Evidence for Diurnal and Seasonal Variations of the Local/Regional Convective Generators

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On the base of the continuous measurements of the aeroelectric field and current density at Borok Geophysical Observatory (58°04'N; 38°14'E, Yaroslavl Region, Russia) for 1998-2012 the effects of the local electric generators are studied. The electric field was measured by the electrostatic fluxmeters ("field mills"). Vertical component of the electric current density was measured by the unique current collector, which represents the open ring antenna with a diameter of about 300 meters and effective height of 4 meters. As follows from the measurements of the fair-weather electric field, the annual and diurnal averaged variations of the field show a number of specific features. Namely, as compared to the Carnegie curve, the diurnal profile of the electric field has a well-recognized additional maximum at about 09:00 UTC. The annual profile of the electric field is also substantially disturbed in spring and summer months as compared to the reference curve [1] and has a maximum in April and May. It was assumed that the above deviations of the averaged profiles of the electric field are caused by the local and regional generators of the atmospheric electricity. Since Borok is placed near the large artificial lake, the diurnal deviation in the spring and summer months can be due to action of the convective generator located over the lake and near the lake cost. The annual spring deviation of the averaged field profile can be due to snow melting process. Based on the measurements of the electric field and atmospheric conductivity near the ground, the basic parameters of the above convective generators are estimated. To estimate the contribution of the local/regional convective generators to the global circuit an approach recently suggested in [2] is adopted. It is noted that the net contribution of the local/regional convective generators to the global electric circuit could be pronounced.

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