



Equatorial Circulation Changes in the Mesosphere and Lower Thermosphere during Stratospheric Sudden Warming Events

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Significant general circulation changes are brought about in the equatorial region as well as in the polar region during stratospheric sudden warming (SSW) events. Many studies have been devoted for the region up to the stratopause level from both observational and theoretical aspects. However, observational evidence is still fragmentary in the mesosphere and lower thermosphere (MLT) during SSW events, because global data capable of comprehensive analyses are still insufficient for the region. In this study, we make global gridpoint data derived from Aura Microwave Limb Sounder (MLS) observations for geopotential and temperature fields in the MLT region as well as in the stratosphere. Using these data, we make dynamical analyses for equatorial zonal wind and temperature changes since June 2004 to present. During SSW events, poleward flows of the residual meridional circulation are enhanced to lead to equatorial temperature perturbations consisting of a cooling in the stratosphere and a warming in the mesosphere. These temperature perturbations are found to strengthen the equatorial semiannual oscillation (SAO) with two separate out-of-phase maxima centered near the stratopause and the upper mesosphere through the thermal wind balance at the equator. Moreover, the temperature perturbations seem to influence the circulation in the equatorial lower thermosphere during this period.