

Effects of storm-time electrodynamic phenomena on the nighttime F-layer height at the magnetic equator: Analysis of ionograms data

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Abstract

In this paper, we report on a comparative study of the observed changes in the nighttime-profile of the F-layer height during the main and recovery phases of the 10-19 march 1998 storm period and the quiet night of 8-9 march preceding that period. The disturbed nights i.e. 10-11 march and 16-17 march were selected from the time variation of the *Dst* magnetic index in the main and recovery phases, respectively. The F-layer height data were collected from the quarter-hourly ionograms of an IPS 42-type vertical sounder at Korhogo (Ivory Coast; 9°25 N; 5°73 W; +2°48 dip. lat) in the West African sector. A common feature is that both time profiles show a single pulse height, peaking at about 20:15 LT. However, while the time profile in the quiet night is quite similar to the well known ExB pulse, with altitude and thickness about 330 km and 100 km respectively, the time profiles of the nights in the main and recovery phases show amplified altitudes up to 450 km. In view to understand these tendencies, the time variations of the polar magnetic disturbances *DP* of the 10-11 march and 16-17 March nights were represented as a function of the latitude varying from polar to equatorial regions conjointly to that of the polar magnetic activity indices *AU* and *AL*. A clear magnetic disturbance was detected on the polar magnetic activity indices *AU* and *AL*, in the night 10-11 march of the storm main phase, and was found to move equatorward on the time profile of the polar magnetic disturbances *DP*, qualitatively explaining the ExB pulse reinforcement in this night. In contrast, the time profiles of the *AU* and *AL* indices and *DP* disturbances remained featureless in the night 16-17 march of the storm recovery phase. We discussed these trends in the light of the magnetospheric and ionospheric-disturbance dynamo theories.