

Simultaneous radar and spaced receiver VHF scintillation observations for different types of ESF structures over Indian region

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Abstract:

In this paper, we present some case studies of simultaneous observations of ionospheric plasma irregularities as obtained by VHF radar at Gadanki along with spaced receiver VHF scintillations recorded at Gadanki, a low latitude station over India to characterize the scintillations under different types of radar echoes. GPS observations of TEC/L-band scintillations and CADI ionosonde over Tirunelveli, an equatorial station, are also being used to study the association of different scale size irregularities, their loss of lock signal and their relation to equatorial Pre Reversal Enhancement (PRE) of the vertical drift. It may also be noted that while scale size of the ionospheric irregularities responsible for the generation of VHF scintillations is about 1 km, it is 400m for L-band scintillations. It may be mentioned that using spaced receiver scintillations, we may be able to obtain information about zonal drift, turbulence parameter and maximum cross-correlation index which is used to identify the 'age' of the plasma bubble. In addition, wavelet/cross-wavelet analysis and power spectral characteristics of the spaced receiver scintillation observations are investigated for different types of radar echoes to understand the evolution of these irregularities at different scale sizes, their correlation to radar echoes and 'age' of the plasma bubbles. These results along with some more analysis shall be presented and discussed in detail in this paper.