

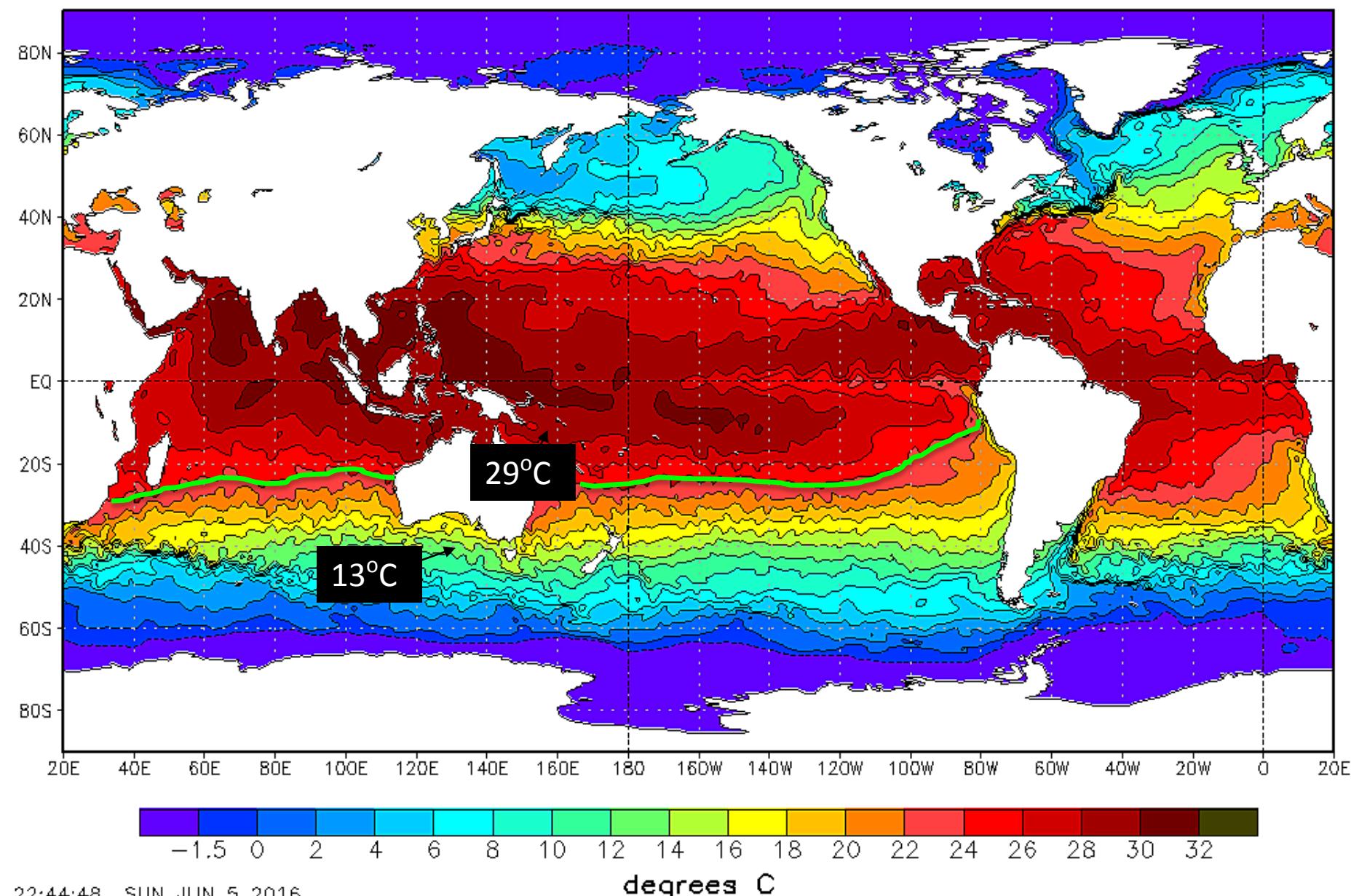
Seasonal Outlook for Winter

Dale Grey
Seasonal Risk Agronomist
Bendigo



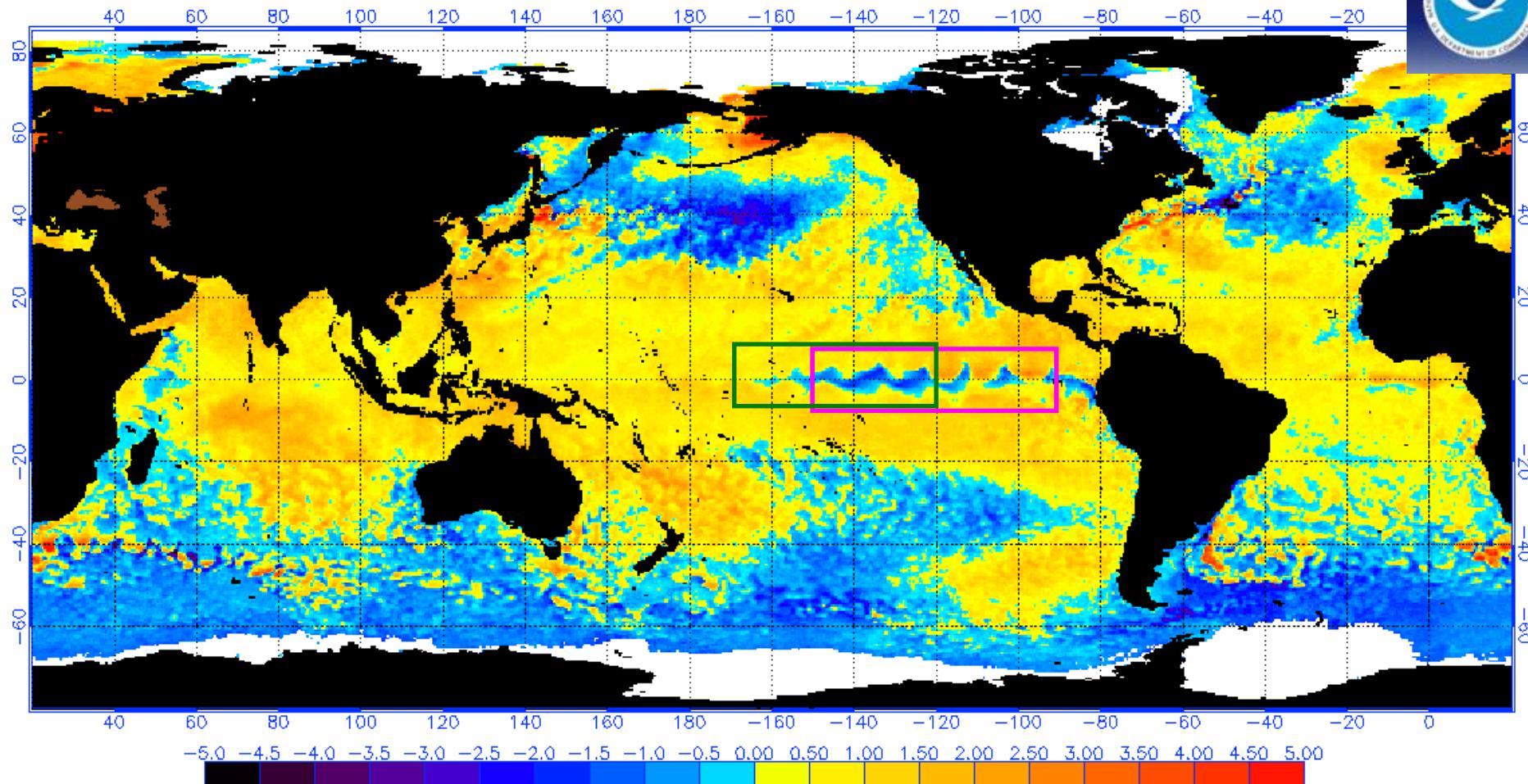
NOAA/NWS/NCEP/EMC Marine Modeling and Analysis Branch

RTG_SST Analysis (0.5 deg X 0.5 deg) for 05 Jun 2016

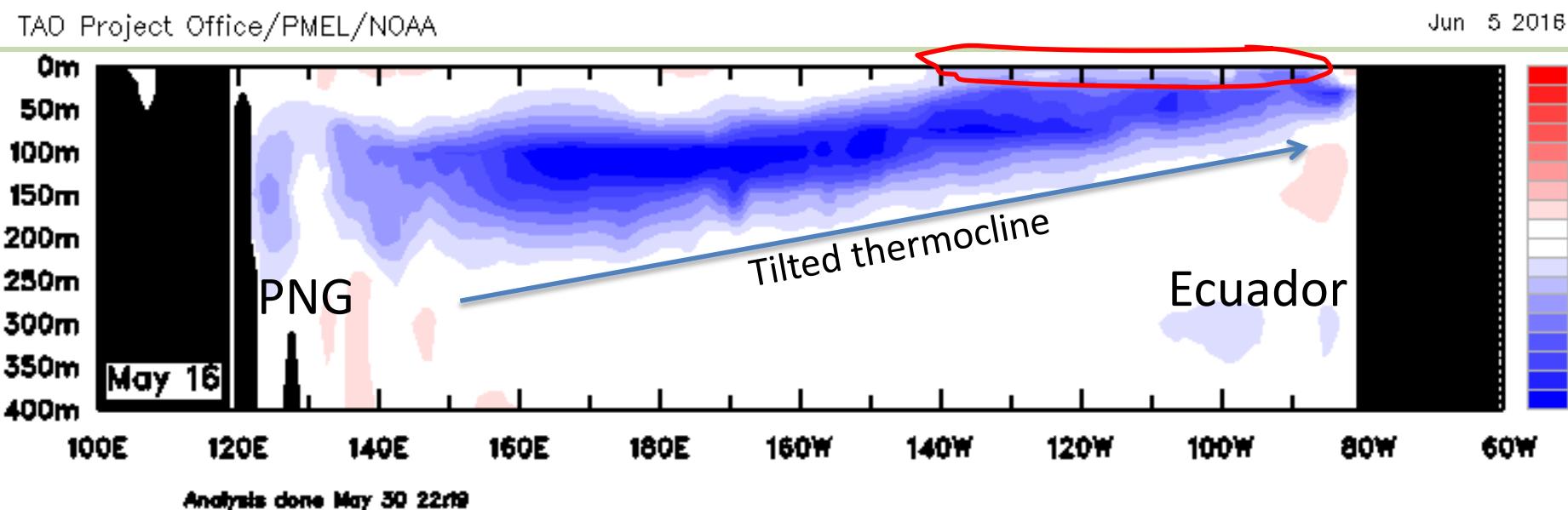
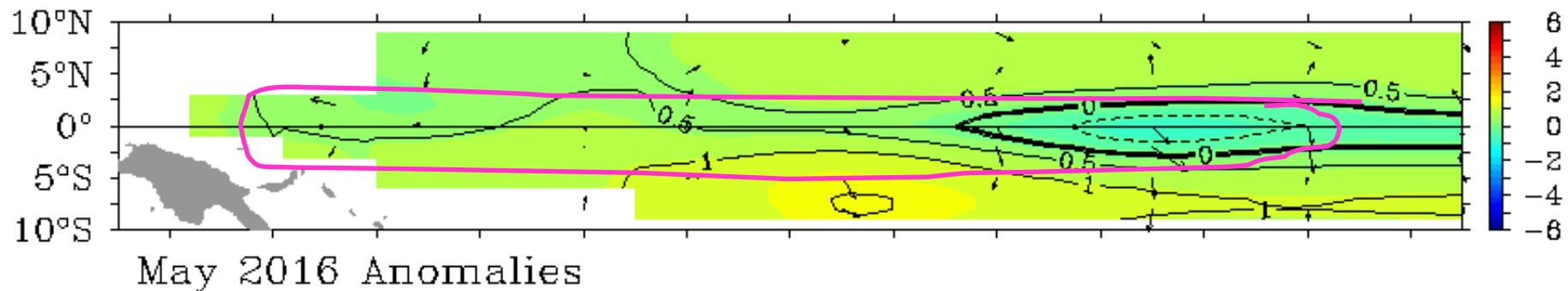


6th June 2016

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 6/2/2016 (white regions indicate sea-ice)



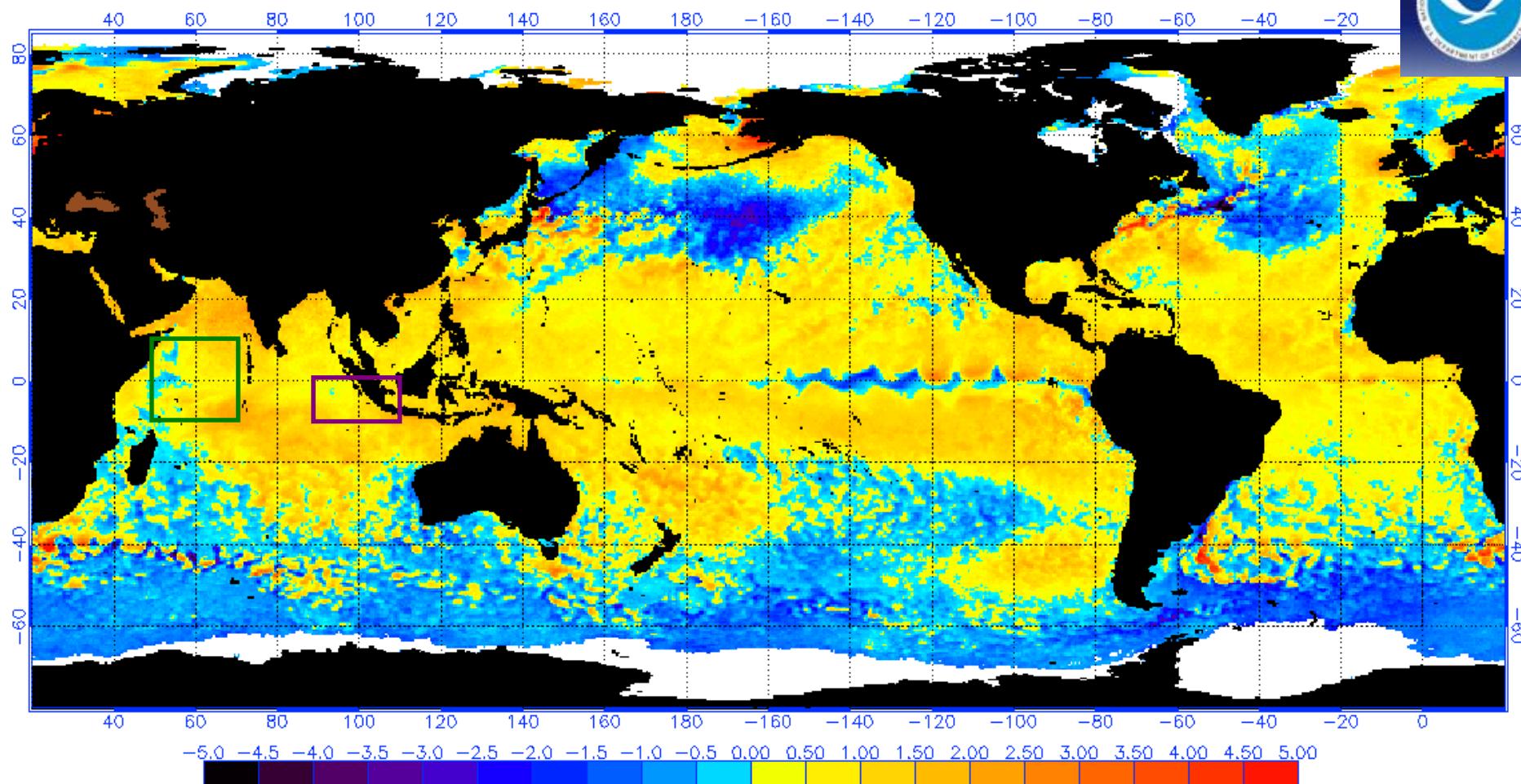
Currently the Niño 3 and 3.4 areas of the Pacific are slowly cooling at **+0.11°C**, **+0.09°C**, below the El Niño thresholds of 0.8°C , El Niño is now officially dead. Pacific Ocean is in a neutral condition.



Trade winds still normal.
Further upwelling of cold water.
Heat has completely gone.

6th June 2016

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 6/6/2016
(white regions indicate sea-ice)

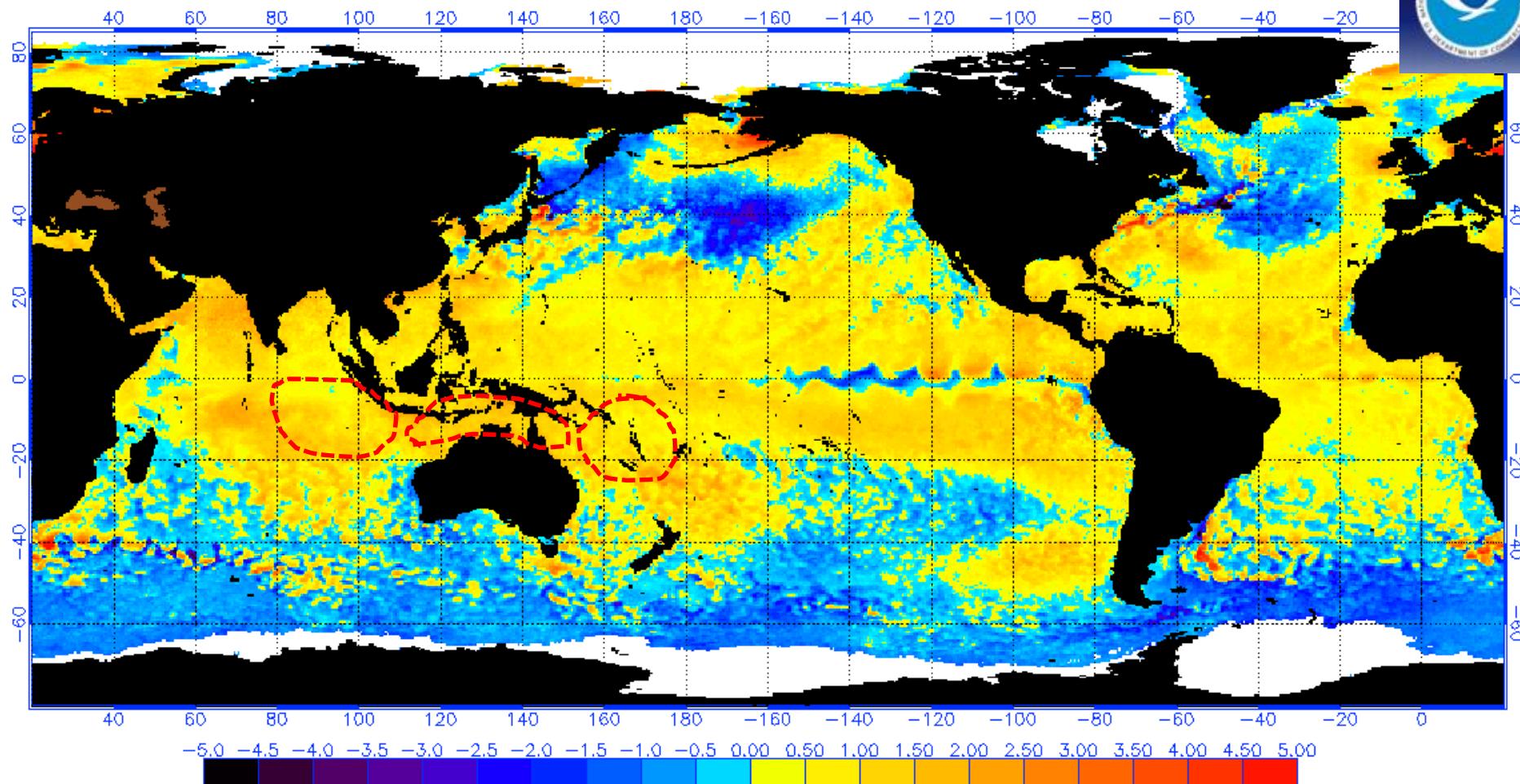


The DMI measurement of the IOD is **-0.65**, at IOD- for a week.

Further cooling off Kenya might see further IOD- formation.

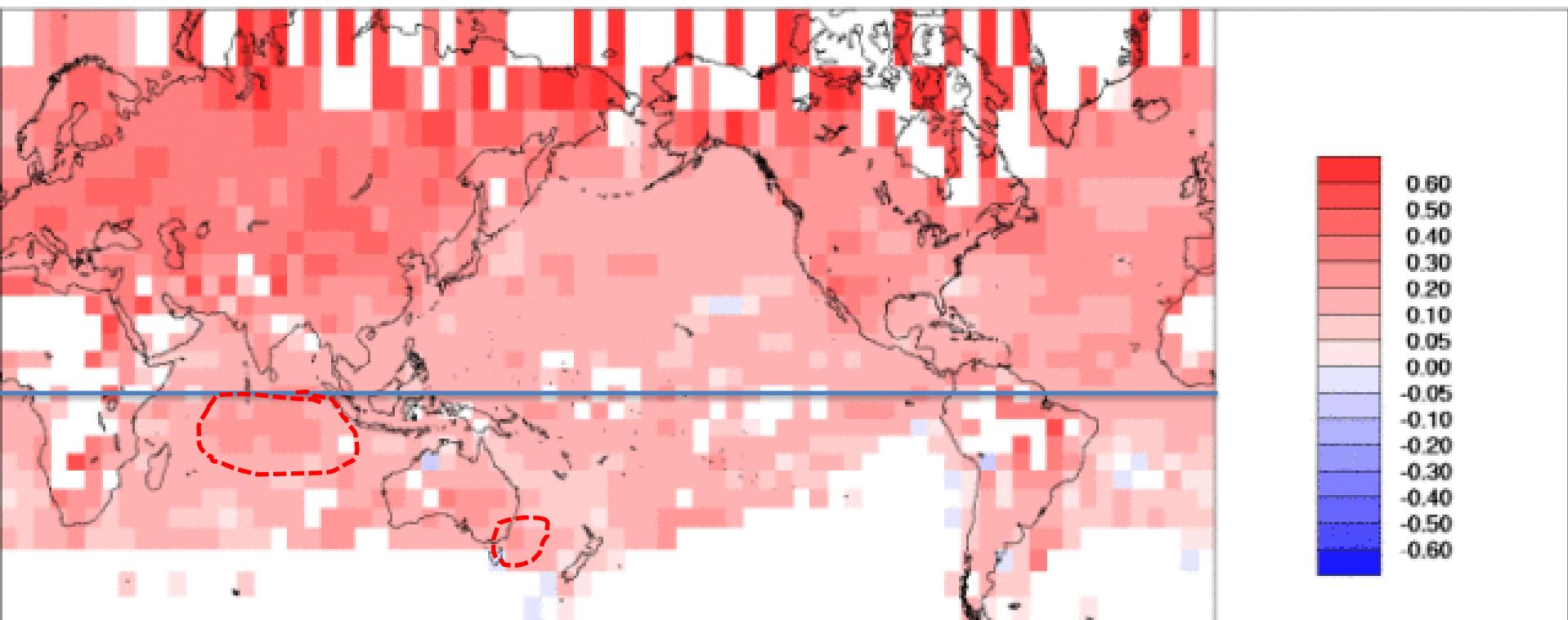
6th June 2016

NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 6/6/2016 (white regions indicate sea-ice)

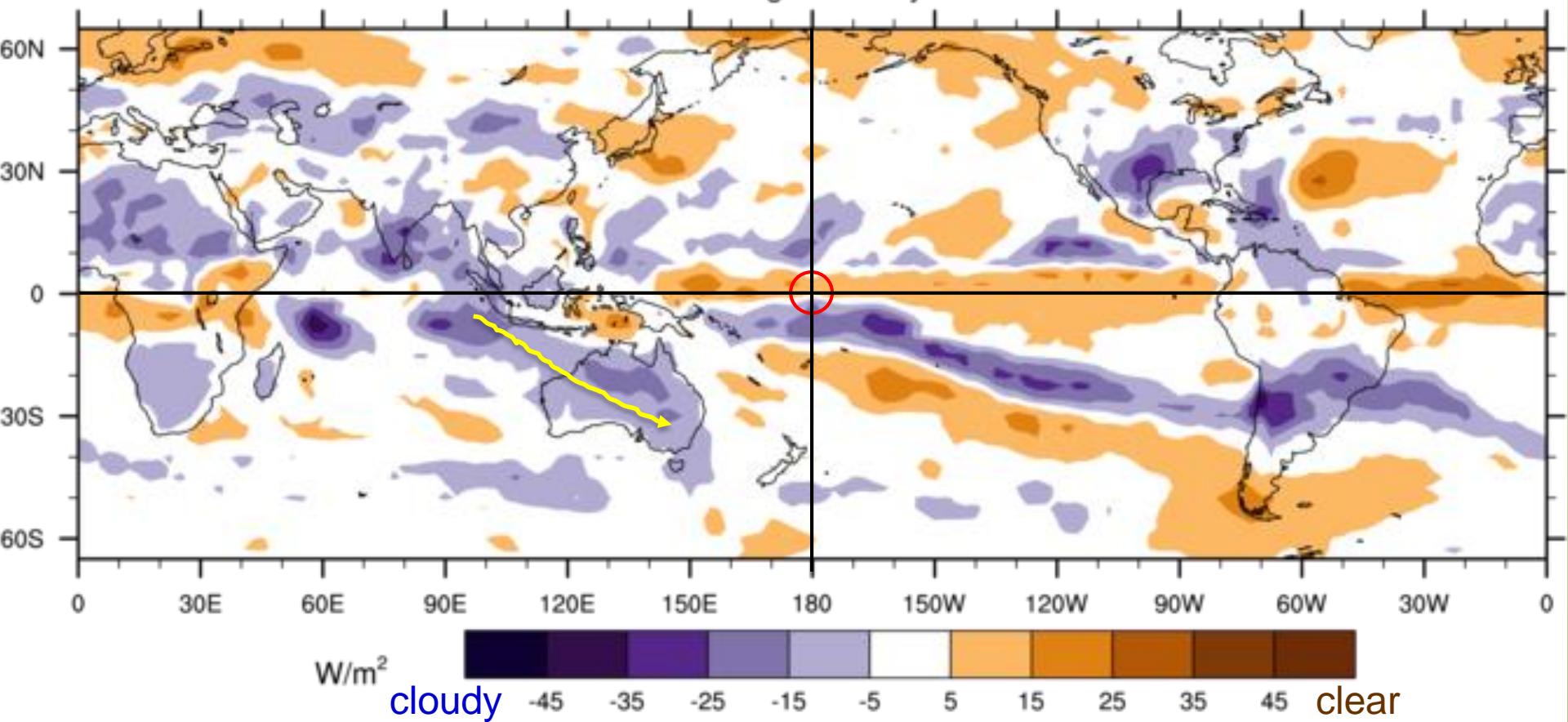


Timor, Coral and Arafura Seas still warmer, that's good as a moisture source.

Trend in Global Annual Temperature ($^{\circ}\text{C}/10 \text{ yrs}$) 1970-2015



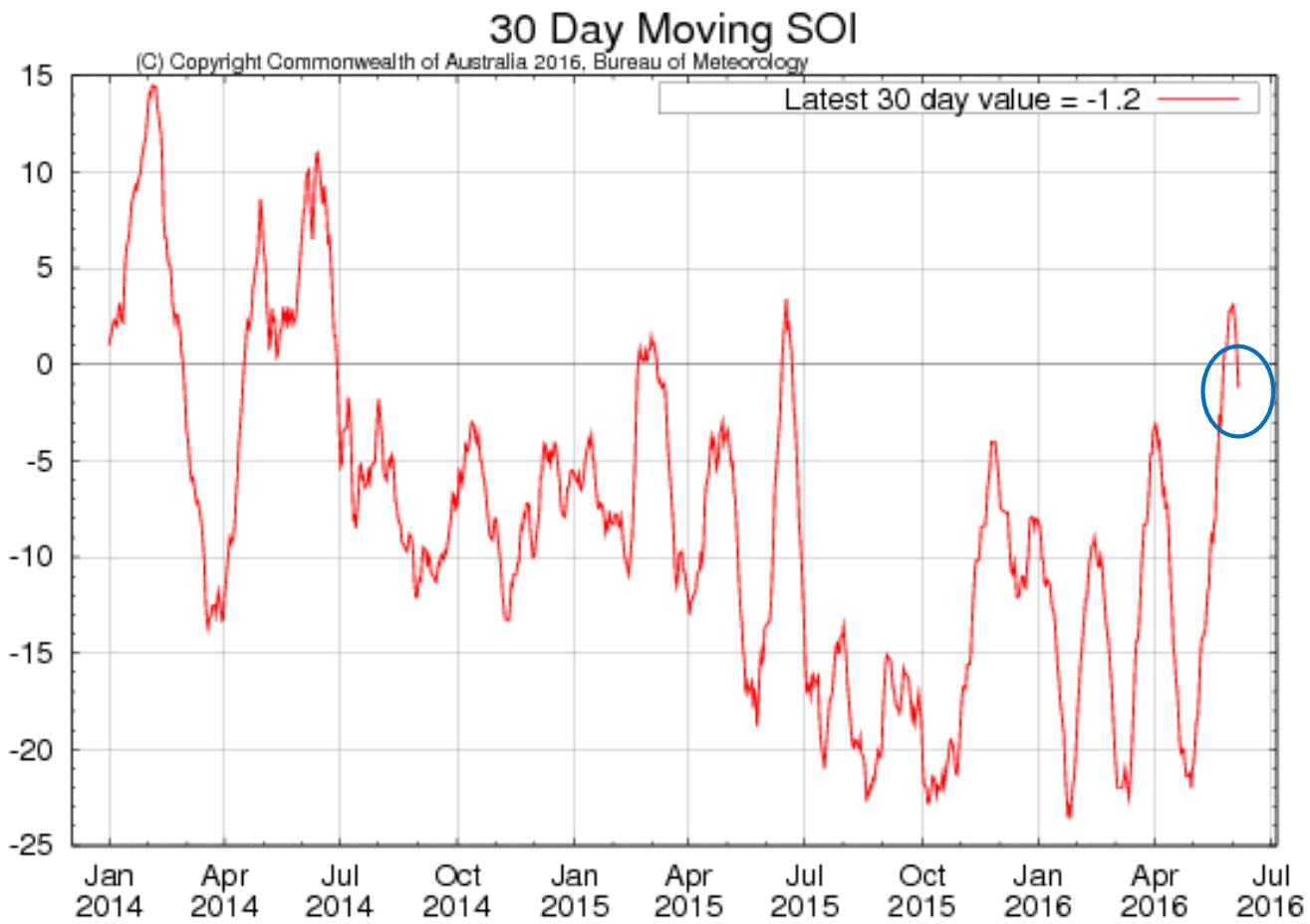
OLR Anomalies : Average of 7 May 2016 : 6 Jun 2016



(C) Copyright Commonwealth of Australia 2016. Bureau of Meteorology

In the last 30 days Cloud at the International Date Line was normal = Neutral.
Cloud has become more normal to the north of Australia.
Plenty of NW cloud band activity

The SOI has ants in its pants

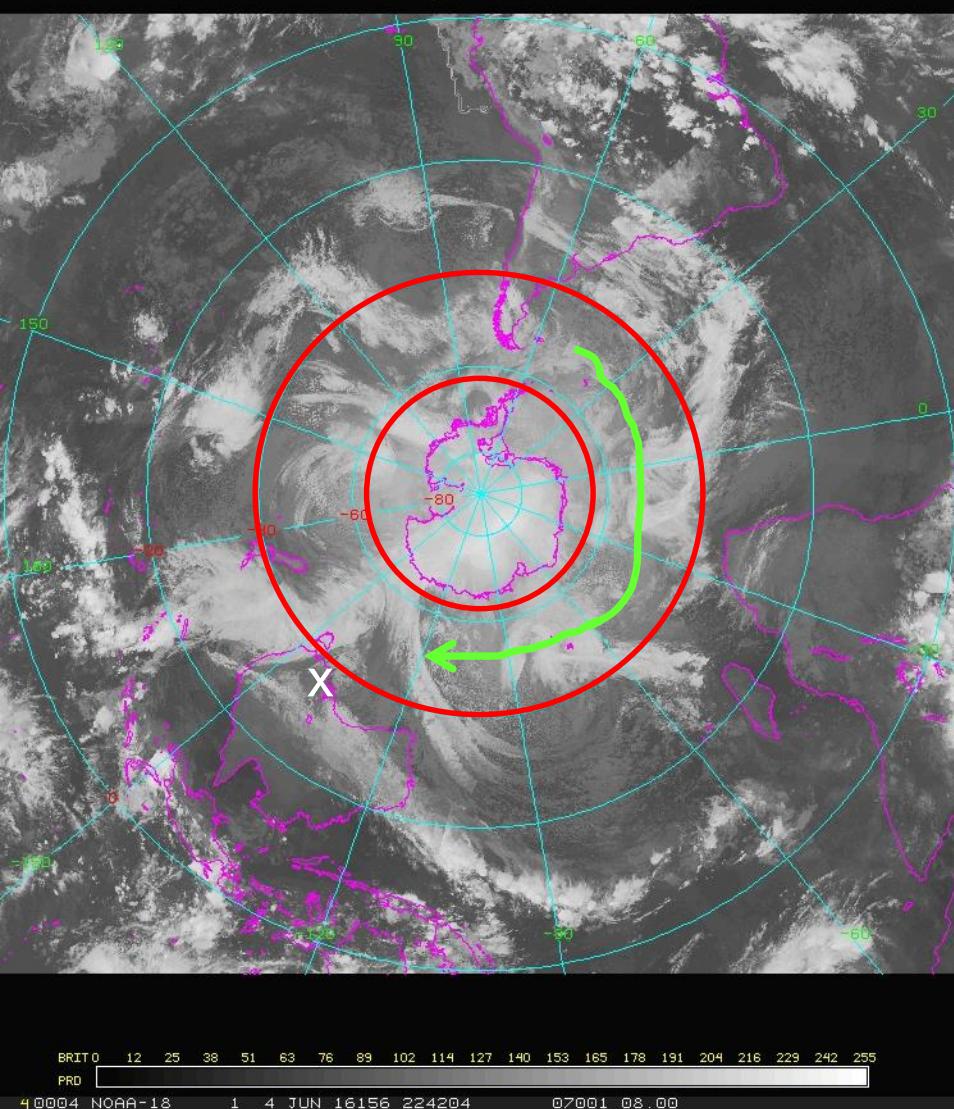


-1.2 and falling.

The pattern of high and low pressure around the Equator is normal

Normal pressure at Darwin and Tahiti.

Starting to be worth watching at this time of the year.

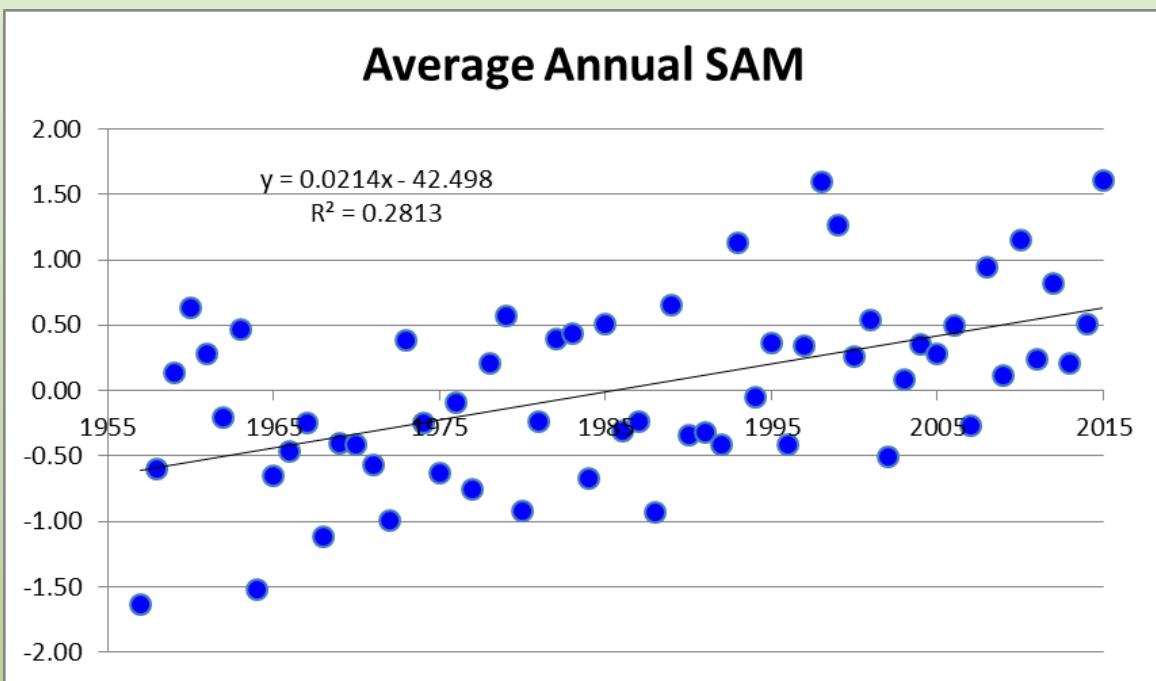


Southern Annular Mode, SAM or AAO

A crude measure of the strength of polar westerlies in the Southern Ocean.

The SAM index is calculated by the differences in pressure between 40° and 65° degrees latitude

Pushes or pulls rain bearing triggers away from southern Victoria.



A 60 year trend of more +SAM

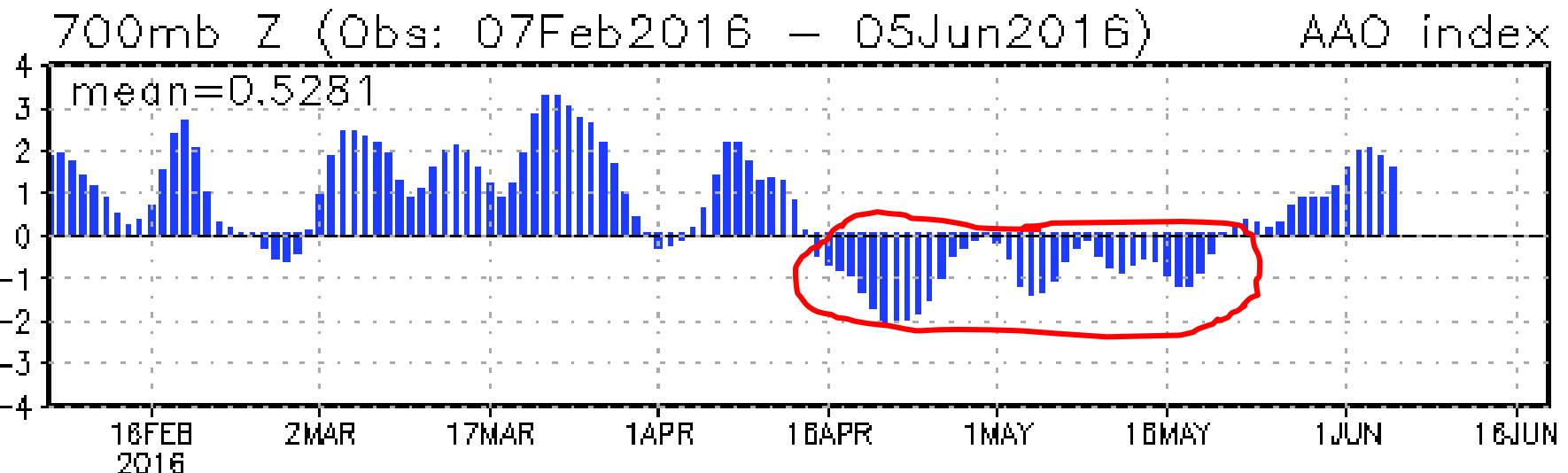
Fronts pulled southwards, but mainly in Summer and Autumn

Elements of natural variability, Antarctic ozone hole, but mainly Climate Change

Big effect in SW WA already



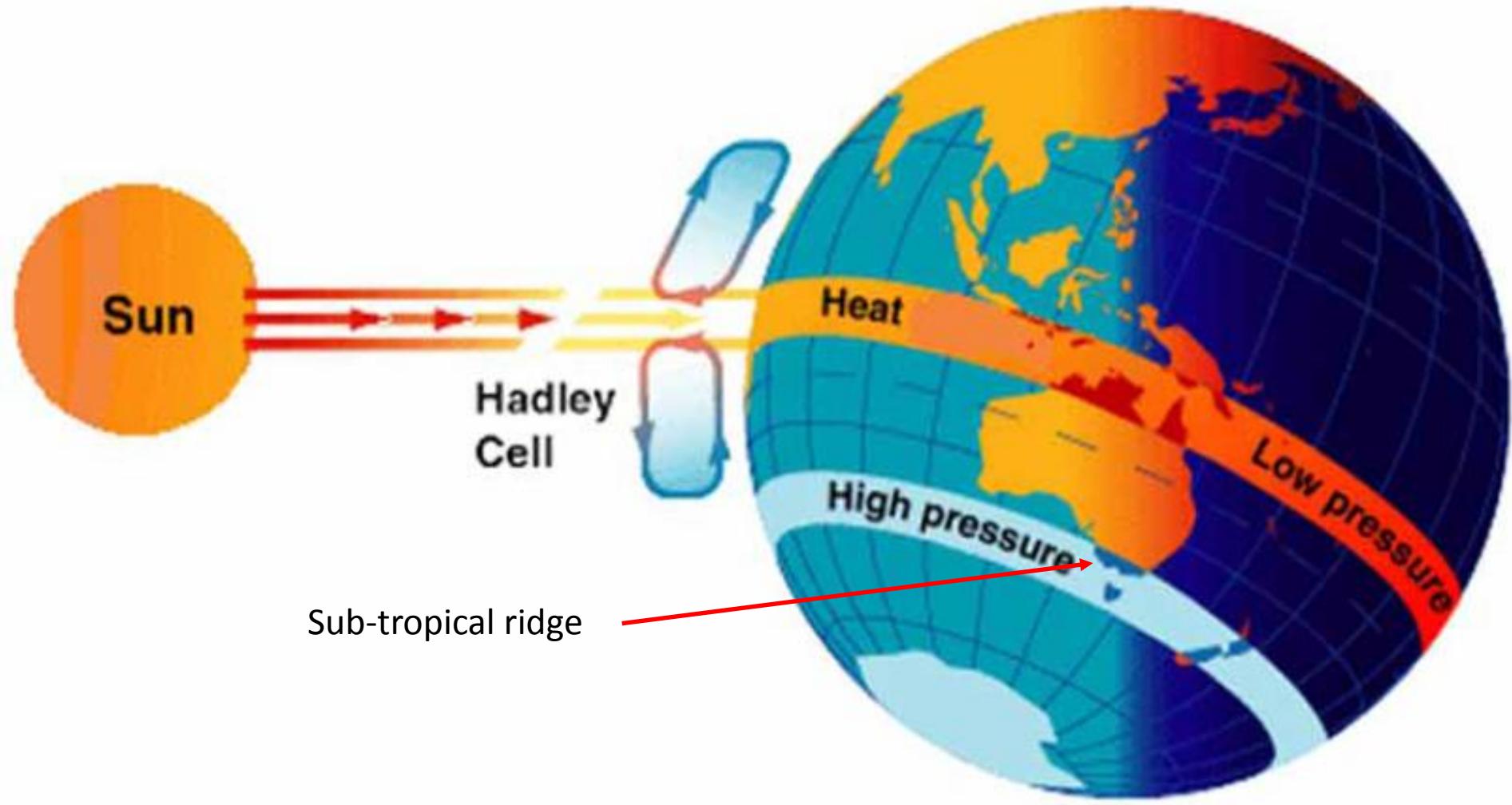
Southern Annular Mode AAO: Observed & GFS forecasts



The Southern Annular Mode (SAM) was negative for most of May.

First break from positive for 12 months

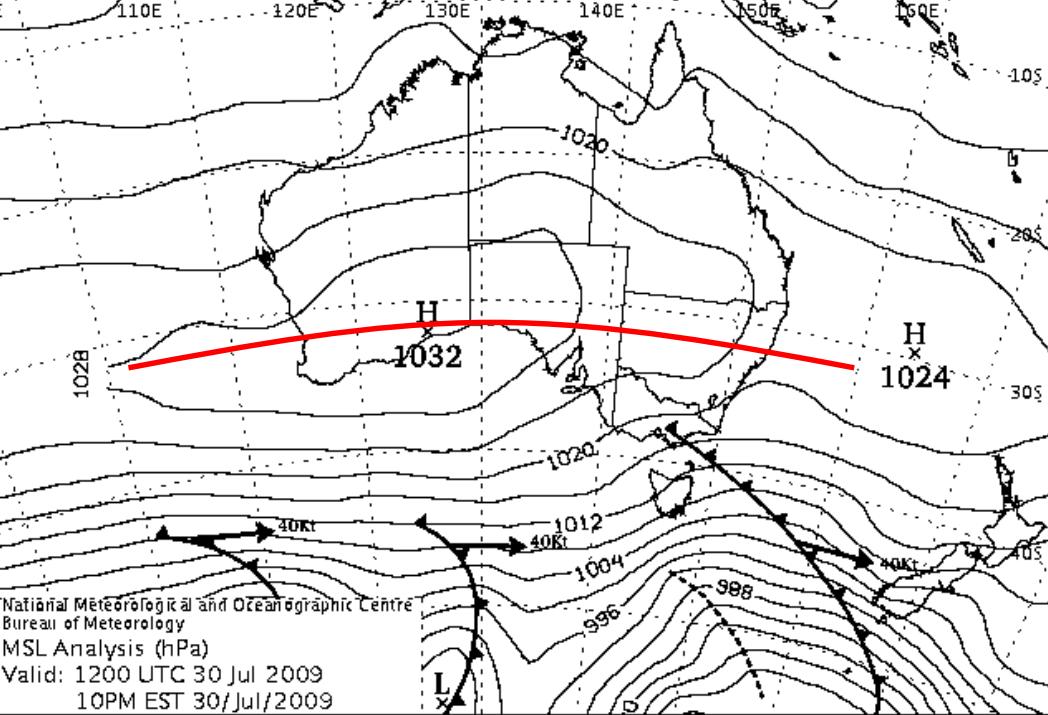
Predicted to go moderately positive for the next two weeks, and potentially most of winter, common in La Niña years.



The Sub tropical ridges originate as a result of the Hadley Cells emanating from the Equator.

One in each hemisphere, dry descending air causing high pressure.

Mediterranean climates and deserts occur in these regions of the world.



July 2009

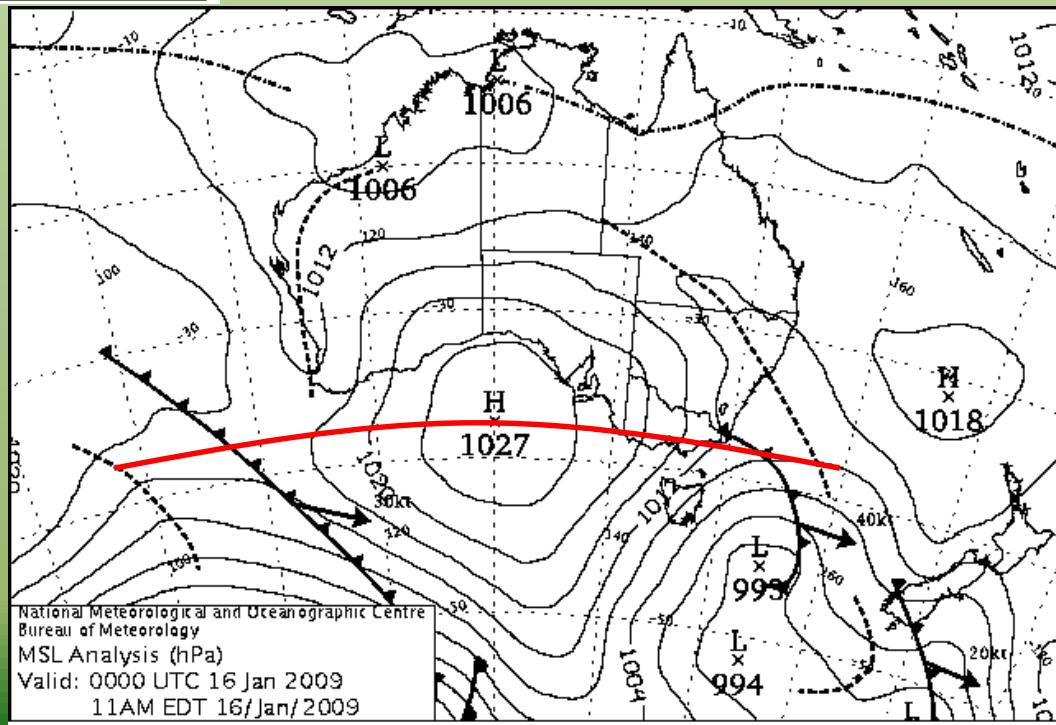
Winter pattern, strong highs centered over the top of the Bight

Jan 2009

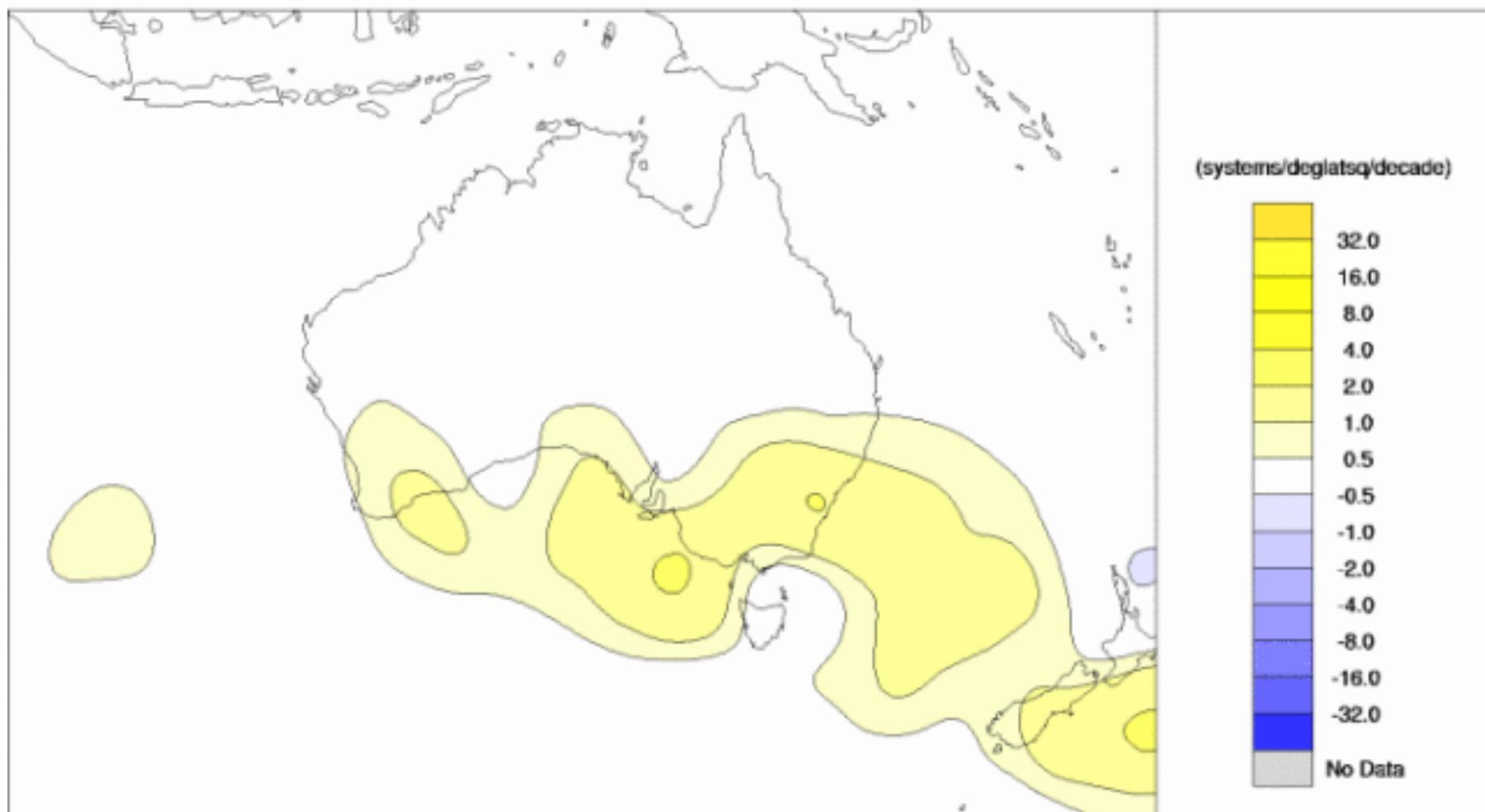
Sub Tropical Ridge

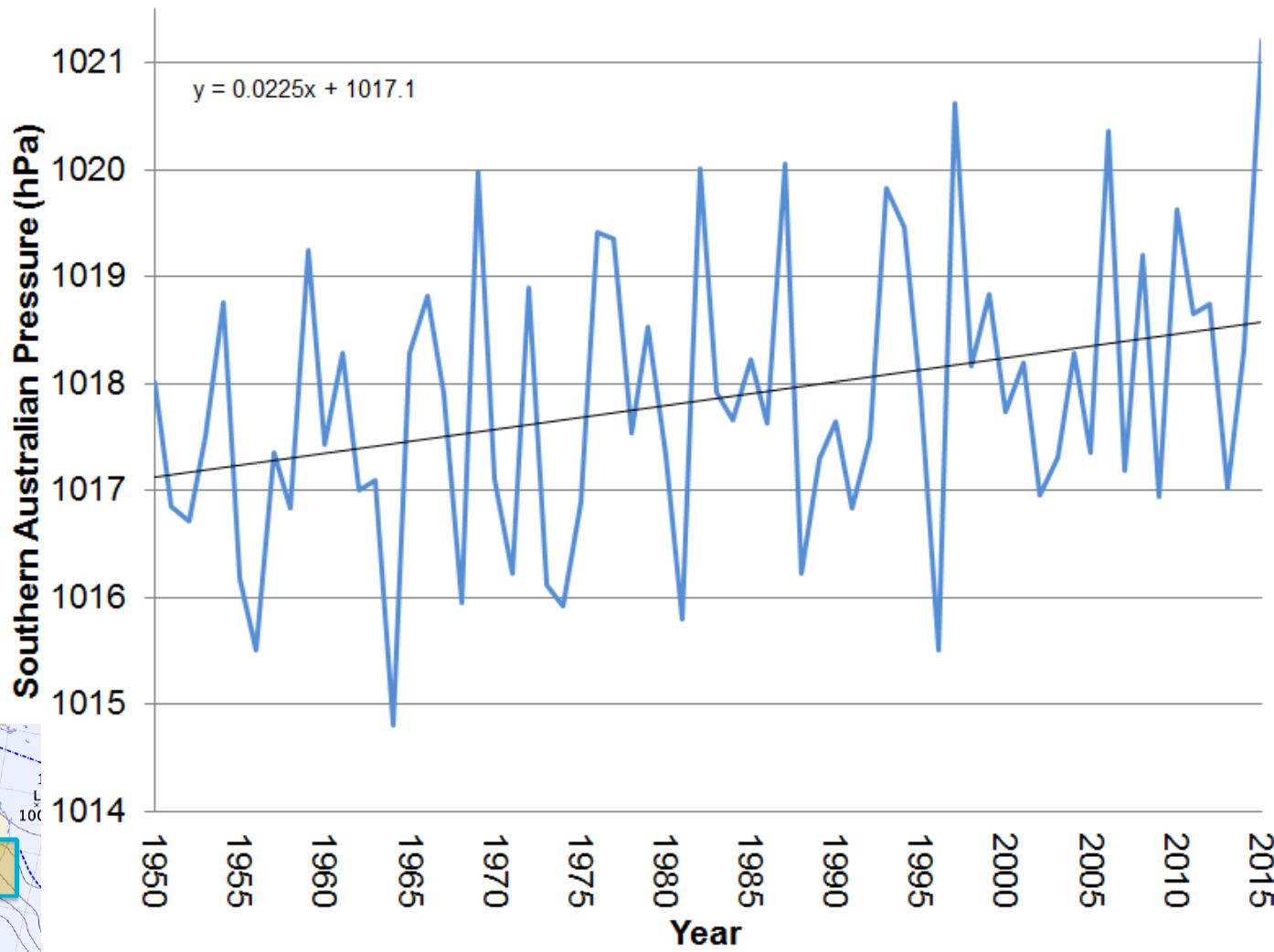
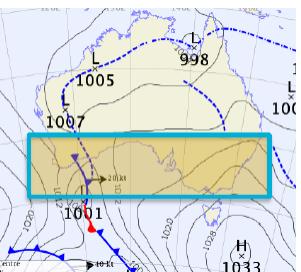
The High pressure belt lying over Australia and at all mid latitudes of the world.

Summer pattern, centre of highs over Melbourne



Trend in Annual Anti-Cyclone Density 1950-2008



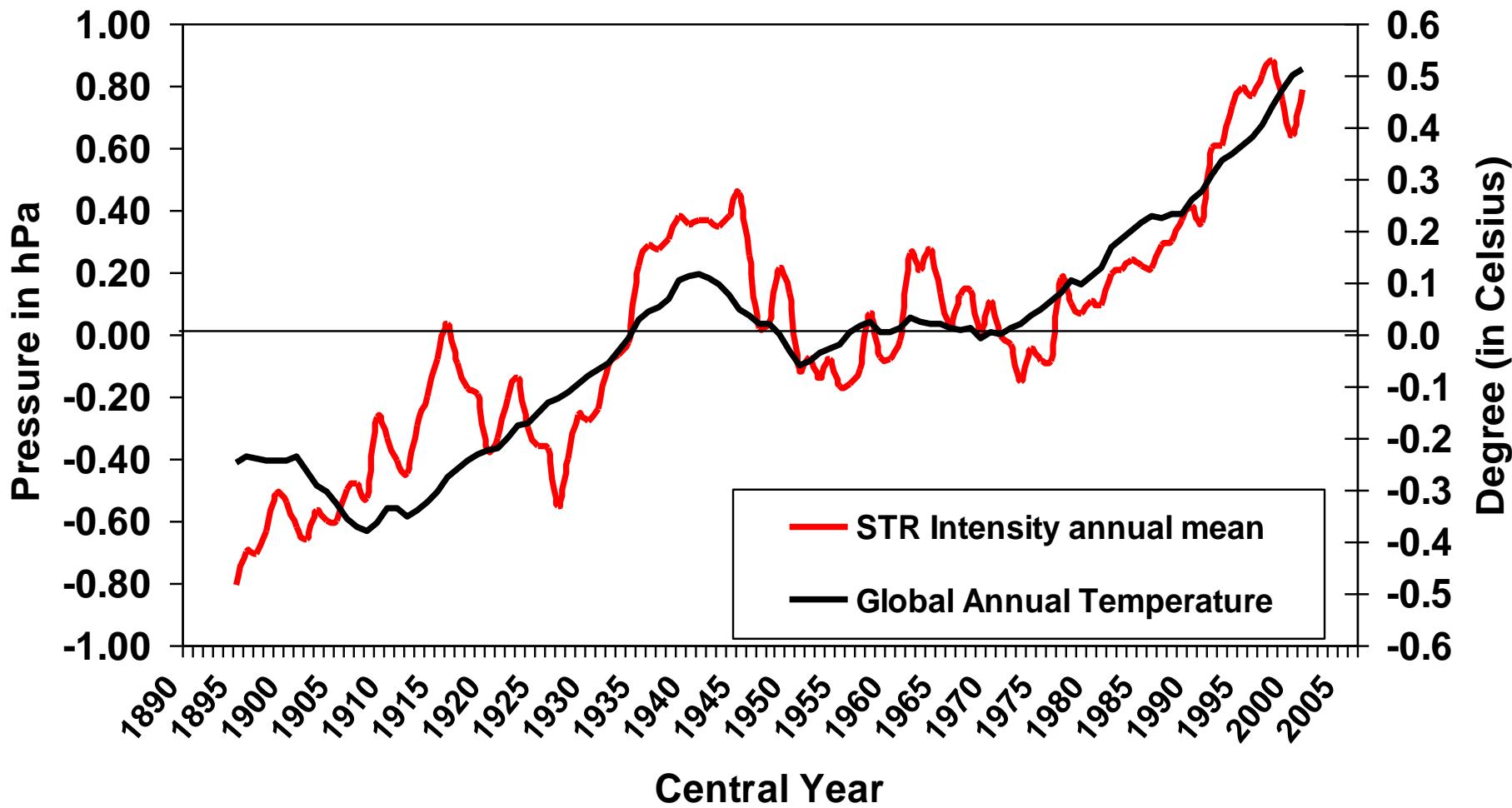


April-Oct Pressure – Southern Australia 1950-2015

Region (100-155E_40-30N) Source: BoM David Jones

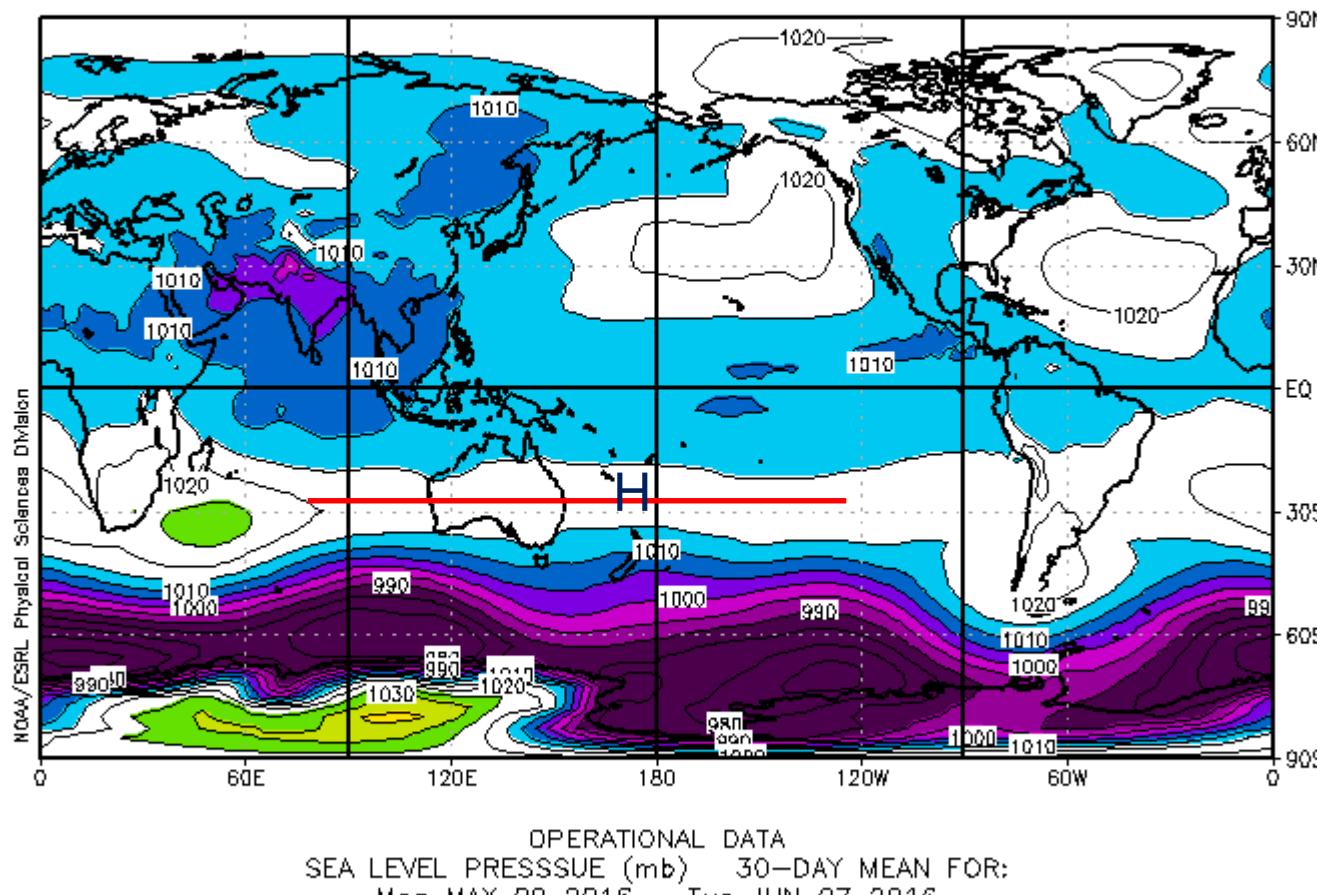
Intensity of the STR and Global Warming

(11-years running means)





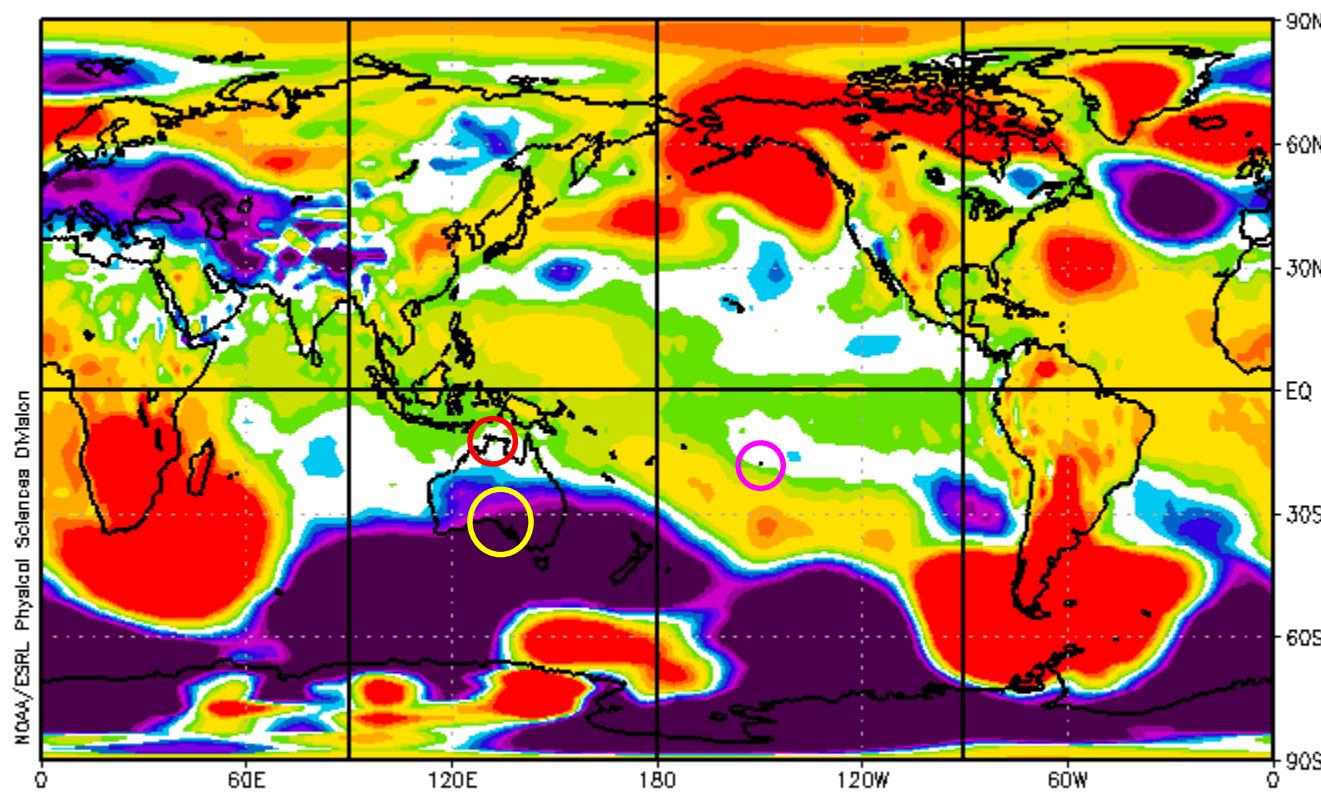
Last 30 days Air Pressure



The Sub Tropical Ridge latitude was higher than normal. Good for fronts.



Last 30 days Air Pressure Anomaly



OPERATIONAL DATA
SEA LEVEL PRESSURE (mb) 30-DAY ANOMALY FOR:
Mon MAY 09 2016 – Tue JUN 07 2016

(NCEP Operational climatology data: 1985–1996, smoothed with 5-day running mean)

Victorian pressure lower

Darwin pressure normal, Tahiti pressure normal, SOI zero

At last Darwin pressure has normalised. Watch for it dropping.

Modelled Climate and Ocean Predictions for SA from May 2016 run models

| | Coupled GCM's | | | | | | | Ensembles | | Statistical | |
|------------------------------|-----------------------------|------------------------------|------------------------------|----------------------|-----------------------|---------------------|------------------------|-----------------|-------------------|-----------------------------------|---------------------------------------|
| | System 4 ECMWF Europe | POAMA2 BoM Australia | SINTEX-F JAMSTEC Japan | CFSv2 NCEP USA | GEOS-5 NASA USA | ENS JMA Japan | UKMO UK GlosSea5 | IRI USA | APCC Korea | SOI phase USQ/Qld Australia | ESS AEGIC Australia |
| Month of Run | May | May | May | May | May | May | May | May | May | May | May |
| Forecast months | JJA | JJA | JJA | JJA | JJA | JJA | JJA | JJA | JJA | JJA | JJA |
| Winter Pacific Ocean NINO3.4 | Cool (La Niña) | Cool (La Niña) | Cool (La Niña) | Cool (La Niña) | Cool (La Niña) | Cool (La Niña) | Cool (La Niña) | Neutral | Cool (La Niña) | | Neutral |
| Winter Eastern Indian Ocean | Warm (weak IOD-) | Slightly warm (weak IOD-) | Warm (weak IOD-) | Warm (weak IOD-) | Warm (weak IOD-) | Slightly warm | Warm (IOD-) | Warm | Warm (IOD-) | | |
| Winter Rainfall | Slightly wetter | Slightly wetter | Slightly wetter | Slightly wetter | Average | Average | Slightly wetter | Average | Average | Slightly wetter | Average/ slightly wetter Mallee |
| Winter Temperature | Average | Slightly cooler/cool | Slightly warmer | Average | Slightly warmer | Average | Average | Slightly warmer | Average | | |

Winter

| | |
|----------------|--------------------------|
| Pacific Ocean- | Cool La Nina |
| Indian Ocean- | Warm (IOD-) |
| Rainfall- | Slightly wetter/average |
| Temperature- | Average/ slightly warmer |

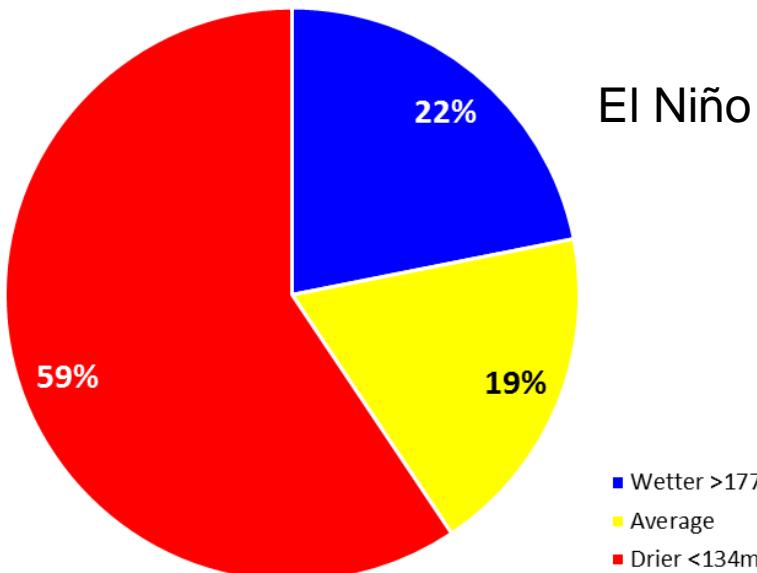
Modelled Climate and Ocean Predictions for SA from May 2016 run models

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|------------------------------|-----------------------------|------------------------------|------------------------------|----------------------|--------------------------------|---------------------|------------------------|------------------------|--------------------------------|-----------------------------------|---------------------------|
| | System 4 ECMWF Europe | POAMA2 BoM Australia | SINTEX-F JAMSTEC Japan | CFSv2 NCEP USA | GEOS-5 NASA USA | ENS JMA Japan | UKMO UK GlosSea5 | IRI USA | APCC Korea | SOI phase USQ/Qld Australia | ESS AEGIC Australia |
| Month of Run | May | May | May | May | May | May | May | May | May | May | May |
| Forecast months | SON | SON | SON | SON | SON | | ASO | SON | SON | | SON |
| Spring Pacific Ocean NINO3.4 | Cool (weak La Niña) | Slightly cool (La Niña) | Cool (weak La Niña) | Cool (La Niña) | Cool (La Niña) | | Cool (La Niña) | Cool (weak La Niña) | Cool (La Niña) | | Slightly cool |
| Spring Eastern Indian Ocean | Warm (weak IOD-) | Slightly warm (weak IOD-) | Warm (IOD-) | Warm (IOD-) | Warm (IOD-) | | Warm (IOD-) | Warm (IOD-) | Warm (IOD-) | | |
| Spring Rainfall | Slightly wetter | Slightly wetter | Slightly wetter | Slightly wetter | Slightly wetter | | Slightly wetter | Average | Slightly wetter | | |
| Spring Temperature | Slightly cooler | Cooler | Slightly warmer | Cooler | Slightly warmer/ average EP | | Average | Slightly warmer | Average, slightly cooler EP | | |

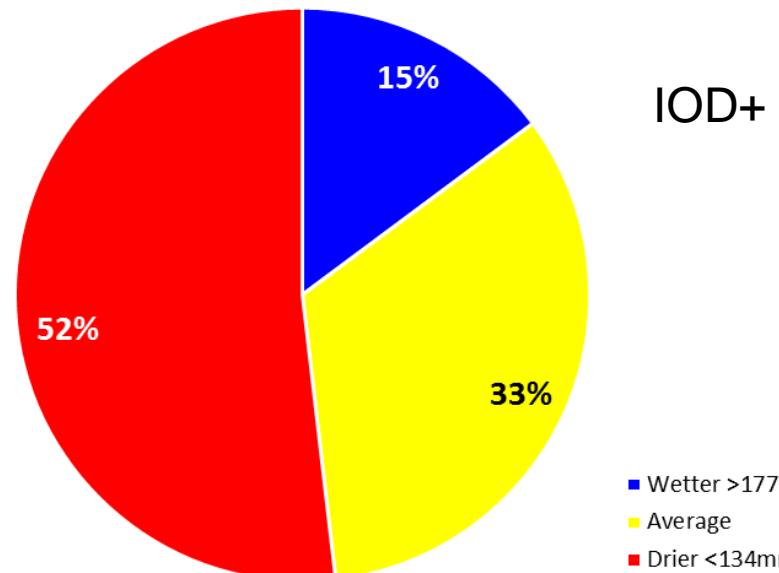
Spring

| | |
|----------------|-----------------|
| Pacific Ocean- | Cool (La Nina) |
| Indian Ocean- | Warm (IOD-) |
| Rainfall- | Slightly wetter |
| Temperature- | Mixed |

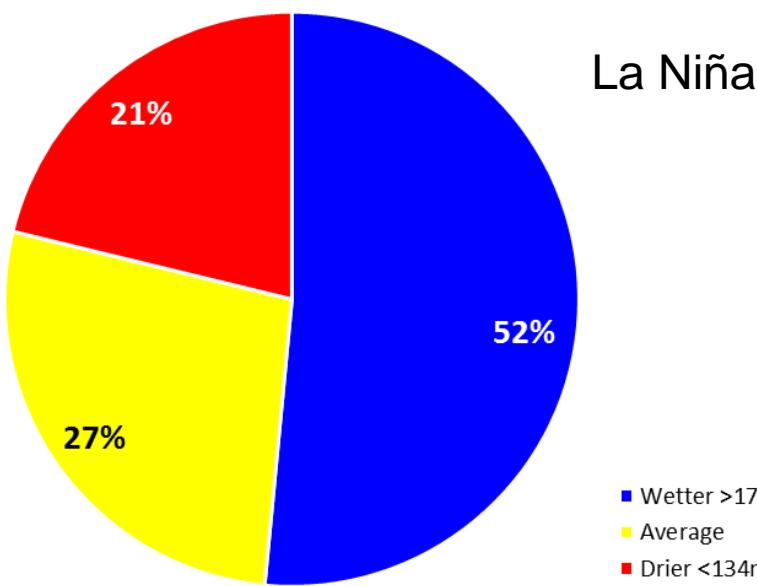
Maitland Aug-Oct rainfall
in 32 El Niño years since 1879



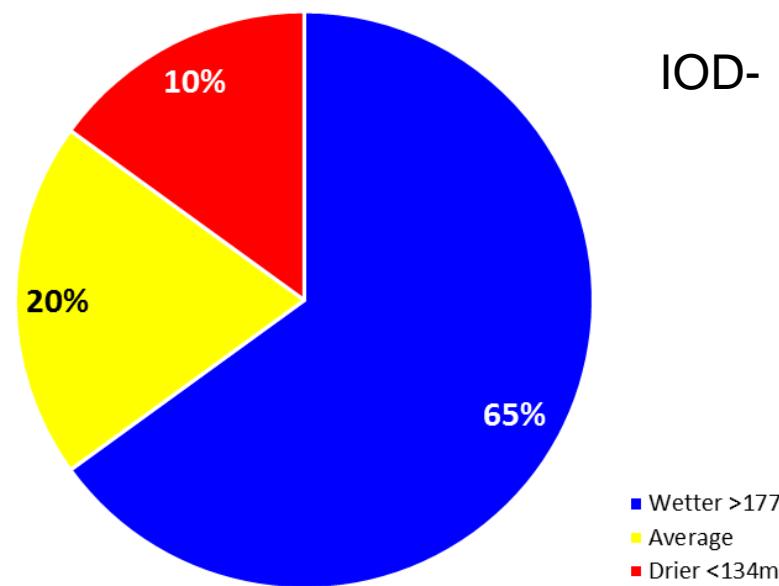
Maitland Aug-Oct rainfall
in 27 IOD+ years since 1879



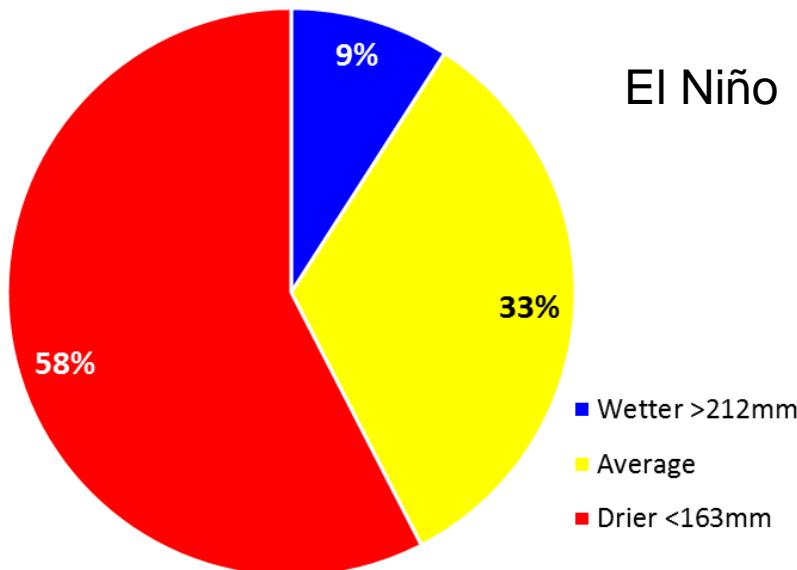
Maitland Aug-Oct rainfall
in 33 La Niña years since 1879



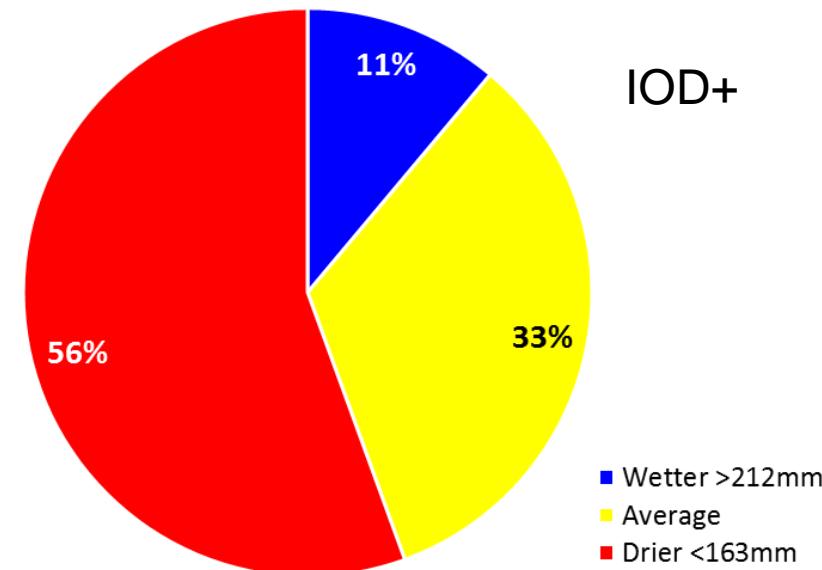
Maitland Aug-Oct rainfall
in 20 IOD- years since 1879



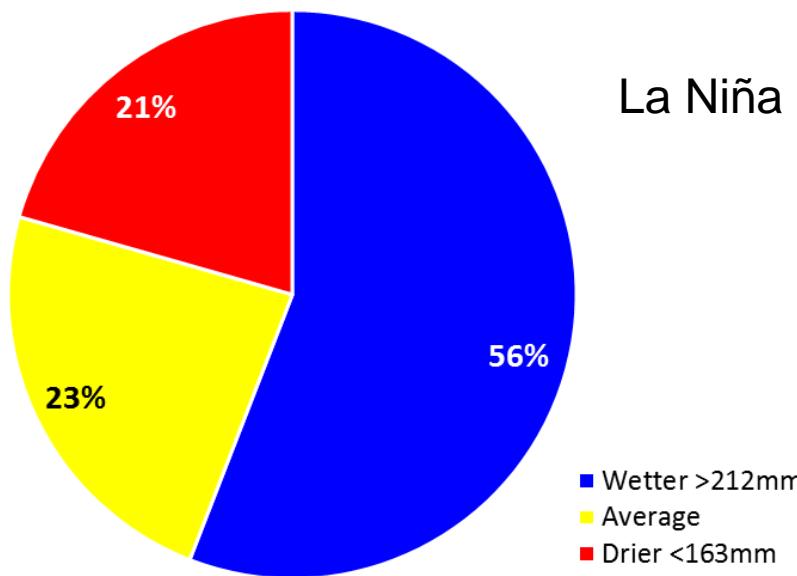
Naracoorte Aug-Oct Rainfall
in 33 El Niño years since 1879



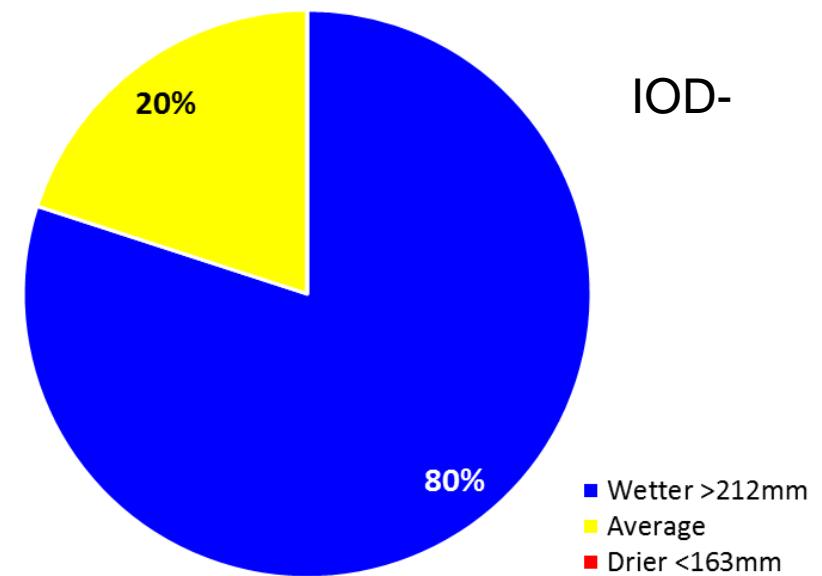
Naracoorte Aug-Oct rainfall
in 27 IOD+ years since 1879



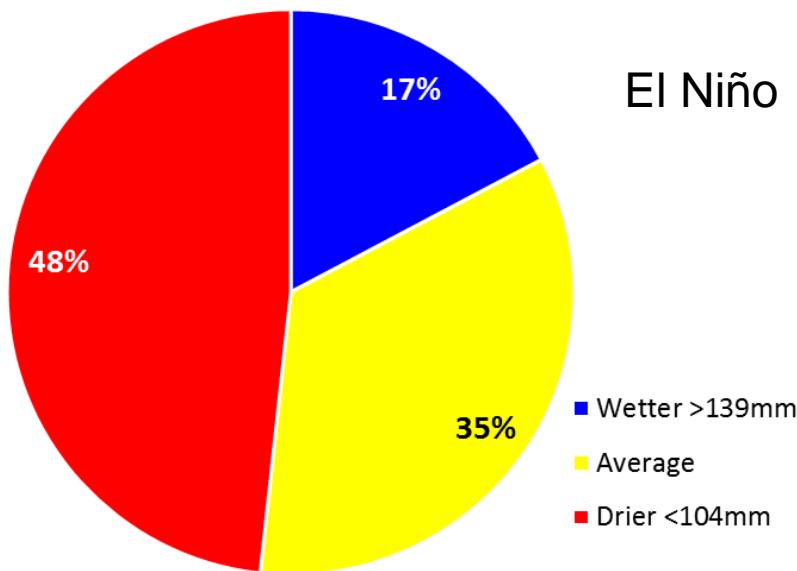
Naracoorte Aug-Oct rainfall
in 34 La Niña years since 1879



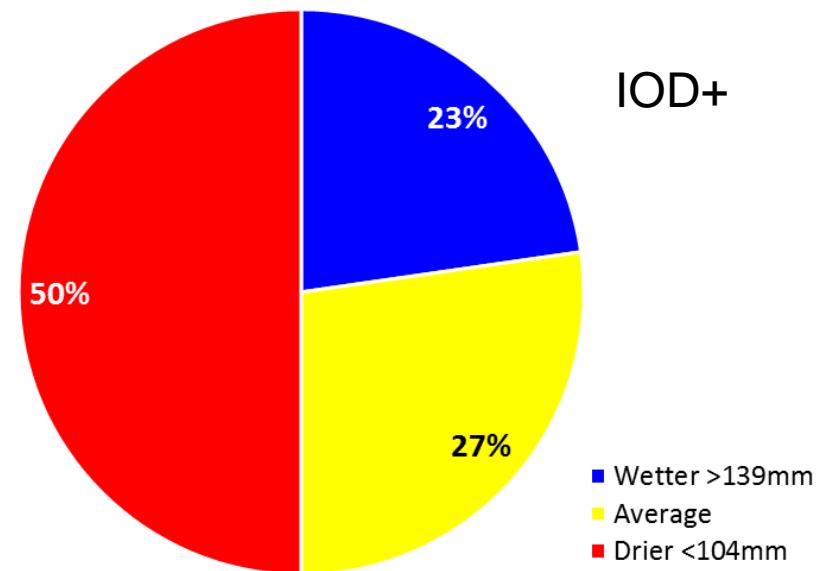
Naracoorte Aug-Oct rainfall
in 20 IOD- years since 1879



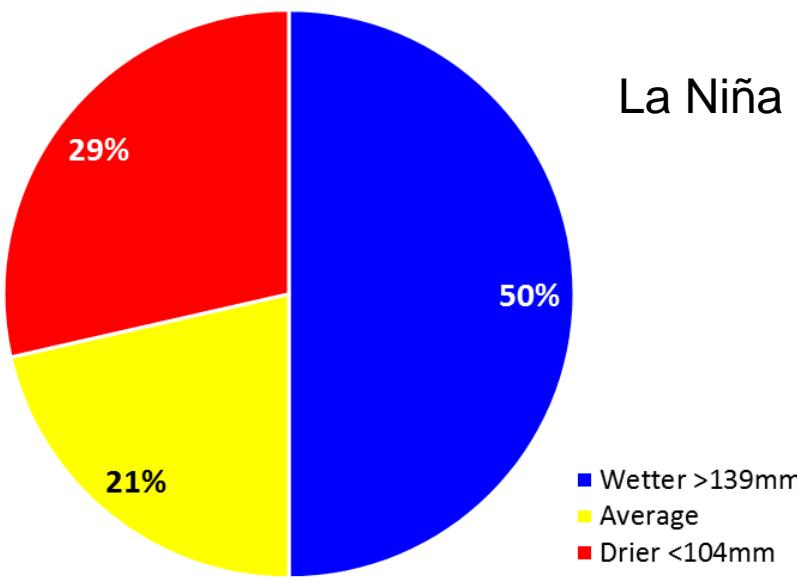
Lameroo Aug-Oct Rainfall
in 29 El Niño years since 1900



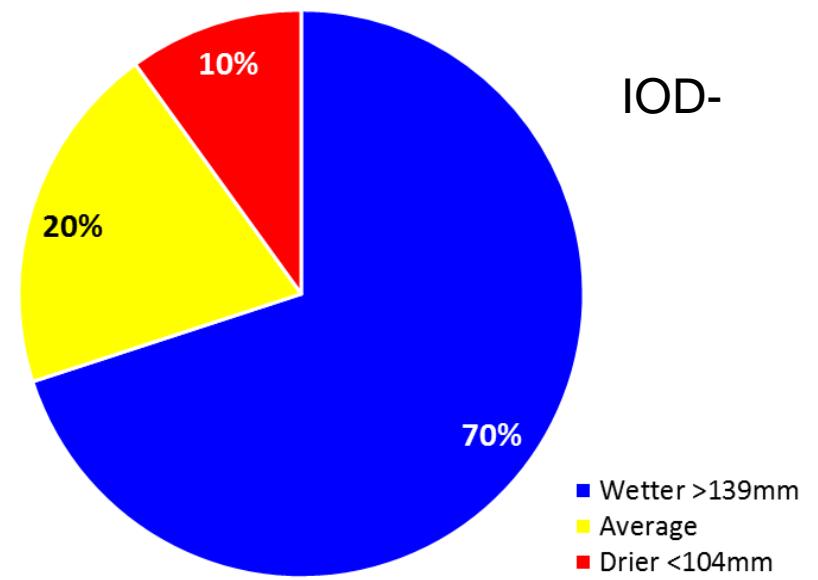
Lameroo Aug-Oct rainfall
in 22 IOD+ years since 1900



Lameroo Aug-Oct rainfall
in 28 La Niña years since 1900



Lameroo Aug-Oct rainfall
in 20 IOD- years since 1900



| Year | El Nino | Apr-Oct | Year After | El Nino | La Nina | IOD+ | IOD- | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Apr-Oct |
|------|---------|---------|------------|------------|---------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| 1888 | ✓ | 439 | 1889 | | | | | 48 | 28 | 7 | 173 | 80 | 185 | 30 | 135 | 45 | 115 | 30 | 12 | 763 |
| 1963 | ✓ | 487 | 1964 | | ✓ | | | 18 | 18 | 23 | 56 | 55 | 97 | 204 | 88 | 101 | 91 | 93 | 40 | 692 |
| 1905 | ✓ | 549 | 1906 | | ✓ | | ✓ | 4 | 10 | 56 | 21 | 74 | 107 | 194 | 70 | 99 | 50 | 57 | 17 | 615 |
| 1941 | ✓ | 437 | 1942 | | ✓ | | ✓ | 30 | 4 | 10 | 31 | 142 | 86 | 98 | 106 | 102 | 45 | 46 | 26 | 610 |
| 1914 | ✓ | 201 | 1915 | | | | ✓ | 9 | 0 | 9 | 32 | 60 | 183 | 45 | 113 | 110 | 33 | 14 | 0 | 576 |
| 1957 | ✓ | 289 | 1958 | | | | ✓ | 1 | 6 | 17 | 16 | 142 | 44 | 96 | 125 | 49 | 80 | 26 | 8 | 552 |
| 1991 | ✓ | 500 | 1992 | | | | ✓ | 16 | 7 | 38 | 80 | 65 | 64 | 67 | 82 | 104 | 75 | 93 | 107 | 537 |
| 1969 | ✓ | 325 | 1970 | | ✓ | | | 26 | 1 | 31 | 77 | 55 | 85 | 93 | 143 | 41 | 38 | 74 | 50 | 532 |
| 1946 | ✓ | 385 | 1947 | | | | | 7 | 46 | 118 | 28 | 41 | 73 | 166 | 59 | 64 | 89 | 86 | 82 | 520 |
| 1972 | ✓ | 395 | 1973 | | ✓ | | | 31 | 65 | 42 | 54 | 75 | 107 | 43 | 92 | 89 | 59 | 21 | 29 | 519 |
| 1951 | ✓ | 529 | 1952 | | | | | 51 | 33 | 1 | 51 | 75 | 104 | 80 | 68 | 73 | 65 | 98 | 36 | 516 |
| 1987 | ✓ | 402 | 1988 | | ✓ | | ✓ | 32 | 29 | 31 | 19 | 98 | 114 | 83 | 67 | 84 | 47 | 27 | 21 | 512 |
| 1925 | ✓ | 437 | 1926 | | | ✓ | | 1 | 14 | 5 | 63 | 93 | 46 | 85 | 92 | 49 | 67 | 28 | 23 | 495 |
| 1919 | ✓ | 347 | 1920 | | | | | 9 | 3 | 16 | 17 | 74 | 100 | 82 | 117 | 61 | 30 | 31 | 13 | 481 |
| 1982 | ✓ | 289 | 1983 | | | ✓ | | 10 | 0 | 95 | 60 | 80 | 48 | 68 | 71 | 111 | 37 | 50 | 43 | 475 |
| 2002 | ✓ | 312 | 2003 | | | | | 31 | 39 | 40 | 30 | 34 | 114 | 67 | 94 | 54 | 63 | 21 | 24 | 456 |
| 1911 | ✓ | 361 | 1912 | | | | | 2 | 11 | 30 | 36 | 16 | 70 | 62 | 60 | 168 | 40 | 48 | 38 | 452 |
| 1902 | ✓ | 277 | 1903 | | ✓ | | | 30 | 58 | 46 | 61 | 26 | 103 | 67 | 66 | 80 | 48 | 29 | 19 | 451 |
| 1994 | ✓ | 329 | 1995 | | | | | 75 | 21 | 14 | 77 | 45 | 102 | 135 | 34 | 26 | 32 | 14 | 16 | 451 |
| 1930 | ✓ | 474 | 1931 | Naracoorte | | | | 33 | 3 | 29 | 54 | 77 | 86 | 83 | 67 | 65 | 18 | 17 | 3 | 450 |
| 1899 | ✓ | 366 | 1900 | | | | | 31 | 4 | 86 | 73 | 54 | 112 | 35 | 100 | 39 | 31 | 13 | 20 | 444 |
| 1965 | ✓ | 451 | 1966 | | | | | 24 | 35 | 31 | 16 | 60 | 51 | 135 | 55 | 69 | 55 | 28 | 62 | 441 |
| 1940 | ✓ | 300 | 1941 | ✓ | | | | 80 | 16 | 57 | 65 | 39 | 37 | 98 | 37 | 119 | 42 | 8 | 13 | 437 |
| 1997 | ✓ | 358 | 1998 | | ✓ | | | 16 | 19 | 7 | 57 | 33 | 72 | 78 | 27 | 110 | 47 | 13 | 8 | 424 |
| 1896 | ✓ | 319 | 1897 | | ✓ | | | 13 | 10 | 20 | 31 | 55 | 59 | 49 | 97 | 81 | 38 | 31 | 1 | 410 |
| 1986 | ✓ | 447 | 1987 | ✓ | | | | 12 | 15 | 9 | 24 | 119 | 91 | 66 | 48 | 15 | 39 | 21 | 40 | 402 |
| 2009 | ✓ | 397 | 2010 | | ✓ | | ✓ | 16 | 29 | 27 | 68 | 25 | 54 | 41 | 102 | 59 | 37 | 42 | 143 | 386 |
| 1877 | ✓ | 329 | 1878 | | ✓ | | | 0 | 16 | 45 | 63 | 30 | 82 | 51 | 57 | 50 | 46 | 21 | 8 | 379 |
| 1918 | ✓ | 413 | 1919 | ✓ | | ✓ | | 7 | 69 | 27 | 1 | 52 | 49 | 75 | 42 | 87 | 41 | 11 | 34 | 347 |
| 2006 | ✓ | 157 | 2007 | | ✓ | | | 85 | 4 | 13 | 20 | 99 | 21 | 77 | 36 | 55 | 37 | 74 | 19 | 345 |
| 1977 | ✓ | 274 | 1978 | | | ✓ | | 18 | 8 | 5 | 39 | 28 | 41 | 75 | 71 | 70 | 21 | 53 | 24 | 345 |
| 1913 | ✓ | 386 | 1914 | ✓ | | | | 25 | 0 | 50 | 42 | 48 | 24 | 56 | 9 | 16 | 6 | 27 | 48 | 201 |

| Year | El Nino | Apr-Oct | Next Year | El Nino | La Nina | IOD+ | IOD- | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Apr-Oct |
|------|---------|---------|-----------|---------|---------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| 1991 | ✓ | 245 | 1992 | | | | ✓ | 13 | 17 | 30 | 61 | 49 | 37 | 25 | 85 | 109 | 58 | 67 | 58 | 424 |
| 1972 | ✓ | 154 | 1973 | | ✓ | | | 33 | 108 | 21 | 33 | 33 | 42 | 65 | 50 | 29 | 139 | 33 | 32 | 391 |
| 1925 | ✓ | 305 | 1926 | | | ✓ | | 0 | 7 | 7 | 48 | 86 | 26 | 51 | 60 | 51 | 43 | 10 | 12 | 365 |
| 1941 | ✓ | 270 | 1942 | | ✓ | | ✓ | 22 | 8 | 0 | 44 | 59 | 65 | 42 | 64 | 60 | 29 | 39 | 12 | 363 |
| 1905 | ✓ | 388 | 1906 | | ✓ | | ✓ | 0 | 13 | 24 | 5 | 32 | 90 | 65 | 64 | 69 | 31 | 52 | 20 | 356 |
| 1914 | ✓ | 107 | 1915 | | | | ✓ | 12 | 0 | 1 | 24 | 61 | 64 | 21 | 72 | 74 | 40 | 6 | 14 | 356 |
| 1994 | ✓ | 169 | 1995 | | | | | 56 | 38 | 4 | 54 | 41 | 78 | 74 | 20 | 11 | 73 | 10 | 12 | 351 |
| 1919 | ✓ | 191 | 1920 | | | | | 6 | 0 | 14 | 5 | 31 | 66 | 28 | 89 | 86 | 38 | 25 | 29 | 343 |
| 1982 | ✓ | 143 | 1983 | | | ✓ | | 8 | 1 | 96 | 60 | 29 | 23 | 58 | 59 | 70 | 39 | 24 | 43 | 338 |
| 1957 | ✓ | 176 | 1958 | | | | ✓ | 7 | 9 | 17 | 13 | 85 | 2 | 54 | 63 | 56 | 55 | 20 | 21 | 328 |
| 1963 | ✓ | 365 | 1964 | | ✓ | | | 8 | 15 | 3 | 45 | 34 | 32 | 46 | 34 | 82 | 47 | 58 | 44 | 320 |
| 1911 | ✓ | 207 | 1912 | | | | | 0 | 4 | 10 | 12 | 14 | 125 | 55 | 30 | 60 | 24 | 61 | 34 | 320 |
| 2002 | ✓ | 136 | 2003 | | Lameroo | | | 4 | 96 | 0 | 17 | 65 | 47 | 45 | 70 | 29 | 46 | 13 | 30 | 319 |
| 1902 | ✓ | 210 | 1903 | | ✓ | | | 17 | 24 | 26 | 54 | 49 | 38 | 36 | 32 | 80 | 25 | 60 | 18 | 314 |
| 1946 | ✓ | 191 | 1947 | | | | | 5 | 51 | 64 | 19 | 13 | 31 | 68 | 49 | 57 | 66 | 21 | 39 | 303 |
| 1986 | ✓ | 365 | 1987 | ✓ | | | | 16 | 30 | 12 | 16 | 88 | 52 | 56 | 22 | 19 | 43 | 7 | 61 | 296 |
| 1930 | ✓ | 309 | 1931 | | | | | 14 | 3 | 20 | 33 | 32 | 86 | 40 | 49 | 41 | 11 | 17 | 2 | 292 |
| 1997 | ✓ | 203 | 1998 | | ✓ | | | 5 | 25 | 6 | 83 | 19 | 26 | 52 | 34 | 37 | 38 | 45 | 17 | 289 |
| 1977 | ✓ | 155 | 1978 | | | ✓ | | 19 | 1 | 35 | 22 | 22 | 38 | 83 | 51 | 42 | 28 | 65 | 7 | 286 |
| 1940 | ✓ | 166 | 1941 | ✓ | | | | 96 | 3 | 36 | 27 | 8 | 40 | 65 | 23 | 62 | 45 | 27 | 9 | 270 |
| 1987 | ✓ | 296 | 1988 | | ✓ | | ✓ | 35 | 21 | 8 | 11 | 75 | 61 | 32 | 19 | 48 | 15 | 35 | 21 | 261 |
| 1951 | ✓ | 339 | 1952 | | | | | 60 | 9 | 1 | 27 | 60 | 42 | 24 | 18 | 42 | 47 | 45 | 13 | 260 |
| 2009 | ✓ | 252 | 2010 | | ✓ | | ✓ | 13 | 25 | 48 | 28 | 30 | 22 | 22 | 62 | 49 | 35 | 31 | 108 | 248 |
| 1969 | ✓ | 229 | 1970 | | ✓ | | | 17 | 1 | 16 | 41 | 29 | 40 | 20 | 41 | 41 | 12 | 68 | 33 | 224 |
| 1965 | ✓ | 250 | 1966 | | | | | 13 | 30 | 13 | 3 | 27 | 33 | 65 | 28 | 28 | 32 | 16 | 49 | 216 |
| 1918 | ✓ | 290 | 1919 | ✓ | | ✓ | | 3 | 60 | 2 | 4 | 30 | 20 | 18 | 35 | 67 | 17 | 11 | 31 | 191 |
| 2006 | ✓ | 126 | 2007 | | ✓ | | | 67 | 25 | 24 | 36 | 43 | 18 | 49 | 8 | 16 | 8 | 30 | 22 | 178 |
| 1913 | ✓ | 293 | 1914 | ✓ | | | | 14 | 8 | 23 | 32 | 25 | 18 | 21 | 5 | 5 | 1 | 47 | 2 | 107 |

- History says chances of reasonable rain are good.
 - Models say warm Indian Ocean for some time.
 - Models are supportive of plenty of optimism with La Niña and IOD-, and skill is improving.
-
- La Niña's of late haven't fired for spring, 2000.
 - Springs have been warmer.
 - Pressure patterns and SAM have been causing issues most years.

June 26, 2014



August 7, 2014



Department of
Environment and
Primary Industries



Oct 3, 2014



Sept 5, 2014



Dec 9, 2014



Mar 10, 2015



The Very Fast Break

May 4, 2015





Stewart the Minion

Thank you

Economic Development,
Jobs, Transport
and Resources

SUBSCRIBE TO "THE
BREAK"
NEWSLETTERS,
[EDJTR.VIC.GOV.AU](http://www.edjtr.vic.gov.au)



AGRICULTURE VICTORIA

Does winning the pre season comp in Feb tell you anything about finals contention?

Video Centre

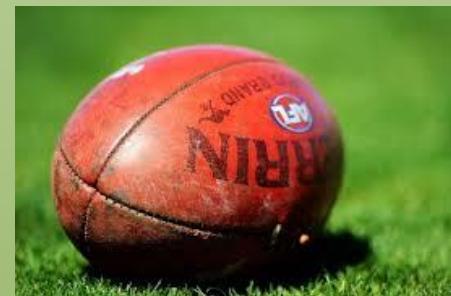


Winning isn't everything in February

Watch Carlton coach Mick Malthouse's post-match press conference



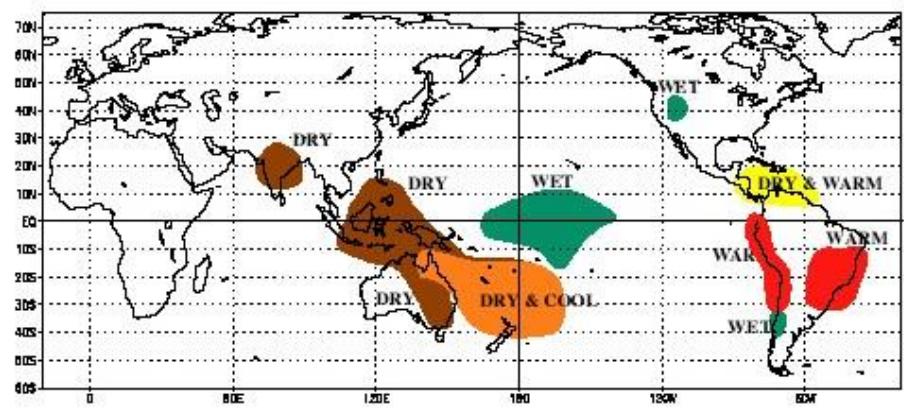
In June-July, greater confidence that your team is going OK, or not.



Come September its almost assured.

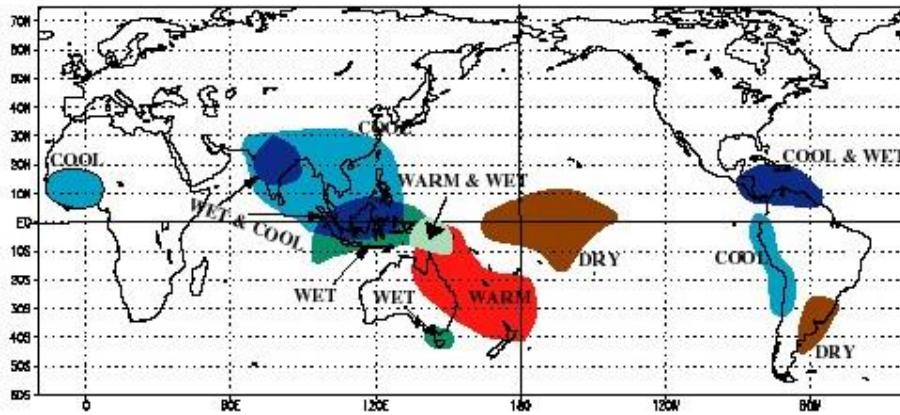


WARM EPISODE RELATIONSHIPS JUNE - AUGUST



El Niño

COLD EPISODE RELATIONSHIPS JUNE - AUGUST

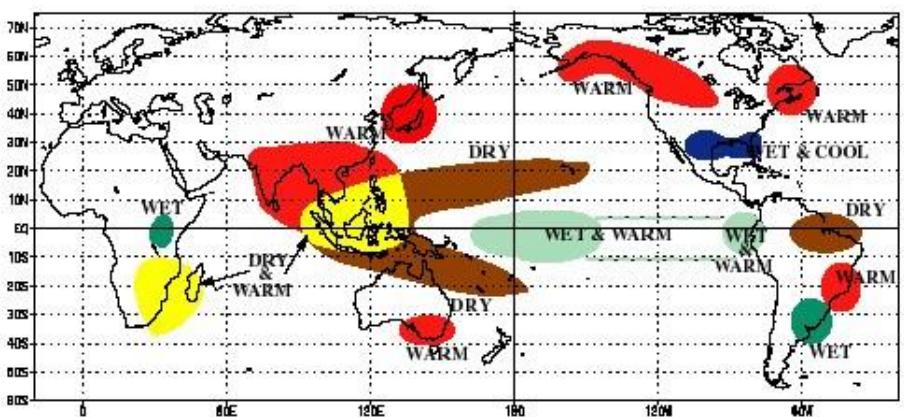


La Niña

Worldwide effects of La Niña and El Niño

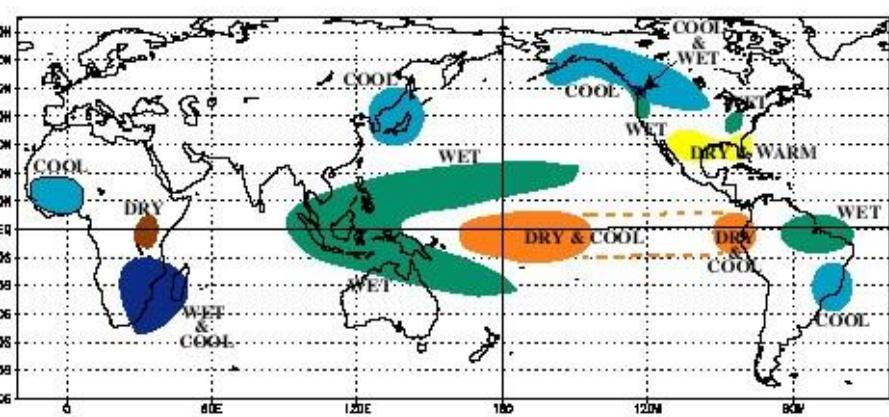
El Niño

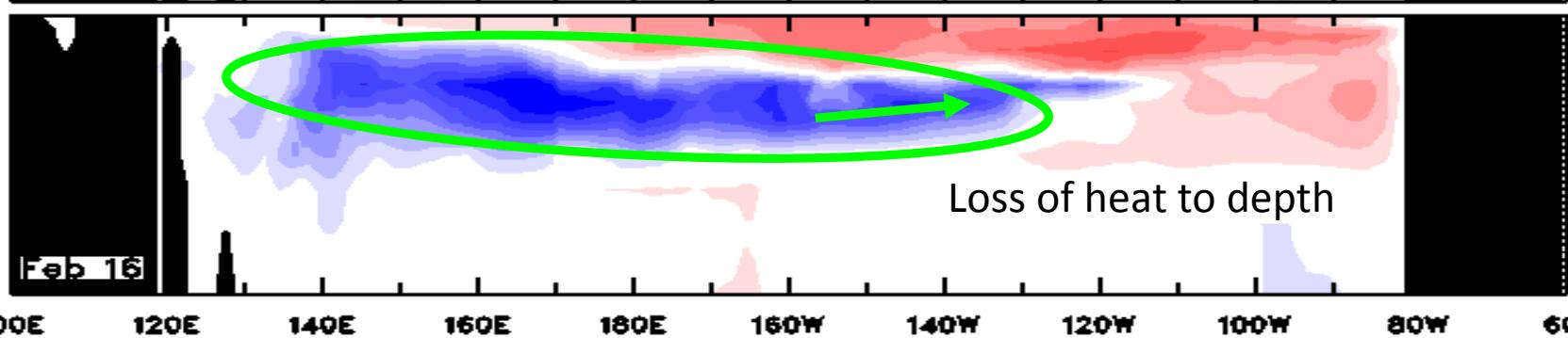
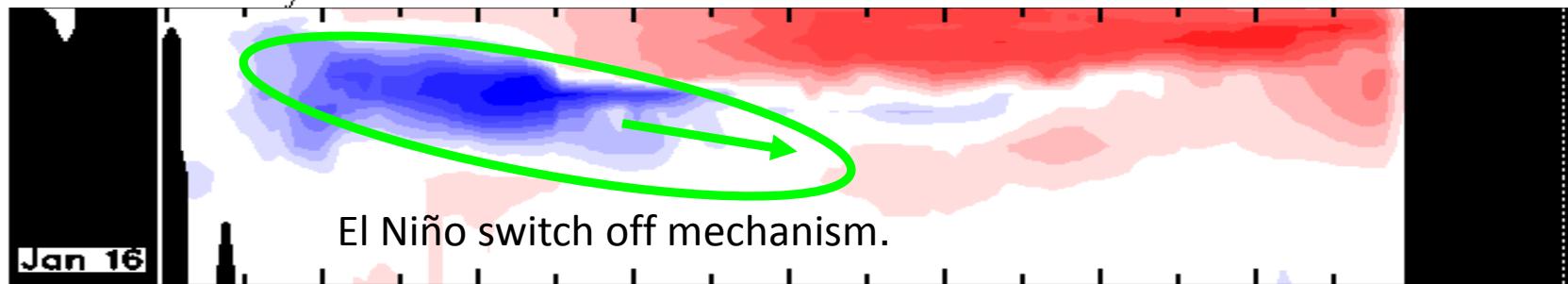
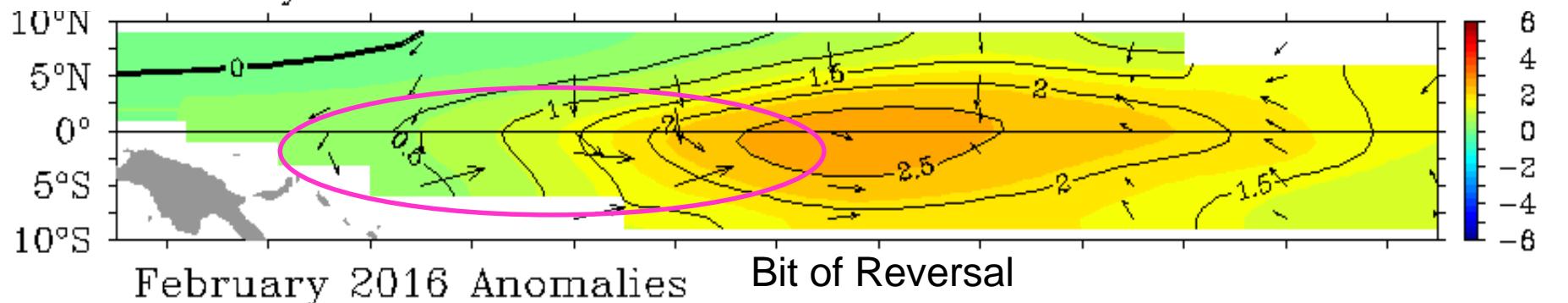
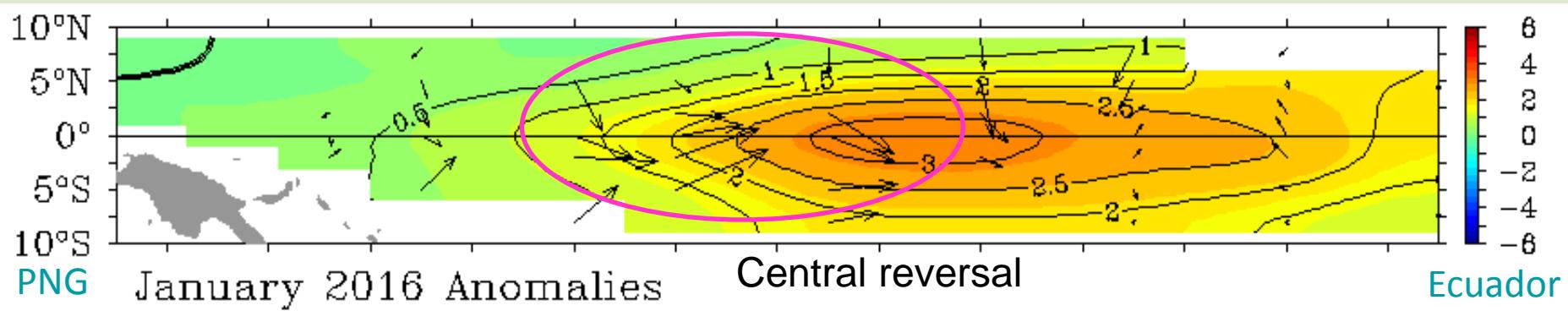
WARM EPISODE RELATIONSHIPS DECEMBER - FEBRUARY



La Niña

COLD EPISODE RELATIONSHIPS DECEMBER - FEBRUARY





Analysis done Feb 29 22:16

