

Meridional Wind Effect on Anti-Solar Activity Correlation of Equatorial Density Irregularity Distribution

Shin-Yi Su¹, Chi Kwan Chao², Chao Han Liu³ and Hsu Hui Ho²

1. Institute of Space Science, and Center for Space and Remote Sensing Research, National Central University, Chung-Li, Taiwan.
2. Institute of Space Science, National Central University, Chung-Li, Taiwan.
3. Department of Electrical Engineering, National Central University, Chung-Li, Taiwan.

Peculiar longitudinal occurrence patterns in the seasonal/longitudinal (s/l) distribution of equatorial density irregularity are noted in data taken by ROCSAT-1 during high solar activity year of 2000 against moderate solar activity year of 2003. The monthly averaged solar flux intensity F10.7 was higher every month in 2000 than in 2003, but the irregularity occurrence rate was not always correlated with solar activity at every longitude in a season. For the equinox season, the occurrence rate was higher at every longitude in 2000 than in 2003. Higher occurrence rate was also observed in 2000 than in 2003 during a solstice season at longitudes of the so-called ESF longitudes in the s/l distribution. However, higher occurrence rates in 2003 were observed at longitudes from 230° to 10° during the June solstice and from 90° to 260° during the December solstice, where the magnetic flux tube makes a large-angle alignment with the sunset terminator during a solstice season. We conclude that such anti-solar activity correlation for the occurrences of ESF irregularity at these longitudes is due to the instability suppression agent of transequatorial meridional winds that becomes more effective to offset the growth rate in the Rayleigh-Taylor instability at these longitudes of large magnetic declination during a solstice season in a high solar activity period than in a low solar activity period.