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the Explosive Nature of the DPRK Nuclear Events at Regional Scale Using Moment Tensor Inversions and MSVMAX

Between 2006 and September 2016, five confirmed nuclear tests occurred in The Democratic People's Republic of Korea (DPRK). The regional and teleseismic seismic waveforms show great similitudes suggesting the spatial closeness of the sources and their similar source radiation patterns. Using the available regional data, we perform the source moment tensor inversions of the five events, and we explore the relative differences among the five events, especially in terms of seismic moment and source decomposition. We confirm the explosive nature of the sources. The inversion of the M5.4 earthquake in September 2016 in South Korea using a similar scheme allows us to verify the stability of the inversions and the resulting source decompositions. We extend the characterization of the explosive behavior of the seismic sources by using additional techniques such as the MSVMAX approach implemented at the French National Data Center. The study of the differential surface wave magnitudes recorded at the regional stations provides useful information regarding the source complexities. Discussion regarding complexities in the amplitude ratio is provided with regards to non-isotropic radiation at the source in regional scale and potential path effects.

Primary author: GUILHEM TRILLA, Aurélie (CEA/CENTRE Ile-de-France)

Presenter: GUILHEM TRILLA, Aurélie (CEA/CENTRE Ile-de-France)

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