Characteristics of nocturnal ionospheric zonal plasma drift velocities determined from OI 630.0 nm and 777.4 nm all sky imaging observations ()

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In the Brazilian sector, mostly during the period from October to March, the equatorial and low latitude Fregions present quasi north-south magnetic field- aligned large-scale ionospheric irregularities, which are one of the most remarkable features of these regions of the upper atmosphere. These ionospheric irregularities may be observed by different observational techniques (e.g., radar, digisonde, GPS and optical instruments) and its time evolution and propagation can be used to study important aspects of ionospheric dynamics and thermosphere-ionosphere coupling. Simultaneous observations of the OI 630.0 nm and 777.4 nm nightglow emissions using all-sky imaging systems at São José dos Campos (23.21o S, 45.86o W; dip latitude 17.6o S), Brazil, have been used to determine the nighttime variations of zonal plasma bubble drift velocities. The OI 630.0 nm and 777.4 nm emissions come from altitudes of about 250 km and 350 km, respectively. The optical signatures of the OI 777.4 nm emission are more closely related to the actual ionospheric plasma bubble structures, owing to the fact that it is a prompt emission and depends only on the electron density profiles, with no F-region height dependence. On the other hand, the OI 630.0 nm emission comes from the bottomside of the F layer with a strong F region height dependence and shows- blurred images due to its 110-s lifetime. The all-sky imaging systems used in the present studies have CCDs, with high quantum efficiency which provide excellent capabilities for quantitative measurements of faint and low contract emissions. Both the emissions (OI 630.0 nm and 777.4 nm) show quasi north-south aligned intensity depletion bands, which are the optical signatures of large scale F-region plasma bubbles. Thus, it is possible to infer the nocturnal ionospheric zonal plasma drift velocities by just following the space-time displacements of the intensity-depleted bands seen in the images. The nocturnal zonal plasma drift velocities obtained from the two emissions are presented and discussed in

this communication. Also, a comparison of the observed zonal plasma drift velocities with the zonal neutral wind velocities obtained from the horizontal wind model (HWM- 90) are presented.

Publication:
34th COSPAR Scientific Assembly

Pub Date:
2002

Bibcode:
2002cosp...34E.480A (/abs/2002cosp...34E.480A/abstract)