EL NIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION

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Synopsis: El Niño conditions are likely to continue through March-May 2007.

Equatorial Pacific SST anomalies greater than +1ºC were observed in most of the equatorial Pacific between 170ºE and the South American coast (**Fig. 1**). The latest SST departures in the Niño regions are around 1.0ºC, except near 0.5ºC for Niño 1+2 (**Fig. 2**). The increase in SST anomalies during the last half of 2006 was accompanied by weaker-than-average low-level equatorial easterly winds across most of the equatorial Pacific and negative values of the Southern Oscillation Index (SOI). Collectively, these oceanic and atmospheric anomalies indicated the development of El Niño in the tropical Pacific.

Beginning in February 2006 the basin-wide upper ocean heat content increased, and since early April 2006 positive anomalies have been observed (**Fig. 3**). The upper ocean heat content since April 2006 has been modulated by oceanic Kelvin waves (**Fig. 4**), initiated by variations in the intensity of the low-level equatorial easterly winds partly associated with Madden-Julian Oscillation (MJO) activity. Four distinct Kelvin waves have occurred in the last nine months (**Fig. 4)**, with the amplitude of each wave exceeding that of its predecessor. The most recent Kelvin wave (bottom of **Fig. 4**) reached the west coast of South America during the last half of December 2006, resulting in a warming of the subsurface and surface waters along the coasts of Ecuador and northern Peru.

Most of the statistical and coupled models, including the NCEP Climate Forecast System (CFS), indicate that SST anomalies are near their peak and that decreasing anomalies are likely during February-May 2007 (**Fig. 5**). Recent observed trends in the upper ocean tend to support those forecasts. Decreasing upper-ocean heat content in the central equatorial Pacific has been progressing east in association with the upwelling portion of the most recent Kelvin wave. In the absence of any further Kelvin wave activity, the upper-ocean heat content should return to near average in a few months. However, there is considerable uncertainty in this outlook, given the resurgence of MJO activity in late December 2006. It is possible that the enhanced precipitation phase of the MJO, which is currently entering the western tropical Pacific, might trigger a more persistent pattern of cloudiness and precipitation over the anomalously warm waters of the central equatorial Pacific during the next several weeks. If that occurs, then the equatorial easterlies over the central Pacific will likely weaken possibly leading to the initiation of a fifth Kelvin wave. Please refer to ENSO Evolution, Status and Prediction Presentation available on the CPC El Niño/ La Niña page for weekly updates on the latest conditions in the tropical Pacific (see link below).

There is an increased probability of observing El Niño-related effects over North America during January-March 2007, including warmer-than-average temperatures over western and central Canada, and over the northern United States, wetter-than-average conditions over portions of the U.S. Gulf Coast and Florida, and drier-than-average conditions in the Ohio Valley and in portions of the Pacific Northwest. Global effects that can be expected during January-March include drier-than-average conditions over portions of Malaysia, Indonesia, northern and eastern Australia, some of the U.S.-affiliated islands in the tropical North Pacific, northern South America and southeastern Africa, and wetter-than-average conditions over central South America (Uruguay, northeastern Argentina, southeastern Paraguay and southern Brazil) and possibly along the coasts of Ecuador and northern Peru.

This discussion is a consolidated effort of NOAA and its funded institutions. Oceanic and

atmospheric conditions are updated weekly on the Climate Prediction Center website (El Niño/La Niña Current Conditions and Expert Discussions). Forecasts for the evolution of El Niño/La Niña are updated monthly in the Forecast Forum section of CPC's Climate Diagnostics Bulletin. The next ENSO Diagnostics Discussion is scheduled for 8 February 2007. To receive an e-mail notification when the monthly ENSO Diagnostic Discussions are released, please send an e-mail message to: ncep.list.enso-update@noaa.gov.

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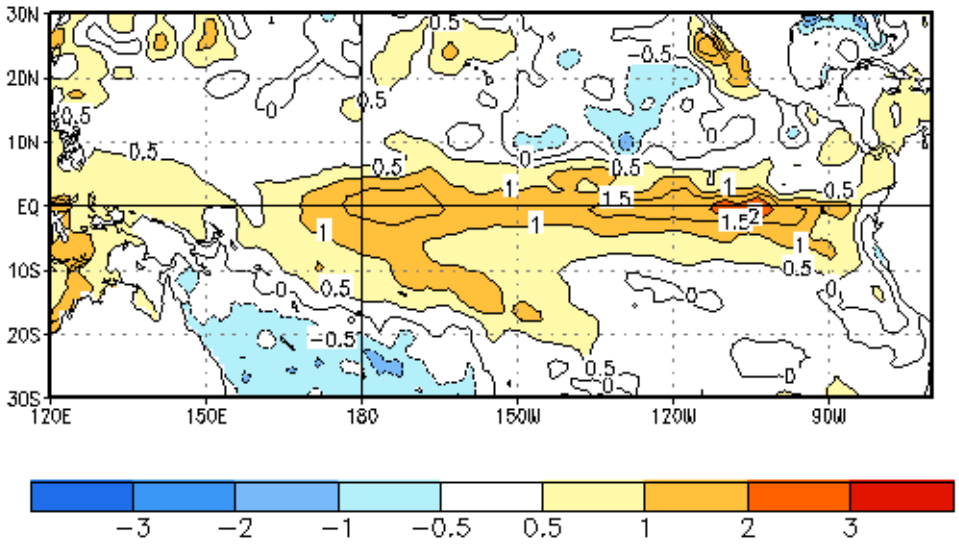

Figure 1. Average SST anomalies (°C) for the four-week period 10 December 2006-6 January 2007. The SST anomalies are computed with respect to the 1971-2000 base period means (Xue et al. 2003, *J. Climate*, **16**, 1601-1612).

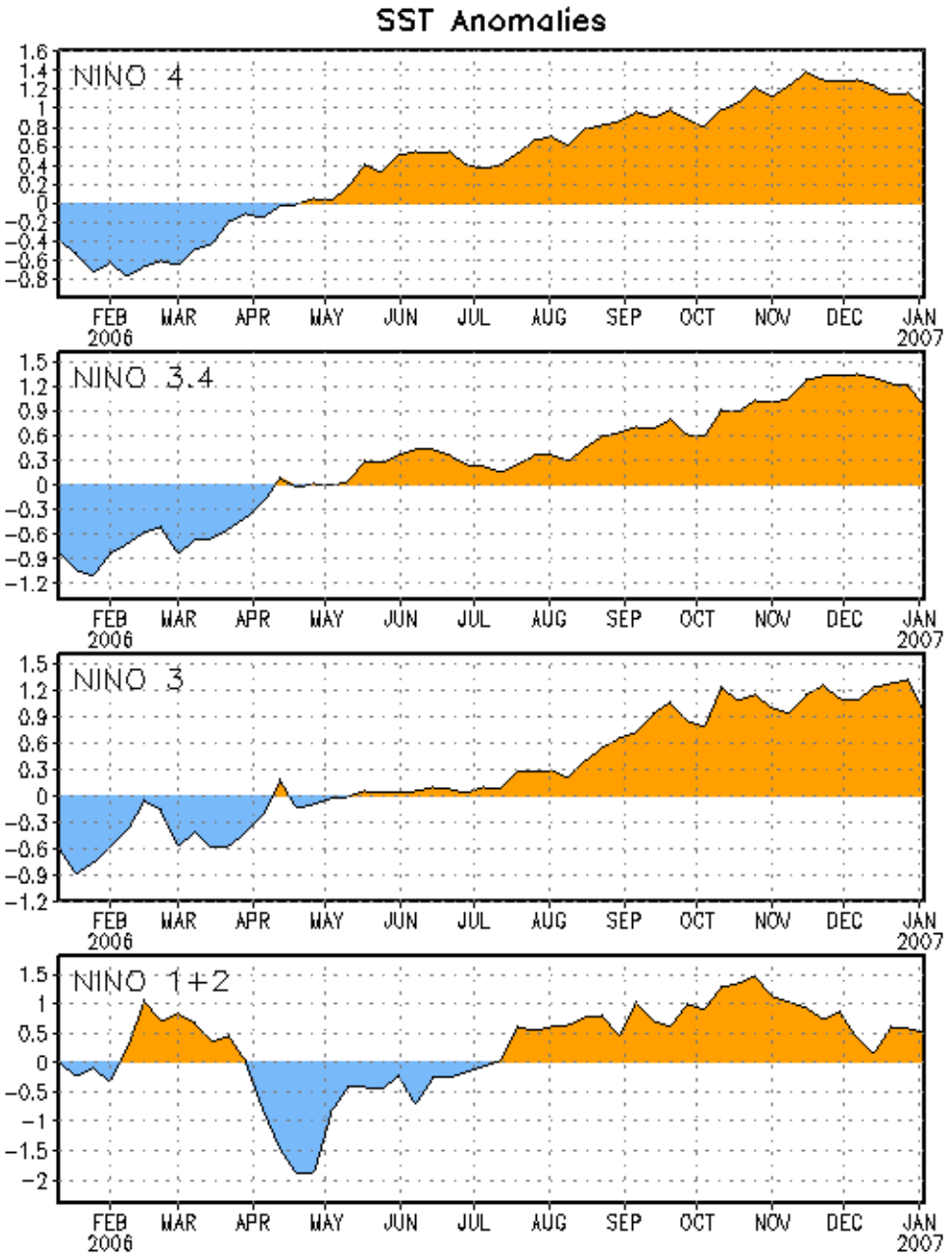

Figure 2. Time series of SST departures (°C) for the Niño regions. The SST departures are computed with respect to the 1971-2000 base period means (Xue et al. 2003, *J. Climate*, **16**, 1601-1612).

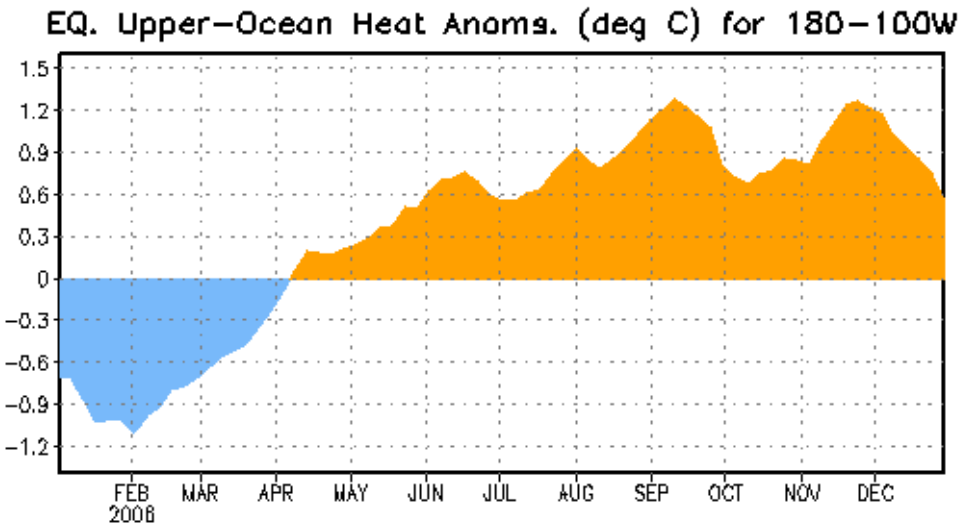

Figure 3. Anomalous equatorial upper-ocean heat content averaged over the longitude band 180º-100ºW. Heat content anomalies are computed as departures from the 1982-2004 base period means.

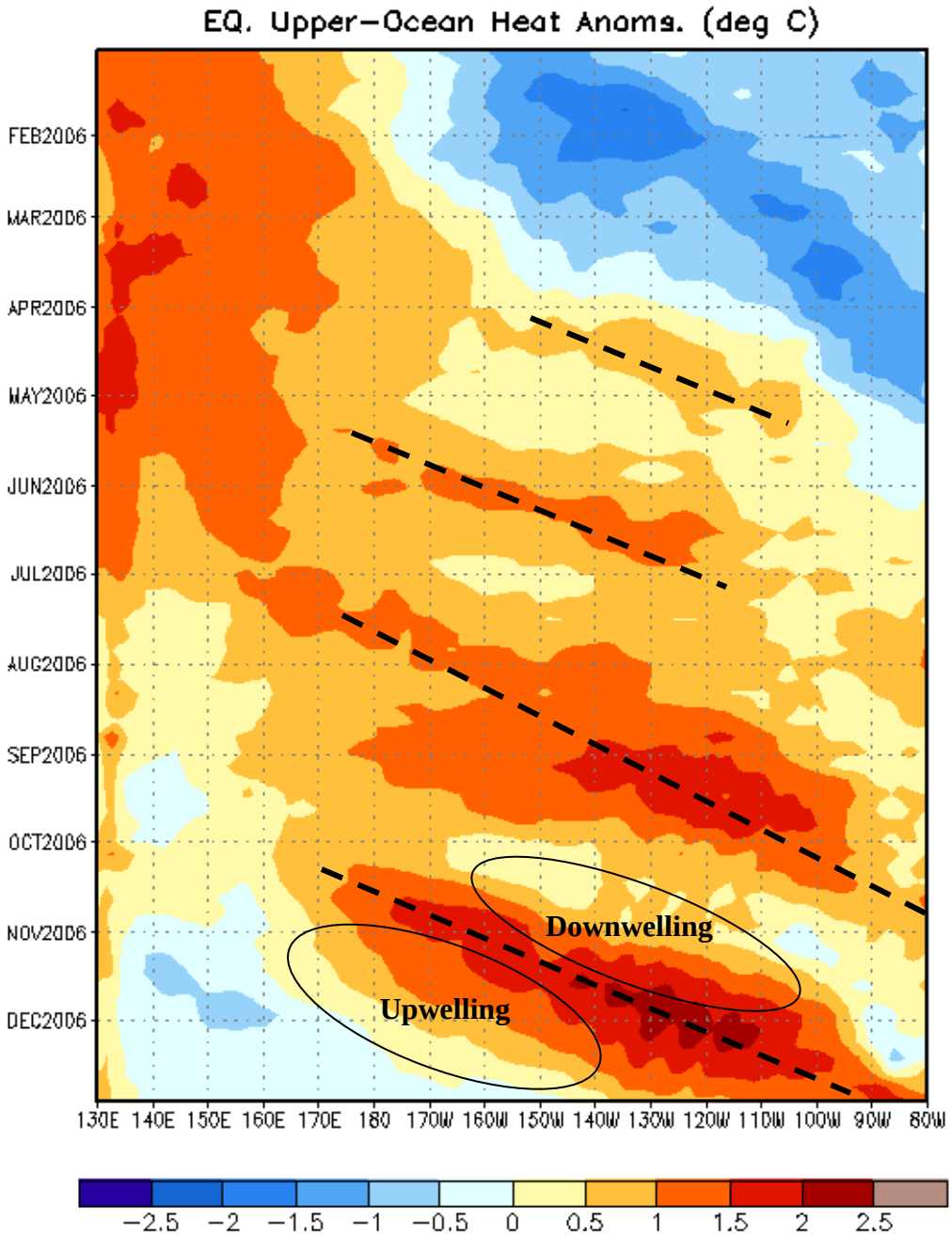

Figure 4. Time-longitude section of equatorial upper-ocean (top 300 m) heat anomalies (ºC). Time increases downward, with the most recent data at the bottom of the plot. Oceanic Kelvin waves, initiated by changes in strength of the surface winds, propagate eastward (left to right) with time. The leading portion of a Kelvin wave is characterized by downwelling and warming in the upper ocean. The trailing portion of a Kelvin wave features upwelling and cooling of the upper ocean. The diagonal dashed lines indicate the warm phase of four Kelvin waves since April 2006.

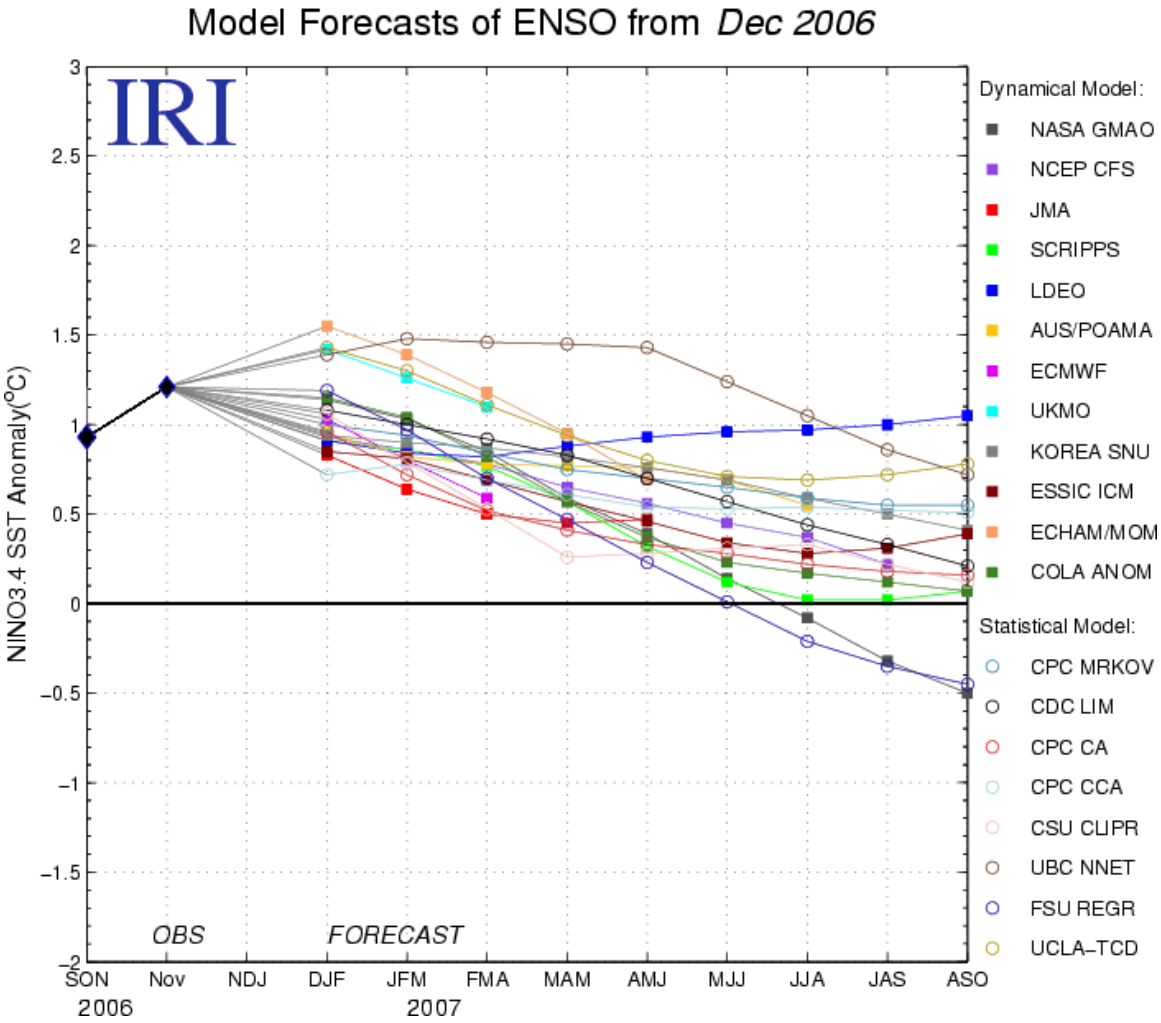

Figure 5. Forecasts of the SST anomalies for the Niño 3.4 region. Figure courtesy of the International Research Institute (IRI) for Climate and Society.