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Expert Technical Analysis of the DPRK-2013 Seismic Event and Waveform Cross-Correlation Perspectives at the International Data Centre

We have performed a comparative analysis of three announced DPRK underground tests using data from International Monitoring System (IMS), including the fusion of seismic and infrasound technologies. Unique similarity between the 2009 and 2013 year waveforms and spectra allows making strong conclusions about the similarity of the source mechanism and the conditions of conduction: depth of burial, geological structure, tectonic stress, and the containment technology, presuming all three events were explosions. For sources close in space and mechanism, waveform cross-correlation (CC) is a natural technique for continuous monitoring as the joint processing of the 2006, 2009, and 2013 data demonstrates. The CC-based relative location has a few hundred meters resolution, i.e. by two orders of magnitude more accurate than the IDC absolute location. The detection capability is enhanced by 0.5 units of magnitude and allows detection of M2.5 aftershocks. . The results of the IDC expedite CC-based location of the 2013 event (14 min after the event) are supported by later reports of different national agencies. This proves the perspective of the IDC CC monitoring prototype, its state-of-the-art status, and its importance in the CTBT practice.

Primary author: ROZHKOV, Mikhail (CTBTO)

Presenter: ROZHKOV, Mikhail (CTBTO)

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