

THE SOLAR WIND ORIGIN OF THE EQUATORIAL IONOSPHERE PARAMETERS VARIATION DURING GEOMAGNETIC STORMS

L. BIKTASH¹ AND T. MARUYAMA²

1: Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation of Russian Acad. Sciences (IZMIRAN), Troitsk, Moscow region, 142190, Russia, e-mail: lsizova@izmiran.rssi.ru

2: National Institute of Information and Communications Technology (NICT), 4-2-1, Nukui-Kitamichi, Kogane, Tokyo 184-8795, Japan, e-mail: tmaru@nict.go.jp

The interplanetary magnetic field, geomagnetic variations, virtual ionosphere height $h'F$ and the critical frequency $foF2$ data during the geomagnetic storms are studied to demonstrate relationships between these phenomena. We study 5-min ionospheric variations using the first Western Pacific Ionosphere Campaign (1998 - 1999) observations, 5-min interplanetary magnetic field (IMF) and 5-min auroral electrojets data during a moderate geomagnetic storm. The ionospheric 5-min variations at the equatorial stations which allow calculating in detail time delays of the auroral and equatorial ionospheric phenomena are scantily known. These data allowed us to demonstrate that the auroral and the equatorial ionospheric phenomena are developed practically simultaneously. Hourly average of the ionospheric $foF2$ and $h'F$ variations at near equatorial stations during a similar storm show the same behavior. We suppose this is due to interaction between electric fields of the auroral and the equatorial ionosphere during geomagnetic storms. It is shown that the low-latitude ionosphere dynamics during these moderate storms was defined by the southward direction of the B_z -component of the interplanetary magnetic field. A southward IMF produces the Region 1 and Region 2 the field-aligned currents (FAC) and polar electrojet current systems. We assume that the short-term ionospheric variations during geomagnetic storms can be explained mainly by the electric field of the FAC. The electric fields of the field-aligned currents can penetrate throughout the mid-latitude ionosphere to the equator and may serve as a coupling agent between the auroral and the equatorial ionosphere. The storm wind driven electric fields which responsible for the larger amplitudes and longer lifetimes of the drift perturbations are discussed. It is shown that model simulations as disturbed ionospheric wind dynamo do not allow explaining a significant part of the experimental data. Additional investigations of the ionospheric characteristics are required to clear up the origin of the short-term equatorial ionospheric variations.

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Lilia Biktash, 142190, Moscow Region, IZMIRAN, Russia