

Trajectory determination of the 2005 December 1st Kanto fireball using seismic network data

Yoshiaki Ishihara[1]

[1] RCPEV, Graduate School of Sci., Tohoku Univ.

Fireball, Bolide falls are the phenomena related to meteoroids passing through the atmosphere with high velocities generate strong shockwaves. The shockwaves are often detected by ground instruments such as a seismometer. The seismological records provide two kinds of information, the shockwave arrival time and the amplitude of the ground motion generated by the shockwave at each seismic station. The shockwave arrival time data enable us to determine trajectories of the fireballs. For example, Ishihara et al. [2003, 2004] determined trajectories of the 1999 Miyako fireball and the 2003 Kanto bolide using the arrival times, respectably.

The 2005 December Kanto fireball was appeared on Dec. 1, 2005, 22:17 JST (UT+9). Many people, who lived in wide area of Honshu Island, Japan, saw a spectacular fireball, fragmentation of meteoroid (meteoroid break into 3 or 5 fragments) and further, some minutes after the sight of the fireball, the residents of the Kanto region heard unaccountable detonating sound like thunder claps, seems to be shockwave generated by the fireball fall. The fireball also recorded instrumentally. Some still and video cameras detected the fireball. At that time, the seismic networks installed by Universities, Japan Meteorological Agency, and National Institute for Earth Science and Disaster Prevention, are operated. I inspect the seismic network data at the time when the fireball witnessed around the Kanto region, I find out the shockwave signals at 19 seismic stations.

I determine the bolide's trajectory using shockwave arrival times at 19 seismic stations. The obtained trajectory parameters are as follows; the meteoroid velocity of 15.0 [km/s], the azimuth of the trajectory (measured from north to clockwise) of 234.0 [degree], the elevation angle of the trajectory of 16.0 [degree].