

The role of different electrodynamical conditions in the E and F regions of the ionosphere for the generation of ESF: A study using radio beacon measurements

Smitha V Thampi, Sudha Ravindran, C V Devasia, Tarun K Pant, P Sreelatha, G. Manju and R Sridharan

Space Physics Laboratory, Vikram Sarabhai Space Centre, Trivandrum 695 022

The EIA and ESF are some of the most persistent manifestations of ionosphere-thermosphere coupling at equatorial latitudes. Though these phenomena have been investigated for more than three decades, some of the intricacies of generation of ESF irregularities and its dependence on the strength and position of EIA crest are still to be understood. The Coherent Radio Beacon receivers (CRABEX receivers) which are being operational at a network of five stations covering the region from Trivandrum (8.5°N , dip $\sim 0.5^{\circ}\text{N}$) to Bhopal (23.2°N , Dip $\sim 15^{\circ}\text{N}$) is set up along the $77-78^{\circ}\text{E}$ longitudes, basically receive the 150 and 400 MHz beacon transmissions from the Low Earth Orbiting Satellites (LEOs). These ground-based receivers measure the relative phase of 150 MHz with respect to 400 MHz, which is proportional to the relative slant Total Electron Content (TEC) along the line of sight of the satellite to the ground at each receiving station. The relative slant TECs are converted to the latitudinal profiles of the absolute TECs. These for different local times give an idea of the various features associated with the development of EIA, like its crest location, and crest to trough ratios in a given season and solar epoch. These features have a definite bearing on the subsequent onset and sustenance of ESF. Also, the electrojet strength, which is an indicator of the development of EIA can be estimated using the ground based magnetometer data. Thermospheric meridional winds, which have a role in the triggering of ESF are calculated using the ionosondes at Trivandrum and SHAR. All these parameters are used to characterize the evening time behaviour of the equatorial and low latitude ionosphere before the initiation of ESF. A case study is presented to establish the role of different electrodynamical conditions in the afternoon E and F regions of the ionosphere for the generation of ESF.