Comparison of the EIA, EETA and ETWA, received in the model GSM TIP, at the self-consistent approach and with use of the model MSIS-90

M.V. Klimenko (1), V.V. Klimenko (2), V.V. Bryukhanov (1)

(1) Kaliningrad State Technical University, Russia, (2) WD IZMIRAN, Kaliningrad, Russia

(pcizmiran@gazinter.net / Phone: 7-4112-215606)

On the basis of the Global Self-consistent model of the thermosphere, ionosphere and protonosphere (GSM TIP), developed in WD IZMIRAN, the calculations for the quiet geomagnetic conditions of the equinox in the minimum of solar activity are carried out. In the calculations the new block of the computation of electric fields in the ionosphere, briefly described in COSPAR2006-A-00108, was used. Two variants of calculations are executed with the account only the dynamo field generated by the thermosphere winds - completely self-consistent and with use of the model MSIS-90 for the calculation of the composition and temperature of the neutral atmosphere. The results of the calculations are compared among themselves.

The global distributions of the foF2, the latitude behavior of the N_e and T_e on the near-midnight meridian at two height levels 233 and 626 km, the latitude-altitude sections on the near-midnight meridian of the T_e and time developments on UT of zonal component of the thermosphere wind and ion temperature at height $\sim$300 km and foF2 and h_mF2 for three longitudinal chains of stations - Brazil, Pacific and Indian in a vicinity of geomagnetic equator (COSPAR2006-A-00109) calculated in two variants are submitted.

It is shown, that at the self-consistent approach the maxima of the crests of the equatorial ionization anomaly (EIA) in the foF2 are shifted concerning calculated with the MSIS aside later evening hours.

The equatorial electron temperature anomaly (EETA) is formed in both variants of calculations. However, at the presence of the EETA itself the latitude behavior of the T_e at height 626 km completely opposite – in the calculations with the MSIS the lowering of the T_e to the equator takes place, and in the self-consistent calculations in a strip of geomagnetic latitudes -35 $^\circ$ - 35 $^\circ$ the growth of the T_e to the equator takes place except for a narrow strip of latitudes -10 $^\circ$ - 10 $^\circ$ where there is the lowering of the T_e. This behavior is provided an explanation by the distinction of the latitude-altitude distribution of the T_e on the near-midnight meridian in two variants of calculations.

In the calculation results of three longitudinal chains of stations also there are qualitative distinctions between two variants of calculations because of distinction of the

neutral atmosphere parameters however in both cases the equatorial temperature and wind anomaly (ETWA) is reproduced.

The most essential difference consists that in the self-consistent calculations day time values of the foF2 in two times are lower, than in the calculations with the MSIS. It speaks that the calculated in the self-consistent manner thermosphere "is heavier" of the MSIS, that is [O] / [N2] in it is less, than in the MSIS hence the loss of ions O^+ in reaction with molecules N_2 is much more.