

Atmospheric waves from the gas explosion in Sapporo on December 16, 2018, recorded by seismometers

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A large gas explosion occurred in Hiragishi, Sapporo, on December 16, 2018, which blew up a two-story building in the hypocenter with more than 50 injured, although no casualty was reported miraculously. Damages to window glasses of neighboring buildings were reported in the radius of about 100 meters around the hypocenter due to strong blast waves from the explosion.

The infrasound waves from this explosion have been recorded in several seismometers installed on the ground surface of Ishikari Lowland (including the one in the campus of Hokkaido University) even at stations more than 60 kilometers away from the hypocenter, which has traveled with a speed of about 330 m/s. It is well known that atmospheric infrasound waves from large volcanic eruptions and/or meteor blast can travel very long distances, which can be observed with broad-band seismometers. Although this explosion in Sapporo is much smaller than such natural phenomena, the observed seismic records are likely to be caused by the air-earth coupled ground motions due to the infrasound waves from the explosion.

The observed infrasound/acoustic signals from this explosion cannot be observed in seismometers installed underground in and around Sapporo. Also, we cannot see any clear elastic wave (P-wave or surface waves) from this explosion. Only several seismometers installed on the ground surface have recorded the infrasound signals that are characterized by strong spectral peaks in a frequency range between 5 and 30 Hz. We can also identify the directional dependence of the observed waveforms; i.e., the amplitudes of infrasound signals are more attenuated and scattered in the north of hypocenter. This may be affected by winds and/or propagation paths, in particular, the urban area of Sapporo with tall buildings spared over the north of hypocenter.

Keywords: infrasound, atmospheric wave, seismometer, gas explosion