Investigation of the magnetosphere convection influence on equatorial electrojet and electric field on geomagnetic equator under self-consistent approach to modeling on the basis of the GSM TIP

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In the given work the results of the self-consistent calculations executed on the basis of GSM TIP, developed in WD IZMIRAN, are submitted. In COSPAR2006-A-00108 the results of the similar researches executed on the same model, but with use the model MSIS for calculation of the composition and temperature of the neutral atmosphere are submitted. The new block of the calculation of electric fields in the ionosphere is included to the model, briefly described in the same work. The calculations were carried out with the account only the dynamo field or its superposition with a field of magnetosphere convection, calculated under the given field aligned currents of the first zone or a potential difference through polar caps without taking into account and in view of the shielding due to the field aligned currents of the second zone. The calculations are executed for the quiet geomagnetic conditions in the equinox in the minimum of the solar activity.

The calculated global distributions of the potential and vector of an electric field, the linear density of a zonal current, the thermosphere circulation on the heights 300 and 120 km, foF2 and TEC are submitted. The comparison of the calculated behavior on UT of zonal component of the electric field, foF2 and hmF2 at the station Jicamarca for the dynamo field and its superposition with a field of the magnetosphere convection without and with shielding is carried out. The vertical profiles of N_e, calculated under the different electric fields for the separate moments UT are submitted.

It is shown that a field of the magnetosphere convection, as well as at the calculations with the model MSIS, in absence of the shielding will penetrate to the equator, strengthening fields and currents at low latitudes. The shielding weakens the action of the magnetosphere convection. At the same time the main role at geomagnetic equator plays the dynamo field. The equatorial electrojet, received in the self- consistent calculations, considerably exceeds in value received with use of the model MSIS. This is explained, apparently, adverse for generation of the equatorial electrojet vertical structure of the wind nearby the equator, which gives the model MSIS.

As shown in COSPAR2006-A-00108, the dynamo field, calculated with use the model

MSIS, is capable to result in stratification of the equatorial F2-layer and formation of the F3-layer. At the same time the dynamo field received in the self-consistent calculations, does not result in stratification. This is explained that in the calculations which results are submitted in the given work, were not used the thermosphere tides therefore the amplitude of zonal components of the electric field at the equator, responsible for stratifications, appears insufficient. However, the superposition of the fields of the dynamo and magnetosphere convection in absence of the shielding results in stratification of the equatorial F2-layer. The account of the shielding results in the disappearance of the F3-layer. From here the important conclusion that on the initial phase of the substorm development when the growth of the currents of the first zone or a potential difference through polar caps outstrips the growth of the currents of the second zone, the probability of the stratification occurrence at the equator so also the F3-layer, grows follows. As to the G-layer received in calculations with MSIS which is formed by ions H^+ at heights $\sim$1000 km due to the meridional component of the thermosphere wind at the separate moments of the time it is reproduced and in the self-consistent calculations that speaks that this layer is not the feature connected with use of the model MSIS.