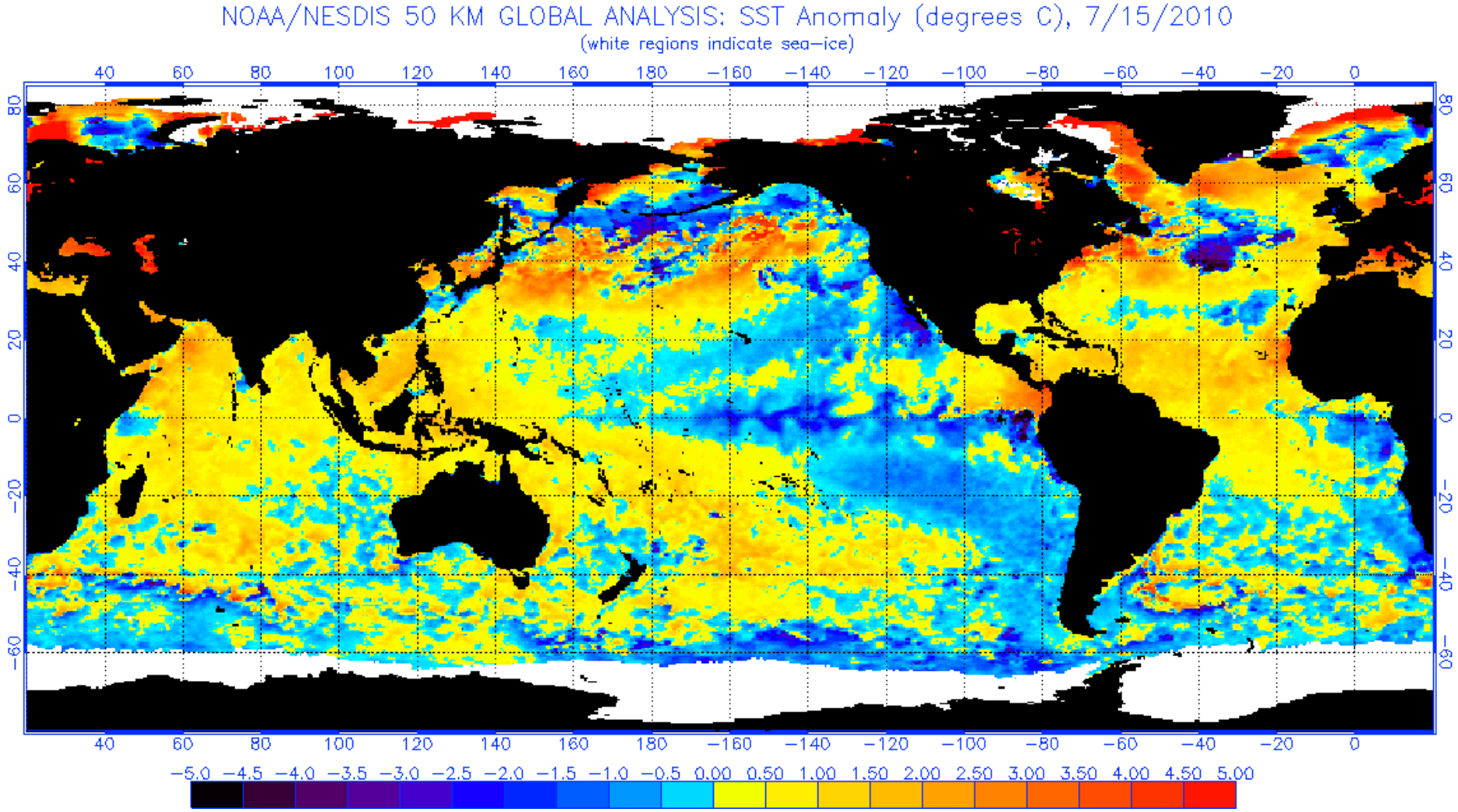
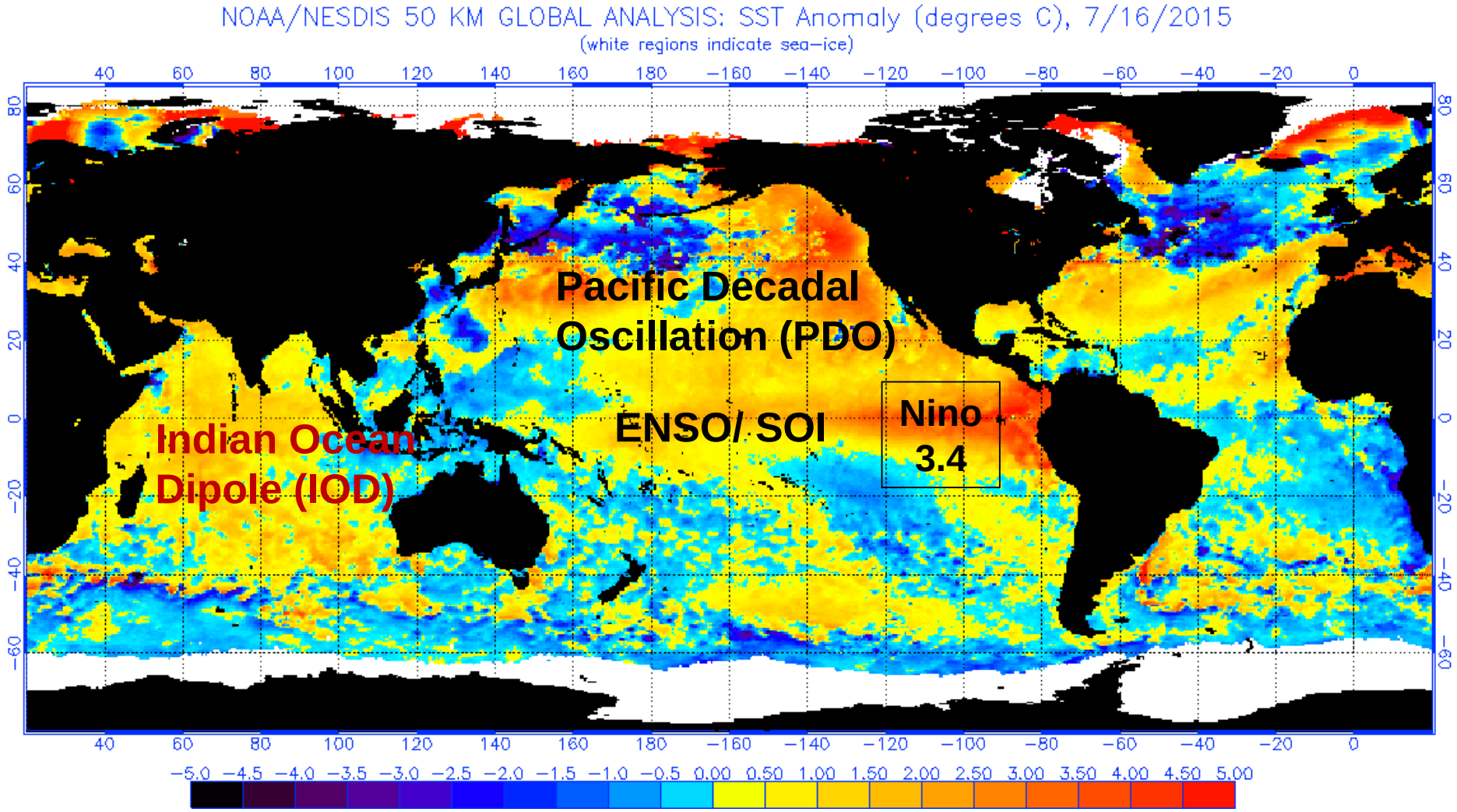
Winter Seasonal Outlook 2016 Cycles, Rainfall Decline, and Implications

Peter Ridge, Corowa

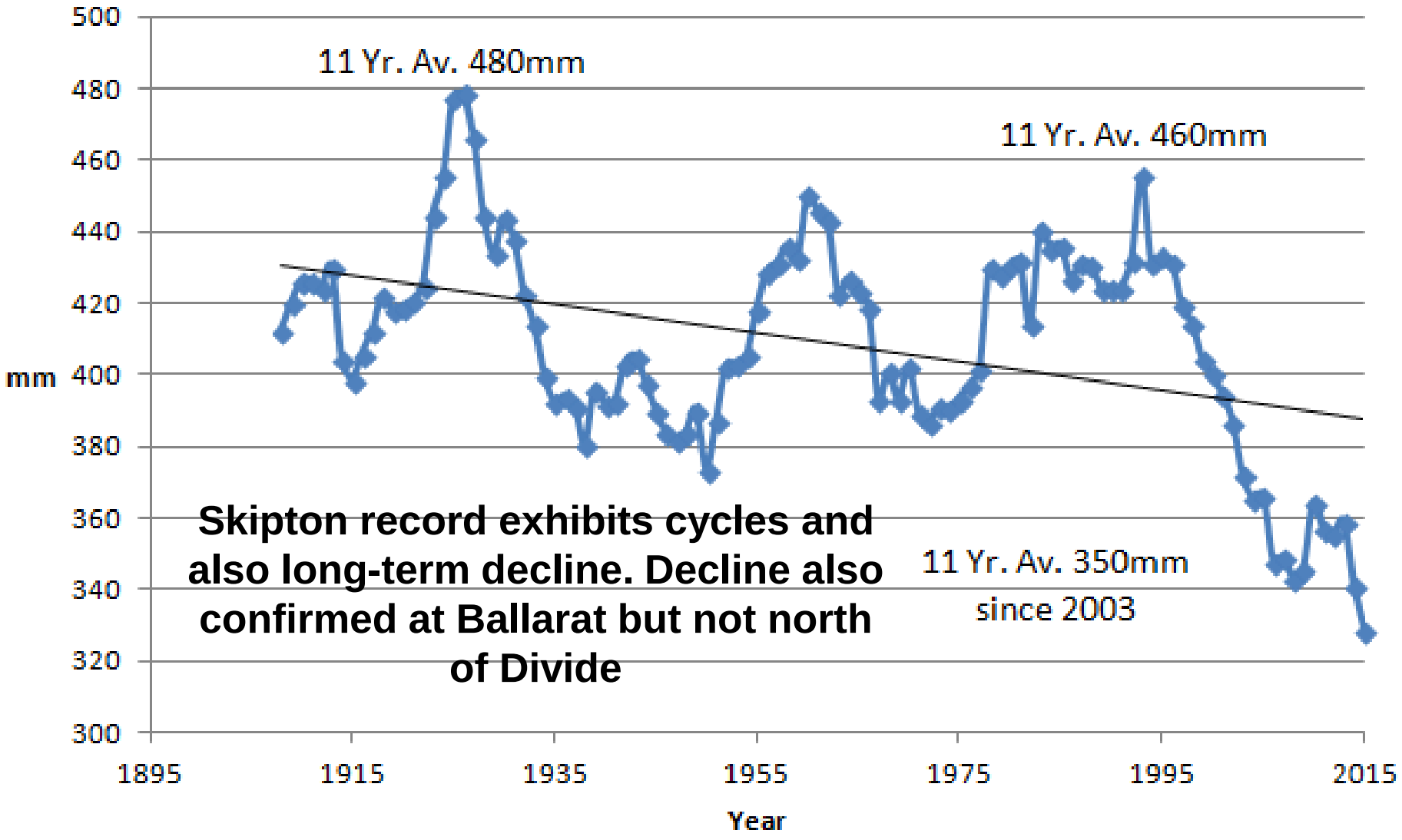
Sea Surface Temperatures
July 2010 (La Nina)



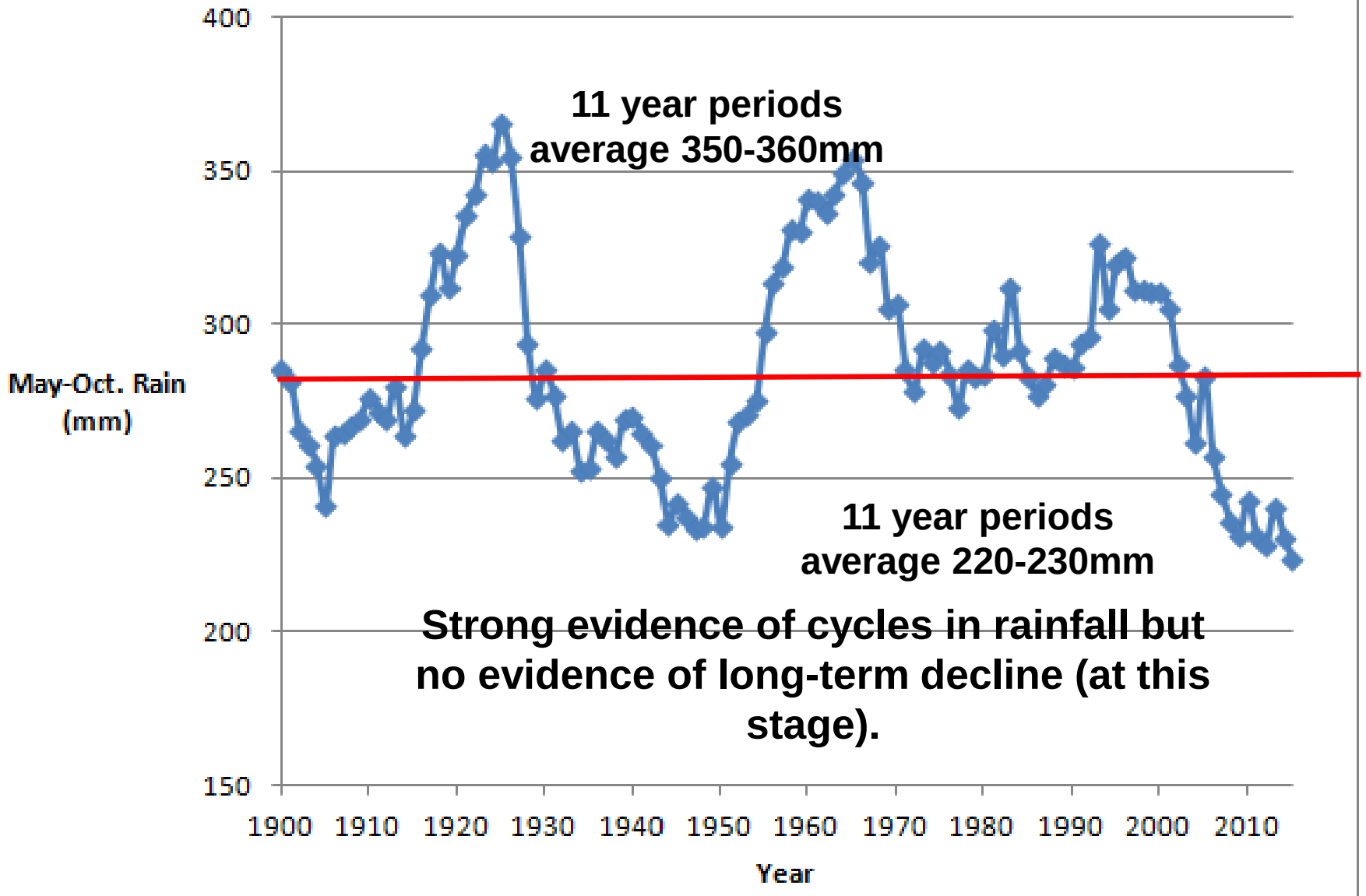
Sea Surface Temperatures
July 2015 (El Nino)



11-Year Moving Average May-November Rainfall at Skipton

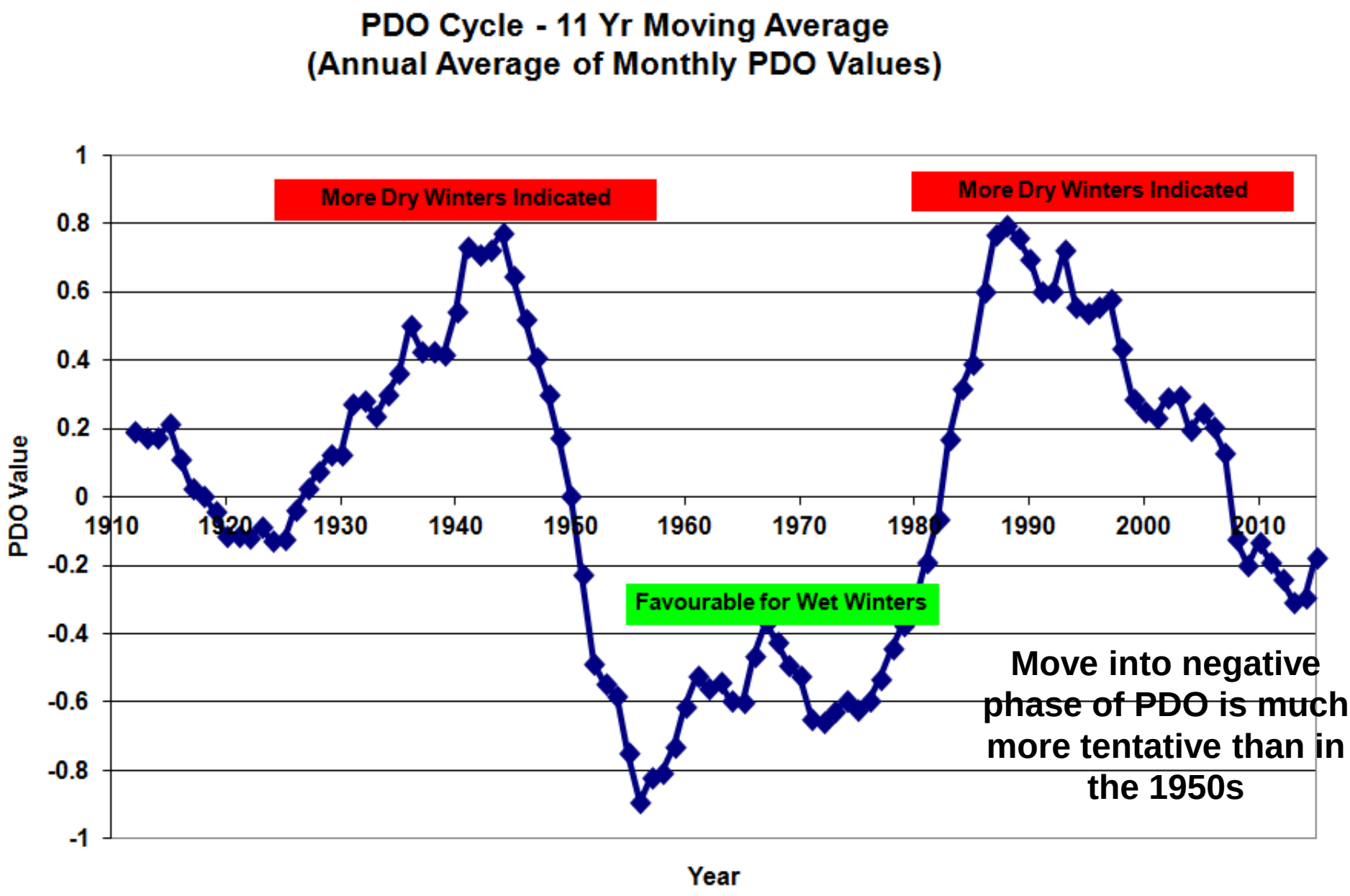


11 Year Moving Average of May-October Rainfall at Mooroopna



2000 to 2015 at Skipton Compared to 1900 to 1999

Period	March-May Rain	May-Nov. Rain	Sept-Nov. Rain
1900-1999	147	415	180
2000-2015	105	342	145
2000-2015 % of 1900-1999	71%	82%	81%


PDO Cycle - 11 Yr Moving Average
(Annual Average of Monthly PDO Values)
More Dry Winters Indicated
More Dry Winters Indicated
Favourable for Wet Winters
Move into negative phase of PDO is much more tentative than in the 1950s
PDO Value
Year
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

The Frequency of La Ninas and El Ninos With PDO Phase

Period	No Yrs	% La Nina	% El Nino
1927-1950 (PDO +ve)	23	17%	35%
1951-1983 (PDO –ve)	32	31%	22%
1984-2007 (PDO +ve)	23	26%	48%

When PDO is in its positive phase:

- El Ninos outnumber La Ninas by almost 2:1

When PDO is in its negative phase:

-La Ninas outnumber El Ninos by 1.5:1

The Effect of PDO Phase on May-November Rainfall at Skipton

Period	May-Nov. Rainfall	Variation (St. Devn.) May-Nov Rainfall	Coeff. Vari'n. May-Nov Rainfall
1927-1950 (PDO +ve)	385	67	17%
1951-1983 (PDO –ve)	425	98	23%
1984-2007 (PDO +ve)	392	68	17%

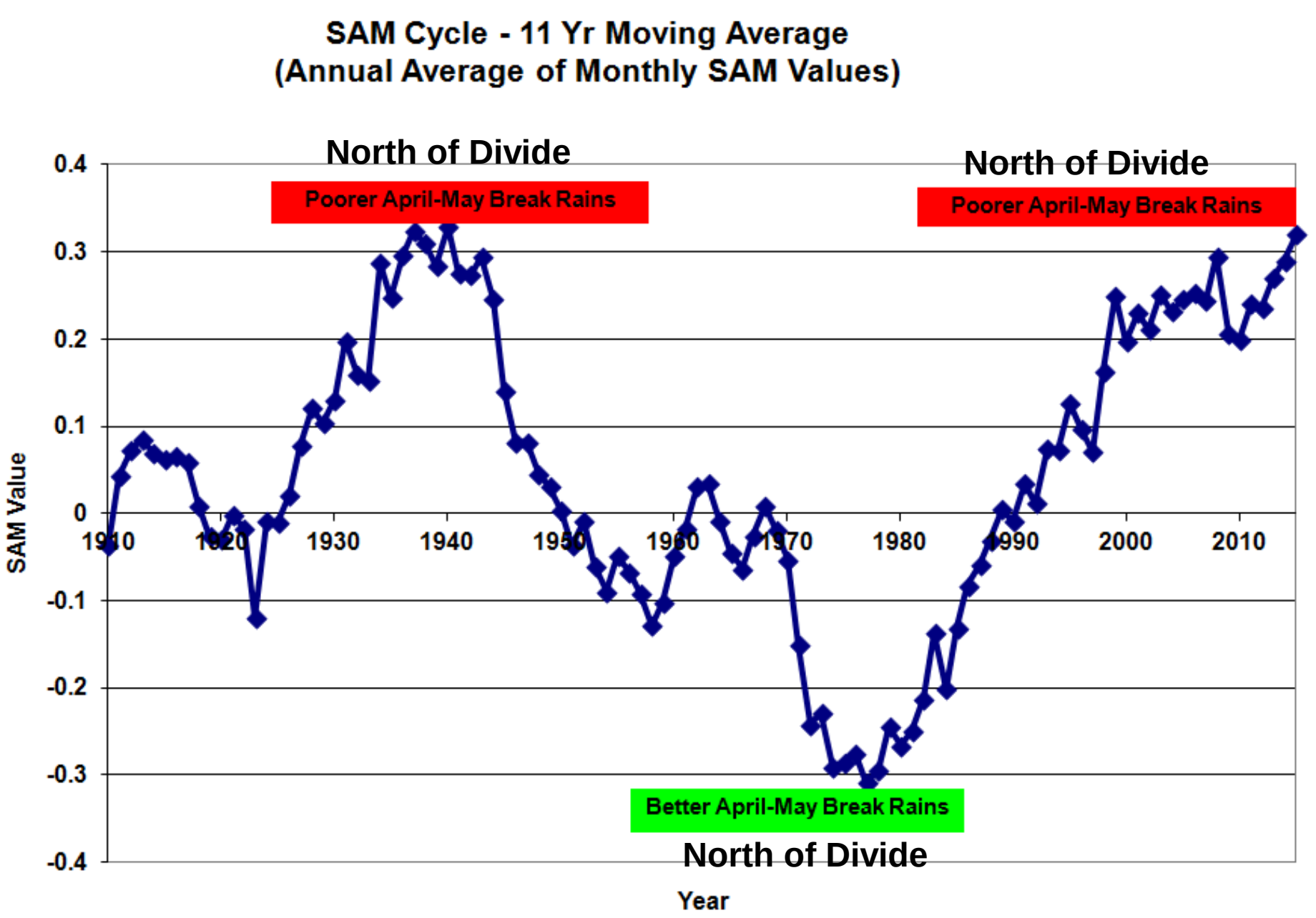
Southern Annular Mode

Positive phase:

- band of westerly winds contracts toward Antarctica
- higher pressures over southern Australia
- can relate to stable, dry conditions.

Negative phase:

- band of westerly winds expands towards the equator
- more (or stronger) low pressure systems over southern Australia
- can mean increased storms and rain.


SAM Cycle - 11 Yr Moving Average
(Annual Average of Monthly SAM Values)
North of Divide
Poorer April-May Break Rains
North of Divide
Poorer April-May Break Rains
Better April-May Break Rains
North of Divide
SAM Value
Year
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010

Rainfall Decline in Winter – Down Trend or Due to SAM Cycle?

- Down trend (i.e. unexplained not due to cycles) appears in Skipton and Ballarat data. (Also since 1975 in WA).
- Effect of SAM cycle evident in records of winter rainfall (May-Oct.) at Corowa, Mooroopna and Horsham BUT no down trend.
- Effect of SAM cycle is more evident in Skipton record for winter (May-Nov.) rainfall but, in addition, there is also a down trend. Statistically both are equally significant (but a long way behind SOI).
- SAM contributes 26mm to current decline.
- Down trend accounts for another 26mm of the decline.

SAM or Down Trend on the Seasons at Skipton

- March to May – Down trend dominates and effect of SAM is not significant.
- May to August – effect of SAM dominates and down trend less clear.
- September to November – effect of SAM dominates and down trend not significant.
- So (unexplained) down trend not apparent in spring but is very much an issue in autumn.
- Effects due to SAM are expected to eventually turnaround.

2015 in Review

- SOI close to zero in February – neutral outlook. Didn't see El Nino coming at this stage of year!
- SOI negative in June and July and then very negative for August, September and October.
- Experts called an El Nino in May – much earlier than normal, and indicated it could be as severe as 1997 (based on very warm SST in Nino 3.4).
- May-November rainfall about 150mm below average.
- About 80 mm of the deficit occurred between September and November.

Basis to Outlook for 2016

- Of two early indicators already in, both are slightly favourable for the outlook locally.
- From now on the outlook is affected by SOI changes to June.
  - SOI negative in December/January (& February) means SOI more likely to rise into positive values by May and June, and especially by July.
- Generally expect a mild La Nina - certainly nowhere near the strength as 1982 to 1983 and probably not as strong as 2009 to 2010.

SOI Changes in Recent Years and Projected for 2016

SOI Month	2010 La Nina	2015 El Nino	2016 (Projected)
Prev. Dec.	-7.0	-5.5	-9.1
January	-10.1	-7.8	-19.7
February	-14.5	0.6	-19.7
Change April to May	-5.2	-9.9	+10 to +30
June	+1.8	-12.0	0
July	+20.5	-14.7	+12
Change Av.Dec/Jan to July	+29.0	-8.0	+26

Seasonal Outlooks

Location	Season	Average	Best Bet 2016	Difference
Skipton	May-Nov	405	451	+46
Mooroopna	May-Oct	282	342	+60
Corowa	May-Oct	310	430	+120
Horsham	May-Oct	270	385	+115

What to Watch

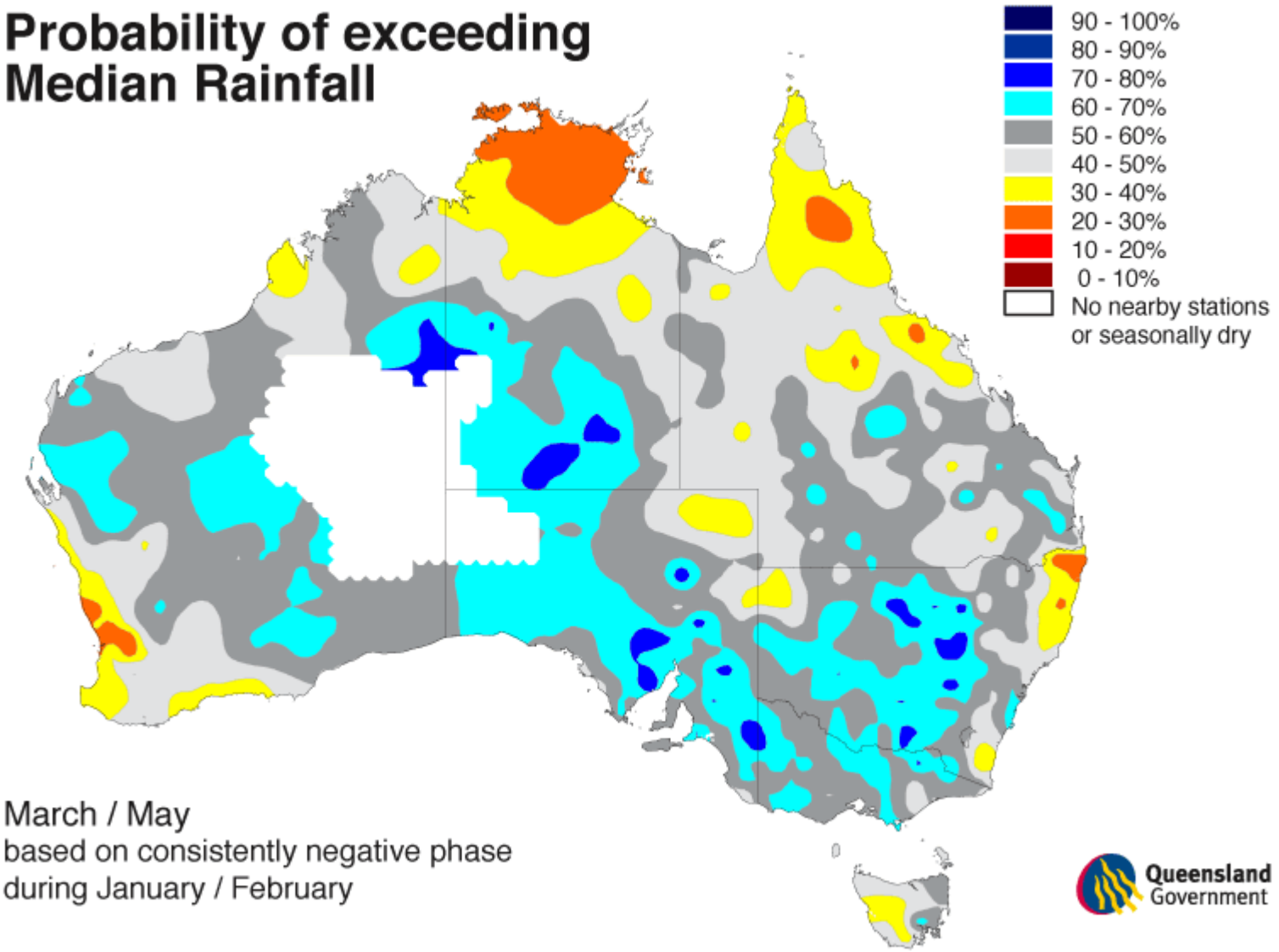
• That the SOI at end of January and February is negative, the more negative the better (-19.7 in both months).

•That the SOI rises markedly above its negative value in February to zero/positive by May. The bigger the rise the better.

•The SOI jumps by at least 10 units from April to May (not critical but a nice bonus).

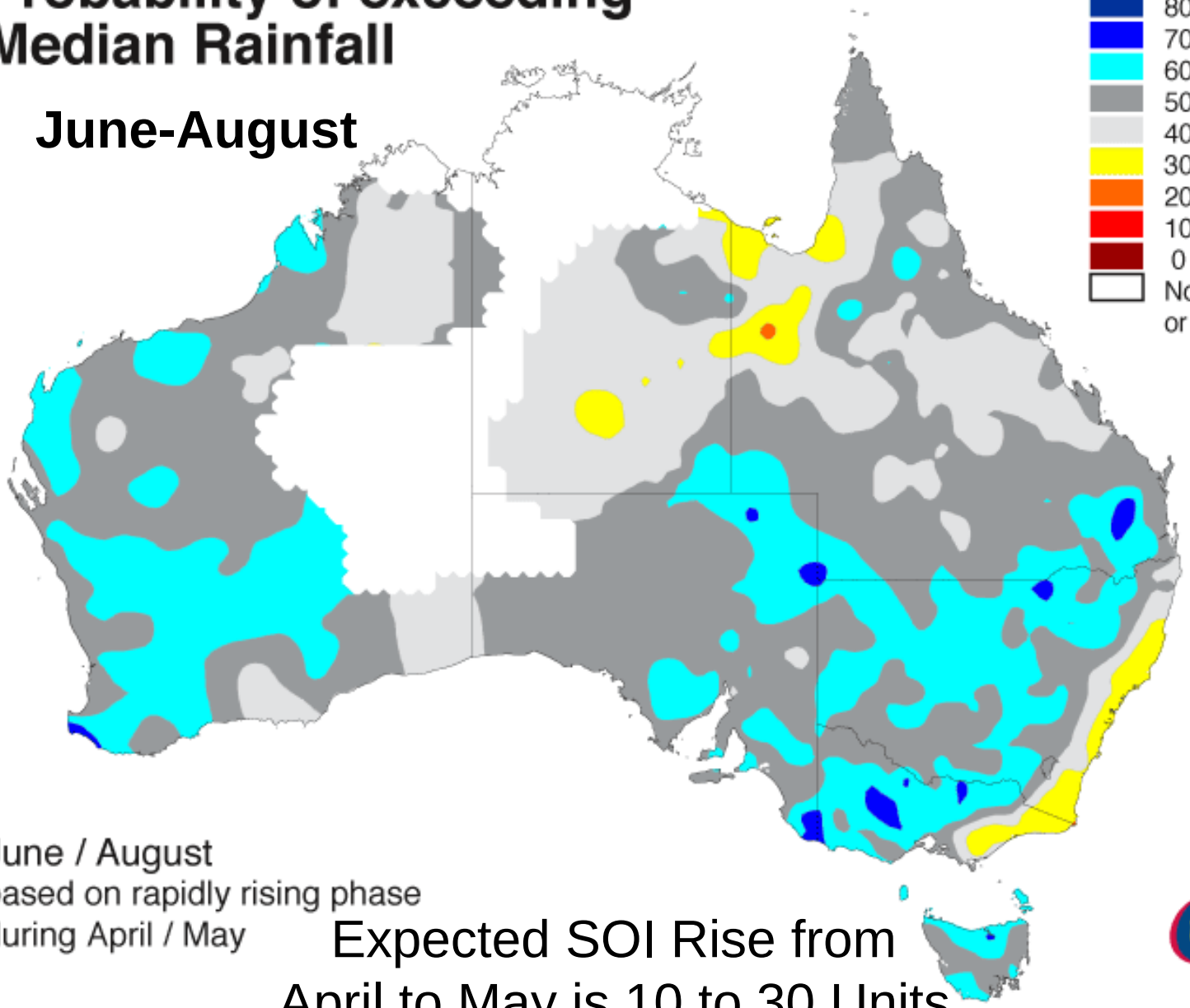
•That the SOI locks into positive values by July. I'm assuming +12. Locally add 2.5mm to expected May-Nov rainfall for each unit of SOI increase from January (-20) to July (+12?).

Consistently Negative SOI Jan/Feb



Probability of exceeding Median Rainfall

June-August



June / August
based on rapidly rising phase during April / May

Expected SOI Rise from April to May is 10 to 30 Units

Queensland Government

SOI Changes Affect CBOT Wheat Prices

- In general, La Nina reduces wheat yields in the northern hemisphere and is supportive of wheat prices.
- Analyses of CBOT wheat prices (in AUD, 50 yrs history) suggest:-
  - Wheat prices will likely rise from Dec15 to Dec16 (they fell markedly last year as predicted).
  - CBOT wheat prices (AUD) are likely to be back on trend ($276) or slightly better.
  - But will Basis stay strong (+$30 over CBOT) in a La Nina year?