

WESTERN REGION TECHNICAL ATTACHMENT  
NO. 87-20

ASSESSING THE STATUS OF ENSO DURING THE SUMMER

The attached figures and discussions are excerpts from the Weekly Climate Bulletin series. Figure 1 shows those anomalies which are typically associated with the occurrence of El Nino/Southern Oscillation (ENSO) conditions in the tropical Pacific Ocean. The warm and often dry winter weather in southwestern Canada has been one of the most consistent anomalies during the previous ENSO events.

Figure 2 shows the maintenance of the ENSO conditions in the eastern tropical Pacific Ocean (with respect to sea surface temperatures), as of late May. Likewise, the Southern Oscillation Index (not shown) continues to indicate the presence of ENSO conditions across the Pacific. As we approach the summer season, it is interesting and perhaps instructive to speculate on the status of the Southern Oscillation as we progress toward the next winter season. It is important to note that of the 7 subjectively defined "warm episodes" (approximately equated to ENSO events) identified between 1945-1980 by Horel and Wallace (1981), 3 lasted two years. Therefore, it would not be precedent-setting to see this current ENSO event last into and perhaps through the 1987-88 winter season. This warm event has lasted into early June so far; in contrast, the 1982-83 event ended in March.

There are a number of potential indicators which may be useful this summer to monitor the progress of this latest ENSO event. Meehl (1987) has shown that one of the major global climate fluctuations, the Indian monsoon, is modulated to an extent by the phase of the ENSO cycle. During a warm event (where the waters are warmer than normal in the central and eastern Pacific), monsoonal convection tends to be weaker than normal, with slightly weaker east-west circulations than are normally seen. For more information on these east-west circulations, see Krishnamurti (1971, p.1343) and Heddninghaus and Krueger (1981, p.1211). If lighter than normal precipitation occurs in the monsoon region this summer, the warm event is probably still going. On the other hand, a strong Indian monsoon might indicate the end of this warm event in the ENSO cycle.

Another summer indicator may be the tropical cyclone activity in the eastern Pacific. Typically, tropical cyclone activity tends to be greater during warm event summers as the source region for the cyclones exhibits above normal water temperatures (Allard and Peterson, 1985; Sadler, 1984). An active summer could indicate maintenance of the warm event.

Finally, normal monitoring activities throughout the equatorial Pacific will show changes of the water temperature fields and Southern Oscillation indices as they occur. One would expect information from these sources to echo the monsoonal and tropical Pacific indicators. We can be sure to hear more about the status of this warm event during the summer and fall months.

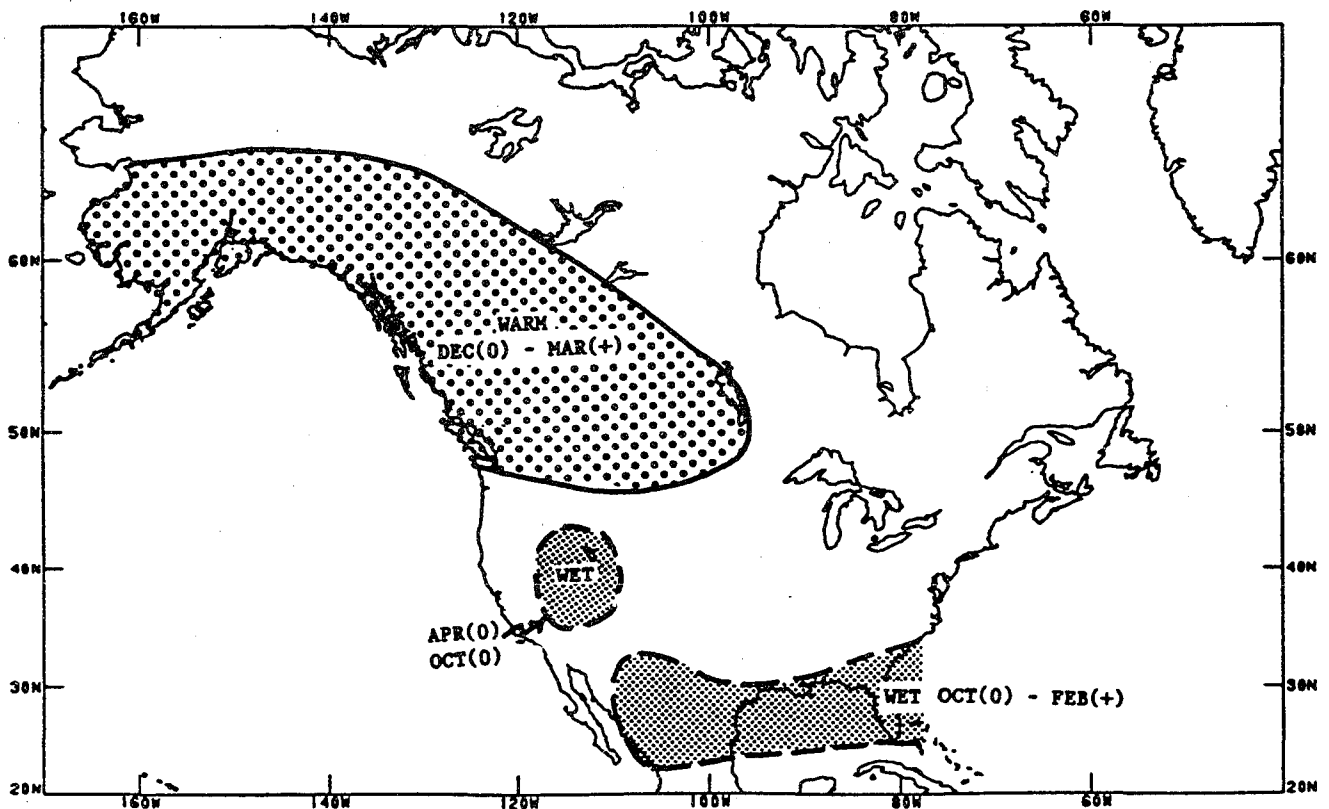
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Climate Analysis Center, NMC  
National Weather Service, NOAA

RECENT TEMPERATURE AND PRECIPITATION ANOMALIES IN NORTH AMERICA  
REFLECT THE INFLUENCE OF EL NINO.

Statistical studies have shown that the occurrence of El Nino conditions in the tropical Pacific Ocean are typically associated with above normal temperatures in southern Alaska and western Canada from December to March or April as well as with above normal precipitation along and near the Gulf of Mexico coast from October to February or March (See map below. Also see the February 14, 1987 Bulletin for additional discussion.). The two maps on the next page show the magnitude of temperature and precipitation anomalies in these regions during the approximate period when an El Nino, acting through subtle changes in the global atmospheric circulation, is likely to have a significant effect on North American climate. Comparison of the maps shows that the expected anomalous temperature and precipitation patterns did in fact occur in the two regions during the 1986-87 El Nino that is still in progress. However, significantly above normal precipitation in the Great Basin area between April and October 1986 was not observed, perhaps because the El Nino conditions did not become well established until September of last year.

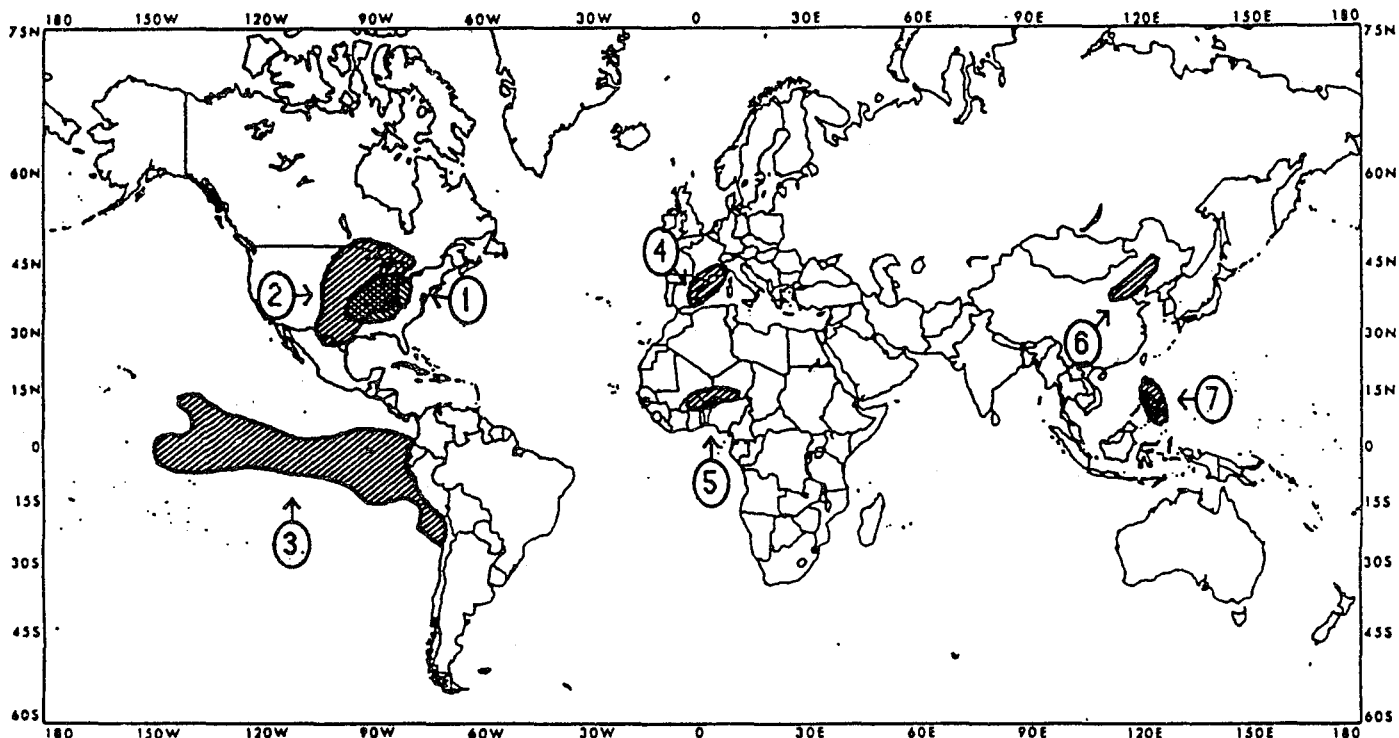


NORTH AMERICAN CLIMATIC ANOMALIES TYPICALLY ASSOCIATED WITH AN EL NINO.  
(For the current El Nino, "zero" is 1986 and "plus" is 1987.)

Figure 1

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF MAY 23, 1987  
(Approximate duration of anomalous conditions in brackets.)

- 1. UNSEASONABLE HEAT PREVAILS IN OHIO VALLEY REGION; COOLING OCCURS IN OTHER USA AREAS.**  
Temperatures averaged from 3 C (5.4 F) to as much as 6.7 C (12.0 F) above normal in an area centered on the lower Ohio River. [1 week] Much cooler weather ended several weeks of early season heat in the Far West and northern Plains.
- 2. SCATTERED HEAVY RAINS ALLEVIATE DRYNESS FROM GREAT LAKES TO TENNESSEE AND TEXAS.**  
Scattered but in some cases heavy rain showers helped to alleviate recent dry conditions in many parts of the abnormally dry region extending from the western Great Lakes southward to Tennessee, Arkansas, and eastern Texas. [1 week] However, many dry pockets persist within this region. [2-6 months] Excessive rains occurred in parts of Texas and Oklahoma last week (See front cover).
- 3. EL NINO CONDITIONS CONTINUE IN EASTERN TROPICAL PACIFIC.**  
Ocean surface temperatures remain between 1 C (1.8 F) and about 2 C (3.6 F) over much of the eastern tropical Pacific, but expectations, based on previous El Nino occurrences, are that these temperature anomalies will weaken during the next few months. The continued warm offshore waters combined with other factors to bring heavy rains last week to western Ecuador. [9 months]
- 4. RAINS EASE DRYNESS IN EASTERN SPAIN AND SOUTHERN FRANCE.**  
Abnormally dry areas in the eastern third of Spain and in southernmost France benefited from moderate late season rains last week, but dryness continued in northwestern Africa, where prospects for any additional rains before next autumn are slim. [3 months]
- 5. RAINY SEASON SLOW TO BEGIN IN BURKINA FASO AND NIGER.**  
The rainy season in the Sahel-Sudan Zone of northern Africa normally is concentrated in the period from May through early October. Thus far, the May rains have been well below normal in much of Burkina Faso and southern Niger. [3 weeks]
- 6. INCREASING RAINS IN NORTHERN CHINA EASE FOREST FIRE THREAT.**  
Substantial rainfall last week, up to 33 mm (1.3 in) in the Beijing area, help to reduce the severity of dry conditions that resulted in widespread forest fires in the region to the north of Beijing. Seasonal rains normally begin in May in this area. [1 week]
- 7. PHILIPPINES REMAIN ABNORMALLY DRY DESPITE INCREASED RAINS IN SOME SECTIONS.**  
Rainfall increased last week in northernmost and southernmost Philippines, but the central part of the archipelago received little or no precipitation. [5 months]



Approximate locations of the major anomalies and events described above are shown on this map. See the other world maps in this Bulletin for current two-week temperature anomalies, four-week precipitation anomalies, and (occasionally) longer-term anomalies.

Figure 2