VHF Scintillation Activity in the Low Latitude F Region and Ionospheric Electrodynamics

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It is becoming increasingly important to study and characterize the quiet and disturbed equatorial ionospheric variations to manage trans-ionospheric propagation problems. The single most dominant factor responsible for many of these phenomena is the electrodynamics of the equatorial ionosphere.The Equatorial Electro Jet (EEJ) and the EXB electric field causing the well known Equatorial Ionization Anomaly (EIA) have been topics of special studies for several decades now. Another interesting feature is the reversal of the electrojet current on some days apparently due to the superposition of an additional semi-diurnal field on the normal EEJ field. The Sq current system with its focus around 35^0N latitude and its variability is still unclear.

During magnetic storms, the equatorial electric field is subjected to two types of intense disturbance manifestations. One is the prompt penetration of the magnetospheric electric field while the other is the disturbance dynamo field of ionospheric origin. To investigate how the changed electrodynamics affect ionospheric patameters, we have taken VHF scintillations as the key index and studied their occurrence and intensity for several storms using data recorded from a chain of stations from the equator to 21^0 N latitude along the 84^0E meridian. These results were confirmed by examining Lunping scintillation data for more than 50 storms. The results show that during magnetic storms reversal of the electric field from west ward to east ward should be a direct consequence of the coupling of the high latitude magnetospheric current system with the equatorial electric field. The observed suppression of nocturnal scintillation activity following the recovery phase should be due to lessened post sunset rise of h'F which is confirmed by the spread F pattern.