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Detection of nuclear explosions by remote regional seismic network

Objective of these studies was to test possibility of identifying nuclear explosions using a remote seismic network and to evaluate effectiveness of some parameters for identification nuclear explosions. Regional seismic network BAVSEN (Baltic Virtual Seismic Network), which unites 10 seismic stations, was used to identify distant nuclear explosions in North Korea. BAVSEN being a part of the GEOFON network (GFZ Potsdam), has been operational since 2008. Were registered 5 nuclear explosions. Three nuclear explosions were used for analysis. The following parameters were used to identify nuclear explosions: 1) amplitude spectra of P and S waves group; 2) spectral ratios P/S; 3) Ms/Mb magnitude ratio. The first two parameters are based on well-known property of S-wave amplitude exceeding over P-wave amplitude for earthquakes and inverse amplitude ratio for explosions. Testing has shown that most effective criterion for identification is Ms/Mb magnitudes ratio. Linear approximation gave following results: Ms = 1.329Mb - 1.530 (for earthquakes); Ms = 1.447Mb - 3.907 (for nuclear explosions). Spectra of P and S waves group, as well as P/S spectral ratios are less effective parameters for identifying nuclear explosions using remote seismic network. Testing has shown the possibility of using remote seismic networks for monitoring nuclear explosions.

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