

Circulation changes in the mesosphere during stratospheric sudden warming events

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Recent satellite observations show the appearance of easterly winds in the upper mesosphere just before the occurrence of the stratospheric sudden warming (SSW) event in the upper stratosphere in January 2009 (Manney et al. 2009). This is considered to be strong manifestation of stratosphere-mesosphere dynamical coupling; in order to understand this phenomenon, the accumulation of detailed investigation of SSW events would be necessary for the region throughout the atmosphere up to the mesopause level. In this study, we make dynamical analyses for wind and temperature fields up to the mesopause level during the recent SSW events by the use of Aura MLS data since 2004. It is found that easterly winds in the mesosphere do not always appear before SSW easterlies of the upper stratosphere. For the appearance of preceding easterlies in the upper mesosphere, wave driving due to internally formed or refracted large-scale waves is necessary in that region; the enhancement of such waves seems to be owing to changing background wind structure of the lower mesosphere prior to the SSW occurrence.

Keywords: stratospheric sudden warming, mesospheric circulation, MLS data