World Meteorological Organization

El Niño Update

INTRODUCTION

Accurate forecasting of the future path of El Niño is probably most difficult at this time of year, with the Northern Hemisphere in spring and the Southern Hemisphere in autumn. This is the time when the performance of computer forecasting models is at its least effective and meteorologists around the world have taken this into account as they review results to make seasonal forecasts. As reported in previous El Niño Updates,[1] no consensus has yet emerged on the probability of a La Niña event developing in the later part of the year. Of eight models examined,[2] three forecast a return to neutral conditions and five forecast a La Niña episode by the end of 1998.

One consensus that is emerging is that this El Niño is in its dying stages. Unlike the last El Niño event that lingered on from mid-1990 to mid-1995, El Niño 1997-1998 is showing clear signs of weakening with all indices diminishing.[3] There is considerable uncertainty, however, about the rate of weakening. One model has conditions moving rapidly towards normal by mid-1998, and another has El Niño lingering on towards the end of the year.

CURRENT STATUS

The four conditions typical of El Niño, namely local warming in the eastern Pacific, a shifting of precipitation from the western to the eastern Pacific, a weakening of the trade winds, and sea-level changes, are still with us, but are becoming less dominant.

The warm water pool in the Pacific is cooling as energy is transferred from the ocean to the atmosphere via rainfall processes. Down from a peak of 32°C, the warm pool measured 29°C at the end of April, just above the 28.5°C threshold for deep convection. Temperature anomalies that exceeded +5°C are now 1.5-2.0°C (see Figure 1).

As the central and eastern equatorial Pacific cools, the zone of precipitation will shift back to the western Pacific Ocean. The shifting towards normal conditions has influenced weather changes in Ecuador faster than expected.[4]

Easterly trade winds actually reversed in June, September and October 1997, a condition not seen in the historical record except in November 1982.[5] By the second week of May 1998, however, the trade wind anomaly reached its lowest level since this El Niño began. How rapidly the trade winds return to their normal strength will be the key to the rate of decay of the current El Niño.

A more pronounced harbinger of change to come is in the sea level. From a peak of 33 cm above normal,[6] the sea level off the coast of South America has lowered 15 cm, as the ocean is beginning to rise again in the western Pacific. Cooler, nutrient-rich water from the thermocline is starting to well up offshore. A mass of

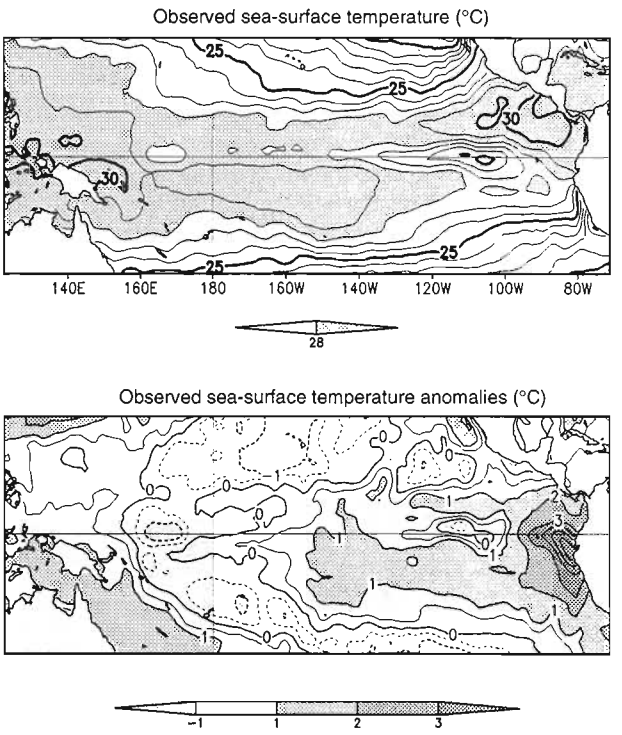

Figure 1 — Observed sea-surface temperatures and anomalies (NOAA/NCEP, 25 May 1998)

cool water some 55 m below the sea surface, measured along the equator by the TAO buoy array,[7] is moving towards South America's coast. Sea-surface temperatures have returned to normal along coastal Peru south of 14°S. Anchovy and sardine catches have returned to normal in that region.[8]

RECENT IMPACTS

The effect on temperature and precipitation patterns continued through April and May with El Niño related extremes recorded in all five continents.[9] There were unusually high temperatures in Indonesia, western Africa, southern India and northern South America. Heavy rainfall continued in the eastern United States and southeastern South America. In southeastern Brazil, significantly above-normal rainfall has persisted since October. Torrential rains (100-300 mm) in early May brought some relief to parched areas of central Sumatra, Malaysia, parts of Borneo and Sarawak.

A feature typically observed during El Niño is drier-than-normal conditions across southern Africa during the peak (November — March) of the region's wet season. Overall, during this El Niño, southern Africa's rainy season was variable. This season did not feature any significant periods of persistent dryness,[10] due to the influence of the warmer Indian Ocean (see El Niño Update No. 3.) During April, the region received below-normal rainfall, continuing a variable pattern.

GLOBAL FORECAST JUNE-JULY-AUGUST 1998[11]

The latest forecasts from the US National Center for Environmental Prediction (NCEP) indicate a return to near-normal conditions in the tropical Pacific during the next 3-6 months. Thereafter, the NCEP ocean-atmosphere coupled model indicates that near-normal conditions will persist through the end of 1998. The NCEP statistical model forecasts a more rapid cooling during June, July and August, with cooler-than-normal conditions developing during the latter half of the year.

Based on current conditions in the tropical Pacific, on the NCEP sea-surface temperature predictions, and on results from historical studies on the effects of El Niño, drier-than-normal conditions are expected to continue over Indonesia, Micronesia and northern South America during the next couple of months. Wetter-than-normal conditions should continue over the central and eastern equatorial Pacific and over southeastern South America. A return to wetter-than-normal conditions is also possible over central Chile as the jet stream over the eastern South Pacific continues to be stronger than normal.

The European Centre for Medium Range Forecasts (ECMWF) has made available forecast charts for temperature, precipitation and sea-surface temperature covering the tropics, South America, Africa and East Asia. Likewise, the International Research Institute for Climate Prediction has provided continental-scale forecast charts. All of these can be accessed via the WMO web page: http://www.wmo.ch. Users are strongly advised to contact national Meteorological and Hydrological Services (NMHSs) for additional guidance on the interpretation of these charts.

CLIMATE AND FORECASTING FORA

Continuing the series of climate fora conducted since the beginning of the current El Niño event, experts convened in three fora to devise more effective ways of applying global forecasts to localized regions. In addition, addressing the need to work towards a global operation system for climate forecasting , a meeting in Pilanesberg was convened in May. An Open Forum for a retrospective on El Niño 1997-1998 will be held in October to help develop a strategy to prevent and reduce damage caused by the El Niño phenomenon.

Seasonal Forecast Forum and Application to Food Security Warning System for West Africa, PRESAO-1, Abidjan, Côte d'Ivoire, 4-8 May 1998[12]

The forum based its outlook on two factors: a rapid weakening of El Niño during the next few months and warmer-than-normal temperatures in the equatorial region of the Atlantic Ocean. The forecast is for July through September.

A strong probability of above-normal precipitation is forecast for the coastal regions of the Gulf of Guinea to central Nigeria. Near-normal to slightly below-normal precipitation is forecast east of central Nigeria, to northwest Senegal and southwest Mauritania. A strong probability of normal precipitation is forecast for the Sahel. The experts provided probability distributions to indicate the likelihood of below-, near-, or above-normal rainfall for each sub-region (see Figure 2).

The Sahel region (12-18 degrees north) receives 80 per cent of its annual precipitation between June and September. South of 7 degrees north, the Gulf of Guinea has a short dry season during

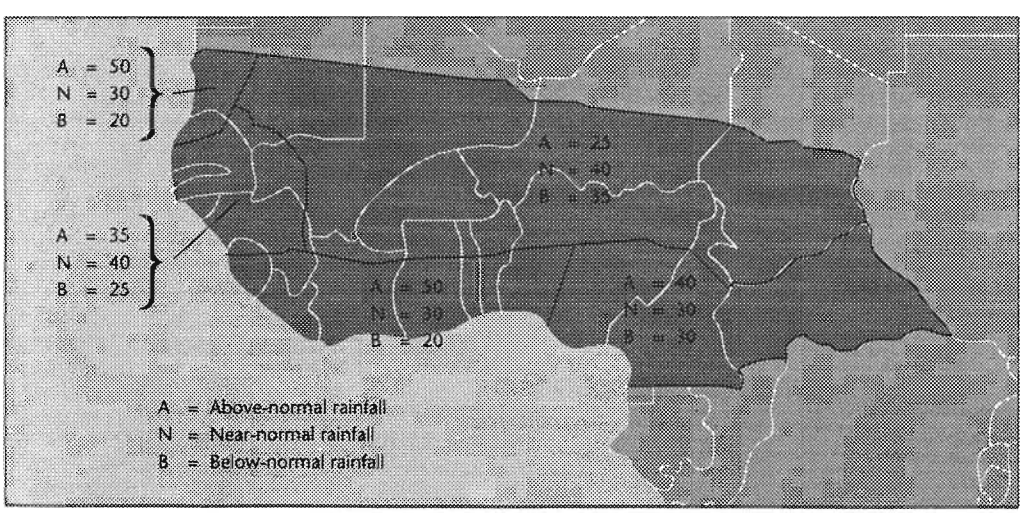

Figure 2 — Climate Outlook Forum, Abidjan, Côte d'Ivoire, precipitation forecast for July–August–September 1998

the same period that has a minor effect on the total annual rainfall. On the other hand, rainfall anomalies from July to September can have a significant effect on agricultural production in the region.

Forecast Forum, Panama City, Panama, 18-19 May 1998 and Forecast Forum, Kingston, Jamaica, 21-22 May 1998[13]

The forecasts from these two fora were influenced by two important factors. The Inter-tropical Convergence Zone, a band of cloudiness and tropical rain found near the equator, tends to migrate northward more slowly during an El Niño year, which delays the start of the rainy season in Central America. Furthermore, easterly wind flow has been anomalously intense over Central America, giving rise to strong orographic precipitation in some regions of the Caribbean coast while reducing precipitation along the Pacific coast. Figures 3 and 4 indicate precipitation probability distributions for June, July and August.

Southern Africa Regional Climate Outlook Forum (SARCOF) — Post-Season Assessment Meeting, Pilanesberg, South Africa, 12-15 May 1998[14]

Earlier Climate Consensus Outlooks were assessed at this meeting, both scientifically and from the point of view of the user community, focusing on the value of these outlooks as a management tool in sectors affected by climate variability. In one study[15], the value of seasonal forecasts was rated "valuable or very valuable" by 85 per cent of the respondents. It was recommended that SARCOF should be held again when the forecast procedure is most skilful, near September. SARCOF will provide guidance to NMHSs, which will then issue the forecasts. The group further recommended retaining a tercile format for forecasts, but providing interpretative information along with the forecast. There is a need to provide a set of maps for the region, showing the meteorological parameter threshold values for each of the tercile categories. NMHSs could modify the tercile threshold maps with higher resolution climatic data if available, and distribute them to users.

The lessons learned from this experience will be used to improve both the process of seasonal forecasting and the usefulness of operational climate products and services globally. A few noted needs include:

1. Regional infrastructure, led by the Directors of Meteorological Services with user representation;
2. Enhancing capacity of NMHSs for seasonal forecasting;
3. Minimum standards for forecast models used in a Climate Outlook Forum;
4. Enhancing climate monitoring and research especially in the southern Atlantic Ocean and the Indian Ocean;
5. An objective way for consolidating multiple seasonal forecasts;
6. Identifying strategies to improve responses to climate forecasts;
7. Identifying information needed to prepare for climatic extremes.

WMO Scientific and Technical Retrospective Open Forum

WMO will prepare scientific and technical information for a United Nations Inter-Agency Task Force on El Niño which is developing a strategy for the prevention, mitigation and rehabilitation of the damage caused by the El Niño phenomenon. A preliminary scientific and technical assessment is being prepared which will be presented at an Open Forum to be held in October. Five key issues to be addressed at the Open Forum include:

1. A unified description of the El Niño/Southern Oscillation (ENSO) phenomenon;
2. The major international climate programmes in place relevant to ENSO;
3. The performance of monitoring systems during 1997-1998;

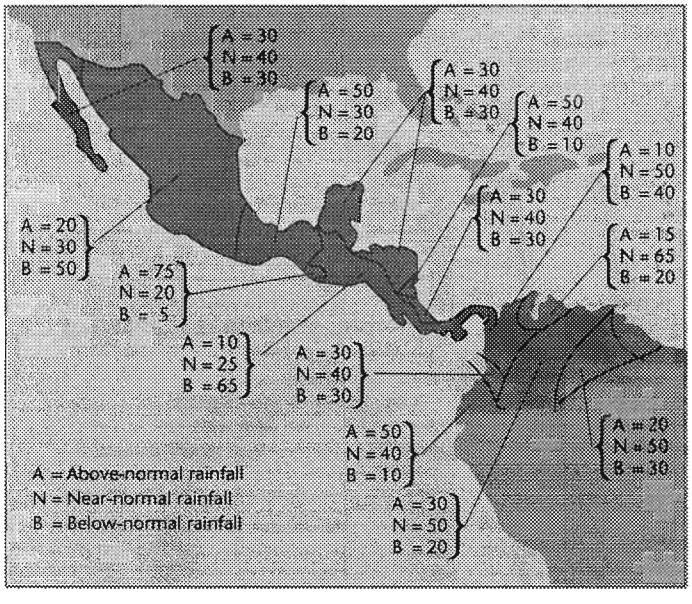

Figure 3 — Climate Outlook Forum, Panama City, Panama, precipitation probability distribution forecast for June–July–August 1998

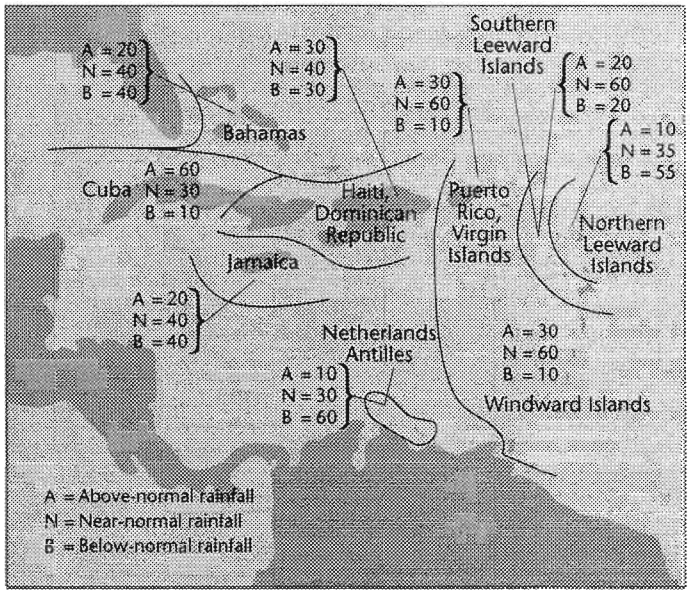

Figure 4 — Climate Outlook Forum, Kingston, Jamaica, precipitation probability distribution forecast for June–July–August 1998

4. Scientific evaluation of climate predictions during 1997-1998;
5. Responsibilities taken for authoritative scientific and technical information and services about ENSO.

The forum will provide an opportunity to formally receive and comment upon material that will be used for a UN-wide Scientific and Technical Retrospective on the 1997-1998 El Niño. More information about the Open Forum may be obtained from WMO at Clips@gateway.wmo.ch.

NOTES:

1 El Niño Update No. 3 (current as at 21 January) stated that the warm episode conditions will continue March-May with some models switching to a cold event July-September. El Niño Update No. 4 (current as at 18 February) stated warm conditions would continue through February-April, and would weaken in May-June. El Niño Update No. 5 (current as at 17 March) stated that there would be a return to normal June-August with no consensus on cold episode.

2 BMRC Intermediate Coupled Ocean Atmosphere Model, CCA Statistical Model (Canonical Correlation), COLA Coupled General Circulation Model, ECMWF Coupled General Circulation Model, LDEO (3) Intermediate Coupled Ocean Atmosphere Model, NCEP Coupled General Circulation Model, NOAA (Linear inverse) Statistical Model, SCRIPPS/MPI Hybrid Coupled Ocean Atmosphere Model (Statistical Atmosphere-Ocean General Circulation Model).

3 NMHS Argentina, 27 May 1998.

4 NMHS Ecuador, 26 May 1998.

5 Australia Bureau of Meteorology, "El Nino 1997 Analysis CD-ROM", 31 January 1998.

6 University of Texas Center for Space Studies.

7 Tropical Atmosphere Ocean Array, a major component of the Global Climate Observing System, is a group of 70 moored buoys which take measurements spanning the equatorial Pacific.

8 NMHS Peru, SENAMHI, 7 May 1998.

9 Highlights of extreme events around the world are compiled by NOAA NCEP and can also be found in the electronic version of the Monthly Climate Systems Monitoring Bulletin at http://www.wmo.ch/web/wcp/wcdmp/csmb.html.

10 NOAA/NCEP ENSO analysis, 15 May 1998.

11 NOAA/NCEP ENSO Diagnostic Advisory 98/5, 15 May 1998.

12 Participants at the forum included representatives from 11 NMHSs (Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Guinea-Conakry, Mali, Niger, Nigeria, Senegal, Tchad, Togo), U. OK/CIMMS, NCSU, Univ. Du Zululand, IRA for Climate Prediction, NCEP, NOAA, UKMO, Météo-France, ORSTOM/Brest, LMD and ACMAD.

13 Participants included experts from NMHSs from Mexico, Central America, Columbia, Venezuela, and international organizations including INRENARE, CATHALAC, NOAA, IRI, IAI, USAID and WMO.

14 The Post-Season Assessment Meeting of the Southern Africa Regional Climate Outlook Forum was hosted by the South African Weather Bureau, 12-15 May 1998, Pilanesberg, South Africa, as a follow up to the Pre-Season and Mid-Season Climate Outlook Forums, Kadoma, Zimbabwe (8-12 September 1997) and Windhoek, Namibia (18-19 December 1997), respectively. Participants included representatives of fourteen NMHSs (Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Niger, South Africa, Swaziland, Tanzania, United Kingdom, United States of America, Zimbabwe); the Drought Monitoring Centres in Harare and Nairobi; the African Centre of Meteorological Applications for Development (ACMAD); WMO, advanced climate prediction research centres, user sector representatives (agriculture, health, water resource management and disaster preparedness), aid organizations and international banks, related international institutes and organizations, and several South African Ministers of Parliament. A full report will be issued in 1999.

15 Analysis of Responses to SARCOF Questionnaire, C. Seas and J. Poulton, Natural Resources Institute, University of Greenwich, UK, May 1998. Copies may be requested from SOS Sahel, 1 Tolpuddle Street, London N1 OXT.

This El Niño Update is based on information obtained from the national Meteorological and Hydrological Serviced (NMHSs) of WMO Member States and affiliated organizations. Information contained herein is current as of 27 May 1998. Extracts may be freely used elsewhere provided acknowledgement of the source is made. Users are strongly advised to contact their NMHS for more detailed information.

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