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ENSO Wrap-Up

A regular commentary on the El Nino-Southern Oscillation

Contents

CURRENT STATUS as at 25th January 2006
Next update expected by 8th February 2006 (two weeks after this update).

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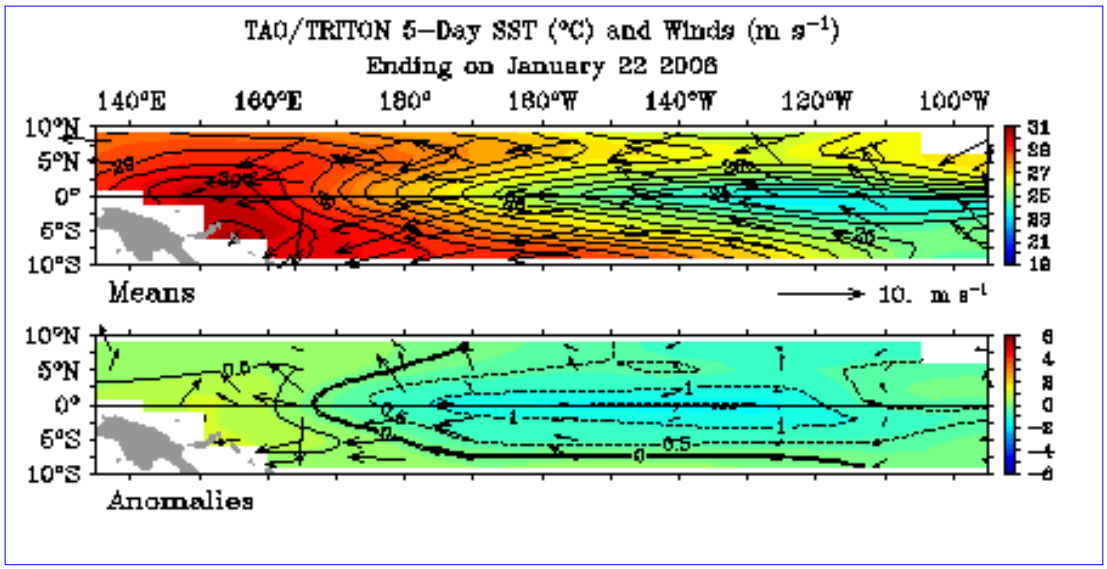
Summary: A cooling Pacific, with some characteristics of a La Niña.

The overall ENSO pattern remains neutral, although with some features of a weak La Niña. This is particularly evident in the cold subsurface waters of the east Pacific, the reduced cloudiness in the central Pacific and the stronger than average Trade Winds in the western Pacific. On the other hand, the SOI remains neutral and sea surface temperatures, though cooler than normal, are not at La Niña levels.

There is a chance that with further cooling, the pattern might develop into a La Niña for a brief period. Historically, the formation of a long-lasting La Niña event at this time of year is extremely rare. Similarly, computer model predictions of ocean temperatures indicate warming after February and ENSO neutral conditions by the middle of 2006.



From the NOAA/PMEL/TAO website.

In Brief

- Sea surface temperatures have continued to cool during January, with cooler than average conditions extending further west to cover much of the equatorial Pacific.
- Subsurface temperatures continued to cool across the eastern half of the Pacific, with conditions now being typical of a weak La Niña.
- The SOI has a current (22nd January) 30-day value of +10 and a 90-day value of +3.
- The Trade Winds have been stronger or much stronger than average over the western equatorial Pacific for most of the past two months. Further east however, they were much weaker than normal during the second half of December, and are currently close to normal.
- The pattern of below to much below average cloudiness in the region around the equatorial dateline since November, continued during January. This situation is typical of a weak La Niña.
- All computer models predict neutral eastern Pacific conditions in June 2006, though five predict weak La Niña conditions over the next few months.

Graph of 30-day Southern Oscillation Index values from 2003.

This graph is updated automatically each day. The data are available here.

Details

Much of the near equatorial Pacific continued to cool during December 2005, with weak negative anomalies extending westwards from South America to the dateline. The strongest anomalies of a little below −1°C were evident near 240°E (120°W). Weak positive anomalies remained in the far western Pacific, and slightly stronger anomalies of +1 to +2°C were arranged in a boomerang shape surrounding the cooler than average water. The combination of the negative and positive anomalies suggests a pattern reminiscent of a weak La Niña. Overall, the pattern was somewhat more intense in December than in November. The NINO indices for December were NINO1: −0.1°C, NINO2: +0.1°C, NINO3: −0.5°C, NINO3.4: −0.4°C, and NINO4: +0.2°C. Warming was apparent near the South American coast (NINO1 and NINO2) in response to weakened Trade Winds (see below).

The weekly NINO indices show a further small extension of the cool anomalies into the central to western Pacific, with NINO4 continuing negative (the first time in some years - currently −0.4°C). The NINO3.4 index dropped by 0.2°C over the past three weeks to −0.7°C, but the NINO1, NINO2 and NINO3 indices have

remained steady, or shown only a small decrease, in response to near-normal Trade Winds. The 7-day SST anomaly map shows a westward extension of negative anomalies on the equator into the central to western Pacific, with a slight increase in the spatial area of negative anomalies less than −1.0°C. In contrast, there was a weakening of the large band of positive anomalies which stretch southeastward across the tropical and sub-tropical south Pacific.

Preliminary subsurface data for January show that further cooling has occurred in the top 200 m of the central to eastern Pacific, with negative anomalies of around −4°C in a broad area between 120°W and 160°W. Weaker positive anomalies are situated further to the west. Overall the pattern is typical to that seen in a weak cold (La Niña) event. The TOGA-TAO subsurface data for the 5 days ending 22nd January shows a similar pattern.

An archive of past SST and sub-surface temperature charts is available.

After falling to −3 in November, the Southern Oscillation Index (SOI) rose to a value of +1 in December (see SOI graph, SOI table). The current (22nd January) 30-day SOI is +10 mainly due to falling pressures at Darwin, coinciding with an active phase of the monsoon. However, the 90-day SOI is weaker at +3. The SOI therefore continues to be neutral.

During El Niño episodes, there is a sustained weakening of the Trade Winds across much of the tropical Pacific but a return to near-average values as El Niño decays. Close to the equator, the Trade Winds have generally been stronger or much stronger than average between about 140°E and 140°W since early December, while over the central to eastern Pacific east of 140°W they have been close to or a little weaker than average since mid-December. The TAO/TRITON map (small image above), for the five days ending 22nd January, shows slightly stronger than average winds over much of the near-equatorial Pacific, especially in the west.

Cloudiness near the dateline in the central Pacific is another important indicator of El Niño, as it normally increases during these episodes with a return to near-average values during the decay phase. In general, cloudiness around the equatorial dateline has been below normal (*i.e.* OLR above average) since the start of August 2005, with well below average values from November to January. This situation is in keeping with the cooling trend observed in ocean temperatures, and is similar to that expected in a weak La Niña.

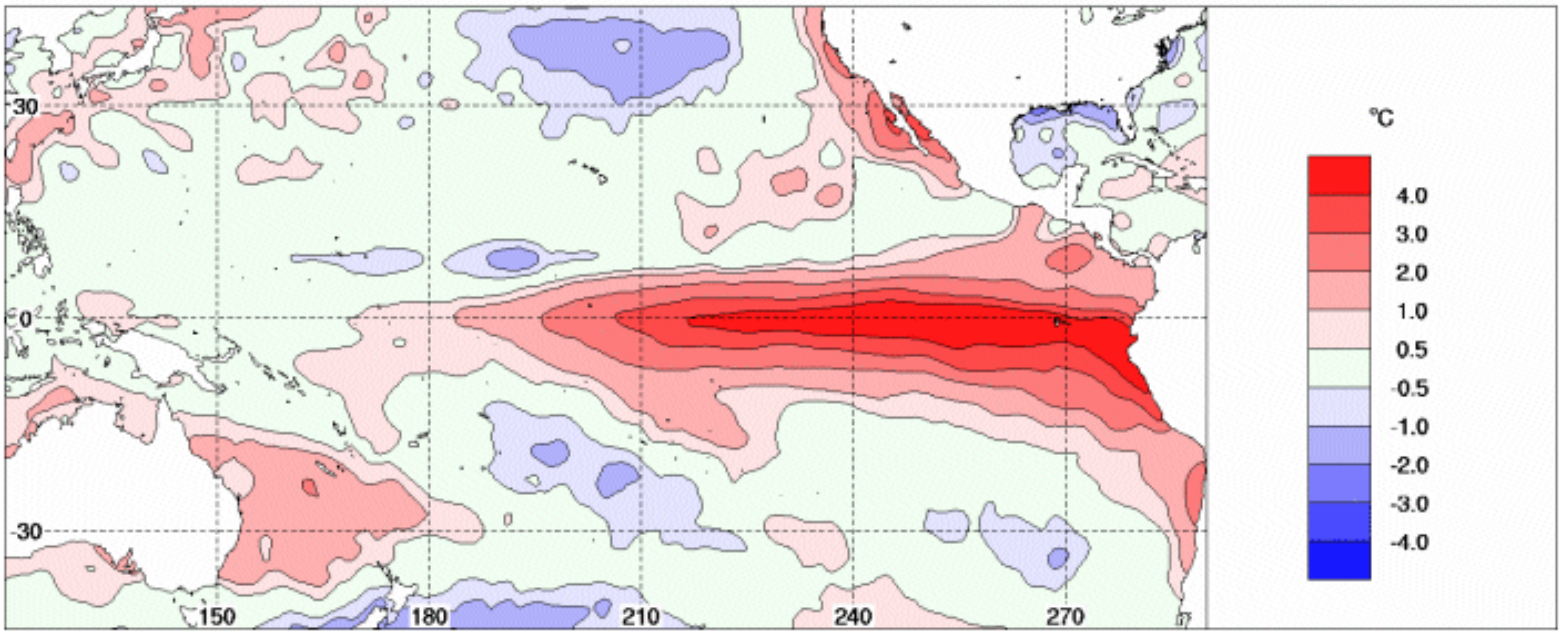
In the latest survey of a dozen international computer models, all favoured neutral temperature patterns in both June and September, though five of the models predict a brief period of weak La Niña conditions between about February and May.

THE NEXT UPDATE OF THE DETAILED SECTION ABOVE IS EXPECTED BY 8th FEBRUARY

The other links section below can be used to keep track of important developments across the Pacific Basin.

What is El Niño?

Although originally named for a local warming of the ocean near the coast of Peru in South America, "El Niño" now refers to a sustained warming over a large part of the central and eastern tropical Pacific Ocean. Combined with this warming are changes in the atmosphere that affect weather patterns across much of the Pacific Basin, including Australia. These altered weather patterns often help promote further warming of the ocean because of the changes they cause in ocean currents.



Map showing departures from average ocean surface temperatures
in November 1997 at the height of the 1997/98 El Niño.

El Niño events occur about every four to seven years and typically last for around 12 to 18 months. They are a natural part of the climate system and have been affecting the Pacific Basin for thousands of years.

Each El Niño event is unique in terms in terms of its strength (as measured by numbers such as the Southern Oscillation Index or changes in ocean temperature), as well as its impact in terms of altered rainfall patterns. Furthermore, El Niño events have a life-cycle during which the impacts vary, both in terms of spatial extent and timing.

More information from the Bureau's Climate Variability and El Niño brochure

El Niño - What it isn't

El Niño is not a freak of climate, it's not a rogue weather phenomenon, and it isn't in any way abnormal. Furthermore it is not a scourge, and as far as Australia is concerned, it shouldn't be thought of as a synonym for drought, although it's often linked to reduced rainfall in eastern and northern Australia. Finally, and unfortunately, it's not regularly periodic so that predicting an event with more than about six to nine months warning is extremely difficult.

Thunderstorm approaching Bargara Beach, Bundaberg, Queensland.
Picture: CASSANDRA PRINCE, from the Bureau of Meteorology 2001 Calendar

What has happened in Australia during previous El Niño events?

More often than not, El Niño events result in reduced rainfall across parts of eastern and northern Australia, particularly during winter, spring and early summer. However, the precise nature (where and when) of the impact differs quite markedly from one event to another, even with similar changes and patterns in the Pacific Ocean. The progress of some events was punctuated by timely rains that made a significant difference to the season.

For example, the 1982/83 and 1997/98 events were both very strong as measured by changes in the Pacific, yet their impacts in Australia were completely different. Eastern and southern Australia was gripped by severe drought in 1982/83, but in 1997 average to above average falls were common in May, and a dry spell over winter was broken by widespread and heavy rains in September. Severe drought can sometimes result from a relatively weak event, as occurred in 2002/03.

Furthermore, changes in the Indian Ocean can enhance the general tendency for reduced rainfall in eastern Australia, or mask it by contributing to timely falls.

- Composite or average rainfall decile patterns in previous El Niño and La Niña events.
- Detailed analysis of the impact of 24 El Niño events in Australia.

Other Useful Links

The Weekly Tropical Climate Note issued by the Darwin office of the Bureau of Meteorology discusses the main features of the tropical atmosphere and ocean, including the **intra-seasonal oscillation or 30-60 day wave** which is thought to sometimes impact on the development of El Niño events.

The Bureau of Meteorology Research Centre (BMRC) has recently developed maps of **Out-going Longwave Radiation (OLR)**, a useful El Niño monitoring tool. Negative anomalies show areas which, in general, have been

cloudier (and potentially wetter) than normal.

The TAO / TRITON data display page is excellent for creating your own plots of numerous variables that are relevant to El Niño.

Note however that information coming from other countries is likely to describe timing and impacts relevant to those countries, which will not be the same as those in Australia.