Relationship between rainfall at Cherrapunji, northeast India and anomalous anticyclonic circulation over western North Pacific

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The characteristics of active rainfall spells (ARSs) at Cherrapunji, northeast India, where extreme high rainfall is experienced, and their relationships with large-scale dynamics were studied using daily rainfall data association with ARSs. The extremely large amounts of rainfall in the monsoon season are determined by the cumulative rainfall during ARSs. ARSs start when anomalous anticyclonic circulation (AAC) at 850-hPa propagates farther westward and suppresses convection over central India during ARSs at Cherrapunji, and continues for 3 to 14 days. Consequently, a northward shift of the monsoon trough during the 'break' in the Indian core region occcurs. The westerly wind, which prevails in the northern portion of the AAC, transports moisture toward northeast India and enhances moisture convergence over northeast India with southerly moisture transport from the Bay of Bengal, and greatly intensifies the orographic rainfall. In the upper troposphere, the Tibetan high tends to extend southward with the onset of ARSs. A linear relationship can be seen between the length and total rainfall of an ARS. Longer ARSs tend to result in greater total rainfall. AACs with a greater zonal-scale tend to produce longer and more intense ARSs. This study provides evidence for the effect of western North Pacific AACs on the Indian summer monsoon.

Keywords: Indian monsoon, intraseasonal variation, orographic precipitation

