

## **Comparative study of the 2016 DPRK event**

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Effective monitoring of any violations of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) depends upon the State Parties' ability to determine the nature of the source of the signals recorded by the IMS stations. Analysis by the IDC of the data gives some of the required information but makes no effort to determine the nature of source as specified by the Treaty.

On January 6, 2016 the IMS network of stations recorded unusual seismic event from the DPRK. This was the fourth time that such an event from a man-made event was recorded from this area. Past detections of announced nuclear tests were on 9 October 2006, 25 May 2009, and 12 February 2013. There are a few natural earthquakes that have been recorded in this region.

This study presents results of an assessment of waveform data and amplitude spectra obtained from seismic events observed at regional and/or local distance ranges, for both natural and man-made events located in the DPRK. The study reveals that the waveform displays of the four man-made events are practically simple and have nearly the same signature, yet they are significantly different to those of the observed natural earthquakes occurring in the region. The similarities of the waveforms obtained from the man-made events are due to the closeness of the epicentres and hence no difference in path effects for the Stations considered.

The computed amplitude spectra of the waveform for the man-made and natural events also show differences in their relative amplitudes between the respective Primary and Secondary seismic phases, indicating that their sources are different.

The study clearly shows the importance of studying the signature of the recorded seismic waves to determine the nature of the source of the energy, if it is man-made or natural, particularly for regions where records of natural earthquakes exist. Determination of the nature of source of recorded seismic waves is fundamental to CTBT verification. Thus data observed at regional and/or local distance ranges as obtained from the IMS stations can shed light on the identification and characterization of the sources (man-made or natural) of the data.