



專題演講

Equatorial atmospheric Kelvin waves during El Niño episodes and their effect on stratospheric QBO

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Time : 106 年 1 月 3 日 星期二 11:00~12:00

Place : 健雄館(科四館)S4-810 教室

摘要/Abstract :

Equatorial atmospheric Kelvin waves are investigated during a positive El Niño Southern Oscillation (ENSO) episode using temperature data retrieved from GPS Radio Occultation (RO) observations of FORMOSAT-3/COSMIC during the period from August 2006 to December 2013. Enhanced Kelvin wave amplitudes are observed during the El Niño episode of 2009–2010 and it is also observed that these amplitudes correlate with the Niño 3.4 index and also with outgoing longwave radiation and trade wind index. This study indicates that the enhanced equatorial atmospheric Kelvin wave amplitudes might be produced by geophysical processes that were involved in the onset and development of the El Niño episode. Further, easterly winds above the tropopause during this period favored the vertically upward propagation of these waves that induced a fast descending westerly regime by the end of 2010, where the zero-wind line is observed to take only 5 months to descend from 10 to 50 hPa. The current study presents observational evidence of enhanced Kelvin wave amplitudes during El Niño that has affected the stratospheric quasi-biennial oscillation (QBO) through wave–mean flow interactions. Earlier El Niño episodes of 1987 and 1998 are also qualitatively investigated, using reanalysis data. It is found that there might have been an enhancement in the equatorial Kelvin wave amplitudes during almost all El Niño episodes, however, an effect of a fast descending westerly is observed in the QBO only when the ambient zonal winds in the lower stratosphere favor the upward propagation of the Kelvin waves and consequently they interact with the mean flow. This study indicates that the El Niño and QBO are not linearly related and wave mean flow interactions play a very important role in connecting these two geophysical phenomena.

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