Spaced observations of lightning discharges over a wide frequency range

Intended for the Lightning Occurrence Relative to Meteorology Topic

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The current state of the lightning detection in Russia, despite the long history of development, is difficult to be considered satisfactory. World experience shows that even in countries with several competing lightning detection networks created, there are developed special systems to address specific issues related to both the physics of lightning discharge and the climatic and geophysical characteristics of thunderstorm activity. Such research areas require the study of the radio emission of thunderstorms over a wide range of temporal and spatial scales.

The presentation will discuss the results of our studies of the regional storm activity, in particular the spatial characteristics of thunderstorms passing through the region in order to develop the revised criteria for interconnection of electrical and meteorological phenomena.

For the most intense storms the spatial distribution of lightning discharges was investigated by the developed software and the use of multipoint locating system. The latter was created on the basis of industrial lightning detector Boltek Stormtracker in addition to the VLF device for receiving and positioning, developed at the IAP RAS. VLF receiver is central to the use of the developed method of thunderstorm hours. One can fix the radio emission of regional storms with high temporal resolution and at given intervals of time (1 hour). The resulting records of VLF radio emission under thunderstorm conditions allow us to undertake a detailed analysis of the lightning discharge , regardless of the type of patterns of waveforms that are used in the industrial lightning detectors.

To investigate the possibilities of lightning detectors Boltek, the experiments were conducted on the use of a long spark as a controlled switching power VLF radiation. For this purpose we have used the high- voltage pulse generator (GIN up to 6 MV), located on the landfill of All-Russian Electrotechnical Institute (VEI) at the Istra town.

The obtained data allow us to investigate with the high spatial and temporal resolution the level of storm activity and to assess the balance between the frontal and local thunderstorms at the regional scale.