

the modeling of infrasound waves propagation and estimation of explosion energy of Chelyabinsk meteoroid of February 15, 2013 by the data of seismic and infrasound waves records

The results of infrasound waves propagation modeling for Chelyabinsk meteoroid explosion on February 15, 2013 using the pseudodifferential parabolic equation are shown. The estimation of the explosion location was conducted by analysis of seismic recording near the epicenter. The IS31 located 542 km away of the explosion has recorded 6 infrasound arrivals. The first infrasound arrival from a high-altitude source corresponds to propagation of infrasound “trapped” into near-ground acoustic waveguide channel. Other five infrasound arrivals correspond to propagation in the thermosphere. A vertical profile of effective velocity of sound constructed with the data of satellite measurements was corrected using Nelder-Mead method considering the measured velocities of the infrasound arrivals. A satisfactory agreement of calculation results and experimental data was obtained. The explosion energy of the meteoroid was estimated using two methods. The first applied the property of “acoustic impulse” I conservation. The second method applies the interaction between the explosion energy and duration t of positive phase N – wave at a height of ray tracing turn to the Earth surface. The values in range of 0.5 – 15 kt were obtained for the explosion energy.

Primary author: SMIRNOV, Alexandr (Kazakhstan National Data Centre)

Presenter: SMIRNOV, Alexandr (Kazakhstan National Data Centre)

Track Classification: 4. Modelling & Network Performance