



Role of ENSO on the Modulation of Upper Troposphere Lower Stratosphere Circulation over Asian Summer Monsoon

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Several studies indicate that the El Niño-Southern Oscillation (ENSO) has a profound influence on the Asian Summer Monsoon. It is explained that the warm/cold phases of ENSO perturb the Walker circulation, thereby modifies the Asian summer monsoon circulation as well as the rainfall pattern. The influence of ENSO on the winds in the upper troposphere and lower stratosphere over the Asian summer monsoon region associated with ENSO is not much attempted. In this study, the role of ENSO on the circulation patterns of the upper troposphere and lower stratosphere has been investigated during the boreal summer over the Asian Summer Monsoon region. ECMWF reanalysis (ERA) Interim data has been used for a period of 37 years (1980-2016) for the study. During the summer monsoon season, strong easterly winds in the upper troposphere, known as the Tropical Easterly Jetstream (TEJ), appear from late May to September. The lower stratospheric winds are dominated by the quasi-biennial oscillation (QBO), which changes the speed and direction in every alternate year. The TEJ exhibits unique characteristics in El Niño and La Niña phases. The intensity of TEJ enhances in both horizontal and vertical direction in La Niña years, whereas it shrinks during El Niño years. In the lower stratosphere, the influence of easterly phase dominates during the La Niña period, whereas it becomes relatively weak during El Niño events. In La Niña composite, the core of TEJ extends vertically to the lower stratosphere. An intense upward flow from the upper troposphere to lower stratosphere is found in the longitude belt of 70°-80° E in the La Niña period. Convergence in the lower level and divergence in the upper level is generally weak in El Niño years. On the other hand, a westward shift of strong upper level divergence is seen in La Niña conditions. Appearance of strong/weak anticyclonic flow near to the tropopause height over the Tibetan Plateau is prominent during La Niña/El Niño year results in the significant inter-annual variability of the circulation in the upper troposphere lower stratosphere region.