The equatorial ionosphere dynamics during 10 March 1998 magnetic storm

L.Z. Sizova[1], T. Maruyama[2], K. Nozaki[3]

[1] *Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, 142190 Troitsk, Moscow Region, Russia, e-mail: lsizova@izmiran.rssi.ru*
[2] *Hiraiso Solar Terrestrial Research Center, Ibaraki 311-1202, Japan, e-mail: tmaru@crl.go.jp*
[3] *Communication Research Laboratory, Antarctic Center, 4-2-1, Nukui-Kitamachi, Koganei, Tokyo184-8795, Japan, e-mail: nozaki@crl.go.jp*

Variations of the equatorial ionosphere height and critical frequency foF2 for Cebu Island (124 deg. E, 10.3 deg N; 2.4 in diplatitude) and Manila (121 deg. E, 14.6 deg. N, 7.3 deg. N in diplatitude) are compared with interplanetary magnetic field data. The ground-based measurements of the critical frequency foF2 Jicamarca are used for study of longitudinal variations during of 10 March 1998 magnetic storm. The subsequently main phase decrease of Dst to –107 nT was generated by the 3 hour's negative IMF Bz=-18nT. Situation in the polar cusp was determined by 6 hour's negative IMF By = - 20 nT. The critical frequency foF2 decrease in the same way at Cebu Island and Jicamarca from 15.45 UT up to 19 UT but the values of decreases are significantly different at two stations. At Cebu Island (the night sector) the foF2 drops from 8 MHz to 2 MHz. In the day sector at Jicamarca the critical frequency drops from 11.5 MHZ to 9 MHz. These changes were accompanied by a rise of heights of the F-region. It is shown that changes in the ionospheric height at two stations (Cebu and Manila) depend from direction of the Bz IMF. The heights at two stations vary almost identical during northward IMF Bz (quiet period on March 7, 1998) and vary a fairly different way during reorientations of the IMF (disturbance periods on 9 and 12 March 1998). The distinctions between quiet and disturbance periods in heights can reach up to 50-100 km. It can be shown that this effect is the result of direct penetration of electric field from the field-aligned currents (FAC), which connected with DP systems, to equatorial ionosphere. This additional electric field of the FAC carries ions away from the equatorial F2 layer and consequently we observe maximum F2 layer at great heights. Differences between behaviour of heights at the two stations during southward IMF Bz are attributable to location of the electrojet that can be formed by the FAC electric field.