



Radar interferometer estimates of F-region zonal irregularity drifts in the Brazilian sector

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1. Extended Abstract

The evening plasma vortex is an important electrodynamic feature of the magnetic equatorial ionosphere. It is a manifestation of the complex three-dimensional system of thermospheric winds and ionospheric conductivities at low latitudes. It has been suggested that the vertical shear in zonal plasma velocity associated with the plasma vortex and the retrograde motion, with respect to the neutral atmosphere, at bottomside F-region heights is linked to plasma structuring producing equatorial spread F – ESF (e.g. Hysell and Kudeki, 2004).

Despite its importance, measurements of the plasma vortex (or shear) are limited. This is, in most part, because observations require height dependent estimates of the plasma drifts. This is only possible, for instance, with the Jicamarca incoherent scatter radar (Kudeki and Bhattacharyya, 1999) or using averages of satellite in-situ observations over a wide longitude sector (Eccles et al., 1999). Previous studies at Jicamarca (e.g. Kudeki et al. 1981) showed that coherent scatter interferometer radar measurements can also be used to estimate vertical profiles of irregularity zonal drifts and detect the vertical shear in the motion associated with the evening vortex.

In this talk, we will present results of an effort to estimate irregularity zonal drifts during equatorial spread F events using measurements made by a small, low power interferometer radar in Brazil. During the presentation, we will describe the coherent scatter radar interferometer measurements of ESF in the Brazilian sector that were available for this study. We will then present estimates of vertical profiles of zonal irregularity drifts during ESF events. The profiles show the occurrence of the shear in the zonal drifts and provide estimates in the variability of the shear node altitude. The estimates are compared with results previous theoretical and experimental studies.

2. References

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