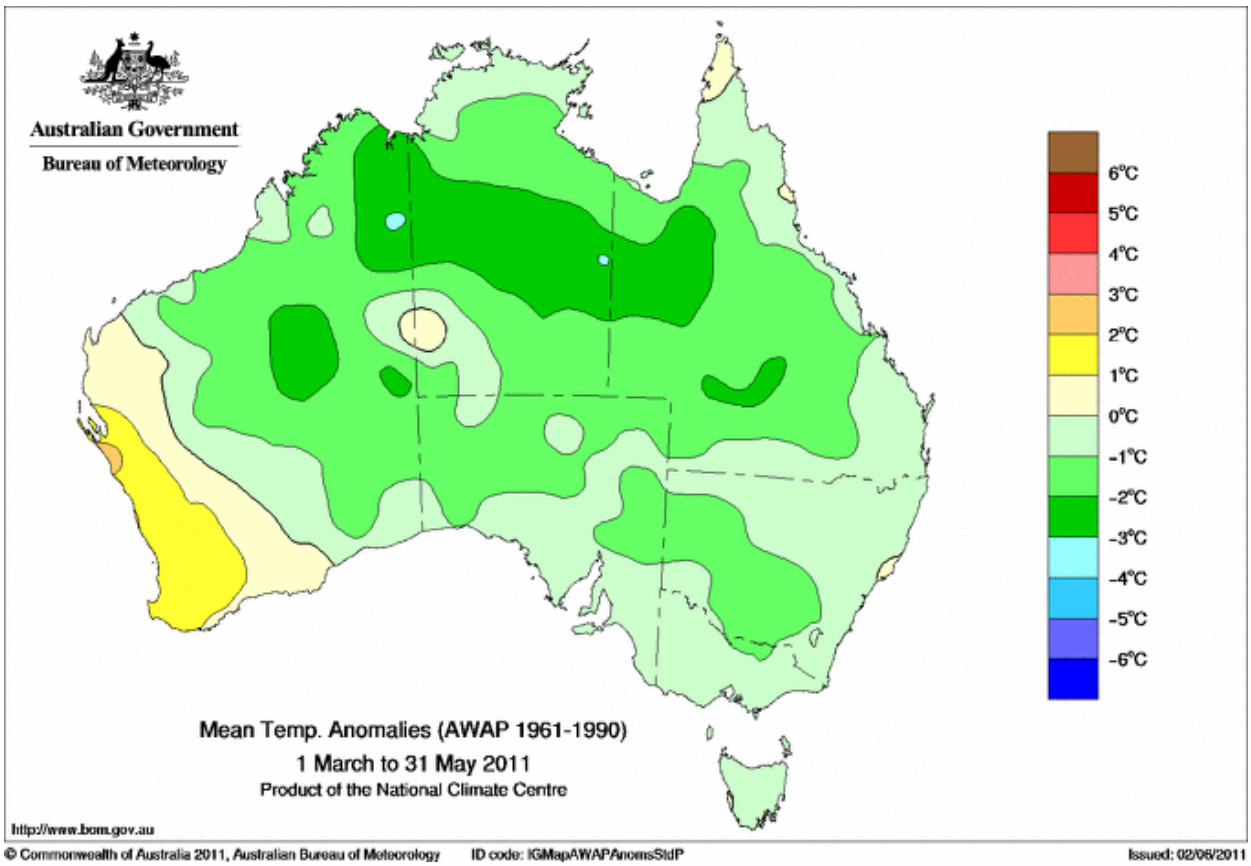

Figure 1: Mean (average of maximum and minimum) temperature anomalies for autumn 2011.

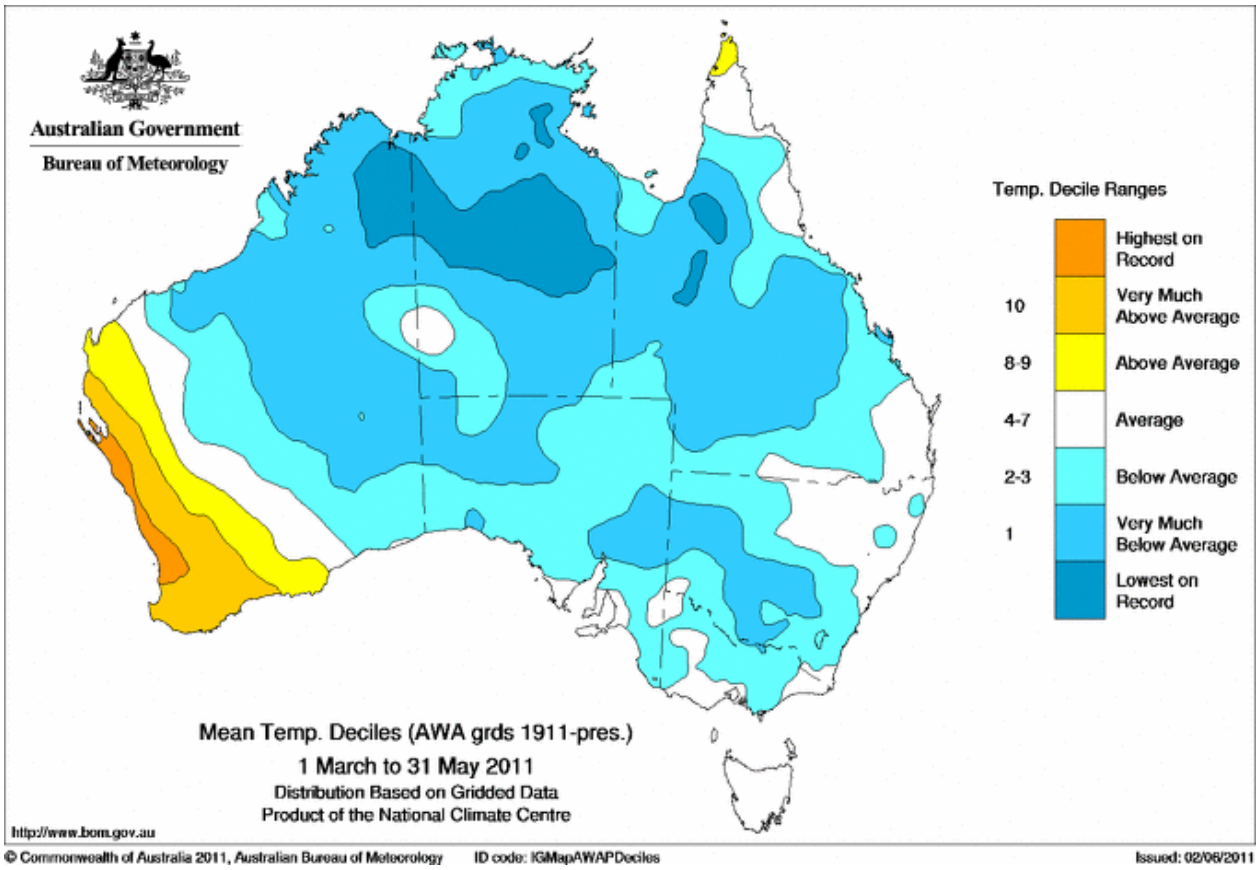

Figure 2: Mean (average of maximum and minimum) temperature deciles for autumn 2011.

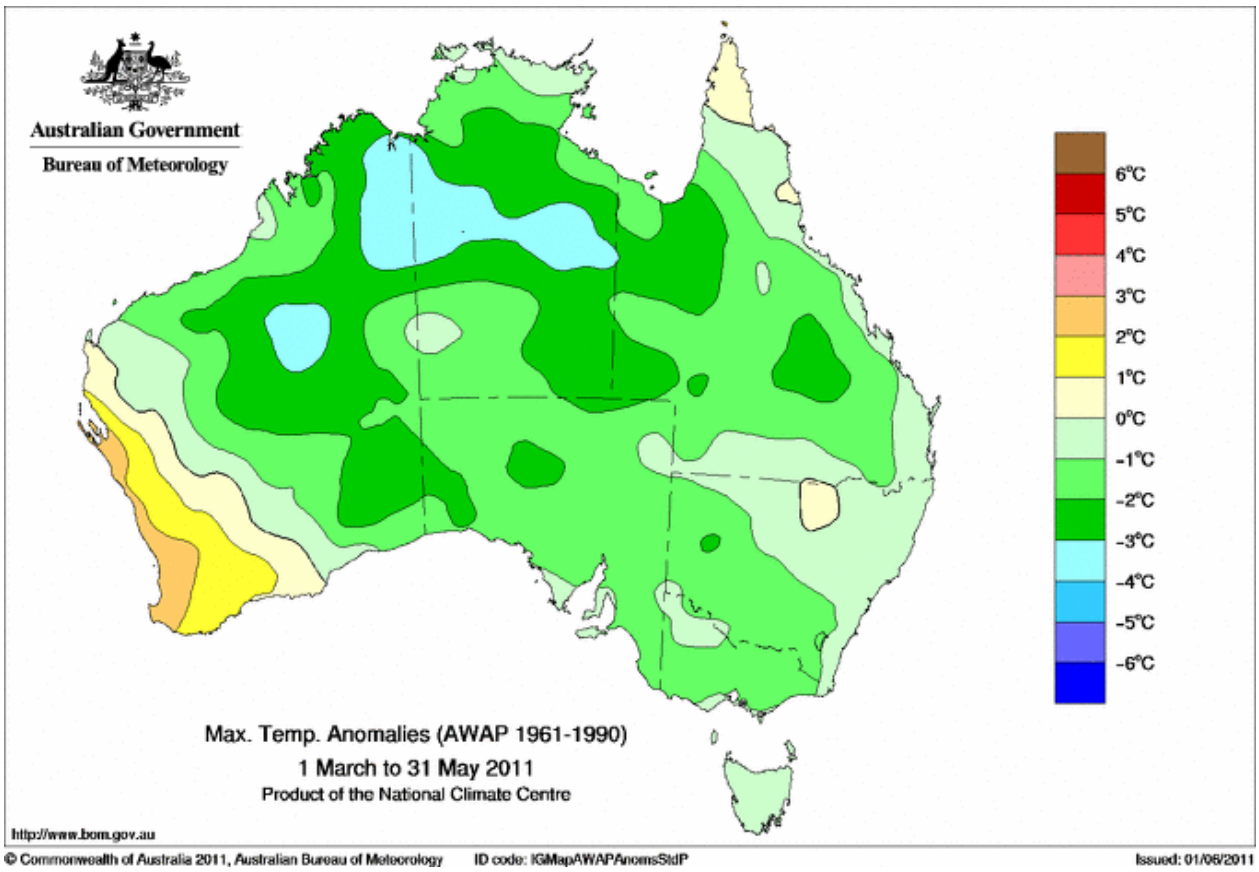

Figure 3: Maximum temperature anomalies for autumn 2011.

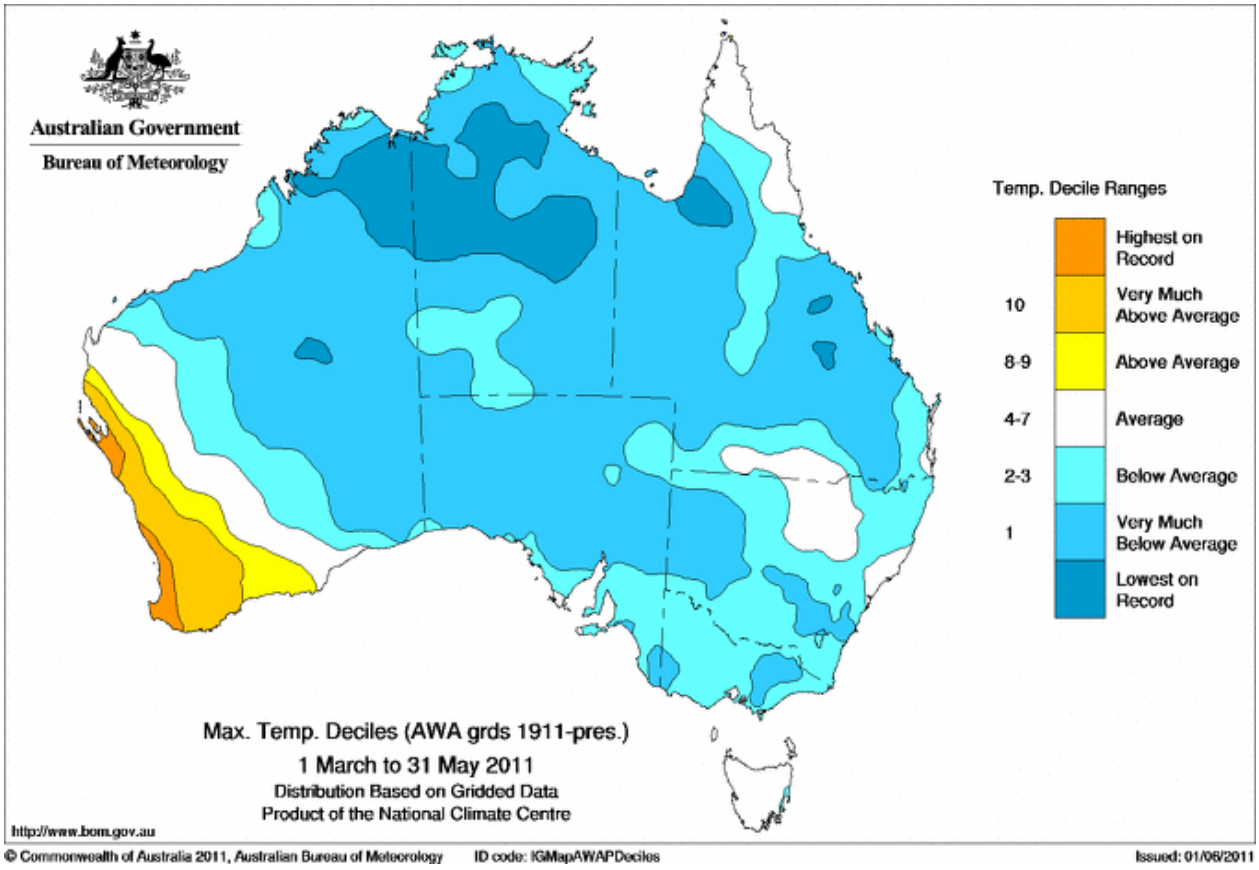

Figure 4: Maximum temperature deciles for autumn 2011.

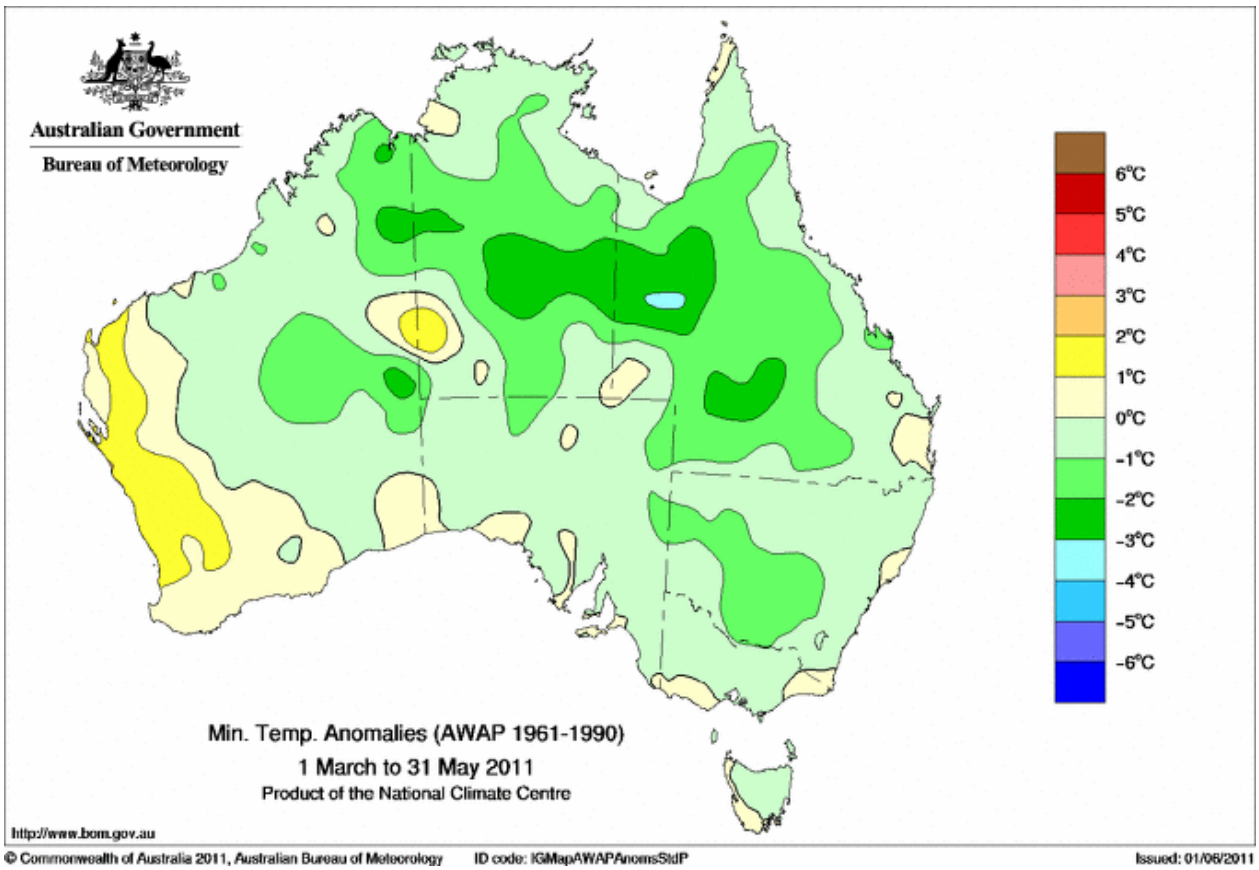

Figure 5: Minimum temperature anomalies for autumn 2011.

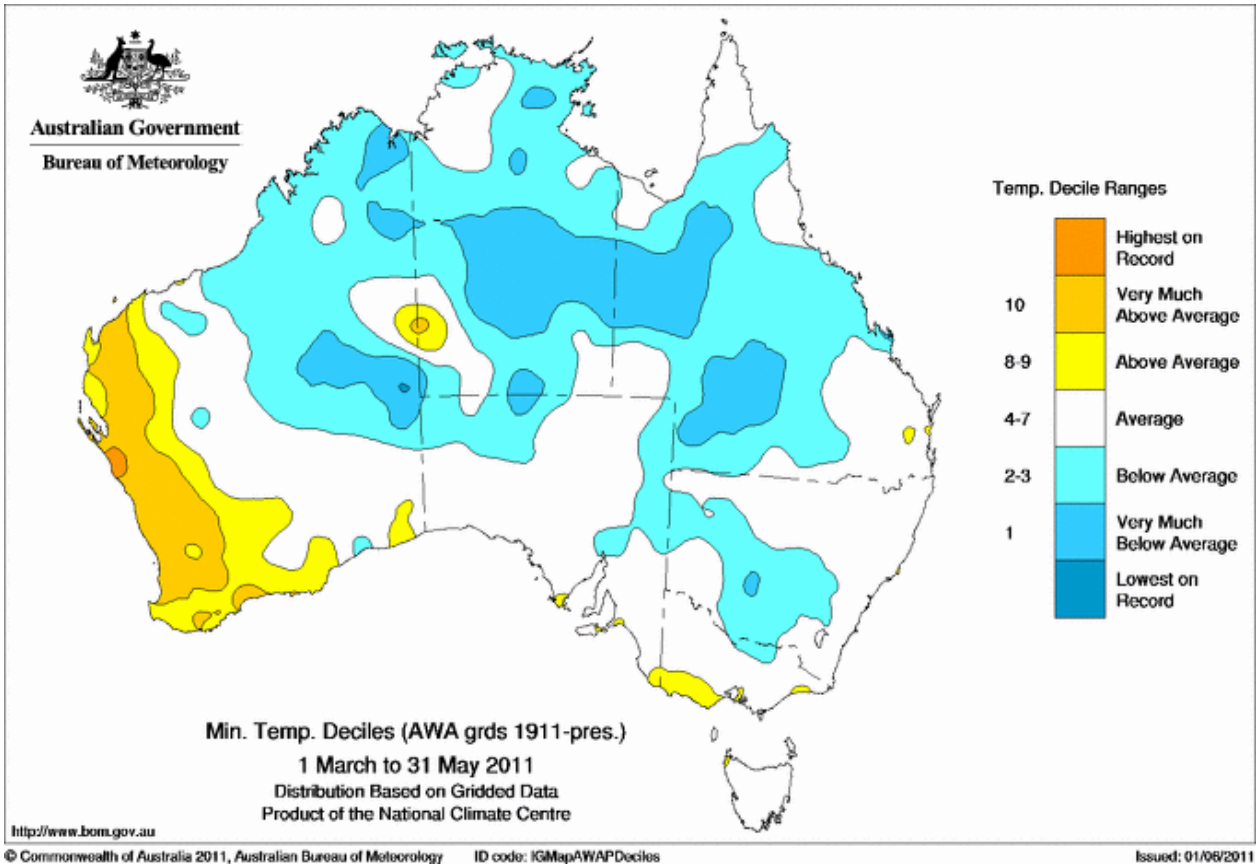

Figure 6: Minimum temperature deciles for autumn 2011.

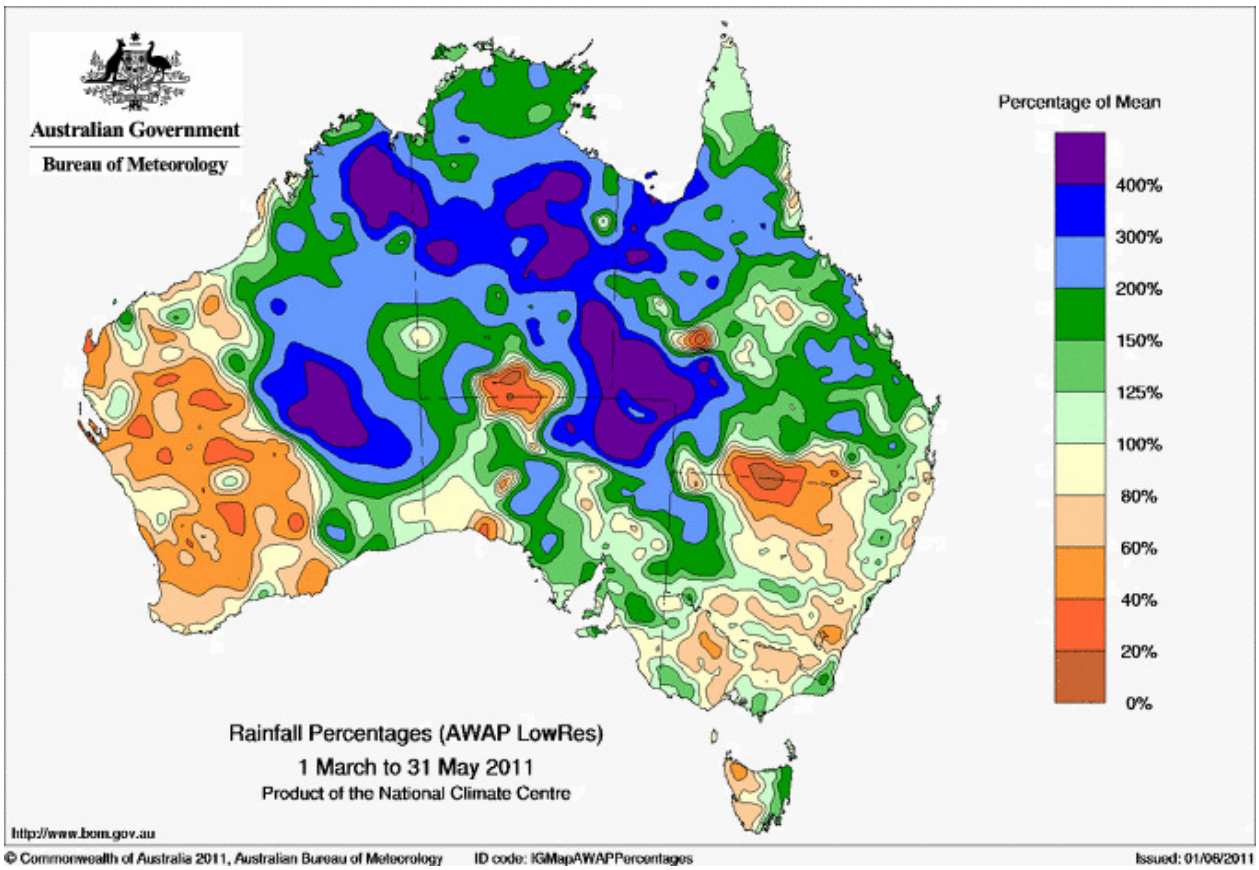

Figure 7: Rainfall in autumn 2011 as a percentage of the historical average for autumn.

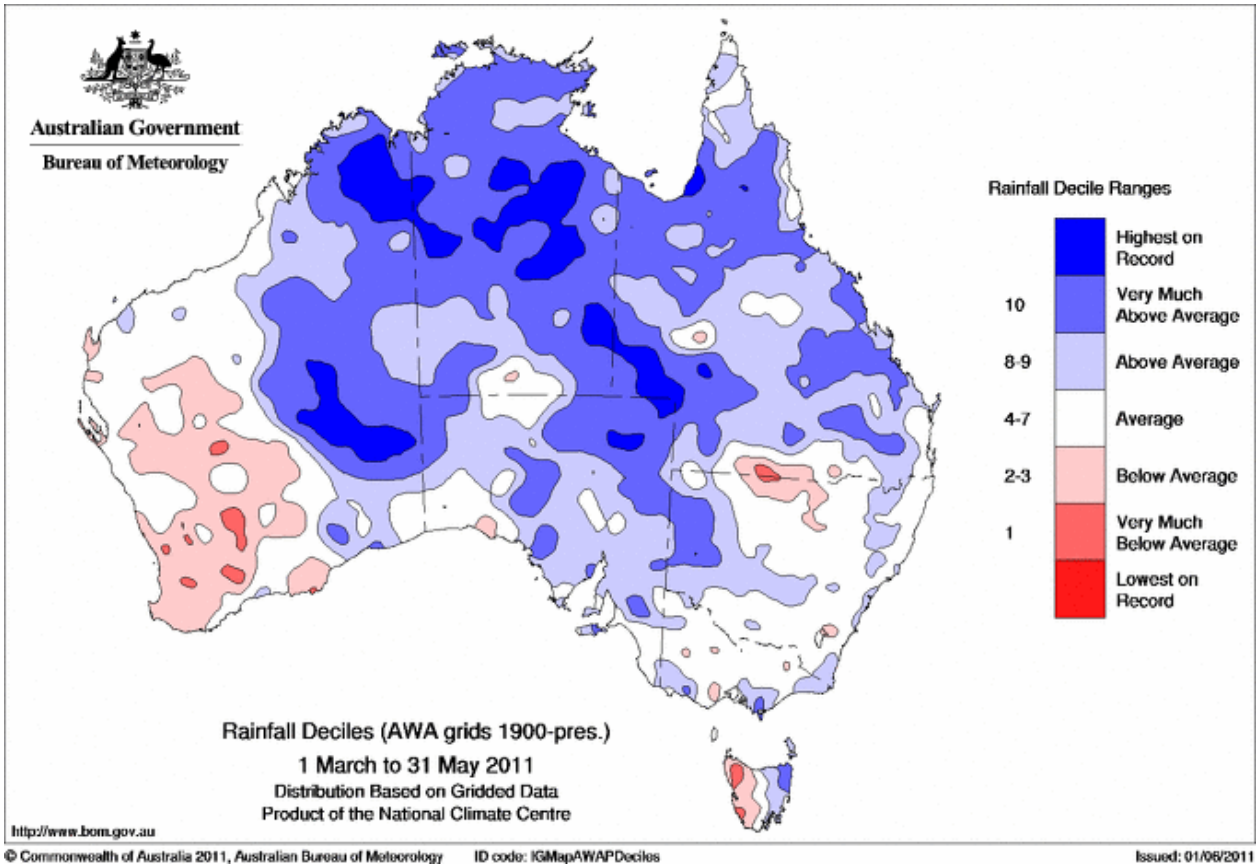

Figure 8: Rainfall deciles for Australia during autumn 2011.

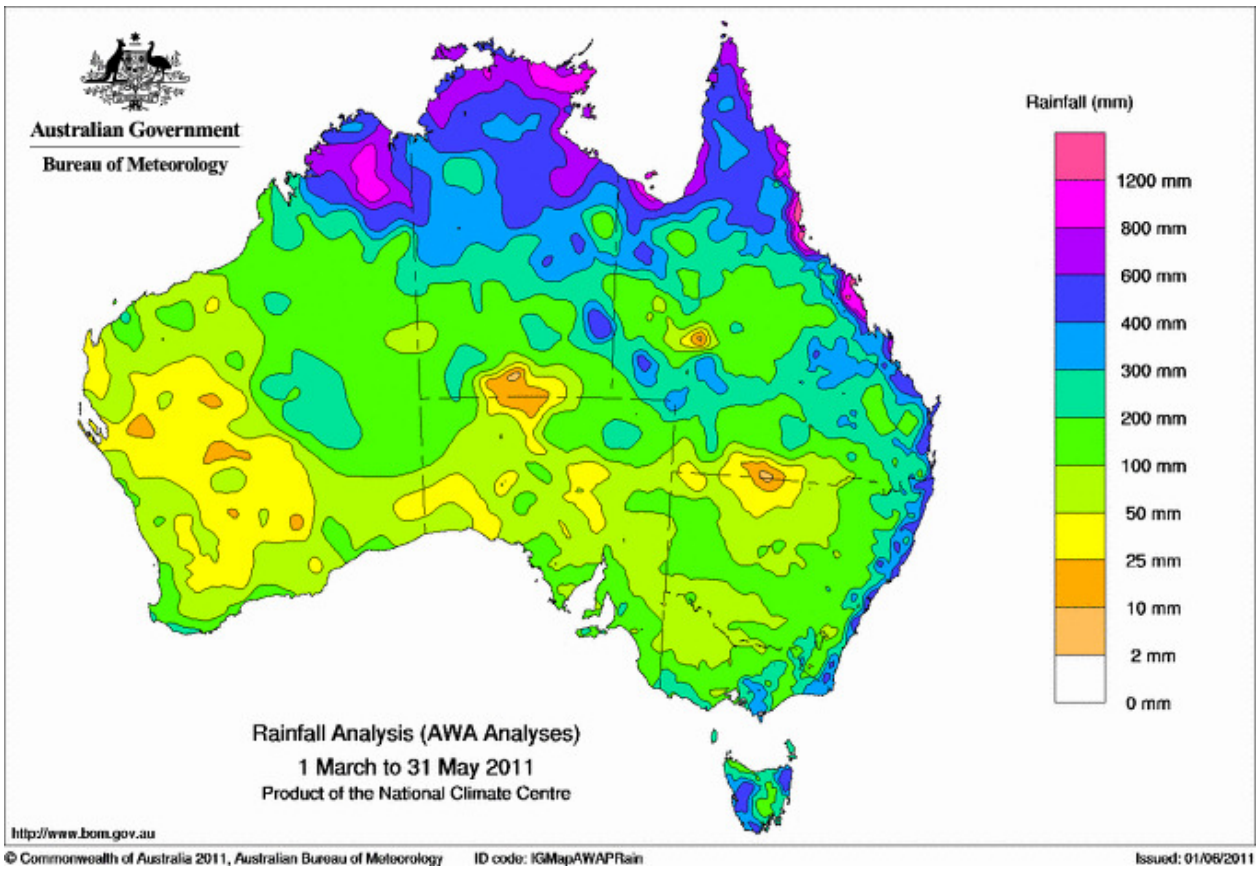

Figure 9: Rainfall totals for Australia during autumn 2011

Region	Maximum temperature		Minimum temperature		Mean temperature	
	Anomaly (°C)	Rank	Anomaly (°C)	Rank	Anomaly (°C)	Rank
Australia	−1.40	2	−0.90	5	−1.15	1
Queensland	−1.23	5	−1.31	4	−1.27	1
New South Wales	−0.62	10	−0.81	15	−0.72	6
Victoria	−1.09	4	−0.49	28	−0.79	7
Tasmania	+0.04	34	−0.05	35	−0.01	34
South Australia	−1.62	2	−0.28	26	−0.95	6
Western Australia	−1.13	6	−0.39	16	−0.75	8
Northern Territory	−2.55	1	−1.94	2	−2.24	1

Table 1: Regional temperature anomalies for autumn 2010. Ranks range from 1 (lowest) to 62 (highest).

Station	Location	State	Years of record	Autumn 2011 average	Previous Record	
1007	Troughton Island	WA	31	30.2	30.5	in 1960
1013	Wyndham	WA	42	31.9	32.5	in 2000
2012	Halls Creek Airport	WA	63	29.3	29.9	in 1983
2032	Warmun	WA	48	31.0	31.8	in 2000
14612	Larrimah	NT	44	30.9	30.9	in 2006
14626	Daly Waters	NT	40	30.4	31.2	in 2006
14703	Centre Island	NT	36	29.5	29.9	in 1999
14825	Victoria River Downs	NT	44	31.2	31.4	in 2000
14840	Wave Hill	NT	37	30.1	31.1	in 1976
14850	Timber Creek	NT	30	32.1	32.6	in 2006
14938	Mango Farm	NT	30	31.6	31.7	in 2006
15085	Brunette Downs	NT	46	29.2	30.2	in 2006
15135	Tennant Creek Airport	NT	41	28.1	28.7	in 2000
19017	Hawker	SA	37	22.8	23.4	in 1989
22803	Cape Willoughby	SA	43	17.7	17.8	in 1983
29012	Croydon	QLD	85	30.8	31.0	in 1971
33013	Collinsville	QLD	52	28.3	28.5	in 1956
33065	St Lawrence	QLD	71	27.6	27.6	in 1961
39004	Baralaba	QLD	37	27.7	28.3	in 1983
41100	Texas	QLD	39	25.5	25.9	in 1988
43015	Injune	QLD	43	25.1	25.3	in 1990
63254	Orange	NSW	35	17.1	17.1	in 1987
68102	Bowral	NSW	40	17.4	17.6	in 1995
70263	Goulburn	NSW	35	18.2	18.4	in 1979
70278	Cooma	NSW	36	17.9	18.2	in 1995
82042	Strathbogie	VIC	33	17.4	17.5	in 1996
82076	Dartmouth Reservoir	VIC	32	19.2	19.4	in 1995
91219	Scottsdale	TAS	31	16.7	16.8	in 2006
92027	Orford	TAS	42	16.7	16.7	in 1996

Table 2: Record cold average maximum temperatures in autumn 2011 at stations with more than 30 years of record.

Station	Location	State	Years of record	Lowest temperature in autumn 2011 (°C)		Previoust coolest for autumn (°C)	
14626	Daly Waters	NT	43	4.8	on 29 May	5.4	on 31 May 2006
15528	Yuendumu	NT	45	0.4	on 27 May	1.9	on 24 May 2001
15603	Kulgera	NT	31	-2.1	on 30 May	-1.9	on 21 May 1985
29127	Mount Isa Aero	QLD	45	1.8	on 31 May	1.9	on 26 May 1974
36031	Longreach Aero	QLD	46	0.5	on 31 May	1.4	on 29 May 2000
61242	Cessnock	NSW	35	-1.6	on 16 May	-1.4	on 24 May 1982
65026	Parkes	NSW	55	-1.5	on 15 May	-1.5	on 30 May 2006
73014	Grenfell	NSW	45	-2.0	on 15 May	-1.7	on 26 May 1967

Table 2: Record cold daily minimum temperatures in autumn 2011 at stations with more than 30 years of record.

Station	Location	State	Years of record	Autumn 2011 average	Previous Record	
14703	Centre Island	NT	36	23.3	23.8	in 1999
15135	Tennant Creek Airport	NT	41	17.6	18.0	in 1976
29127	Mount Isa Aero	QLD	44	15.7	15.7	in 1997

Table 3: Record cold average minimum temperatures in autumn 2011 at stations with more than 30 years of record.

Station number	Name	State	Rainfall (mm)	Years of record	Previous record (mm)	Percentage of average rainfall
2009	Gibb River	WA	872.2	81	502.8 mm in 1960	494 % of 176.6 mm
2020	Moola Bulla	WA	512.2	98	439.9 mm in 2000	490 % of 104.4 mm
2021	Mount Amhurst	WA	522.6	53	324.4 mm in 2007	494 % of 105.9 mm
2026	Ruby Plains	WA	386.8	68	363.4 mm in 2000	443 % of 87.4 mm
2030	Yulmbu	WA	890.2	44	373.0 mm in 1960	660 % of 134.9 mm
2032	Warmun	WA	762.7	103	534.7 mm in 1960	486 % of 156.8 mm
14618	Daly Waters	NT	529.3	119	439.8 mm in 1899	360 % of 147.2 mm
14626	Daly Waters Aws	NT	447.4	42	406.2 mm in 2006	318 % of 140.8 mm
14702	Mallapunyah	NT	778.0	47	432.0 mm in 2006	467 % of 166.6 mm
14704	Mcarthur River Mine	NT	627.4	41	418.5 mm in 1985	340 % of 184.7 mm
15015	Helen Springs	NT	422.8	65	348.0 mm in 1949	447 % of 94.6 mm
15139	Warramunga	NT	320.8	40	276.8 mm in 2001	407 % of 78.7 mm
15537	Kurundi	NT	474.1	57	321.8 mm in 1983	672 % of 70.6 mm
15657	Epenarra	NT	367.5	47	254.1 mm in 1983	490 % of 75.1 mm
16034	Hiltaba	SA	152.6	80	145.3 mm in 1931	249 % of 61.3 mm
29004	Burketown	QLD	878.0	119	804.9 mm in 1903	462 % of 189.9 mm
29039	Mornington Island	QLD	1132.6	87	895.0 mm in 2006	349 % of 324.5 mm
30088	Werrington Station	QLD	415.6	52	383.5 mm in 1983	298 % of 139.5 mm
30115	Lucky Springs Station	QLD	383.7	42	379.1 mm in 1983	258 % of 148.6 mm
32001	Bambaroo	QLD	1395.6	92	1372.5 mm in 1950	283 % of 493.5 mm
32043	Upper Stone Exelby	QLD	1165.0	71	1125.1 mm in 1950	245 % of 475.4 mm
32064	Paluma	QLD	1837.3	42	1703.2 mm in 1990	281 % of 654.4 mm
33094	Bowen Cheetham Salt	QLD	750.2	49	726.0 mm in 1990	355 % of 211.3 mm
33144	Wilson Beach	QLD	1818.8	41	1601.2 mm in 1990	298 % of 611.2 mm
38000	Bedourie	QLD	476.8	65	217.4 mm in 2010	989 % of 48.2 mm
38005	Cluny	QLD	432.4	68	202.6 mm in 2010	867 % of 49.9 mm
38009	Glengyle	QLD	438.4	90	201.4 mm in 2010	1017 % of 43.1 mm
38017	Mount Leonard Station	QLD	313.2	58	242.0 mm in 1983	661 % of 47.4 mm
38020	Roseberth Station	QLD	347.4	97	202.8 mm in 1950	911 % of 38.1 mm
38025	Sandringham	QLD	285.0	41	154.3 mm in 1972	604 % of 47.2 mm
38049	Hayfield	QLD	385.0	50	322.7 mm in 1990	486 % of 79.2 mm
91173	Tomahawk	TAS	314.5	46	305.2 mm in 1977	170 % of 185.0 mm
92011	Gladstone	TAS	535.6	83	416.7 mm in 1931	253 % of 211.9 mm
92051	Pyengana	TAS	583.2	50	558.0 mm in 1989	198 % of 293.9 mm
92067	Rushy Lagoon	TAS	369.4	44	295.6 mm in 1970	205 % of 180.6 mm

Table 4: Record rainfall totals during autumn 2011 at key stations with at least 40 years of records.

Contacts for further information

The following climatologist may be contact for further information about this event:

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Ms. Agata Imielska (02) 9296 1539

General notes

This statement is based on information as of 1 June 2011. This is preliminary data, and may change as further observations are obtained and quality assurance is undertaken.

Maximum and minimum temperatures prior to 1910 have not been considered for inclusion unless they are known to have been measured in a standard Stevenson screen or similar.