The La Nina episode and the heavy winter rainfall of 1999 over Peninsular Malaysia

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Abstract

Prolonged events of heavy rainfall which commenced in September 1999 and continued until January 2000 during the northeast monsoon over the Malaysian Peninsula showed that the enhanced rainfall conditions were related to the larger scale La Nina phenomenon. This was substantiated by large-scale observational features, such as the monthly precipitation, anomaly of outward long wave radiation, zonal and meridional wind fields at the lower and upper levels, vorticity and vertical motion, that exhibited a disparity from the El Nino conditions of 1997. Low-level convergence concentrating over the maritime continent coincided with the region of enhanced rainfall. The more frequent occurrences of heavy rainfall and flooding during this period fell within the La Nina episode, occurring approximately two years after the major dry episode of the El Nino phenomenon. The enhanced rainfall encountered by Peninsular Malaysia was considered to be related to the transitional phase of the Tropical Biennial Oscillation. The causes of these heavy rainfall episodes were variable and included the localized and organized enhanced afternoon convection resulting from the radiative diurnal cooling and heating effects. The heavy rainfall in early October 1999 was associated with the presence of the confluence of airstreams along the Malaysian Peninsula at cyclonic vortices of 850, 250 and 100 hPa over the northern Malaysian Peninsula. Two westward propagating tropical cyclones which existed over the Bay of Bengal and the Gulf of Siam were among the main contributors to the heavy rainfall over the region during October.

Keywords: El Nino phenomenon, La Nina phenomenon, meridional wind fields, Tropical Biennial Oscillation, tropical cyclones, vorticity and vertical motion