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Madden-Julian Oscillation in the Tropical Stratosphere

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Links are sought between MJO related variations in the troposphere and stratospheric winds, temperature and ozone. Tropospheric variations of equatorial MJO filtered 200 hPa zonal winds define indices of MJO activity for two equatorial regions in the Indian and Western Pacific Oceans. These indices are used to calculate composite means of MJO filtered winds, temperature, and ozone mixing ratio for the eight height levels from the upper troposphere well into the stratosphere. Strong evidence is presented for significant and coherent MJO departures throughout the lower stratosphere. At 100hPa these departures show easterlies in the equatorial regions of the compositing centers, nearly symmetric anticyclonic centers at 25º poleward of those centers, which are associated with significant negative departures in both temperature and ozone mixing ratio. Near 40ºN MJO departures of meridional velocity, temperature and ozone mixing ratio generally tilt westward with height. The most important aspects of these features propagate eastward at a rate of about 5m/s second in the Eastern Hemisphere and several times faster in the Western Hemisphere. Extended Eliassen-Palm fluxes are used to illustrate the associated wave interactions between the troposphere and stratosphere.