Session: C8 Poster: M78A

Observational evidence of the delayed response of stratospheric polar vortex variability to ENSO SST anomalies

Rongcai Ren[†];
[†] Institute of Atmos. Phys., CAS, China, China, People's Republic of
Leading author: rrc@lasg.iap.ac.cn

The temporal and spatial relationship between ENSO and the extratropical stratospheric variability in the Northern Hemisphere is examined. In general, there exists a negative correlation between ENSO and the strength of the polar vortex, but the maximum correlation is found in the next winter season after the mature phase of ENSO event, rather than in the concurrent winter. Following a warm ENSO event, the stratospheric polar vortex tends to be anomalously warmer and weaker in both the concurrent and the next winter season and vice versa. However, the polar anomalies in the next winter are much stronger and with a deeper vertical structure than that in the concurrent winter. Our analysis shows that, the temporal lagged relationship between ENSO and the stratospheric polar vortex variability is related to the ENSO-induced interannual variability of the warm air branch of the meridional mass circulation in the stratosphere. In response to the strengthening of the tropical warming induced by a warm ENSO event, the tropical portion of the poleward mass circulation is first strengthened since the preceding summer, resulting in the warmer temperature (positive mass) anomalies in the midlatitude stratosphere. This warmer (positive mass) anomaly signal persists throughout the following spring-to-summer. The poleward mass circulation in the extratropics is thus anomalously strong in both the concurrent and the next winter. But it is relatively much stronger/weaker in the next/concurrent winter due to the much stronger/weaker wave-effect by the planetary wavenumber-2/wavenumber-1.