Persistent Longitudinal Variations of Plasma Density and DC Electric Fields in the Low Latitude Ionosphere Observed with Probes on the C/NOFS Satellite

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Continuous measurements using in situ probes on consecutive orbits of the C/NOFS satellite reveal that the plasma density is persistently organized by longitude, in both day and night conditions and at all locations within the satellite orbit, defined by its perigee and apogee of 401 km and 867 km, respectively, and its inclination of 13 degrees. Typical variations are a factor of 2 or 3 compared to mean values. Furthermore, simultaneous observations of DC electric fields and their associated **E** x **B** drifts in the low latitude ionosphere also reveal that their amplitudes are also strongly organized by longitude in a similar fashion. The drift variations with longitude are particularly pronounced in the meridional component perpendicular to the magnetic field although they are also present in the zonal component as well. The longitudes of the peak meridional drift and density values are significantly out of phase with respect to each other. Time constants for the plasma accumulation at higher altitudes with respect to the vertical drift velocity must be taken into account in order to properly interpret the detailed comparisons of the phase relationship of the plasma density and plasma velocity variations. Although for a given period corresponding to that of several days, typically one longitude region dominates the structuring of the plasma density and plasma drift data, there is also evidence for variations organized about multiple longitudes at the same time. Statistical averages will be shown that suggest a tidal "wave 4" structuring is present in both the plasma drift and plasma density data. We interpret the apparent association of the modulation of the **E** x **B** drifts with longitude as well as that of the ambient plasma density as a manifestation of tidal forces at work in the low latitude upper atmosphere. The observations demonstrate how the high duty cycle of the C/NOFS observations and its unique orbit expose fundamental processes at work in the low latitude, inner regions of geospace.