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Model study of the FAC2 influence on the night-time F2-layer electron density variations in subauroral latitudes

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The Millstone Hill incoherent scatter radar observations demonstrated the electron density enhancement during the night hours under quiet geomagnetic conditions of April 15-16, 2002. The global Upper Atmosphere Model (UAM) was used for interpretation of this unusual behaviour of the night-time F2-layer electron density over Millstone Hill. 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 magnetospheric block included in the UAM allows to model the magnetospheric plasma sheet dynamics and to calculate the FAC2 distribution. The numerical experiments without the magnetospheric block have showed that the mechanism of the observed electron density enhancement is related to the zonal plasma drift caused by the convection electric field which is determined in subauroral latitudes by the FAC2 variations. We have continued the numerical experiments using the UAM with the magnetospheric block and have proved that the variations of the FAC2 intensity and location have caused the converging zonal plasma flow increasing the night-time electron density over Millstone Hill on April 15-16, 2002.