



Monana

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Weather factors impacting insect populations

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Dr Maryam Yazdani, a researcher and lecturer in insect and plant populations, spoke at the AMETA August 2016 meeting, giving an excellent overview of the range of weather related factors impacting insect populations.



A number of weather related factors influence insect behaviour and population dynamics. Warmer winter temperatures, such as the conditions being observed over recent decades, reduce insect mortality. Increased temperatures at other times of the year, reflected in higher heating degree days, results in increased numbers of offspring, and increases food availability.

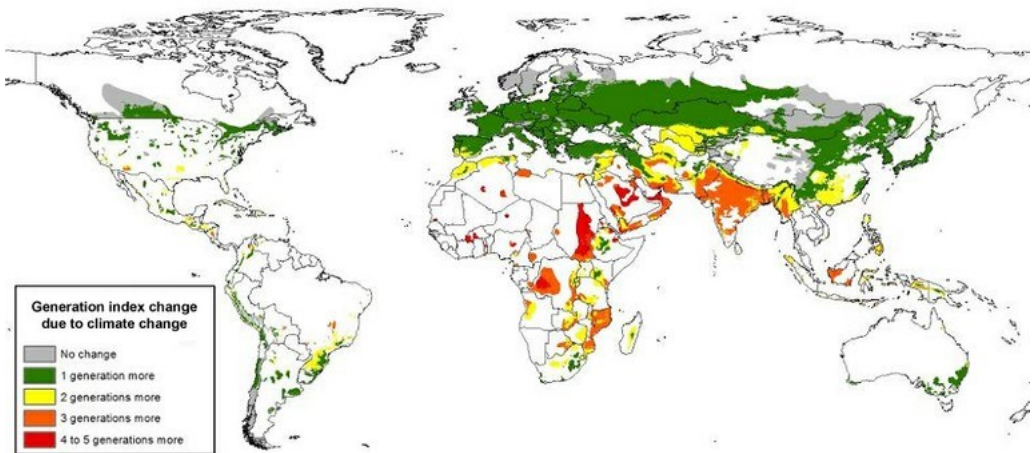
As a result of temperature changes, aphid populations in Europe are emerging 1 day per 4 years earlier over recent years, coming out of winter.

Increased numbers of insects and shorter growing times in warmer temperatures increases the generations of insects occurring. This means that resistance to pesticides can develop more quickly. It was also noted that increased temperatures and rainfall intensity acts to reduce the effectiveness of insecticides. Research has identified that a 2 °C increase in temperature, a level of change expected to be reached in the next 30-50 years, can double the number of generations of aphids occurring.

Another factor involves the impact of increased CO₂ levels on plants. While plant growth is generally promoted in increased CO₂ levels, protein levels in the plants decrease in higher CO₂ levels. This results in insects eating more plant material to meet their needs for protein for growth. Many fungi contain pathogens that reduce insect populations, and drier conditions starting to occur in mid-latitude areas results in reduced fungi populations.

The Pine Beetle is a major pest in Europe and Northern America. Warmer winters reduce egg mortality in Pine Beetle moths, so more survive. The range of Pine Moths traditionally confined to the Mediterranean, is moving northwards in Europe, while in Canada massive die-off is occurring in pine forests for similar reasons.

So what can be done to reduce the impacts? Minimising emissions to reduce the amount of further climate change is fundamental. Increasing organic farming methods and crop diversification makes it harder for pest insects. Work is needed to map and track changes in pest ranges [a potential citizen science opportunity ?]. Growers can now utilise early warning systems using season outlook information to use factors like heating or growing degree days to map out potential problem areas.

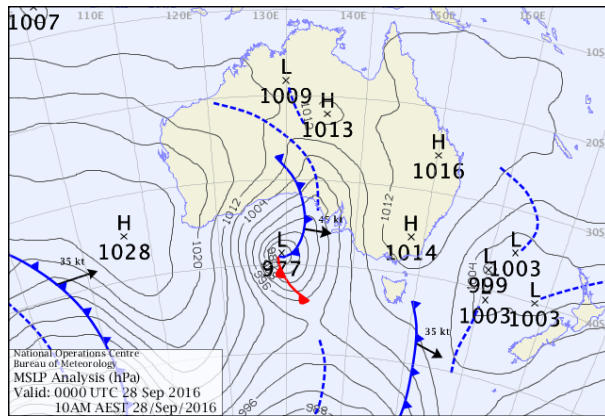


Projected change in numbers of generations of potato tuber moth by 2050 under climate change

From <http://cipotato.org/research/integrated-crop-and-systems-research/global-control-principles-and-strategies-for-potato-and-sweetpotato-pests-and-diseases/insect-phenology-modeling-and-climate-change/>

Severe weather conditions in late September 2016

Late September saw the development of a significant low pressure system in the Great Australian Bight, that resulted in major impacts on the South Australian community.

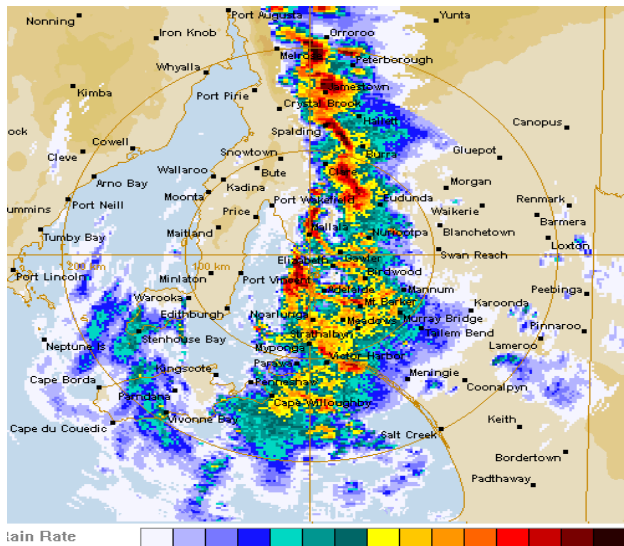


Surface air pressure chart of the morning of 28th September 2016

The trough of low pressure visible on the above weather chart over Eyre Peninsula generated a line of severe thunderstorm activity on the afternoon of the 28th September. This line moved over northern Yorke Peninsula, and into the Mid-North through the afternoon. Reports were received by the Bureau of Meteorology of possible tornado activity generated by this line of severe thunderstorm activity. While data is being compiled for final reports, these tornado reports, and damage surveys indicate the formation of several tornados north of Adelaide through the afternoon. At least one of these appears to have damaged a line of power supply towers to the north-east of Melrose, triggering the blackout across South Australia.

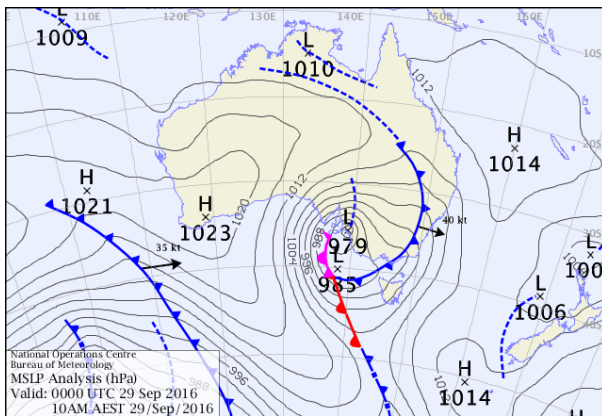
The low pressure intensified further, passing over the Adelaide area during the 29th September. Air pressure readings were lowest on record for Adelaide Airport synoptic hour observations back to 1955. The low pressure centre passed a little south of Adelaide. Cape Borda air pressure observations look to be second lowest on record after a similar system on 1 June 1981.

Wind speeds in the recent event reached 120 km/h at Neptune Island. 14 stations had wind gusts in excess of 100 km/h. 10 minute averaged winds also reached 80km/h or more in several locations. 7 day rainfall totals produced by this system were significant, with 213.4 mm recorded at Lenswood, 213.0mm at Woodhouse, and 212.8mm at Uraidla. Totals of 120-150mm over the 7 days were common in the Adelaide region. Major flooding occurred as a result in the Onkaparinga and Gawler River catchments. Also, storm surge levels were high – over 1 metre above the background astronomical tides- with damage occurring at locations like Port Germain, and coastal flooding occurring at Port Pirie.



rain Rate
 Light Moderate Heavy
 Wed, 28 Sep 2016 06:40:00 GMT 9/28/2016, 4:10:00 PM

Buckland Park radar at the time of the blackout



Surface air pressure chart of the morning of 29th September 2016

A weather chart archive is available on the Bureau of Meteorology webpage to look through charts in recent years: <http://www.bom.gov.au/cgi-bin/charts/charts.browse.pl>

Maximum wind gusts for Bureau of Meteorology stations can be seen in the tables on the Daily Weather Observations pages: <http://www.bom.gov.au/climate/dwo/IDCJDW5002.latest.shtml>

Weather chasers maintain an excellent online radar image archive. To look at radar through the event go to: <http://www.theweatherchaser.com/radar-loop/IDR642-adelaide-buckland-park/2016-09-28-04/2016-09-29-04>

President's Report August 2016

Beth Walton

AMETA's raison d'etre is to bring meteorology to the public – to promote understanding and raise awareness of advances in the science and the services available. As part of its role AMETA also facilitates access to historic meteorological records and information. We could not achieve these things without the generous support of the Bureau of Meteorology, who kindly allow us to meet in their offices and also provide office accommodation for our volunteer groups.

This year I would particularly like to reflect on the contribution of our Secretary Darren Ray. As the Regional Climatologist here at the Bureau he has access to the most recent Australian and global climate information and research. His regular seasonal briefs and climate outlooks have become a key part of our meetings and this year, as a guest speaker, he provided insight into some of the recent advances in climate science and how these have improved understanding of the drivers of Australia's climate. His tips on what's new on the Bureau's extensive website are also well received. Thank you Darren.

AMETA Volunteer Groups

Another aspect of AMETA's provision of meteorological information is the outstanding work undertaken by our two volunteer groups.

The Digitisation and Imaging Group led by Mac Benoy, and now in its 10th year, has led the way in Citizen Science projects in South Australia. It is recognised internationally for its fine work, which was the subject of our October 2015 AMETA meeting '*Citizen Science; making a contribution to global climate analysis*'. After several years of research, the anticipated book by the History Group led by Dr Tony Rogers, is now in early draft form and expected to be published early next year. It explores the period in which Sir Charles Todd lived, especially his early years in England and how this led to his outstanding contribution to the colony of South Australia. Tony also makes regular contributions to SA History Week and both Mac and Tony give their time to do presentations for a range of community groups.

Both Mac and Tony have harnessed the expertise of some wonderful dedicated volunteers who are making these projects possible. I again pay tribute to everyone involved. Through their work they significantly enhance AMETA's contribution to the community and will leave a valuable legacy for future generations. If you are interested and have skills that could be used in their work please talk to Tony or Mac.

Guest Speakers

Over the year we had an array of interesting presentations at our bimonthly meetings. It gives me much pleasure to note that half these were given by our own members. Apart from the presentations by Mac and Darren (above), our Vice President, Bill Slaytor, gave a brief history of AMETA at our Annual Dinner in November. We also heard about the trials of an expert witness from consultant, Chris Purton, the excitement of chasing tornadoes in the USA's famous 'Tornado Alley' from Jon Fischer, a regional forecaster, and a fascinating view of meteorology from the perspective of a soaring glider pilot, Richard Geytenbeek.

Other Outreach Opportunities

Our meetings are well attended, but the Committee continues to explore effective ways of reaching the wider public to increase our membership and 'enable a better understanding of meteorology within the community'. Our **Website** www.ameta.org.au is evolving well under the management of David Brown, with help from Darren Ray and Mac Benoy. This year we have also successfully promoted our meetings through Eventbrite and Twitter – to reach a wider cross section of the community. Thank you to Mac for your work on this.

Our **Newsletter**, the *Monana*, under the leadership of Darren Ray also continues to evolve, containing interesting snippets on 'all things meteorological'. A particular thank you to David and Bruce for collation and dissemination of each issue.

We also look to members to help promote our meetings through friends and family.

Our Committee

None of our activities would be possible without an active and dedicated Committee. I thank the Committee, for their work and encouragement over the last year. They are a wonderful group to work with. I particularly appreciate the support we receive from our Secretary, Darren Ray as our link to the Bureau and for his secretarial support, our Treasurer, John Braendler for his organisational skills and attention to detail, David Brown for evolving the website and 'being there' when we need a 'fill in' and Mac for his innovative approach to challenges we face.

Beth Walton
President, AMETA
16 August 2016

AMETA Speaker Presentations 2015-2016

August 2015. **'The Role of an Expert Witness'**. Chris Purton, formerly with Tonkin Consulting.

October 2015. **'Citizen Science; Making a contribution to Global Climate Analysis.'**
Mac Benoy, AMETA Volunteer Project Manager.

December 2015. **'Brief History of AMETA'** Bill Slaytor, Vice President, AMETA

February 2016. **'Chasing Tornadoes in the USA'** Jon Fischer, Forecaster, South Australian Regional Office, Bureau of Meteorology

April 2016. **'Climate Drivers in the Australian Region'** Darren Ray, Senior Climatologist, South Australian Regional Office, Bureau of Meteorology.

June 2016. **'Meteorology and Soaring Flight'** Richard Geytenbeek, Gilder Pilot, Trainer and Inspector.

A spectacular global weather model visualisation webpage

Thanks to Mark Little for this webpage with lovely presentation of global weather model output. Well worth a look, and saving as a bookmark!!

<https://earth.nullschool.net/>

Feel free to pass on your favourites to the group to share

BOM's new Weather App

Bureau of Meteorology weather forecasts and radar images has been available on your smartphone using m.bom.gov.au in a browser, but last week saw the release of a Bureau of Meteorology weather app. This is available for i-phone and Android systems from

<http://www.bom.gov.au/app/>

They are keen on hearing your feedback and incorporating your ideas.



BOM Weather

BOM Weather is the Bureau of Meteorology's weather app, giving you the most accurate weather information as you move around.

BOM Weather gives you:

Current conditions

- Temperature
- What it actually feels like outside
- Wind, humidity and rainfall

Forecasts

- For the next 24hrs (in 3-hourly blocks)
- Temperature, humidity, wind, chance of rain
- Details for the week ahead

Radar

- Our popular rain radar
- Pause the radar loop at any time
- Zoom in and out easily

Warnings

- Summaries listed by State
- Detailed warnings
- Live updates

Locations

- Save your favourite locations
- Quickly navigate to the capital cities, and places you've recently visited
- View your current location's weather with one touch

You can check the weather—wherever you are—from Australia's official weather source, the Bureau of Meteorology.

Adelaide in August 2016

August rainfall was close to average across the Adelaide metropolitan area. Daytime temperatures were warmer than average in all suburbs, while nighttime temperatures were generally close to average for August.

Slightly below average rainfall

- Rainfall was close to average in most suburbs, ranging from 76% of average in Mount Barker to 136% of average in Noarlunga
- Cold fronts brought heavy rain across Adelaide on the 1st, 10th and 19th
- The month ended with several days of rain from a northwest cloud band

Warmer than average days

- Warmer than average days in all Adelaide suburbs
 - Maximum temperatures on the 18th were more than 8 °C warmer than average: the warmest temperatures in the city since May
- August minimum temperatures were generally slightly cooler than average

Extremes in August 2016

Hottest day	25.4 °C at Adelaide Airport on the 18th
Warmest days on average	17.7 °C at Adelaide (Kent Town)
Coollest days on average	11.4 °C at Mount Lofty
Coldest day	6.5 °C at Mount Lofty on the 4th
Coldest night	0.0 °C at Mount Barker on the 25th
Coollest nights on average	5.5 °C at Mount Lofty
Warmest nights on average	8.8 °C at Noarlunga
Warmest night	13.4 °C at Adelaide Airport on the 18th
Warmest on average overall	12.7 °C at Adelaide (Kent Town)
	12.7 °C at Noarlunga
Coollest on average overall	8.6 °C at Mount Lofty
Wettest overall	131.2 mm at Piccadilly (Woodhouse)
	131.2 mm at Uraidla
Driest overall	41.4 mm at Morphettville
Wettest day	30.8 mm at Mylor (Biggs Flat) on the 20th
Strongest wind gust	100 km/h at Kuitpo Forest Reserve on the 18 th

For more information on August's temperatures and rainfall plus a summary of statistics please see:

<http://www.bom.gov.au/climate/current/month/sa/archive/201608.adelaide.shtml>

Adelaide, South Australia August 2016 Daily Weather Observations

Observations are from Kent Town, about 2 km east of the city centre.

Date	Temps		Rain mm	Evap mm	Sun hours	Max wind gust			9am					3pm				
	Min °C	Max °C				Dirn	Spd km/h	Time local	Temp °C	RH %	Cld eighths	Dirn	Spd km/h	MSLP hPa	Temp °C	RH %	Cld eighths	Dirn
1	Mo	11.8	13.9	11.0		SSW	44	14:11	12.7	84	WSW	9	1013.5	12.5	79	SSW	11	1014.8
2	Tu	4.8	14.9	1.8		SSW	35	12:01	10.0	66	SSW	9	1027.2	13.6	63	SW	24	1026.4
3	We	6.5	15.2	0		E	81	11:03	11.8	77	SW	9	1030.7	13.9	48	SSE	9	1029.2
4	Th	5.4	12.6	0.4		NE	22	10:02	9.5	78	NE	6	1031.2	12.1	50	ESE	7	1029.5
5	Fr	3.7	14.7	0		N	24	11:13	10.0	60	NE	6	1030.4	14.2	46	NNW	7	1027.8
6	Sa	3.4	17.2	0		NNW	28	14:21	11.2	60	NNE	6	1026.8	16.2	40	NW	13	1023.5
7	Su	5.0	19.5	0		N	31	13:53	13.5	49	NE	9	1023.6	19.0	36	NNW	17	1020.8
8	Mo	12.8	22.0	0		NNE	37	23:44	17.1	35	NNE	11	1018.8	21.4	36	NNW	13	1015.9
9	Tu	13.2	18.7	0.8		WSW	57	16:35	14.0	70	NE	9	1008.9	12.6	78	WNW	19	1007.7
10	We	9.1	15.0	3.6		NW	56	13:07	11.6	78	NW	17	1013.6	13.2	74	W	31	1013.6
11	Th	6.2	18.0	8.2		WSW	39	00:27	11.3	86	NNW	4	1023.2	15.1	53	W	11	1022.8
12	Fr	8.1	18.0	0		NNW	48	12:09	12.2	65	NNW	13	1021.2	17.8	47	NW	15	1018.5
13	Sa	7.9	15.8	0		WNW	30	11:45	10.2	86	N	4	1025.7	15.3	56	WNW	11	1024.9
14	Su	7.8	17.0	0		WNW	20	12:12	11.2	75	NNE	9	1030.6	16.5	42	NNW	9	1028.3
15	Mo	4.8	20.8	0		NNW	26	16:21	14.8	47	NNE	9	1028.9	20.5	33	NNW	13	1025.0
16	Tu	10.2	22.6	0		N	41	12:31	17.6	33	NNE	15	1022.3	20.5	29	N	15	1018.9
17	We	7.8	21.8	0.8		NNE	26	15:27	14.8	65	NNE	15	1022.8	20.9	40	N	13	1018.8
18	Th	12.2	24.7	0		NE	63	10:12	20.1	32	N	22	1010.8	23.2	26	N	24	1006.9
19	Fr	8.6	14.3	16.8		W	57	14:45	10.4	87	WNW	11	1011.3	9.8	84	WNW	19	1012.3
20	Sa	7.6	15.6	7.0		W	41	00:53	12.1	72	W	15	1019.1	13.1	81	WSW	11	1018.2
21	Su	7.5	17.2	0.2		W	28	14:00	11.1	74	NNE	7	1017.8	16.6	42	WNW	17	1014.1
22	Mo	4.8	17.6	0		WSW	20	13:33	12.0	57	NE	2	1014.7	16.5	38	SW	13	1013.4
23	Tu	4.8	16.7	0		SE	24	17:26	11.7	72	NNW	7	1017.8	15.1	53	SW	13	1015.6
24	We	6.9	16.6	0		WSW	26	13:24	11.7	70	NNW	7	1016.4	14.0	62	ENE	7	1014.6
25	Th	3.9	15.5	0		SSW	31	16:17	10.6	64	N	2	1020.6	14.8	54	SW	15	1020.0
26	Fr	5.8	14.2	0		NW	20	14:58	9.3	77	ENE	2	1026.1	13.3	47	WNW	9	1023.6
27	Sa	3.9	18.4	0		N	35	12:36	12.5	50	NNE	9	1023.0	17.3	28	NW	15	1018.9
28	Su	7.9	21.8	0		NNE	37	13:19	17.2	30	NE	11	1018.1	21.5	30	NE	17	1013.8
29	Mo	12.8	22.4	1.6		NE	46	18:38	17.2	37	NNE	13	1016.3	20.1	34	NE	15	1011.4
30	Tu	12.7	19.9	5.8		NW	35	17:06	13.7	66	NNE	9	1012.9	18.9	64	NNW	15	1010.6
31	We	11.9	18.8	1.0		SW	28	15:03	14.3	60	WNW	11	1018.5	15.2	79	SW	13	1017.7
Statistics for August 2016																		
Mean		7.7	17.7						12.8	65		8	1020.8	16.3	50		14	1018.6
Lowest		3.4	12.6						9.3	30		Cal	1008.9	9.8	26	#	7	1006.9
Highest		13.2	24.7	16.8		E	81		20.1	86	N	22	1031.2	23.2	84	W	31	1029.5
Total																		

Observations were drawn from Adelaide (Kent Town) (Station 013959)

ECUJWA002-201608 Prepared at 13:05 GMT on 21 Sep 2016

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South Australia in August 2016

August was generally wetter than average across most of South Australia. Overall, temperatures were close to average across South Australia in August, but days were warm in the southeast and nights were cool around Spencer Gulf.

Wetter than average

- Above average to very much above rainfall throughout the State's north and east
- August rainfall was average to below average for much of the south and far west of South Australia
- Strong winds in excess of 80 km/h were recorded in the south on the 9th and 18th ahead of cold fronts that brought heavy rain across southern areas
- In the last few days of the month, a northwest cloud band brought rain to most areas of the State
- A few sites had their highest August daily rainfall on record

Near-average temperatures

- Mean temperatures were close to average across most of the State in August
- Daytime temperatures were warmer than average in the southeast
- Overnight temperatures were cooler than average around Spencer Gulf and the Flinders Ranges
- Temperatures in several parts of the State were more than 6 °C cooler than average around the 25th
- Maximum temperatures on the 18th were more than 8 °C warmer than average in a broad strip running from the State's mid-northwest to the southeast: the warmest temperatures since May
- Ernabella (Pukatja) recorded its coldest August day on record on the 23rd, and Cleve recorded its coldest August temperature on record on the morning of the 24th

Extremes in August 2016

Hottest day	30.1 °C at Coober Pedy Airport on the 18th
Warmest days on average	22.0 °C at Moomba and Oodnadatta Airports
Coollest days on average	11.4 °C at Mount Lofty
Coldest day	6.5 °C at Mount Lofty on the 4th
Coldest night	-3.1 °C at Yunta Airstrip on the 5th
Coollest nights on average	2.8 °C at Hawker
Warmest nights on average	11.8 °C at Neptune Island
Warmest night	16.9 °C at Oodnadatta Airport on the 29th
Warmest on average overall	15.0 °C at Moomba Airport
Coollest on average overall	8.6 °C at Mount Lofty
Wettest overall	179.8 mm at Cherry Gardens
Driest overall	13.8 mm at Yunta Airstrip
Wettest day	49.8 mm at Marree (Farina) on the 30th
Strongest wind gust	100 km/h at Kuitpo Forest Reserve on the 18 th

Many other rainfall & temperature records were also set in August, some of which follow. For more information plus a summary of statistics please see: <http://www.bom.gov.au/climate/current/month/sa/archive/201608.summary.shtm>

Some notable statistics for August were:

Record highest August daily rainfall			
	New record (mm)	Old record	Years of record
Petersville	36.4 on the 1st	33.3 on the 27th in 1973	52
Leigh Creek	39.8 on the 30th	25.8 on the 6th in 1985	30
Marree	38.0 on the 30th	34.0 on the 29th in 1992	101
Clare	30.4 on the 19th	30.0 on the 9th in 1999	23
Ernabella	19.4 on the 30th	19.2 on the 10th in 2003	20
Cape Jaffa	33.6 on the 21st	29.0 on the 24th in 2003	23
Tieyon	31.6 on the 30th	15.2 on the 30th in 2008	22
Beltana	33.2 on the 30th	27.0 on the 10th in 2010	31

Record highest August total rainfall				
	New record (mm)	Old record	Years of record	August Average
Beltana	59.4	53.8 in 1992	31	15.1
Leigh Creek	64.4	51.0 in 2000	30	16.6
Tieyon	31.6	24.4 in 2008	22	5.4
Ernabella	48.6	21.4 in 2003	20	6.5

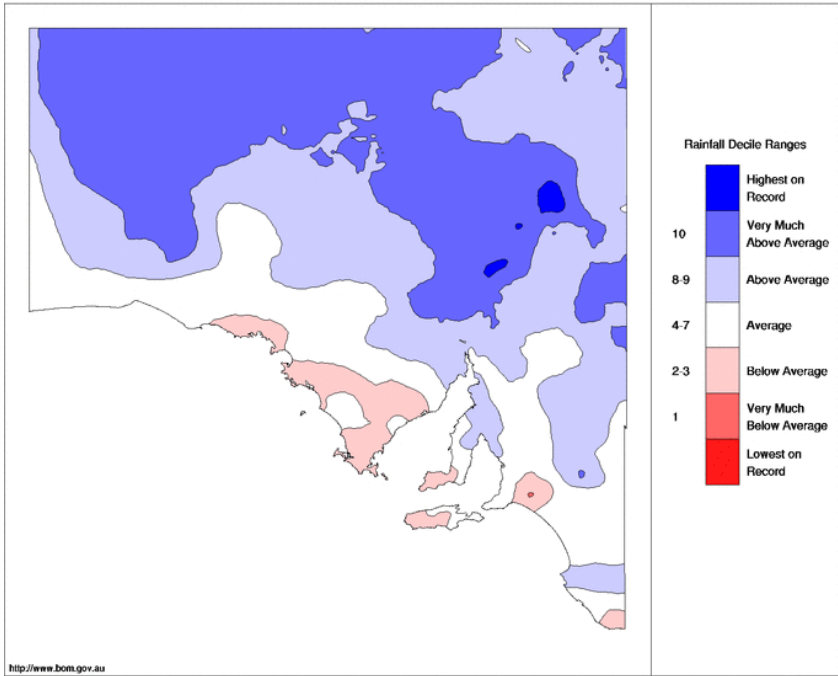
Highest August total rainfall for at least 20 years			
	Observed	Most recent higher	August Average
Karoonda	70.4	71.0 in 1932	38.3
Woomera	48.0	54.4 in 1958*	14.3
Farina	59.6	107.0 in 1973	10.7
Mount Dare	21.7	70.0 in 1975*	7.2
Witchelina Station	46.0	51.0 in 1975*	8.9
Parachilna	41.8	45.0 in 1985	16.4
Port Parham	64.8	75.0 in 1986*	39.9
Orroroo	57.4	67.6 in 1992	35.5
Bute	73.2	77.2 in 1996	46.9

* **note:** there are gaps in the historical record at this site, so it is possible a higher value has gone unreported.

Record lowest August daily maximum temperature				
	New record (°C)	Old record	Years of record	August Average
Ernabella	10.7 on the 23rd	12.0 on the	20	21.1

Record lowest August temperature				
	New record (°C)	Old record	Years of record	August Average
Cleve	1.4 on the 24th	1.5 on the	21	7.4

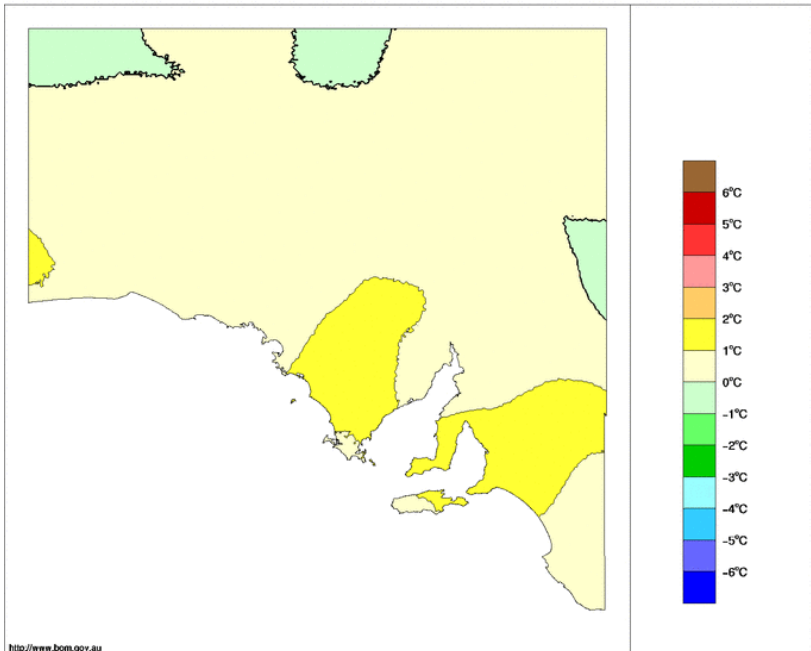
South Australian Rainfall Deciles August 2016
 Distribution Based on Gridded Data
 Australian Bureau of Meteorology



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Issued: 21/09/2016

Maximum Temperature Anomaly (°C) August 2016
 Australian Bureau of Meteorology



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Issued: 21/09/2016

Adelaide in winter 2016: wetter than average

Wet winter

- Winter rainfall was above average across Adelaide
- July was very wet in Adelaide, while rainfall in June and August was close to average
- Some sites had their highest winter daily rainfall on record

Temperatures close to average

- Both daytime and overnight temperatures were slightly warmer than average across the city
- Very few nights dropped below zero during winter: Parafield recorded $-0.2\text{ }^{\circ}\text{C}$ on 16 July; Roseworthy recorded $-0.2\text{ }^{\circ}\text{C}$ on 25 August

Windy winter in the city

- Adelaide Airport's average wind speed was its highest winter value since at least 2002
- Surrounding suburbs weren't as windy, with mean wind speeds away from the airport close to their winter average
- Adelaide and surrounds recorded strong and damaging winds in both June and July

Extremes in winter 2016

Hottest day	25.4 °C at Adelaide Airport on 18 Aug
Warmest days on average	16.3 °C at Adelaide (Kent Town) 16.3 °C at Parafield Airport
Coollest days on average	10.4 °C at Mount Lofty
Coldest day	4.6 °C at Mount Lofty on 12 Jul
Coldest night	$-0.2\text{ }^{\circ}\text{C}$ at Parafield Airport on 16 Jul
Coollest nights on average	5.5 °C at Mount Lofty
Warmest nights on average	9.2 °C at Noarlunga
Warmest night	14.0 °C at Adelaide (Kent Town) on 22 Jul 14.0 °C at Adelaide Airport on 22 Jul
Warmest on average overall	12.4 °C at Noarlunga
Coollest on average overall	8.0 °C at Mount Lofty
Wettest overall	600.0 mm at Uraidla
Driest overall	174.8 mm at Gawler

Record highest winter daily rainfall

	New record (mm)	Old record	Years of record
Burnside	55.6 on 5 Jul	47.5 on 22 Jun 1908	38
Happy Valley	62.6 on 5 Jul	56.9 on 1 Jun 1920	125
McLaren Vale	46.4 on 5 Jul	37.8 on 21 Jun 2012	23

Highest winter total rainfall for at least 20 years

	Observed (mm)	Most recent higher	Winter Average
Happy Valley	363.4	448.6 in 1996	250.7

For a summary of winter's statistics please see <http://www.bom.gov.au/climate/current/season/sa/archive/201608.adelaide.shtml>

South Australia in winter 2016: wetter than average

Winter was much wetter than average for most of South Australia. Minimum temperatures were warmer than average across most of the State.

A wet winter

- Wettest winter for South Australia since 2001, and the eighth-wettest winter on record
- Winter rainfall was above average across most of South Australia
- Very much above average winter rainfall fell across the Pastoral Districts
- The wet weather in South Australia continued after a much wetter than average autumn
- Winter began with a very wet June in South Australia, and while July was near average, August ended the season with a wetter than average month
- Particularly wet days on 18 June and again on 5 July gave some sites their highest winter daily rainfall on record
- A very wet June helped Whyalla and sites further north to have their wettest winter on record

Warmer than average nights

- Temperatures were above average for winter
- After some very warm winters in recent years though, daytime temperatures were the coolest for South Australia since winter 2010
- Overnight temperatures were particularly mild during winter, with the northern Pastoral Districts very much above average
- Daytime temperatures were generally close to average overall

Extreme weather in July

- Strong and damaging winds affected southern South Australia in mid-July
- A cold outbreak brought hail, sleet and snow flurries to elevated areas of the southeast in mid-July

Extremes in winter 2016

Hottest day	30.1 °C at Coober Pedy Airport on 18 Aug
Warmest days on average	20.2 °C at Oodnadatta Airport
Coollest days on average	10.4 °C at Mount Lofty
Coldest day	4.6 °C at Mount Lofty on 12 Jul
Coldest night	-5.0 °C at Yunta Airstrip on 16 Jul
Coollest nights on average	4.2 °C at Hawker
Warmest nights on average	11.8 °C at Neptune Island
Warmest night	16.9 °C at Oodnadatta Airport on 29 Aug
Warmest on average overall	14.2 °C at Moomba Airport
Coollest on average overall	8.0 °C at Mount Lofty
Wettest overall	600.0 mm at Uraidla
Driest overall	49.0 mm at Yunta Airstrip
Wettest day	99.0 mm at Whyalla (Mullaquana) on 18 Jun
Strongest wind gust	139 km/h at Cape Willoughby on 12 Jul

Some notable statistics for winter were:

Record highest winter daily rainfall			
	New record	Old record	Years of record
Finniss	48.6 on 5 Jul	43.2 on 14 Jun 1898	103
Burnside	55.6 on 5 Jul	47.5 on 22 Jun 1908	38
Whyalla (Mullaquana)	99.0 on 18 Jun	45.7 on 18 Jul 1916	99
Happy Valley	62.6 on 5 Jul	56.9 on 1 Jun 1920	125
Marrabel	49.0 on 5 Jul	43.4 on 27 Aug 1970	133
Whyalla (Broadview)	45.4 on 18 Jun	41.4 on 27 Aug 1973	76
Victor Harbor	95.4 on 6 Jul	63.6 on 4 Jun 1978	42
Reeves Plains	37.0 on 5 Jul	30.4 on 27 Jun 1978	43
Stockport (Clifton)	47.8 on 5 Jul	38.6 on 27 Jun 1990	58
Mount Gambier Aero	50.0 on 23 Jun	48.0 on 5 Aug 1990	75
Witchelina Station	38.0 on 30 Aug	34.0 on 29 Aug 1992	106
Riverton (Leeward)	45.4 on 5 Jul	39.4 on 8 Jul 1993	48
Petersville	36.4 on 1 Aug	33.6 on 7 Jun 1994	52
Parawa	69.8 on 5 Jul	51.0 on 19 Jul 1999	23
Roseworthy AWS	33.2 on 5 Jul	29.8 on 21 Jun 2005	20
Strathalbyn	35.6 on 5 Jul	28.6 on 25 Aug 2009	21
McLaren Vale	46.4 on 5 Jul	37.8 on 21 Jun 2012	23
Leigh Creek Airport	39.8 on 30 Aug	35.6 on 1 Jun 2013	32
Clare High School	37.6 on 5 Jul	37.2 on 1 Jun 2013	23

Record highest winter total rainfall				
	New record	Old record	Years of record	Winter Average
Whyalla	201.2	172.4 in 1916	98	70.9
Beltana	115.2	97.0 in 1991	31	52.3
Leigh Creek	127.2	98.8 in 2001	30	51.4

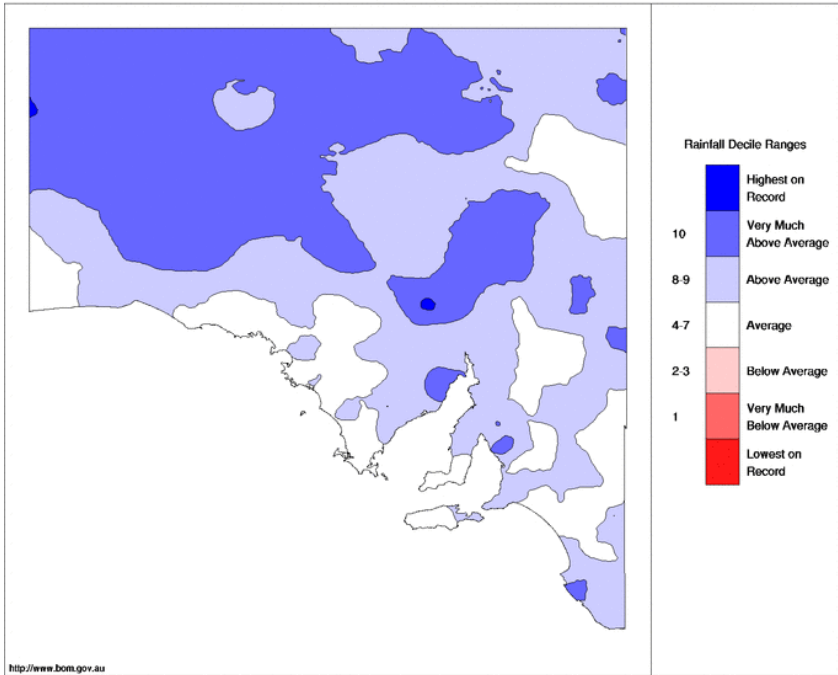
Record lowest winter daily maximum temperature				
	New record	Old record	Years of record	Winter Average
Kingscote	9.3 on 12 Jul	10.7 on 28 Jul 1998	23	15.9

Record lowest winter temperature				
	New record	Old record	Years of record	Winter Average
North Shields	-0.3 on 16 Jul	1.3 on 3 Aug 1999	25	7.8

Many other rainfall & temperature records were also set in Winter. For more information plus a summary of statistics please see:

<http://www.bom.gov.au/climate/current/season/sa/archive/201608.summary.shtml>

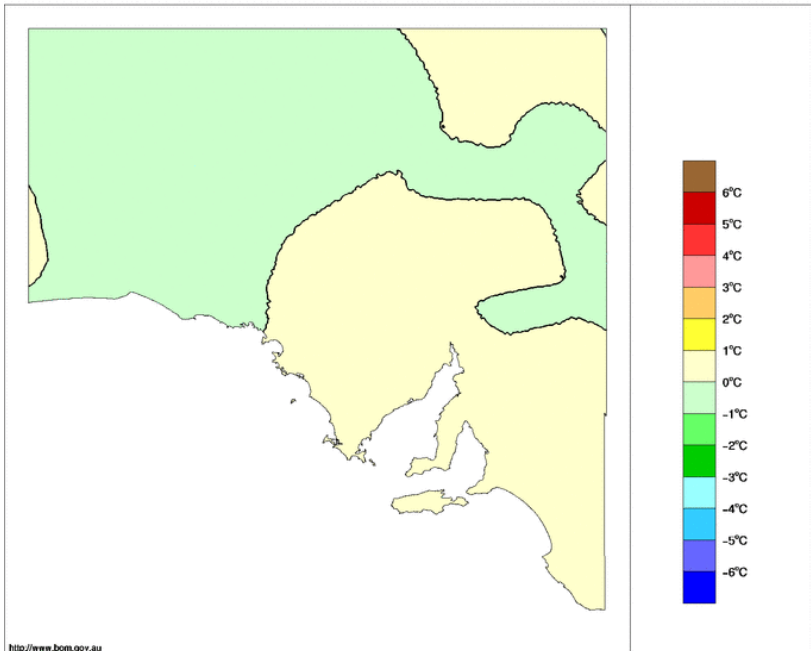
South Australian Rainfall Deciles 1 June to 31 August 2016
 Distribution Based on Gridded Data
 Australian Bureau of Meteorology



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Issued: 21/09/2016

Maximum Temperature Anomaly (°C) 1 June to 31 August 2016
 Australian Bureau of Meteorology



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Adelaide in September 2016: Very wet with heavy rain and cool days

The passage of several vigorous frontal systems and intense low pressure systems, in particular on the 14th-15th and 28th-29th brought heavy, and in many locations, record-breaking September rainfall across the Adelaide metropolitan and Hills region. Flooding occurred across the Mount Lofty Ranges in response to the heavy rainfall. These conditions resulted in below average temperatures, with much cooler than average days throughout much of the month.

Heavy rainfall leads to very wet month

- Some sites reported their wettest September day in the 24 hours to 9 am on either the 9th, 15th, 29th and 30th
- In the 24 hours to 9am on the 15th, 101.4 mm of rainfall was recorded at Uraidla, in the Adelaide Hills, marking the highest September daily rainfall total on record for the Adelaide region (previous highest 100.3 mm at Cherry Gardens on 16 September 1935)
- With the monthly total rainfall more than double the long term average across the region, several sites reported their wettest September on record
- It was the fourth wettest September to be recorded in the city since 1839, with 131.2 mm at Adelaide (Kent Town)

Cooler than average days and nights

- Both maximum and minimum temperatures were below average for most of September
- Daytime temperatures were 1 to 2 °C cooler than average
- The passage of a vigorous cold front resulted in several sites reporting very cold days between the 12th and 14th
- Adelaide (Kent Town) reported its coldest September day since 1992, with a maximum of 11.9 °C on the 14th
- Overall, for Adelaide it was the coldest September (with respect to the September mean maximum temperature) since 2010

Strong winds and deep low pressure

- Deep and intense low pressure systems on the 14th and again on the 29th saw wind gusts in excess of 95 km/h in the Adelaide region
- The low pressure system produced exceptionally low air pressure readings, below 980 hPa, in the metropolitan region

Extremes in September 2016

Hottest day	25.0 °C at Adelaide (Kent Town) on the 7th
Warmest days on average	17.6 °C at Parafield Airport
Coollest days on average	11.4 °C at Mount Lofty
Coldest day	7.7 °C at Mount Lofty on the 30th
Coldest night	2.4 °C at Mount Barker on the 23rd
Coollest nights on average	5.6 °C at Mount Lofty
Warmest nights on average	9.8 °C at Noarlunga
Warmest night	16.5 °C at Noarlunga on the 8th
Warmest on average overall	13.3 °C at Adelaide Airport
Coollest on average overall	8.5 °C at Mount Lofty
Wettest overall	360.9 mm at Uraidla
Wettest day	101.4 mm at Uraidla on the 15th

Some notable statistics for Adelaide in September were:

Record highest September daily rainfall			
	New record (mm)	Old record	Years of record
Woodside	65.6 on the 29th	59.7 on the 25th in 1893	123
Nairne	58.6 on the 29th	53.8 on the 16th in 1935	132
Williamstown	58.7 on the 30th	47.2 on the 2nd in 1937	133
Hahndorf	68.0 on the 29th	61.0 on the 11th in 1958	131
Adelaide Airport	35.0 on the 29th	30.7 on the 7th in 1960	62
Ashton Co-op	74.4 on the 15th	64.4 on the 1st in 1992	65
Uraidla	101.4 on the 15th	85.6 on the 30th in 1996	127
Lenswood	78.4 on the 29th	76.8 on the 30th in 1996	49
Heathfield	68.0 on the 29th	46.2 on the 23rd in 1998	32
McLaren Vale	43.2 on the 29th	33.8 on the 23rd in 1998	23
Cudlee Creek	73.0 on the 15th	58.8 on the 4th in 2010	103
Burnside	50.8 on the 9th	36.8 on the 4th in 2010	39
Mount Crawford	54.0 on the 30th	48.2 on the 4th in 2010	23

Record highest September total rainfall				
	New record (mm)	Old record	Years of record	September Average
Mount Barker	227.8	194.2 in 1915	156	85.8
Williamstown	230.1	184.8 in 1992	134	73.1
Nairne	183.0	172.9 in 1912	133	76.2
Hahndorf	257.8	223.9 in 1941	132	96.6
Uraidla	360.9	319.0 in 1979	127	115.6
Cudlee Creek	254.6	222.4 in 1992	103	97.5
Parafield Airport	107.6	92.6 in 1979	69	44.5
Burnside	178.2	108.2 in 1917	39	57.0
Hope Valley	144.2	140.0 in 2001	38	64.9
Blackwood	192.8	160.6 in 1979	38	75.4
Heathfield	315.9	217.0 in 1992	32	114.8
Mount Crawford	169.2	150.8 in 2001	23	74.4
McLaren Vale	125.2	96.8 in 2001	22	55.6

Many other rainfall records were also set in September. For more information plus a summary of statistics please see:

<http://www.bom.gov.au/climate/current/month/sa/archive/201609.adelaide.shtml>

All the detail you could possibly want and more is available on the BoM website.

Visit <http://www.bom.gov.au/climate> and wander through the various archived climate reports and summaries which are available in text and graphical forms.

Adelaide, South Australia September 2016 Daily Weather Observations

Observations are from Kent Town, about 2 km east of the city centre.

Date	Day	Temps		Rain mm	Evap mm	Sun hours	Max wind gust					9am					3pm				
		Min	Max				Dirn	Spd km/h	Time	Temp °C	RH %	Cld egths	Dirn	Spd km/h	MSLP hPa	Temp °C	RH %	Cld egths	Dirn	Spd km/h	MSLP hPa
		°C	°C				local														
1	Th	9.2	19.4	0.2			SSW	24	14:01	15.3	66		NE	7	1018.0	17.5	54	E	11	1013.2	
2	Fr	9.6	18.8	0.2			SW	31	14:20	14.8	88		SSW	2	1011.7	17.4	57	SW	15	1008.2	
3	Sa	9.2	15.7	0.4			SW	50	14:02	13.2	83		WNW	15	1014.4	14.4	54	WSW	28	1016.8	
4	Su	8.7	17.1	1.0			WNW	24	15:31	12.3	77		N	4	1027.3	16.1	54	WNW	13	1026.9	
5	Mo	6.4	20.1	0			N	24	10:12	13.4	68		N	9	1030.2	19.2	40	N	9	1028.8	
6	Tu	8.2	22.8	0			ENE	22	23:28	17.2	43		NE	9	1028.1	22.1	34	N	6	1025.0	
7	We	11.6	25.0	0			N	46	22:48	20.0	36		NNE	13	1023.6	24.5	30	NNE	22	1017.9	
8	Th	16.1	20.1	1.2			NNE	37	00:08	17.6	67		NE	6	1015.0	19.9	68	NNE	15	1010.2	
9	Fr	10.7	16.7	30.4			SW	35	13:28	13.1	77		SW	17	1015.2	16.3	65	WSW	19	1015.6	
10	Sa	10.8	15.8	0.2			W	24	05:58	12.7	58		SW	13	1022.7	14.4	59	W	11	1020.7	
11	Su	6.1	18.0	0			WNW	26	13:35	12.9	68		N	7	1021.2	17.3	50	W	9	1019.1	
12	Mo	10.8	12.9	0			ESE	26	23:56	12.6	80		ENE	4	1020.4	11.9	82	ESE	6	1018.8	
13	Tu	9.0	13.7	6.2			SW	35	14:42	11.0	76		N	6	1016.4	9.5	96	WSW	17	1011.4	
14	We	8.6	11.9	15.6			WNW	61	10:34	9.0	84		WSW	30	1010.0	10.6	92	WSW	26	1008.6	
15	Th	8.9	15.4	18.6			SW	31	03:34	11.8	85		SW	13	1016.2	14.1	56	WSW	15	1015.2	
16	Fr	6.6	19.0	0			N	31	11:23	12.7	70		N	11	1018.8	18.7	30	NNW	17	1016.0	
17	Sa	12.2	20.9	0			WSW	31	13:42	16.9	43		N	9	1015.0	15.8	64	SW	19	1012.7	
18	Su	7.8	13.8	2.4			SW	33	11:04	11.7	65		SW	13	1017.6	12.0	74	SW	13	1016.1	
19	Mo	6.7	16.4	0.4			N	31	15:15	11.2	65		N	15	1014.4	15.9	40	N	15	1010.0	
20	Tu	11.2	18.4	0.4			WSW	31	21:27	12.8	72		N	9	1010.8	17.0	68	NW	11	1007.3	
21	We	10.8	14.0	1.6			SW	41	14:42	12.3	58		SSW	17	1016.9	12.7	56	SW	20	1018.1	
22	Th	6.5	15.5	0			WSW	24	14:21	12.0	60		SSW	11	1022.5	15.0	49	WSW	9	1019.6	
23	Fr	5.6	20.8	0			N	37	09:49	15.1	47		NE	15	1013.9	20.6	43	NNW	13	1008.4	
24	Sa	12.5	16.6	2.4			WSW	35	12:16	12.7	92		NNE	9	1006.9	15.4	87	WSW	19	1006.8	
25	Su	8.2	17.0	2.0			SW	33	11:15	10.5	77		S	15	1016.9	16.2	49	WSW	15	1014.1	
26	Mo	8.3	17.8	0			WSW	43	13:43	13.9	44		N	11	1012.6	15.4	50	WSW	20	1012.1	
27	Tu	7.9	18.3	0			SW	39	00:08	13.7	60		NW	9	1016.9	15.7	49	NW	9	1014.8	
28	We	7.0	19.9	0			N	50	14:24	18.2	38		NE	15	1003.4	17.2	61	ENE	19	989.8	
29	Th	7.6	15.8	37.8			WSW	69	10:01	11.2	80		WSW	31	982.3	11.1	94	WSW	13	986.4	
30	Fr	9.1	15.6	12.2			WSW	50	08:07	13.3	83		SW	22	1002.5	13.7	70	SW	20	1005.0	
Statistics for September 2016																					
Mean		9.1	17.4							13.5	66			12	1015.4	15.9	58		15	1013.1	
Lowest		5.6	11.9						9.0	36			SSW	2	982.3	9.5	30	#	6	985.4	
Highest		16.1	25.0	37.8					20.0	92			WSW	31	1030.2	24.5	96	WSW	26	1026.9	
Total				131.2																	

Observations were drawn from Adelaide (Kent Town) (station 023095)

DC:DW5903_201609 Prepared at 13:36 GMT on 1 Oct 2016
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http://www.bom.gov.au/dm/mfa/dwo/DC-DW5903_201609.pdf

South Australia in September 2016

The passage of several vigorous frontal systems, low pressure troughs and intense low pressure systems, in particular on the 14th-15th and 28th-29th brought heavy, and in many locations, record-breaking September rainfall. These conditions resulted in below average temperatures, with particularly cooler than usual days for much of the month. Daytime temperatures were more than 3 °C cooler than average across the northern parts of the State. The intense low pressure system on the 28th-29th produced exceptionally low surface air pressure across southern and central districts. Wind gusts up to 115 km/h were recorded on the Eyre Peninsula, with land gales persisting in excess of 80 km/h at several locations as the system crossed the southern coast.

Heavy rainfall results in very wet September

- Highest September daily rainfall on record reported between the 9th and 15th or between the 29th and 30th
- In the 24 hours to 9am on the 15th, 101.4 mm of rainfall was recorded at Uraidla, in the Mount Lofty Ranges, marking the sixth-highest September daily rainfall total on record for South Australia, behind the State record of 149.4 mm at Wirrabara Forest observed on 19 September 1913.
- With much of the State reporting more than double the monthly average, many sites had their wettest September on record
- For the State as whole, it was the fifth wettest September on record

Colder than average days across much of the State

- Daytime temperatures were more than 3 °C below average across the north-east of the State, and up to 2 °C cooler than average about the agricultural areas
- In the Northeast Pastoral district; sites in the region reported their coolest September days in more in about 20 years
- The passage of a vigorous cold front resulted in several locations having their coldest September day on record on the 12th or 13th

Colder than average nights through Central districts

- Minimum temperatures were 1 to 2 °C cooler than average across most central districts, this saw several sites report their coolest September nights in about 20 years
- Night time temperatures were closer to average across the far northeast and lower southeast districts

Strong winds and deep low pressure

- A deep and intense low pressure system saw wind gusts exceed 100 km/h across the Eyre and Yorke Peninsulas on the 29th, with Neptune Island recording a west-south-westerly gust of 120 km/h
- The low pressure system produced exceptionally low air pressure readings, below 980 hPa, across southern areas

Many rainfall & temperature records were set in September, some of which follow. For more information plus a summary of statistics please see:

<http://www.bom.gov.au/climate/current/month/sa/archive/201609.summary.shtml>

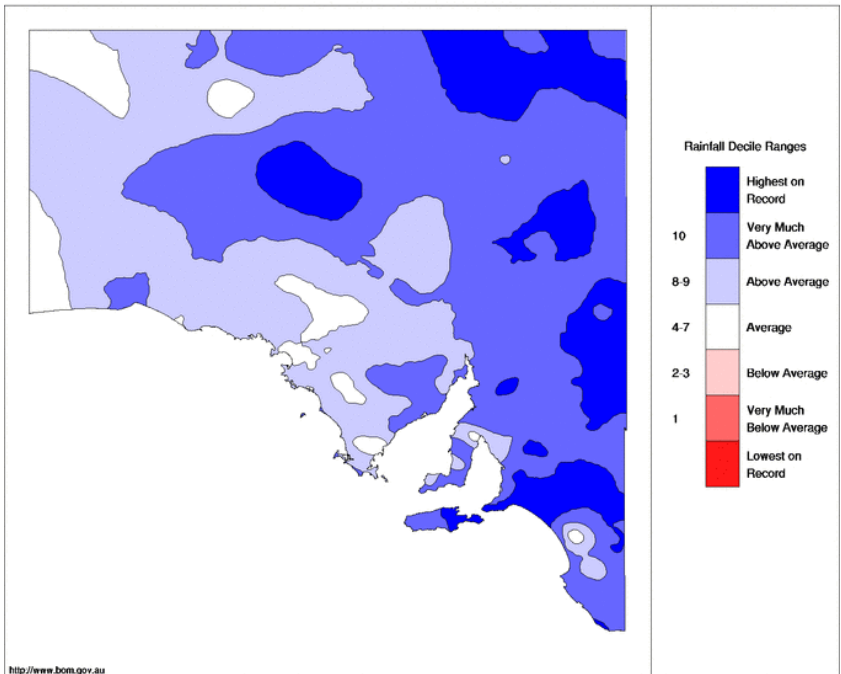
Extremes in September 2016

Hottest day	35.2 °C at Oodnadatta Airport on the 28th
Warmest days on average	23.5 °C at Oodnadatta Airport
Coollest days on average	11.4 °C at Mount Lofty
Coldest day	7.7 °C at Mount Lofty on the 30th
Coldest night	-1.2 °C at Yongala on the 19th
Coollest nights on average	3.7 °C at Yongala
Warmest nights on average	11.5 °C at Neptune Island
Warmest night	18.9 °C at Tarcoola Aero on the 8th
Warmest on average overall	17.2 °C at Oodnadatta Airport
Coollest on average overall	8.5 °C at Mount Lofty
Wettest overall	360.9 mm at Uraidla
Wettest day	101.4 mm at Uraidla on the 15th
Strongest wind gust	120 km/h at Neptune Island on the 29th

Record lowest September daily maximum temperature				
	New record (°C)	Old record	Years of record	September Average
Warooka	11.2 on the 12th	= 11.2 on the 26th in 1970	52	17.9
Meningie	11.2 on the 12th	= 11.2 on the 26th in 1970	51	18.2
Kimba	10.5 on the 29th	= 10.5 on the 22nd in 2009	49	20.3
Hawker	11.5 on the 29th	11.6 on the 30th in 2003	43	21.8
Cape Jaffa	11.5 on the 13th	11.7 on the 11th in 2004	25	16.3
Port Lincoln	12.1 on the 29th	12.4 on the 30th in 2003	25	18.7
Kingscote	11.2 on the 12th	12.3 on the 28th in 1996	23	17.9
Parawa	8.3 on the 12th	= 8.3 on the 5th in 1995	23	14.6
Renmark	12.4 on the 13th	12.5 on the 3rd in 2005	22	22.2
Cleve	10.6 on the 29th	11.7 on the 1st in 1997	21	20.3
Minnipa	11.2 on the 29th	13.0 on the 16th in 1999	21	21.8
Stenhouse Bay	11.4 on the 12th	12.0 on the 11th in 2004	21	18.2
Ernabella	10.3 on the 13th	11.0 on the 18th in 2010	20	26.4
Roseworthy	11.7 on the 14th	12.0 on the 11th in 2004	20	20.0

Some of the Record highest September daily rainfalls			
	New record (mm)	Old record	Years of record
Macclesfield	58.2 on the 29th	56.1 on the 25th in 1893	132
Goolwa	60.6 on the 14th	38.1 on the 25th in 1893	131
Woodside	65.6 on the 29th	59.7 on the 25th in 1893	123
Truro	45.0 on the 30th	43.4 on the 19th in 1913	133
Cleve	38.8 on the 29th	37.1 on the 21st in 1916	121
Belair	59.0 on the 15th	52.1 on the 12th in 1917	128
Clarendon	57.0 on the 29th	54.4 on the 20th in 1923	133
Cooke Plains	48.0 on the 30th	42.2 on the 20th in 1923	119
Bridgewater	78.0 on the 29th	71.1 on the 1st in 1933	132
Nairne	58.6 on the 29th	53.8 on the 16th in 1935	132
Williamstown	58.7 on the 30th	47.2 on the 2nd in 1937	133
Millicent	52.0 on the 9th	35.6 on the 3rd in 1947	133
Hahndorf	68.0 on the 29th	61.0 on the 11th in 1958	131
Inman Valley	51.8 on the 29th	41.1 on the 7th in 1960	84
Adelaide Airport	35.0 on the 29th	30.7 on the 7th in 1960	62
Mount Gambier	53.2 on the 9th	32.5 on the 14th in 1961	75
Cooper Pedy	57.6 on the 2nd	29.7 on the 21st in 1970	86
Aldgate	80.2 on the 29th	59.2 on the 2nd in 1973	48
Kalangadoo	71.0 on the 9th	42.0 on the 8th in 1983	102
Avenue	48.0 on the 9th	40.0 on the 8th in 1983	43
Goolwa Barrage	39.0 on the 14th	35.0 on the 10th in 1991	29
Mount Schank	56.8 on the 9th	33.6 on the 17th in 1991	48
Murrays Lagoon	45.2 on the 14th	37.4 on the 23rd in 1991	108
Ashton	74.4 on the 15th	64.4 on the 1st in 1992	65
Cape Jaffa	35.4 on the 9th	31.0 on the 29th in 1996	23
Uraidla	101.4 on the 15th	85.6 on the 30th in 1996	127
Lenswood	78.4 on the 29th	76.8 on the 30th in 1996	49
Clare	53.8 on the 29th	44.0 on the 2nd in 1997	23
Lucindale	43.0 on the 9th	36.6 on the 23rd in 1998	48
Heathfield	68.0 on the 29th	46.2 on the 23rd in 1998	32
McLaren Vale	43.2 on the 29th	33.8 on the 23rd in 1998	23
Cooper Pedy	61.4 on the 2nd	16.2 on the 17th in 2009	22
Nangwarry	66.8 on the 9th	28.6 on the 22nd in 2009	23
Wirrabara	74.2 on the 30th	72.4 on the 23rd in 2009	133
Kalamurina	53.4 on the 2nd	31.8 on the 3rd in 2010	30
Strathalbyn	37.4 on the 29th	32.7 on the 4th in 2010	109
Cudlee Creek	73.0 on the 15th	58.8 on the 4th in 2010	103
Finniss	43.0 on the 29th	37.4 on the 4th in 2010	101
Strathearn	24.0 on the 21st	20.4 on the 4th in 2010	26
Kingscote	43.2 on the 14th	37.8 on the 4th in 2010	24
Mount Crawford	54.0 on the 30th	48.2 on the 4th in 2010	23
Strathalbyn	34.4 on the 29th	32.2 on the 4th in 2010	21

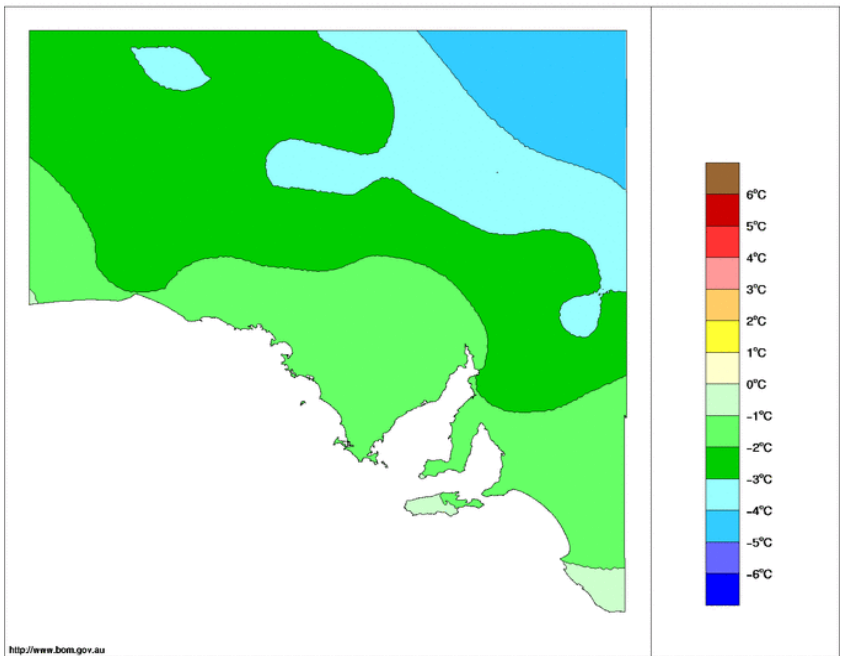
Distribution Based on Gridded Data
Australian Bureau of Meteorology



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Issued: 04/10/2016

Maximum Temperature Anomaly (°C) September 2016
Australian Bureau of Meteorology



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Issued: 03/10/2016



Australian Meteorological Association Inc (AMetA)
www.ameta.org.au

NEXT MEETING

6.00 PM TUESDAY 18 October 2016

*Bureau of Meteorology offices, Level 4, corner of South Terrace & King
William Street, Adelaide (Meet in foyer 5:45pm)*

Please note that subscriptions for 2016/2017 (\$15) are now due

Feature presentation: An Operational Heatwave Warning Service for Australia

**John Nairn, Regional Director-South Australian office of the
Bureau of Meteorology**

As well as his role as Regional Director of South Australia with the Bureau of Meteorology for several years, John has been managing the Bureau of Meteorology National Heatwave Warning project.

Understanding heatwaves is key to reducing their impact. His talk will cover the development of new methods for assessing heatwave intensity and severity, trials of this as a heatwave forecast service, and moves to develop this into a national Heatwave Warning System, and linkages to international hazards warning systems.

Convenient free street parking is usually available nearby (e.g. South Tce.)

We look forward to seeing you.

For further information contact

<i>Secretary:</i>	<i>Darren Ray</i>
<i>Phone:</i>	<i>8366 2664</i>
<i>Fax:</i>	<i>8366 2693</i>

Inquiries or suggestions, please contact the Secretary on the phone number listed above.