



ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

Tropical cyclone activity may lead to further ocean warming

Issued on 17 March 2015 | Product Code IDCKGEWW00

The past fortnight has seen unusual conditions in the tropical Pacific, which may increase the chance of El Niño in 2015.

In the western Pacific, severe tropical cyclone *Pam* and tropical storm *Bavi** straddled the equator, producing one of the strongest reversals in the trade winds in recent years. This change is expected to increase the already warm sub-surface temperatures currently observed in the tropical Pacific Ocean, which may in turn raise tropical Pacific Ocean surface temperatures in the coming months. However, it remains too early to say whether the reversal in the trade winds is a short term fluctuation or the beginning of a sustained trend.

International models surveyed by the Bureau have strengthened their outlooks for the likelihood of El Niño, with all eight models suggesting ocean temperatures will exceed El Niño thresholds by mid-year. However, model outlooks spanning the traditional ENSO transition period, February to May, generally have lower accuracy than outlooks made at other times of year.

The Bureau's ENSO Tracker remains at El Niño WATCH. This is due to a combination of warmer-than-average sub-surface temperatures in the tropical Pacific Ocean and models indicating that central and eastern tropical Pacific will warm to El Niño thresholds by mid-year. An El Niño WATCH indicates that there is about a 50% chance of El Niño forming in 2015—double the normal likelihood of an event.

El Niño is often associated with below-average winter–spring rainfall over eastern Australia and above-average daytime temperatures over the southern half of Australia.

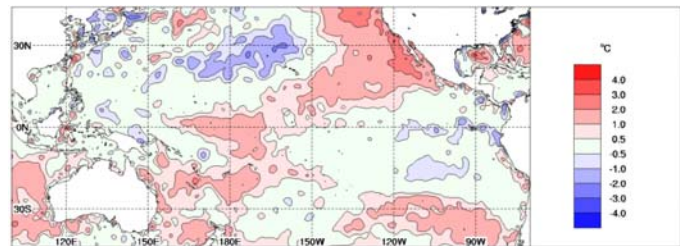
Next update expected on 31 March 2015 |

***Note:** On the Australian tropical cyclone scale *Bavi* would rate as a category 1 tropical cyclone.

Weekly sea surface temperatures

Compared to two weeks ago, warm sea surface temperature (SST) anomalies have decreased across nearly the entire equatorial Pacific. Severe tropical cyclone *Pam* cooled waters in parts of the western Pacific during the past week. The SST anomaly map for the week ending 15 March shows warm anomalies in the tropical Pacific between about 160°E and 140°W, while cool anomalies are evident along parts of the equator in the eastern equatorial Pacific and small areas of the far western equatorial Pacific north of Australia. In a large part of the central equatorial Pacific temperatures are near average for this time of the year.

Warm anomalies remain across a large part of the northeast of the Pacific Basin. Waters are also warmer than average to Australia's east, extending generally between the coast and the Date Line, and to Australia's west, extending across large parts of the Indian Ocean.



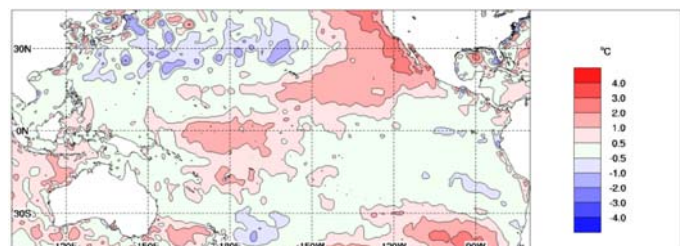
Index	Previous	Current	Temperature change (2 weeks)
NINO3	+0.3	-0.1	0.4 °C cooler
NINO3.4	+0.7	+0.3	0.4 °C cooler
NINO4	+1.1	+0.9	0.2 °C cooler

Baseline period 1961–1990.

Monthly sea surface temperatures

The SST anomaly map for February shows warmer than average waters over large areas of the Pacific. These areas include the tropical Pacific west of about 160°W, much of the northeast of the Pacific Basin, and the Tasman Sea. Warmer waters also persist across large parts of the Indian Ocean.

Compared to January, positive anomalies had decreased slightly in the eastern equatorial Pacific and increased slightly in the western equatorial Pacific.



Index	January	February	Temperature change
NINO3	+0.3	+0.2	0.1 °C cooler
NINO3.4	+0.5	+0.5	no change
NINO4	+0.9	+1.0	0.1 °C warmer

Baseline period 1961–1990.

See also:

[Animation of recent SST changes](#)

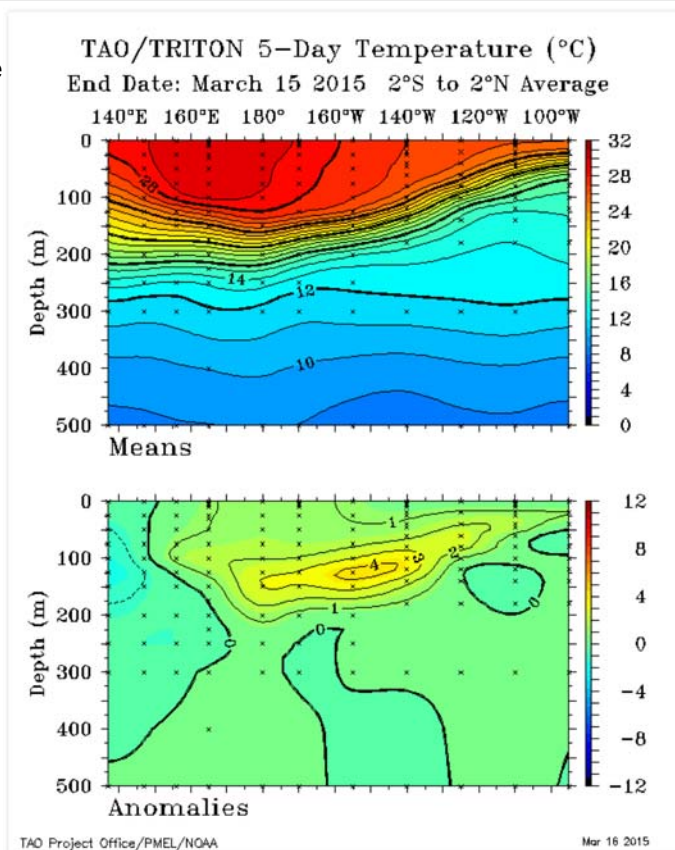
[Weekly index values](#)

[Sea temperature analyses](#)

[Map of NINO regions](#)

5-day sub-surface temperatures

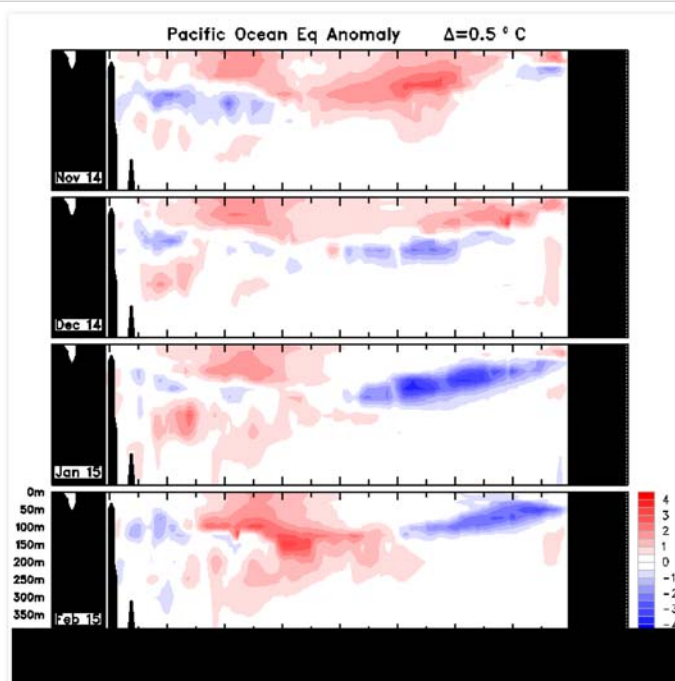
The sub-surface temperature map for the 5 days ending 15 March shows temperatures are near average across most of the shallow sub-surface of the equatorial Pacific, with an area of warm anomalies present in the central Pacific between 100 m and 200 m depth. This pool of warmer-than-average water has progressed eastward over recent weeks (this is known as a downwelling Kelvin wave). Anomalies in the centre of this region exceeded +4 °C.



Monthly sub-surface temperatures

The four-month sequence of sub-surface temperature anomalies (to February) shows cool anomalies have decreased 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. Overall, the pattern of warm and cool anomalies has shifted slightly eastward compared to January.

For February, warm anomalies were present in the top 200 m of the equatorial Pacific sub-surface between about 150°E and 140°W. Anomalies in western parts of this region reached more than +2.5 °C. Cool anomalies were present in much of the top 150 m of the equatorial Pacific sub-surface east of 140°W, with anomalies reaching more than -2.5 °C in the far eastern part of this area.



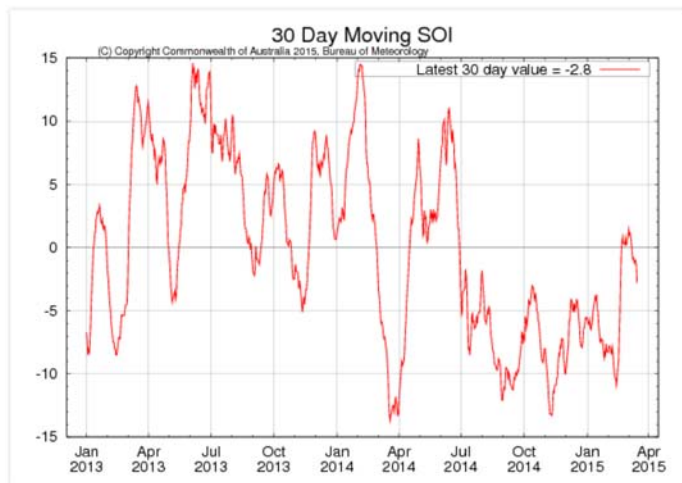
See also: [Animation of recent sub-surface temperature changes](#)

[Archive of sub-surface temperature charts](#)

Southern Oscillation Index

The Southern Oscillation Index (SOI) has decreased over the past two weeks, but remains within neutral values. The latest 30-day SOI value to 15 March is -2.8 . It is common for tropical weather systems to cause the SOI to fluctuate during the first quarter of the year, especially if a tropical low or cyclone was to pass near either Darwin or Tahiti. Recent tropical activity is likely to see these fluctuations continue for the immediate future.

Sustained positive values of the SOI above $+8$ may indicate La Niña, while sustained negative values below -8 may indicate El Niño. Values of between about $+8$ and -8 generally indicate neutral conditions.



See also:

[Monthly SOI graph](#)

[Table of monthly SOI values](#)

[30-day SOI values](#)

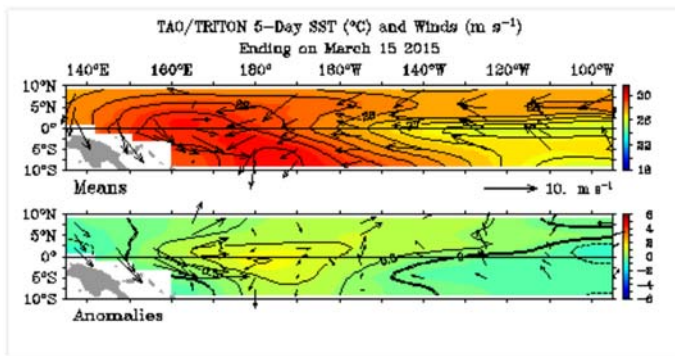
Trade winds

Trade winds were weaker than average over the tropical Pacific west of the Date Line for the 5 days ending 15 March (see map). A reversal of wind direction has been observed in the far western tropical Pacific; westerly winds have been observed in parts of this area for about five weeks now with recent very strong westerlies driven by tropical cyclone *Pam* and tropical storm *Bavi*.

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.

Trade winds in the central tropical Pacific east of the Date Line were near average, and slightly stronger than average in the eastern tropical Pacific.

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.



Data Source:

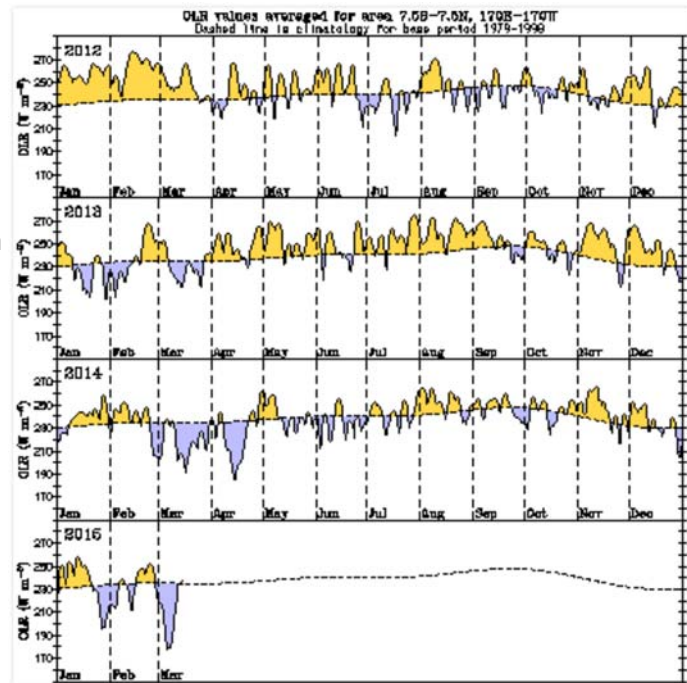
[TAO/TRITON data](#)

[Time-longitude wind anomalies](#)

Cloudiness near the Date Line

Cloudiness near the Date Line has returned to near-average values during recent days, after having been above average for the first half of March. This fluctuation was likely due to the effects of tropical cyclone *Pam* and tropical storm *Bavi*.

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.

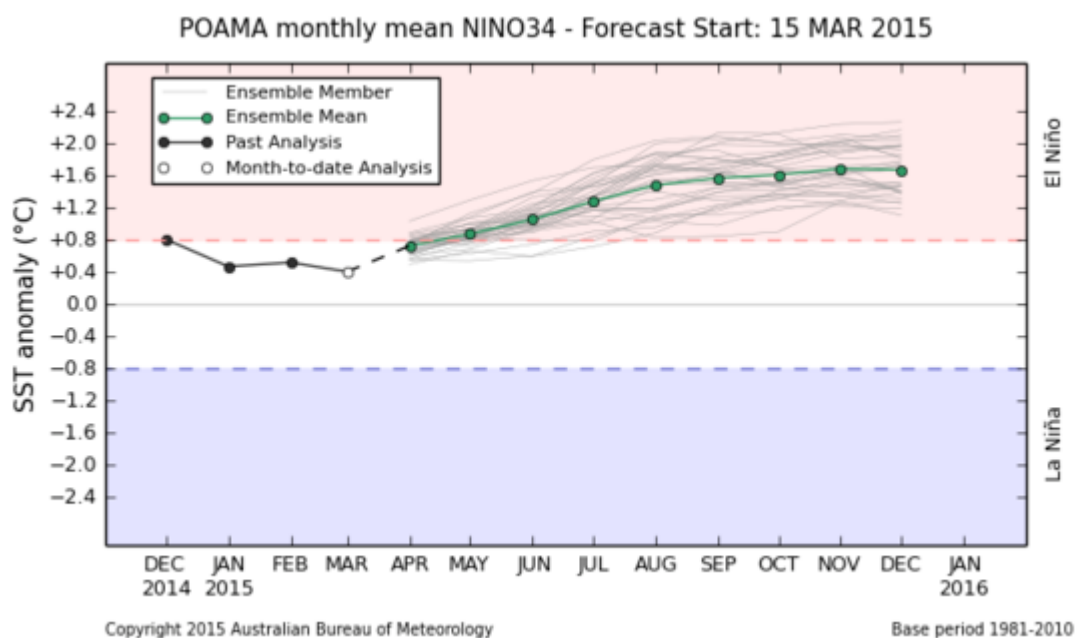


- Spatial cloudiness
- Regional cloudiness
- Out-going longwave radiation maps

Model outlooks

All of the eight surveyed international [climate models](#) favour warming of central Pacific Ocean SSTs over the coming months. All surveyed models indicate that NINO3.4 will reach El Niño threshold levels by mid-year, with the majority of models suggesting a prolonged period of sustained warming of sea surface temperatures.

Model outlooks spanning February to May (the traditional ENSO transition period) have lower confidence than forecasts made at other times of year. Many models currently show a substantial spread in their outlooks for tropical Pacific Ocean temperatures, indicating that while further warming is very likely, the degree of warming is not yet well constrained.



See also:

[Climate model summary](#)

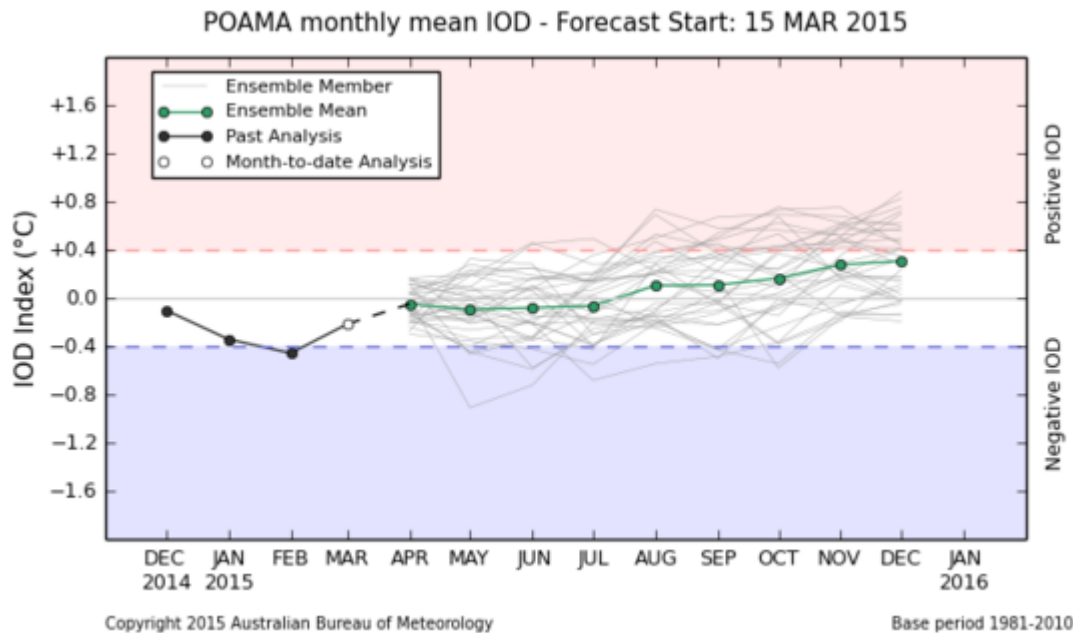
[POAMA model](#)

[Map of NINO regions](#)

Indian Ocean Dipole

The latest weekly value of the Indian Ocean Dipole (IOD) index to 15 March is 0.0 °C. Climate models surveyed in the [model outlooks](#) favour a continuation of a neutral phase of the IOD until at least mid-year.

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.



See also:

[POAMA model](#)

[IOD time series](#)

[Map of IOD regions](#)

[IOD forecasts](#)

[Weekly IOD values](#)

Archive

-

This page was created at **14:58 on Tuesday 17 March 2015 (AEDT)**

© [Copyright](#) Commonwealth of Australia 2015, Bureau of Meteorology (ABN 92 637 533 532) | [Disclaimer](#) | [Privacy](#) | [Accessibility](#)