

Seasonal variation in the longitudinal structure of the equatorial ionosphere: does it reflect tidal influences from below?

Huixin Liu[1]

[1] Earth and Planetary Sci., Hokkaido Univ

We have examined the longitudinal structure of the equatorial ionosphere at 400 km altitude in the noon and post-sunset local time sectors in different seasons using six years of F-region plasma density observations from the CHAMP satellite. A four-peak wave structure is observed in both local time sectors. In the noon sector at a fixed solar flux level, this structure is observed to be most prominent around September equinox and weakest around December solstice. This seasonal dependence agrees well with that of the non-migrating diurnal tides DE3, hence supporting a close coupling between the ionosphere and the mesosphere-lower thermosphere possibly via the DE3 tidal modulation of the E-layer dynamo. In the post-sunset sector, however, such agreement cannot be claimed. In this sector, although the four-peak structure can be observed in all seasons at moderate and high solar flux levels, its seasonal dependence does not follow that of the DE3 tides. This structure becomes indiscernible near solstices at low solar flux levels. Furthermore, the post-sunset four-peak wave structure exhibits larger amplitude than that during daytime, hence indicating that it is more likely an amplified feature rather than a remnant of the daytime structure. The pre-reversal enhancement is speculated to be a possible candidate to cause this amplification.