

Supplemental Material 1

Harmonization of KiK-net and K-NET Ground-Motion Parameters and Metadata: A Flatfile of 950,000 Three-Component Records Spanning 29 Years

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Description of the Supplemental Material

The supplemental material contains tables and figures complementing the manuscript

Name	Date	M_w	Lon (°)	Lat (°)	Depth (km)	Fault type
2011 Tohoku	2011-03-11	9.0	142.86	38.10	24.0	Subduction
2016 Kumamoto (curved)	2016-04-16	7.3	130.76	32.76	13.6	Strike-slip
2016 Kumamoto (foreshock)	2016-04-14	6.5	130.81	32.74	11.0	Strike-slip
2018 Hokkaido Iburi	2018-09-06	6.7	142.00	42.69	37.0	Reverse
2008 Iwate-Miyagi	2008-06-14	7.2	140.88	39.03	8.0	Reverse
2008 Northern Iwate	2008-07-24	6.8	141.63	39.73	108.0	Reverse
2015 Off Miyagi	2015-05-13	6.8	142.85	38.85	46.0	Reverse
2016 Off Urakawa	2016-01-14	6.7	142.79	42.00	51.0	Reverse
2016 Central Tottori	2016-10-21	6.6	133.85	35.38	11.0	Strike-slip
2019 Off Yamagata	2019-06-18	6.7	139.48	38.61	14.0	Reverse
2024 Hyuganada	2024-08-08	7.1	131.50	31.80	25.0	Megathrust

Table S1 NIED rupture models used in this study.

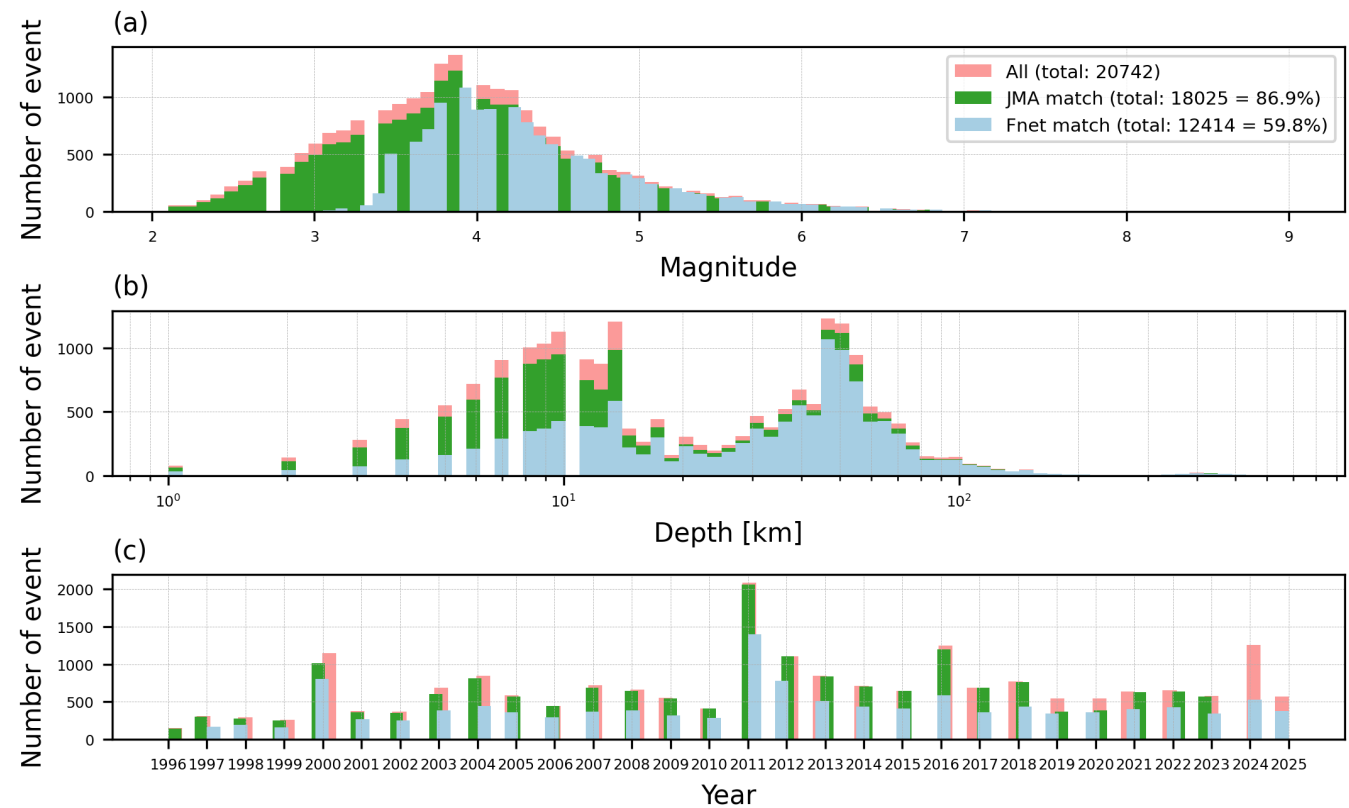


Figure S1 Distributions of recorded earthquakes by KiK-net and K-NET from May 11, 1996, to December 31, 2025. Top: JMA magnitude distribution. Middle: Depth distribution. Bottom: Yearly distribution. Colors indicate all recorded events (pink), events matched with the JMA catalog (green, only available up to December 31, 2023), and events matched with the F-net catalog (blue, up to December 31, 2025). In total 18,782 out of the 20,742 events (90.5%) recorded by KiK-net and Knet are matched with either JMA and Fnet.

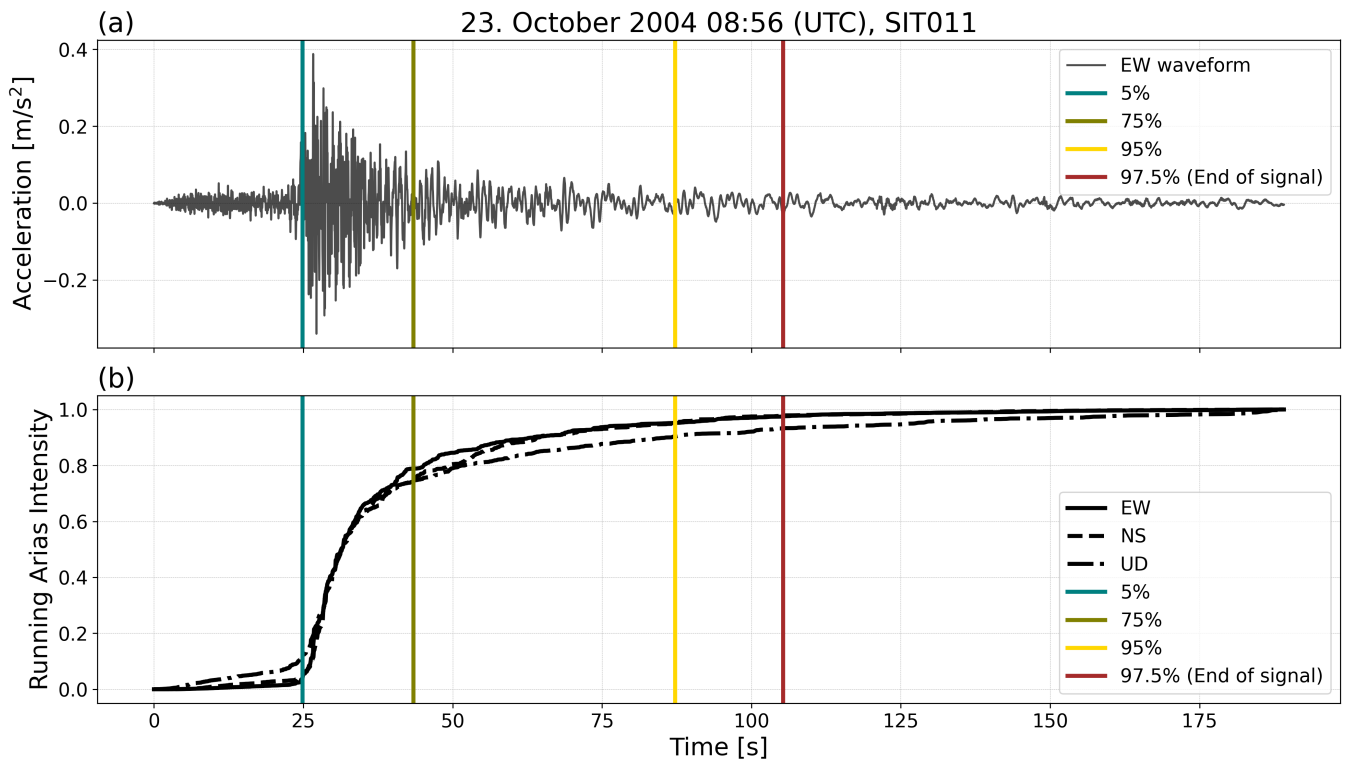


Figure S2 Demonstration on how the significant duration and end of the signal are determined using the running Arias Intensity for the $M_W 6.8$ earthquake recorded on 23rd of October 2004 at the station SIT011. (a) Detrended waveform for the EW component, (b) the running Arias Intensity ($I_A(t)$) of the three components. The 5 %, 75 %, 95 % and 97.5 % percentiles of $I_A(t)$ are shown as vertical lines. The 97.5 % percentile is selected as the end of the main signal.

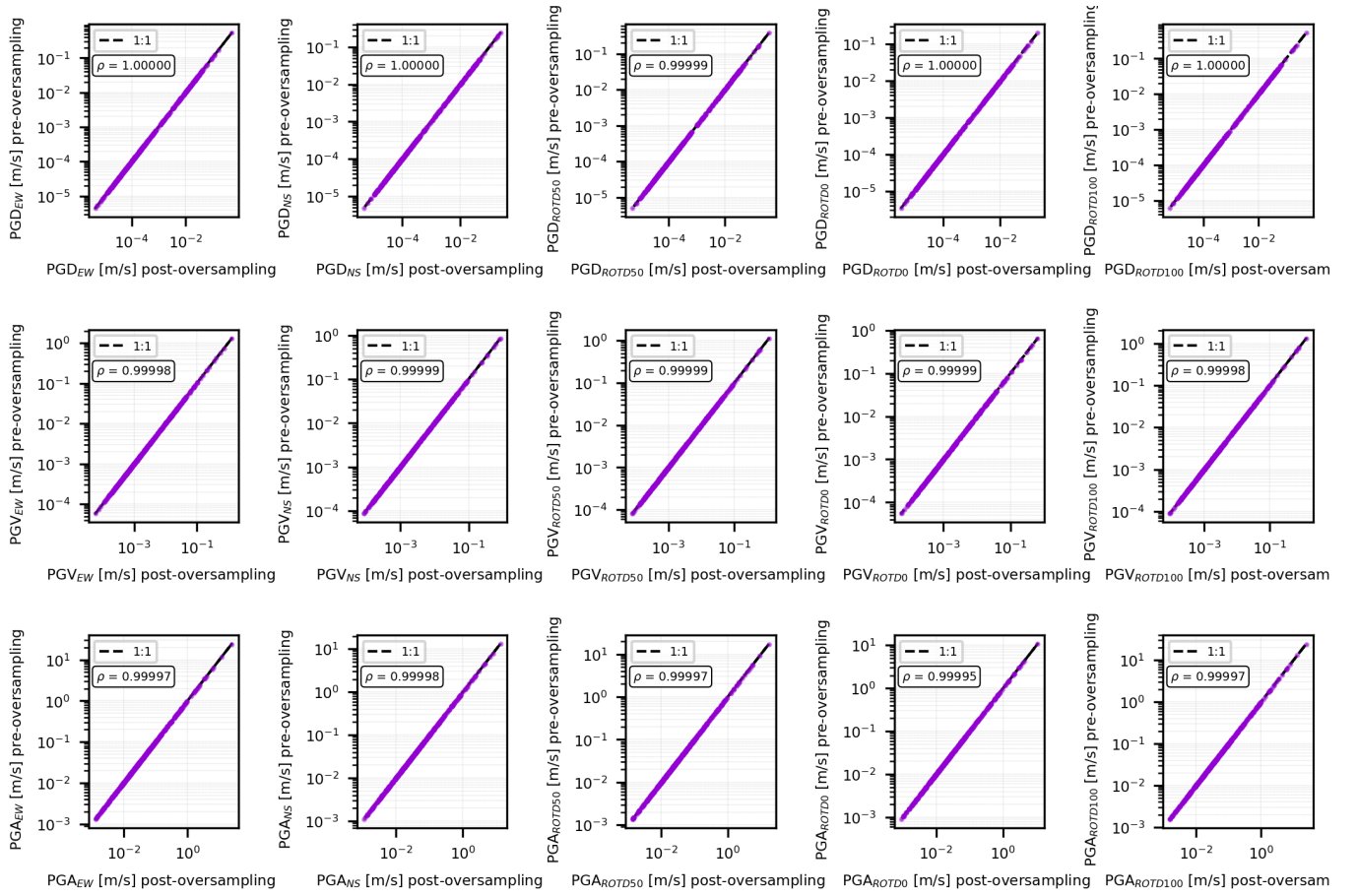


Figure S3 Comparison of the the peak amplitudes PGD (top row), PGV (middle row) and PGA (bottom row) computed before (y-axis) and after (x-axis) oversampling of the waveforms. The Spearman's correlation coefficients (ρ) demonstrates the similarity between the values.

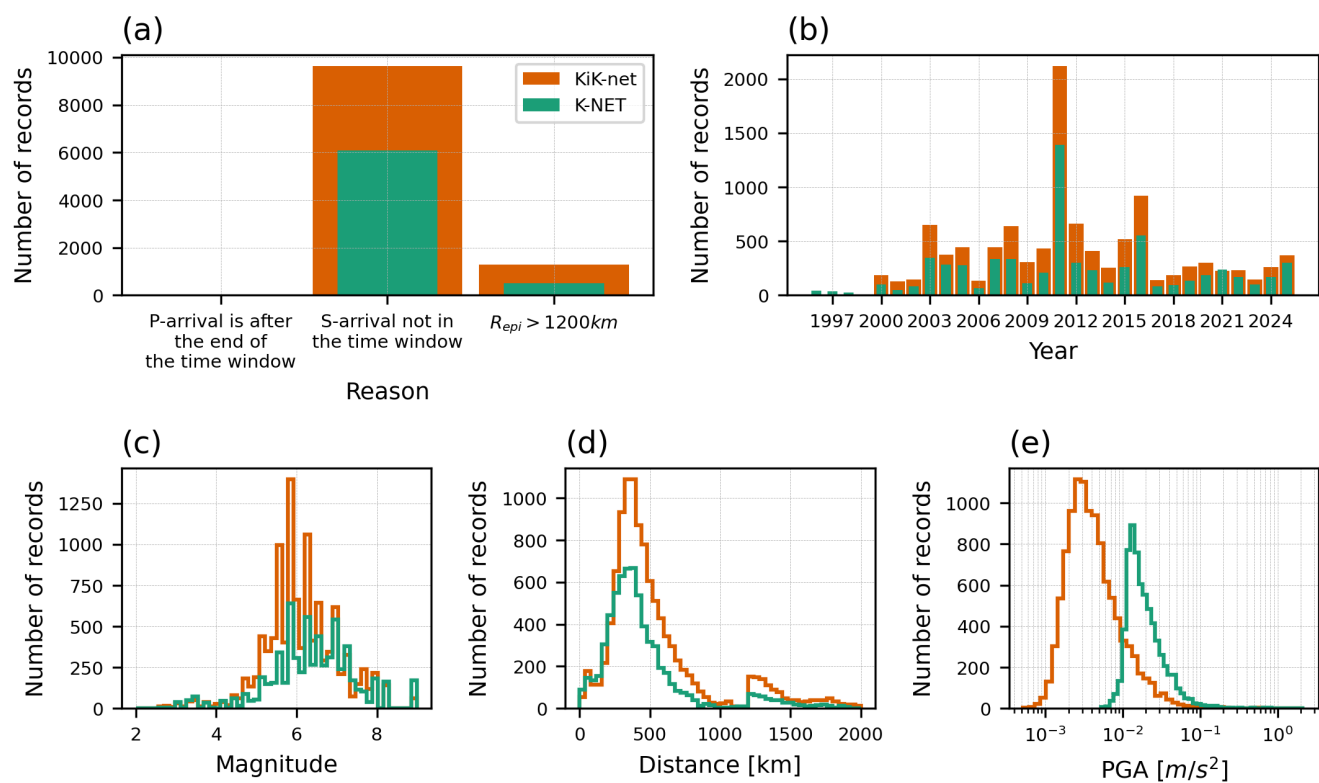


Figure S4 (a) The reason for rejection, and distribution of (b) year, (c) magnitude, (d) distance and (e) PGA of the ground motion rejected during the procession for K-NET (green) and KiK-net (orange).

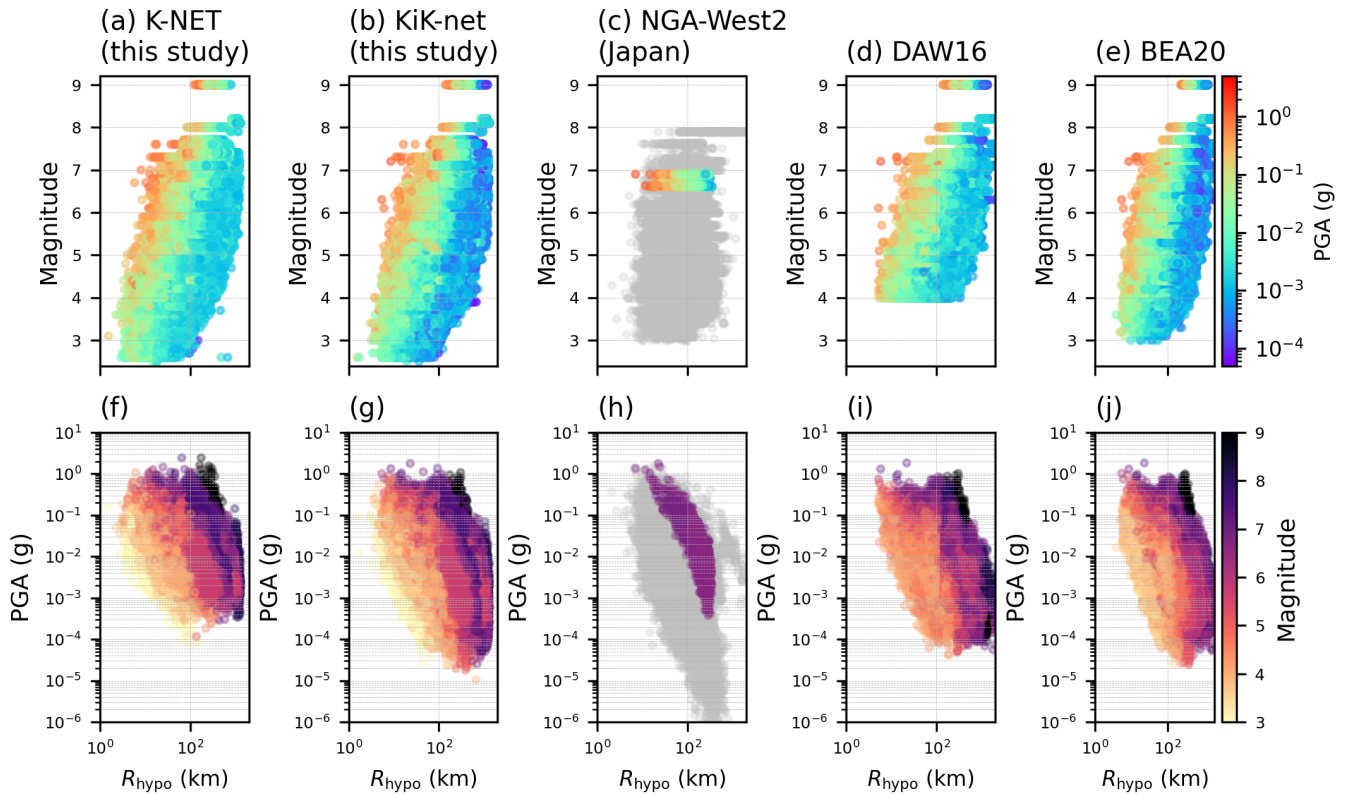


Figure S5 Top: Magnitude-distance distribution, and bottom: PGA-distance distribution, of K-NET (this study), KiK-net (this study), NGA-West 2 (Ancheta et al., 2014), DAW16 (Dawood et al., 2016) and BEA20 (Bahrapouri et al., 2020). The NGA-West 2 flatfile also contain ground motions from other regions than Japan (shown in gray), but only the Japanese records are colored by PGA (c) and magnitude (h) in this figure.

References

- Ancheta, T. D., Darragh, R. B., Stewart, J. P., Seyhan, E., Silva, W. J., Chiou, B. S.-J., Wooddell, K. E., Graves, R. W., Kottke, A. R., Boore, D. M., Kishida, T., and Donahue, J. L. NGA-West2 Database. *Earthquake Spectra*, 30(3):989–1005, aug 2014. doi: 10.1193/070913EQS197M.
- Bahrapouri, M., Rodriguez-Marek, A., Shahi, S., and Dawood, H. An updated database for ground motion parameters for KiK-net records. *Earthquake Spectra*, page 875529302095244, 9 2020. doi: 10.1177/8755293020952447.
- Dawood, H. M., Rodriguez-Marek, A., Bayless, J., Goulet, C., and Thompson, E. A flatfile for the KiK-net database processed using an automated protocol. *Earthquake Spectra*, 32(2):1281–1302, may 2016. doi: 10.1193/071214EQS106.