

Seismic Sources of North Korean Nuclear Tests and Its Meaning for Event Identification

Wednesday, 28 June 2017 11:15 (15 minutes)

Amplitude ratios between the first 2016 and 2013 North Korean nuclear tests for different kinds of seismic waves are compared. The observations show the first 2016 test had generated stronger Rayleigh waves with weaker short period P and Love waves in comparison with the 2013 test. Based on the observations, secondary seismic sources including the DC components caused by tectonic releases and the CLVD components caused by induced rock damages of the explosions are determined. It is shown the DC sources of the two tests should have an identical thrust faulting mechanism with DC moment MDC of the first 2016 test smaller than that of the 2013 test, and the ratio between the CLVD moment MCLVD and the isotropic moment Miso is between 17~27% for the 2013 test, 0.7~11% for the first 2016 test, both much lower than that for underground nuclear explosions detonated by standard yield-scaled burial depth and of similar mb. The above mentioned results suggest the tectonic releases have significant effect on Ms for DPRK nuclear tests, which is of important implications for understanding the mb:Ms criteria and Ms-yield scaling.

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Session Classification: T2.1 Treaty-Relevant Events (cont.)

Track Classification: 2. Events and Nuclear Test Sites