

Tropospheric response to anomalous wave forcings in the stratosphere

G. Nikulin, F. Lott

Laboratoire de Meteorologie Dynamique, Ecole Normale Supérieure, Paris, France
(grigory@lmd.ens.fr)

The study analyses the midwinter (January-February) response of the tropospheric mean state and variability to anomalies of upward wave activity fluxes into the stratosphere occurring in early winter (November-December). The stratosphere in this case plays the role of a transmission pathway: the wave activity fluxes modify strongly the stratospheric mean state and variability, and those changes are felt in the troposphere at a late stage. Based on NCEP/NCAR Reanalysis (1979-2006) we show that strong or weak wave fluxes in early winter lead to different tropospheric mean states in the subsequent period but also to changes in tropospheric variability. Anomalous weak wave fluxes in early winter result in a midwinter mean state resembling positive phase of the Northern Annular Mode (a strong polar vortex) as well as in enhanced variability over the North-Eastern Pacific. Spectral analysis reveals that the differences in midwinter variability over the North-Eastern Pacific essentially occur in the low frequency band, i. e. at periodicities between 10 and 30 days. These differences in variability also affect wave activity generation over the Pacific in the troposphere suggesting the existence of a negative feedback loops between the Northern Annular Mode and the tropospheric low frequency variability.