Supplementary materials for

Bayesian differential moment tensor inversion: theory and application on North Korea nuclear tests
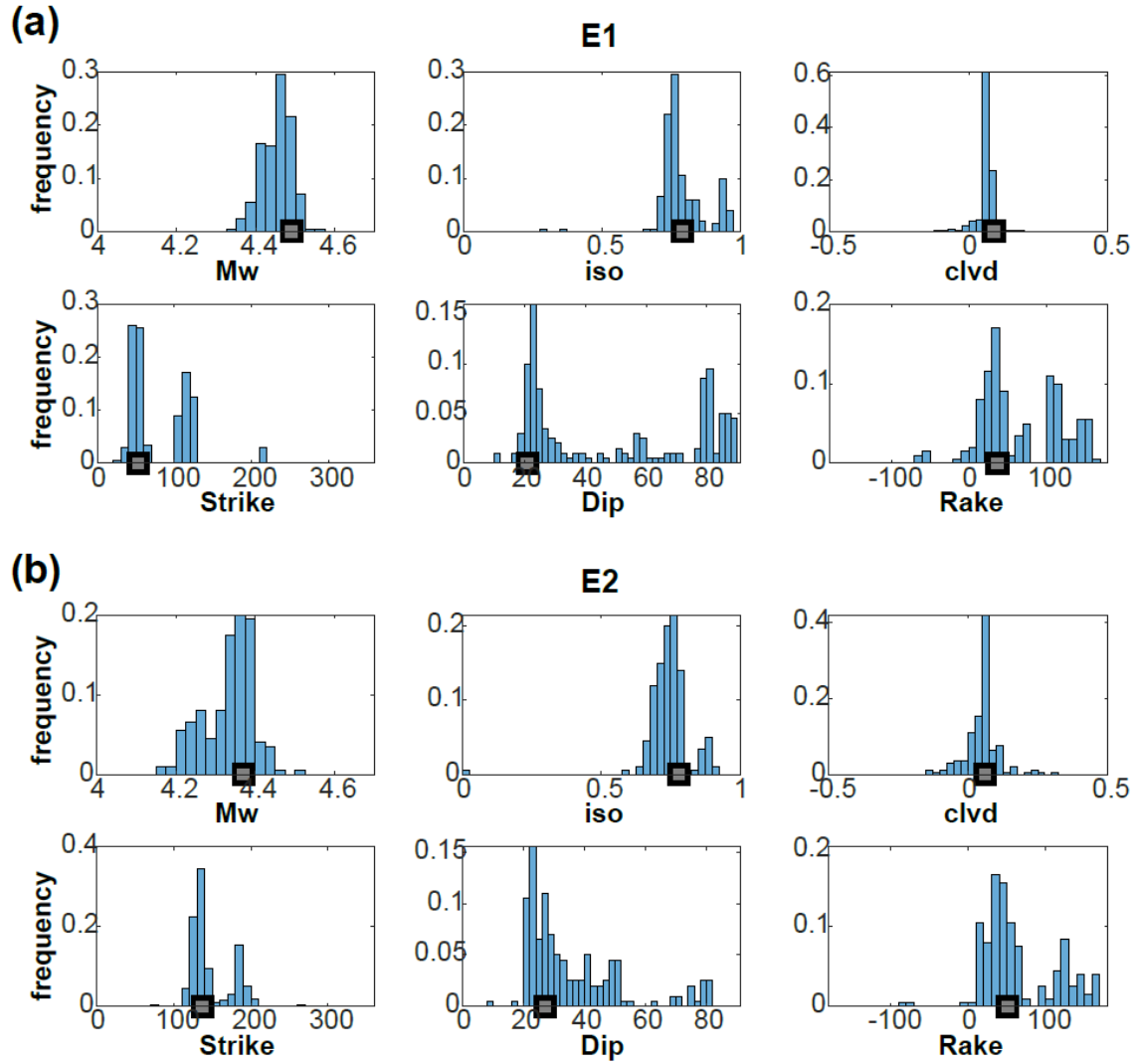
Zhe Jia, Zhongwen Zhan, Donald Helmberger [†]

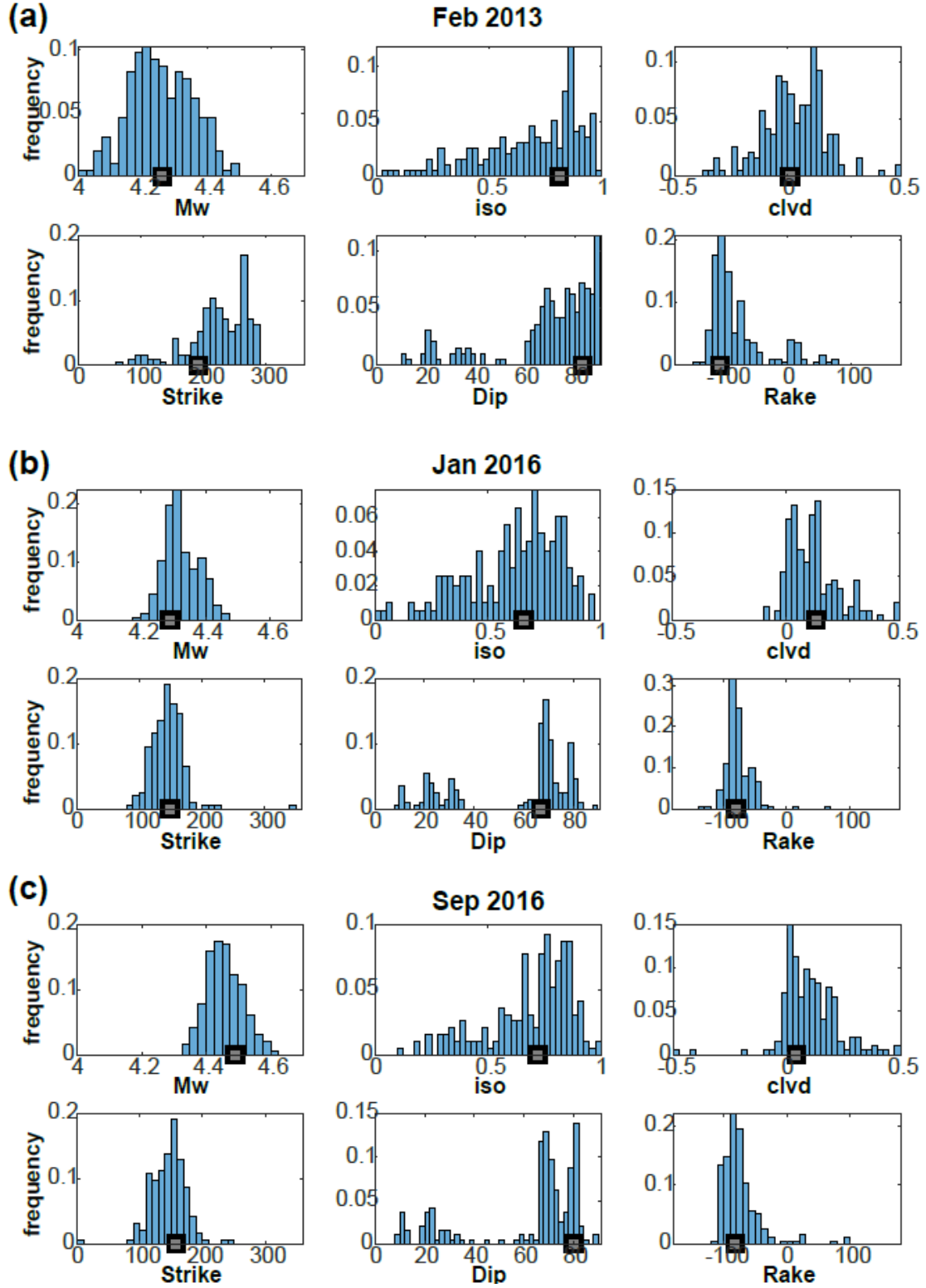Seismological Laboratory, California Institute of Technology, Pasadena, CA 91125, USA.
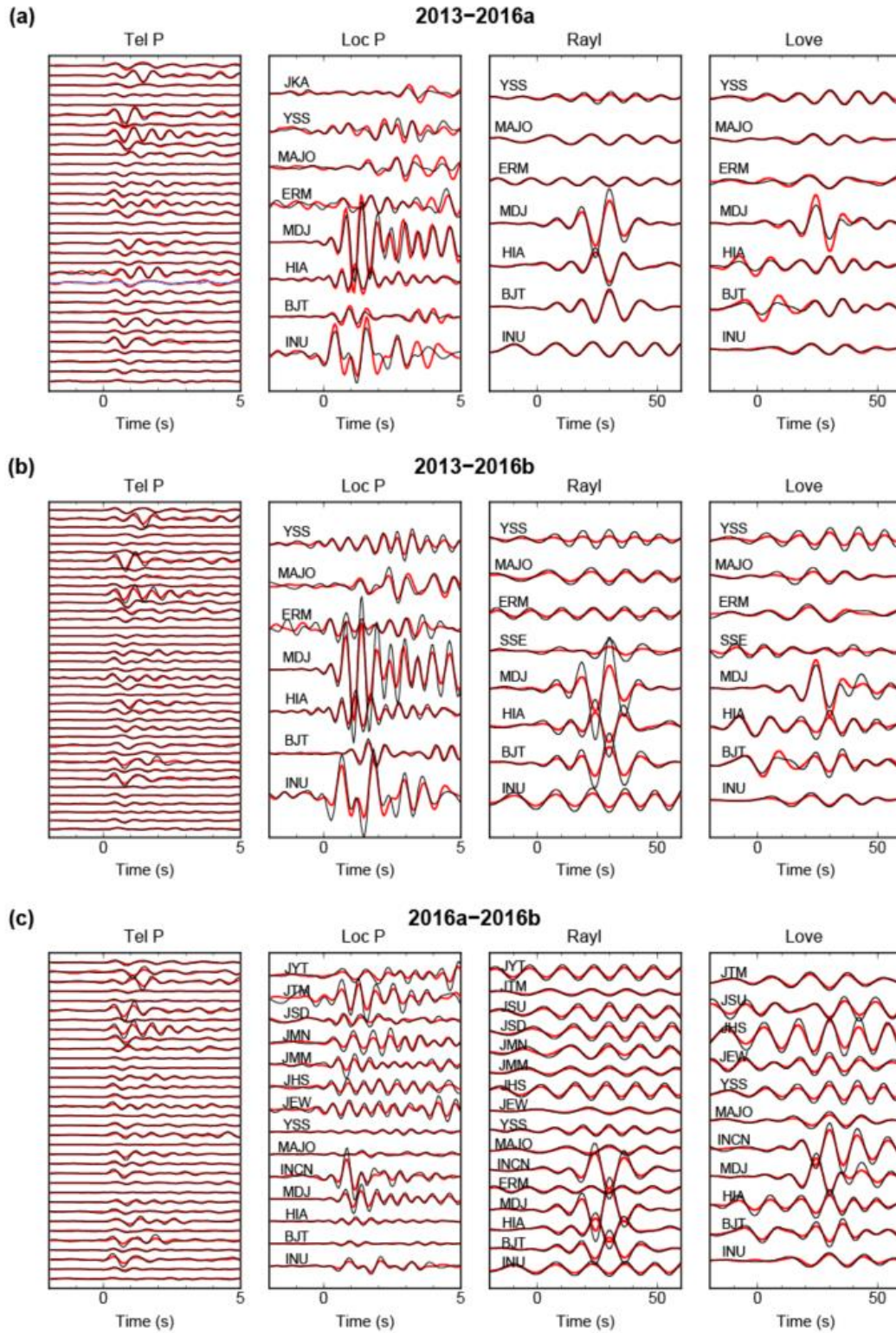
[†] Deceased on August 13, 2020

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Figures S1 to S6

(a)

E1

(b)

E2

Figure S1. Distribution of gCAP source parameters from bootstrapping sampling in the synthetic test. Results for E1 and E2 are shown in panels (a) and (b), respectively.

**Figure S2.** Same as Fig. S1, but for the 3 studied North Korea nuclear explosions.

Figure S3. Measurement of amplitude ratios among 3 studied North Korea nuclear explosions. The symbols are similar to that in Fig. 5a.
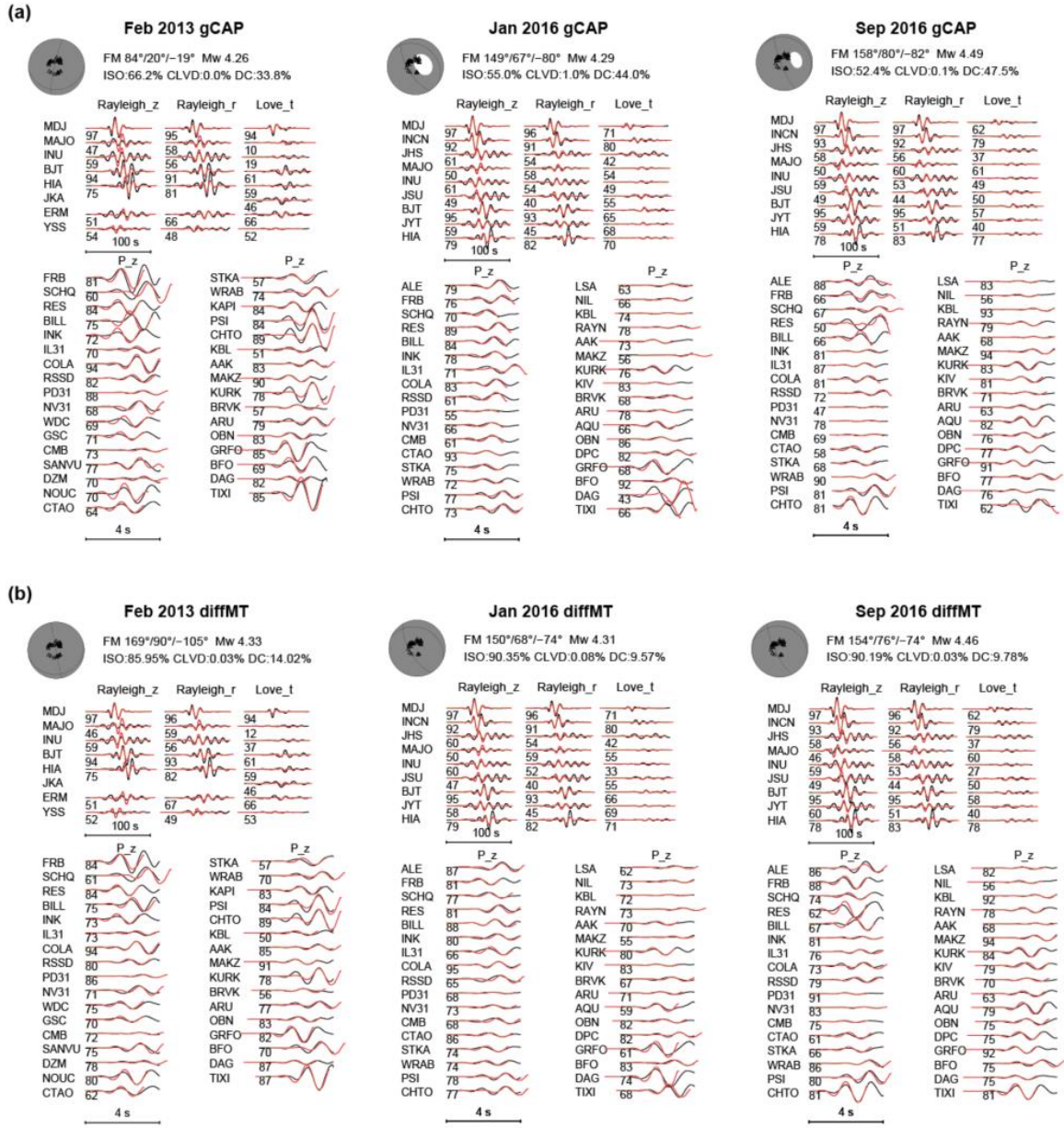
Figure S4. Comparison of waveform fittings for the (a) gCAP and (b) diffMT solutions. The fitting difference is hardly observable, suggesting that the moment tensor difference of these two solutions can't be resolved by the gCAP waveform inversion.

(a)

(b)
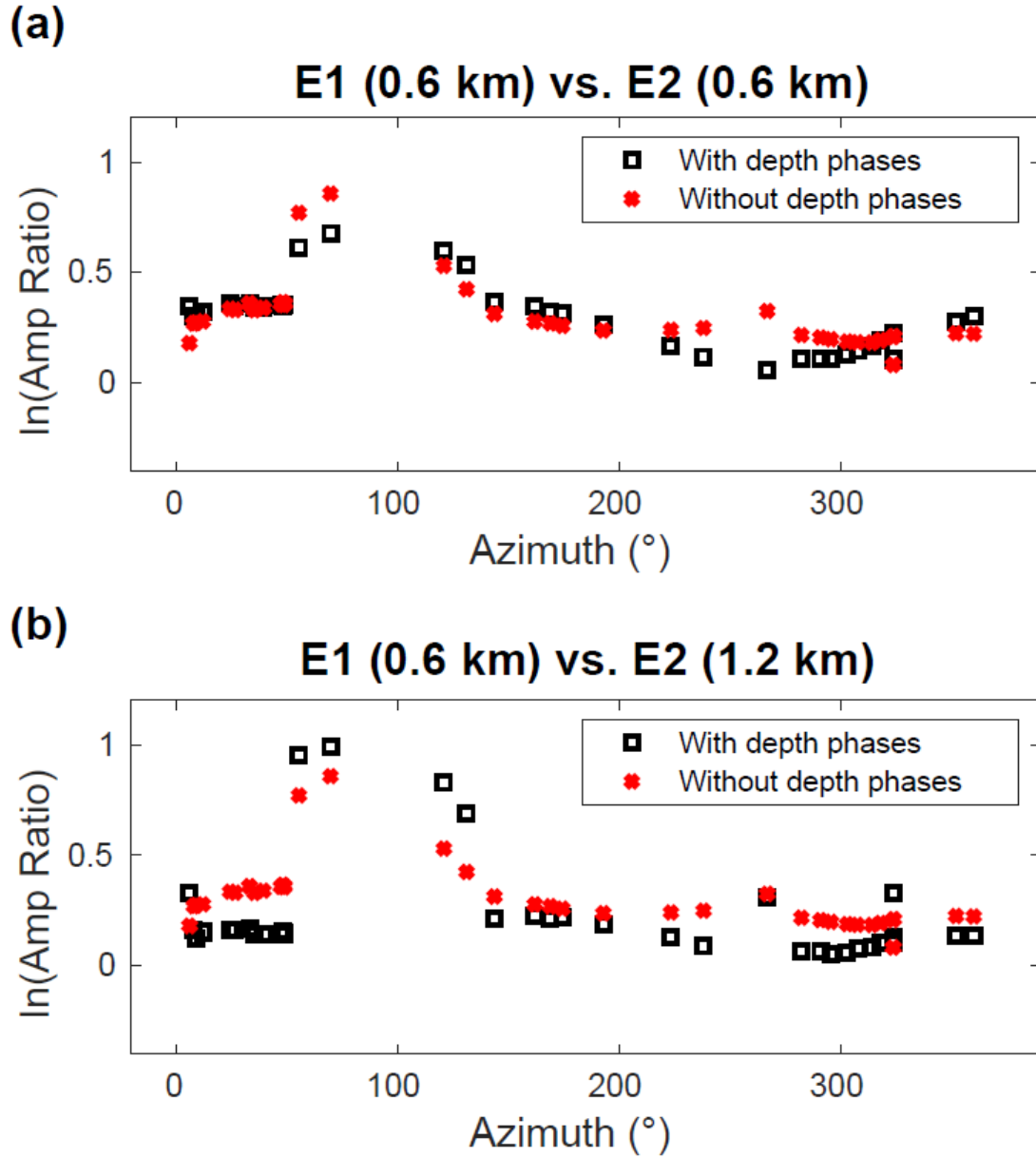
Figure S5. Influence of 1D depth phases (pP, sP) on the body wave amplitude ratios for the synthetic events E1 and E2. (a) Comparison of P wave amplitude ratios from waveform cross correlation (with depth phases) (black squares) and analytical calculation (without depth phases) (red crosses). The depths used to generate synthetic waveforms are both 0.6 km for E1 and E2. (b) Same as (a), but the depths used to generate synthetic waveforms are 0.6 and 1.2 km for E1 and E2, respectively.
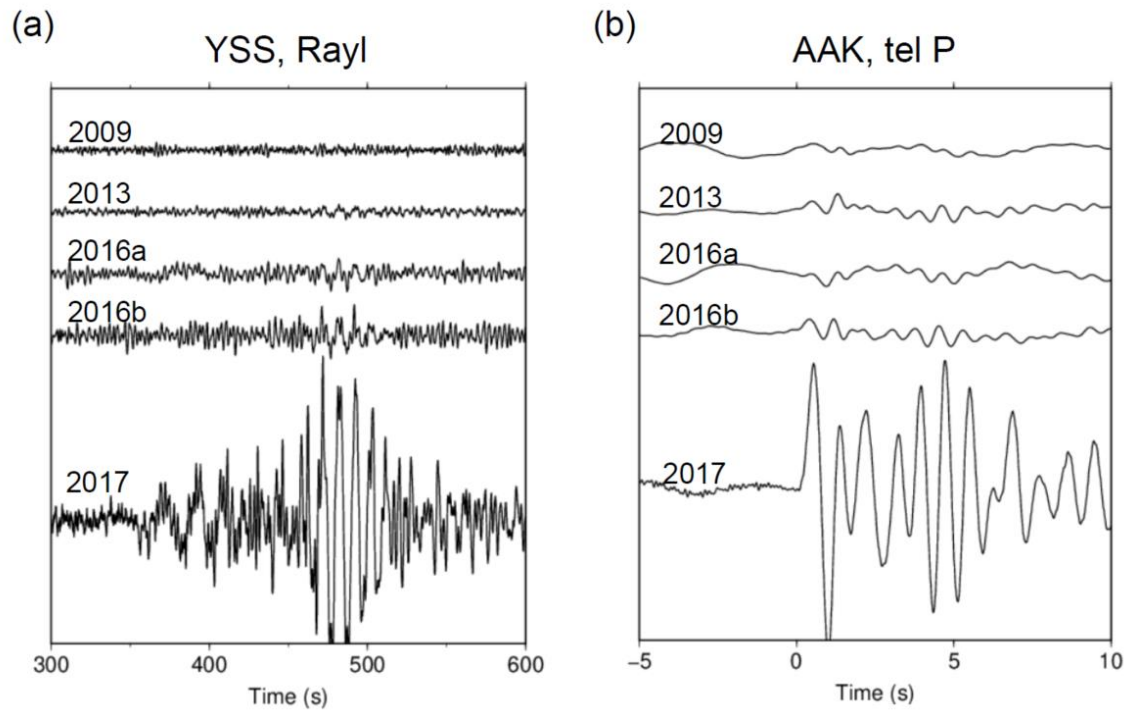
Figure S6. Seismograms of the North Korea nuclear explosions recorded at (a) a regional and (b) a teleseismic station.