World Meteorological Organization

El Niño/La Niña Update

Produced in collaboration with
IRI
INTERNATIONAL RESEARCH INSTITUTE
For Climate Prediction

INTRODUCTION

During 1998 a rapid transition from strong El Niño to strong La Niña conditions occurred (Figure 1). In the ocean component of the climate system, one of the major characteristics of La Niña is colder than average sea-surface temperatures (SSTs) in the central and eastern equatorial Pacific Ocean. At the beginning of 1998 the equatorial Pacific SSTs were at near-record high levels in association with the 1997/98 El Niño. The El Niño decayed steadily during the first four months of 1998. During May and June, SST anomalies in the central equatorial Pacific Ocean fell rapidly, such that the ocean surface temperatures averaged over the central Pacific dropped from values near one degree Celsius above average to one degree Celsius below average. The ocean component of the 1998/99 La Niña episode was well under way and cold episode conditions continued to develop throughout the rest of the year.

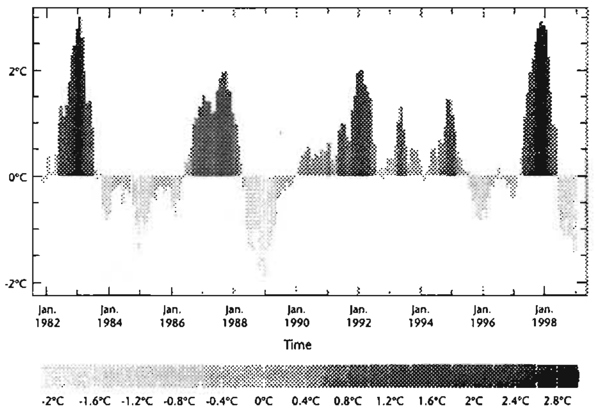

Figure 1 — Time sequence of SST anomalies in the central equatorial Pacific Ocean (NIÑO3 region) from January 1982 to January 1999 (NOAA/NCEP data)

The evolution of the La Niña episode did not follow all of the "classic" La Niña characteristics. The SSTs in the far eastern tropical Pacific Ocean, specifically the waters along the coasts of Ecuador and Peru, did not experience strong cooling or negative temperature anomalies during the La Niña evolution until late in 1998. Cooler than average SSTs in the far eastern part of the Pacific were narrowly confined to the equator and positive anomalies continued to characterize the SSTs to the south of the equator through early in 1999 (Figure 2). Nonetheless, La Niña had profound influences on the atmosphere during the second half of 1998.

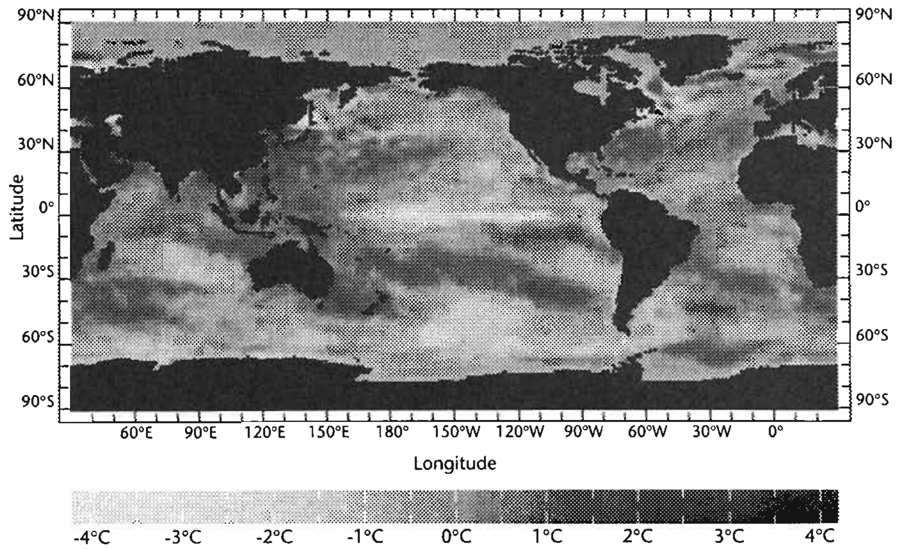

Figure 2 — Global SST anomalies in January 1999 (NOAA/NCEP data)

IMPACTS ON PRECIPITATION AND TEMPERATURE

While typical impacts of both El Niño and La Niña can be readily recognized, it should be noted that these impacts do not necessarily occur with any given El Niño or La Niña episode. For example, rainfall over southern Africa is often below normal concurrent with an El Niño, but during the 1997/98 event near-average or even above-average rainfall occurred over much of the region. Factors other than the state of tropical Pacific Ocean SSTs may influence regional climate variability (including internal atmospheric dynamics, SST in other ocean basins and land surface conditions). Therefore, impacts noted below may not necessarily be caused directly by La Niña but appear consistent with the event.

As La Niña conditions developed after mid-year, global rainfall patterns started to adjust, especially in the tropics. By October, global rainfall patterns consistent with the developing La Niña conditions were first observed in the far western Pacific and, as the cold episode developed, characteristic La Niña patterns were observed elsewhere. These included relatively wet conditions over much of Indonesia and parts of Australia and southern Africa, and relatively dry conditions in south-eastern South America, including parts of southern Brazil, Uruguay, Northern Argentina, and much of eastern Africa.

A classic feature of the transition from an El Niño pattern into a La Niña was seen in the global average surface temperature anomaly for 1998, which was the highest observed in the instrumental record despite maturing La Niña conditions during the latter half of the year. Although La Niña patterns are generally associated with colder than average surface land temperatures in the global tropics and subtropics over the full period of an event, these temperature conditions may not start to emerge until January, as was the case this year. This lag between the development of La Niña and the emergence of negative surface land temperature anomalies and teleconnections to higher latitudes is typical.

TROPICAL STORM ACTIVITY

Researchers have linked decreased Atlantic tropical storm activity to El Niño and increased activity to La Niña conditions. The 1998 hurricane season saw a total of 14 named Atlantic storms, twice the number experienced in 1997 with El Niño conditions and considerably more than the average of 9 to 10 storms per season. Hurricane Mitch, the strongest October hurricane ever recorded, was marked by its duration, strength and persistent, destructive rains over Central America. Several intense storms occurred in the western Pacific Ocean, including Thelma, a category 5 storm that was the most powerful recorded off the north-west coast of Australia, and Dani that caused severe damage in Vanuatu.

OUTLOOK

Skills of extended-range forecasts for tropical Pacific Ocean SSTs improve markedly as the start date of the predictions moves through the April to May period. In other words, NIÑO3 predictions for the later months in the year are more skillful when made from June onwards than when made from March, April or May. This feature of forecast models is known as the 'spring predictability barrier' and is taken into consideration when seasonal forecasts are produced. Nevertheless, numerical and

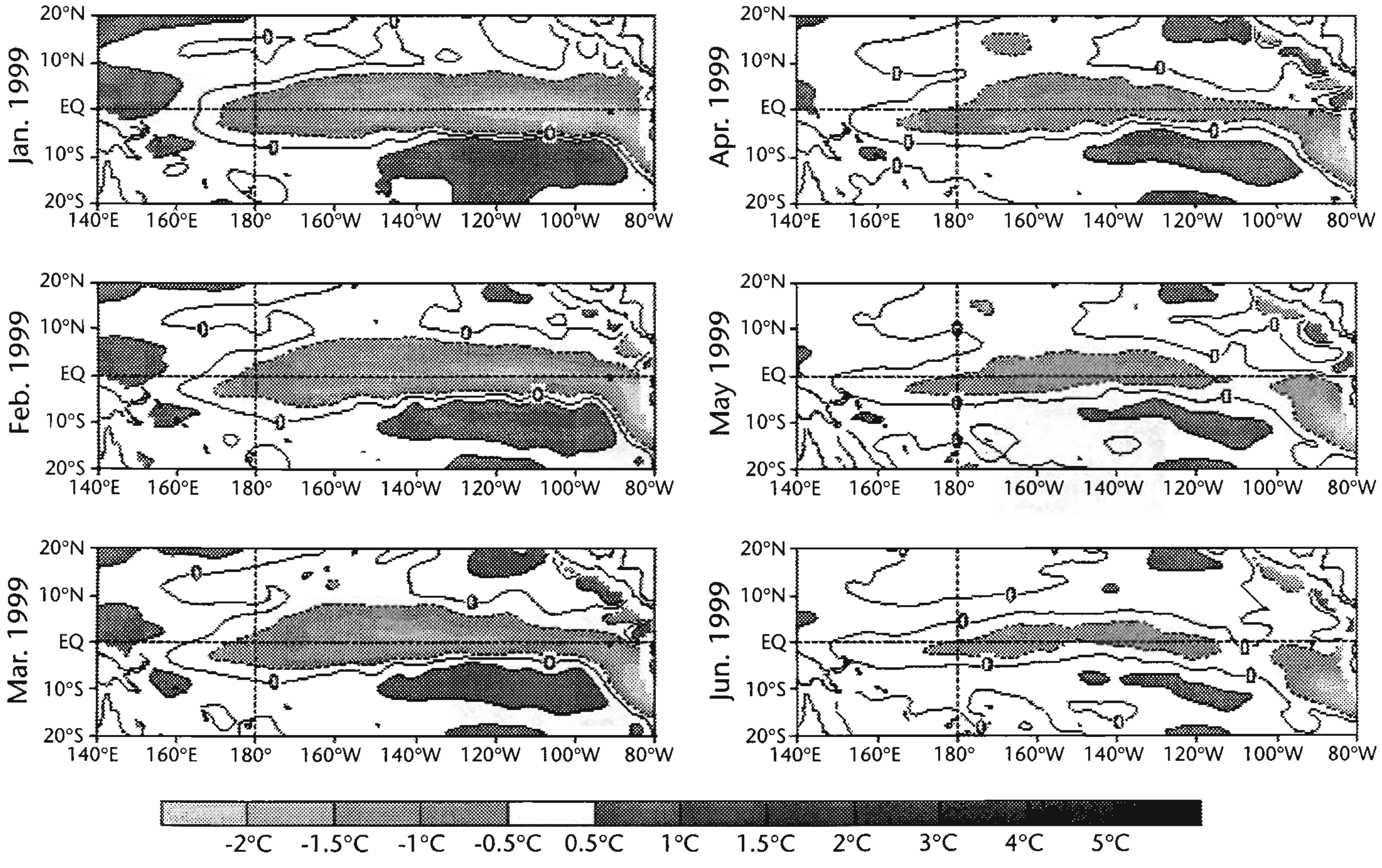

Figure 3 — NOAA/NCEP sea-surface temperature anomaly forecasts to June 1999

statistical models are in general agreement that the current La Niña will slowly diminish in magnitude over the next several months (see example in Figure 3), although there is disagreement concerning the rate of decay of the event. Sea-surface temperatures in the tropical Indian and Atlantic Oceans, in addition to those in the Pacific Ocean, are important determinants of rainfall in many tropical regions. Forecasts of SSTs in the former two tropical oceans are produced operationally by only a few centres and are known to be less accurate (in general) than those for the tropical Pacific. Expectations are that SSTs in the Caribbean and north tropical Atlantic Ocean will cool while those in the western tropical Indian Ocean will remain near or below normal.

RECENT CLIMATE FORECAST FORUM OUTLOOKS

Since the previous El Niño Update issued in November of last year, further Regional Climate Outlook Fora have been held. The two most recent were in Africa and the resulting seasonal outlooks are summarized below.

In both Fora the regional climate assessment began with consensus agreement that moderate La Niña conditions will persist throughout the forecast period. Sea-surface temperature anomalies over the Indian and Atlantic Oceans, of importance in predicting African rainfall, were also considered. These and other factors affecting the climate of the eastern and southern African regions were assessed using coupled atmosphere-ocean models, physically-based statistical models and expert interpretation. [Note that forecasts for the United Republic of Tanzania were created independently in both Fora.]

SOUTHERN AFRICA CLIMATE OUTLOOK FORUM

Ezulwini, Swaziland, 14–15 December 1998 (for January to March 1999)

The period from January to March constitutes the main rainfall season over most of southern Africa. Exceptions are north-eastern Tanzania, where there are usually two rainfall seasons (October–December and March–May), and the extreme south-western part of South Africa, which experiences part of its dry season throughout this period.

Northern Tanzania and Seychelles have increased probabilities of below-normal rainfall (Figure 4). Increased probabilities of normal to below-normal rainfall are indicated for southern Tanzania, northern Mozambique, northern Malawi and north-eastern Zambia. For central Mozambique, southern Malawi, central and southern Zambia, northern Zimbabwe, and Mauritius, increased probabilities of normal to above-normal rainfall are predicted. For most of Namibia, Botswana, southern Zimbabwe, southern Mozambique, Swaziland, Lesotho and most of South Africa, there are enhanced probabilities of above-normal rainfall. There are increased probabilities of normal to below-normal rainfall over the south coast of South Africa, and the south-western Cape.

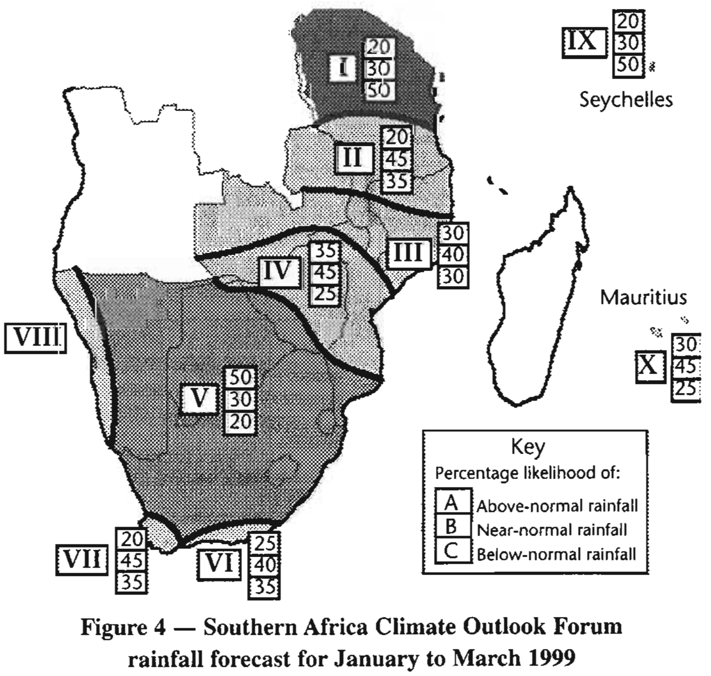

Figure 4 — Southern Africa Climate Outlook Forum rainfall forecast for January to March 1999

GREATER HORN OF AFRICA CLIMATE OUTLOOK FORUM

Kampala, Uganda, 11–12 February 1999 (for March to May 1999)

In southern Tanzania there are increased probabilities of normal to above-normal rainfall (Figure 5). The probabilities of normal to below-normal rainfall are enhanced over central and western Tanzania, Rwanda, Burundi, most of Uganda, western Kenya, and the extreme south-western part of Ethiopia. Over eastern Kenya, north-eastern Tanzania, Somalia and south-eastern Ethiopia, there are enhanced probabilities of below-normal rainfall. Probabilities

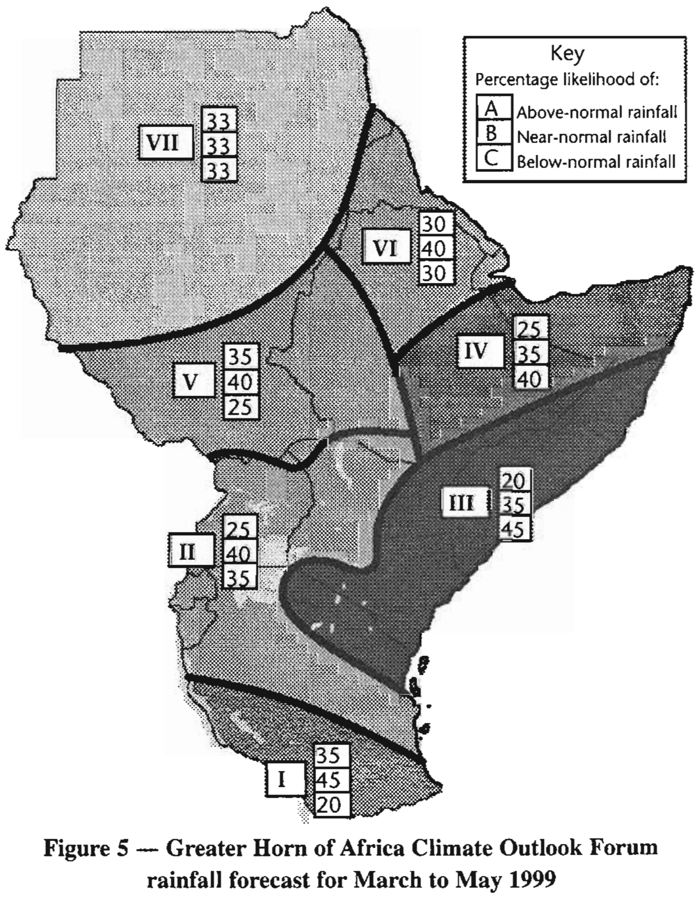

Figure 5 — Greater Horn of Africa Climate Outlook Forum rainfall forecast for March to May 1999

of normal to above-normal rainfall are increased over western Ethiopia, southern Sudan, the extreme north-eastern part of Uganda and the extreme north-western part of Kenya. For Djibouti, Eritrea and northern Ethiopia, increased probabilities of near-normal rainfall are predicted.

INTERNATIONAL SEMINAR ON THE 1997–1998 EL NIÑO PHENOMENON: EVALUATION AND PROJECTIONS; AND FIFTH UNESCO/WMO INTERNATIONAL CONFERENCE ON HYDROLOGY

The first Intergovernmental Meeting of Experts on El Niño concluded successfully on 13 November 1998 in Guayaquil, Ecuador. The meeting was held in accordance with UN General Assembly Resolution 52/200 of 18 December 1997 on international cooperation to reduce the impact of the El Niño phenomenon, and in line with the report to the UN Secretary-General on its implementation by the Inter-Agency Task Force on El Niño. As part of an ongoing United Nations System strategy, the first intergovernmental meeting provided a unique scientific and technical understanding of the latest El Niño/Southern Oscillation, for all the regions affected worldwide. In addition to providing a global insight into the climate anomalies and their socio-economic impacts associated with the latest event, emphasizing both the positive in addition to the negative impacts, experts presented a first overview of the predictability of such climate extremes.

The principle decisions taken at the meeting are laid out in the Declaration of Guayaquil. The Declaration calls for an increased synergy between science and technology, decision-makers and planners at all levels, as well as the public at large. It calls for the development of regional networks and implementation of proven operational systems to improve monitoring of the climate system. It also pinpoints the need for an interdisciplinary approach to prevention and risk reduction in order to diminish the impact of future climatic extreme events. In addition, the Declaration calls for improved early warning for the prevention of natural disasters through capacity building at local and regional levels.

The Fifth UNESCO/WMO International Conference on Hydrology closed in Geneva on 12 February 1999. The current status of climate prediction and its application to water resources management was presented to experts in hydrology and water resources.

NOTES:

Forecast contributors to the Southern Africa Climate Outlook Forum included representatives from national Meteorological Services of eleven Southern African Development Community (SADC) countries (Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, United Republic of Tanzania and Zimbabwe) and climate scientists and other experts from national, regional and international institutes (Drought Monitoring Centre, Harare; Drought Monitoring Centre, Nairobi; International Research Institute for Climate Prediction (IRI); Universities of Pretoria, Zimbabwe and Zululand). Additional input was supplied by the US Climate Prediction Center (Washington), European Centre for Medium-range Weather Forecasts (Reading, UK), and the United Kingdom Meteorological Office.

Forecast contributors to the Greater Horn of Africa Climate Outlook Forum included representatives of national Meteorological Services from nine countries (Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, United Republic of Tanzania and Uganda) and climate scientists and other experts from national, regional and international institutes (African Centre of Meteorological Applications for Development (ACMAD), Niamey, Niger; University of Oklahoma; Climate Information and Prediction Services (CLIPS), WMO; Drought Monitoring Centre, Nairobi; Drought Monitoring Centre, Harare; IRI, San Diego, USA; the US Climate Prediction Center (Washington); North Carolina State University). Additional input was supplied by the United Kingdom Meteorological Office.

Further contributions were received from the National Oceanic and Atmospheric Administration/National Centers for Environmental Prediction (NOAA/NCEP).

For further information concerning the WMO El Niño/La Niña Updates and other guidance products, users are strongly advised to contact their national Meteorological Services.

For further information about WMO, please contact:

Information and Public Affairs Office
World Meteorological Organization
41, avenue Giuseppe-Motta
P.O. Box 2300
1211 Geneva 2
Switzerland
Tel. (+41 22)730 83 14; (+41 22)730 83 15
Fax (+41 22)733 28 29
E-mail: ipa@gateway.wmo.ch
http://www.wmo.ch
or your national Meteorological or Hydrometeorological Service