



ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

Tropical Pacific Ocean primed for El Niño in 2015

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The chances of El Niño occurring in 2015 have increased. Ocean temperatures in the tropical Pacific continue to be warmer than average, trade winds remain weaker than average, and all models surveyed suggest further ocean warming will occur. As a result, the ENSO Tracker has been raised to El Niño ALERT, indicating at least a 70% chance of El Niño occurring this year.

Tropical Pacific Ocean sea surface temperatures are now just shy of El Niño levels. Large areas of warmer-than-average water below the surface are likely to keep these waters warm for some time. This increases the odds of atmospheric factors coming into play, and hence further warming of the tropical Pacific Ocean.

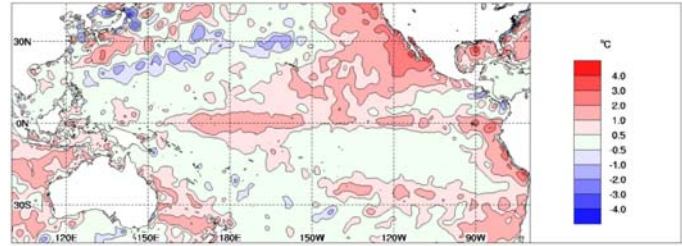
All international climate models monitored by the Bureau indicate that El Niño thresholds will be reached or exceeded by June. However, the accuracy of model outlooks during the El Niño–Southern Oscillation (ENSO) transition period is lower than for outlooks made at other times of the year.

El Niño is often associated with below-average winter and spring rainfall over eastern Australia and above-average daytime temperatures over the southern half of Australia. However, April to June is likely to be wetter than average across much of Australia due to very warm conditions in the Indian Ocean. See the latest [climate outlook](#).

Next update expected on 28 April 2015 |

Weekly sea surface temperatures

There has been relatively little change in the pattern of sea surface temperature (SST) anomalies across the tropical Pacific compared to two weeks ago. The SST anomaly map for the week ending 12 April shows warm anomalies extending across nearly all of the equatorial Pacific, from about 150°E to the South American coast. As a result, ENSO indices are just shy of El Niño thresholds.



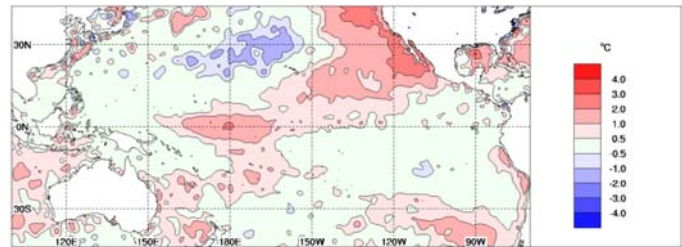
Warm anomalies remain across a large part of the northeast of the Pacific Basin, across waters between Australia’s east to southeast and New Zealand, and to Australia’s west and northwest, extending across most of the Indian Ocean. The waters to Australia’s west and northwest have warmed compared to two weeks ago.

Index	Previous	Current	Temperature change (2 weeks)
NINO3	+0.7	+0.7	no change
NINO3.4	+0.7	+0.7	no change
NINO4	+1.0	+1.0	no change

Baseline period 1961–1990.

Monthly sea surface temperatures

The SST anomaly map for March shows warmer than average waters were present over a large area of the central tropical Pacific and across much of the central to northeast Pacific Basin. Water was also warmer than average in the Tasman Sea and across large parts of the Indian Ocean.



Sea surface temperatures in both the eastern and western equatorial Pacific warmed between February and March.

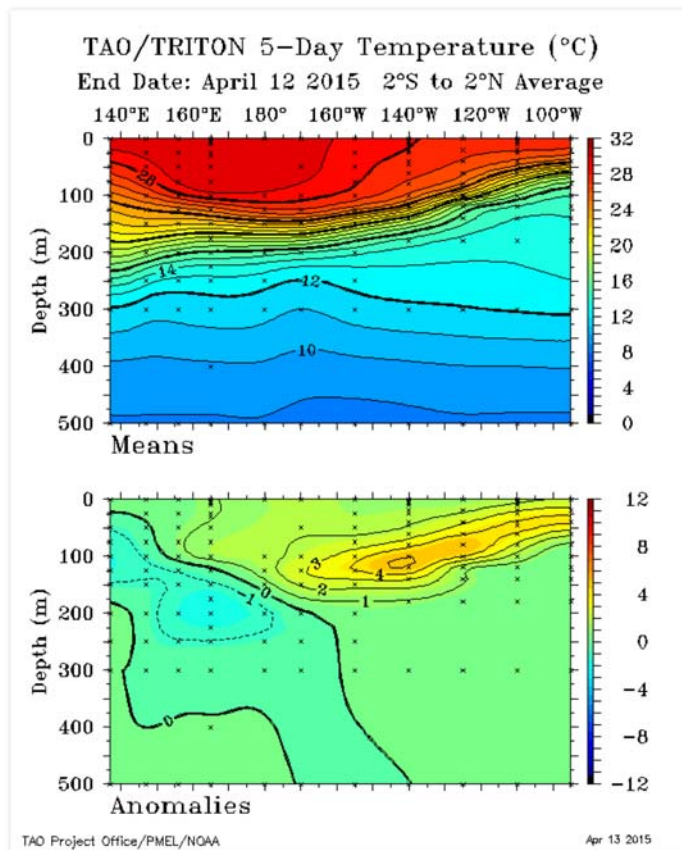
Index	February	March	Temperature change
NINO3	+0.2	+0.3	0.1 °C warmer
NINO3.4	+0.5	+0.6	0.1 °C warmer
NINO4	+1.0	+1.1	0.1 °C warmer

Baseline period 1961–1990.

5-day sub-surface temperatures

The sub-surface temperature map for the 5 days ending 12 April shows temperatures are near average below the surface of the ocean in the western equatorial Pacific. An area of warmer than average water is present between around 50 m and 150 m depth in the central equatorial Pacific, with warm anomalies extending across the entire eastern equatorial Pacific. In the far eastern Pacific this area of warmer-than-average water lies closer to the surface, covering the top 100 m. Warm anomalies peak near 140°W and 100 m depth, where they exceeded +5 °C in a small area.

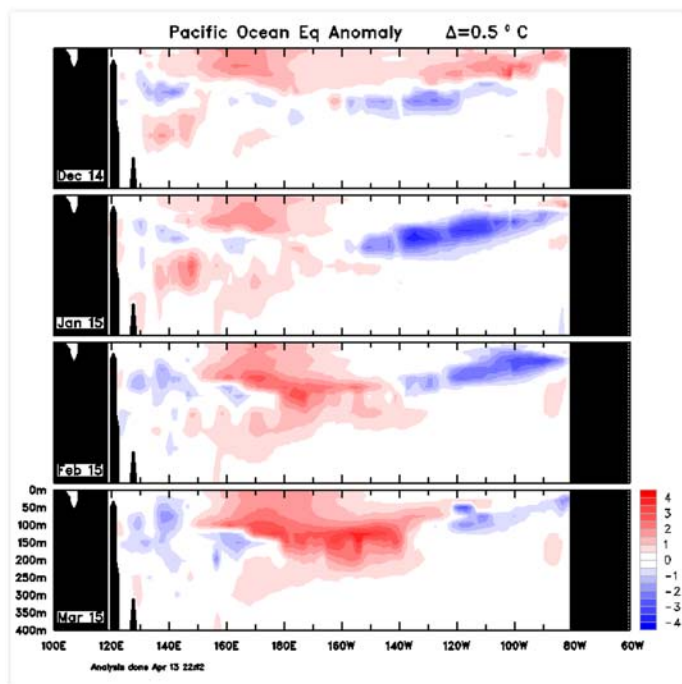
Further increases in surface temperature anomalies in the eastern Pacific are expected to result as warm anomalies below the surface of the tropical Pacific continue to migrate eastward and rise towards the surface of the ocean.



Monthly sub-surface temperatures

The four-month sequence of sub-surface temperature anomalies (to March) shows cool anomalies decreased during March in the sub-surface of the eastern equatorial Pacific, compared to last month, while warm anomalies have increased in the western and central equatorial Pacific sub-surface. Weakening of cool anomalies in the east and strengthening of warm anomalies in the central to western Pacific is a pattern which had been observed over the months since January 2015.

For March, warm anomalies were present in the top 200 m of the equatorial Pacific sub-surface between about 150°E and 130°W. Anomalies in small parts of this region reached more than +3 °C. A small area of weak cool anomalies remains between 50 m and 150 m, east of about 130°W.

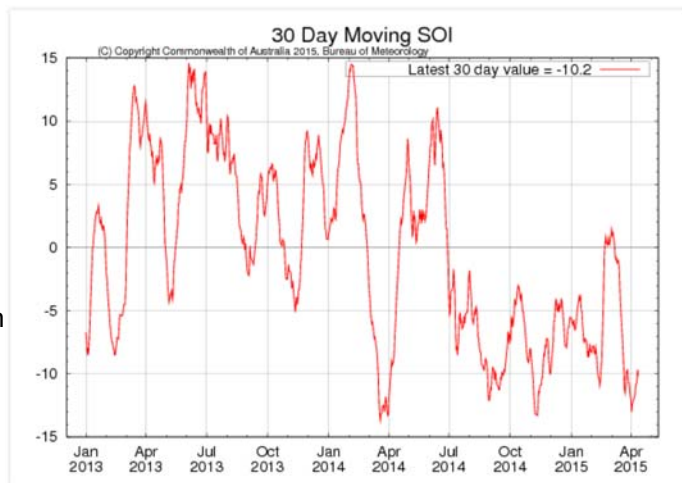


Southern Oscillation Index

The Southern Oscillation Index (SOI) has remained relatively stable over the past two weeks, with values exceeding El Niño thresholds. The latest 30-day SOI value to 12 April is -10.2 . The monthly value for March was -11.2 .

Fluctuations of the SOI associated with the passage of tropical systems near Darwin or Tahiti are common during the first quarter of the year; it remains to be seen whether recent values of the SOI are a result of transient tropical weather systems, or a more sustained shift towards El Niño-like conditions.

Sustained positive values of the SOI above $+7$ may indicate La Niña, while sustained negative values below -7 may indicate El Niño. Values of between about $+7$ and -7 generally indicate neutral conditions.

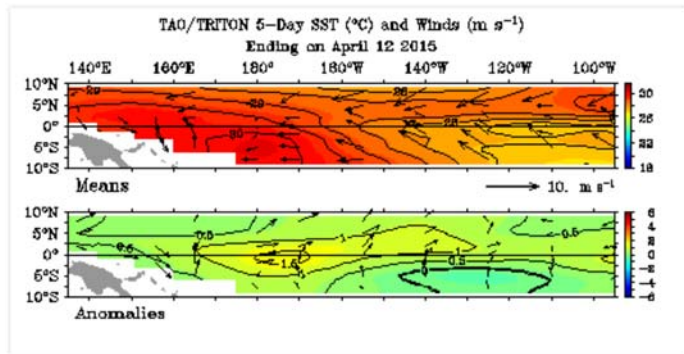


Trade winds

Trade winds were weaker than average over much of the tropical Pacific for the 5 days ending 12 April (see map). Trade winds have been consistently weaker than average, and on occasion reversed in direction (i.e. westerly), since the start of 2015. This has caused the warming of the sub-surface of the tropical Pacific Ocean observed over recent months.

Bursts of westerly winds over the equatorial Pacific can induce warming of the ocean below by driving downwelling Kelvin waves, which travel eastward as a 'pulse' of warmer-than-average water and warm the surface and sub-surface of the ocean.

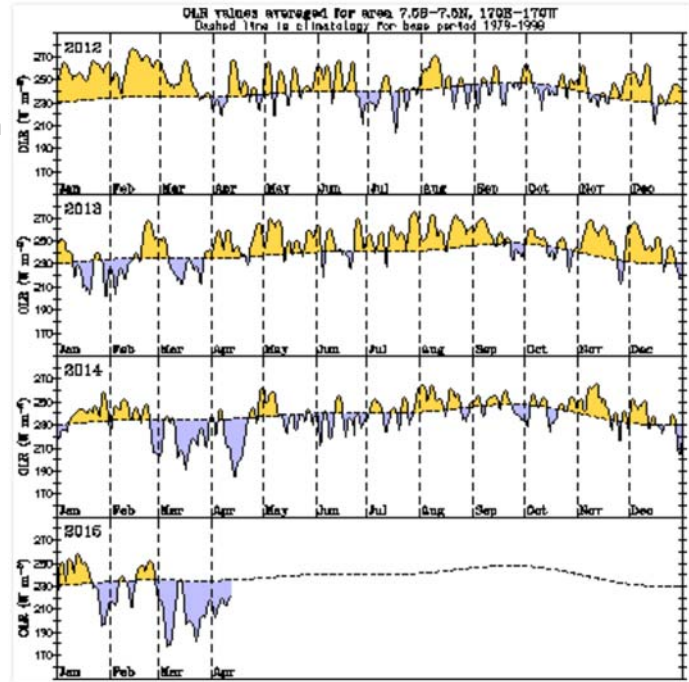
During La Niña there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño there is a sustained weakening of the trade winds.



Cloudiness near the Date Line

Cloudiness near the Date Line has been generally above average since the start of March.

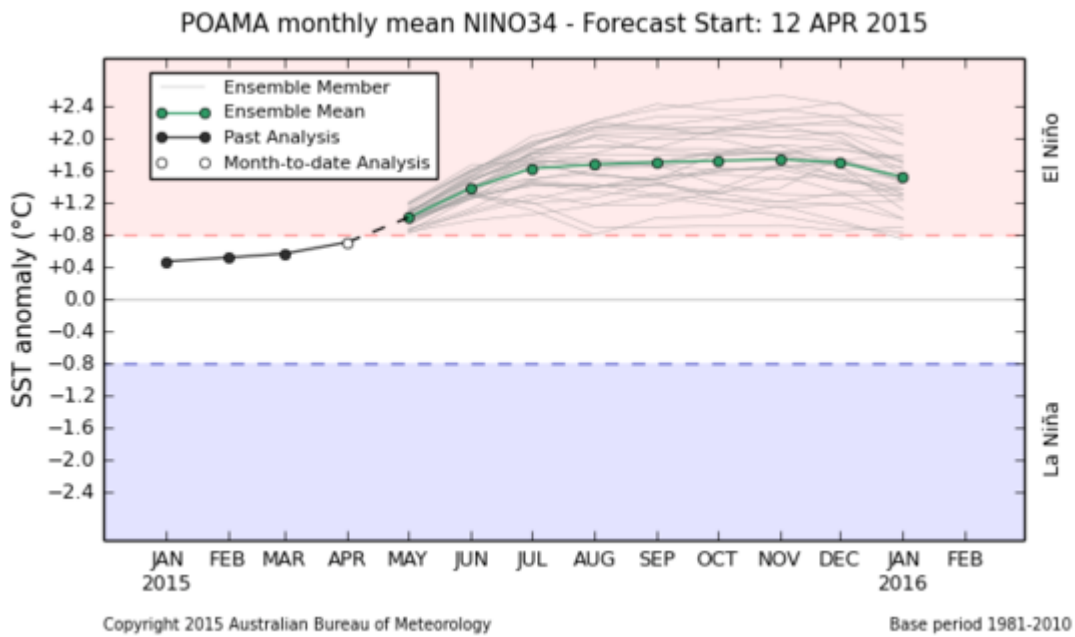
Cloudiness along the equator, near the Date Line, is an important indicator of ENSO conditions, as it typically increases (negative OLR anomalies) near and to the east of the Date Line during El Niño and decreases (positive OLR anomalies) during La Niña.



Model outlooks

All eight of the surveyed international [climate models](#) indicate the central Pacific Ocean will warm further during the coming months. All surveyed models indicate that NINO3.4 will reach or exceed El Niño threshold levels by mid-year. All models suggest that SSTs will remain above threshold levels for a sustained period. The average value of NINO3.4 expected by the end of the southern winter is about +1.5 °C; however, it is too early to determine with confidence how strong this potential El Niño could be.

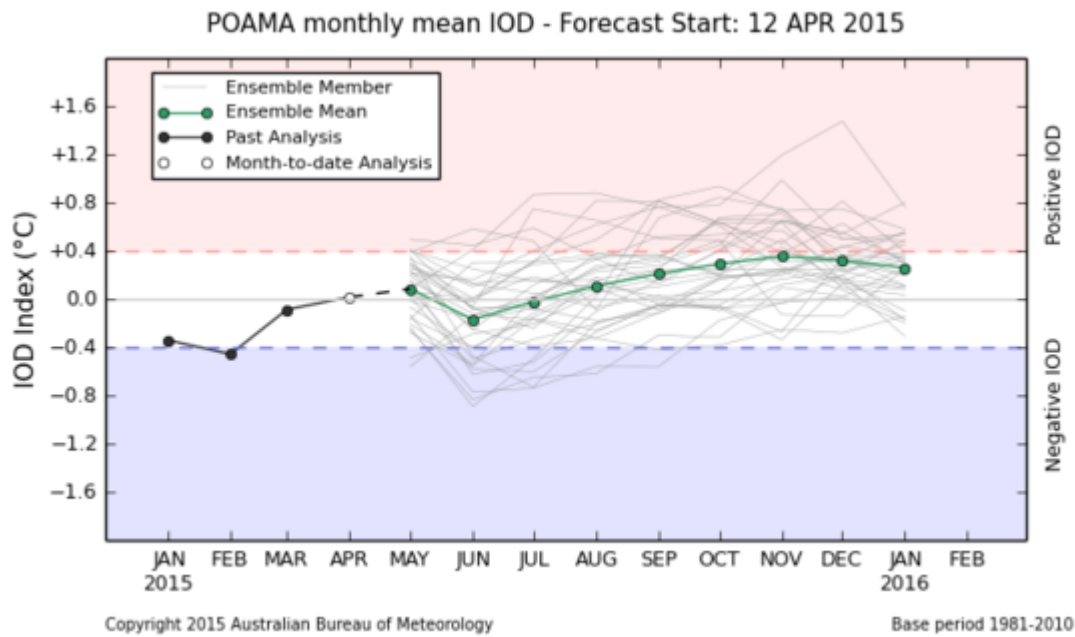
Model outlooks spanning February to May (the traditional ENSO transition period) have lower confidence than forecasts made at other times of year.



Indian Ocean Dipole

The latest weekly value of the Indian Ocean Dipole (IOD) index to 12 April is -0.1 °C. Climate models surveyed in the [model outlooks](#) favour a continuation of a neutral phase of the IOD over at least the next few months. Positive IOD events are more likely to occur in conjunction with El Niño events, therefore climatologists will closely monitor the Indian Ocean for any early signs of a developing event.

The IOD typically has little influence on Australian climate from December to April. During this time of year, establishment of negative or positive IOD patterns is largely inhibited by the development and position of the monsoon trough in the southern hemisphere.



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