

Sudden tropical stratospheric warming by subtropical jet variation in the middle atmosphere

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An exceptional event of a strengthening of the subtropical jet (STJ) occurred in the stratosphere in association with a sudden equatorward shift of the stratospheric polar night jet (PNJ) in early December 2011. This event is dynamically analyzed on the basis of the Japanese 55-year reanalysis data, JRA-55, along with Aura Microwave Limb Sounder (MLS) observations. The abrupt transformation of the STJ and PNJ is found to be associated with a change in the meridional propagation of planetary waves in the upper stratosphere with little connection to the upward propagation of planetary waves from the troposphere. The exceptional rapid downward extension of STJ was seen from the lower mesosphere to the lower stratosphere, it is suggested that the strengthening of the STJ was originated from the mesosphere. The impact of this event farther penetrates into the troposphere in two regions, in the northern polar region and the tropics.

The discussion on the influence of the exceptional event on troposphere and the mechanism for the strengthening of the STJ in the mesosphere will be shown in the presentation.

Key words: subtropical jet, polar night jet, sudden tropical stratospheric warming, stratosphere-troposphere interaction, stratosphere-mesosphere interaction