IONOSPHERIC IRREGULARITIES INDUCED BY TURN-ON AND TURN-OFF OF THE TROMS&OSLASH; HF HEATER

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ABSTRACT

It has been proposed that ionosondes can be used to measure vectorial ionospheric drift measurements at the altitudes of reflection. These measurements have been validated for night times at mid and high magnetic latitudes. Here we report concurrent drift measurements made at Jicamarca, in the magnetic equator, using the main Incoherent scatter radar (ISR) and a Digisonde (DPS). For the latter we used the drift determining technique and algorithm that is built in with the instrument. As far as the vertical drift measurements, we show good agreement between the two techniques at night time, particularly when production and recombination cease to be important in determining the shape of the density profile (e.g., around large pre-reversal enhancements). Ionosonde determined vertical drifts measure the time derivative of the virtual height of reflection, as expected, which does not necessarily move at vertical drift velocities. This is in agreement with previous concurrent measurements and comparisons carried out at the Arecibo Observatory (Gonzalez et al.). For the horizontal drift component, we limited our measurements to the EW component. We find good agreement at times that the E region electron density is low. At other times, there is no agreement at all between the drifts determined by the DPS and the ISR drift at the altitude of HF reflection. We find that the DPS drifts are in better agreement with the drift velocity of the long wavelength equatorial electrojet (EEJ) instabilities. This is to be expected since, the diffraction pattern on the ground ---to which any ionosonde technique will be sensitive to---is mainly, if not solely, dependent on the electron density structure at EEJ heights, when the electron irregularity density is sufficiently high to diffract the phase front of the F region reflected wave. We claim that our findings can be generalized to other HF reflection techniques, independent of the ionosonde instrument or processing algorithm.