Numerical modeling of the coupled thermosphere, ionosphere and plasmasphere dynamics for the April 3-4, 1979 geomagnetic storm

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The method of mathematical modeling has been applied to investigate coupled physical processes in the thermosphere, ionospheric F2-region and plasmasphere at the high solar and geomagnetic activity near the spring equinox. The modeling was performed using the self-consistent global model of the upper atmosphere of the Earth, which takes into account the electrodynamic phenomena. Besides, the locations of the auroral precipitation and field-aligned current regions were set as functions of the geomagnetic activity. A numerical experiment was carried out to divide the effects of an electrical field penetration to mid and low latitudes and those of changes in the thermospheric gas composition. It has been shown, that the changes of the thermospheric gas composition during magnetic storm can detain restoring the plasmasphere back to the quiet level during the recovery phase of the geomagnetic storm.

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