



ENSO Wrap-Up

Current state of the Pacific and Indian Ocean

El Niño slowly weakening

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The 2015–16 El Niño continues its gradual decline. Sea surface temperatures in the tropical Pacific Ocean are cooling, and beneath the surface, cooler-than-average waters are advancing into the eastern Pacific. The atmosphere is also showing some signs of a declining El Niño. Trade winds are now the strongest they have been in nearly two years, though may weaken again briefly in the coming fortnight.

Based on the 26 El Niño events since 1900, around 50% have been followed by a neutral year, and 40% have been followed by La Niña. International climate models suggest neutral is most likely for the second half of the year. However, La Niña in 2016 cannot be ruled out, and a repeat El Niño appears unlikely. Historically, the breakdown of strong El Niño events often brings above average rainfall to some—but not all—parts of Australia in the first half of the year.

The Indian Ocean Dipole has little influence on Australian climate between December and April. However, Indian Ocean sea surface temperatures remain very warm across the majority of the basin which may provide extra moisture for rain systems across Australia. The southern hemisphere Indian Ocean remains at record warm levels, with January 2016 adding to the string of record warm months observed since mid-2015.

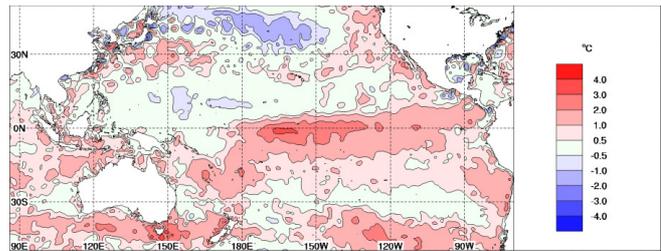
Next update expected on 1 March 2016 |

Weekly sea surface temperatures

Equatorial Pacific sea surface temperature anomalies (difference from normal) have cooled over the past fortnight, but remain at moderate to strong El Niño levels. Since the El Niño peaked in late 2015, anomalies in the central tropical Pacific have decreased by 0.4 to 0.8 °C.

Warm anomalies surround most of the Australian continent. Over the past fortnight, anomalies near the Western Australian, Northern Territory and northern Queensland coasts have warmed slightly. Large anomalies of more than +3 °C remain near Tasmania. Warm anomalies elsewhere in the Pacific remain similar to two weeks ago.

Warm anomalies continue to cover much of the Indian Ocean, but have decreased in the west of the basin over the past fortnight.



Index	Previous	Current	Temperature change (2 weeks)
NINO3	+1.8	+1.6	0.2 °C cooler
NINO3.4	+2.1	+2.0	0.1 °C cooler
NINO4	+1.4	+1.3	0.1 °C cooler

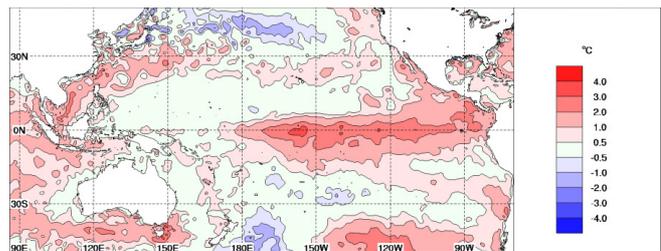
Baseline period 1961–1990.

Monthly sea surface temperatures

The SST (sea surface temperature) anomaly map for January 2016 shows warm SST anomalies extending across almost the entire equatorial Pacific. Compared to December, warm anomalies have decreased slightly along the equator and in the northeast of the Basin, while increasing near the coast of South America.

Warm anomalies persist over much of the Indian Ocean.

In January, the NINO3 index in the eastern Pacific cooled, declining from its peak value which had remained steady during November and December. The NINO3.4 and NINO4 indices also cooled during January. Values in the Bureau dataset for NINO3, NINO3.4 and NINO4 were +2.1 °C, +2.2 °C and +1.3 °C respectively, indicative of a strong El Niño event.



Index	December	January	Temperature change
NINO3	+2.4	+2.1	0.3 °C cooler
NINO3.4	+2.3	+2.2	0.1 °C cooler
NINO4	+1.6	+1.3	0.3 °C cooler

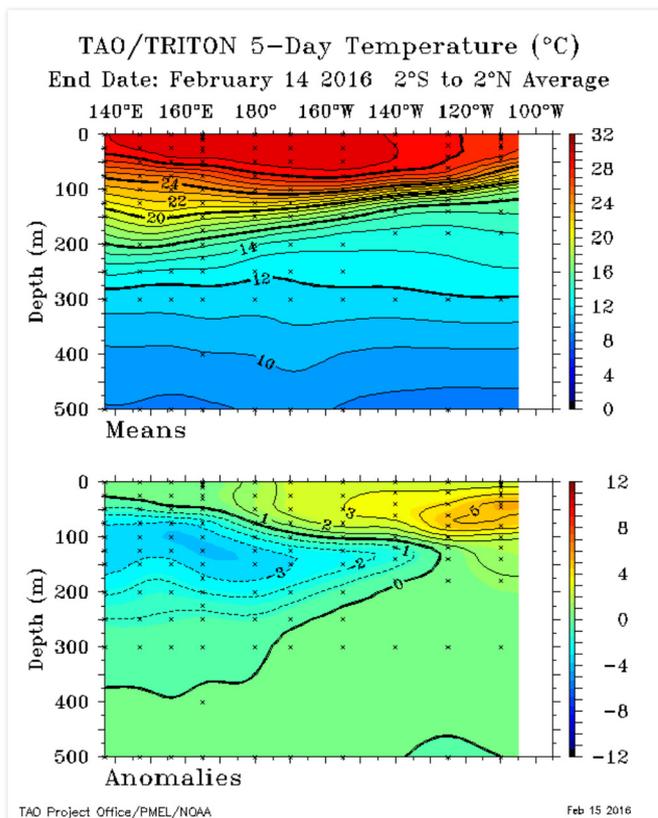
Baseline period 1961–1990.

5-day sub-surface temperatures

The sub-surface temperature map for the 5 days ending 14 February shows temperatures more than 2 °C warmer than average in the top 100 m of the ocean east of about 130° W, tapering off to shallower depths in the central Pacific sub-surface. The sub-surface of the western Pacific is mostly cooler than normal, with anomalies less than -3 °C in an area west of 170° W, approximately 125 m below the surface.

The area of cool sub-surface anomalies has extended further east over the past fortnight to approximately 130° W, which is 20° further than a fortnight ago. The warm sub-surface anomalies in the eastern Pacific have decreased in strength and size compared to two weeks ago.

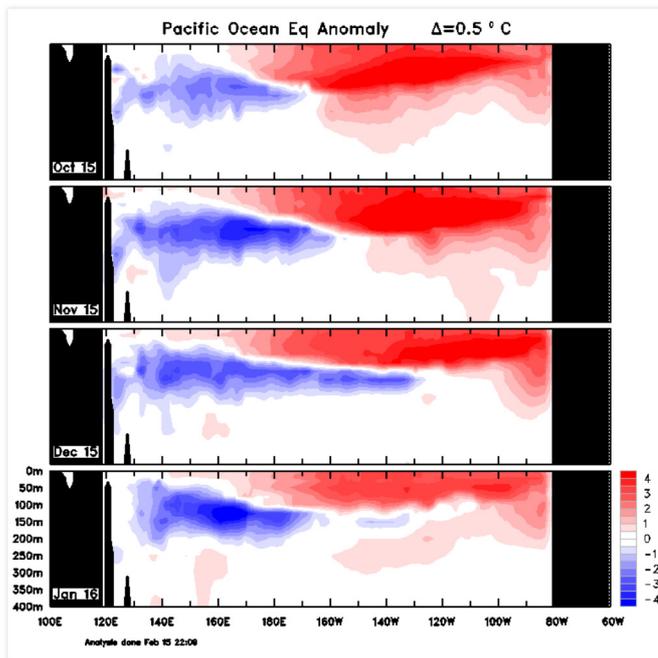
Cool anomalies are expected to migrate eastwards and cool the surface of the equatorial Pacific in the coming weeks, in line with the expected eventual return to an ENSO-neutral state.



Monthly sub-surface temperatures

The four-month sequence of sub-surface temperature anomalies (to January) shows a decrease in warm sub-surface temperature anomalies compared to December, while the area of cool sub-surface anomalies has strengthened and contracted.

During January, warm anomalies were present in the top 150 m of the equatorial Pacific sub-surface, extending between about 170° E and the South American coastline. These warm anomalies have cooled by about a degree compared to December. Cool anomalies for January covered much of the western Pacific at around 150 m depth, with a narrow area of cool anomalies underlying warm anomalies in the central region.

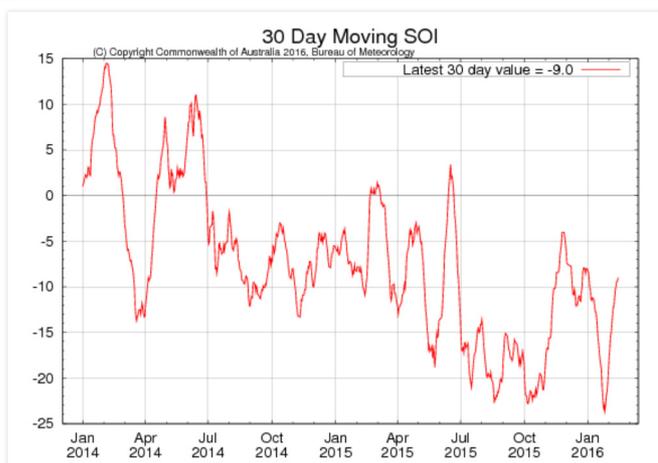


Southern Oscillation Index

The 30-day Southern Oscillation Index (SOI) dipped to an event-to-date minimum of -23.6 on 26 January. Since then, the SOI has risen steeply, with the latest 30-day SOI to 14 February at -9.0 .

Fluctuations of the SOI during Australia's northern wet season (October-April) are not unusual as the passage of tropical systems near Darwin and Tahiti affects atmospheric pressure. During this period, the SOI should be used cautiously; 90-day values can provide more reliable guidance. The current 90-day SOI is -12.2 .

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.



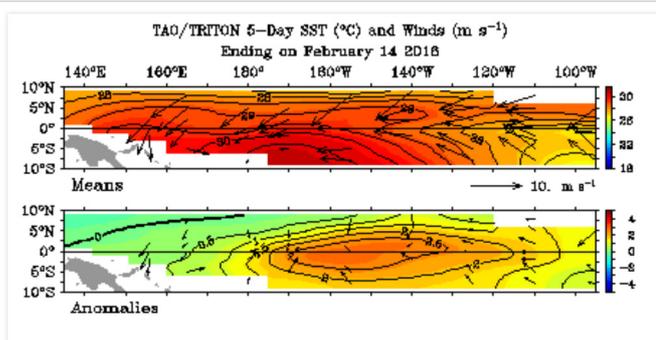
Updated daily

Trade winds

Trade winds for the 5 days ending 14 February are mostly close to normal across the equatorial Pacific Ocean. There is little change in the pattern from a fortnight ago.

The return to near-normal trade winds is consistent with a declining El Niño. Prior to January 2016, trade winds had been consistently weaker than average, and on occasion reversed in direction (i.e. westerly rather than easterly), since the start of 2015.

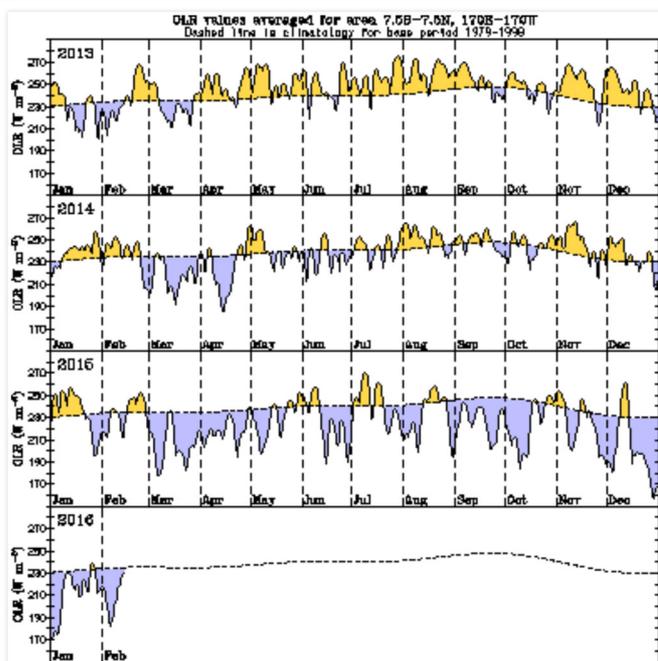
During La Niña events, there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño events there is a sustained weakening, or even reversal, of the trade winds.



Cloudiness near the Date Line

Cloudiness near the Date Line has been above average since the end of January as it has mostly been since March 2015.

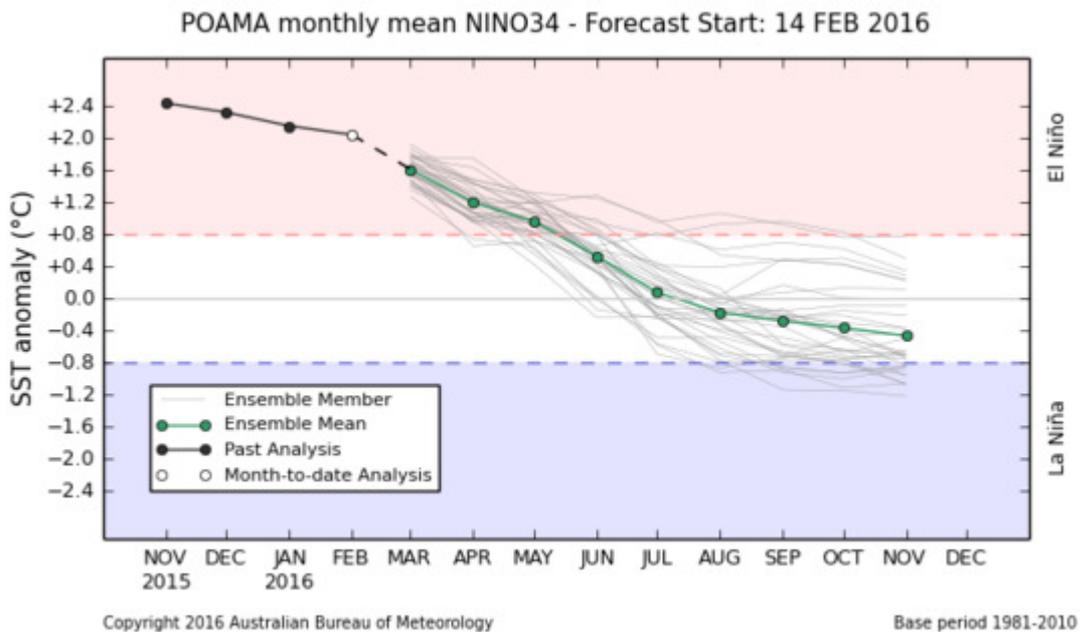
Cloudiness along the equator, near the Date Line, is an important indicator of ENSO, as it typically increases (negative Outgoing Long-wave Radiation (OLR) anomalies) near and to the east of the Date Line during an El Niño event and decreases (positive OLR anomalies) during a La Niña event.



Model outlooks

All eight international [climate models](#) surveyed by the Bureau indicate central Pacific sea surface temperatures (SSTs) will continue to cool in the coming months.

Two models indicate central Pacific SSTs will fall below El Niño thresholds by May and the other six by July.

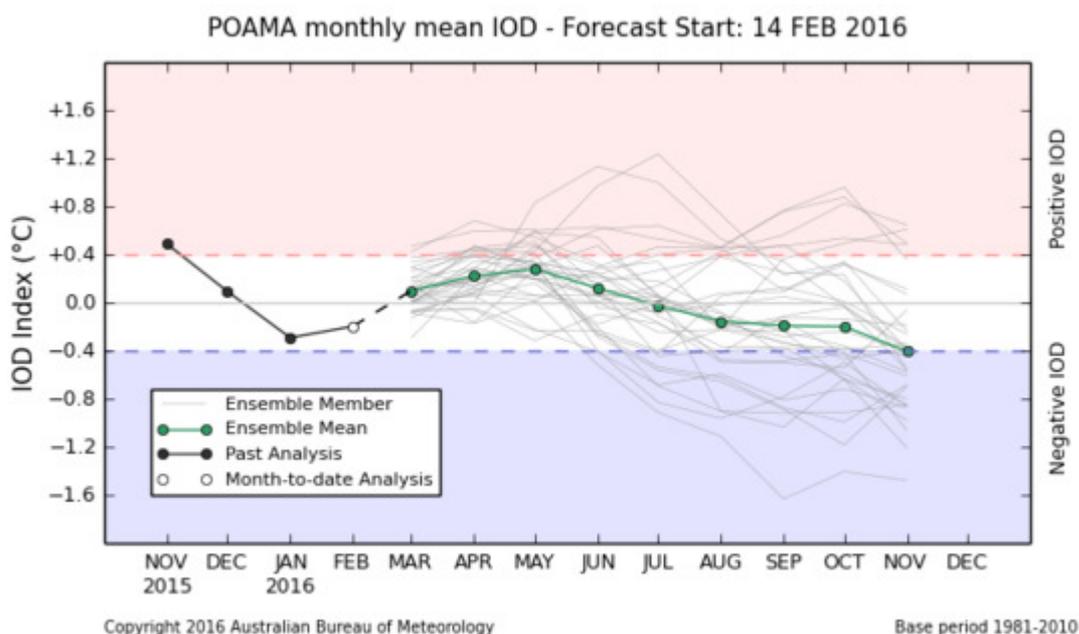


Indian Ocean Dipole

The Indian Ocean Dipole (IOD) is neutral. The Dipole Mode Index value to 14 February was -0.18 °C.

The IOD does not typically influence Australian climate during the months December to May. When the monsoon trough is in the southern hemisphere (as it typically is between the months of December to May) neither positive nor negative IOD events are able to form.

More generally, sea surface temperatures (SSTs) remain significantly warmer than average across most of the Indian Ocean basin, with a large part of the Indian Ocean measuring warmest on record for this time of year. This unusually warm ocean is likely to increase the available moisture for weather systems travelling across Australia in the coming weeks and months, increasing the likelihood of good falls occurring across southern Australia.



See also: [IOD forecasts](#)

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