No. 4 (February 1998)

World Meteorological Organization

El Niño Update

INTRODUCTION

This El Niño Update summarizes information obtained from the national Meteorological and Hydrological Services (NMHSs) of WMO Member States and affiliated organizations. Information contained herein is current as of 18 February 1998. More can be found on WMO's Home Page (http://www.wmo.ch). Extracts from **El Niño Update** may be freely used elsewhere provided acknowledgement of their source is made.

The climate forecast in the Summary is relevant only with seasonal timescales and relatively large areas. Local and month-to-month variations may occur. For this reason, users are strongly advised to contact their NMHS for guidance. In addition, please refer to the Climate Fora section of this Update which has forecasts that account for regional and national climate variability.

El Niño 1997-1998 continues to dominate climatic conditions causing extreme precipitation and severe storms in certain areas, and exceptionally dry conditions in others. The phenomenon has passed its peak in some areas (e.g. Australia)[1], where it is now on the decline, but in other areas (e.g. west coast of North America)[2] its influence will continue well into May.

Kenya has been particularly hard hit by flooding, where rainfall surpluses since October have exceeded 1 000 mm in some parts. As a result, over 1 500 people have died of malaria spread by flooding.[3] El Niño induced tremendous downpours in the coastal regions of Ecuador and northern Peru. Piura Peru had 12 separate days with at least half its normal annual rainfall, and Talara Peru received five times its normal annual rainfall in a single day.[4] At the opposite extreme, Guyana, severely affected by drought, has begun water conservation measures, and gold mining has been severely affected by water shortages. Measures, based on El Niño forecasts, have been put in place to minimize effects on the country's agriculture.[5] Likewise, Papua New Guinea is suffering from drought. Rain on Colombia's Pacific coast has increased the threat of landslides while inland the number of forest fires has risen, the loss reaching about 150 000 hectares. The sea level in the Colombian Pacific has risen 20 cm, fortunately without loss of human life thanks to accurate warnings.[6]

SUMMARY

Warm episode conditions are expected to continue February through April and to weaken during May-July. Drier-than-normal conditions are expected over Indonesia, northern South America and parts of southern Africa during the next few months. Wetter-than-normal conditions should continue over the central and eastern equatorial Pacific, along the coasts of Ecuador and northern Peru, and over southeastern South America. Also, increased storminess and wetter-than-normal conditions are expected to continue over California and the southern third of the United States. Warmer-than-normal conditions will persist over much of central North America. This forecast is based on current conditions in the tropical Pacific, on the NCEP sea-surface temperature (SSTs) predictions (see Figure 1), and on results from historical studies on the effects of ENSO.[2,7,8]

Looking back over the past month, very strong warm episode conditions continued during January, as tropical Pacific SSTs remained well above normal east of the date line. Actual SSTs in the eastern Pacific increased during the month, as SSTs greater than 28.5°C (the threshold for deep tropical convection and heavy precipitation) extended across the entire equatorial Pacific (see Figure 2 top). SST anomalies exceeded +2.0°C over the equatorial Pacific and exceeded +4.0°C offshore of South America (see Figure 2 bottom). While anomalies in the eastern equatorial Pacific decreased during the month, this does not indicate a weakening of the El Niño episode. Instead, it reflects the normal annual cycle, which produces sharp increases at this time of year in the climatological mean SSTs that are used as the basis for computing anomalies.

Tropical precipitation during January was again greatly enhanced across the central and eastern equatorial Pacific,

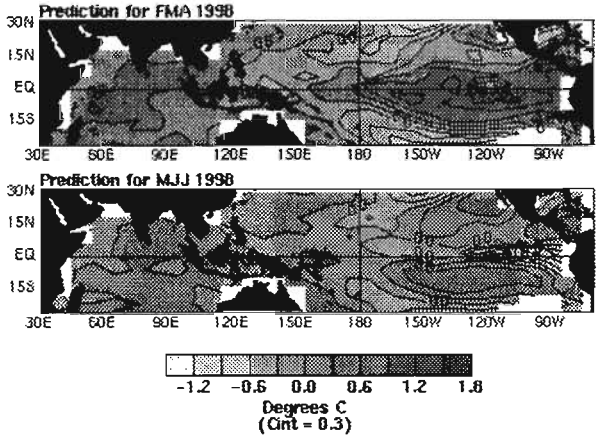

Figure 1 — Sea-surface temperature anomaly predictions for 1998 (http://www.cdc.noaa.gov/~mcp/Cecile.forecast.html)

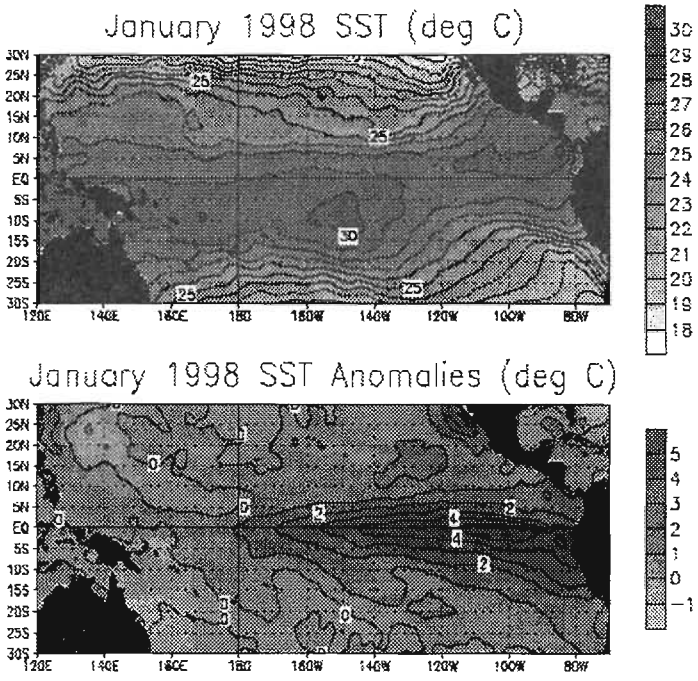

Figure 2 — Sea-surface temperature, mean (top) and departures from normal (bottom) for January 1998. Contour interval is 1°C. Departures from normal are computed based on the 1950-1979 adjusted climatology

(http://nic.fb4.noaa.gov:80/products/analysis_monitoring/enso_advisory/advfig1.gif)

over the western Indian Ocean and in eastern Africa. Precipitation was suppressed during January over Indonesia, the western Pacific and over the eastern Indian Ocean. This overall pattern has persisted since June 1997.[2]

Globally, anomalies of temperature and precipitation in January are depicted in Figure 3. (For more detailed descriptions, see Highlights.)

The usual warming effect of El Niño was a major factor contributing to the record high global temperature in 1997. However, other factors combine to either amplify or suppress global temperatures in any given year, so this El Niño is not to be blamed for the full amount of the observed increase.

CLIMATE FORA

ASMC Workshop on Seasonal Climate for the ASEAN Region, 9-10 February 1998, Singapore

Experts agreed that the El Niño episode of 1997 is expected to weaken gradually from February through April. Prevailing below-normal rainfall conditions are expected to last until April. From May to October 1998, and November 1998 to April 1999, it was agreed that it would be more realistic to consider three scenarios and their probability of occurrence. The three scenarios are "back-to-neutral", "La Niña" and "prolonged El Niño".

The experts agreed that the back-to-neutral scenario is the most likely of the three, with a 50% probability of occurrence. This scenario implies that rainfall conditions will revert back to normal for the region. However, as Indonesia experiences its dry season in May to October each year, in addition to the drought conditions experienced in early 1998, hazy conditions and localized forest fires may occur. The La Niña scenario has a 35% probability of occurring. Under this scenario, rainfall over the region is expected to increase, with a lower chance of occurrence of fire and haze. Under a prolonged El Niño scenario, which has a 15% probability of occurring, rainfall over the region is expected to remain below normal.

Southeastern Asia Regional Climate Outlook Forum, 2 February 1998, Bangkok, Thailand

Experts agreed that below-normal rainfall conditions will continue to prevail in most parts of the region during the period February through April 1998 (see Figure 4). Indications for below-average rainfall are strongest in the Philippines, northeastern Kalimantan, the northern Sulawesi and the region around the Bay of Bengal including Sri Lanka, and around the South China Sea. Above-average precipitation is expected only in western Sumatra and southeastern China. These conditions are consistent with precipitation patterns usually associated with the mature phase of a major El Niño, such as occurred in previous events (e.g. 1982-83) and the current event.

Climate Outlook Forum for 1998 and Implications for Regional Food Security: Outlook for March-May 1998, 9-13 February 1998, Nairobi, Kenya

Experts concluded that near- to above-normal rainfall conditions over the period March-May 1998 are expected over much of the eastern part of the Greater Horn of Africa and equatorial inland areas (see Figure 5). The indications for above-normal rainfall are strongest over the coastal parts of northern Tanzania, Kenya, coastal southern Somalia and northeastern Ethiopia. Near- to above-normal rain is expected over the western part of the area. Near- to below-normal conditions are expected further south and in the central inland areas. Risks of widespread dry conditions are low. However, the food security situation remains precarious in the region due in part to poor harvests in early 1997 and excessive rains late in the year.

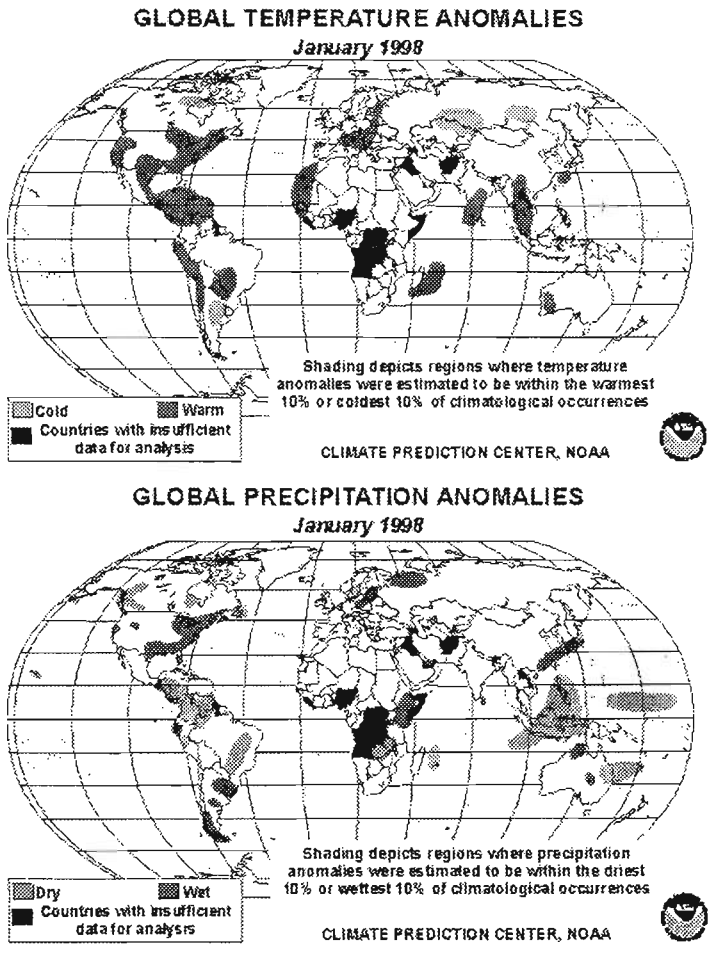

Figure 3 — Global temperature and precipitation anomalies for January 1998

(http://nic.fb4.noaa.gov:80/products/analysis_monitoring/GLOB_CLIM/1mgtandp.gif)

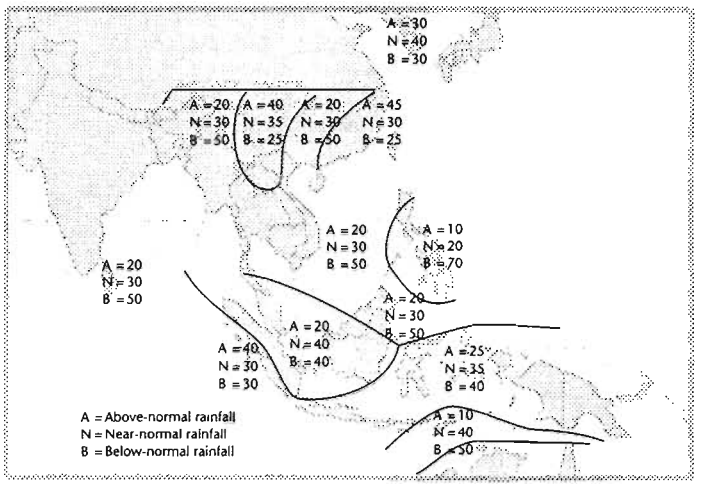

Figure 4 — Probability of above-, near- and below-normal rainfall for February-March-April 1998

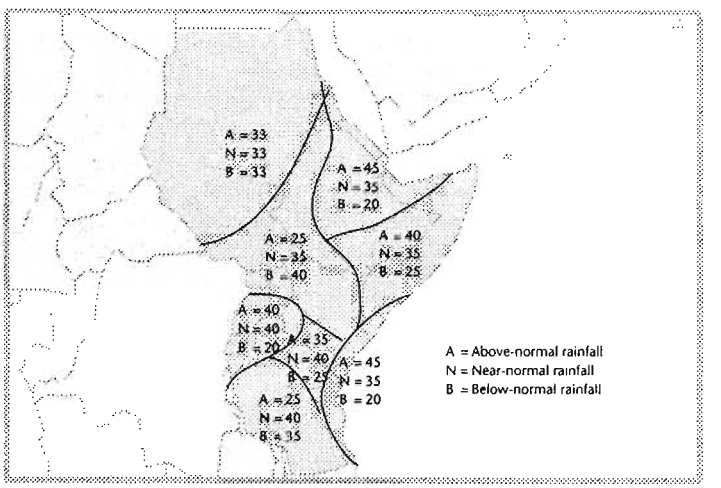

Figure 5 — Probability of above-, near- and below-normal rainfall for February-March-April 1998

The strong El Niño and warm SST in the western Indian Ocean contributed significantly to heavy rains over much of the region since October 1997. The relationship between SST variability in the Pacific and Indian Oceans and rainfall during October-December 1997 over much of the region is relatively well established. The relationship with rains during March-May is less so (except in north-eastern Ethiopia). As a result, the March-May rains are more difficult to predict.

Climate Forum for South America

Consensus forecasts were reported in Update No. 3.[8] The forecast maps are available on the web at http://iri.ucsd.edu/forecast/sup/.

HIGHLIGHTS

Except where noted otherwise, these highlights were drawn from NCEP Global Climate Highlights.[4]

South America

In the ***southern Caribbean*** and ***northern South America***, very warm and dry conditions spread southward over the region. Six-week precipitation shortfalls of 100 to 250 mm were reported across western Colombia, French Guiana, Guyana, Suriname and most of western, central and east-central Brazil. Short-term moisture deficits were within 100 mm across the southern Caribbean, Venezuela and the remainder of Colombia. Temperatures averaged 1°C to 4°C above normal, with the largest departures occurring in western Venezuela, where highs soared to 39°C

On the coasts of ***Ecuador*** and ***northern Peru***, El Niño-enhanced rains persisted with six-week precipitation excesses of 390 to 740 mm across the region. During December 1997 and January, the area received 350 to 775 mm of rain, compared with annual norms of 20 to 60 mm.

In ***central South America***, the area of warm temperature anomaly expanded during January and into early February. Temperatures were 3°C to 7°C above normal in January along the coasts of Peru and northern Chile. Highs soared to 40°C in east-central Brazil and in central Paraguay, and exceeded 35°C at many stations in Brazil and Venezuela.

In ***east-central South America***, El Niño-enhanced precipitation continued over the entire region. Torrential rains soaked southern Brazil, southeastern Paraguay, most of Uruguay and adjacent parts of northeastern Argentina, with isolated totals of 250 to 350 mm in extreme western Rio Grande do Sul state in Brazil, extreme northern and extreme western portions of Uruguay, and extreme eastern Entre Rios province of Argentina. During the six weeks ending 7 February, significant moisture excesses (130 to 510 mm) were reported in extreme northeastern Argentina, extreme southern Brazil, northern and central Uruguay and southeastern Paraguay. Short-term surpluses of 50 to 150 mm prevailed across the remainder of the region. Large two-month precipitation excesses were reported in Uruguay (150 to 740 mm), northeastern Argentina (100 to locally 860 mm) and southern Brazil (100 to 500 mm).

Africa

In ***southern Africa***, unusually warm weather was reported in most of South Africa, southern Mozambique, and the central and southern portions of Madagascar. Normal to wetter-than-normal conditions prevailed across the northern, central and southeastern sections of southern Africa during the last 11 days of January easing fears of El Niño-induced drought for the 1997-1998 rainy season, as discussed in Update No 3. Heavy rain fell across much of central and southern Mozambique, the northern half of Zimbabwe and parts of Zambia causing flash floods in places. However, the climatologically drier southwestern half of the subregion remained relatively dry during the period.[7]

In ***east-central Africa***, rains eased across much of Ethiopia, Kenya and Tanzania by 24 January, giving the driest week since late September 1997. Excessive rains which fell from December through January created moisture surpluses from 100 to 300 mm at most locations, but reached as high as 718 mm at Meru in central Kenya.

Asia and the Pacific

In ***Indonesia*** and the ***Philippines***, long-term dryness persisted over the region despite scattered heavy rains. Six-week moisture deficits in the Philippines typically ranged from 100 to 400 mm across the archipelago. Highly variable precipitation shortfalls during December 1997 and January ranged from 50 mm on parts of Luzon to 845 mm on Mindanao. Heavy rains (50-250 mm) soaked central and western Java and southern Sumatra at the beginning of February. The remainder of the archipelago received only 10 to 50 mm while little or none was reported on Sarawak. Since late December, moisture deficits generally ranged from 100 to 400 mm, and reached as high as 620 mm on Celebes.

In ***southern Indochina***, abnormally warm temperatures prevailed in the region with temperatures 1°C to 4°C above normal across central and southern Thailand, southern Viet Nam and peninsular Malaysia. Highs approached 38°C as far north as 17°N in central Thailand in early February.

In ***Australia***, heavy rainfall across the far north during January was further confirmation of El Niño's declining influence. Although drier-than-normal weather affected southeast Queensland, much of tropical Australia recorded average to above-average rainfall in

January. Similarly, there is every indication that the peak of the El Niño episode, in terms of eastern Pacific Ocean temperatures, has passed and a declining phase has commenced.[1]

Tropical storms *Les* and *Katrina* induced drenching rains in northern Australia, with severe flooding in Katherine. During December 1997 and January, between 300 and 1 270 mm of rain fell on the region. The remainder of the region received only 20 to 70 mm.

The Southern Oscillation Index (SOI) based statistical guidance on Australian rainfall patterns is limited from February to April, due to the weak link between the SOI and rainfall during this period. However, historical data indicate a slight preference for average to above-average totals over eastern Australia during the declining phase of an El Niño event.[1]

Japan is outside the areas where direct and typical mid-latitude influences of ENSO, know as Pacific North American pattern, are seen. However, above-normal temperatures over most of the main Japanese island may be attributed to the indirect influences of the current event. The precipitation amount in October 1997 was extremely small except in the northern part. This is also a feature typically observed during El Niño events.[9]

North America

El Niño contributed to pronounced departures from normal in the position and intensity of the jet stream over the North Pacific and North America during January and early February. The Pacific jet stream remained strong across the entire North Pacific from south of Japan to just off the California coast. As this pattern developed, storminess increased in intensity and frequency over the eastern North Pacific and over the West Coast of the United States. Heavy precipitation (100 to locally 500 mm) pelted California. The main core of the jet stream then continued eastward over northern Mexico and over the Gulf of Mexico, where a series of intense low-pressure systems developed from mid-January through the first week of February. [2]

Notes:

1. National Climate Centre, Bureau of Meteorology (BoM), Australia, 3 February 1998.
2. National Oceanic and Atmospheric Administration (NOAA) Office of Global Programs (OGP), National Centers for Environmental Prediction (NCEP) and Climate Prediction Center (CPC), ENSO Diagnostic Advisory 98/2, 11 February 1998, Forecast Forum, 13 February 1998, Prognostic Discussion for Long-Lead Outlooks, 12 February 1998.
3. Kenya Meteorological Department, 13 February 1998.
4. NCEP Climate Analysis Center (CAC) Global Climate Highlights, 24 and 31 January 1998 and 7 February 1998.
5. Ministry of Agriculture, Hydrometeorological Service, Georgetown, Guyana.
6. Instituto de Hidrología, Meteorología y Estudios Ambientales, Colombia, 12 December 1997.
7. Drought Monitoring Centre (DMC) Harare, 6 February 1998.
8. El Niño Update Number 3 (January 1998), WMO.
9. Japan Meteorological Agency.

In addition to sources already quoted, information has been drawn from three Climate Fora.

Climate Outlook Forum for 1998 and Implications for Regional Food Security: Outlook for March-May 1998, 9-13 February 1998, Nairobi, Kenya

Participants at the Forum included representatives of NMHSs from nine countries (Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Tanzania, Uganda), and climate scientists and other experts from national, regional and international institutes (CLIPS, WMO; Disaster Prevention and Preparedness Commission, Ethiopia; DMC, Nairobi; DMC, Harare; USAID/FEWS, Ethiopia; Water Department of Kenya; North Carolina State University; University of Nairobi; International Research Institute for Climate Prediction (IRI); NCEP. Additional input was supplied by the UK Meteorological Office.

ASMC Workshop on Seasonal Climate for the ASEAN Region, 9-10 February 1998, Singapore

Participants at the forum included representatives of six NMHSs (Indonesia, Malaysian, Myanmar, Singapore, Thailand, Socialist Republic of Viet Nam) and climate scientists and other experts from national, regional and international institutes (WMO, NOAA, OGP, CPC, BoM).

Southeastern Asia Regional Climate Outlook Forum, 2 February 1998, Bangkok, Thailand

Participants at the Forum included representatives of fifteen NMHSs (Australia, Bangladesh, Cambodia, China, Fiji, Indonesia, Republic of Korea, Lao People's Democratic Republic, Macau, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Socialist Republic of Viet Nam) and climate scientists and other experts from national, regional and international institutes (Asian Disaster Preparedness Centre, IRI, the University of Colorado, NOAA).

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