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Simultaneous Measurements of Atmospheric Electric Field near Elbrus in Fair Weather

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Atmospheric Electric field variations are an appropriate indicator of local weather phenomena electrification and global electric circuit processes. The temporal variations of electric field based on experimental data, measured at Baksan gorge and high-mountains stations near Elbrus in the period of June 2012 - September 2013.
The experimental stations are located in the natural preserve zone, characterized by low aerosol emissions and low quantity of ionizing radiation sources. Such perfect conditions allow to identify the diurnal variations of the electric field in fair weather, caused by unitary variation of the potential gradient.
The station near Kyzburun village is situated 40 km on the west from Nalchik city at 600 m above sea level (43º40'N, 43º27'E). The alpine stations "Peak Cheget" and "Peak Terskol" are situated at 3040 m and 3003 m above sea level respectively (43º16'N, 42º30'E). The distance between mountain stations is about 3 km. The Kyzburun station is located 70 km on the east along the Baksan canyon.
The EFM 550 Vaisala devices were used for uninterrupted electric field registration at three experimental stations. Measuring sensors were installed on the buildings' roofs at 3 m height. The Vaisala weather stations were applied for automatic 10-minutes registrations of the meteorological data on each stations. Meteorological parameters have been also measured using traditional methods simultaneously.
The electric field diurnal variation during summer is characterized by significant evening maximum (16-19) UT and morning minimum (09-12) UT for all stations. The extra morning maximum at (05-07) UT was observed as a peculiarity of diurnal electric field data, received at Kyzburun, during summer and winter seasons. The correlation between diurnal variation of data, received at high-mountains stations and Carnegie curve, is rather high.
Correlation between electric field, measured at high-altitude stations (Peak Cheget, Peak Terskol) and plain conditions (Kyzburun),were received. The correlation coefficients were sufficiently high (0,67 – 0,86). The average electric field values were at Peak Cheget - 640 V/m, Peak Terskol - 520V/m and Kyzburun - 230 V/m.
It is mentioned that diurnal variations of the surface layer electric field are characterized by two maximums, observed at plain and mountain stations during summer season (July, August, September). Electric field diurnal data has global component (consistent to Carnegie curve), overlaid with local convective current generator. Thus alpine measurements stations could be recommended for atmospheric condition monitoring at global and local levels.