

Discrimination between nuclear explosions and natural earthquakes

Seismic discrimination between underground nuclear explosions and earthquakes is an important component of the Comprehensive Test Ban Treaty (CTBT) verification regime. Complexity, Spectral ratio, amplitude ratio of P/S and mb-Ms (body wave and surface wave magnitudes) discrimination methods were applied for identifying natural events from nuclear explosions in China, India, Pakistan, North Korea, and USA. The waveform data were collected from different sources i.e. IMS and IRIS for a set of 16 nuclear explosions and 16 earthquakes with $4.5 \leq mb \leq 6.5$ using broadband stations. The complexity of natural events is higher than of artificial events. The spectral ratio is larger for explosions than of the earthquakes due to the higher frequency content in the seismogram of explosions. The amplitude ratio of P/S shows larger amplitude in the case of explosions compared to earthquakes. mb-Ms discriminant method shows that mb is larger than Ms in the case of explosions. Based on the results of our study, the amplitude ratio of P/S and mb-Ms techniques are the most effective seismic methods for identifying the nature of the source. Keywords: Amplitude ratio of P/S, mb-Ms, CTBT, Discrimination, complexity

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