The International Beacon Satellite Symposium *BSS2010*
P. Doherty, M. Hernández-Pajares, J.M. Juan, J. Sanz and A. Aragon-Angel (Eds)
Campus Nord UPC, Barcelona, 2010

EFFECT OF MAGNETIC ACTIVITY ON THE CHARACTERISTICS OF INTERMEDIATE SCALE ESF IRREGULARITIES

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Key words: Equatorial Spread F irregularities, scintillations, magnetic activity.

Abstract.

There have been numerous studies of the effect of magnetospheric forcing on the occurrence of irregularities, and in particular scintillation-producing irregularities, in the night time equatorial F region of the ionosphere. A background ionospheric parameter that has been found to play a key role in the occurrence of these irregularities, known by their generic name: equatorial spread F (ESF), is the height of the night time F layer in the equatorial ionosphere. This height is influenced by the zonal electric field in the night time equatorial ionosphere and it is well known that magnetic activity can alter this zonal electric field. Spatial structures associated with ESF span a large range of scale sizes, out of which the intermediate scale length (100m few km) irregularities are generated due to the growth of the Generalized Rayleigh Taylor (GRT) instability on the bottom-side of the nighttime equatorial F region and its subsequent non-linear development. These irregularities are involved in scattering trans-ionospheric radio waves in the VHF to GHz frequency range and thus give rise to scintillations on such radio signals. The latitudinal extent of scintillations caused by the intermediate scale irregularities depends on both the height of the background equatorial F layer and the perturbation electric field associated with the GRT instability which carries the irregularities to greater heights above the dip equator so that they can be mapped down to higher latitudes. The interplay of both these factors in the equatorial ionosphere under magnetically disturbed conditions is studied using ionospheric scintillation and other observations.