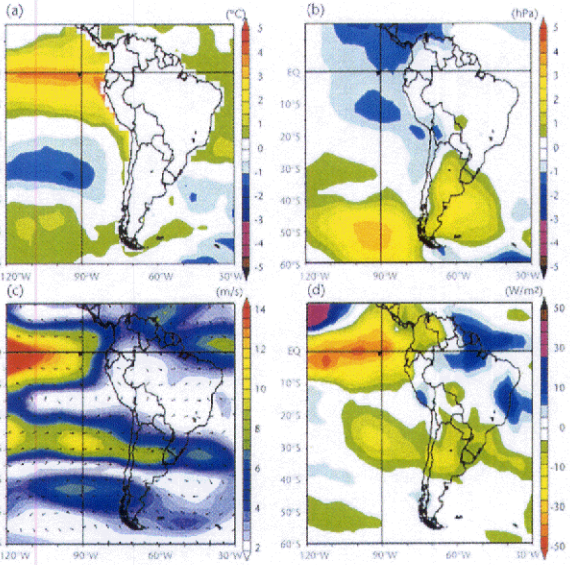

Figure II.23
Climate characteristics during the Southern Hemisphere summer (January through March 1998) during the mature phase of the El Niño event: anomalies of a) sea surface temperature; b) surface atmospheric pressure; c) 250 hPa (approximately 10.5 km altitude) vector mean wind; and d) outgoing longwave radiation.
(NOAA/CDC, USA)

cyclones that tracked into the region of the central coast of Chile, and that brought heavier than normal winter rains.

The upper atmosphere westerly winds of the subtropics were stronger than normal (Figure II.22c — 250 hPa is at approximately 10.5 km altitude). The strengthened westerly jetstream was driven by the enhanced release of latent energy in the deep atmospheric convection occurring over the warmer waters of the equatorial central and eastern Pacific Ocean. The eastern extension of the anomalous deep atmospheric tropical convection over the eastern equatorial Pacific Ocean is identified by the region of reduced outgoing longwave radiation (Figure II.22d). The increased outgoing longwave radiation over equatorial regions of continental South America was consistent with suppressed convection and reduced cloudiness associated with subsiding airflow.

The region covering Paraguay, northern Argentina, southeastern Brazil and Uruguay often receives more rainfall than normal in winter and spring during El Niño events and 1997 was consistent with the pattern. Monthly precipitation records were exceeded at different locations in central and northern Argentina during March, June and October 1997. Many rivers of northern Argentina rose to levels significantly higher than normal during the latter half of 1997. The increased frequency of winter and spring storms tracking from the Pacific Ocean and to the east of the Andes Mountains, and the increased rainfall, is identified by the reduced outgoing longwave radiation over these parts of the continent.

December 1997–April 1998

A positive anomaly of sea surface temperature was maintained over the eastern equatorial Pacific Ocean during January–March 1998 (Figure II.23a). Warmer than normal surface waters were also experienced southward along the coast to Chile. Surface atmospheric pressure also continued to be below normal over the eastern equatorial Pacific Ocean, and this was consistent with the continuing negative values of the SOI. The frequent strong anticyclones that tended to block to the southwest of the continent maintained a strong positive anomaly of surface pressure in that region (Figure II.23b).

During December 1997 through February 1998, sea surface temperatures over the Pacific Ocean offshore from Ecuador and Peru exceeded the threshold value (about 28°C) necessary to support deep convection. This was an outcome of the combined influences of the warm anomaly of El Niño and seasonal warming. The anomalous equatorial easterly winds of the upper atmosphere (Figure II.23c) and the reduced outgoing longwave radiation (Figure II.23d) are consistent with a region of deep atmospheric convection over the eastern equatorial Pacific Ocean and over the coastal margins of Ecuador and Peru.

The intertropical convergence zone moved further south than usual during the Southern Hemisphere summer of 1997–98 and was active over the coastal margins of southern Ecuador and northern Peru. Deep convection developed over the normally dry coastal regions of Ecuador and Peru. Torrential rains with floods, mudslides and destruction of infrastructure (including highways and buildings) occurred over Ecuador from November 1997 to May 1998. Over northern Peru the rains started a month later but also continued until May 1998.

Monthly values of departure from normal of outgoing longwave radiation over the central and eastern equatorial Pacific Ocean (long 120°W to 180°W and long 60°W to 120°W respectively) for the period May 1997 to August 1998 are plotted in Figure II.24. Also plotted is an index of precipitation over the coastal margin of Ecuador. The consistently negative departures of outgoing