

Impacts of mesospheric westerly-jet instability on the middle and lower atmosphere

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Kodera et al. [ACP, 2016] reported that 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. The exceptional rapid downward extension of STJ was developed from the lower mesosphere to the lower stratosphere, and the impact of this event farther penetrated into the troposphere in two regions, in the northern polar region and the tropics. The abrupt transformation of the STJ and PNJ is found to be associated with little connection to the upward propagation of planetary waves from the troposphere.

Analyses of minor constituent and wind fields derived from Aura MLS observations show that the strengthening of the PNJ and STJ were originated from the upper mesosphere and its mechanism could be explained by a wave-mean flow interaction which seems to be caused by large-scale waves enhanced through barotropic and/or baroclinic instability in mid- to high latitudes of the mesosphere. The detailed mechanism for the strengthening of both PNJ and STJ in the mesosphere and the impact on the stratosphere and troposphere will be shown in the presentation.

Keywords: subtropical jet and polar night jet, mesosphere-stratosphere-troposphere interaction