

Global scale modelling of ground geoelectric field using realistic models of magnetospheric and ionospheric current systems and realistic 3-D conductivity model of Earth

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We present a numerical scheme for modeling the effect of space weather on ground geoelectric field. The scheme exploits realistic three-dimensional (3-D) distribution of Earth's electrical conductivity and realistic representation of magnetospheric and ionospheric current systems. The scheme involves three steps: 1) Using a magnetohydrodynamic model of the magnetosphere coupled to an electrostatic model of the ionosphere, we compute the spatio-temporal distribution of external magnetic field on a regular grid at the surface of the Earth; 2) From these data we compute the source in the form of equivalent currents flowing in a thin shell above the Earth; 3) For a given source from step 2 and given 3-D conductivity model of the Earth we compute ground geoelectric and geomagnetic fields. We apply the scheme to compute the fields during parts of the Halloween storm (2003-10-29/30) and discuss the results.