

Monsoon Intra-seasonal Oscillations during ENSO Episodes

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Passive radiometers generally provide excellent information relating to convective clouds and monsoon rainfall in terms of Outgoing Longwave Radiation (OLR) flux. Remotely sensed NOAA-OLR data is used to investigate the role of monsoon intra-seasonal oscillations (ISOs) during ENSO episodes over the study region (50-100°E and 0-38°N) for a period, 1979-2006. Morlett wavelet analysis technique is used to identify number of ISOs, which influence Indian summer monsoon rainfall using OLR data and they are related with different phases of ENSO cycle. In the present study seven El Nino (1982, 1989, 1991, 1994, 1997 & 2002) and seven La Nina (1985, 1988, 1996, 1998, 1999, 2000 & 2001) episodes are identified. This study further highlights that there are two/three significant number of ISOs in El Nino, while five/six ISOs are in La Nina episodes. Satellite derived OLR is inversely related ($r = -0.61$; significant at 1% level) with Southern Oscillation Index (SOI), which gives the intensity of ENSO. Thus OLR field gives a distinct convective picture during El Nino and its counterpart La Nina episodes. The magnitude of ISOs in terms of MJO index over 70°, 80° and 100°E is also used to relate with SOI dataset and a statistically significant inverse relationship is observed between them.

Mean annual pentad OLR cycle shows minimum in August and maximum in February. Later it is examined for a typical El Nino (2002) and La Nina (1998) episodes; it reveals that negative OLR anomalies are highly dominant over the most parts of Arabian sea, Indian sub-continent and the Bay of Bengal in La Nina period, while a reverse convection is observed in El Nino episode during June through September in composite annual cycle. On examining onset of monsoon over different regions (Indonesia, Andaman and Arabian Sea) using annual cycle of OLR, it is found that onset over Andaman Sea is 7 to 10 days earlier than the monsoon branch of Arabian Sea. Finally the relationship between OLR and circulation fields is studied in detail for the study period. U-850 hPa is inversely related with OLR, where as U-200 hPa is directly related for the southwest monsoon period.

Keywords: OLR, ISOs, ENSO, Onset