



## **The Seismic Event in North Korea on 12 May 2010: an assessment from available seismological data**

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North Korea conducted underground nuclear explosions in October 2006, May 2009, February 2013, and January 2016 that were subsequently officially announced. Based on a number of detections of radionuclides and noble gas elements in May 2010, claims were raised that North Korea conducted a small clandestine nuclear test on its test site on 11 or 12 May 2010, which, however, lacked any signs of an associated seismic event in IMS and non-IMS seismic data. First evidence was presented in fall 2014 and published in February 2015 that data from a Chinese seismic network showed signals that could be related to the claimed underground nuclear explosion in May 2010. Unfortunately, these data have not become openly available for further and wider seismological assessments.

First openly available data were found for this seismic event from stations of the North-East China Extended Seismic (NECESS) Array consistent with an event on or near the North Korean test site. Later, additional data were obtained from stations of the nearby Dongbei Broadband Seismographic Network (DBSN), for the event of 12 May 2010 and for the underground nuclear tests conducted in 2006 and 2009. Together with data from the open GSN station Mudanjiang (MDJ) in northeastern China we developed a framework for relative location of the event, event characterization by measuring P/S amplitude ratios at different frequencies and by independently assessing the magnitude of the event. While the location of the event can be shown to be within several kilometers of previous nuclear tests, event characterization for frequencies between 5 and 10 Hz indicates that the known nuclear tests are explosion-like; the 12 May 2010 event is in contrast characterized as earthquake-like. Our assessment also indicates that seismic events about three-thousand times smaller than the UNEs in 2013 or 2016 may be monitored on or near the North Korean test site.