



Statistical behavior of the longitudinal variations of the evening topside mid-latitude trough position in both Northern and Southern Hemispheres

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Based on the nighttime ionosphere ion density data from the Defense Meteorological Satellite Program (DMSP) satellites in 1996-2016, we statistically analyzed the longitudinal variation of the mid-latitude trough position in the Northern and Southern hemispheres. The results show significant difference in the longitudinal variation of the trough position between the Northern and Southern hemispheres. In the Northern hemisphere, the trough position in the two longitudinal sectors of 60°W and 120°E is always located at higher latitudes than that in the other longitudinal sectors under most of time and solar and geomagnetic conditions. The longitudinal variation of trough position in the Northern hemisphere is mainly affected by season, solar activity level, and geomagnetic activity level. In the Southern hemisphere, the trough position in the western hemisphere is located at lower latitude than that in the eastern hemisphere in winter and at low solar activity level in equinox. At medium and high solar activity levels in equinox, the southern trough structure in the western hemisphere can't be identified, which also occurs in summer. The change in geomagnetic activity would cause the same movement of trough position in the Southern hemisphere in all longitude sectors at low solar activity level. Thus, the longitudinal variation of trough position in the Southern hemisphere is mainly affected by season, solar activity level. The longitudinal variation of the trough position may be associated with the longitudinal variation of the ion density at the equatorward/poleward side of the trough in the Northern and Southern hemispheres.