Geophysical Research Abstracts
Vol. 12, EGU2010-3074, 2010
EGU General Assembly 2010


# Equatorial plasma irregularities detected by total magnetic field enhancements and by electron density depletions: similarities and differences

Claudia Stolle (1,2), Jaeheung Park (1), and Hermann Lühr (1)

(1) Helmholtz Centre Potsdam - GFZ, Germany Research Centre for Geosciences, (2) National Space Institute, Technical University of Denmark (cst@space.dtu.dk)

Equatorial plasma irregularities (commonly termed “bubbles” (EPB)) severely disturb the post sunset F region ionosphere and cause the strongest radio wave scintillations globally during solar maximum years. Using CHAMP observations, it has been proven that equatorial plasma irregularities show signatures in the magnetic field in all components. The total field deflections are caused by diamagnetic currents. Deflections in the perpendicular components reflect field-aligned currents. The climatological behaviour of the EPB occurrence rate based on total field magnetic signatures is very similar to the one that is based on plasma density depletions. Since the detection method is very different, i.e., the amplitude of the diamagnetic effect depends on the ambient magnetic field strength and on the background electron density, it has often been pointed out that the distribution of the magnetic effects of equatorial plasma irregularities has to be treated with some caution when investigating the bubble phenomenon.
This paper will compare in more detail the climatological distributions of the electron density depletions and the magnetic signatures of equatorial plasma irregularities and discuss their similarities and differences. For example, the EPB rate based on electron density depletion is higher over Indonesia than the occurrence rate based on magnetic signatures. We claim the strong Earth magnetic field in this region to cause these observations.