MODELLING OF THE GLOBAL IONOSPHERE BEHAVIOUR DURING MAJOR MAGNETIC STORMS USING THE NUMERICAL UPPER ATMOSPHERE MODEL

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The global numerical models are used as a powerful tool for investigation and prediction of the upper atmosphere behaviour under different geomagnetic conditions. We have investigated the ionospheric variations during major magnetic storms using the global numerical Upper Atmosphere Model (UAM). The UAM calculates self-consistently the time-dependent global distributions of the densities and temperatures of the neutral and charged components of the upper atmosphere, the thermosphere wind and ion drift velocities and the electric fields. The investigations with using the data of the seven incoherent scatter radars have showed that the UAM reproduces the main features of the ionospheric behaviour during both quiet and disturbed geomagnetic conditions. According to the results of the numerical experiments the neutral composition influences the global ionosphere behaviour most substantially. The vibrationally excited molecular nitrogen also plays important role during high solar activity and disturbed geomagnetic conditions. The energetic particles precipitation causes the significant high-latitude ionosphere variations not only in the E region, but also in the F region. The thermospheric winds play the important role for the middle-latitude electron density. The field-aligned currents particularly the amplitude and location of the second zone currents determine the night-time subauroral electron density values to a great extent.

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