



ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

El Niño strengthens

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The El Niño in the tropical Pacific continues to strengthen. International climate models surveyed by the Bureau indicate sea surface temperatures will remain well above El Niño thresholds at least into the southern hemisphere spring.

Oceanic and atmospheric indicators show a clear El Niño signal. Sea surface temperatures in the tropical Pacific Ocean have exceeded El Niño thresholds for nearly two months, supported by warmer-than-average waters below the surface. Trade winds have remained consistently weaker than average since the start of the year, cloudiness at the Date Line has increased, and the 90-day average Southern Oscillation Index (SOI) is now below -10 .

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. However, the strength of El Niño doesn't directly relate to the strength of its effects on Australia's climate.

The Indian Ocean Dipole (IOD) is currently neutral, with the majority of the Indian Ocean being warmer than average. Of the five international models that monitor the IOD, three suggest a positive IOD event is likely later in 2015. A positive IOD is typically associated with reduced winter and spring rainfall over parts of southern and central Australia.

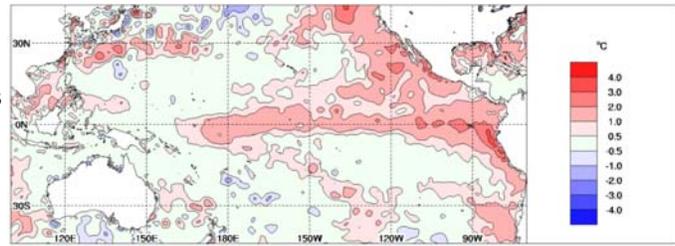
Next update expected on 9 June 2015 |

Weekly sea surface temperatures

Over the past fortnight, sea surface temperature (SST) anomalies have increased in the eastern and central equatorial Pacific, meaning the area of warm anomalies in the tropical Pacific now more resembles a classical El Niño pattern (i.e. a warm tongue extending along the equator from the South American coastline to around the Date Line). While anomalies in the far western equatorial Pacific have returned to neutral, the horseshoe shaped band of cool anomalies surrounding the warm tongue has not yet developed.

The SST anomaly map for the week ending 24 May shows warm anomalies in excess of +2 °C in parts of the far eastern equatorial Pacific and along part of the South American coast, with anomalies in excess of +1 °C present across most of the remaining equatorial Pacific to just west of the Date Line. All five NINO indices again exceeded +1 °C this week. Likewise, averaged over the past four weeks all NINO indices have averaged more than +1 °C. This is the first time this has occurred since the 1997–98 El Niño.

Warm anomalies also remain across a large part of the northeast of the Pacific Basin, extending down the western coastline of both North and South America. Over the past few weeks, SSTs surrounding Australia have cooled, with much of the country now surrounded by near-average SSTs. Some weak warm anomalies remain in areas to Australia's east.

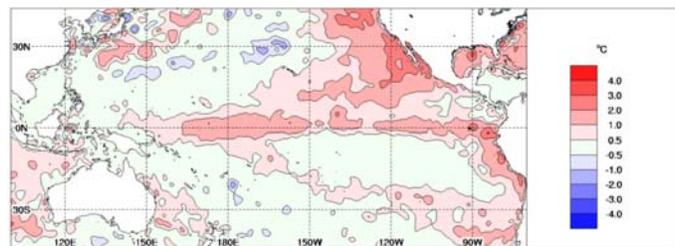


Index	Previous	Current	Temperature change (2 weeks)
NINO3	+1.2	+1.3	0.1 °C warmer
NINO3.4	+1.0	+1.1	0.1 °C warmer
NINO4	+1.1	+1.1	no change

Baseline period 1961–1990.

Monthly sea surface temperatures

The SST anomaly map for April shows water across the entire equatorial Pacific east of 150°E was warmer than average. Water was also warmer than average over much of the northeastern Pacific Basin, along the coastline of South America, adjacent to Australia's east coast, and across large parts of the Indian Ocean.



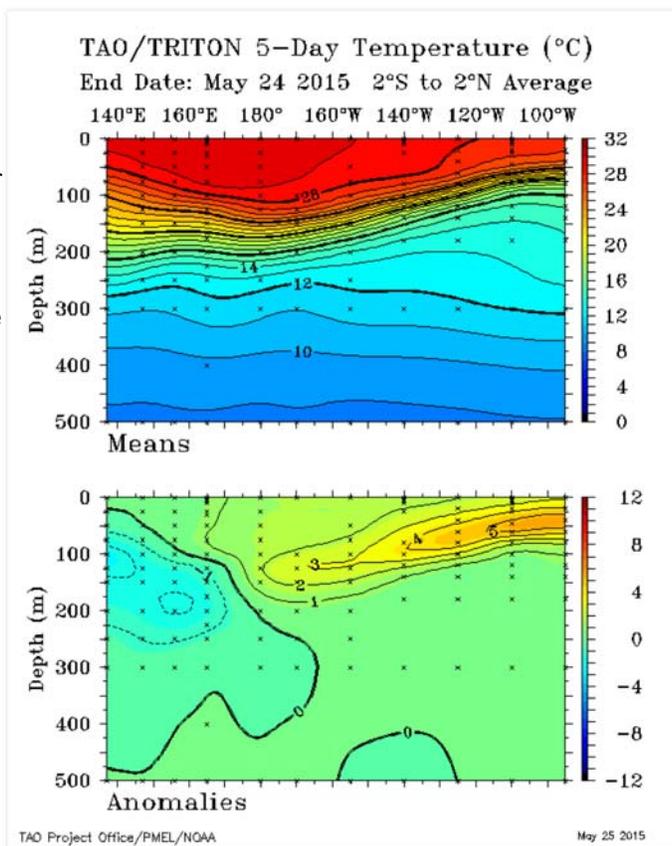
Index	March	April	Temperature change
NINO3	+0.3	+0.8	0.5 °C warmer
NINO3.4	+0.6	+0.8	0.2 °C warmer
NINO4	+1.1	+1.1	no change

Baseline period 1961–1990.

5-day sub-surface temperatures

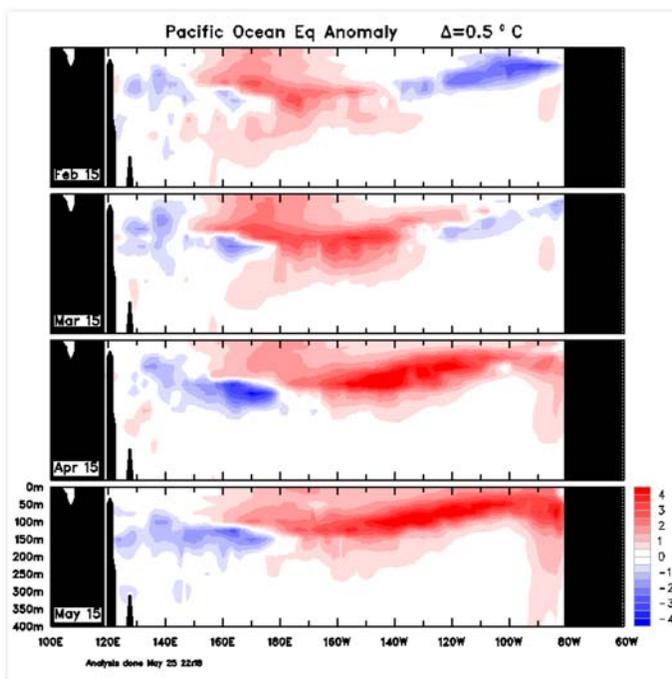
The sub-surface temperature map for the 5 days ending 24 May shows temperatures are near average below the surface of the ocean in the western equatorial Pacific and warmer than average in the top 150 m of the central to eastern equatorial Pacific. Water in the top 75 m of the far eastern Pacific is more than 5 °C warmer than average.

Anomalies in the sub-surface of the central Pacific have increased compared to two weeks ago.



Monthly sub-surface temperatures

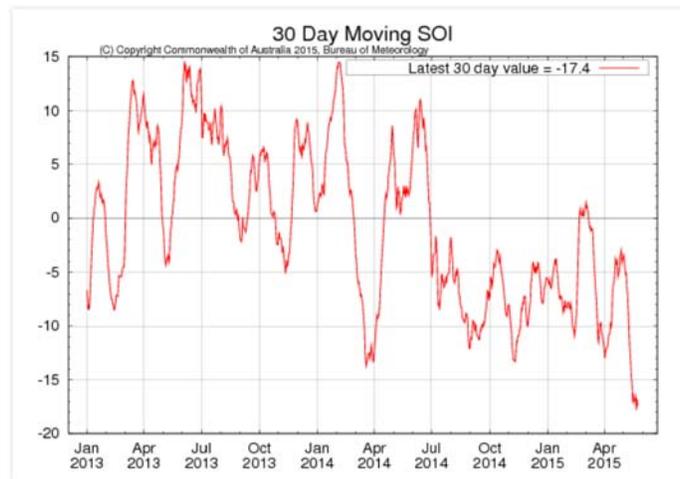
The four-month sequence of sub-surface temperature anomalies (to 25 May) shows the eastward migration of strengthening warm anomalies over the past four months, and their gradual rise towards the surface. For May, warm anomalies are evident across the top 150 m of the equatorial Pacific sub-surface between about 160°E and the South American coast. In the far eastern equatorial Pacific, warm anomalies are present throughout the water column. Anomalies across small areas of the central and eastern equatorial Pacific reached more than +4 °C. A small area of cool anomalies persists in the sub-surface of the western equatorial Pacific.



Southern Oscillation Index

The Southern Oscillation Index (SOI) has dropped further over the past two weeks, remaining firmly within El Niño values. The latest 30-day SOI value to 24 May is -17.4 . The 30-day SOI has remained below El Niño thresholds for more than two weeks. The 90-day SOI has also dropped below -10 ; indicative of a persistent three-month period of higher atmospheric pressure in the western Pacific.

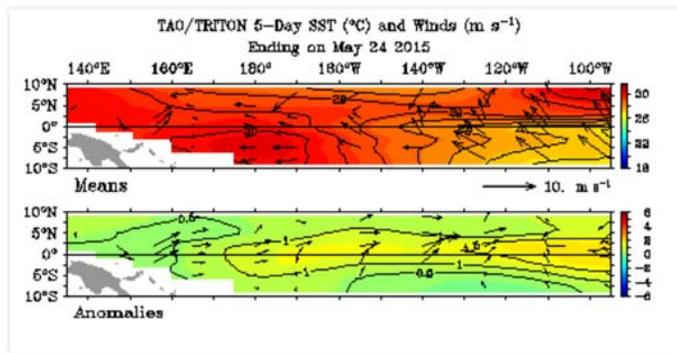
Sustained positive values of the SOI above $+7$ may indicate La Niña, while sustained negative values below -7 may indicate El Niño. Values of between about $+7$ and -7 generally indicate neutral conditions.



Trade winds

Trade winds over all but the far eastern tropical Pacific for the 5 days ending 24 May were weaker than average. Over the far western Pacific trade winds were in fact reversed (i.e. westerly—see map). Trade winds have been consistently weaker than average, and on occasion reversed in direction, since the start of 2015.

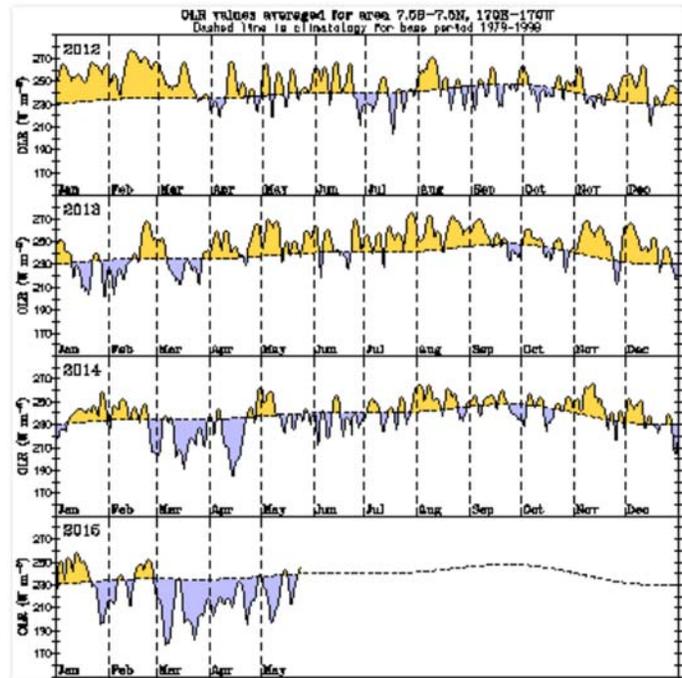
During La Niña there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño there is a sustained weakening of the trade winds.



Cloudiness near the Date Line

Cloudiness near the Date Line has been generally above average for the past two weeks. Cloudiness has been generally above average since the start of March.

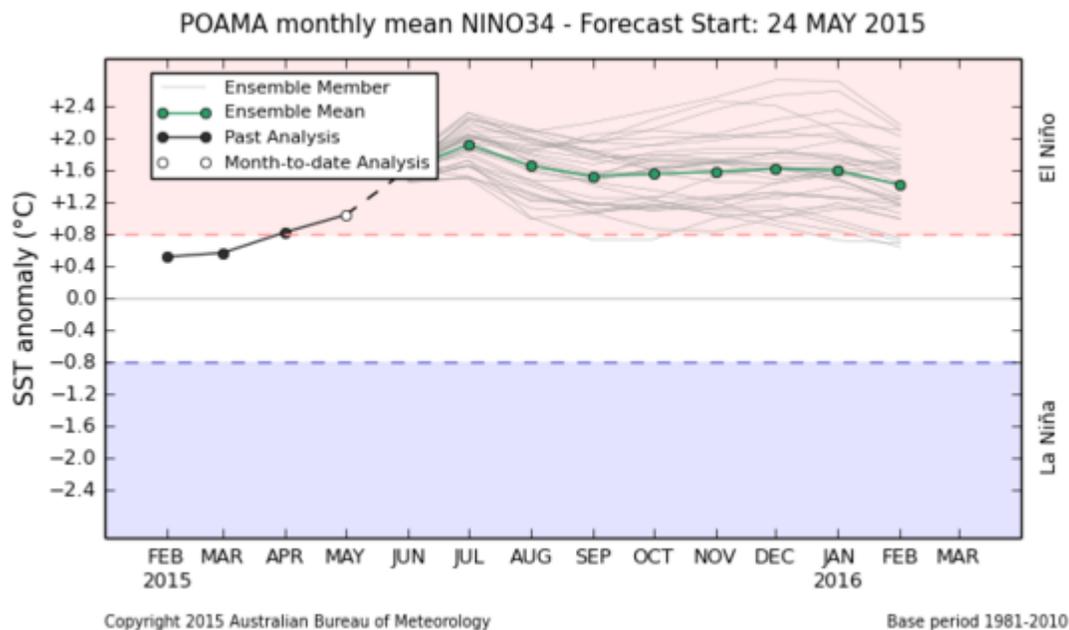
Cloudiness along the equator, near the Date Line, is an important indicator of ENSO conditions, as it typically increases (negative OLR anomalies) near and to the east of the Date Line during El Niño and decreases (positive OLR anomalies) during La Niña.



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 El Niño thresholds through the southern hemisphere winter and at least well into spring.

There is some spread between model averages for the individual models surveyed, and greater spread between ensemble members within several of the individual models; this underscores that while substantial warming is expected, it is still too early to determine with confidence what the peak ocean temperatures for this El Niño will be. However, the consistency of model outlooks for further warming right through into the southern hemisphere spring, as opposed to some disagreement between models at this time last year, indicates a low likelihood of the current event breaking down rapidly.

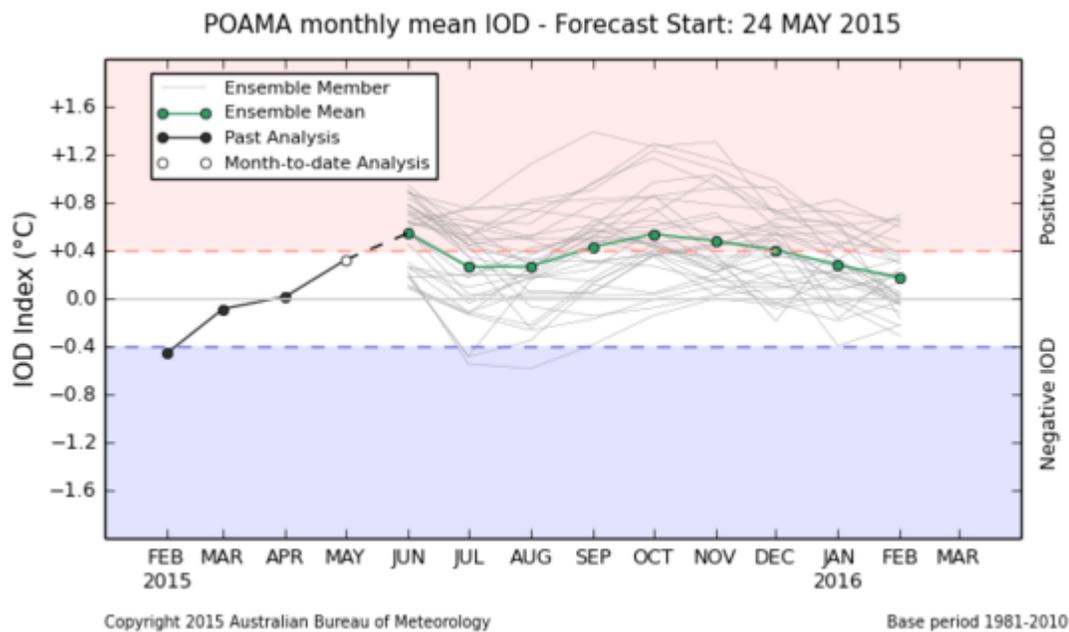


Indian Ocean Dipole

The latest weekly value of the Indian Ocean Dipole (IOD) index to 24 May is +0.46 °C.

On average, climate models surveyed in the [model outlooks](#) favour a continuation of a neutral phase of the IOD throughout winter. However, three of five surveyed models favour values near positive IOD thresholds during the southern hemisphere spring. Positive IOD events, often associated with lower rainfall in central and southeastern Australia, are more likely to occur during El Niño. Conditions will be monitored closely.

Temperatures in the Indian Ocean more broadly are warmer than average over much of the basin, with largest positive anomalies in the mid-latitudes of the southern hemisphere. However, since early May warm anomalies to the northwest of Australia and immediately to Australia's west have largely dissipated. Temperature anomalies in the Indian Ocean have been a significant driver of Australia's climate in recent months. As the El Niño unfolds, temperature patterns in the Indian Ocean will continue to have an influence on rainfall outlooks in the months ahead (the Bureau's [Climate Outlook](#) will be updated later this week).



See also: [IOD forecasts](#)

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