VHF radar studies of the daytime equatorial E and F region electrodynamics dynamics associated with Blanketing Es and Spread F occurrence

C. V. Devasia, Smitha V Thampi, Sudha Ravindran, Diwakar Tiwari [1], G. Manju and R Sridharan

Space Physics Laboratory, Vikram Sarabhai Space Centre, Trivandrum 695 022
[1]Indian Institute of Geomagnetism, Mumbai

The VHF radar at Trivandrum (8.5°N, 77°E, dip ~0.5°N) has been used extensively for the study of small-scale (2.7m) irregularities in the Equatorial Electrojet (EEJ) region. In the present study the VHF radar observations for June-July 2000 and January-March 2001 are compared to bring out the nature of electrodynamical conditions in the equatorial E region preceding the occurrence of E and F region irregularities like blanketing Es (Esb) and Spread F. In June-July months, the afternoon VHF radar echoes are seen to be present at comparatively lower altitudes of the EEJ, indicating the presence of irregularities that are confined to the lower altitude region of the electrojet where the neutral wind effects have a significant role. These prevailing conditions are found to be associated with the subsequent appearance of Esb layers and are in general accompanied by the counter electrojet (CEJ) phenomena. Also, in June-July season the afternoon CEJ occurrence is seen to inhibit/delay the formation of ESF. Unlike this, in January-February months, the afternoon VHF radar echoes are seen to be confined more towards higher altitudes of EEJ where the electrodynamical effects are dominantly significant. These conditions are seen to be favourable for the strong, early development of ESF irregularities. Using the ground based magnetometer and ionosonde observations along with the VHF radar data, the different electrodynamical conditions prevailing in these two seasons leading to the phenomena of Esb and ESF are studied, and few interesting cases are presented.