

**STATISTICAL STUDY ON PLASMA VELOCITIES  
IN THE BOTTOM-SIDE IONOSPHERE OVER LOW LATITUDE  
HAINAN STATION: DIGISONDE MEASUREMENT**

**Guojun Wang, Jiankui Shi, Zheng Wang, Xiao Wang, Zhengwei Cheng**

*State Key Laboratory of Space Weather, National Space Science Center, CAS, Beijing, China,  
gjwang@nssc.ac.cn*

Data measured by the Digisonde at the low-latitude station Hainan from 2003 to 2016 are statistically analyzed to specify the diurnal average variations of the bottom-side F region ionospheric plasma velocity vector  $\mathbf{V}$ . This is the first comprehensive analysis of Digisonde measurements of low latitude F region plasma velocities in the East Asian sector that use a database covering more than one solar cycle. The velocity components  $V_N$  (Northward),  $V_E$  (Eastward) and  $V_Z$  (Upward) are analyzed for two levels of solar flux and two levels of geomagnetic activity, respectively. The diurnal variations of the average  $V_Z$  show three positive peaks near the prereversal enhancement (PRE) period, pre-midnight, and before sunrise, respectively, and a prominent valley in the early morning. The averaged  $V_Z$  significantly increased with solar flux in the period of PRE during equinoxes, but it was only slightly affected by  $K_p$ . The  $V_E$  component was westward in daytime and eastward in nighttime. The average eastward  $V_E$  increased significantly with solar flux but decreased with  $K_p$ , whereas the average westward  $V_E$  exhibited only a small variation with solar flux and  $K_p$ . The average  $V_N$  was almost southward independent of solar flux and  $K_p$ . The plasma velocities over the Hainan station were mainly caused by the electric field and neutral wind. Our results show that the features of the vertical and meridional velocities over the Hainan station in the morning are associated with the formation of the equatorial ionization anomaly (EIA).