

## **Source Scaling of Underground Nuclear Explosions in Northern Korean Peninsula**

The three underground nuclear explosions in northern Korean Peninsula bequeathed waves recorded by seismic stations in Northeast China and South Korea. Studies on the three events illustrated that the difference in the locations of the two explosions is tiny on a regional distance scale. The tiny difference could be incorporated to establish empirical source scaling relationships of the two explosions by excluding path effects through spectral ratios of the collocated seismograms. The spectral ratios have been compared to theoretical source model. This model analysis provided the scaling relationship of the yields and depth of burials of the two explosions: the relative depth of burial of the 2nd explosion is about 1.2 times deeper than that of the 1st explosion, and the relative yield of the 2nd explosion is about 5 times larger than that of the 1st explosion. Empirical scaling relationships of the 3 underground explosions in northern Korean Peninsula are analyzed by excluding path effects through estimation of spectral ratios between collocated seismograms. To obtain the empirical scaling relationship of the source parameters, the measured spectral ratios were compared with the Mueller-Murphy source model.

**Primary author:** KIM, Geunyoung (Korea Institute of Geoscience and Mineral Resources (KIGAM))

**Presenter:** KIM, Geunyoung (Korea Institute of Geoscience and Mineral Resources (KIGAM))

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