

Vertical and meridional propagations of 6.5DWs in stratosphere-MLT regions observed by satellite

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6.5-day-waves (6.5DWs) are one of the most dominant planetary wave components in mesosphere and the lower thermosphere (MLT) regions, especially during equinoctial seasons. 6.5DWs amplitudes are almost tripled in the lower thermosphere than in stratosphere, and their seasonal variations are different. Are 6.5DWs in MLT propagated from stratosphere, or re-excited in MLT? In this paper, relationships between 6.5DWs in MLT and in stratosphere are analyzed. Firstly, vertical propagation characteristics of 6.5DWs in mid-high latitudes in both hemispheres during spring and autumn seasons are obtained, respectively, based on SABER/TIMED global observations from 2002 to 2016. Then results in the Northern Hemisphere (NH) and the Southern Hemisphere (SH) are compared to obtain inter-hemispheric similarities and discrepancies. Given these results and by utilizing wind data observed by TIDI/TIMED as well, wave-flow interactions through vertical propagations of 6.5DWs are analyzed. We first obtain results from case study, and then draw general conclusions from statistics researches. Previous studies have inferred that 6.5DWs could probably propagate along meridional directions [Liu, et al., 2004, Belova, et al., 2008]. It has been showed that 6.5DWs in MLT regions of one hemisphere may be propagated from stratosphere of the other hemisphere, and their amplitudes could be strengthened in unstable regions along their paths. However, these suggestions need to be proved by more observation evidences. The second part of this paper discusses possible meridional propagations of 6.5DWs based on SABER/TIMED and TIDI/TIMED observations. Results obtained in this paper could be useful in improvement of future atmospheric models of stratosphere-MLT regions.

References

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