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Association of sporadic E –layer (Es-layer) with daytime VHF scintillations at Waltair, a low latitude station in the Indian sector during half a solar cycle

Abstract:
Though the occurrence of ionospheric scintillations is mostly confined to the local nighttime epochs at equatorial and low latitude stations, the occurrence of daytime scintillation is a typical feature, especially during summer months of low sunspot years. The VHF amplitude scintillations were recorded at Waltair (17. 70 N, 83.30 E, dip 160 N), a typical low latitude station in the Indian sector, located in the transition region between the equatorial trough and anomaly crest, using 244 MHz beacon signals from the geostationary satellite, FLEETSAT (75°E), while the presence of sporadic E-layer (Es-layer) was recorded by using a co-located ionosonde radar. In general, very weak daytime scintillations are observed at Waltair during half a solar cycle period (1997 – 2003), which are associated with the presence of Es-layers. The occurrence of daytime scintillations at low latitudes is more during summer months followed by winter and equinoctial months.The presence of daytime scintillations is associated with the occurrence of both q-type (foEs) and blanketing type (fbEs) sporadic-E, contrary to the results reported from the equatorial stations. Another interesting feature is that the occurrence of daytime scintillation is associated with the sporadic-E layer with critical frequencies of both foEs and fbEs ≥ 4MHz, indicating the presence of intense ionization patches in Es-layers. The daytime scintillation patch durations extend from short durations of 15 minutes to as long as of about 1 hour during the present period of observation. It seems from these observations that the plausible physical mechanisms responsible for the association between Es-layers and daytime scintillations are still intriguing phenomena, particularly at low latitudes.