MAGNETIC ACTIVITY LINKED GENERATION OF NIGHTTIME EQUATORIAL SPREAD F IRREGULARITIES

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Abstract:

Spaced receiver scintillation data recorded at a dip equatorial station, Tirunelveli (dip 0.40) for a 251 MHz radio signal transmitted from the geostationary satellite UFO2, is used in a statistical study of the generation of nighttime equatorial spread F (ESF) irregularities as a result of magnetic activity. For this it is essential to establish whether the observed scintillations are caused by freshly generated irregularities or by irregularities generated earlier, which later drift onto the signal path. This is achieved by making use of the de-correlation between the signals recorded by two spaced receivers with a baseline closely aligned with the magnetic east-west. It has been observed in the past that the maximum cross-correlation between the two signals is significantly less than 1 during the initial phase of development of ESF irregularities. This feature is used to identify freshly generated ESF irregularities from the scintillation data. It is found that apart from the occurrence of freshly generated irregularities immediately after sunset due to growth of the Rayleigh-Taylor instability on the bottomside of the equatorial F region for which the basic condition always exists during post-sunset hours even during magnetically quiet periods, there is significant occurrence of fresh irregularities during postmidnight hours of autumnal equinoxes, as a result of magnetic activity.