



HF Radar Investigations of Equatorial Ionosphere – Results from Thumba

Tarun Kumar Pant⁽¹⁾ and Lalitha G Krishnan^(1,2)

(1) Space Physics Laboratory, Vikram Sarabhai Space Centre, Thiruvananthapuram-695022, India
e-mail: lalithag28@gmail.com; tarun_kumar@vssc.gov.in

(2) Department of Physics, University of Kerala, Thiruvananthapuram- 695583, India

Electric Field is an important parameter that controls many plasma processes in the Thermosphere Ionosphere. Therefore it is important to quantify the ionospheric dynamo region electric field and understand its day to day changes or changes in response to varying space weather. The Radar measurements of the ionospheric irregularities are used to estimate/infer the E region zonal electric fields [1]. The Doppler shifts obtained from the backscattered radar echoes are indicative of not only the ionospheric plasma irregularity drift velocity, but only the prevailing electric field. However, it must be kept in mind that the drift velocity is dependent on various other parameters such as the magnetic field, neutral density, temperature and wind. Hence with continuous radar observations, the variability in the electric field in response to various external forcing can be understood.

In this context, an 18MHz HF radar located at Thumba (8.5°N, 77°E, dip= 0.5°N) is being used to probe the plasma irregularities of 8.3m scale size and infer the E region dynamo electric field on a daily basis. The estimated variations in the electric field/drift are being supplemented by the ground magnetic field and Ionosonde measurements at Thumba. The irregularity drifts thus measured clearly elude to a significant variability in electric field during both, geomagnetically quiet and disturbed periods. These results and their implications will be presented and discussed in detail.

1. Reddy, C. A., B. T. Vikramkumar, and K. S. Viswanathan (1987), Electric fields and currents in the equatorial electrojet deduced from VHF radar observations – I. A method of estimating electric fields, J. Atmos. Terr. Phys., 49, 183-191.