Geophysical Research Abstracts
Vol. 15, EGU2013-8625-1, 2013
EGU General Assembly 2013

Identification of electricity generators in the global atmospheric circuit from the ground-level electric field at high and mid-latitudes

Marek Kubicki (1), Anna Odzimek (1), Mark Lester (2), Adrian Grocott (2), and Mariusz Neska (3)

(1) Institute of Geophysics Polish Academy of Sciences, Department of Atmospheric Physics, Warsaw, Poland (swider@igf.edu.pl), (2) University of Leicester, Department of Physics and Astronomy, Leicester, U.K., (3) Institute of Geophysics Polish Academy of Sciences, Department of Magnetism, Warsaw, Poland

The main electric generators in the Earth's global atmospheric circuit (GEC) manifest themselves differently at different latitudes. The magnetospheric generator and its current system is coupled to the currents in the lower atmosphere which are generated by electrified clouds located mainly at low and middle latitudes, and the magnetospheric effects are significant in polar regions. We investigate the GEC signal in the ground-level DC electric field measured simultaneously at two distant locations: Hornsund in Arctic (77.00 N, 15.55 E) and Swider at mid-latitudes (52.12 N, 21.24 E). Diurnal variations of the fair-weather geoelectric field from Hornsund and Swider, on selected days with low aerosol concentration, are considered, in order to separate the GEC signals due to the main generators on individual days. In one method we subtract from the Hornsund data the effects of the magnetospheric influences using SuperDARN (SuperDual Auroral Radar Network) ionospheric electric potential data. In the second method we use the Swider data as representing the signal due to the lower atmosphere cloud generator and subtract it from the Hornsund data. We analyse the diurnal variation of the separated signals and correlations between them. The magnetospheric effects on ground-level electric field on some days can be greater than on average which indicates occurrences of stronger electrical coupling between the magnetosphere and lower atmosphere.
This work is supported by Polish National Science Center (NCN), grant number UMO-2011/01/B/ST10/07118.