

Australian Meteorological Association Inc

# Monana

THE OFFICIAL PUBLICATION OF THE AUSTRALIAN METEOROLOGICAL ASSOCIATION INC October 2021

# From the President's Pen by Mark Little

Well, what a year it has been!! We have been lucky in South Australia with comparatively less pandemic related problems than some of the other states, but as Australia-wide restrictions begin to ease, we may have periods where issues increase, rather than decrease. Hopefully, if these events occur, they will be short lived as the "new normal" settles in. How ever it goes, you can rest assured that the AMetA will continue to follow all relevant health procedures to protect our members.

Putting any pandemic glitches aside, what can members look forward to in the 2021-2022 membership year?

Well, the Committee is looking to find the best presenters to keep you informed on the current state of Meteorology in South Australia and around the world. Our aspiration is to be able to put together a list of presenters for the next 12 months. However, this is an aspiration that is not likely to be met any time soon because good presenters are in demand, both professionally and as presenters. It is likely that the best we can do is to outline potential topics and/or presenters, but with the understanding that the farther the meeting is in the future, the more likely it is that it may change.

As has been noted before, the Monana Editor, Bruce, is branching out to undertake new adventures, leaving less time for the arduous duty of hunting up articles and publishing the magazine. Bruce has been a great editor, but there comes a time when the call of other activities must be answered. As a result, Monana will be reduced to a single edition per year—unless someone else wants to take on the role of Editor.

To fill the void created by the reduction in annual magazine issues, a new eBulletin will be sent to members on a semi-regular basis. In fact, a couple of eBulletins have already been sent out. Members are encouraged to provide items for this eBulletin, but unlike the magazine, this can consist of just a sentence of two and perhaps a link where members can find out more information. As long as it is weather-related, it can be about almost anything, even For Sale or Wanted messages.

While the AMetA currently has a positive bank balance, our finances are still teetering on the edge of making a loss. Should it turn out that the AMetA goes back to hiring a hall for our meetings, our financial situation will become tighter. Since the membership fee is probably about right at \$20 (\$4 per meeting) and we are asking for donations from visitors, it is time for the AMetA to think about how we can get more members.

Now all the pep-talks are out of the way, it is time to talk about the good stuff. The End of Year Function has been booked in the area downstairs at the Benjamin-on-Franklin Hotel on the evening of Tuesday, the 23rd of November. The AMetA has dined at this establishment before and a good time was had by all, so don't forget to let the Secretary (Beth) know if you wish to come. More information including links to the hotel and its menu, as well as the contact email to register your attendance will be provided in a later eBulletin.

Well, that is about it from me for the moment, so you can get on with reading the always interesting articles in this magazine. Keep Happy, Keep Safe. Mark Little President

### Transformations at the Bureau of Meteorology

### **By Beth Walton**

At the AMetA annual general meeting in August, Paul Lainio, BoM Decision Support Services, provided an extremely interesting overview of major transformations occurring at the Bureau. Through utilising advances in data acquisition, modelling capability and scientific understanding, the Bureau is strengthening meteorological services for all Australians; aiming to contribute to ongoing reduction in lives lost due to natural hazards, and to making an annual contribution of ~\$2billion in value towards the nation's social and economic outcomes by 2022



**Paul Lainio** 

In 2017 a 6-year program to comprehensively redesign the Information and Communications Technology (ICT) systems commenced. Priority was given to addressing security, stability and resilience. Improved modelling capability – both higher resolution and the ability to model small scale processes such as convection, is enabling many new products to be developed.

The Public Services transformation got underway in 2019 and involves consolidation of basic operational forecasting services to just two centres, Melbourne and Brisbane. These centres will also serve as Environmental Prediction hubs, building expertise in hazard warning (eg bushfires, severe storms, floods, tropical cyclones....) and coordinating operational warning services. A small contingent of state-based forecasting staff will remain in each capital city, capable of surging quickly into operational mode when required and working jointly with the larger centres to provide local warning services. South Australia will be part of an Environmental Prediction Centre for Marine and Antarctic Services (in conjunction with Tasmania).

As a first step in revamping state operations, 2 - 7 day forecasts and beyond (weather and seasonal) for South Australia are already disseminated from one of the National Centres. Shorter term forecasts are to be transferred by 2022. This will free up some state forecasting staff to work with local stakeholders (especially Emergency Services and the media) to gain a better understanding of 'weather triggers' and the way weather impacts decision making. Insight gained will be used to further enhance services.

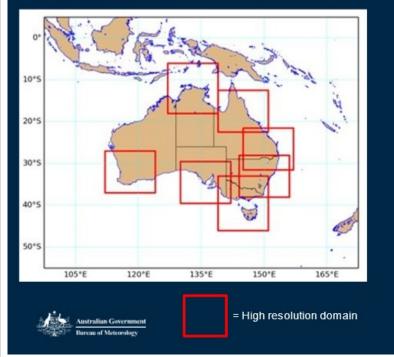
The ACCESS suite of numerical models underpin both weather and seasonal forecasting services. For weather forecasting the global model ACCESS-G, with





resolution of 12x12 km in mid latitudes, is run out to 10 days with reruns every 6 hours. In well populated areas (see Fig 1) higher resolution models (ACCESS-C), with grid points at 1.5km, are initialised using forecast output from the global models to provide detailed local forecasts.

#### Model development



Seasonal – ACCESS S: 60\*60 km

Global – ACCESS G : 12\*12 km, 10 days 6 hourly updates

High Res - ACCESS C: 1.5 km, 36hours

Ensembles at lower resolution to provide probability forecast capability

Full representation of atmosphere <u>Flexibility to derive many more parameters</u>

Fig 1 showing the regions covered (outlined in red) by detailed forecasts using high resolution ACCESS-C output.

The increased computing power is also being applied to reanalysis and climate projection projects. Reanalysis of the 29 year period 1990-2018 is providing hourly data at fine spatial resolution (12km over the Australian region and 1.5km over selected cities, including Adelaide), and with 70 atmospheric levels to better investigate past high impact weather events. More than 100 different meteorological parameters can be generated. These reanalyses will improve future forecasts and give a greater understanding of and preparedness for extreme weather.

Another modelling advance for the Bureau is the Rainfields Project. It uses a blend of rain gauge observations and quality controlled rainfall volume data from 66 weather radars across the continent, to enable rainfall accumulations (for periods of 5 mins to 24 hr) to be generated within any radar domain (a radius up to 200km). Combining this information with numerical model output, such as convective activity generated from the fine resolution ACCESS-C model, gives potential to produce Quantitative Precipitation Forecasts across Australia.

The increased computer power also enables repeated runs of the numerical models over the same time period, using slightly different, but still plausible, initial conditions. This is termed ensemble modelling. The suite of possible forecasts generated can then be ranked to determine not only the most likely or most common outcome (ie the mean forecast, or that with a 50% chance of occurring) but also the less likely outcomes (e.g. those with only a 10% probability) but which, if they did occur could produce extremely hazardous conditions. These more extreme forecasts can assist specific users with risk assessments e.g. emergency services can prepare contingency plans in heavy rainfall/ flood situations. The suite of forecast products can also be used in sensitivity analyses - assessing the impact of small variations in input parameters. This type of ensemble modelling can contribute to climate change projections out to 2100.

How does the transformation affect us? Apart from improved forecasting services, watch for a significant revamp of the BoM website later this year. Feedback on the new design and accessibility will be sought from users. There is also an expanding use of communication platforms (Webinars, You Tube, Instagram, Blogs, Facebook, Twitter etc) not only to deliver forecasts and other servicers but also for public interaction and as a means to improve the community's understanding of meteorology.

## AMETA AGM REPORTS

# The AMETA AGM was held on Tuesday August 24th 2021 at the conclusion of the general meeting.

The following reports were presented:

### President's Report 2020-2021

As stated in the latest edition of Monana, there are going to be a few changes on Committee. Although I said in the latest "From The President's Pen" in the Monana that I would not be nominating for President, after discussions with the rest of the Committee, I have decided to re-nominate for President. I was offered a chance to update my article in the Monana, but I'm afraid that I was slack and didn't update the piece about not nominating for President.

So, now that my apology is out there, it is time to review the year that was – well, the year from the last AGM (February this year), and to gaze into the crystal ball for the upcoming year.

This year there will be a significant change to the Committee with Mac and Bruce stepping down. Thanks for all the good work. Many thanks to those who have nominated, but we still need another two General Committee Members to make up the Committee as defined by the Constitution.

The members nominating for the Committee are:

President:	Mark Little
Vice-President:	Warwick Grace
Secretary:	Beth Walton
Treasurer:	Jon Lethbridge
Committee Member:	Dave Brown
Committee Member:	Gary Goland
Committee Member:	Graham Boyce
	•

As a reward, nominating members will be eligible for a two-week all expenses paid holiday to ...Oops! Just remembered COVID. (2) It looks like we will need to postpone that until another AGM.. (3)

On a more serious note, the AMetA is in a better financial position than expected because members of Committee have been donating not only their time for the tasks that they do, but in most cases, they have elected to donate the money needed to carry out those tasks. While that was appreciated in a time when the Association was coming to grips with having to pay for things like hall rental, in the end it was unfair to allow those people to fund the enjoyment of other members from their own pockets. I think that it is important members appreciate the dedication of their committee members.

Our long serving Editor for the Monana (Bruce) is stepping back from all the work it

takes to publish the magazine to enjoy other activities. If members would like to keep getting the **Monana** regularly, they will need to step up to help with the production of the magazine and to make sure that there are articles to include in the magazine.

The Constitution says that only one edition of **Monana** is required per year. If that suits you, then you don't need to do anything. However, if you want at least the current number per year, be sure to let your committee know. However, in that case also be prepared to say how you can help make sure that the **Monana** continues as you would like.

Normally, one of our problems is finding a speaker who is available on the meeting date. Now things are a bit different in that a couple of Probus Clubs are looking to get a speaker from the AMetA to talk at their meetings. It is a bit of a change to be sought out to provide speakers, rather than seeking speakers for our meetings.

### AMETA Financial Statement 2020 - 2021

#### AMetA Society Cheque Account

Balance (30 June 2021):	\$6,255.38
Closing Balance (30 June 2021):	\$2,000.00
<b>AMetA Term Deposit Account</b> Opening Balance (1-August-2020):	\$2,000.00
Cash Holdings Cash Holding (30 June 2021):	\$430.10
Closing Balance (30 June 2021):	\$3,825.28
Donations (EFT)	\$3.92
Books (EFT)	\$38.00
Subscriptions (EFT, Cheque):	\$1749.24
Account Interest: Term Deposit Interest:	\$0.12 \$21.00
Opening Balance(30 June 2020):	\$3,583.00

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# Weather the Words?

### by Dianne Davis

Walking through a shopping centre the other day during lunchtime (with required mask firmly in place) I heard, as one does, snippets of conversation of passers-by. And what struck me was that all the discussions were about the weather. This brought home to me once again the pivotal role that weather plays in our lives and in our language.

That morning I had shot out of bed *like a thunderclap* because the alarm had failed. It was *raining cats and dogs* and as I tried to find appropriate clothing for the **foul** and **harsh** conditions outside, I knew I was *losing my cool*.

I ran at *lightning speed* to the bus stop where, as usual, the others waiting there gave me the *cold shoulder*. Not a *bright face* amongst them – just ones giving me an *icy reception.* 

On the bus I passed a park and saw people *warming up and cooling down* their bodies according to where they were in their routine. Mind you most looked *freezing* in their skimpy gym clothes, but with their *faces all steamy* with sweat. No doubt they thought that all would be as *right as rain* when they were fit.

As I neared the office, I knew that there would be **dark clouds ahead**. I hoped that there would have been **a thaw in the relations** between two colleagues and pondered why they were always so **bleak** with one another. Their **arid** faces and **burning** anger were always present. Surely coming to work like that would mean it must always feel **like a wet week** with constant **dark clouds on the horizon**.

On the other hand, the new recruit had such a *sunny personality* that they always seemed to be on *cloud nine* and was like a *breath of fresh air* around the place. In addition, the innovative boss from another branch had moved at *hurricane* speed to bring about a new *dawn*.

The boss entered with the design for our new building, and I was *completely blown away by it*. Or, as one of the others said they were, *completely thunderstruck*. It seemed as if from now on, physically at least, we would have reason to *look on the bright side*. When we were asked for feedback, there were *floods of comments* and the *doldrums seemed to have lifted*. It looked like *blue skies ahead*.

To celebrate, that evening we all went out for drinks. Unfortunately, many of us **ended up under the weather!** 

# The latest Report from the Intergovernmental Panel on Climate Change by Beth Walton

In August 2021 the Intergovernmental Panel on Climate Change (IPCC) released 'Climate Change 2021 – The Physical Science Basis', the first of 4 component reports of its 6<sup>th</sup> global assessment (AR6). It provides the most up to date physical understanding of the climate system, observed climate change and possible pathways to limit future climate change. The report is based on comprehensive assessment of peer reviewed literature accepted up to 31 January 2021.

### Some Observed Changes in aspects of the Climate System

- Atmospheric Carbon Dioxide Concentration the highest in 2 million years
  - (Other greenhouse gases are also increasing e.g. Methane and Nitrous Oxide)
- The *rate* of Global Warming unprecedented in at least the last 2000 years
- **Global** Sea Level Rise the fastest rate in 3000 years
- Arctic Sea Ice (late summer) the lowest areal extent in 1000 years.
- Glacial Retreat (areal extent) unprecedented in more than 2000 years

#### Climate change is widespread, rapid and intensifying

Stabilising the climate will require strong, rapid and sustained reductions in Green House Gas emissions, including reaching net zero  $CO_2$  emissions (the dominant greenhouse gas).

(WWW.IPPC.CH<sup>1</sup> 09 AUGUST 2021)

The Report shows that greenhouse gas (GHG) emissions from human activities are responsible for approximately 1.1°C of net global warming since the period 1850-1900 and finds that, averaged over the next 20 years, global warming is expected to reach or exceed 1.5°C (compared to 1850-1900). Unless there are immediate, rapid and large scale reductions in GHG emissions, limiting warming to close to 1.5°C or even 2.0°C will be beyond reach.

Projections in the Report show that in the coming decades, climate changes will increase in all regions of the globe. For 1.5°C of global warming, there will be increased heat waves, longer warm seasons and shorter cold seasons. At 2°C global warming, heat extremes would more often reach critical tolerance thresholds for agriculture and health.

But it is not just about temperature:

<sup>1</sup> IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

### Other changes which will increase with further warming

#### • The water cycle is intensifying.

- This brings more intense rainfall and associated flooding as well as more intense drought periods
- Rainfall patterns are affected.
  - In high latitudes, precipitation is likely to increase but it is likely to decrease over large parts of the subtropics.
- Sea level will continue to rise throughout the 21<sup>st</sup> century.
  - Extreme sea level events in coastal regions that may previously have been a 1 in 100 year event could happen every year by the end of the 21<sup>st</sup> century.
- Changes in the ocean, including warming, more frequent heatwaves, ocean acidification, and reduced oxygen levels have been clearly linked to human influence.

Detailed regional assessments, including information that helps translate physical changes in the climate (e.g., changes in temperature, rainfall patterns and extremes, wind, etc) into the significance for society and ecosystems are included in the report. This data can inform risk assessment, adaptation and other decision making. Further information can be explored in detail and at an advanced level in a newly developed interactive Atlas at: <u>https://interactive-atlas.ipcc.ch/</u>

### The 6<sup>th</sup> IPCC Assessment Report

IPCC reports provide the most authoritative information on how our climate is changing. There are 195 member countries on the Intergovernmental Panel. This latest Working Group I Report was compiled by 234 authors from 66 countries. An additional 517 authors made contributions and over 14,000 references were cited!.

Two more reports focussing on 'Impacts, Adaptation and Vulnerability' (from IPCC Working Group II) and 'Mitigation Options' (from IPCC Working Group III) will be released early in 2022.

The final report of this Assessment, the **AR6 Synthesis Report**, will be released in September 2022.

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

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

Another useful website is <u>https://www.theweatherclub.org.uk/index.php/</u> (Please note a little patience may be required when accessing this website as it can take some time to open)

# WHEN ICE ISN'T NICE

### by Bruce Davis

The inspiration for this article came after recently watching an episode of the TV program "Air Crash Investigation". The program in question covered the crash of a SAAB 340A turboprop aeroplane in Argentina in 2011 killing all 22 on board (Sol Líneas Aéreas Flight 5428). This aeroplane type commonly used in Australia by Regional Airlines such as Regional Express on the Adelaide to Figure 1: SAAB 340 operated by REX Airlines.

Whyalla route (see Figure 1)



As with many accidents, multiple factors contributed to the accident with human factors being the final cause. However, the chain of events started with airframe icing.

Many people incorrectly believe that, given Australia's climate, aeroplane icing would not be a problem. That is not correct as a search of the Australian Transport Safety Bureau (ATSB) incident database shows. The most affected aeroplanes are turboprops like the SAAB 340 as they tend to spend more time in icing conditions. Jet engine airliners often climb quickly through the icing layers and cruise above them.

One such icing incident from this database refers to the same type of aeroplane. On 5 November 2008 at about 1838 Eastern Standard Time, the flight crew of a Saab Aircraft AB 340B, (VH-UYI), identified an incipient (approaching or the onset of a) stall while flying a holding pattern in icing conditions. The aircraft's stall warning system did not activate. The pilot in command disconnected the autopilot and recovered the aircraft from the stall. During the recovery, both engines exceeded their maximum continuous operating temperature for an extended period. The Aircraft Operating Manual stated that the Saab 340B stall warning system had an activation level designed for a clean wing only. Subsequently SAAB issued updated operating procedures for flight in icing conditions, designed to prevent ice build-up on the airframe.

This report is interesting in that it suggests that the aeroplane's stall warning would not operate correctly in the icing conditions encountered. Fortunately, the crew recognised the problem and were able to take corrective action – although the process required exceeding the design limitations of the aeroplane.

Ice affects both the powerplant and the airframe. All effects are negative.

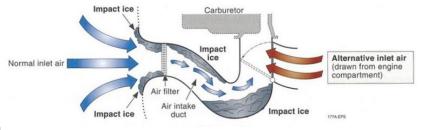


Figure 2: Piston Engine Impact Icing

Source: UniSA

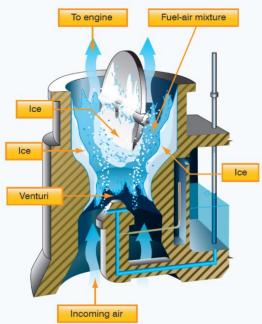
The engine effects are normally due to the blocking of the air intakes of both piston and iet engines aeroplanes when moisture in the airstream freezes on impact with inlet components. However, the effects often occur at temperatures above freezing and often in clear air.

This is because air passing into the engine (in both piston and jet engines) frequently undergoes rapid expansion with subsequent adiabatic cooling (Cooling of a parcel of gas by expansion, with no heat exchange between the parcel and the surrounding air). (See Figures 2, 3 & 4).

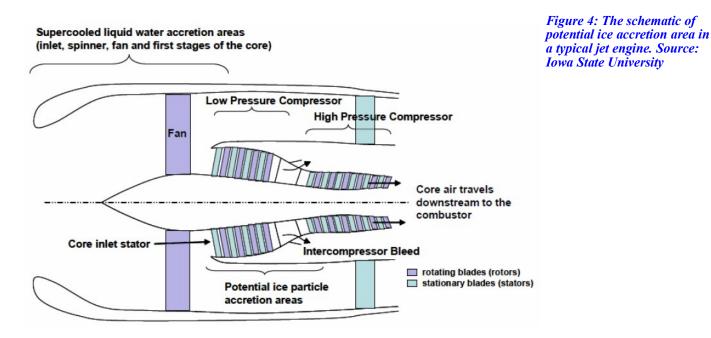
In piston engine aeroplanes with a carburettor (such primitive technology still exists in

aircraft engines) the cooling process is also aided by latent heat absorbed as fuel evaporates. Hence intake icing can occur at temperatures around 30° C providing the air is sufficiently humid and engine power setting is low. Interestingly, in Australia, such icing is more likely in winter whereas in England it tends to occur more often in summer.

One form of induction icing peculiar to jet aeroplanes occurs during flight through air containing small ice crystals (often invisible). These very small ice crystals melt as they impact on the warm internal engine components enabling adhesion to occur. A thin film of super cooled liquid (water still in liquid form at temperatures below  $0^{0}$ C) may then form over parts of the engine, enabling the further build-up of ice crystals. The sheer volume of these partially melted crystals cools



these surfaces below freezing, causing ice accumulation Figure 3: The formation of carburettor ice may rein the engine core. This reduces the internal temperature FAA of the engine leading to various engine malfunctions.



Hence a means of melting the ice is required. For piston engine aeroplanes this is achieved by using the exhaust system to heat up an alternate source of intake air. In jet engines air that has been heated by the compression process in the early engine stages is bled off to heat the engine nacelles. One drawback is that this anti-icing reduces power available from the engines.

Airframe icing normally occurs at low temperatures. Here I will only consider the major problems in flight through cloud. Airframe icing refers to ice that accumulates on the airframe, particularly the aerofoil surfaces of the wings.

An aeroplane in flight is under the influence of 4 basic forces. These are lift, weight, thrust and drag (see Figure 5). Airframe ice has a negative effect on each. It increases the weight. If it forms on a propellor (or reduces the airflow into a jet engine) it reduces the thrust. The major effects, however, are on lift and drag. Here ice changes the shape of the wing surface usually making it rougher. This increases the drag but, more importantly, alters the airflow over the wing reducing lift and hence increasing the stalling

speed. Experiments have shown that as little as 1 cm of ice on the leading edge can reduce lift and increase drag, each by up to 50%. This would increase the stalling speed by more than 50%.

One cm or more of ice can accumulate in a minute or two in heavy icing conditions. Tests conducted at NASA Glenn Research Centre on several modern

aerofoils demonstrated that exposure to clear icing *Figure 5: 4 Basic Forces of Flight*. *Source: NASA* for 2 minutes could also reduce the critical (stalling) angle of attack by up to 8 degrees. Coupled with the extra weight this would further increase the stalling speed.



Figure 6: Rime & Clear Ice.

Source: FAA

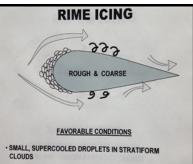
Thrust Weight

There are considered to be 3 major types of airframe ice that occur in cloud. These are rime, clear and mixed. They are formed when supercooled water droplets in the air impact on an airframe and immediately freeze.

Rime Ice (see Figures 6 & 7) has a granular, opaque 'white' appearance and

is formed when super cooled

water droplets rapidly freeze on impact with the airframe. The granular appearance is due to air being trapped within the ice. It tends to occur during flight through clouds consisting of small droplets (e.g., stratiform clouds) at temperatures well below freezing (see Figure 10). This type of ice is far easier to remove



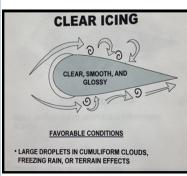


Figure 8: Clear Ice Source: NOAA

than clear ice.

Clear Ice has a clear, glassy appearance *Figure 7: Rime Icing* (see Figures 6 & 8) and is formed by slow *Source: NOAA* 

freezing of super cooled water droplets. A small amount of the droplet freezes on impact and the remainder flows back over the airframe surface slowly freezing. The latent heat released during the freezing process contributes to the spread of the ice. Clear ice tends to occur during flight through clouds with large droplets

(e.g., cumulonimbus and nimbostratus) and at temperatures not far below 0<sup>0</sup>C (see

Figure 10). It is very dense & hard to remove.

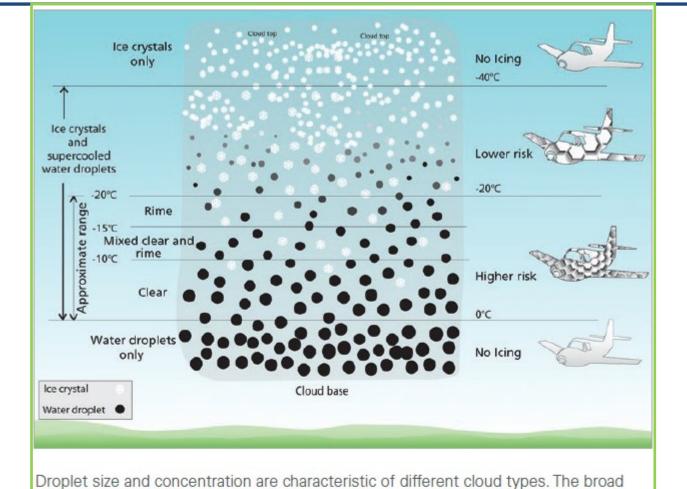
The final form mixed ice (see Figure 9) is, as its name implies, a mixture of rime and clear ice. This is the most common form of airframe ice and most likely to form in cloud in the temperature range of -10°C to -15°C.

As with engine icing, for flight to occur through icing conditions a means of preventing / removing ice accumulation must be provided. [Strictly anti-icing refers to ice prevention whilst de-icing refers to ice removal. However, these 2 terms have come to be synonymous over the years and here I will use them interchangeably.]

Such equipment is not very common on piston engine aeroplanes and so these are not normally certificated for flight in icing conditions. Sometimes electrical heating may be provided for the *Source: NOAA* 



FAVORABLE CONDITIONS



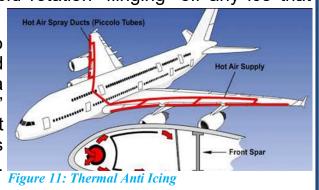
relationship between cloud type and icing are:

Code	Cloud Type	Icing threat
СВ	Cumulonimbus	Possible severe clear ice
TCU	Towering cumulus	Possible severe clear ice
NS	Nimbostratus	Moderate mixed icing in lower levels.
SC	Stratocumulus	Moderate rime when freezing level is low enough
AS	Altostratus	Light to moderate rime. Clear ice possible in lower levels.
AC	Altocumulus	Light to moderate rime
ST	Stratus	Nil to light rime

#### Figure 10: Airframe Icing Conditions. Source: BOM

propeller blades. In a way this seems strange as the propeller blades are probably the least likely components to ice up due to their rapid rotation "flinging" off any ice that forms.

In large jet aeroplanes bleed air is normally used to heat the leading edges of aerofoils. Air heated during the compression process is bled off from a compressor stage (see Figure 11). As the "bleed" process takes considerable energy and can affect engine temperature limitations, this process normally requires a large and powerful engine.



Interestingly, for the B787 Dreamliner Boeing have replaced the air bleed ani-ticing with electrical heating mats bonded to the interior of aerofoil leading edges (ThermaWing) (See Figure 12). This has been made possible by the improved electrical generation now available and installed on this aeroplane. Boeing claim a considerable energy saving (about 50%) by doing this.

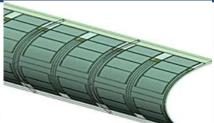


Figure 12:Figure 11: B787 Heater Mat Source: GKN Aerospace

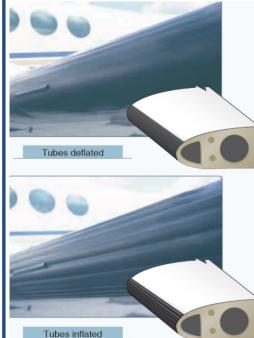


Figure 13: De-Icing Boots on the leading edge of a wing. Source: FAA

In turboprop aeroplanes (those most affected by icing) the most common system is the use of inflatable rubber boots. These consist of a rubber sheet bonded to the leading edge of the aerofoil. (See Figure 13). When ice builds up on the leading edge, an engine-driven pneumatic pump or engine bleed air inflates the rubber boots. Upon inflation, the ice cracks and should fall off the leading edge of the wing. The common wisdom used to be that boots were only activated after ice had formed (the theory being that if activated during ice formation, an ice bridge could form over it.). However, with modern boots such "bridging" does not occur. It has been found that delaying action can make the situation far worse and the ice too thick to be removed. Waiting too long has resulted in a number of accidents and fatalities worldwide. So, the procedure for most aeroplanes is to activate the boots as soon as an ice accumulation is suspected or observed.

Let us return to the incident involving Sol Líneas Aéreas Flight 5428 mentioned at the start of this article. The investigation showed that the cause of the accident was a stall due to severe airframe icing and subsequent loss of control.

No evidence of technical defects in the aircraft was found. It was determined that the icing conditions encountered were so severe that the aircraft's de-icing systems were overwhelmed.

Unfortunately, the response from the flight crew was inadequate. There was inadequate monitoring of warning signals such as temperature, cloudiness, precipitation, and ice accumulation The airspeed set was totally inappropriate for prolonged operations in icing conditions. The engines were never set to full power and the airspeed was allowed to dwindle until the aircraft stalled. A mitigating factor was that weather reports the crew received forecast minor icing, and hence they were not prepared for the conditions encountered. The crew's stall recovery technique was described as "inappropriate". Prestall buffeting was assumed to be vibrations caused by ice contamination of the propellers.

Finally, if any reader is interested in just seeing how ice has affected flight in Australia, I would suggest a search of the ATSB archives (<u>https://www.atsb.gov.au/publications/</u> safety-investigation-reports/?mode=Aviation).

This makes chilling reading.

#### Greater Adelaide in August 2021: Mild days and nights, close to average rainfall

August rainfall was just below average at most locations across Greater Adelaide. Both daytime and night-time temperatures were above average.

For more information plus a summary of August's statistics please see: <u>http://www.bom.gov.au/climate/current/month/sa/archive/202108.adelaide.shtml</u>

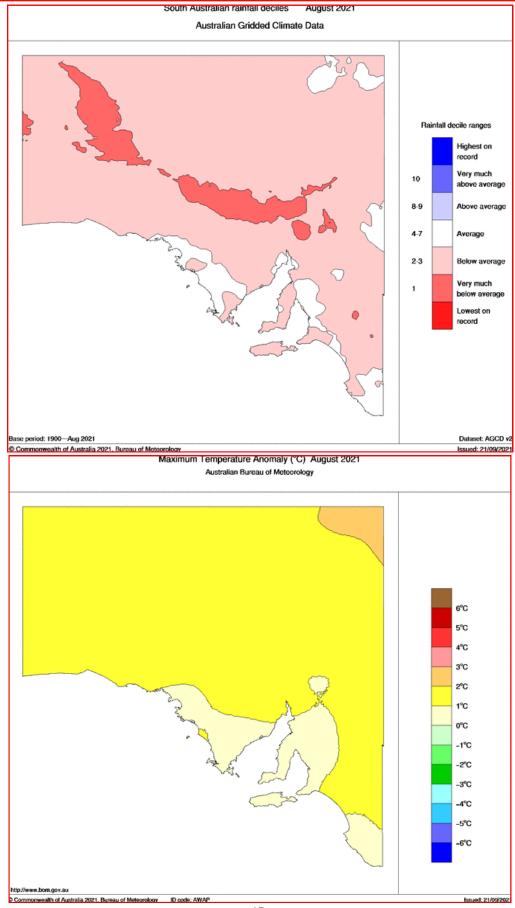
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	he official	The official site for Adelaide, having reopened in May 2017.	łaide, havii	ig reopened	l in May 2(	017.													B B	Bureau of Meteorology	f Meteoi	vgolo
Notion         Target         Time			Ten	sdu	Rain	Evap	Sun	Ma	k wind g	ust				E					3pn	F		
m         with bit         withwith bit         with bit         withwith bit         with bit         withwith bit         withwith bit         withwith bit         withwith bit         withwithwithwith         withwith         withwithwith         withwith         withwith         with         with         withwith	Date	Day	۹	۳ax	-	-	horizod	Dirn	Spd	Time	ہ Temp	RH »	Cld	Dirn	Spd	MSLP	ہ <sup>م</sup>	RH	+		Spd	MSLP
7         22         12.45         13.4         46         NNE         19         1009.3         12.7         69         NW         24           7         31         312.33         11.1         71         32         72.45         73         32         12.45         13.5         57         50         70         73         32         11.24         12.3         51         NW         11         1027.5         14.2         73         WSW         11           7         33         11.30         12.9         65         NN         103.3         16.1         52         NNW         15           7         33         11.30         12.9         65         101.37         14.8         71         WSW         11           7         30         132.6         15         NN         7         1029.3         17.7         44         WN         17           7         30         132.6         14.5         NN         7         1029.3         17.7         44         MN         17           7         102.4         102.5         17.7         42         MNW         13         13         13         13         13	,	Su	ر 8.4	ر 15.1	12.2	Ē	SIDOL	MNN	<u>26</u>	13:37	ر 6.6		eidunis	NE	MIIWI 11	1013.9		°	eidunis	MN	17	1013.
4         12.3         11.1         71         SW         11         102.7         13.2         57         SW         17           2         11.1.3         12.1         83         14.1         78         WSW         11           2         11.2.8         12.7         83         WSW         11         102.7.5         14.2         73         WSW         11           2         8         14.13         12.2         55         NNE         131         1033         16.1         27         WSW         11           2         33         11.23         12.2         55         NNE         131         1033         16.1         57         WSW         11           3         14.13         12.2         91         NNE         13         1030         14.4         14	2		9.7	14.9	0.2			NNN		12:43	13.4	46		NNF	19	1009.3		69		MN	24	1007
1         13:38         12.7         83         WSW         11         102.47         14.1         78         WSW         11           2         6         11.24         12.1         91         WS         11         1027.6         14.2         73         WSW         11           2         8         11.30         12.9         65         NNE         13         1000.9         15.0         60         WSW         11           2         3         11.30         12.9         65         NNE         13         1000.9         15.0         60         WSW         11           2         3         11.30         12.9         65         NNE         13         1000.9         15.0         60         WSW         11           2         3         11.20         12.9         14.2         71         WSW         13         12         13         12         13         12         13         12         12         13         12         12         12         13         12         12         12         12         12         12         12         12         12         12         12         12         12         12	0		7.8	13.9	8.0			WSW		12:32	11.1	71		SW	20	1017.0		57		SW	19	1019.
2         11:24         12:1         91         W         11         1027.6         14.2         73         WSW         11           2         33         11:30         12.2         65         NNE         13         100.33         16.1         52         NSW         11           2         33         11:30         12.2         65         NNE         13         100.33         16.1         52         NSW         15           4         33         10.13         13         102.3         16.1         52         NSW         15           4         10.3         22         11.5         10.4         99         100.35         17.5         42         NSW         13           2         14.5         10.4         99         100.35         17.5         42         NNW         13           2         11.2         12.4         11.9         NSW         11         100.35         17.5         42         NNW         13           2         10.25         NS         11         100.35         14.5         14.4         17.7         42         NNW         13           2         11.2.4         11.3	4		9.7	15.4	1.2			MSM		13:38	12.7	8		MSM	11	1024.7		78		WSW	17	1025.1
1         1	2		10.1	14.8	0.4			8		11:24	12.1	91		8	11	1027.6		79		WSW	1	1026.5
2         1351         12.2         83         NUN         15         00.3         15.0         0.0 <td>9</td> <td></td> <td>11.1</td> <td>15.8</td> <td>1.2</td> <td></td> <td></td> <td>×</td> <td>28</td> <td>14:18</td> <td>12.3</td> <td>95</td> <td></td> <td>MN</td> <td>6</td> <td>1028.9</td> <td></td> <td>78</td> <td></td> <td>8</td> <td>1</td> <td>1026.9</td>	9		11.1	15.8	1.2			×	28	14:18	12.3	95		MN	6	1028.9		78		8	1	1026.9
V         33         11:30         129         65         NNE         13         10303         16:1         52         NNW         15           V         33         14:19         142         51         NNE         13         1024.3         18.3         40         NNW         12           V         43         00:44         12.3         91         V         15         1013.7         19.7         19.7         19.7         105         12         16         NNW         13           V         22         14:52         10.4         99         NN         16.1         67         NNW         13           V         22         14:56         11.1         93         10:57         42         NNW         13           V         23         11:24         124         81         NNW         16.1         67         NNW         17           V         24         10:57         14.9         NNW         17         NNW         17           V         24         10:57         14.9         NNW         16         16         7         NNW         17           V         24         11:10	7		10.4	15.7	0.4			WSW		13:51	12.2	8			Calm	1030.9		60		WSW	;	1029.6
V         33         14:19         142         51         NNE         13         1024.3         18.3         40         NNW         13           V         23         16:04         15.6         41         N         19         19.7         19.7         39         NNW         13           V         22         14:52         10.4         99         N         103.1         16.1         67         NNW         13           V         22         14:52         10.4         99         103.1         16.1         67         NNW         13           V         22         14:5         124         111         93         NV         7         1020.5         14.5         46         NNW         17           V         24         14.1         63         NN         17         46         NNW         17           V         26         13.7         71         NNE         9         1012.7         16.2         57         NN         17           V         26         10.12         10.12         10.12         16.2         57         NN         17           V         24         10.3         10.2	8		8.5	16.7	0.2			NNN		11:30	12.9	65		NNE	13	1030.3		52		NNN	15	1026.4
43         18:06         15.6         41         N         19         1017.7         19.7         19.7         10.7         19.7         10.7         19.7         10.7         19.8         NNE         15           7         22         14:52         10.4         99         NN         17         10027.5         14.8         7         WNW         13           7         22         14:52         10.4         79         NNE         14         87         WNW         13           7         22         14:16         11.1         93         10.25         14.4         46         WNW         17           7         26         13:49         10.4         79         NNE         13         1019.7         20.6         SW         17           7         10.55         14.1         49         NNE         13         1019.7         20.6         SW         17           8         10.55         14.1         14         44         17.7         65         WN         17           8         10.55         76         NNE         13         1012.4         22.8         33         NNE         16           8	6		10.2	18.8	0			MN	33	14:19	14.2	51		NNE	13	1024.3		40		MNN	22	1020.
V         43         00:44         12.3         91         W         15         1013.7         14.8         71         WSW         19           2         22         13.20         10.4         9         9         103.1         1.1         WSW         13           2         22         12.4         11.9         7         0029.5         17.5         4.6         WNW         13           2         24         12.41         11.9         7         1020.5         17.7         4.2         WNW         13           2         24         12.46         11.1         93         N         7         1020.5         17.7         4.2         WNW         17           2         14.16         12.9         K3         N         7         1020.5         17.7         4.2         WNW         17           2         14.26         11.1         93         NNE         9         1015.4         16.2         5         NN         17           3         10.57         14.2         10.10         12.2         8         N         NN         17           4         13.26         14.8         17.7         6.3	9		13.0	20.2	0			NNE		18:09	15.6	41		z	19	1017.7		39		NNE	15	1011.
V         28         13300         10.8         92         N         9         1029.5         12.9         88         NUW         13           V         22         14.52         10.4         79         9         1031.1         16.1         67         WNW         13           V         22         14.55         11.9         75         N         7         1027.5         17.7         46         WNW         17           V         23         11.24         12.4         81         WSW         11         1030.9         14.4         65         SW         16           V         26         13.4         14.1         93         NVW         7         1030.5         14.5         59         W         17           V         26         13.4         71         NNE         9         1015.4         18.2         61         NNW         17           V         46         13.3         71         NNE         9         1016.0         13.2         61         SW         17           V         50         112.26         13.7         7         16.2         33         NNW         17           V<	÷		12.3	15.1	2.4			MSM		00:44	12.3	91		>	15	1013.7		71		MSW	19	1018
V         22         14.52         10.4         99         NN         1 <th< td=""><td>12</td><td></td><td>9.1</td><td>16.3</td><td>6.0</td><td></td><td></td><td>MNM</td><td></td><td>13:00</td><td></td><td>92</td><td></td><td>z</td><td>6</td><td>1029.5</td><td></td><td>88</td><td></td><td>MNN</td><td>13</td><td>1028.</td></th<>	12		9.1	16.3	6.0			MNM		13:00		92		z	6	1029.5		88		MNN	13	1028.
V         24         12.41         11.9         75         NE         9         1027.5         17.7         42         WNW         17           V         30         132.56         12.9         63         N         7         1027.5         17.7         42         WNW         17           V         23         11.24         12.9         63         N         N         7         1030.5         14.4         65         SW         15           V         26         13.7         71         030.5         14.5         59         NW         17           V         35         10.57         14.9         NNE         13         1019.7         206         34         NW         17           V         35         10.57         14.9         NNE         13         1019.7         206         34         NW         17           V         35         11.20         16.0         55         NNE         13         1012.4         218         33         NNW         17           V         36         132.61         10.5         76         SSW         16         NNW         17           V         4	13		9.0	16.9	0.4			MNM		14:52		66		z	6	1031.1		67		WNW	13	1028.
V         30         13:26         12.9         63         N         7         1027.5         17.7         42         WNW         17           V         33         11:24         11.1         93         W         7         1020.5         14.5         59         WNW         11           V         24         14:16         11.1         93         W         7         1030.5         14.5         57         NNW         13           V         35         10:57         14.9         55         NNW         9         1015.4         18.2         61         NW         17           V         50         11:20         16.0         55         NNE         13         1012.4         12.2         63         WNW         17           V         50         11:20         16.0         55         NNE         13         1012.4         57         53         WNW         17           V         26         09:07         10.5         77         NNE         13         1012.4         13         57         SW         17           V         26         09:07         10.7         57         NN         57 <t< td=""><td>14</td><td></td><td>5.9</td><td>17.8</td><td>0</td><td></td><td></td><td>MNN</td><td></td><td>12:41</td><td>11.9</td><td>75</td><td></td><td>IJ</td><td>6</td><td>1029.3</td><td></td><td>46</td><td></td><td>WNW</td><td>13</td><td>1025</td></t<>	14		5.9	17.8	0			MNN		12:41	11.9	75		IJ	6	1029.3		46		WNW	13	1025
V         33         11:24         12.4         81         WSW         11         1030.9         14.4         65         SW         15           V         24         11.1         93         W         7         1030.5         14.5         59         W         11           V         26         13.49         10.4         79         NN         2         10.57         14.5         57         NN         11           V         37         14.14.9         56         NN         112.1         20.6         51         NN         10           V         50         11/20         16.0         55         NN         10         11         20         34         NN         11           V         30         14/20         16.0         55         NN         10         57         83         10         57         83         10	15		7.6	17.8	0			8	30	13:26		83		z	7	1027.5		42		WNW	17	1026
V         24         114:16         11.1         93         W         7         1030.5         14.5         59         W         11           V         26         13:49         10.4         79         NN         7         1030.5         14.5         57         NN         13           V         35         10:57         14.9         NN         9         1015.4         18.2         61         NN         13           V         35         10:57         14.9         NN         9         1015.4         12.0         54         NN         13           V         46         13:35         10.5         7         1024.6         13.1         79         SW         13           V         26         09:07         10.7         57         SW         16         13.0         44         SSW         13           V         28         13.24         10.7         57         SW         16         13.0         44         SSW         13           V         46         12:09         11.6         56         N         N         13         1012.6         54         NNN         17           V	16		10.7	15.8	0			SW	33	11:24	12.4	81		WSW	11	1030.9		65		SW	15	1029
V         26         13:49         10.4         79         NNE         13         1019.7         20.6         54         NNW         13           V         37         14:43         14.1         49         NNE         13         1019.7         20.6         34         NNW         19           V         35         10:57         14.9         NNE         9         1015.4         22.8         34         NNW         19           V         36         11/2.20         16.0         55         NNE         13         1012.4         22.8         33         NNW         13           V         46         132.36         10.5         72         SSW         15         1012.4         22.8         33         NNW         13           V         28         132.40         10.7         57         SSW         15         13.1         79         SW         17           V         28         10.5         77         NW         6         102.4         13.7         79         SW         17           V         28         NW         1014.6         10.7         57         SW         17         NW         17	17		8.4	15.4	0.2			>	24	14:16	11.1	33		>	7	1030.5				8	1	1027
V         37         14:43         14.1         49         NNE         13         1019.7         20.6         34         NNW         19           V         35         10:57         14.9         55         NNW         9         1015.4         18.2         61         NNW         17           V         50         11:20         16.0         55         NNE         9         1015.4         18.2         61         NNW         13           V         46         13:35         10.5         76         SSW         15         1012.4         22.8         33         NWW         13           V         35         13:30         10.5         72         SSW         15         102.9         13.1         79         SSW         24           V         28         13:24         10.7         57         NW         13         102.46         13.1         79         SW         19           V         46         12:09         11.6         57         N         N         11         10         13         10         13         10         14         ESE         13         101.4.5         15.1         54         NNW	18		5.7	16.7	0			MN		13:49	10.4	79		z	2	1025.7				Ň	13	1021
V         35         10:57         14.9         55         NNW         9         1015.4         18.2         61         NW         17           V         50         11:20         16.0         55         NNE         13         1012.4         22.8         33         NNW         13           V         46         13:35         10.5         76         SSW         15         1016.0         13.2         61         SSW         24           V         35         13:30         10.5         76         SSW         15         1012.4         22.8         33         NNW         28           V         28         13:24         10.5         77         NSW         16         73         57         SSW         16           2         26         09:07         10.7         57         RSE         13         1024.6         13         79         SW         19           2         37         23:23         11.6         60         N         N         11         1018.4         16.7         39         NNW         17           2         46         12:04         10.15         114         1015.5         18	19		8.3	21.0	0			MNN		14:43	14.1	49		NNE	13	1019.7		34		MNN	19	1015
V         30         14:25         13.7         71         NNE         9         1018.4         17.7         6.3         WNW         13           V         50         11:20         16.0         55         NNE         13         1012.4         22.8         33         WNW         13           V         46         13:35         10.5         76         SSW         15         1012.4         22.8         33         WNW         24           V         28         13:32         10.5         72         SSW         15         1024.6         13.1         79         SW         17           E         37         23:23         11.6         56         N         N         13         1012.5         14.4         ESE         13           V         46         12:09         11.6         56         N         N         17         39         NNW         17           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         16           V         41         12:54         13.9         1014.6         21.5         35         NNW	20		14.1	18.3	0			MNN		10:57	14.9	55		MNN	6	1015.4		61		Ň	17	1013
V         50         11:20         16.0         55         NNE         13         1012.4         22.8         33         NW         28           V         46         13:35         10.5         76         SSW         15         1016.0         13.2         61         SSW         24           V         35         13:35         10.5         76         SSW         15         1016.0         13.2         61         SSW         24           V         28         13:24         10.6         77         NW         6         1027.9         13.1         79         SSW         13           Z         23:23         11.6         56         N         N         13         1012.5         14.8         53         W         17           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         17           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         16           V         41         12:54         13.1         1014.6         21.5         35	21		8.9	18.0	0			>		14:25	13.7	71		NNE	6	1018.4				MNW	13	1016
V         46         13:35         10.5         76         SSW         15         1016.0         13.2         61         SSW         19           V         35         13:30         10.5         72         S         S         7         1028.3         13.7         57         SW         19           V         28         13:24         10.6         77         NW         6         1027.9         13.1         79         SW         19           Z         23:23         11.6         56         NE         11         1018.4         16.7         39         NNW         17           V         44         12:09         11.6         60         N         11         1018.4         16.7         39         NNW         17           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         17           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         17           V         41         12:54         13.3         1014.6         21.5         35	3		9.5	23.8	0			MNN		11:20	16.0	55		NNE	13	1012.4				Ň	28	1005
V         35         13:30         10.5         72         S         7         1028:3         13.7         57         SW         19           Z         28         13:24         10.6         77         NW         6         1027.9         13.1         79         SW         13           Z         26         09:07         10.7         57         ESE         13         1024.6         13.0         44         ESE         13           V         46         12:09         11.6         60         N         13         1012.5         14.8         53         WNW         17           V         41         12:54         13.3         70         N         13         1014.6         15.1         54         WNW         16           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         16           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NN         16           V         41         12:54         13.3         1014.6         21.5         35	33		7.7	13.9	4.6			SSW		13:35	10.5	76		SSW	15	1016.0		61		SSW	24	1018
V         28         13:24         10.6         77         NW         6         1027.9         13:1         79         SW         13           E         26         09:07         10.7         57         ESE         13         1024.6         13.0         44         ESE         13           V         46         12:09         11.6         60         N         13         1012.5         14.8         53         WNW         19           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         17           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         16           V         31         00:43         15.6         55         N         13         1014.6         21.5         35         NW         15           V         53         00:43         15.6         55         N         13         101         10         12.7         33         #         11           V         52         14         100         31         102.0         16	24		4.7	14.1	1.8			SSW		13:30	10.5	72		S	7	1028.3		57		SW	19	1026
E         26         09:07         10.7         57         ESE         13         1024.6         13.0         44         ESE         13           V         46         12:09         11.6         56         NE         N1         1018.4         16.7         39         NNW         17           V         46         12:09         11.6         60         N         13         1012.5         14.8         53         NNW         19           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         16           V         41         12:54         13.3         70         N         13         1014.6         21.5         35         NNW         16           V         41         12:6         55         N         13         1014.6         21.5         35         NW         16           V         51         0:43         16.0         9         41         102.0         16.0         57         N         16           V         52         16         0:03.1         201         101.1         22.8         88         NW	25		4.6	14.2	0.2			MSM	28	13:24	10.6	17		MN	9	1027.9		62		SW	13	1024
E         37         23:23         11.6         56         NE         11         1018.4         16.7         39         NNW         17           V         46         12:09         11.6         60         N         13         1012.5         14.8         53         WNW         19           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         19           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         15           V         31         00:43         15.6         55         N         13         1014.6         21.5         35         NN         20           V         52         14.1         1014.6         21.5         35         N         16         6         16	26		5.9	14.2	0.8			SE		03:07	10.7	57		ESE	13	1024.6		44		ESE	13	1020
V         46         12:09         11.6         60         N         13         1012.5         14.8         53         WNW         19           V         31         14:34         11.7         83         NNE         9         1014.5         15.1         54         WNW         17           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         20           V         41         12:6         55         N         13         1014.6         21.5         35         NW         15           V         52         15.6         55         N         13         1014.6         21.5         35         m         16           V         52         14.8         53         5         NW         15         16           V         52         14.1         1009.3         12.7         33         #         11           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         20           V         52         16.0         59         SW         20	27		1.9	17.2	0			NNE		23:23	11.6	56		IJ	11	1018.4		39		MNN	17	1013
V         31         14:34         11.7         83         NNE         9         1014.5         15.1         54         WNW         17           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         20           V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         20           V         31         00:43         15.6         55         N         13         1014.6         21.5         35         NW         15           A         9.9         41         10         1022.0         16.0         57         #         16           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         20           V         52         16.0         20         1031.1         22.8         88         NW         20         20         20         20         20 </td <td>28</td> <td></td> <td>8.8</td> <td>16.4</td> <td>0</td> <td></td> <td></td> <td>MNN</td> <td>-</td> <td>12:09</td> <td>11.6</td> <td>09</td> <td></td> <td>z</td> <td>13</td> <td>1012.5</td> <td></td> <td>53</td> <td></td> <td>WNW</td> <td>19</td> <td>1009</td>	28		8.8	16.4	0			MNN	-	12:09	11.6	09		z	13	1012.5		53		WNW	19	1009
V         41         12:54         13.3         70         N         11         1015.5         18.9         48         NNW         20           V         31         00:43         15.6         55         N         13         1014.6         21.5         35         NW         15           V         52         12.4         71         10         1022.0         16.0         57         #         16           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           atlable from the Kent Town site (station number 023090) up until 31 July 2020.         1050.1000 Prepared at 16.02 UTC on 16 Oct 2021         160 ct 2021         160 ct 2021         160 ct 2021	29		7.3	15.9	5.4			MNN		14:34	11.7	88		NNE	6	1014.5		54		WNW	17	1013
Image: Normal state of the control of the c	8		9.3	19.3	0			MN	41	12:54	13.3	70		z	11	1015.5				MNN	20	1012
12.4         71         10         1022.0         16.0         57         16           9.9         41         Calm         1009.3         12.7         33         #         11           V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           IDCLIDW6081.302.108         Prepared at 16.02 UTC on 16 Oct 2021           IDCLIDW6081.302.108         Prepared at 16.02 UTC on 16 Oct 2021           IDCLIDW6081.302.108         Prepared at 16.02 UTC on 16 Oct 2021           IDCLIDW6081.202108         Prepared at 16.02 UTC on 16 Oct 2021           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108           IDCLIDW6081.202108	3		12.2	22.2	0			z		00:43	15.6	55		z	13	1014.6		35		MN	15	1014
12.4         71         10         102.2.0         16.0         57         16         16           V         52         16.0         99         3W         20         1031.1         22.8         88         MV         28           V         52         16.0         99         SW         20         1031.1         22.8         88         NV         28           atable from the Kent Town site (station number 023090) up until 31 July 2020.         IDC.DIW5061.002108         Prepared at 16.02 UTC on 16 Oct 2021         5021 Bureau of MHEconlogy         2021 Bureau of MHEconlogy	tatisti	cs for Au	gust 20	21																		
v         52         9.9         41         Calm         1009.3         12.7         33         #         11           v         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           iable from the Kent Town site (station number 023090) up until 31 July 2020.         ICC.IDW5061.022100         Prepared at 16:02 UTC on 16 Oct 2021         SC051 Bureau of Meteorology		Mean	8.7	16.8							12.4	71			10	1022.0		22			16	1019.
V         52         16.0         99         SW         20         1031.1         22.8         88         NW         28           Image: Second		Lowest	1.9	13.9							9.9	41			Calm	1009.3		33		#	11	1005.
valiable from the Kent Town site (station number 023090) up until 31 July 2020.		Highest	14.1	23.8	12.2			MNN			16.0	66		SW	20	1031.1		88		MN	28	1029.
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	bservatic ris is the	ns were dra "official" site	wn from Au for Adelaiv	delaide (We: Je, having n	st Terrace eopened ir	/ Ngayirda n May 2017	tpira) {stativ 7. Observal	on 023000} tions are ava	ilable from	the Kent To	wn site {stati	ion number	n (023090) u	p until 31 Ju	ly 2020.	20 3	CJDW5081. opyright © 20 sers of this 1	202108 F )21 Bureau wroduct are	Prepared at 16 of Meteorolo	6:02 UTC o gy have read	n 16 Oct 2/ the inform	)21 vation an

#### South Australia in August 2021: Below average rainfall, warm days and mild nights

Rainfall in August was below average across most of South Australia with areas in the north and northwest seeing very much below average rainfall. Daytime temperatures were above average across much of the state, though some central districts experienced daytime temperatures closer to average. Night-time temperatures were generally closer to average but areas in the state's lower south-east had warmer than average nights.

For more information plus a summary of August's statistics please see:

http://www.bom.gov.au/climate/current/month/sa/archive/202108.summary.shtml



#### Greater Adelaide in winter 2021: Warm days and nights, above average rainfall

Winter rainfall was above average at most reporting sites across Greater Adelaide. Despite a few cold spells during the season, both mean daytime and night-time temperatures were above average for Greater Adelaide.

For more information plus a summary of Winter's statistics please see:

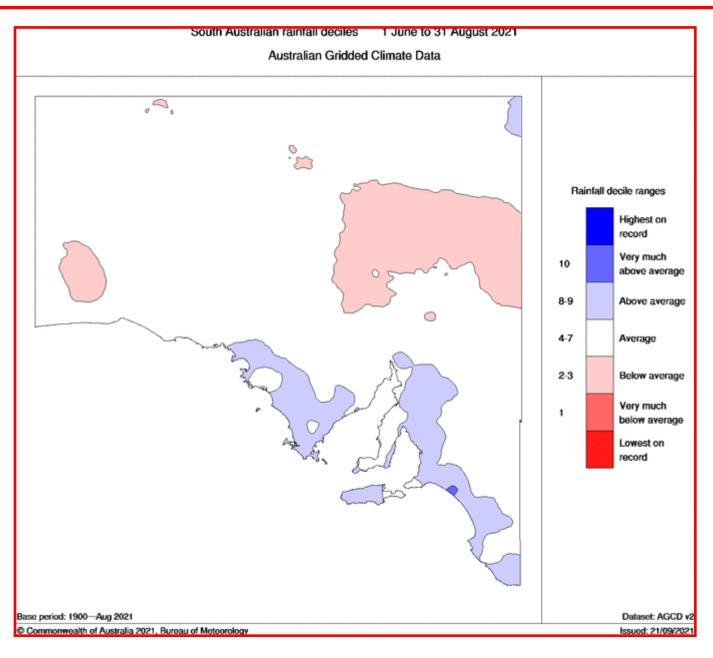
http://www.bom.gov.au/climate/current/season/sa/archive/202108.adelaide.shtml

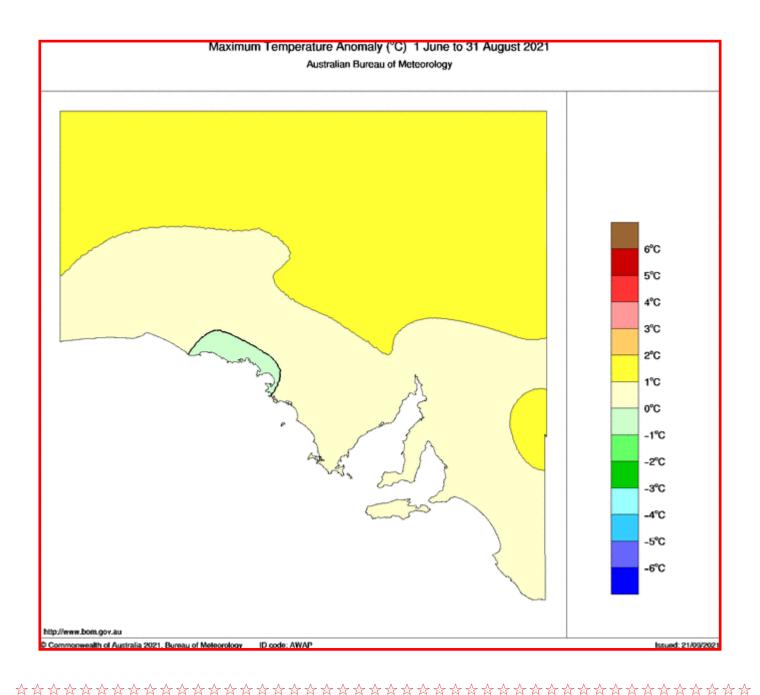
#### South Australia in winter 2021: Warm days and nights, mostly close to average rainfall

Winter rainfall was close to average across most of South Australia. Daytime temperatures were above average in most of the state, and very much above average in parts of the far north. Night-time temperatures were above average across most of South Australia, with coastal areas and parts of the southeast districts experiencing very much above average night-time temperatures. In terms of the mean temperature, it was the eighth warmest winter on record, and the warmest since 2013.

For more information plus a summary of Winter's statistics please see:

http://www.bom.gov.au/climate/current/season/sa/archive/202108.summary.shtml







## *<b>@ ATTENTION ALL SCRIBES* AND PHOTOGRAPHERS &

Members are encouraged to submit weather related articles and photos to monana@ameta.org.au for publication in Monana.

#### Greater Adelaide in September 2021: very low rainfall for some sites

September was much drier than average for parts of Adelaide and the driest since at least 1987 for some sites. Days were warmer than average across Adelaide and nights were slightly warmer than average at some sites.

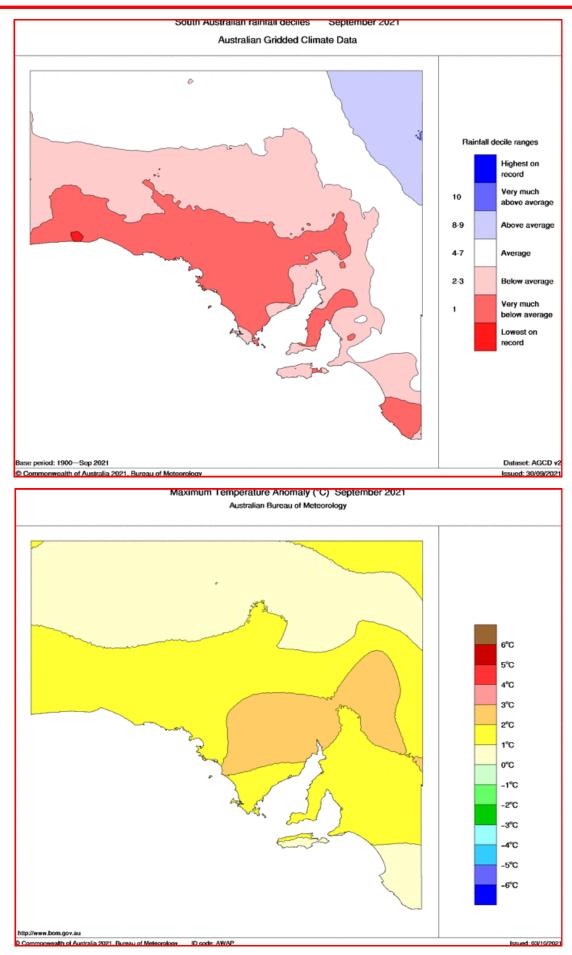
For more information plus a summary of Septembers statistics please see: <u>http://www.bom.gov.au/climate/current/month/sa/archive/202109.adelaide.shtml</u>

Min         Mix         Rand         Eval         Dim         Spin         Time         Fam	official	site for Ad	The official site for Adelaide, having reopened in May 2017	ng reopene	d in May 20	017.	ł	Max	ax wind gust	st			9am	ε				1. A.		<ul> <li>Bureau of Meteorology</li> <li>3pm</li> </ul>	r Meteor	ology
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ate	Day	Min	Мах	Kaln	Evap	uns	Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	망	Dim	Spd	MSLP
35.5         0         NNE         37         21.20         71.3         15.3         0         NNE         37         21.20         71.3         15.3         15.0         26.0         26.0         28.0         NN           16.6         2.2         WSW         41         16.41         3.1         3.1         3.1         1016.2         16.5         17.9         66         17.9         W         4         103.22         15.5         56.0         17.9         W         W         4         103.22         15.5         56.0         17.9         W         W         4         103.2         15.5         56.0         17.9         W         W         4         103.2         15.5         56.0         17.9         W         W         4         103.2         15.5         56.0         17.9         W         W         27.5         15.1         71         91.0         17.9         17.9         56.0         17.9         W         W         17.9         17.9         17.9         17.9         17.9         17.9         56.0         17.9         W         W         17.9         17.9         17.9         17.9         17.9         17.9         17.9         17.9			°	°	mm	mm	hours		km/h	local	ç	%	eighths		km/h	hPa	°	%	eighths		km/h	hPa
312         0         NN         61         12.47         319         NNE         260         1012         300         17         NNM           15:1         35         SSW         41         410         131         83         W         13         10122         300         17         NNM           15:1         35         SSW         41         44:0         13.1         83         W         4         0022         419         SW           16:6         22         SSW         41         14:0         13.1         83         NN         4         1022         419         SW           22.7         0         0         25         15.0         64         NN         7         1032         15.9         65         NN           27.9         0         17         10.1         13.1         16         65         NN         110.2         13.1         65         NN           27.9         10.2         10.2         10.2         10.2         10.2         12.1         10.2         12.1         65         NN           27.9         NN         11.1         10.2         13.1         10.2         10.2	<u>,                                     </u>	We		26.5	0			NNE	37	21:20	17.9	60		NE	11	1020.9	26.0			Ν	17	1016.2
	2	f		31.2	0			z	61	12:47	24.9	19		NNE	26	1010.2				MNN	28	1005.6
146         42         SSW         41         14:10         112         81         NW         4         10224         129         67         SS           16.6         2.2         NSW         21         1237         2.10         112         81         NW         4         1022.4         129         67         SS           16.5         2.2         WSW         24         10.48         13.1         74         NSW         7         1026.2         15.2         63         WSW           25.1         0.2         NW         30         12.32         15.0         64         WSW           27.9         0         0         13.2         15.0         64         NW         1036.2         15.9         67         SW           27.9         0         10.2         11.3         16.0         65         NW         11026.4         13         107.1         110         NW         NW         101         111         NW         NW         101         110.2         13         NW         1026.1         13         NW         NW <td>3</td> <td>Ē</td> <td></td> <td>16.8</td> <td>0.6</td> <td></td> <td></td> <td>WSW</td> <td>41</td> <td>16:41</td> <td>13.1</td> <td>83</td> <td></td> <td>3</td> <td>13</td> <td>1016.2</td> <td></td> <td></td> <td></td> <td>8</td> <td>19</td> <td>1015.5</td>	3	Ē		16.8	0.6			WSW	41	16:41	13.1	83		3	13	1016.2				8	19	1015.5
151         36         SW         37         1259         105         88         SW         6         10258         14.9         66         SW           16.6         22         WSW         24         12.37         12         7         91         N         4         1035.2         15.9         64         WSW           25.1         02         NNW         30         12.52         16.0         65         NNW         11         101.1         11         102.1         35.6         17         NNW           27.9         02         13.32         18.3         31         13.1         70         WSW         24         101.1         11         102.1         181         66         NNW           15.9         0.2         WSW         24         12.1         49         66         WN         11         102.1         181         66         WN           15.9         0.2         14.27         15.1         44         NSW         24         101.1         71         75         SW         50         WSW           177         10         0         0         102.6.4         NSW         70         NSW         24 <td>4</td> <td>Sa</td> <td></td> <td>14.6</td> <td>4.2</td> <td></td> <td></td> <td>SSW</td> <td>41</td> <td>14:10</td> <td>11.2</td> <td>81</td> <td></td> <td>MN</td> <td>4</td> <td>1022.4</td> <td></td> <td></td> <td></td> <td>S</td> <td>19</td> <td>1023.2</td>	4	Sa		14.6	4.2			SSW	41	14:10	11.2	81		MN	4	1022.4				S	19	1023.2
	2	Su		15.1	3.6			SW	37	12:59	10.6	88		SW	9	1029.8				SW	15	1029.5
16.3       0       W       24       10.48       13.1       7.4       NW       7       1036.2       15.2       66       17       WNW         25.7       0       NWW       50       12.52       15.0       64       NW       15       1025.2       15.0       64       NW         27.9       0       NWW       50       12.52       15.0       64       NW       15       102.2       17       105.0       17       105.0       17       105.0       17       105.0       17       105.0       17       105.0       15.1       85       NW       17       100.0       17       100.0       17       100.0       17       100.0       17       100.0       17       100.0       10.0       17       100.0       15.0       15       15       15       15       17       101.1       11.1       17       100.0       15       17       100.0       15       100.0       15       100.0       100.0       15       100.0       100.0       100.0       100.0       100.0       100.0       120.0       15       100.0       100.0       100.0       100.0       100.0       100.0       100.0       100.0	9	Mo		16.6	2.2			WSW	24	12:37	12.7	91		z	4	1035.2				MSM	13	1033.8
22.7         0         NNW         30         12.52         15.0         64         NNE         13         102.2         1         36         NW           27.9         0         NWW         50         13.32         18.3         31         NNE         13         70         27.5         17         NNW           27.9         0         WSW         45         13.32         18.3         21.9         NNE         11         102.5         2.5.6         13         NNW           13.9         11.2         SW         39         14.03         11.3         70         WSW         24         101.1         110         75         SW         3         13.3         NNW         11         102.5         11         NNW         15         NNW         NNW         11         101.2         14.1         65         WSW         35         SW         35         SW         35         NNW         NNW         11         102.5         13.0         NNW         NNW         NNW         NNW         11         102.5         14.0         NNW         NNW         NNW         11         102.5         14.0         NNW         12         101.1         11.0	7	Tu	-	16.3	0			8	24	10:48	13.1	74		SW	7	1036.2				WSW	13	1033.4
261         0.2         NW         50         13.32         18.3         31         N         15         102.5         25.6         17         NW           130         1         0         WSW         48         14.35         12.6         55         NW         111	8	We		22.7	0			MNN	30	12:52	15.0	64		NNE	13	1032.0		36		MN	17	1027.7
27.9       0       NW       48       44.35       19.8       28       NK       13       102.12       27.6       13       NNW         13.9       12       XW       59       11.33       12.6       76       NSW       24       11.1       101.7       11.0       66       NNW         15.9       0.2       SW       35       11.35       12.6       76       NSW       24       10.17       11.0       75       SNM         15.9       0.2       NSW       24       14.21       13.1       61       A       A       SNV       24       NNW       17       1005.6       19.0       NNW         17.1       0       NSW       24       14.1       13.7       64       NN       17       1008.0       18.6       SN       SN       SN       SN       SN       24       10.12       12.1       NN       NN       SN	6	f		26.1	0.2			MN	50	13:32	18.3	31		z	15	1025.4				MN	26	1021.2
19.0     0     WSW     43     22.47     16.0     65     NNW     11     1012.1     18.1     66     WNW       13.9     12     SW     59     14.03     11.3     70     WSW     24     1011.7     11.0     75     SW       15.9     0.2     E     26     21:57     15.1     49     ENE     9     1026.5     19.0     45     WSW       13.2     0     E     E     26     21:57     15.1     49     ENE     9     1026.5     19.0     45     WSW       23.8     0     0     17.1     0     N     44     10.18     14.0     54     WSW       23.1     0     146     34     0.12     21.3     54     NN     17     10.05     13.9     56       20.0     0     N     44     10.18     14.0     67     NN     17     10.05     14.4     SW       15.5     1.6     0     11.8     64     NN     17     10.05     14.4     SW       15.7     1.6     0     12.6     13.0     17     10.3     13.4     14     NN       15.7     1.6     0     11.0 <t< td=""><td>10</td><td>Ē</td><td></td><td>27.9</td><td>0</td><td></td><td></td><td>M</td><td>48</td><td>14:35</td><td>19.8</td><td>28</td><td></td><td>IJN</td><td>13</td><td>1021.2</td><td></td><td></td><td></td><td>MNN</td><td>22</td><td>1015.6</td></t<>	10	Ē		27.9	0			M	48	14:35	19.8	28		IJN	13	1021.2				MNN	22	1015.6
139         112         SW         59         14:03         11.3         70         WSW         24         1011/2         11.0         75         SW         50         14:35         12.6         75         SW         51         13.3         16.1         61         4.4         75         SW         35         11.35         12.6         76         SW         24         10.11/2         11.0         75         SW         36         11.35         12.6         76         SW         24         10.11/2         11.0         75         SW         35         SW         35         11.1         1025.5         13.0         64         WSW         71         1008.0         16.5         WSW         24         10.12         11.1         11.0         75         SW         25.1         11.1         10.03.1         11.3         10.03.1         11.1         10.03.1         11.1         10.03.1         11.1         10.03.1         11.1         10.03.1         11.1         10.03.1         11.3         10.2         11.3         10.2         11.1         10.1         11.1         10.1         11.1         10.1         10.1         10.1         10.1         10.1         10.1         10.1	1	Sa		19.0	0			WSW	43	22:47	16.0	65		MNN	11	1012.1				WNW	17	1010.2
16.6         4.4         SW         35         11.35         12.6         76         S         11         1025.4         15.1         56         WSW           15.9         0.2         WSW         24         14.21         13.1         61         S         9         1026.6         14.0         56         WSW           23.8         0         ENE         36         0122         21.37         13.0         15.1         49         NE         16         54         WSW           23.4         0         NW         44         10.18         14.0         67         NNW         17         1008.0         18.6         54         WSW           20.0         0         NW         44         10.18         14.0         67         NNW         19         1021.2         11.44         74         WSW           15.7         0.8         51.6         0.51         11.8         84         NSW         1031.5         14.4         74         WSW           15.7         0.8         11.12         13.4         74         WSW         1031.5         14.4         74         WSW           16.5         0         20.2         11.18	12	Su		13.9	1.2			SW	59	14:03	11.3	70		WSW	24	1011.7				SW	17	1013.4
15.9 $0.2$ WSW $24$ $14.2.1$ $13.1$ $61$ Caim $1028.6$ $14.0$ $56$ WSW         19.2       0       E $26$ $21:57$ $15.1$ $49$ NE $9$ $1026.5$ $19.0$ $45$ WSW         22.4       0       NW $44$ $10:18$ $13.47$ $14.0$ $56$ $23.5$ $27$ NNE         20.0       0       NW $44$ $10:18$ $14.0$ $56$ $28$ $27.5$ $18.6$ $54$ WSW         20.0       0       NW $44$ $10:18$ $14.0$ $57$ $13.0$ $58$ $88$ $1026.5$ $19.1$ $46$ WNW $15.5$ $16$ $88$ $84$ $84$ $88$ $17$ $1024.3$ $264$ $88$ </td <td>13</td> <td>Mo</td> <td></td> <td>16.6</td> <td>4.4</td> <td></td> <td></td> <td>SW</td> <td>35</td> <td>11:35</td> <td>12.6</td> <td>76</td> <td></td> <td>s</td> <td>11</td> <td>1025.4</td> <td></td> <td>56</td> <td></td> <td>s</td> <td>13</td> <td>1024.1</td>	13	Mo		16.6	4.4			SW	35	11:35	12.6	76		s	11	1025.4		56		s	13	1024.1
	14	1		15.9	0.2			WSW	24	14:21	13.1	61			Calm	1028.6				WSW	13	1025.6
23.8       0       ENE       33       21:00       17.5       40       NE       15       1019.8       23.5       27       NNE         17.1       0       N       43       09:19       13.7       64       N       17       1008.0       18.6       54       WSW         17.1       0       N       44       10:18       13.7       64       N       V       24       102.12       13.1       58       54       WSW       54       WSW         15.7       0.8       N       56       13.4       76       N       24       102.12       13.9       58       54       WSW       56       55       SW       56       SW       56       SW       56       SW       54       WSW       54       WSW       54       WSW       54       WSW       56       SW       56       SW       56       SW       55       WSW       54       SW       54       WSW       54       SW       55       SW       55       SW       54       SW       56	15	We		19.2	0			ш	26	21:57	15.1	49		ENE	6	1026.5				WSW	13	1021.8
22.4     0     NE     50     01:22     21.3     29     NW     17     1008.0     18.6     54     WSW       17.1     0     NW     43     09:19     13.7     64     W     24     10:22     19.1     46     WNW       20.0     0     NW     44     10:18     14.0     67     NNW     19     10212     19.1     46     WNW       14.6     3.4     SW     56     13.47     11.5     62     S     7     103.51     14.4     7     80       15.5     0.8     WNW     28     11:12     13.4     76     N     9     1024.3     20.6     39     WN       17.6     0.2     ENE     33     07:16     13.4     76     N     9     102.43     20.6     39     WN       17.6     0.2     ENE     33     07:16     13.4     74     WSW     17     1016.7     15.4     53     WSW       17.6     0.2     ENE     33     07:16     13.9     49     ENE     102.3     15.4     53     WSW       17.6     0.2     ENE     33     07:16     13.4     13.4     74     WSW <td>16</td> <td>Ę</td> <td></td> <td>23.8</td> <td>0</td> <td></td> <td></td> <td>ENE</td> <td>39</td> <td>21:00</td> <td>17.5</td> <td>40</td> <td></td> <td>IJ</td> <td>15</td> <td>1019.8</td> <td></td> <td></td> <td></td> <td>NNE</td> <td>17</td> <td>1014.0</td>	16	Ę		23.8	0			ENE	39	21:00	17.5	40		IJ	15	1019.8				NNE	17	1014.0
17.1       0       W       43       09:19       13.7       64       W       24       102.02       16.0       60       SW         20.0       0       NW       44       10:18       14.0       67       NNW       19       102.12       19.1       46       WNW         15.5       1.6       SW       35       13.47       11.5       62       S       17       1033.1       13.9       59       SW       WW       19       102.12       19.1       46       WNW         15.7       0.8       SW       35       13.47       11.5       62       S       13.9       59       WW       WW       24       102.12       19.1       46       WNW       28       11.1       10.15       13.4       74       WSW       11.3       10.21.2       19.1       46       WNW       27       20.9       0       59       9       59       WSW       W       11.1       10.15       13.9       59       59       WSW       11.1       10.16       74       74       W       W       11.1       10.16       13.9       59       59       59       59       50       54       54       54	17	Ē		22.4	0			IJ	20	01:22	21.3	29		Ň	17	1008.0				WSW	6	1008.9
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	18	Sa		17.1	0			≥	43	09:19	13.7	64		3	24	1020.2				SW	1	1020.6
14.6       3.4       SW       56       10.57       13.0       58       SW       24       1022.7       12.0       58       SW         15.5       1.6       SW       35       13.47       11.5       62       S       17       1033.1       13.9       59       WSW       WSW         15.7       0.8       SW       35       13.47       11.5       62       S       17       1033.1       13.9       59       WSW       WSW         16.5       0       WNW       28       11.12       13.4       76       N       9       1024.3       20.6       39       WSW       WSW         17.6       0.2       ENE       33       07.16       13.9       49       ENE       13       1024.3       20.6       39       WSW       WSW         17.6       0.2       ENE       33       07.16       13.9       49       ENE       13       1024.3       20.6       39       WSW       WSW         17.6       0.2       ENE       33       07.16       13.9       49       ENE       101.0       13       101.6       74       WSW       WSW       101       101.0       13 </td <td>19</td> <td>Su</td> <td></td> <td>20.0</td> <td>0</td> <td></td> <td></td> <td>M</td> <td>44</td> <td>10:18</td> <td>14.0</td> <td>67</td> <td></td> <td>MNN</td> <td>19</td> <td>1021.2</td> <td></td> <td></td> <td></td> <td>WNW</td> <td>24</td> <td>1018.3</td>	19	Su		20.0	0			M	44	10:18	14.0	67		MNN	19	1021.2				WNW	24	1018.3
15.5       1.6       SW       35       13.47       11.5       6.2       S       17       1033.1       13.9       59       WSW         15.7       0.8       SW       24       00:51       11.8       84       WSW       13       1031.5       14.4       74       WSW         20.9       0       WNW       28       11:12       13.4       76       N       9       1024.3       20.6       39       WSW         16.5       0       SW       43       13:15       15.3       74       WSW       17       1016.7       15.4       53       WSW         17.6       0.2       W       28       11:52       13.9       49       ENE       13       1023.9       15.2       54       SW         17.6       0.2       W       VSW       27       WSW       17       1016.7       15.4       53       WSW         24.6       0       NE       13.40       22.7       233       05.13       19.1       30       NE       13       1016.8       24.2       21       NNE         24.0       0       N       4       13.40       22.7       233       NE	20	Q	<u> </u>	14.6	3.4			SW	56	10:57	13.0	28		SW	24	1022.7				SW	26	1023.5
157       0.8       SW       24       00:51       11.8       84       WSW       13       1031.5       14.4       74       74       W         20.9       0       WNW       28       11:12       13.4       76       N       9       1024.3       20.6       39       W         16.5       0       SW       43       13:15       15.3       74       WSW       17       1016.7       15.4       53       WSW         17.6       0.2       W       28       11:52       13.9       49       ENE       13       1023.9       15.2       54       SW         196       0.2       ENE       33       07:16       13.9       49       ENE       13       1016.8       24.2       21       NNE         24.6       0       NNE       44       13.40       22.7       23       N       4       101.3       16.4       82       SW         22.0       0       NNE       44       13.40       22.7       233       N       4       101.13       16.4       82       SW         22.0       32       SW       33       16.05       13.8       93       NN<	21	P		15.5	1.6			SW	35	13:47	11.5	62		S	17	1033.1				WSW	20	1032.6
20.9     0     WNW     28     11:12     13.4     76     N     9     1024.3     20.6     39     W       16.5     0     SW     43     13:15     15.3     74     WSW     17     1016.7     15.4     53     WSW       17.6     0.2     W     28     11:52     13.9     49     ENE     13     1025.4     53     WSW       19.6     0.2     ENE     33     07:16     13.9     49     ENE     13     1076.8     24.2     21     NNE       24.6     0     NNE     44     13.40     22.7     23     NE     13     1016.8     24.2     21     NNE       24.0     0     NNE     44     13.40     22.7     233     NE     13     1016.8     24.2     21     NNE       22.0     0     WSW     24     10.13     16.1     30     N     4     1011.3     16.4     82     SW       22.0     32     SW     33     16.05     13.8     93     WSW     9     1011.3     15.1     83       23.1     15.5     3.2     SW     9     1011.3     15.1     83     SW       1	22	Me		15.7	0.8			SW	24	00:51	11.8	84		MSM	13	1031.5				>	<del>,</del>	1028.1
16.5     0     SW     43     13:15     15.3     74     WSW     17     1016.7     15.4     53     WSW       17.6     0.2     W     28     11:52     13.6     69     SSE     13     1023.9     15.2     54     SW       19.6     0.2     ENE     33     07:16     13.9     49     ENE     19     1025.4     18.9     35     NNE       24.6     0     NE     43     19.1     30     NE     13     1016.8     24.2     21     NNE       24.0     0     NE     44     13.40     22.7     23     N     4     1011.3     16.4     82     SW       22.0     0     WSW     24     10.8     24.2     21     NNE       24.0     0     WSW     24     11:09     20.0     56     N     4     1011.3     16.4     82       22.1     SW     33     16:05     13.8     93     WSW     9     1010.3     15.1     83       2021     13.9     13.6     56     N     4     1011.3     15.1     83       196     13.9     10.6     19     10.10.3     15.1     83	33	F		20.9	0			MNM	28	11:12	13.4	76		z	6	1024.3				>	15	1018.6
17.6     0.2     W     28     11:52     13.6     69     SSE     13     1023.9     15.2     54     SW       19.6     0.2     ENE     33     07.16     13.9     49     ENE     19     1025.4     18.9     35     NNE       24.6     0     NE     13.9     49     ENE     13     1016.8     24.2     21     NNE       24.0     0     NNE     44     13.40     22.7     23     NE     13     106.8     24.2     21     NNE       22.0     0     WSW     24     11.09     20.0     56     N     4     1011.3     16.4     82     SW       15.5     3.2     SW     33     16.05     13.8     93     WSW     9     1010.3     15.1     83     SW       196     13     15.3     60     13     13     10.6     19     13     49	24	ι, Γ		16.5	0			SW	43	13:15	15.3	74		MSM	17	1016.7				MSM	2	1017.0
196         0.2         ENE         33         07:16         13.9         49         ENE         19         1025.4         18.9         35         NNE           24.6         0         NE         33         09:13         19.1         30         NE         13         1076.8         24.2         21         NNE           24.0         0         NNE         44         13:40         22.7         23         NE         13         1076.8         24.2         21         NNE           22.0         0         WSW         24         11:09         20.0         56         N         4         1011.3         16.4         82         SW           15.5         3.2         SW         33         16:05         13.8         93         WSW         9         1010.3         15.1         83         SW           196         13.4         15.3         60         13         1021.6         18.3         49         SW	25	Sa		17.6	0.2			≥	28	11:52	13.6	69		SSE	13	1023.9				SW	19	1023.0
24.6         0         NE         33         09:13         19.1         30         NE         13         1016.8         24.2         21         NNE           24.0         0         NNE         44         13:40         22.7         23         NE         13         1016.8         24.2         21         NNE           22.0         0         WSW         24         11:09         20.0         56         N         4         1011.3         16.4         82         SW           15.5         3.2         SW         33         16:05         13.8         93         WSW         9         1010.3         15.1         83         SW           15.6         3.4         15.3         93         WSW         9         1010.3         15.1         83         SW           19.6         13.9         0.0         15.3         60         13         13.4         SW         10.10.3         13.1         13.4         SW	26	Su		19.6	0.2			ENE	33	07:16	13.9	49		ENE	19	1025.4				NNE	6	1020.8
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22.0         0         WSW         24         11:09         20.0         56         N         4         1011.3         16.4         82         SW           15.5         3.2         SW         33         16:05         13.8         93         WSW         9         1010.3         15.1         83         SW           2021         SW         33         16:05         13.8         93         WSW         9         1010.3         15.1         83         SW           19:6         1         15.3         60         13         13         121.6         18.3         49         SW           13.9         .         .         .         10.6         19         .         Calm         1008.0         11.0         13         SW	28	2		24.0	0			UN N	44	13:40	22.7	23		Ш	13	1008.9				ENE	15	1006.4
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2021         2021         15.3         60         13         1021.6         18.3         49         1           13.9         10.6         19         10.6         19         11.0         13         8W	30	Ч	10.9		3.2			SW	33	16:05	13.8	93		WSW	6	1010.3				SW	15	1008.5
9.9         19.6         15.3         60         13         1021.6         18.3         49           3.7         13.9         10.6         19         Calm         1008.0         11.0         13         SW	itistic	s for Se	ptember																			
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		Lowest	e,								10.6	19			Calm	1008.0				SW	7	1005.6
18.5 31.2 4.4 N 51 24.9 33 NNE 25 1036.2 30.0 83 NNW		Highest	18.5	31.2	4.4			Z	61		24.9	93		NNE	26	1036.2	30.0	83		NNW	28	1033.8
Total 26.0 26.0 26.0 1 1 1 1 1 1 1 1 1		Total			26.0																	

#### South Australia in September 2021: very low rainfall across the south

September was much drier than average across southern South Australia. Days were warmer than average across the southern half of the state, while nights were warmer than average in the west.

For more information plus a summary of July's statistics please see: <a href="http://www.bom.gov.au/climate/current/month/sa/archive/202109.summary.shtml">http://www.bom.gov.au/climate/current/month/sa/archive/202109.summary.shtml</a>





## Next Event:

- What: The End of Year Function
- When: Evening of Tuesday 23rd of November.
- Where: Downstairs at the Benjamin-on-Franklin Hotel (see From <u>The President's Pen</u>).

Further details to follow.

This is the final Monana for 2021 and all that is left is to wish all readers a Merry Christmas and a Happy (and covid-19 free) New Year.



We will return in 2022 (exact month to be determined).





Secretary



If in between now and next year, there is any comment / contribution / suggestion that you would like to make concerning Monana, please don't hesitate to forward it to the email address below.

For further information about AMETA & meeting details please contact:

<u>secretary@ameta.org.au</u>

For newsletter contributions, comments or suggestions please contact <u>monana@ameta.org.au</u>