Latitudinal Profile of Low Latitude Plasma Drift Velocities Determined by the 135.6 nm nightglow observations by IMAGE/FUV

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The IMAGE/FUV observations provide an instantaneous view of the 135.6 nm nightglow of the low latitude ionosphere. These images correspond to the two-dimensional maps of electron density integrated along the line-of-sight of the instrument. The equatorial ionization anomaly (EA) is the most prominent feature in these images. We have found the wavy longitudinal structure which has the scale size of about 1000 km longitudinally, and extends almost latitudinally from the southern to the northern crests of EA. The structure was found to drift eastward with the speed of about 100 m/s. The drift can be due to the equatorial vertical electric field, and the drift velocity is very consistent to previous observations of the electric field by the ground-based radar and by the in-situ observations of the plasma bubbles. Although the structure extends almost latitudinally, in some cases, it has a slight tilt to the west at higher latitude than at the equator. If we assume the structure reflects the plasma density depression due to the plasma bubbles, this can be interpreted as the westward tilt of the bubbles in the longitude-height plane at the equator, that could be caused by the decrease of the electric field intensities with the increase of height. Theoretically this height dependency of the vertical electric field has been predicted by Haerendel et al. (1992) and other authors. In this paper we have analyzed the IMAGE/FUV data to detect the latitudinal dependence of the plasma drift velocities. We have used several analysis techniques to deduce the plasma drift velocities. One of the methods is the MCCM (Maximum Cross-Correlation Method), in which two consecutive images of the 135.6 nm nightglow are divided into a number of small sub-images, and cross correlation of two corresponding sub-images is calculated with variable lag vector so that the maximum value of cross correlation gives the best estimate of the drift vector. It is found that there are many cases in which the wavy structure have clear tilt to the west at higher latitude, although there are many cases with no tilt. The determination of drift velocities at various latitudes has, so far, not yielded consistent latitudinal dependence. Although this is partly due to a large error in determining drift velocity due to low signal-to-noise ratio of the images, it may suggest that the tilt is the characteristics at the bubble formation period when the fast rise of the bubble is inclined westward at the equator. We will refine the analysis method to finalize the conclusion.