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The 2006 North Korean nuclear test - analysis of the explosive component using moment tensor inversion based on a 3D earth model

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Due to its low yield, the m_b 3.9 North Korean nuclear test on 9 October 2006 could not be verified undoubtedly using solely seismic methods. The low signal-to-noise ratio (*SNR*) limits conventional discrimination methods such as P/S amplitude-ratios, and thus we perform a moment tensor inversion (*MTI*) to estimate the explosive (isotropic) component of the event. Long-period recordings are mainly controlled by the seismic source mechanism, while at shorter periods variations of the crustal structure have a stronger influence on the waveforms. On the other hand, long periods have a lower *SNR* than shorter periods. To obtain a good *SNR* for source-sensitive periods, we use an intermediate pass-band (T = 10-50 s) and include a regional 3D velocity structure deduced from the *Crust 2.0* model (Bassin et al., 2000) to calculate synthetic waveforms. We study the influence of the crustal model on the inversion result using regional recordings with source-receiver distances up to 3000 km and compare the results with a tectonic m_b 4.0 event that occurred in a distance of 34 km on 16 April 2002. We observe a higher isotropic part (M_{iso}) for the nuclear test compared to the tectonic event. However, the absolute value of M_{iso} cannot be determined because a trade-off with the inversion damping exists. To study the influence of seismic noise on M_{iso}, we add artificial noise to the recordings of the tectonic event. Compared with the *MTI* of the original data we also find an increased M_{iso}, but with other dependencies on the damping compared to the nuclear explosion data. We show trade-off curves of damping versus model length (as a function of M_W) that can be a helpful tool for a

timely verification of nuclear tests.