



Characteristics of Thunderstorm Activity and Parameters of Lightning in the South of Russia

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The instrumental research of the thunderstorm activity and measurements of lightning parameters were undertaken in the southwestern Russian Federation. The features of spatial-temporal variations of thunderstorms, the hail activity and lightning parameters were stated within the territory of 650000 km² around the thunderstorm and the lightning detection center of High-Mountain Geophysical Institute in Nalchik (the Kabardino-Balkaria Republic). This area covers the North Caucasus and the Black Sea coast.

The joint results of instrument monitoring provided with the lightning sensor LS8000 (Vaisala), the meteorological radiolocator (MRL-5, DMRL-S), the electric field mills EFM-550 (Vaisala) were analyzed.

Observed thunderstorm characteristics within the period of 2008–2014 years show that the total thunderstorm activity of the monitored area is 120 days per year. The dynamics of the seasonal thunderstorm activity is characterized by maximum during summer period up to 22 days in June and minimum of 2–3 days in December. The following ratios between numbers of intracloud (IC), cloud-to-ground (CG), cloud-to-ground positive (CG+) and negative (CG-) values are typical for all observed years. Ratio of CG and IC in the total discharge quantity is 12% to 88%. Ratio of CG+ and CG- in the total quantity of CG lightning is 23% to 77%.

Statistical current values of the CG channel for positive ones are: the weakest observed impulse of the measured current is +2,1 kA, the strongest impulse is +311 kA. The average value of the current is equal to +10,6 kA. The median value is +7,6 kA.

The negative CG lightnings are characterized by the weakest impulse of the measured current of -2,1 kA. The strongest impulse is -326 kA. The average value of the current is equal to -13,5 kA. The median value is -9,8 kA.

The specific affection of the observed area of the thunderstorm detection is within the diapason of 0 to 22 lightning discharges per square km per year. The intensity of lightning strikes across the whole observed area is up to 210 strikes per minute for the CG lightning, for the IC – up to 1650 strikes per minute, the greatest lightning activity up to 100 times/min occurs during the formation and the precipitation of hail.

The areas within the radius of 10 km around the EFM550 installation point were selected for joint research of the lightning sensor LS8000 and the electric field mill EFM550 data. The results of the research allowed to find the critical electric field values at which the discharge phenomenon in the cloud is achieved.