An evolution and dynamics of Equatorial Spread-F irregularities: A Multitechnique investigation

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We present a case study to understand more comprehensively an evolution and dynamics of ESF irregularities using multi technique observations from Indian equatorial and low latitudes. The ionosonde observations located at equatorial station Trivandrum (8.5^0N, 76.6^0E, magnetic latitude 0.5^0N) shows the conditions necessary for ESF irregularity generation. Indian MST radar located at low latitude station Gadanki (13.5^0N, 79.2^0E, magnetic latitude 5.5^0N) start showing striated or elongated blob like multiple plumes of irregularities between 1955 and 2600 IST just after ~10 min of onset at Trivandrum. The spectral width and Doppler velocity information distinguishes various phases of irregularity development: for example initial phase, decay phase etc. The GPS TEC observations from Gadanki show periodic multiple depletion and scintillation in PRN 20 between 2100 and 2300 IST which can be associated with the periodic multiple plumes on radar power map. The weak scintillation in PRN 23 between 2215 IST and 2315 IST reveals that the Fresnel scale size irregularities are in decay phase. The absence of scintillation in PRN 23 after 2300 IST may correspond to the initial phase of ESF irregularities, as observed in spectral width values, which yet not developed to Fresnel scale sizes. Due to the low solar activity period the scintillation index S4 always remains low in present study.