WORKSHOP-Carbon, Climate, Methane & your Farm
Making sense of it

Monday 22nd of August 2022

12.30pm - 4.00pm Keith Institute

Light lunch & refreshments provided

See program below & on back Drop in to sessions that interest you

REGISTRATIONS essential;

Email: tstrugnell@coorong.sa.gov.au

Text: 0427 750 050

Register by Thursday 18th August

TOPICS AND SPEAKERS

Overview of current carbon climate - Global trends, Climate Emissions Reduction Facility (*CERF*)

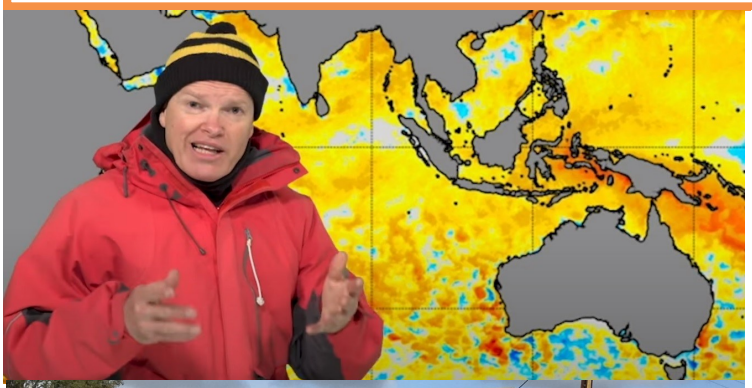
Methane emissions in livestock
Can we manage it?
Emma Winslow, SARDI

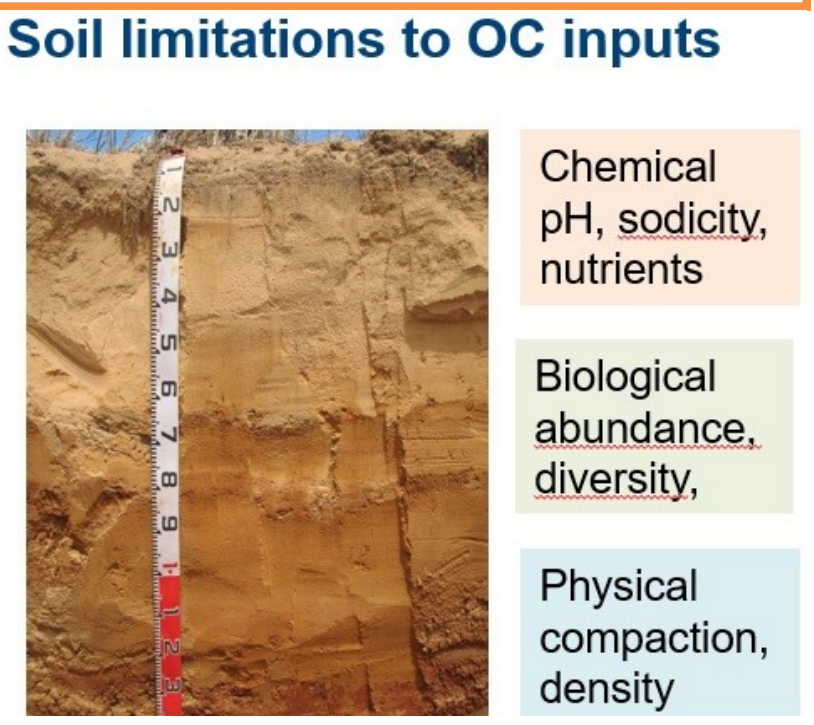
Seasonal outlook &
current climate trends
Dale Grey, Agriculture Victoria

Understanding On Farm Carbon Footprints
Felicity Turner, Turner Agribusiness

The capacity of our soils to store Carbon
Update on recent SA based work
Amanda Schapel, SARDI

PANEL DISCUSSION





Australian Government
Department of Agriculture, Water and the Environment
Future Drought Fund
FRRR Foundation for Rural Regional Renewal
Coorong Tatiara Local Action Plan

This project is supported by FRRR, through funding from the Australian Government's Future Drought Fund

Tatiara the good country
Australian Government
National Landcare Program
Landcare Farming
National Landcare Network

WORKSHOP KEITH Carbon, Climate & Methane - *making sense of it*

Keith Institute – Ruth Wheal Room

Monday 22nd August 2022

12.30pm - 4.00pm Afternoon tea & refreshments provided

	Item	Speaker	Organisation	Location	Time	BOOKLET PAGES
1	**Welcome & Introduction**	Tracey Strugnell	Coorong Tatiara Local Action Plan	**Keith Institute – Ruth Wheal Room Heritage Street KEITH**	**12.30 pm** *10 minutes*	3. Pre Event Evaluation
2	**Overview of current carbon climate** Global trends, Climate Emissions Reduction Facility (CERF)	Emma Winslow	SARDI		**12.40 pm** *20 minutes*	5. Growing Carbon Pilot
3	**Seasonal outlook & current climate trends** – *via zoom*	Dale Grey	Agriculture Victoria		**1.00 pm** *30 minutes*	6. Seasonal Climate Risk Information for SA
4	**Understanding On Farm Carbon Footprints**	Felicity Turner	Turner Agribusiness		**1.30 pm** *30 minutes*	
	QUICK BREAK				**2.00 pm– 2.15 pm** *15 minutes*	
5	**The capacity of our soils to store Carbon** Update on recent SA based work	Amanda Schapel	SARDI		**2.15 pm** *40 minutes*	19. Soil Carbon in South Australian Soils
6	**Methane emissions in livestock can we manage it?**	Emma Winslow	SARDI		**2.55pm** *40 minutes*	
7	**PANEL DISCUSSION**	**ALL SPEAKERS**			**3.35pm**	23. Post Event Evaluation
	FINISH				**4.00pm**	

PRE EVENT EVALUATION

KEITH WORKSHOP - Monday 22nd August 2022

WORKSHOP- Carbon, Climate & Methane - making sense of it

Please complete this QUICK evaluation either by;

Scanning in the logo top right with your smartphone and completing on line, OR

Please complete this paper version, tear out of your booklet and give to Workshop Facilitator Tracey Strugnell

CARBON **1= Low** **5=Average** **10=High**

1. How would you rate your current knowledge around carbon emissions and sequestration?

1	2	3	4	5	6	7	8	9	10

2. How well do you understand the factors that contribute to your farms carbon footprint?

1	2	3	4	5	6	7	8	9	10

3. How would you rate your current knowledge around soil carbon?

1	2	3	4	5	6	7	8	9	10

CLIMATE **1= Low** **5=Average** **10=High**

4. How well do you understand interpreting climate forecasting tools and data to apply to your farm business?

1	2	3	4	5	6	7	8	9	10

METHANE **1= Low** **5=Average** **10=High**

5. How well do you understand on farm methane emissions and how they are calculated?

1	2	3	4	5	6	7	8	9	10

https://www.surveymonkey.com/r/P_KEITH

NOTES

Emma Winslow - SARDI

Growing Carbon Farming Pilot

The Growing Carbon Farming Pilot is a $1 million initiative to encourage carbon farming adoption and build the carbon market in South Australia.

Grants of up to $100,000 for at least 6 projects will help cover establishment costs, including technical advice and carbon measurement. The program will run for 12 months and funding can also be used to cover participation in PIRSA-led demonstration activities that will build carbon farming knowledge and capacity.

Eligible projects

Interested applicants who are planning, or have an established carbon farming project can apply for funding. The projects must:

- demonstrate a carbon farming method or practice that has application for the South Australian primary industry sector
- demonstrate how carbon farming activities contribute to revenue and jobs in South Australia
- demonstrate and measure the relevant environmental, social and economic co-benefits of carbon farming
- work with PIRSA to improve knowledge and capability, particularly for small to medium farm enterprises, and for larger businesses and other organisations yet to engage with carbon markets.

For more information please contact:

Emma Winslow – Project Coordinator

Emma.winslow@sa.gov.au

Phone: 0427 000 264 between 9am and 5pm, Monday to Thursday

Dale Grey - Agriculture Victoria
.
Very Fast Break update for August
.
https://www.youtube.com/watch?v=gwtffm6cjUI

South Australia

Date: 29 Jul 2022

Seasonal Climate Risk Information For South Australia

If you like this publication, please consider passing it on through your networks and subscribing.

A drier month again, with most areas looking like receiving less than 50 per cent of normal rainfall which is less than 25mm in many places. Soil moisture has remained stable across most of the eastern half of the state but many Eyre Peninsula probes have decreased, with rainfall not matching water use. Modelled soil moisture is ranked average or drier, with areas of the eastern EP, Upper North and Southeast ranked decile two to three.

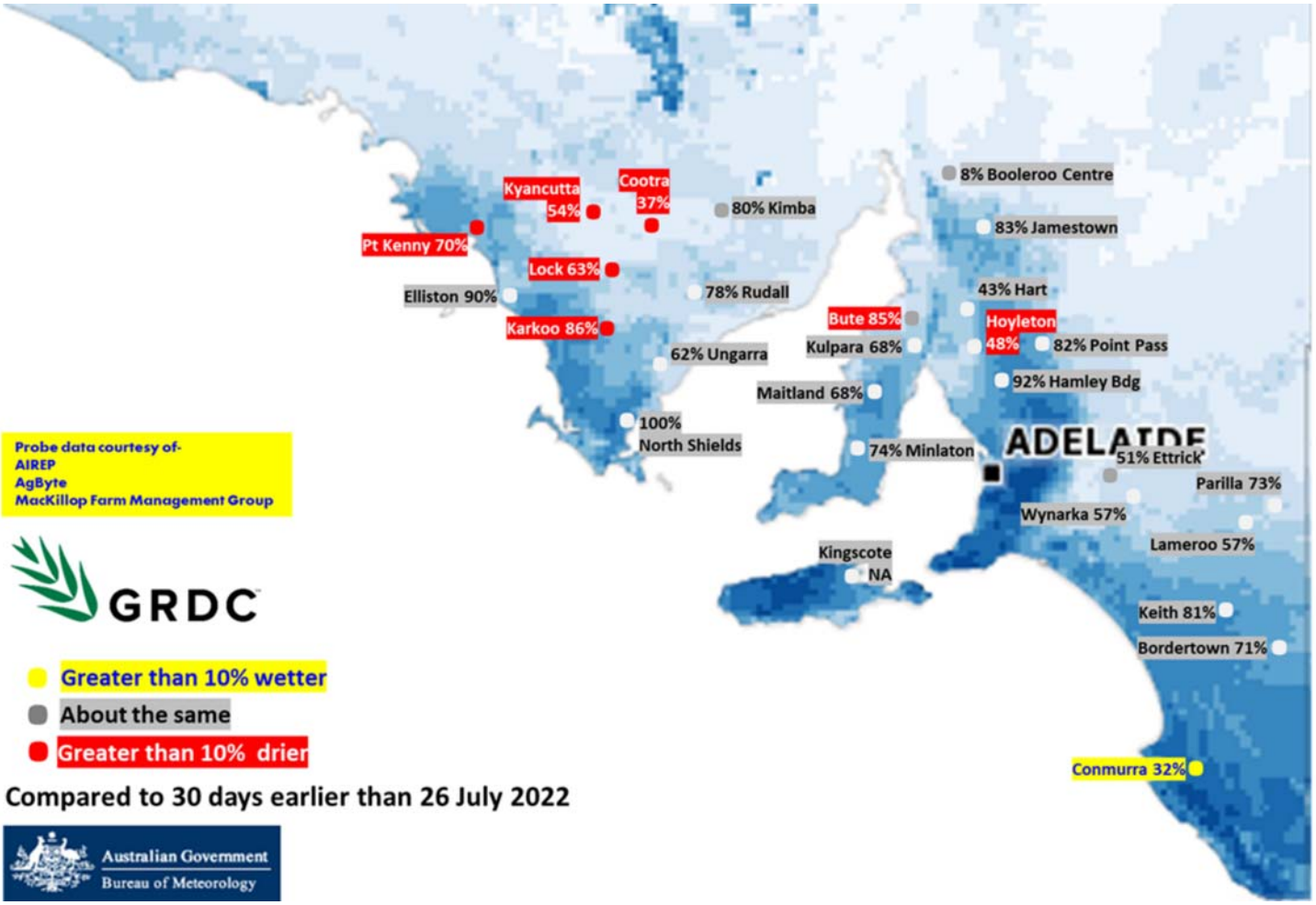
The Pacific Ocean is up to funny business. The surface and undersea have lapsed from being within La Niña like thresholds however, the atmospheric indicators of cloud, pressure and wind have been still humming along with a La Niña like pattern. While there have been some signs of normality in cloud and pressure patterns in recent weeks, the trade winds have also cranked right back up again. More of this behaviour could see some of the indicators swing back to La Niña like values. Almost half the models surveyed are predicting a third coming of La Niña in mid to late spring.

The Indian Ocean has gone further towards cementing itself as a negative Indian Ocean Dipole (-IOD). Surface and deeper oceanic patterns are looking much like a classic event, although a stronger ‘eye’ of warming off Sumatra would be more convincing. All eyes are looking to the sky for the ocean to start coupling with the atmosphere. At this stage pressure and wind patterns are mildly convincing, but cloud patterns are yet to be anything like a classic event. Until we get coupling, it will be hard to believe we will see the rainfall response of greater north-west cloud band activity. All models surveyed predict a -IOD to continue for the rest of the season.

While there is nothing broken with the ocean to our north as a moisture source, the rainfall trigger mechanisms went missing in action during July. A mainly positive southern annular mode (SAM) was pulling frontal systems further south of SA. In conjunction with this, and seemingly in keeping with our modern winters, the sub-tropical ridge of high pressure was much stronger than normal and in a blocking position, forcing frontal systems to the south as well.

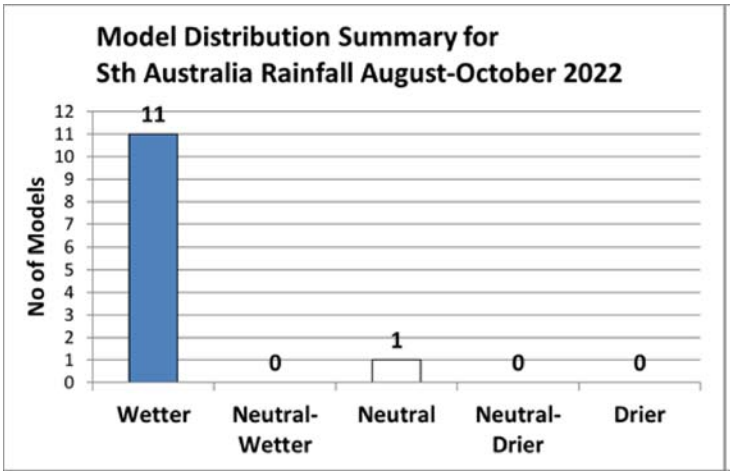
My assessment of 12 climate models for South Australia shows likely wetter rainfall and a split between neutral or likely cooler temperatures for the next three months.

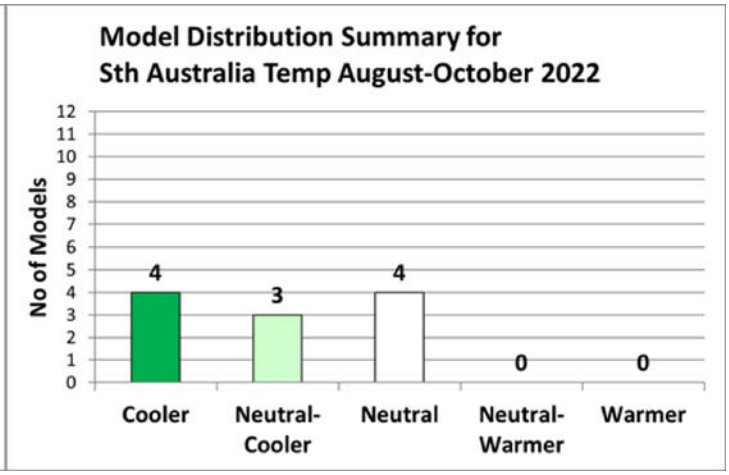
Soil Moisture



The BoM Australian Water Outlook (AWO) modelled plant available soil moisture (10-100cm) for actively growing pasture, shows a decrease in most cropping areas with the exception of the southern coasts. Soil moisture is ranked average or drier than normal at decile two to three over the eastern EP, Upper North and Southeast. Kyancutta decreased by a massive 42 percentage points from 96 to 54 per cent and Conmurra was the only probe to increase by 14, from 18 to 32 per cent.

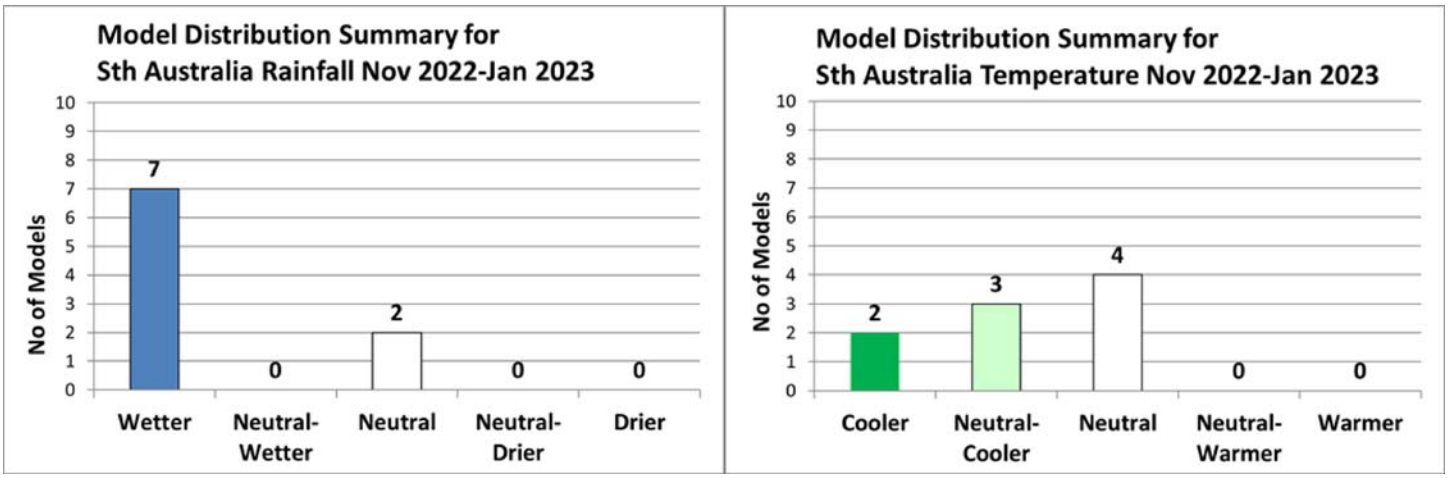
Model Distribution Summary For The Next Three Months





Graphs showing the distribution of 12 global model forecasts for August to October 2022, with likely wetter rainfall and a split between likely neutral and cooler temperatures for the next three months.

Model Distribution Summary For The Next Four To Six Months



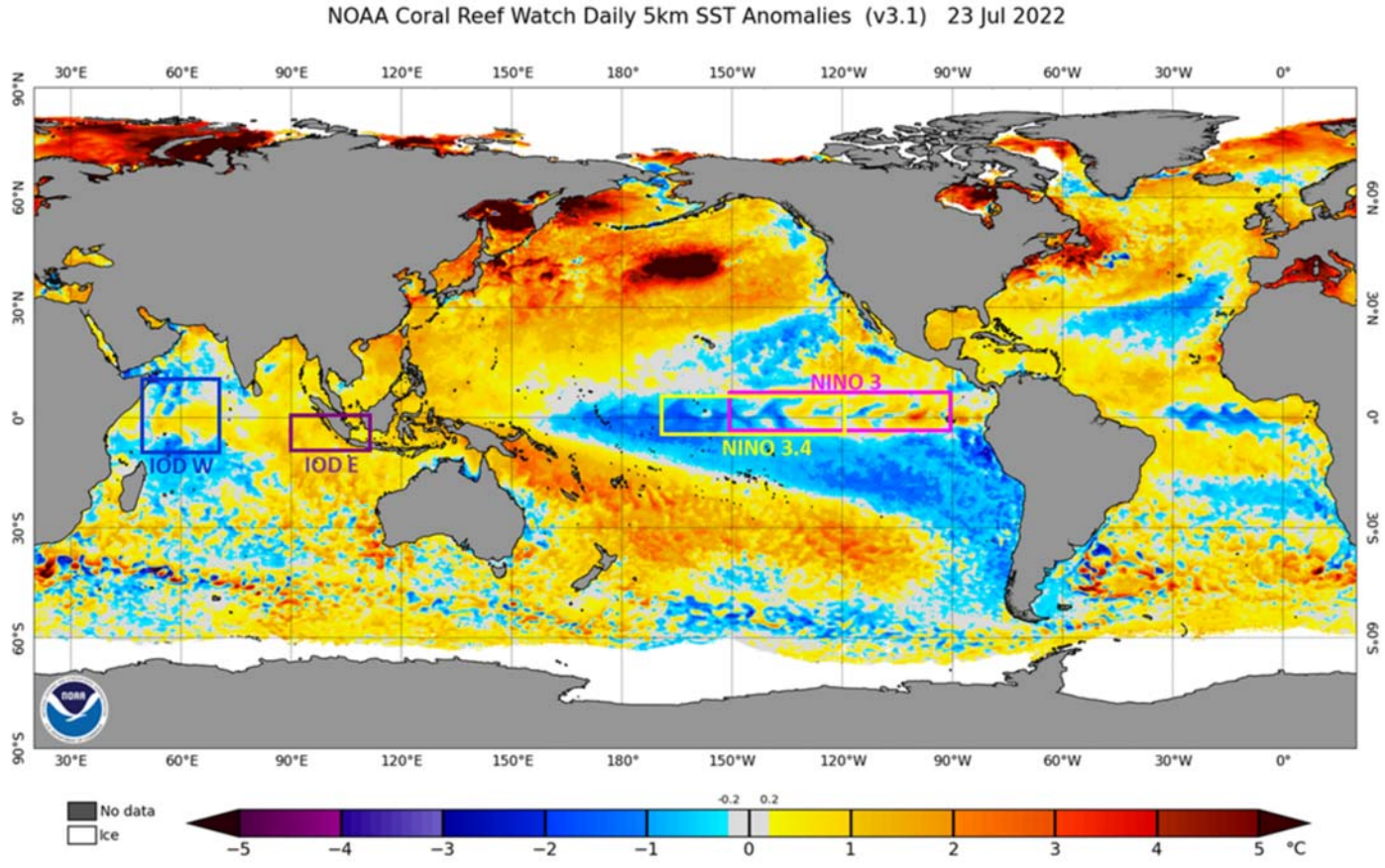
Graphs showing the distribution of nine global model forecasts for November 2022 to January 2023 with likely wetter rainfall and a split between likely neutral or cooler temperatures for the next three months.

Model Consensus Forecast For The Next Six Months

	Current outlook (27 July)		**Previous outlook (27 June)**	
	Aug-Oct	**Nov-Jan**	**Jul-Sept**	**Oct-Dec**
Pacific Ocean	Slightly cool / Cool (poss La Niña)	Slightly cool	Slightly cool	Slightly cool

	Current outlook (27 July)		Previous outlook (27 June)	
	Aug-Oct	**Nov-Jan**	**Jul-Sept**	**Oct-Dec**
Indian Ocean	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)
Rainfall	Wetter	Wetter	Wetter	Wetter
Temperature	Neutral / Cooler	Neutral / Cooler	Neutral / Cooler	Cooler / Neutral

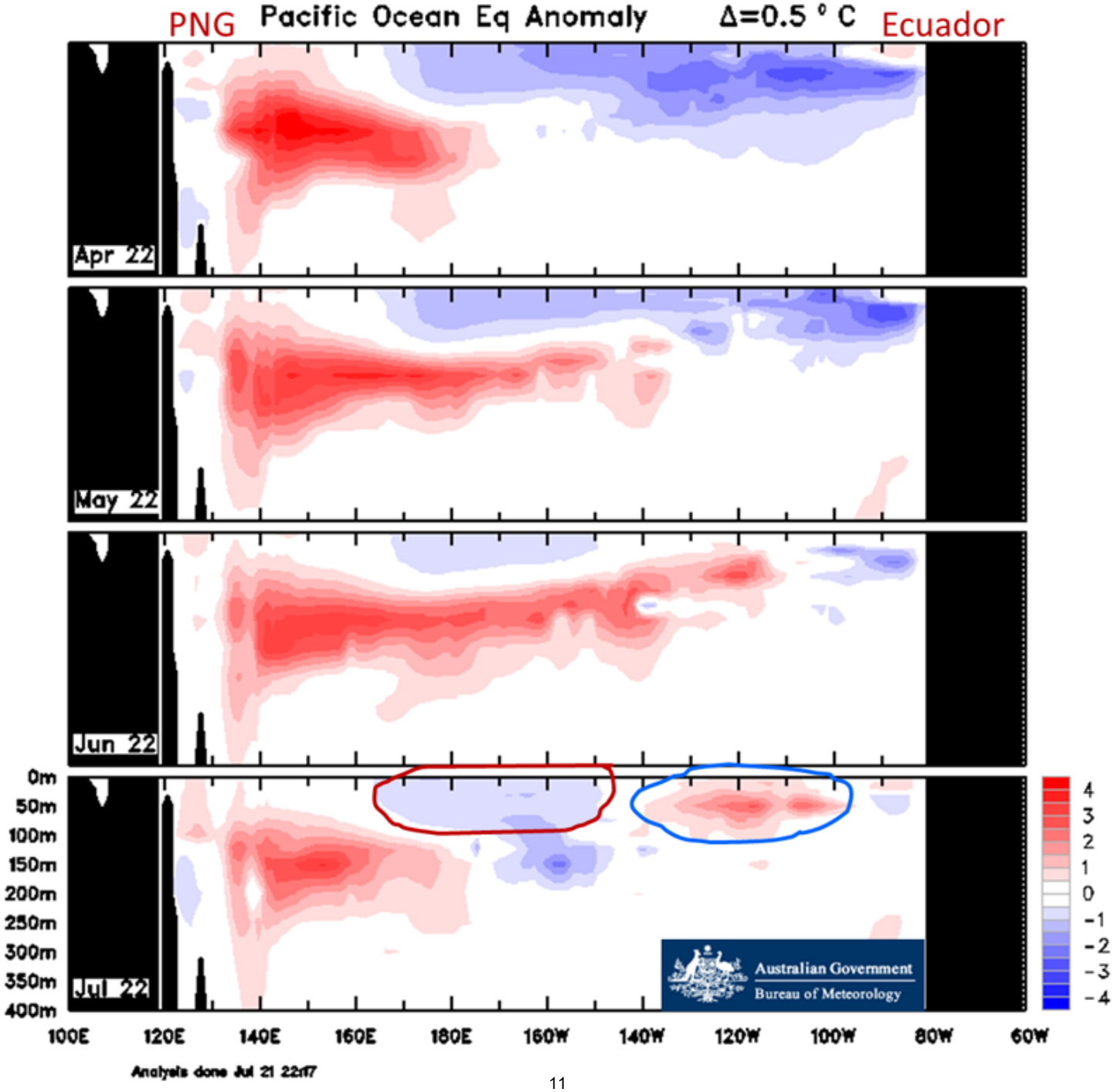
Sea Surface Temperature Anomalies



The Equatorial Pacific Ocean changed little over July, with NINO3 and NINO3.4 values at -0.12oC and -0.40oC respectively (as of 26 July). The Pacific Ocean is in neutral phase at the moment, however the ocean to the

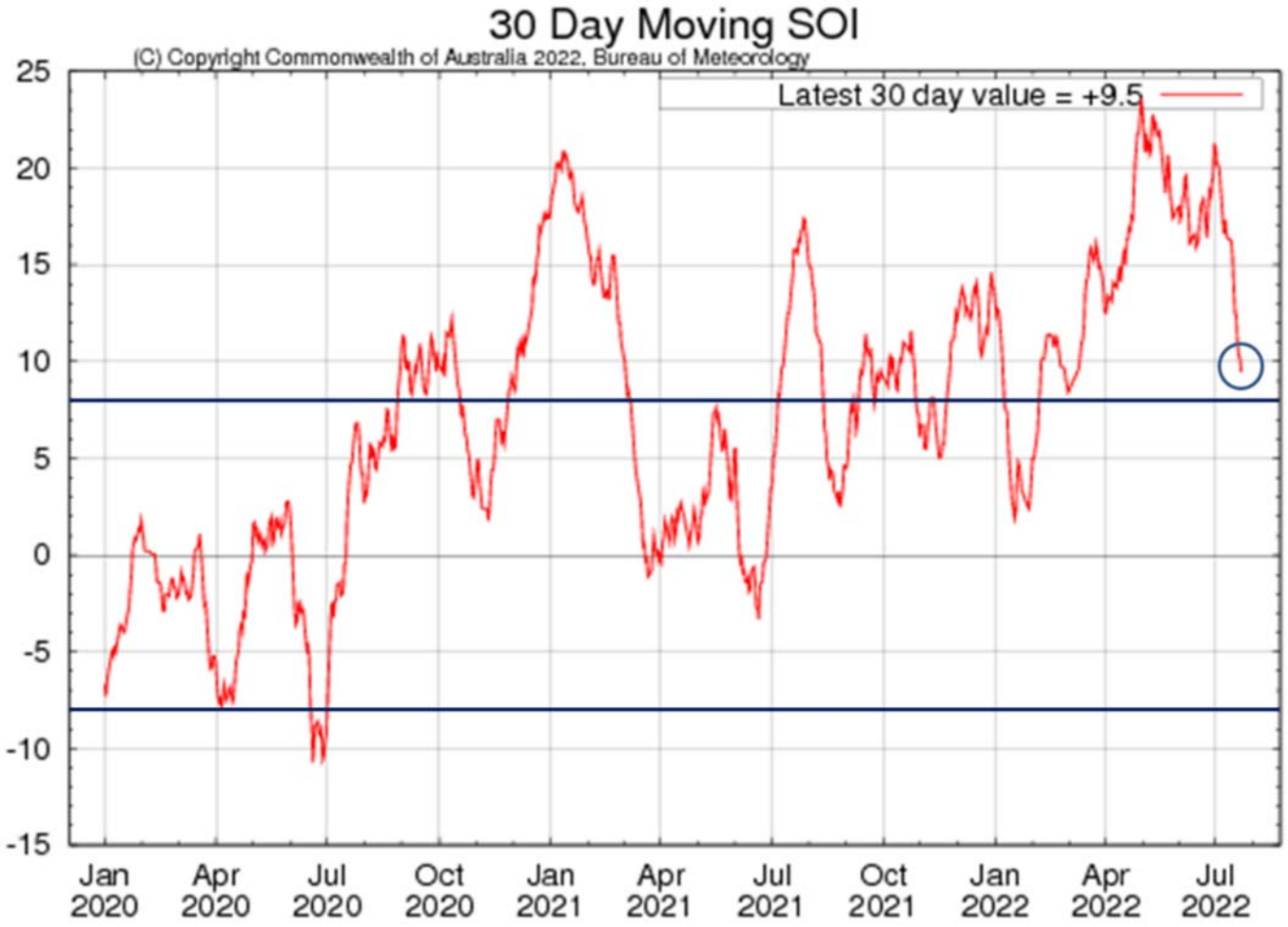
north of Australia looks more like La Niña. The Dipole Mode Index (DMI) has stayed below the IOD threshold of -0.4 currently at -0.99oC and only needs a few more weeks like this to be classified as an event. While it's cool off Africa and warm off Sumatra, the whole eastern Indian Ocean is warmer with no classical defined 'eye' of warming off Sumatra. All models predict a -IOD to hang around for the rest of the season. Sea surface temperatures are the key to the world's rainfall. For more information on how they are measured, maps created and how to read them, check out our eLearn: https://rise.articulate.com/share/kJceF16KasOxoeypJi1UWsAz0IzKKUF1

Equatorial Pacific Sub-Sea Temperature Anomalies



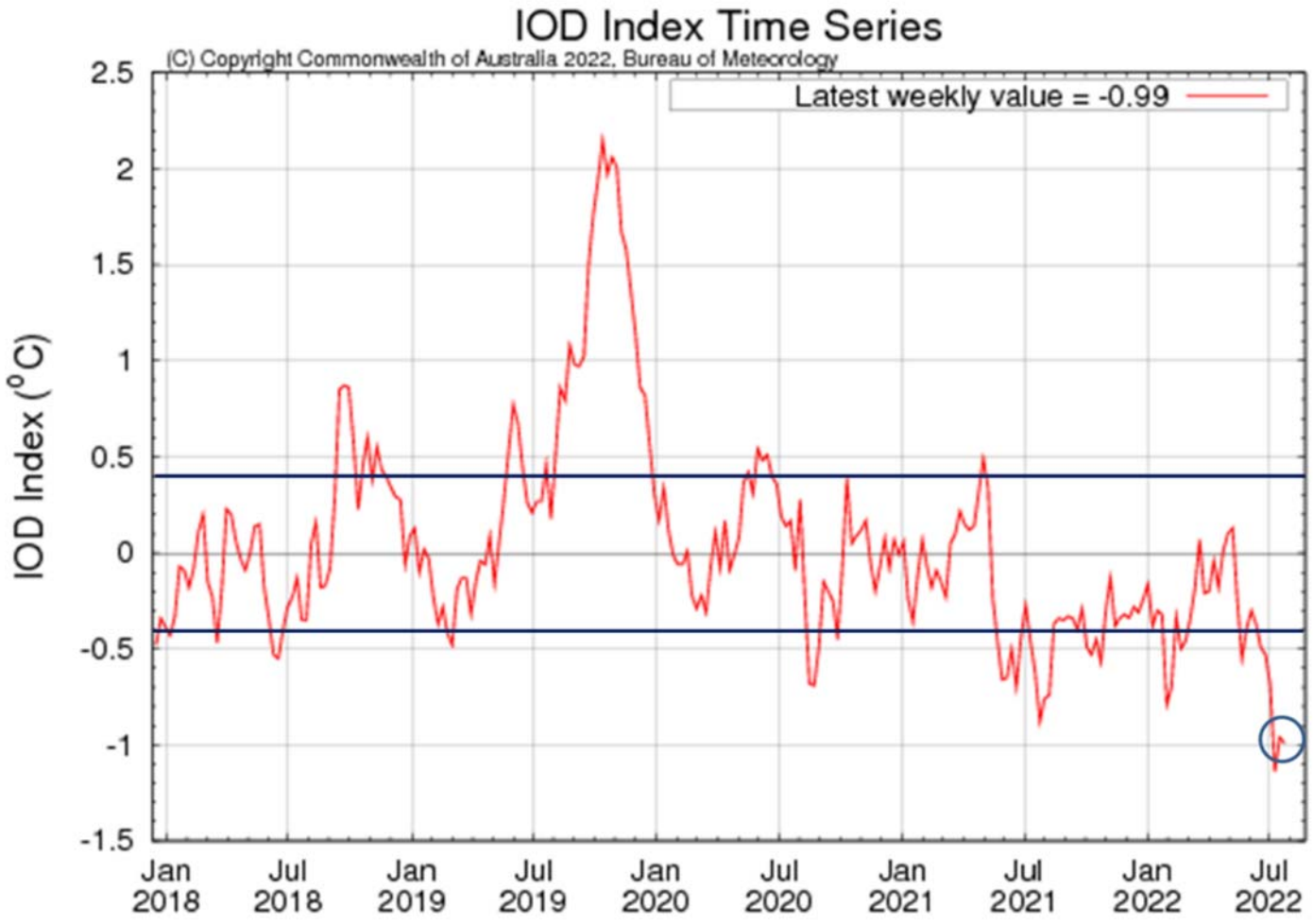
The Pacific Ocean Equatorial sub-surface temperatures show a pattern of mixed neutrality with a patch of warmer water to the east and a patch of cooler water in the centre. It doesn't look very La Niña like.

Southern Oscillation Index



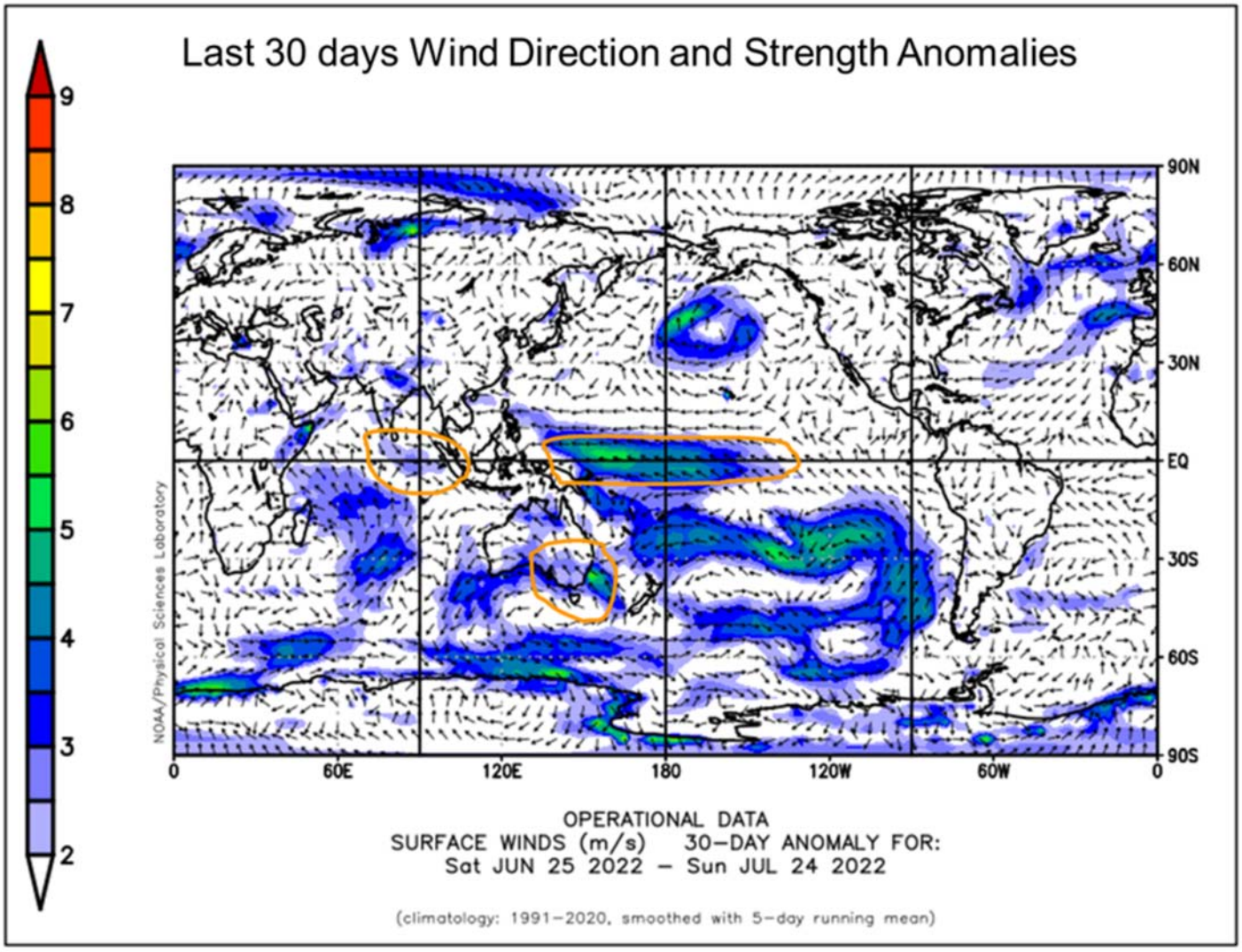
The SOI has started a steep fall during July currently +9.5 (at 25 July 2022) but still at a La Niña level. Recent daily values are close to normal, and it would be expected to see a further drop. This would be in keeping with the neutral ocean. Darwin pressure is the most normal for many months with higher pressure at Tahiti.

Dipole Mode Index (DMI)



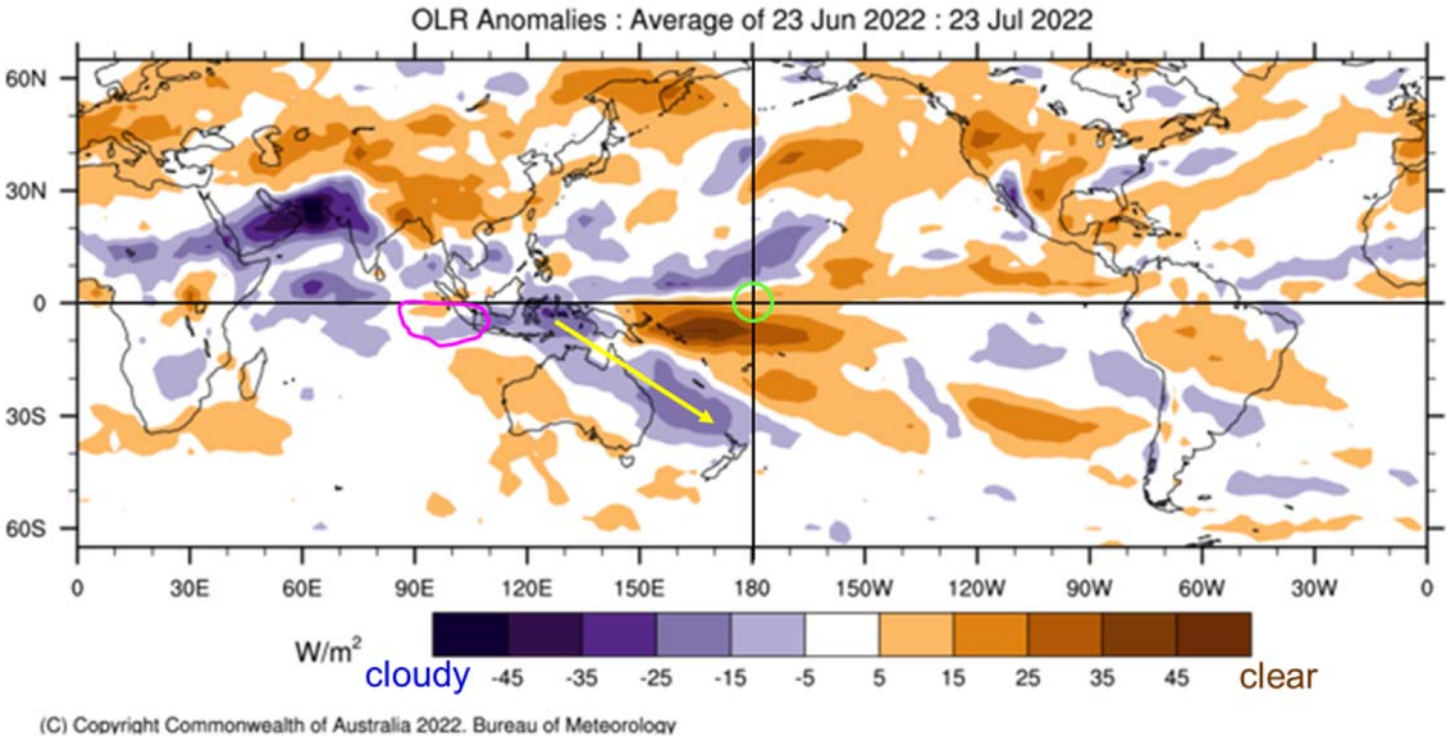
The DMI is the difference between the west and east boxes of ocean monitored for the IOD. It has remained below the -IOD threshold of -0.4 in the last month (currently -0.99 as of 26 July 2022). Two more weeks of this activity will see it being classified as an official -IOD year.

Pacific Ocean Surface Wind Anomalies



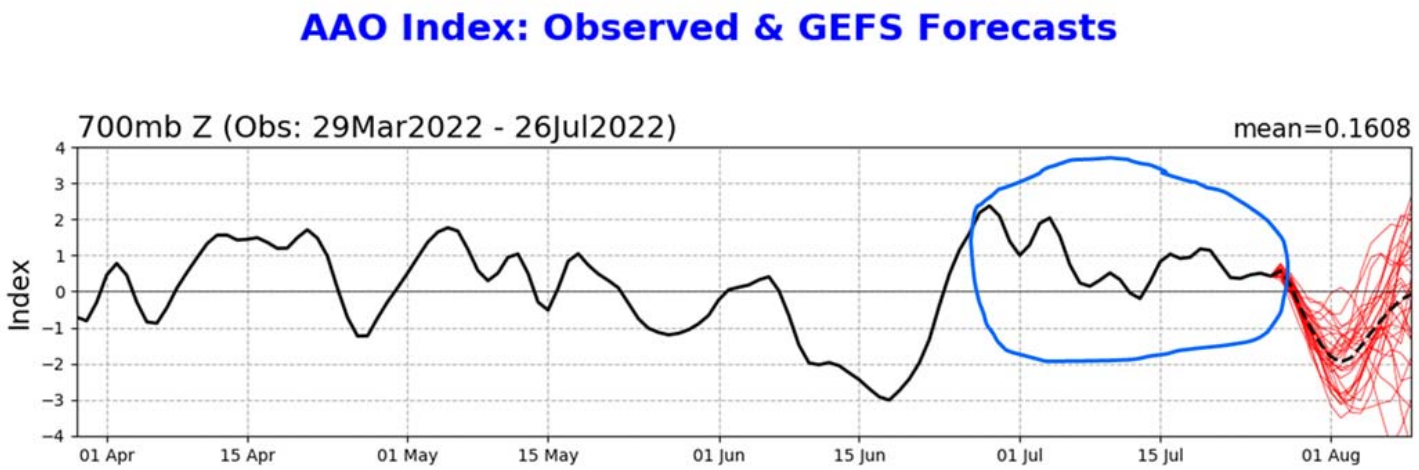
Easterly trade winds picked back up to be very much stronger than normal. This is likely to maintain further warmth in the Coral Sea and upwell cooler water in the central Pacific. Small westerly anomalies off Sumatra are only weakly of a -IOD format. There was stronger southeast wind over South Australia

World Cloudiness Anomalies



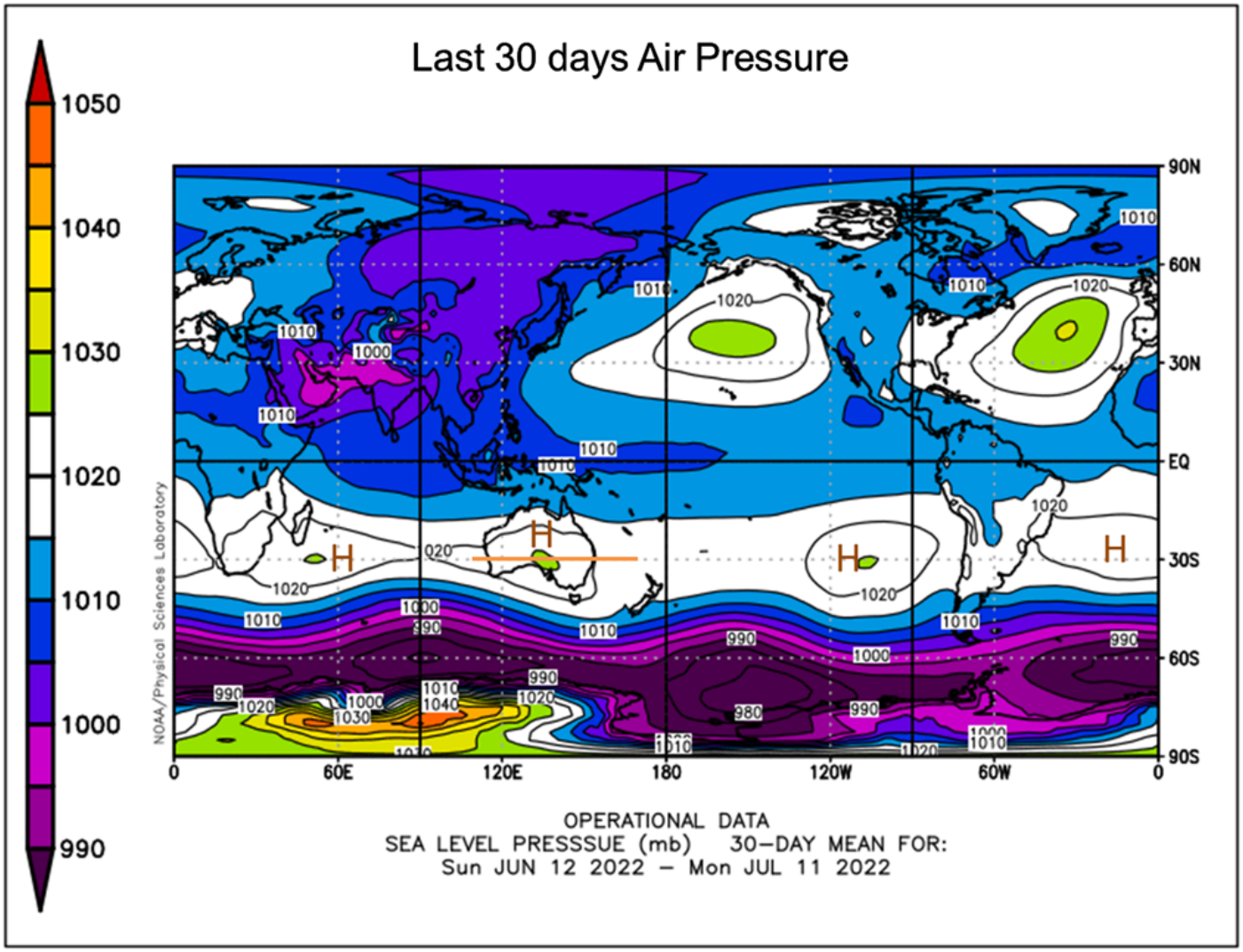
A lack of cloud over the international dateline junction with the equator remains as a lingering reminder of the recent La Niña event, but a greater anomaly is south of the Equator. Greater cloud north of Australia is more like La Niña. A mixture of cloud types is not in keeping with a classic -IOD 'eye' of extra cloud off Sumatra. There has been less cloud over South Australia.

Southern Annular Mode



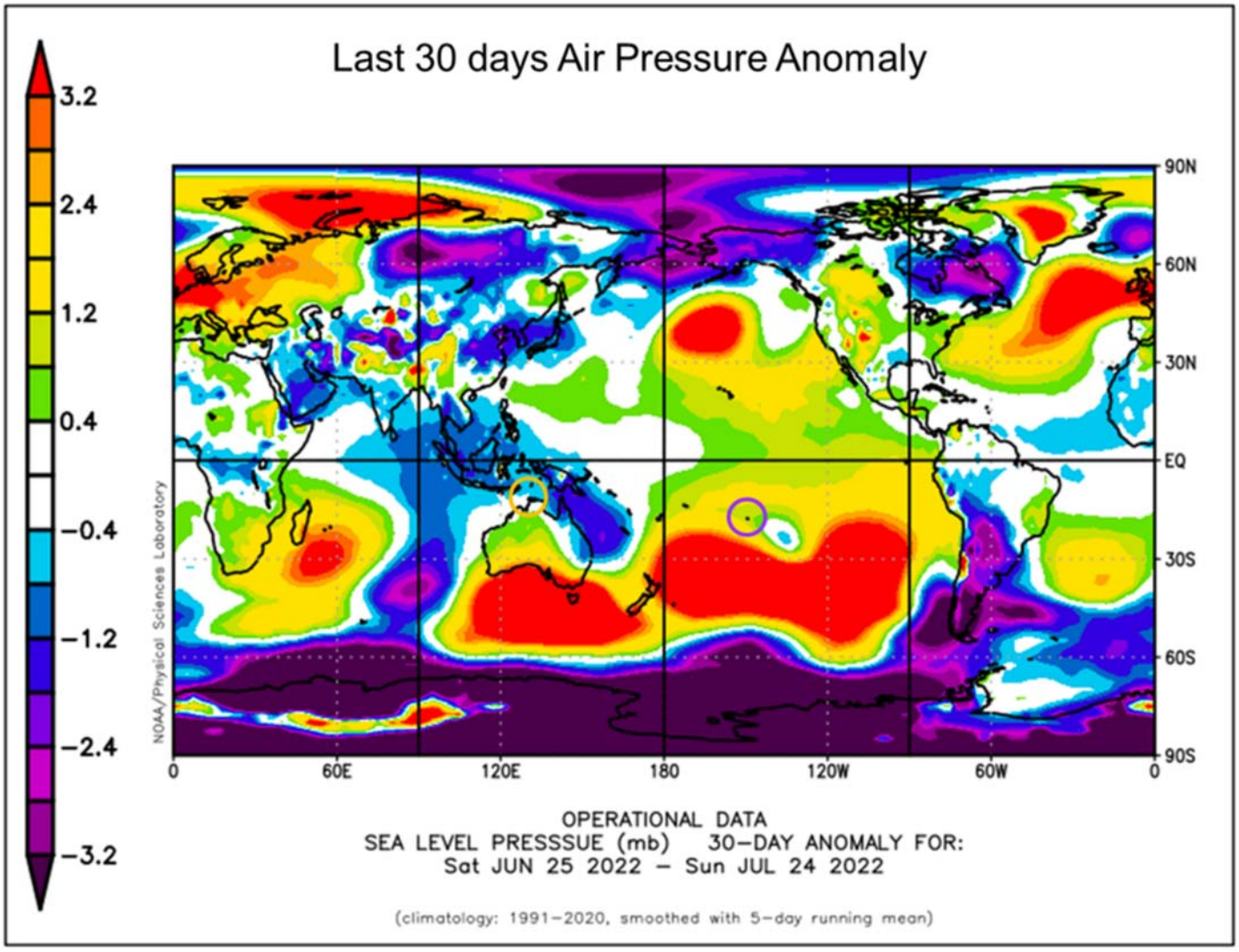
The Southern Annular Mode (SAM) or Antarctic Oscillation (AAO) has spent July in weak to moderate positivity. This has been putting southerly pulling pressure on frontal systems across the southern parts of the state. A positive SAM would be expected to decrease rainfall over winter in the southeast of South Australia, a negative SAM would be expected to wet it up. The BoM and NOAA models are in conflict, with BoM keeping SAM positive and NOAA going negative for the next two weeks.

Air Pressure



In the past 30 days, the Sub Tropical Ridge of High Pressure (STR) has been showing normal behaviour, having been near the top of the Bight. The overall positioning of the high has been in a classic block centred over SA, preventing rainfall triggers from crossing the state and pushing them south. It would be unusual for this pattern to set up permanence in the absence of a +IOD or El Niño.

Air Pressure Anomalies



The sub-tropical ridge of high pressure has been much higher over and to the south of SA meaning slower moving high pressure systems pushing rain triggers further south. Pressure is higher at Tahiti and normal over Darwin, which is why the SOI is positive but perhaps not for long. A positive SOI is indicative of La Niña-like pressure conditions. Lower pressure over and off Indonesia could be helpful to aid convection and cloud formation off Sumatra if it could hang around. A -IOD would normally have lower pressure off Sumatra and higher off Africa.

Definitions

For a list of climate acronyms and explanations (https://agriculture.vic.gov.au/climate-and-weather/understanding-weather-climate-and-forecasting/climate-definitions#h2-9)

Modelled Climate And Ocean Predictions For South Australia From July 2022 Run Models

	Ocean-Atmosphere Coupled Models								Multi Model Ensembles			Statistical
	System 5 ECMWF Europe	ACCESS-S BoM Australia	SINTEX-F JAMSTEC Japan	CFSv2 NCEP USA	GEOS-S2S NASA USA	EPS JMA Japan	CSM1.1m BCC China	GloSea5 UKMO UK	NMME USA	C3S Europe	MME APCC Korea	SOI phase USQ/Qld Australia
Month of Run	July	July	July	July	July	July	July	July	July	July	July	July
Forecast months*	ASO	ASO	ASO	ASO	ASO	ASO	ASO	ASO	ASO	ASO	ASO	ASO
Rainfall Skill ASO	Moderate / Low UN	High	-	Moderate	Moderate	Moderate	-	Moderate / Low S EP	Moderate	-	-	-
Spring Pacific Ocean NINO3.4	Slightly cool	Slightly cool	Slightly cool	Cool (weak La Niña)	Cool (La Niña)	Cool (weak La Niña)	Slightly cool	Cool (La Niña)	Cool (La Niña)	Slightly cool	Cool (weak La Niña)	SOI Positive
Spring Eastern Indian Ocean	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (weak -IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	-
Spring Rainfall	Wetter N, slightly wetter S	Slightly wetter	Neutral, slightly wetter SE	Slightly wetter, neutral SE	Slightly wetter	Slightly wetter	Slightly wetter	Wetter	Wetter	Wetter	Slightly wetter, wetter Mallee	Slightly wetter, neutral NW EP
Spring Temperature	Slightly cooler N, neutral S	Neutral, slightly warmer SE	Neutral	Neutral	Neutral	Slightly cooler	Slightly cooler	Slightly cooler	Cooler	Slightly cooler N, neutral S	Slightly cooler N, neutral S	-
Forecast months*	NDJ	OND	NDJ	NDJ	NDJ	NDJ	NDJ	OND	NDJ	OND	NDJ	-
Summer Pacific Ocean NINO3.4	Slightly cool	Slightly cool	Slightly cool	Slightly cool	Cool (La Niña)	Cool (weak La Niña)	Warm (El Nino)	Cool (La Niña)	Cool (La Niña)	Slightly cool	Slightly cool	-
Summer Eastern Indian Ocean	Warm (-IOD)	Warm (-IOD)	Normal	Slightly warm (weak -IOD)	Normal	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Warm (-IOD)	Normal	-
Summer Rainfall	Slightly wetter	-	Slightly wetter	Neutral	Neutral	-	Slightly wetter, neutral SE	Wetter, slightly wetter EP	Slightly wetter	Slightly wetter	Slightly wetter	-
Summer Temperature	Neutral S, slightly cooler N	-	Neutral	Neutral	Neutral S, slightly cooler N	-	Neutral	Slightly cooler	Slightly cooler	Slightly cooler N, neutral S	Neutral, slightly cooler far N	-
Further Info	Operational	Operational	Experimental	Operational	Experimental	Experimental	Operational	Operational	Experimental Summary of 8 dynamic models	Experimental Summary of 8 dynamic models	Experimental Summary of 14 dynamic models	5 phase system based on previous 2 months SOI

(https://grdc.com.au/__data/assets/image/0036/578394/Big-table-SA.gif)

Click here to download this table in MS Word format (https://grdc.com.au/__data/assets/word_doc/0033/578409/Fast-Break-July-SA-2022-big-table.docx)

Back to Fast Break (https://grdc.com.au/news-and-media/newsletters/fast-break)

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Amanda Schapel - SARDI

Soil Carbon in South Australian Soils

Notes for the capacity of our soils to store carbon presentation

Role of carbon in the soil

Soil carbon is important for the physical, chemical and biological properties of the soil.

There are five functions that are reliant on organic matter (organic carbon (OC) in the soil)

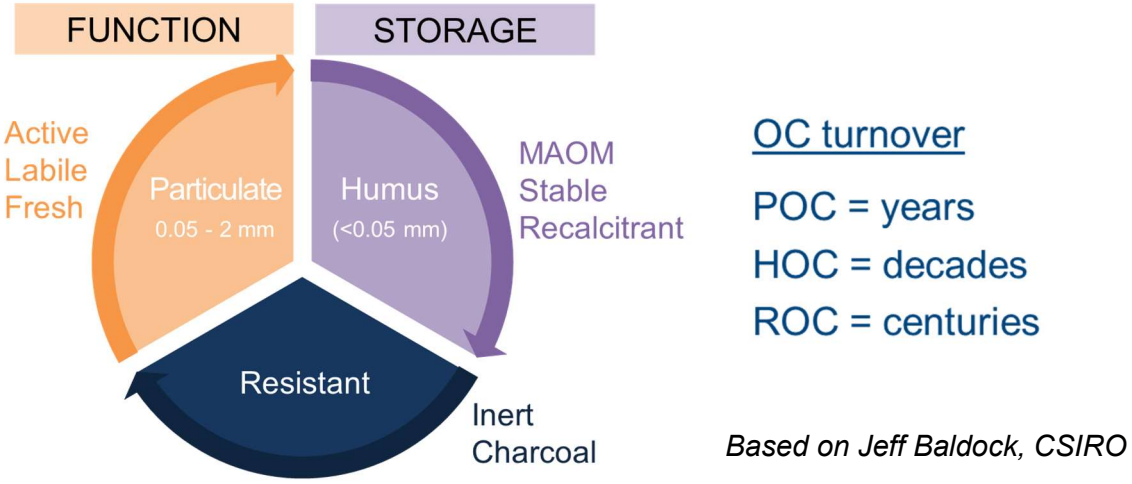
- Productivity or biomass production – increased shoot and root (organic matter) inputs, less bare ground at the surface modifies microclimate affecting microbial activity and soil carbon decomposition
- Water circulation – water infiltration and storage is influenced by soil structure that is improved by aggregate formation from microbial secretions and OC.
- Nutrient cycling – functioning soils retain and recycle nutrients in a suitable form for plants and microbes to use for growth and conversion of POC to HOC (stable carbon)
- Biological organisms – decompose organic matter releasing nutrients and secretions to the soil. The diversity of organic matter (from rotations or multi-species mixes) affects the microbial diversity and disease resilience of the soil.
- Greenhouse gas mitigation – through long term storage of organic carbon in the soil. Organic carbon is made up of different fractions and have different roles and residence time in the soil.

Soil organic carbon fractions

Particulate or active OC has an important role in soil function particularly water, rapid nutrient cycling and energy for biological organisms. It stays in the soils for relatively short periods of days to years.

Humus or mineral associated OC has a role in soil function improving cation exchange capacity and nutrient availability but also has a role in greenhouse gas mitigation with long-term storage in the soil.

Resistant OC is relatively inert and in Australian soils comprises mainly charcoal and products like biochar. It remains in the soil for decades to centuries.



Based on Jeff Baldock, CSIRO

Amanda Schapel
Email: Amanda. Schapel@sa.gov.au
Phone: 0411 137 258
pir.sa.gov.au

Government of South Australia
Department of Primary Industries and Regions
SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

Soil Carbon Tests

There are a number of tests available for soil carbon analysis. For general fertility analysis Organic C by Walkley-Black method is most common. However, if using for carbon accounting, you need to select either the total carbon (if no carbonate present) or total organic carbon (if carbonate present)

Carbon type	Method	Measures	Pros / Cons
Total C	High temperature combustion (Dumas - Leco)	Organic and inorganic C	In soils with carbonate can be difficult to measure change in organic C. Use Total Organic C test.
Total Organic C	Acid pretreatment then High temperature combustion (Dumas - Leco)	Organic C	Need to ensure that have complete removal of inorganic C before combustion or results will be incorrect. Use inorganic C test if carbonate suspected
Organic C	Wet oxidation (Walkley-Black method)	Organic C	Incomplete test – measures only 55-80% of total OC
Inorganic C	Calcium carbonate Equivalent MIR analysis	Inorganic C	Can be an inexact test. More exact test and preferred

Boundaries for Agricultural Districts for Soil Carbon Benchmarks

Agricultural districts follow local government (LGA) boundaries and are the same as the PIRSA Crop and Pasture Reports.

<u>Upper South East</u>
Includes LGA Coorong, Tatiara, Kingston

<u>Lower South East</u>
Includes LGA Naracoorte Lucindale, Robe, Wattle Range and Grant.

Amanda Schapel
Email: Amanda. Schapel@sa.gov.au
Phone: 0411 137 258
pir.sa.gov.au

Government of South Australia
Department of Primary Industries and Regions
SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

Soil Organic Carbon Benchmarks for the South East Agricultural Districts

Extracted from Schapel A, Herrmann T, Sweeney S and Liddicoat C (2021). Soil Carbon in South Australia: Volume 4 – Benchmarks and Data analysis for the Agricultural Zone 1990-2007. Soil and Land Hub, Adelaide.
Soil Carbon in SA Vol 4 - SA Ag Benchmark Analysis 1990-2007 June 2021 Final.pdf (environment.sa.gov.au)

Upper South East

Proportion of Landuse	
Cropping	54%
Pasture	31%

Annual change in OCwb
0.0103% ↔

*Benchmark topsoil 0-10cm OC Walkley- Black method (%) values for texture and land use displaying the mean and percentile values for the **Upper South East** compared to the mean for the Agricultural Zone.*

	Ag Zone	Ag District Benchmarks						
Texture	***Mean***	**Count**	**Mean**	**25%**	**40%**	**50%**	**60%**	**75%**
Sand	*1.12*	23	1.08	0.90	1.05	1.12	1.19	1.31
Loamy sand	*1.42*	933	1.21	0.85	1.01	1.10	1.24	1.51
Sandy loam	*1.79*	636	1.43	0.96	1.20	1.35	1.50	1.80
Loam	*1.96*	437	1.66	1.20	1.40	1.50	1.70	1.97
Clay loam	*1.93*	308	1.81	1.40	1.59	1.74	1.87	2.13
Clay	*1.66*	288	1.63	1.00	1.26	1.40	1.60	1.92
Weighted Mean (all texture)	*1.77*	2625	1.45	1.02	1.22	1.33	1.49	1.77

Lower South East

Proportion of Landuse	
Pasture	57%
Cropping	28%

Annual change in OCwb
-0.0185% ?↓

*Benchmark topsoil 0-10cm OC Walkley- Black method (%) values for texture and land use displaying the mean and percentile values for the **Lower South East** compared to the mean for the Agricultural Zone.*

	Ag Zone	Ag District Benchmarks						
Texture	***Mean***	**Count**	**Mean**	**25%**	**40%**	**50%**	**60%**	**75%**
Sand	*1.12*	13	1.65	1.29	1.45	1.52	1.57	1.75
Loamy sand	*1.42*	818	1.89	1.19	1.48	1.71	2.01	2.45
Sandy loam	*1.79*	502	2.38	1.48	1.87	2.07	2.40	3.05
Loam	*1.96*	374	2.93	1.80	2.35	2.71	3.12	3.91
Clay loam	*1.93*	526	2.97	1.61	2.32	3.13	3.56	4.11
Clay	*1.66*	262	2.81	1.31	2.10	2.59	3.20	4.10
Weighted Mean (all texture)	*1.77*	2495	2.47	1.44	1.93	2.32	2.70	3.31

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SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

NOTES

POST EVENT EVALUATION

KEITH WORKSHOP - Monday 22nd August 2022

WORKSHOP- Carbon, Climate & Methane - making sense of it

Please complete this QUICK evaluation either by;

Scanning in the logo top right with your smartphone and completing on line, OR

Please complete this paper version, tear out of your booklet and give to Workshop Facilitator Tracey Strugnell

1. How would you rate todays session (1- poor, 10-excellent)

1	2	3	4	5	6	7	8	9	10

2. Has today's event increased your knowledge in the following areas (Y or N) - *Please circle*

Carbon On-Farm	Y	N
Climate Forecasting	Y	N
Methane	Y	N
On Farm and Business Resilience	Y	N

As a result of today's events are you likely to follow up on any of the matters covered or make any business / on-ground changes on your farm? - *Please circle*

3. **Carbon on-farm**

No	Unlikely	Maybe	Likely	Definitely

4. **Soil Carbon**

No	Unlikely	Maybe	Likely	Definitely

5. **Climate and Drought Impact**

No	Unlikely	Maybe	Likely	Definitely

6. **Methane**

No	Unlikely	Maybe	Likely	Definitely

https://www.surveymonkey.com/r/A_KEITH

NOTES