Study of Ionospheric F3 Layer Properties Over Equatorial Station Tirunelvelli during Low Solar Activity

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In the present study we try to summarize the features and properties of the F3 layer observed over the equatorial station Tirunelvelli (77.8° E, 8.7° N, dip lat. 0.7° N). For this study, ionosonde (CADI) data for the year 2007 and 2008 has been used. The F-region $\vec{E} \times \vec{B}$ drift gives rise to the plasma fountain and the anomaly which should have been symmetric with respect to the magnetic equator if Earth's magnetic field is considered as a central dipole. But the meridional neutral wind causes asymmetries into the plasma fountain. It is the upward $\vec{E} \times \vec{B}$ drift which produces a vertically upward plasma velocity at altitude near and above the F2 peak, causing the morning F2 peak to drift upward and the F3 layer is produced as a distinct entity. At the same time normal F2 layer develops at lower altitudes through the usual photochemical and dynamical processes of the equatorial region. In most of the cases, the F3 layer is found to occur between 8:30Hrs to 11:30 Hrs. But in some cases, it has also been observed in the afternoon hours. The F3 layer has been observed far more frequently in summer months than winter ones. It doesn't show any clear dependence on magnetic activity but is more likely to occur on magnetically quite days. An attempt has been made to investigate the dependence of the F3 layer on equatorial electrojet. It was found that in most of the cases, the F3 layer occurs around a time when the equatorial electrojet (EEJ) strength attains its peak value ,mostly during morning hours and in some cases, it is seen that when the peak of the EEJ strength shifts towards afternoon, so does the F3 layer.