Scintillation zonal drifts inferred at equatorial and low-latitude magnetic conjugate regions

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Ionospheric irregularities zonal drift velocities were inferred using Global Positioning System (GPS) measurements at three sites during the Conjugate Point Equatorial Experiment (COPEX) campaign conducted in Brazil from October 1 to December 10, 2002. The three observation sites were located along the same magnetic meridian, one at the magnetic equator, Cachimbo (9.5^o S, 54.8^o W, dip angle: -3.9^o), one at the northern conjugate point, Boa Vista (2.8^o N, 60.7^o W, dip angle: 22.5^o) and one at the southern conjugate point, Campo Grande (20.5^o S, 54.7^o W, dip angle: -22.5^o). Radio scintillations at the GPS L1 frequency (1.575 GHz) monitored by two magnetic east-west spaced-receivers and the cross-correlation technique applied on the scintillation pattern measured by the two spaced receivers were used to obtain the scintillation zonal drifts. Our observations show that the zonal velocities decrease with local time and at the conjugate locations they are smaller than that at the equator, presenting a negative latitudinal gradient which indicates a vertical shear of the eastward plasma drift velocity at nighttime in the equatorial ionosphere. However, the average values of the zonal velocities at each of the two conjugate locations also show difference in magnitudes, which can be attributed to latitudinal variations of the ionosphere and thermosphere dynamics along the magnetic field line. In order to find a plausible explanation for such differences in the irregularity zonal velocity at the conjugate points, the vertical (**E** x **B**) drift velocity at the equator and the magnetic meridional winds at the three stations were inferred using F region critical frequency *foF2* and F region ionospheric height variations ($h'F$and *hmF2*) measured simultaneously at all stations. Using the ionospheric parameters as input the magnetic meridional winds were estimated by the Sheffield University Plasmasphere-Ionosphere Model (SUPIM) and also using a nonlinear time dependent servo model. This work presents a comparison of the wind results given by the two models and their possible correlation with the scintillation drifts measured at the conjugate stations.