

# Analysis of optical and infrasound observations of the Ozerki meteorite fall

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Superbolides (meteors brighter than -17 magnitudes) are observed about 10-30 times a year over the globe, they are rare events. Most observational data on superbolides, which make it possible to estimate the energy and mass of meteoroids, are obtained from optical observations by US government satellite sensors. Only limited information is available for analysis (mainly the energy in the radiation, the coordinates and the height of the maximum energy release and, for a small part of the events, the speed of entry). Recording infrasonic signals is another instrumental method of registering superbolides, which makes it possible to estimate the coordinates of the event, and the energy of the source. The combination of different methods of observation allows to obtain more reliable estimates.

Optical observations of the Lipetsk superbolide (June 21, 2018; 01:16:20 UT) include satellite observations (UGS) and occasional video recordings. The analysis of videorecords permit to derive the light curve of the bolide. Infrasound signals of the bolide were recorded at several points, including IDG, the geophysical observatory Mikhnevo, a temporary observation point in the Kursk region and several CTBTO stations. In addition, fragments of meteorites were found - about a hundred fragments with a total mass of more than 6.5 kg. The meteorite is classified as ordinary chondrite L6.

Analysis of the observational data permits to estimate the bolide energy as 2.8 - 3.5 kt TNT, the accuracy of determining the source position is approximately  $\pm 10$  km using satellite data, and  $\pm 20$ -50 km using infrasound.