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Relations Between The Equatorial Vertical Drifts, Electrojet, GPS-TEC And Scintillation During The 2008-09 Solar Minimum

Abstract:

Over an extensive period of time, tremendous amount of scientific effort has been committed to the forecasting of equatorial ionospheric scintillations. This study delineates the interrelationship between the equatorial vertical ExB drift, Equatorial Electrojet (EEJ) strength, Global Positioning System (GPS)-derived total electron content (TEC) and postsunset scintillation from ground observations with the aim of finding reliable indications of the occurrence of ionospheric irregularities. Data from ground based observations such as magnetometers, ionosondes, GPS receivers and Incoherent Scatter Radars in the low latitudes of the American longitude sector were examined during the 2008-09 solar minimum. The difference between horizontal components of the geomagnetic field (at and off by 6-90 to dip equator) from a pair of magnetometers is a measure of EEJ strengths and this can be used to estimate vertical drifts. Ionosondes and radars data are expected to give a much more accurate measure of the vertical drifts. The electric field controlling EEJ and ExB drifts might determine whether we have favorable condition for the development of postsunset equatorial plasma bubble (EPB) and scintillations or not. The data show a strong relationship between the electric field and GPS-derived TEC. This presentation will also discuss the relationship between daytime equatorial vertical ExB drift and postsunset ionospheric scintillation.