



Australian Government
Bureau of Meteorology

ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

Tropical Pacific approaches El Niño thresholds

Issued on 28 April 2015 | Product Code IDCKGEWW00

ENSO indicators in the tropical Pacific are approaching El Niño levels. Sea surface temperatures now exceed El Niño thresholds and trade winds have remained weaker than average for several weeks. This suggests some coupling between the ocean and atmosphere may be occurring. If these patterns persist or strengthen, El Niño will become established.

All international climate models surveyed by the Bureau indicate that ocean temperatures are likely to remain above El Niño thresholds until at least the southern hemisphere spring. However, the accuracy of model outlooks at this time of year, the traditional El Niño–Southern Oscillation (ENSO) transition period, is lower than at other times.

Based upon model outlooks and current observations, the Bureau's ENSO Tracker is at ALERT status. This indicates that there is triple the normal chance of El Niño in 2015. 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 the country.

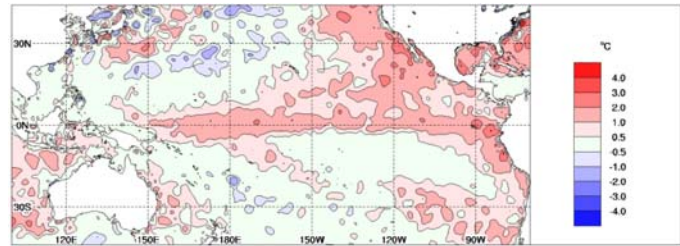
The Indian Ocean Dipole (IOD) remains neutral and model outlooks indicate a neutral IOD for the coming months. From May to November, the IOD can impact Australian climate. However, the Indian Ocean remains much warmer than average, which is currently influencing the Australian rainfall outlook, with an increased chance of above-average rainfall in the near term.

Next update expected on 12 May 2015 |

Weekly sea surface temperatures

Sea surface temperature (SST) anomalies have increased over the past fortnight across nearly the entire tropical Pacific. The SST anomaly map for the week ending 26 April shows warm anomalies in excess of +1 °C extend across the equatorial Pacific from about 150°E to the South American coast. NINO indices have been above El Niño thresholds for both of the past two weeks.

Warm anomalies remain across a large part of the northeast of the Pacific Basin and now extend down the western coastline of the Americas. Warmer-than-average SSTs also persist along Australia's east coast, and to Australia's west and northwest, extending across most of the Indian Ocean.



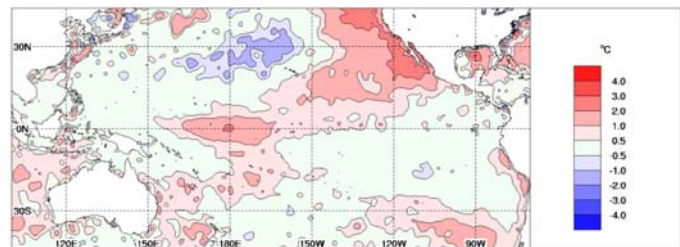
Index	Previous	Current	Temperature change (2 weeks)
NINO3	+0.7	+1.0	0.3 °C warmer
NINO3.4	+0.7	+1.0	0.3 °C warmer
NINO4	+1.0	+1.2	0.2 °C warmer

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.



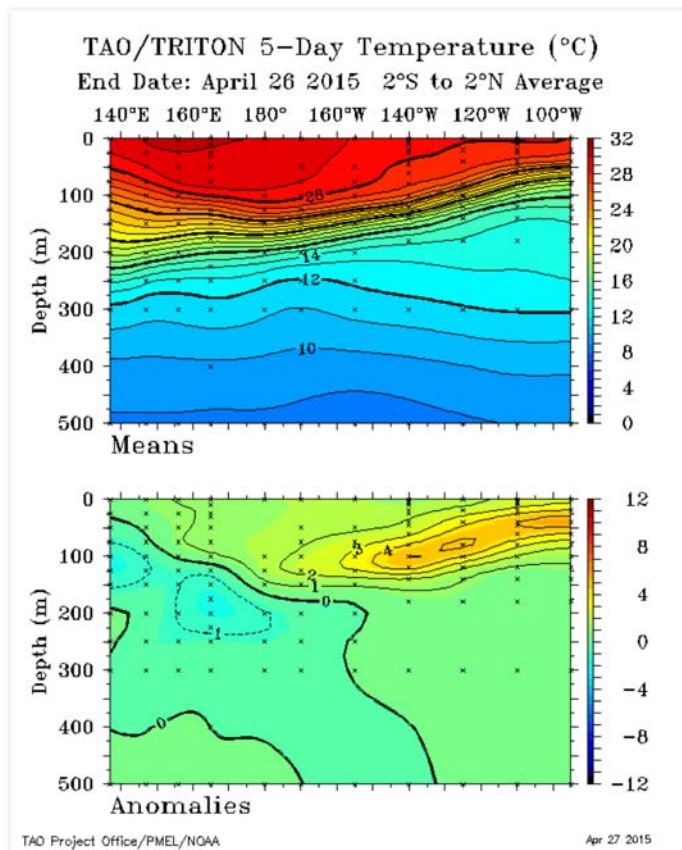
Index	February	March	Temperature change
NINO3	+0.2	+0.3	0.1 °C warmer
NINO3.4	+0.5	+0.6	0.1 °C warmer
NINO4	+1.0	+1.1	0.1 °C warmer

Baseline period 1961–1990.

5-day sub-surface temperatures

The sub-surface temperature map for the 5 days ending 26 April shows temperatures are near average below the surface of the ocean in the western equatorial Pacific, while waters in the top 150 m of the eastern Pacific are generally warmer than average. In the far eastern Pacific this area of warmer-than-average water lies close to the surface. Several small areas of anomalies in excess of +5 °C were present in the eastern equatorial Pacific, most notably east of 110°W at about 50 m depth.

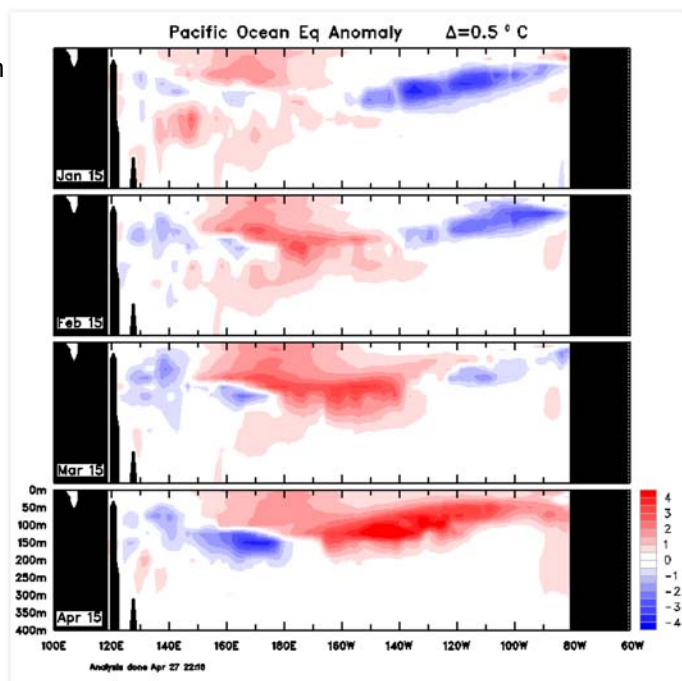
Further increases in surface temperature anomalies in the eastern Pacific are expected to result as warm anomalies below the surface of the tropical Pacific continue to migrate eastward and rise towards the surface of the ocean.



Monthly sub-surface temperatures

The four-month sequence of sub-surface temperature anomalies (to 27 April) shows the eastward progression of warm anomalies over the past 3 to 4 months (also known as a downwelling Kelvin wave). The eastward migration of strengthening warm anomalies, and their gradual rise towards the surface, can be seen in the monthly sequence from January. Compared to last month, warm anomalies have increased in the central to eastern equatorial Pacific sub-surface and have extended farther eastward.

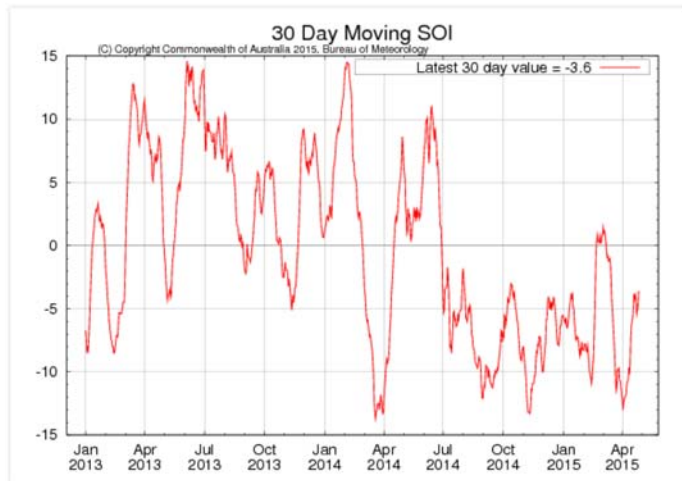
For April, warm anomalies were present in the top 150 m of the equatorial Pacific sub-surface between about 150°E and the South American coast. Anomalies in small parts of the central equatorial Pacific reached more than +4 °C. Cool anomalies are present in the sub-surface of the western equatorial Pacific.



Southern Oscillation Index

The Southern Oscillation Index (SOI) has become less negative over the past two weeks, with values returning to neutral bounds. The latest 30-day SOI value to 26 April is -3.6. The SOI has been generally negative since early in the southern hemisphere spring of 2014, but despite recent forays exceeding El Niño thresholds, the SOI is yet to show a sustained shift into values indicative of El Niño.

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.

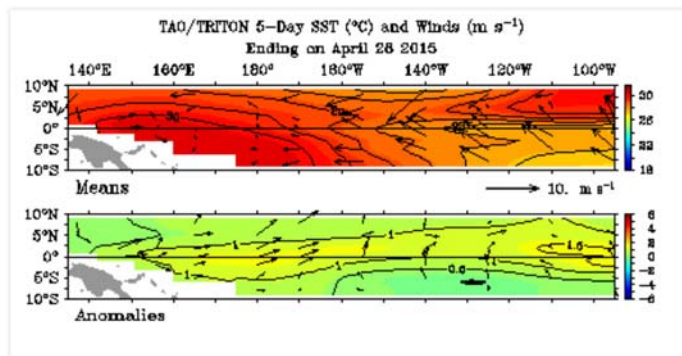


Trade winds

Trade winds were weaker than average over much of the tropical Pacific for the 5 days ending 26 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 warming of the sub-surface of the tropical Pacific Ocean, as 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.

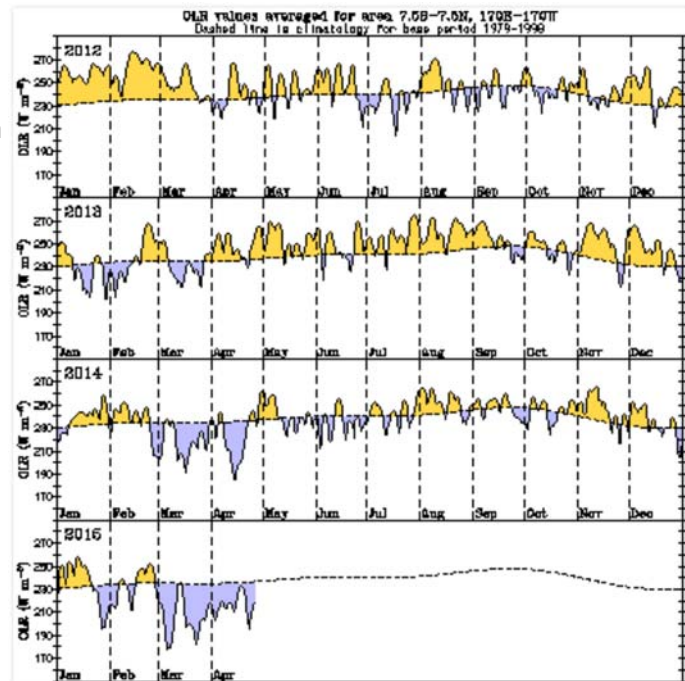
During La Niña there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño there is a sustained weakening of the trade winds.



Cloudiness near the Date Line

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

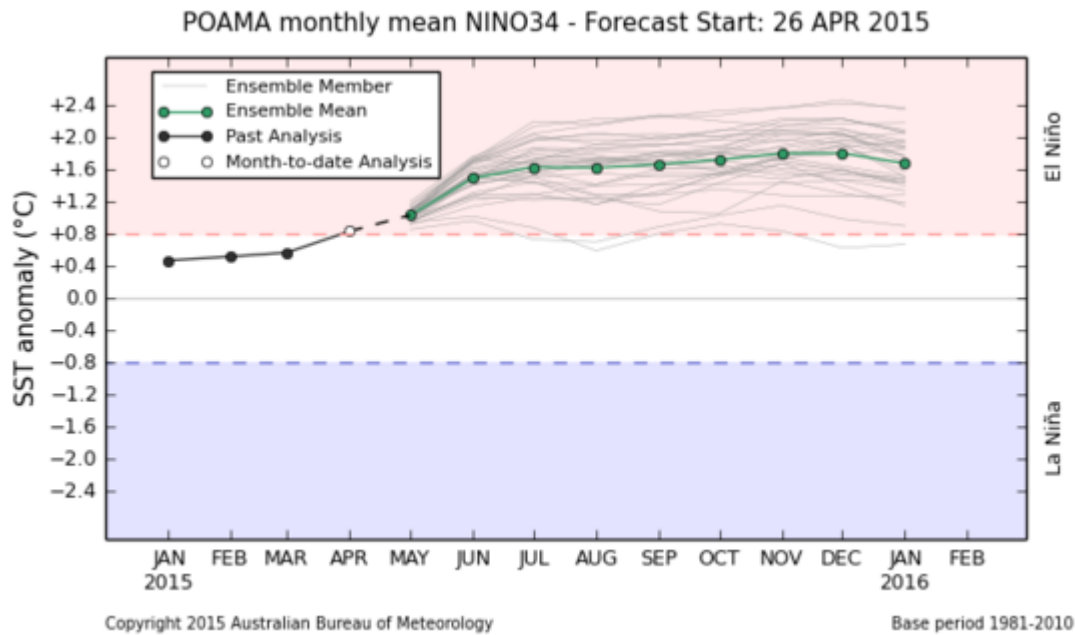
Cloudiness along the equator, near the Date Line, is an important indicator of ENSO conditions, as it typically increases (negative OLR anomalies) near and to the east of the Date Line during El Niño and decreases (positive OLR anomalies) during La Niña.



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 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.

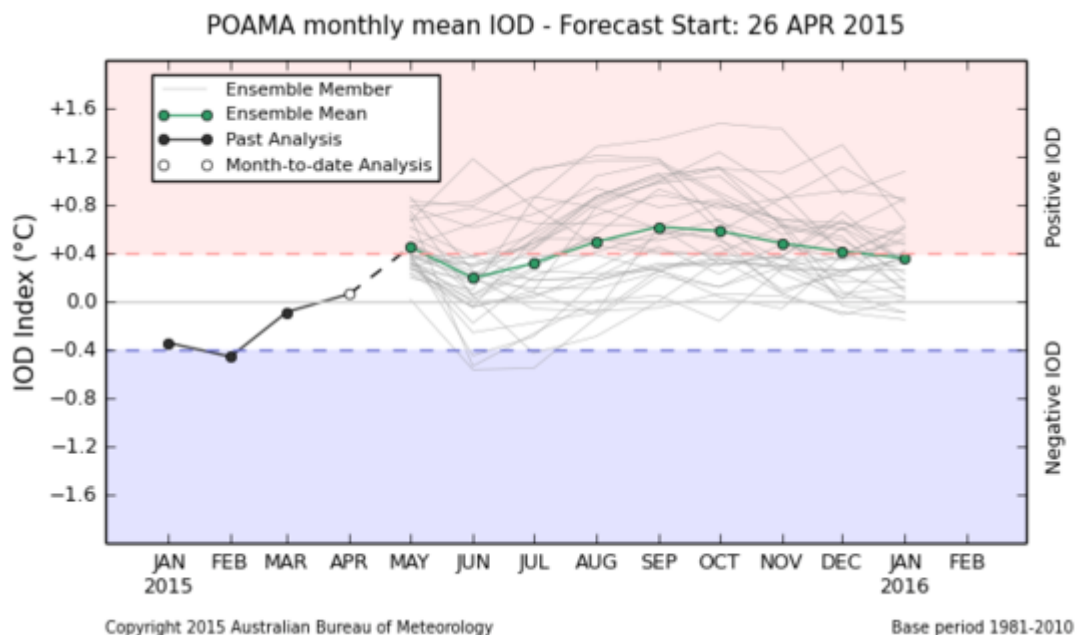


Indian Ocean Dipole

The latest weekly value of the Indian Ocean Dipole (IOD) index to 26 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, therefore climatologists will closely monitor the Indian Ocean for any early signs of a developing event.

Temperatures in the Indian Ocean more broadly are warmer than average over much of the basin, with largest positive anomalies in the mid-latitudes. These very warm temperatures are currently having a significant impact upon Australia's climate, increasing the odds of wetter months ahead in most dynamical climate models surveyed.

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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