

Relative Roles of Background Moisture and Vertical Shear in Regulating Inter-annual Variability of Boreal Summer Intra-seasonal Oscillations

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The inter-annual variability of the boreal summer intra-seasonal oscillation (BSISO) is investigated using observed outgoing long wave radiation (OLR) and reanalysis data for the period of May-October 1980-2012. The BSISO intensity at each grid is defined as the standard deviation of 20-80-day filtered OLR. An empirical orthogonal function analysis of the BSISO intensity field shows two dominant modes in the tropics. The two modes are closely associated with ENSO-type sea surface temperature anomalies in the tropical Pacific, with preferred background moisture and vertical shear fields appearing over the main BSISO activity centers. Using a 2.5-layer atmospheric model with a specified background mean state, we further examine the relative roles of background moisture and vertical shear fields in modulating the BSISO intensity. Sensitivity numerical experiments indicate that the background moisture change is critical in regulating the BSISO intensity, whereas the background vertical shear change also plays a role but is much weaker.

Key words: inter-annual variability, BSISO, background