World Meteorological Organization

El Niño Update

SUMMARY

Tremendous variations in the normal patterns of temperature and precipitation continued to be brought on by El Niño during the month of February and into early March. Both ends of the spectrum are evidenced in abnormal precipitation in February (Figure 1).[1] El Niño continued shifting precipitation patterns, making it very dry in south-east Asia and very wet on the coasts of North and South America. For example, rainfall in south-east Asia was 150 mm below normal while Pacific coastal South America received at least 75 mm more rain than normal. In fact, in terms of percentages, rain in Peru and California measured in the top 10 per cent range of *wettest* Februarys while all over south-east Asia and southern Africa rain measured in the bottom 10 per cent range of *driest* Februarys (Figure 2 right).

Although the primary effect of El Niño is in the tropics, February saw notable impacts elsewhere. One of the most prominent aspects of the global circulation was a change in the Northern Hemisphere jet stream. Warm tropical air was pulled into the north bringing above-normal temperatures to North America, Europe and eastern Asia (Figure 2 left). As a result, the air temperature over land in the Northern Hemisphere was the warmest on record since 1950.[2] Because land heats up and cools off more rapidly than water, air temperatures over land do not indicate temperature change for the whole planet. However, they do illustrate how unusually strong this El Niño event is.

Globally, the combined air temperature over land *and* sea-surface temperature (SST) for February was 0.75°C above normal, breaking the record for the

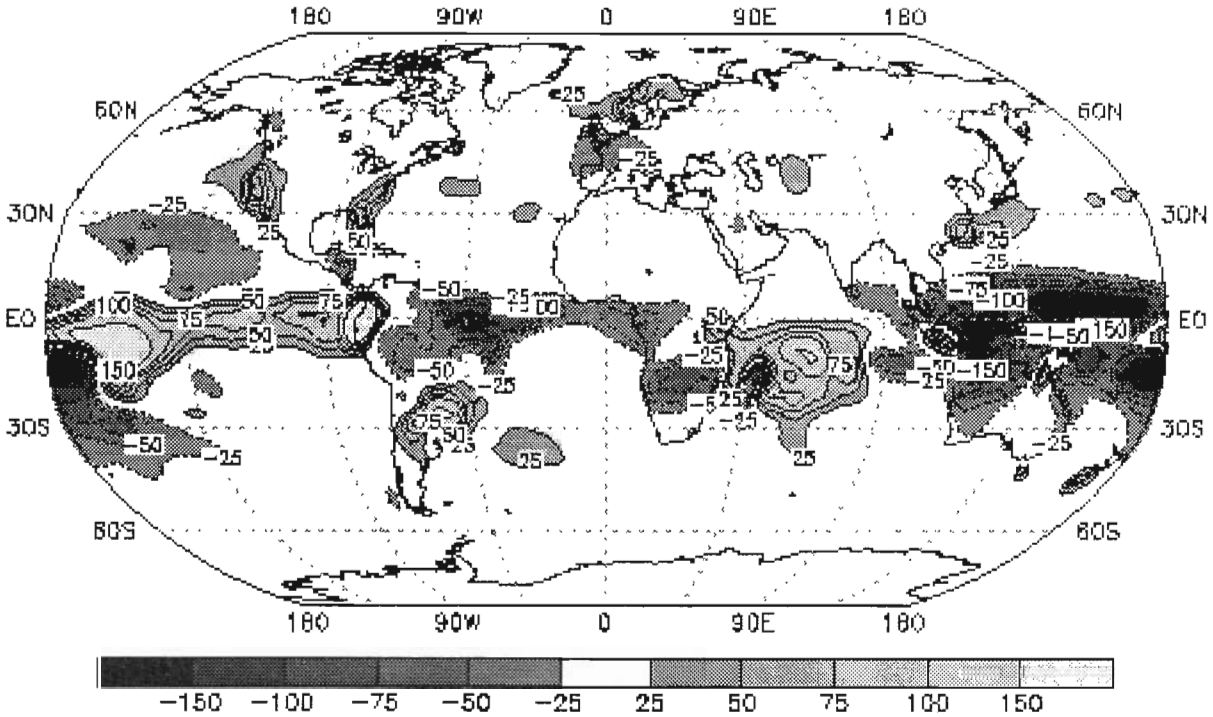

Figure 1 — Precipitation departures from normal (mm) for February 1998. Data are combined by merging raingauge observations and satellite-derived precipitation estimates. Departures from normal are computed using the 1979-1995 base period monthly means. Contour interval is 50 mm

http://nic.fb4.noaa.gov.products/analysis_monitoring/bulletin/camsopi.gif

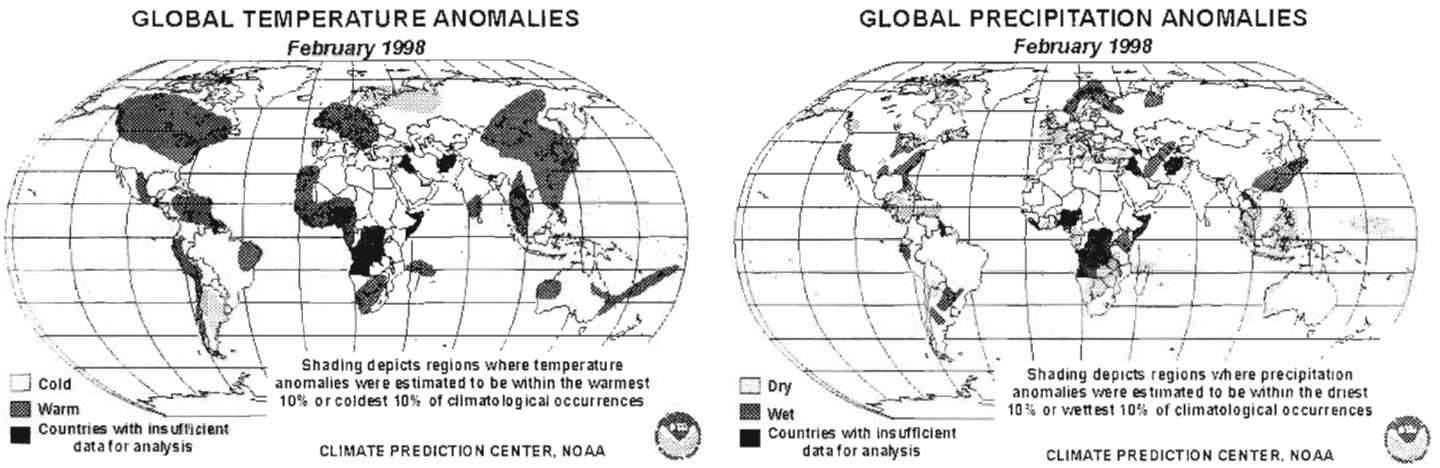

Figure 2 — Global temperature and precipitation anomalies for February 1998
(http://nic.fb4.noaa.gov:80/products/analysis_monitoring/GLOB_CLIM/1mgtandp.gif)

highest departure from the 1961-1990 normal for *any* month as measured back to 1856. So while February 1998 was not only the warmest February, it also broke the record by more than ever before.[3] These global effects, however, are not all attributable to El Niño.

SST FORECAST

As depicted in Figure 3, the SST forecast[4] for March-April-May and June-July-August shows the pool of abnormally warm water shrinking from March through May. Large areas will return closer to normal in the eastern Pacific from June through August. This means that the El Niño phenomenon will be with us through May. A return to normal conditions is forecast for June-July-August.[5]

These SST forecasts have been accepted (in various Climate Fora)[6] as a reliable basis for climate forecasts. As long as the SST is forecast to vary from normal, one can continue to expect global climate pattern disruptions.

Globally, this means an expectation of continued drier-than-normal conditions over Indonesia, northern South America and southern Africa. Wetter-than-normal conditions are expected over the central and eastern equatorial Pacific, along the coasts of Ecuador and northern Peru and over southeastern South America. A return to wetter-than-normal conditions is also likely over central Chile during April through July, as the jet stream over the eastern South Pacific continues to be stronger than normal.[1]

Pronounced departures from normal in the position and intensity of the jet stream over the North Pacific and North America are expected to continue through March and possibly into April.[1] Impacts of these conditions[7] are likely to be recurring periods of significant storm activity and precipitation across California and the southern third of the United States.[1]

Climate forecasts show that significant departures from normal, both for temperature and precipitation, will continue through May principally in the tropical regions, coastal North America and southern Africa. The technical reader may refer to graphical outputs of climate model forecasts, using links from WMO's Web pages.[8] These charts indicate the probability of below- or above-normal temperature and precipitation. Normal conditions are an average over a base time period, for example the climate of 1961-1990.

Figure 4[9] shows a multivariate Southern Oscillation Index (SOI). Peaks above the zero line are El Niño years and peaks below are La Niña years.[10] (The multivariate index includes sea-level pressure, surface winds, SST, air temperature and total cloudiness.) From the 1950s through the mid-1970s, La Niña years tended to alternate and balance El Niño years. More recently there have been more El Niño years and fewer La Niña episodes. No consensus has yet emerged on the probability of a La Niña event developing in the later part of the year.

Circulation discussion

In the eastern South Pacific, enhanced westerly winds continued across the subtropics. This feature, which has endured since June, has been the prominent aspect of global circulation related to El Niño. It has produced increased storminess and above-normal precipitation across much of the eastern South Pacific and South America throughout the period. During the last five months, the enhanced westerlies and storminess have contributed to above-normal precipitation over southeastern Brazil, Uruguay and sections of central and northern Argentina. In these latter areas, area-averaged rainfall totals have exceeded the 80th percentile for the past five months.[1]

Another feature typically observed during El Niño is drier-than-normal conditions across southeastern Africa during the peak (November-March) of the region's wet season. During February the region received below-normal rainfall, with totals below the 30th percentile in many places.

The trade winds across the Pacific eased further as February equatorial winds at both lower and upper levels slowed down. Tropical convection during February was again greatly enhanced across the central and eastern equatorial Pacific, and suppressed over Indonesia and the western Pacific.

Elsewhere, the very heavy convection and tropical rainfall that had dominated in the western Indian Ocean and equatorial eastern Africa since October 1997 lessened during February, providing some relief from torrential rains and disastrous flooding. Floods have lessened for the first time since October 1997 in Eastern Africa.[11]

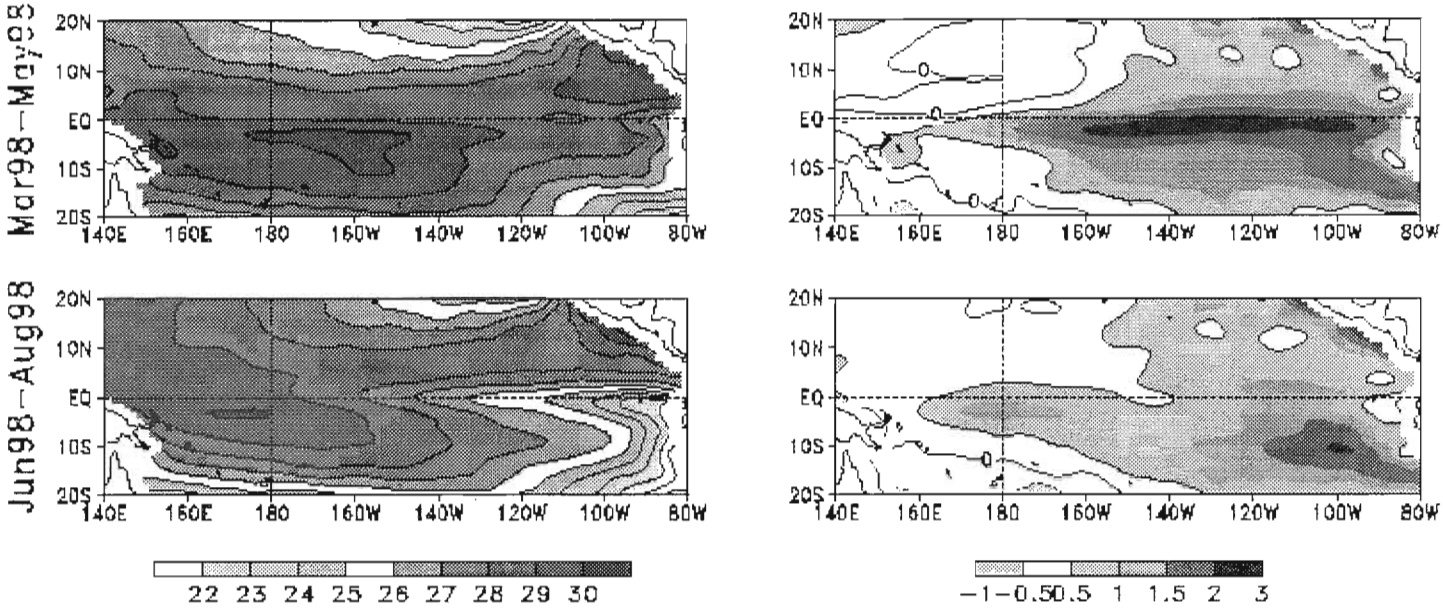

Figure 3 — SST forecasts are shown at left and SST forecast anomalies on the right

http://nic.fb4.noaa.gov/products/analysis_monitoring/bulletin/couple1.gif

SOME IMPACTS AROUND THE WORLD

In the **United States**, the national average temperature during the month was the sixth warmest on record. The national average rainfall total during February was the third largest value for any February in the historical record dating back to 1895. For the December 1997–February 1998 winter season as a whole, the temperature and precipitation anomalies observed over most of the United States were remarkably consistent with past strong El Niño conditions.

In **Europe**, surface temperatures have averaged well above normal for the past several months. During February temperatures were above the 70th percentile throughout the continent, meaning that less than 30 per cent of previous Februarys were warmer.

In **Brazil,** the Civil Defence bureau is warning farmers to remain particularly vigilant for possible crop damage that may be caused during the harvest period.[12] Long-range forecast models indicate rainfall far above normal from March through July in the areas of São Paulo, Mato Grosso do Sul and the whole southern region of Brazil.

Based on technical analysis of compilations of previous events and the analysis of the SST forecast, there is currently only a low probability that a La Niña event will bring associated rainfall deficits in central **Chile** this year.[13]

During January and February, significant areas of **Hawaii** received less than 100 mm of rainfall, increasing rainfall deficits.

In **Hong Kong**, 3 340 mm of rain fell in 1997 making it the wettest year ever, breaking the previous record set during the 1982-1983 El Niño event. No previous tropical cyclone season started as late. Only seven tropical cyclones affected the South China Sea in 1997, five below normal.[14]

The 1997-1998 tropical cyclone season in the **south-west Indian Ocean** is already exceptional due to the late date of the first occurence of a tropical cyclone.[15] Although a more detailed study would be necessary to establish a strong connection between tropical cyclones in this area and El Niño, the pattern for this year strongly resembles previous El Niño episodes.

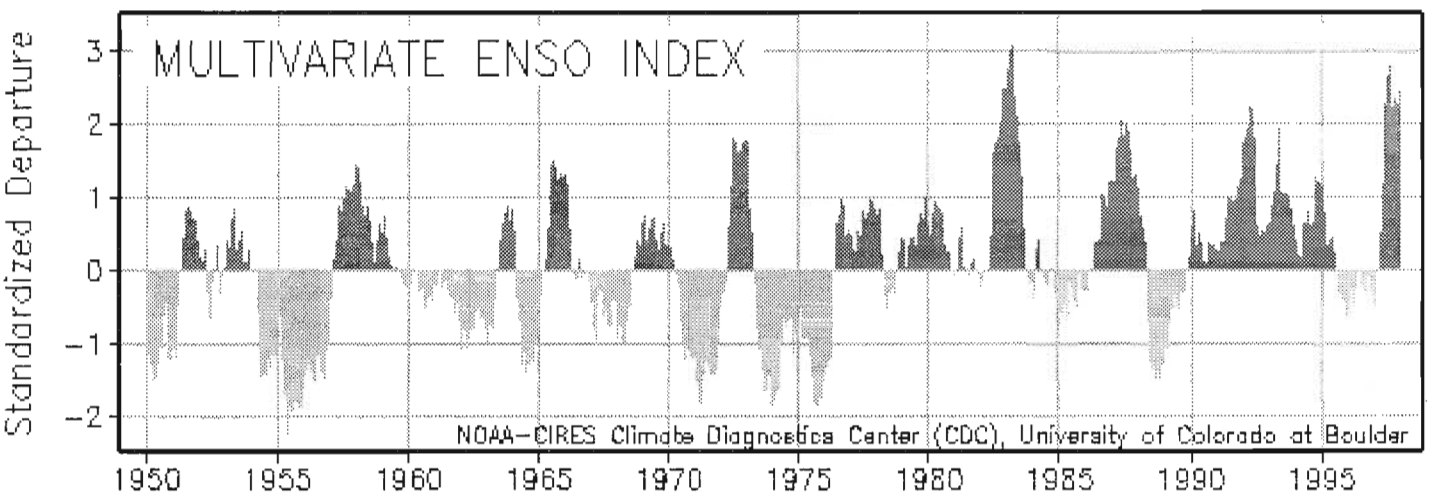

Figure 4 — The multivariate ENSO index for 1950 to present

http://www.cdc.noaa.gov/~kew/MEI/mei.html

In **Brunei**, dry conditions persist with serious forest fires again breaking out. Smog is now a common feature in the mornings although it dissipates when the afternoon wind picks up. December 1997 rainfall was about one third the normal. Surface maximum temperatures were well above normal in February and early March with numbers rising close to 38°C, the highest maximum that was recordeu during the 1982-1983 El Niño event.[16]

As for the fires in **south-east Asia**, the air pollution index in most ASEAN locations remains in the good category. The exception is Miri, a border town located 600 km north-east of Kuching which is experiencing localized hazy conditions and occasional short periods of high air pollution due to bush fires occurring there.[17]

Very dry conditions continued in the **Philippines** and **Indonesia**.[1] These areas usually receive abundant moisture from the northeast monsoon, which prevails from November through March.[18] Some islands in East Timor have had little to no rain during their normal rainy season (December-February), leading to requirements for importing food.[19] **Papua New Guinea**, also suffering severe drought, has received food donations from Australia and New Zealand.[20]

Notes:

1. National Oceanic and Atmospheric Administration/National Centers for Environmental Prediction (NOAA/NCEP).
2. NOAA/NCEP, 12 March 1998. http://nic.fb4.noaa.gov/products/analysis_monitoring/bulletin/extra.html
3. Hadley Centre, UK.
4. NOAA/NCEP Climate Monitoring Branch ENSO Advisory, 10 March 1998.
5. European Centre for Medium-Range Weather Forecasts (ECMWF).
6. Climate Forum results can be found at http://iri.ucsd.edu/forecast/sup/. They have been held in Bangkok, Singapore, Zimbabwe, Namibia, Brazil, Uruguay and Peru.
7. El Niño Update No 4. The reader may recall that the Pacific jet stream was strong across the entire North Pacific from south of Japan to the California coast. The main core of the jet stream then continued eastward over northern Mexico and over the Gulf of Mexico.
8. http://www.wmo.ch. Link to El Niño info page then look particularly for graphics from ECMWF, NCEP, NOAA/OGP/IRI – NOAA Office of Global Programs/International Research Institute for Climate Prediction.
9. NOAA Climate Diagnostic Center.
10. El Niño and La Niña are opposite phases of the El Niño-Southern Oscillation (ENSO) cycle, with La Niña sometimes referred to as the cold phase of ENSO and El Niño as the warm phase of ENSO. A good description of La Niña may be found at http://www.pmel.noaa.gov/toga-tao/el-nino/faq.html.
11. Kenya NMHS. Note that El Niño Update No. 4 reported that the rains had slowed down considerably and that there was "the driest period since September." Also note that the East African Forum forecast above normal precipitation through March-April-May.
12. Brazil NMHS, 4 February 1998. http://www.inmet.gov.br
13. Chile NMHS, 18 February 1998. http://www.meteochile.cl/comunica2.html
14. Hong Kong NMHS, 6 March 1998.
15. Tropical Cyclone Centre, La Réunion, 6 February 1998.
16. Brunei NMHS, 7 March 1998.
17. Malaysia Environment Service has an air pollution index located at http://www.jas.sains.my/doe/api.html.
18. Climate Systems Monitoring, WMO.
19. Australia NMHS, 17 March 1998.
20. New Zealand NMHS, 17 March 1998.

This El Niño Update is based on information obtained from the national Meteorological and Hydrological Services (NMHSs) of WMO Member States and affiliated organizations. Information contained herein is current as of 17 March 1998. Extracts from the El Niño Update may be freely used elsewhere provided acknowledgement of their source is made. Users are strongly advised to contact their NMHS for more detailed information.

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