The Equatorial Scintillations and Space Weather Effects on its Generation of during Geomagnetic Storms

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Great diversity of the ionospheric phenomena leads to a variety of irregularity types with spatial size from many thousands of kilometers to few centimeters and lifetimes from days to fractions of second. Since the ionosphere strongly influences the propagation of radio waves, signal distortions caused by these irregularities affect short-wave transmissions on Earth, transionospheric satellite communications and navigation. In this work the solar wind and the equatorial ionosphere parameters, Kp, Dst, AU, AL indices characterized contribution of different magnetospheric and ionospheric currents to the H-component of geomagnetic field are examined to test the space weather effect on the generation of ionospheric irregularities producing VLF scintillations. According to the results of the current statistical studies, one can predict scintillations from Aarons' criteria using the Dst index, which mainly depicts the magnetospheric ring current field. To amplify Aarons' criteria or to propose new criteria for predicting scintillation characteristics is the question. In the present phase of the experimental investigations of electron density irregularities in the ionosphere new ways are opened up because observations in the interaction between the solar wind - magnetosphere - ionosphere during magnetic storms have progressed greatly. According to present view, the intensity of the electric fields and currents at the polar regions, as well as the magnetospheric ring current intensity, are strongly dependent on the variations of the interplanetary magnetic field. The magnetospheric ring current cannot directly penetrate the equatorial ionosphere and because of this difficulties emerge in explaining its relation to scintillation activity. On the other hand, the equatorial scintillations can be observed in the absence of the magnetospheric ring current. It is shown that the factor, which presents during magnetic storms to fully inhibit scintillation, is the positive Bz-component of the IMF. During the positive Bz IMF F layer cannot rise altitude where scintillations are formed. The auroral indices and Kp do better for the prediction of the ionospheric scintillations at the equator. The interplanetary magnetic field data and models can be used to explain the relationship between the equatorial ionospheric parameters, h'F, foF2, and the equatorial geomagnetic variations with the polar ionosphere currents and the solar wind. Taking into account the time delay between the solar wind and the ionosphere phenomena, the relationship between the solar wind and the ionosphere parameters can be used for predicting of scintillations.