中間圏・下部熱圏における東西風の季節内振動

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Intraseasonal variability of zonal winds in the MLT region

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The long-term MF radar wind data in 1993-2006 over Tirunelveli, south India, are used to study the long-term behavior of the intra-seasonal variations (ISO) with 30-60 day periods at 86 km and its relation to the tropospheric ISO. Satellite data of the outgoing longwave radiation (OLR) shows that the ISO amplitudes in OLR at 100-150E and 150-180E vary biennially in 1993-1997, when we observed similar biennial variability in the ISO amplitude in zonal wind at 86 km. The diurnal tide in zonal wind at 86 km also has similar biennial variation coinciding with eastward phase of stratospheric QBO. This suggests that (non-migrating) diurnal tides were generated by the ISO modulated tropical convection, and they propagated upward through stratospheric QBO. Because of the wave induced driving of the mean flow, similar ISO variability appeared in the MLT region. However, after the year 1998, the variation of ISO amplitude in OLR in the two longitude bands is different. Though the ISO amplitude in OLR at 100-150E continues to show biennial variation, the period of the same at 150-180E gets elongated to nearly three years during 1999-2003. As an interesting coincidence, the period of stratospheric QBO also gets extended from usual two year variation to more than three years. As it could be due to change in the period of stratospheric QBO, the biennial variability of diurnal tidal amplitude is slightly disturbed, though the eastward phase of stratospheric QBO coincides with larger tidal activity.

The diurnal tidal behavior is slightly different in the years 1998-99, when the maxima occurs a little earlier during the transition phase of stratospheric QBO.