Western Region Technical Attachment
No. 91-34
August 20, 1991

EL NINO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC ADVISORY 91/5

CLIMATE ANALYSIS CENTER/NMC

[Editor's Note: This following Technical Attachment is a Diagnostic Advisory on the El Nino/Southern Oscillation (ENSO) situation, issued by the Climatic Analysis Center of NMC.]

During the last several months, the trend in SST in the region 160°E eastward to 160°W (Fig. 1a), has been rather steady in indicating the development of a warm episode. The rather sharp increase in sea surface temperature (SST) anomalies in the eastern tropical Pacific, that occurred from April to June 1991 (Fig. 1b), coincided with a period of low-level westerly anomalies throughout the equatorial Pacific and a deepening thermocline in the eastern equatorial Pacific. Consistent with these features, the Southern Oscillation Index (SOI) has been negative for the last several months. However, enhanced persistent tropical convection has not yet become established in the central equatorial Pacific.

The June 1991 eruptions of Mt. Pinatubo in the northern Philippines have resulted in an extensive aerosol cloud in the stratosphere which is affecting the satellite estimates of SST. The cloud completely encircled the earth by the middle of July and at the end of the month was confined to the tropics (20°N-30°S). During July, the aerosol cloud interfered with the satellite sea surface temperature retrievals, resulting in negative satellite SST biases of up to 2°C. In addition, the presence of the aerosol has increased the area classified as cloud using visible imagery, thus resulting in a dramatic drop in the number of daytime retrievals. The number of nighttime retrievals has not been significantly affected. The April 1982 eruptions of El Chichon in Mexico produced a smaller aerosol cloud, which also resulted in negative biases in the satellite SST retrievals which lasted through 1984.

The TOGA/CAC SST (blended) analysis technique uses the shape of the higher resolution satellite field and calibrates the SSTs utilizing observations from buoys and ships, plus information on the extend of sea ice. Thus, the blended analysis is not substantially affected by the presence of the aerosol cloud.

The SST anomaly field for July 1991 is shown in Fig. 2. This pattern is quite similar to that observed during June. In July, all three Niño regions had anomalies near 1°C (Fig. 3).

As the Northern Hemisphere warm season comes to a close, tropical convection will begin shifting equatorward. The transition seasons (March-May and September-November) are key periods in the evolution of warm episodes. During those seasons, convection is not tied to any particular geographic location and, thus, it may experience rather large longitudinal shifts, which depend on features such as the SST pattern and the intensity and phase of the 30-60 day (intraseasonal) oscillations. Intraseasonal oscillations, at times, play an important role in the establishment of persistent enhanced convection in the central equatorial Pacific.

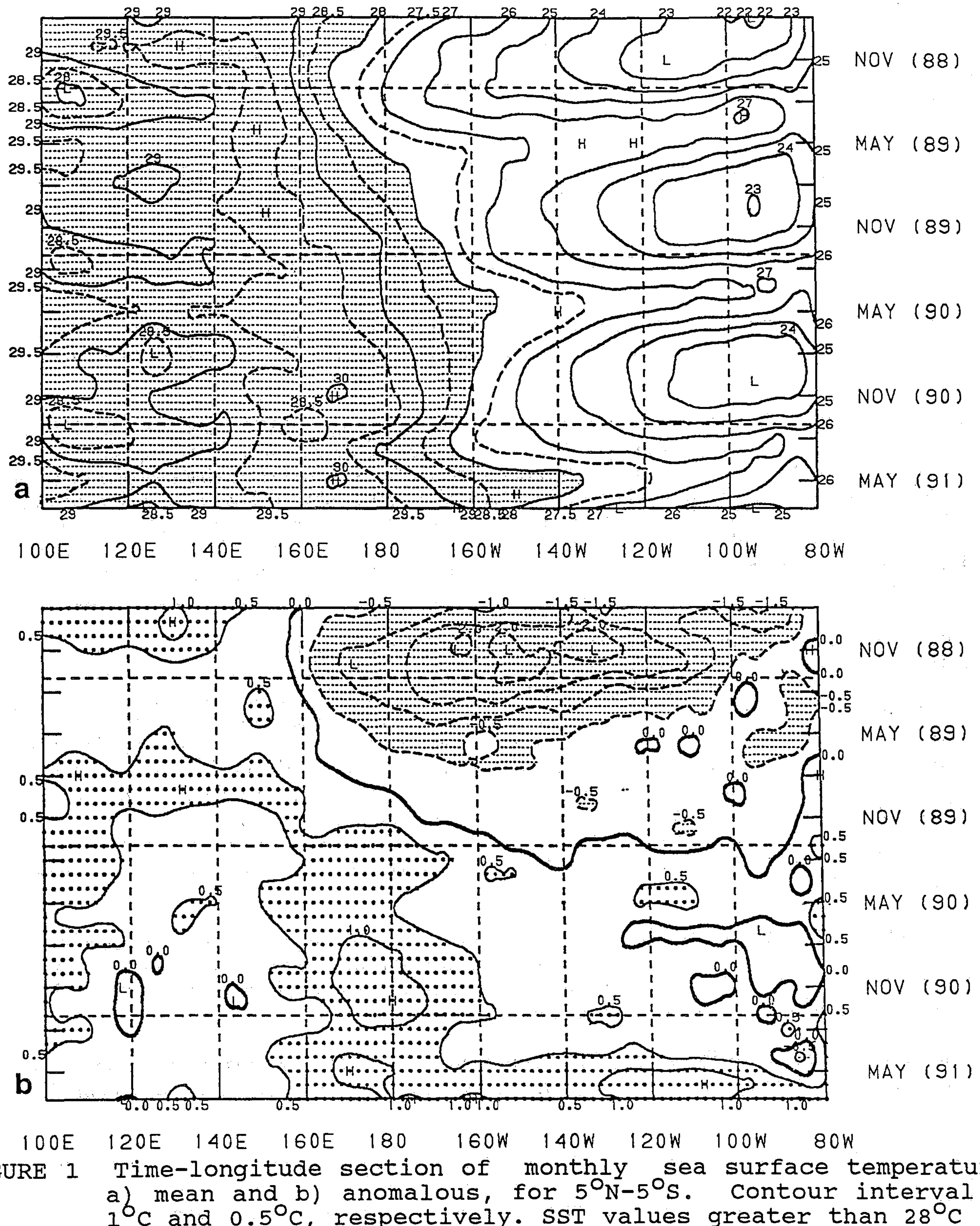


FIGURE 1 Time-longitude section of monthly sea surface temperature, a) mean and b) anomalous, for 5°N-5°S. Contour interval is 1°C and 0.5°C, respectively. SST values greater than 28°C and anomalies less than -0.5°C are shaded. Stippled areas indicate anomaly values greater than 0.5°C. Anomalies are computed based on the COADS/ICE climatology.

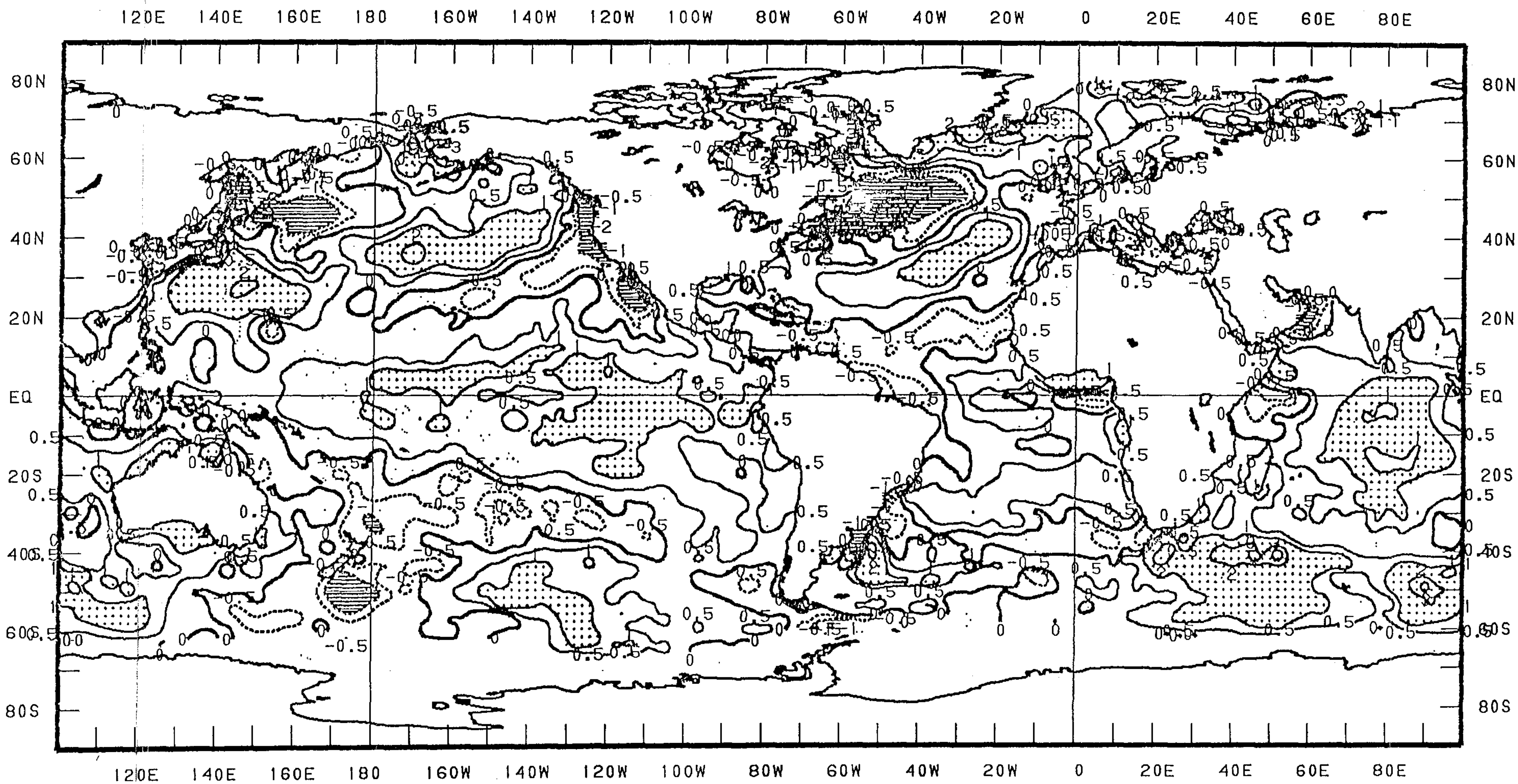
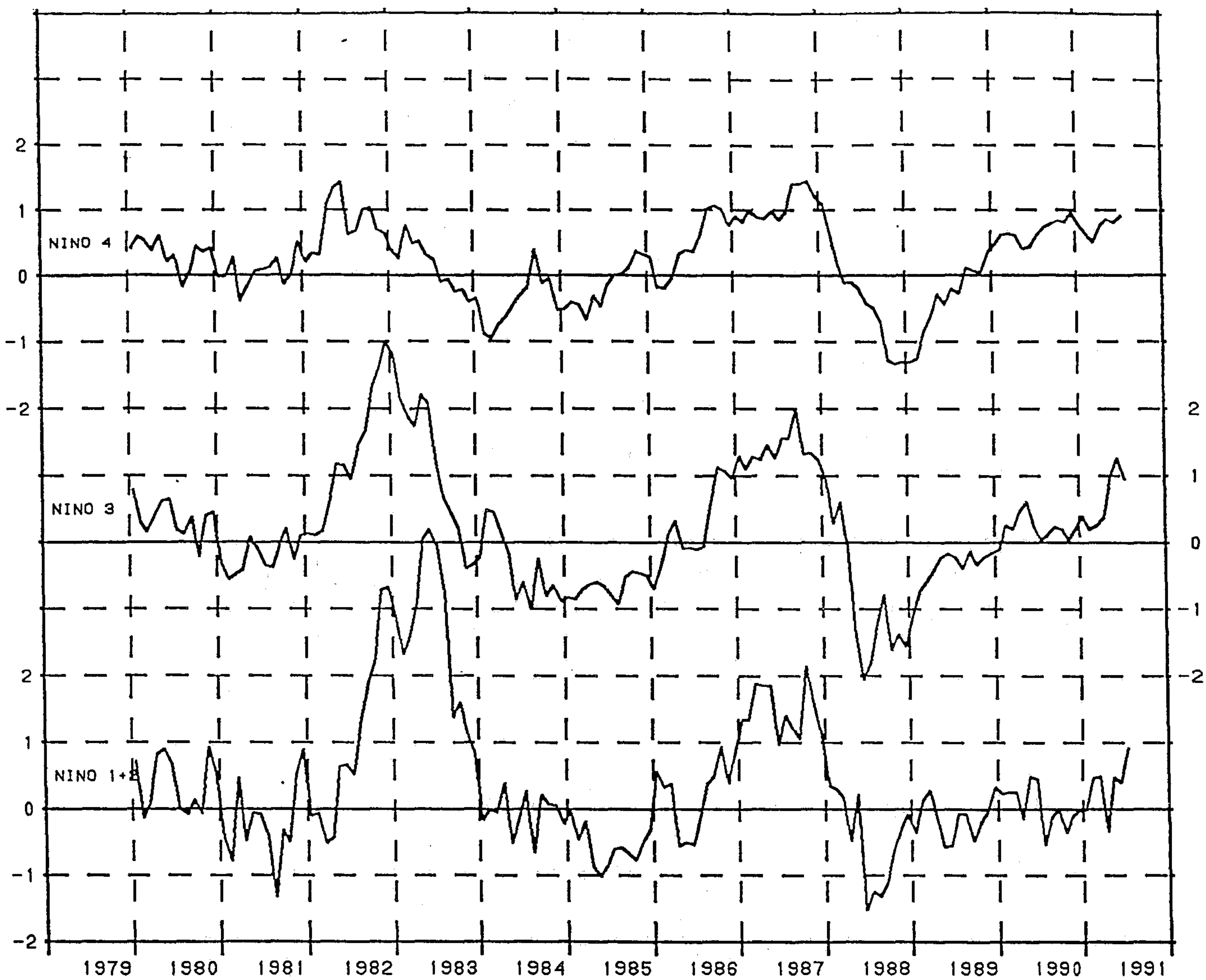


FIGURE 2 Blended sea surface temperature anomaly for July 1991. The contour interval is 1°C and negative contours are dashed. The 0°C contour has been darkened. Anomalies less than -1°C are shaded and greater than 1°C are stippled. Additional anomaly contours of ±0.5°C are shown.



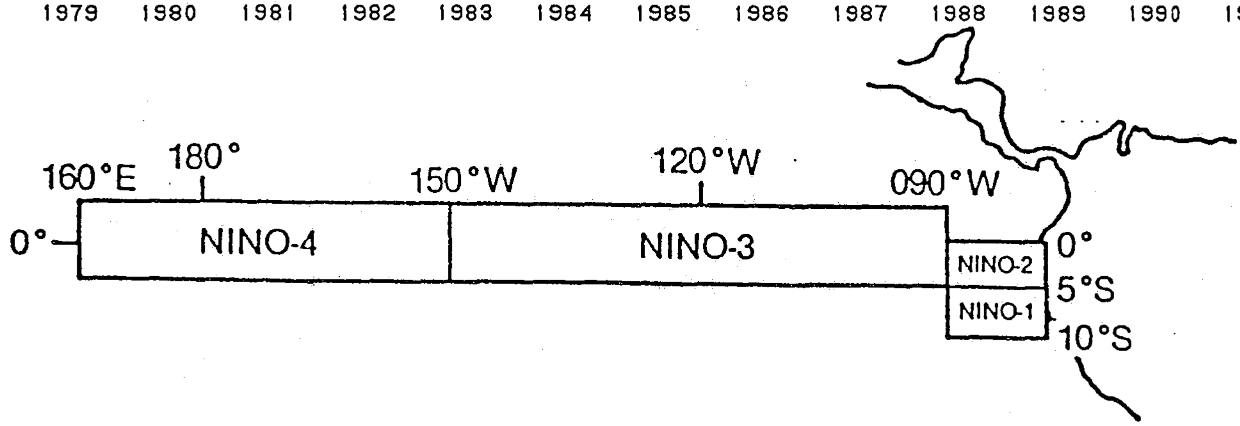


FIGURE 3 Equatorial Pacific sea surface temperature anomaly indices (°C) for the areas indicated at the bottom of the figure. Niño 1+2 is the average over the Niño 1 and Niño 2 areas.