Indian Ocean and in the coastal waters offshore from Namibia and Angola. As northeast winds became established over the north Indian Ocean, and the intertropical convergence zone of East Africa moved southward, the abnormally warm waters of the western Indian Ocean provided sufficient moisture and energy to sustain deep atmospheric convection. Periods of very heavy rains and flooding were experienced over most of the East African region from September 1997 to February 1998. The regional maps of sea surface temperature anomaly and the surface winds for the period October to November 1997 are shown in Figure 58, a and b respectively.

The relatively strong southerly winds in the Atlantic Ocean offshore from Namibia induced upwelling and cooling in the surface ocean layers but abnormally warm sea surface temperatures persisted further north in the eastern Gulf of Guinea until late February 1988. The warmer than normal sea surface temperatures over the western equatorial Indian Ocean also persisted through February 1998 (Figure II.59a) and the eastern Gulf of Guinea and the western Indian Ocean had sea surface temperatures above the threshold for deep tropical atmospheric convection. The map of outgoing longwave radiation anomaly for January and February 1998 identifies the areas of unusual deep convection over East Africa (Figure II.59b – negative anomalies associated with deep atmospheric convection shaded blue/mauve). These areas are consistent with the very much above average rainfall received during the period.

Rainfall for Southern Africa, particularly the southwest of the subcontinent, is usually significantly below average during an El Niño event. The event of 1997–98 was therefore unusual in that Southern Africa, especially the central and eastern parts, received average to above average rainfall. The map of outgoing longwave radiation anomaly (Figure II.59b) also clearly identifies increased cloudiness over the central and eastern parts of Southern Africa during this time. Whether or not this unusual rainfall (unusual for an El Niño event) is a result of Rossby wave teleconnections from the warm waters and increased convection over the Gulf of Guinea will require further analysis.

The total rainfall over Southern Africa for the period 1 July 1997 to 31 March 1998, and the comparison with normal, is shown in Figure II.60. Only the above average

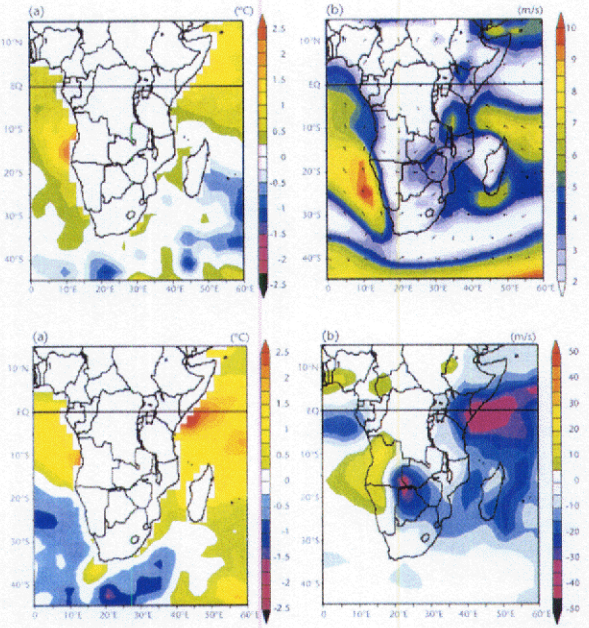

Figure II.58
Maps of a) sea surface temperature anomaly; and b) surface wind for October to November 1997.
(NOAA/CDC, USA)

Figure II.59
Maps of a) sea surface temperature anomaly; and b) anomaly of outgoing longwave radiation for January to February 1998.
(NOAA/CIRES, USA)

rainfall over the northeast of the region, linking to the above average rainfall over equatorial East Africa, is consistent with typical El Niño events.

Impacts

The period from July to September 1997 was relatively dry over those areas of sub-Saharan Africa that are normally affected by the Northern Hemisphere summer rains. However, very wet conditions became established during mid-September 1997 and persisted until February 1998. Flooding was experienced over most of the East African region that includes Sudan, Eritrea, Ethiopia, Djibouti, Somalia, Kenya, Uganda, Rwanda, Burundi and the United Republic of Tanzania.

The impacts of the heavy rain and flooding included loss of life through drowning, landslides and outbreaks of disease. There was also widespread loss of rail and road networks causing disruption to transport. Food supplies and the rural economies were seriously disrupted through lost agricultural production following waterlogging of soils and rotting of crops in the fields, and through livestock deaths from drowning and disease.

Outbreak of disease, because of stagnant and polluted surface waters and the