



ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

Six months of El Niño—event still going strong

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It is now six months since the 2015 El Niño became established in the Pacific. During this time, oceanic and atmospheric indicators have been persistently strong, comparable to the events of 1997–98 and 1982–83. International climate models suggest the peak in El Niño sea surface temperatures is likely to occur before the end of the year, then gradually ease in the first quarter of 2016.

Sea surface temperatures in the central tropical Pacific are now around 2.4 °C above average, the largest anomaly for this event so far. Other indicators of El Niño, such as the Southern Oscillation Index (SOI), cloudiness near the Date Line, and trade winds, still reflect strong El Niño conditions, despite some weakening in the SOI over the past fortnight.

The positive Indian Ocean Dipole (IOD) event persists. This event has been in place for over three months. International climate models expect the positive IOD to break down during November and early December. More broadly, Indian Ocean temperatures remain very warm: the October sea surface temperatures anomaly for the southern hemisphere Indian Ocean was the highest positive anomaly for any month on record.

El Niño is usually associated with below-average spring rainfall over eastern Australia, and increased spring daytime temperatures south of the tropics. A positive IOD typically reinforces the drying pattern, particularly in the southeast. During summer, El Niño's influence on rainfall decreases, while warmer daytime and night-time temperatures continue to be more likely across the south and east.

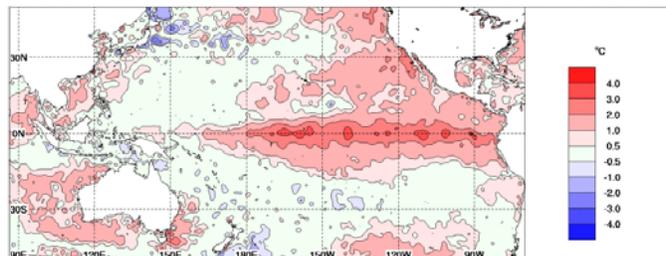
Next update expected on 24 November 2015 |

Weekly sea surface temperatures

Compared to two weeks ago, warm sea surface temperature (SST) anomalies have increased across much of the equatorial Pacific and decreased across the northeast of the basin. Cool anomalies have decreased across the Indonesian archipelago and waters to Australia's north.

Anomalies for the week ending 8 November exceeded +2 °C across nearly all of the equatorial Pacific east of the Date Line, with some areas exceeding +3 °C. Warm anomalies are present along nearly the entire equator in the Pacific, extending from the South American coastline to north of Papua New Guinea, although anomalies west of 165°E are weak.

Warm anomalies also remain across much of the Pacific Ocean in the northern hemisphere between the equatorial Date Line and the northeast of the Pacific basin, and across far northern latitudes. Warm anomalies persist in areas wrapping from Australia's southeast, around the Bight, to Australia's northwest, and are also present across large parts of the Indian Ocean.



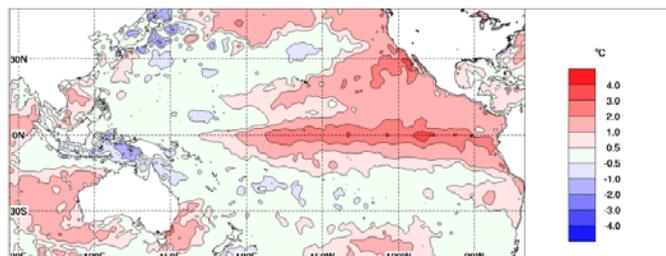
Index	Previous	Current	Temperature change (2 weeks)
NINO3	+2.2	+2.3	0.1 °C warmer
NINO3.4	+2.2	+2.4	0.2 °C warmer
NINO4	+1.3	+1.7	0.7 °C warmer

Baseline period 1961–1990.

Monthly sea surface temperatures

The SST anomaly map for October 2015 shows warm SST anomalies extended across the equatorial Pacific from the South American coastline to about 165°E and also across much of the east and far north of the basin in the northern hemisphere.

Compared to September, warm anomalies have increased along the equator and to Australia's southeast and west, but have decreased north of the equator in the central Pacific. Cool anomalies have increased across the Indonesian archipelago and waters to Australia's north. Moderate to strong warm anomalies persist across much of the Indian Ocean.



Index	September	October	Temperature change
NINO3	+2.2	+2.3	0.1 °C warmer
NINO3.4	+2.0	+2.2	0.2 °C warmer
NINO4	+1.1	+1.3	0.2 °C warmer

Baseline period 1961–1990.

All of NINO3, NINO3.4 and NINO4 continued to warm, reaching anomalies of +2.3 °C, +2.4 °C, and +1.7 °C respectively for October 2015. The NINO4 region has been unusually warm, with each month since February the warmest since records began in 1981.

NINO3.4 still remains behind the peak monthly anomaly value reached during either 1982 or 1997 (+2.8 °C and +2.7 °C respectively). *Note:* peak values

are typically recorded late in the year.

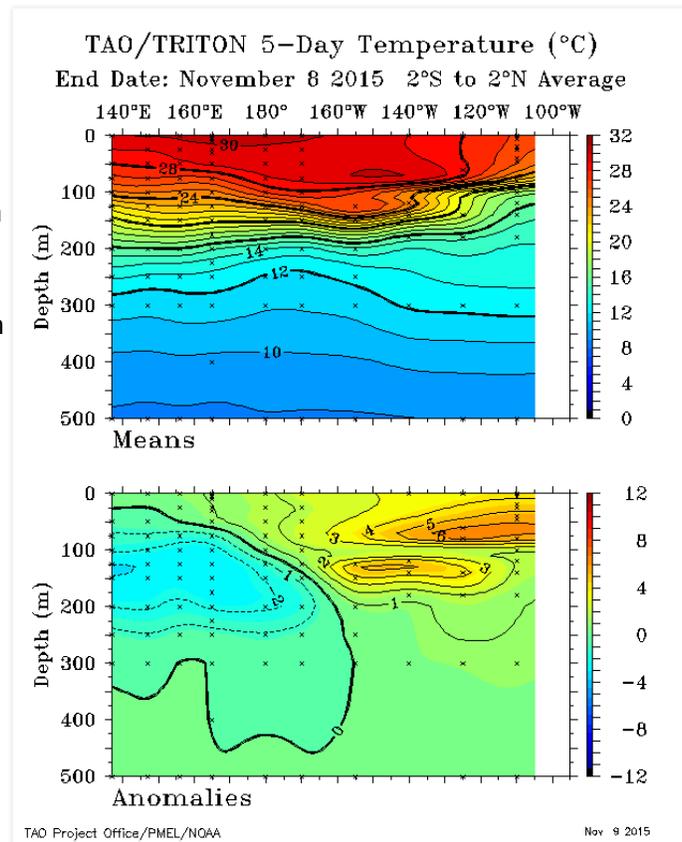
5-day sub-surface temperatures

The sub-surface temperature map for the 5 days ending 8 November shows temperatures were warmer than average in the top 150 m of the eastern half of the equatorial Pacific and cooler than average below the surface of the ocean in the western half. Water in the eastern Pacific sub-surface remains much warmer than average. Compared to two weeks ago, warm anomalies around 150 m depth have strengthened. An area around 75 m depth is more than 6 °C warmer than average.

Cool anomalies in the western equatorial Pacific have increased slightly when compared to two weeks ago. Anomalies across much of the western equatorial Pacific sub-surface are more than 2 °C cooler than average.

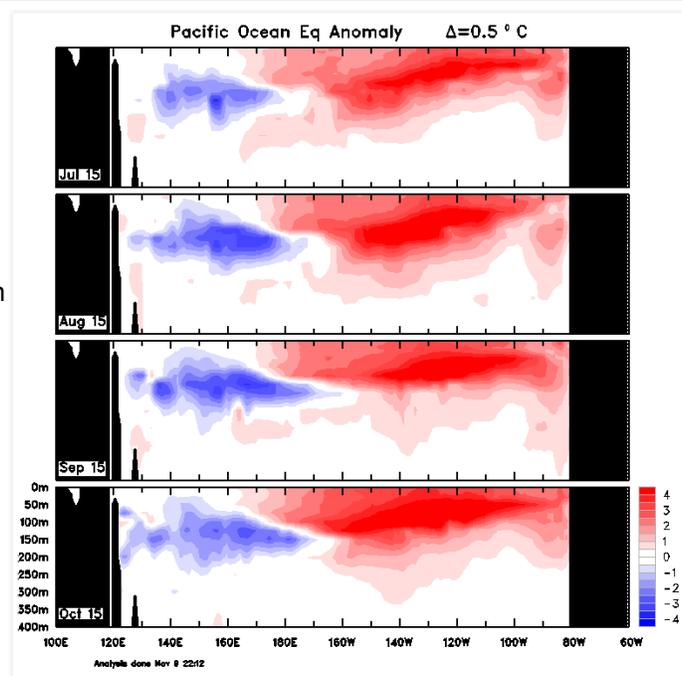
The pattern of warm anomalies in the eastern sub-surface and cool anomalies in the west is consistent with a well-established El Niño.

In the mean 5-day values (upper panel), the thermocline remains almost flat. The thermocline sits around the 20 °C region, and is considered mid-point between the warmer surface waters, and cooler subsurface waters. An almost flat thermocline tends to only occur during strong El Niño events.



Monthly sub-surface temperatures

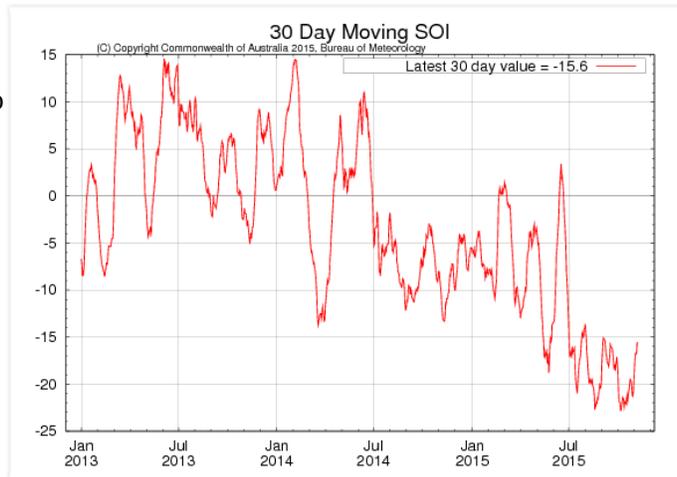
The four-month sequence of sub-surface temperature anomalies (to October) shows a generally consistent pattern of anomalies throughout the past four months. In October, warm anomalies were present in the top 200 m of the equatorial Pacific sub-surface, extending between about 170°E and the South American coastline. Monthly anomalies across large areas of the eastern half of the equatorial Pacific reached more than +4 °C. Cool anomalies persist in the sub-surface of the western equatorial Pacific.



Southern Oscillation Index

During the past two weeks the Southern Oscillation Index (SOI) has remained strongly negative, but has risen toward more moderate-strong values compared to two weeks ago. The 30-day SOI value to 8 November was -15.6.

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

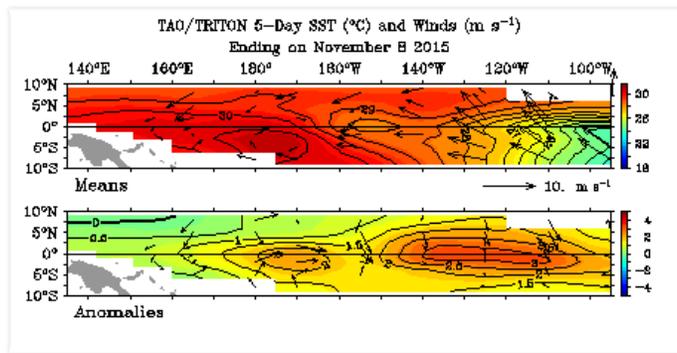


Trade winds

Trade winds for the 5 days ending 8 November show westerly anomalies across the central equatorial Pacific. The area of westerly anomalies has weakened, and spread eastward compared to two weeks ago as a westerly wind burst tracks across the Pacific.

Trade winds have been consistently weaker than average, and on occasion reversed in direction (i.e. westerly rather than easterly), since the start of 2015.

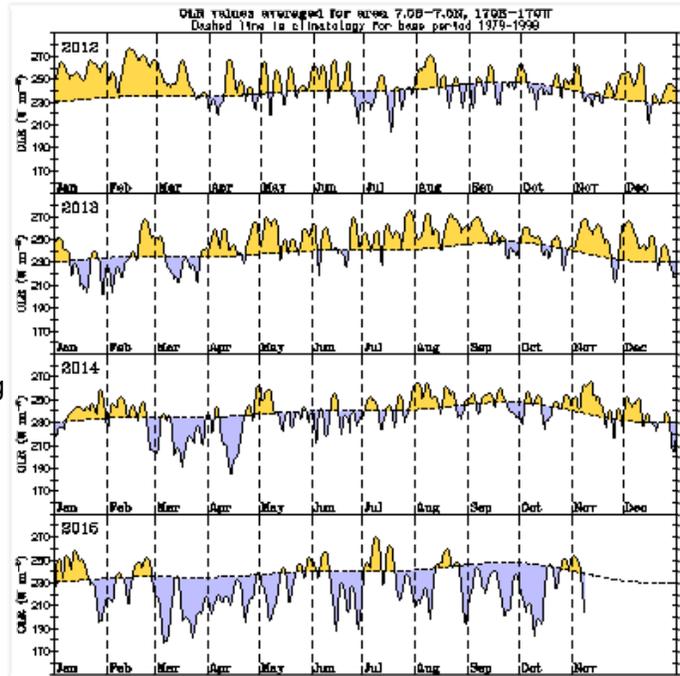
During La Niña events, there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño events there is a sustained weakening of the trade winds.



Cloudiness near the Date Line

Cloudiness near the Date Line has fluctuated around neutral values during late October and early November, but has returned to above-average values in recent days. Cloudiness near the Date Line has generally been above average since March.

Cloudiness along the equator, near the Date Line, is an important indicator of the El Niño–Southern Oscillation (ENSO), 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.

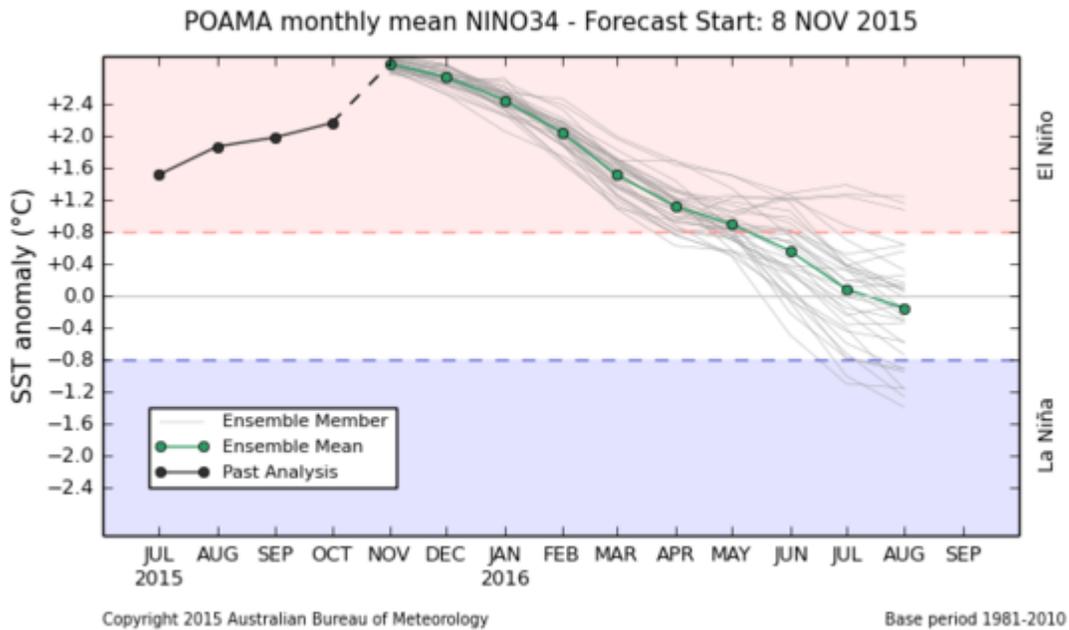


Model outlooks

All of the eight international [climate models](#) surveyed by the Bureau indicate that the peak values of this event in the central Pacific Ocean are likely to be reached in either November or December.

Most models indicate a steady decline in central Pacific SST values from the start of 2016 once peak values are reached later this year.

All surveyed models indicate that NINO3.4 will remain above El Niño thresholds through the first quarter of 2016.



Indian Ocean Dipole

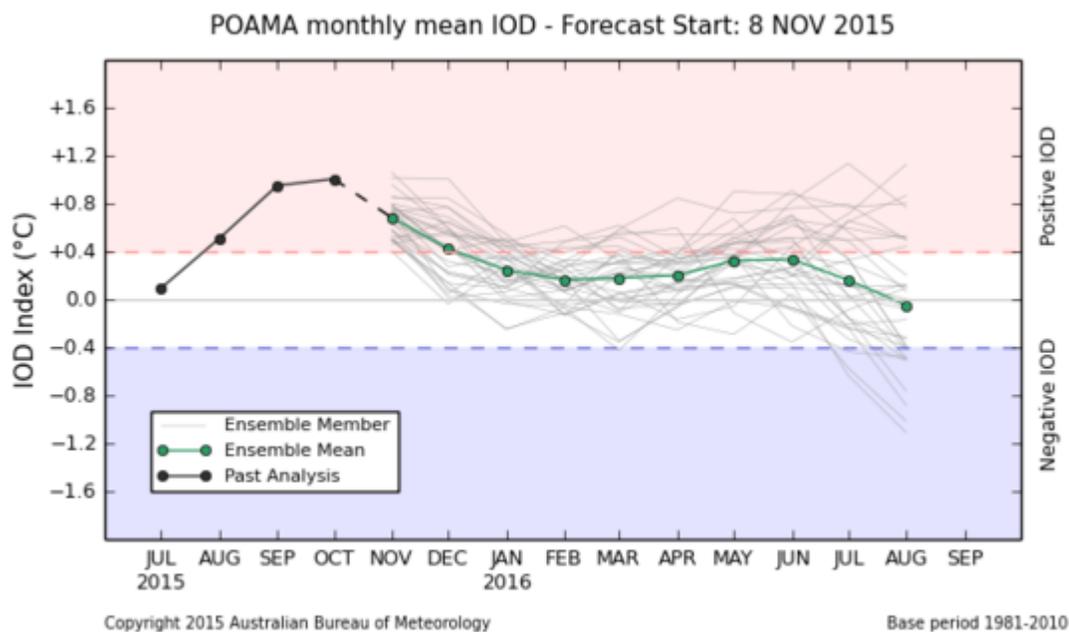
The positive Indian Ocean Dipole (IOD) event persists, with the weekly index value to 8 November positive at +0.88 °C.

Sea surface temperatures (SSTs) in the Indian Ocean are warmer than average over much of the basin, while waters around the Indonesian archipelago and to Australia's north are cooler than average. Compared to two weeks ago, both warm and cool anomalies have eased back slightly towards more neutral values.

For October as a whole, the sea surface temperature anomaly for the southern hemisphere Indian Ocean was the warmest on record for any month. The October anomaly of +0.65 °C (base period 1981–2010) surpassed the previous two records by 0.13 °C and 0.19 °C respectively (the previous two records were September 2015 +0.52 °C and November 2011 +0.46 °C).

Positive IOD events are often associated with lower rainfall in parts of central and southeastern Australia (see [About the Indian Ocean Dipole](#)). Positive IOD events are more likely to occur during El Niño, which also is typically associated with a reduction in winter–spring rainfall in eastern Australia.

All surveyed international [climate models](#) indicate this event is likely to begin to decay in late spring. IOD events typically decay by early summer.



See also: [IOD forecasts](#)

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