

Observed vs Simulated — Goodness of Fit

intensitylab.com · ground motion validation report

WITHIN BAND · mean |bias| 0.370 · factor 1.45x

RESULT — BBP ROTD50 RESIDUALS (AUTHORITATIVE)

mean bias	0.370	(a factor of 1.45x)
mean sigma	0.57716	(station-to-station scatter)
stations compared	40	
spectral periods	63	
pass band	mean bias <= 0.69 (a factor of 1.99x), declared before the run	
bias at 0.1s	-0.655	simulation over-predicts by 93%
bias at 0.3s	-0.177	simulation over-predicts by 19%
bias at 1s	+0.354	simulation under-predicts by 42%
bias at 3s	+0.775	simulation under-predicts by 117%

CROSS-CHECK — THIS REPORT'S OWN SPECTRA

mean bias	0.446	(a factor of 1.56x)
mean sigma	0.753	
basis	geometric-mean horizontal, computed from the downloaded waveforms rather than BBP's residual tables. It will not match exactly; a large divergence indicates a pipeline fault, not physics.	

EVENT

USGS id	nc75382936
magnitude	M5.59 (mw)
origin time	2026-06-24 15:10:40 UTC
epicentre	39.3623, -123.2288
depth	8.8 km
region	11 km N of Redwood Valley, CA

Provenance

nc75382936 · generated 2026-08-04 22:12 UTC

SIMULATION

produced by	BBP simulated
BBP job id	job_7827afbe58cc416695ae
BBP version	22.4.0
method	GP
realizations	1 of 1 succeeded – a single stochastic rupture, not an ensemble; the bias below is one draw
realization used	r0001
sites in job spec	–
job submitted	2026-08-04T21:54:40Z
per-site Vs30 from	submit-time record (/app/plots/gof_work/nc75382936/compare/station_specs.json)

SOURCE PARAMETERS

magnitude used	–
hypocentre	–
depth	–
strike / dip / rake	–
mechanism source	USGS moment tensor, nodal plane 1 – the conjugate plane is equally consistent with the tensor and gives different amplitudes

VELOCITY MODEL

region used	NoCal500
native for this location	Mojave500 – not installed, so the run is approximate. LABasin500 carries a deep sedimentary basin that Ridgecrest does not have, which would amplify 0.3-1 s motion.
calibration	M5.59 against GP's ~M5.5 floor
platform	arm64 under emulation – amplitudes are not SCEC-reference-accurate; this number measures BBP plus Rosetta and cannot separate them

Observed data and processing

fetches 2026-08-04T21:52:37Z

STATION SELECTION

search radius	100.0 km
policy	all usable within radius
stations on event	639
without FDSN code	0 – cannot be queried at all
candidates	67
usable records	65 (2 returned no usable 3-component set)
in this report	40 with both observed and simulated
distance range	6.9 – 73.8 km

INSTRUMENTATION

channel priority	HN?, EN?, HH?, BH?, EH?
channels used	HN
data centres	NCEDC
mixed instrument types	no
Vs30 source	ShakeMap stationlist (per-station)

SIGNAL PROCESSING

window	origin -60.0 s to +300.0 s (requested)
records not starting as requested	none
response removal	to acceleration and velocity separately, pre-filter (0.05, 0.1, 20.0, 25.0) Hz
resampled to	100.0 Hz
time origin	t = 0 is the rupture origin for both observed and simulated traces on every overlay

How to read this report

the metric, the sign convention, and the limits

THE METRIC

definition	$\ln(\text{observed} / \text{simulated})$ RotD50 spectral acceleration, averaged across stations at each period.
sign	POSITIVE means the simulation under-predicts – real shaking was larger. NEGATIVE means it over-predicts.
scale	It is a log ratio: ± 0.10 is about $\pm 10\%$, ± 0.69 is a factor of 2, ± 1.10 is a factor of 3.
sigma	The station-to-station spread around that average. A large sigma with a small bias means the model is right on average and wrong site by site.

READING THE PATTERN

short-period poor, long-period good	Points at high-frequency attenuation or near-surface site response rather than the source.
long-period poor, short-period good	Points at the source – corner frequency, stress drop – or at basin response in the velocity model.
one station far off	Usually 3D site or directivity effects that a 1D layered velocity model cannot reproduce by construction. Check whether it is driving the sigma before treating it as model error.

WHAT THIS DOES NOT TELL YOU

A pass means the simulation is consistent with recordings at these stations, for this event, under this velocity model, on this hardware. It is not a general statement about BBP, and it is not a prediction of accuracy at an unrecorded site.

Station summary — three independent sources (1/2)

ShakeMap = amplitudes the seismic network reported in stationlist.json. obspy = the same recordings fetched from FDSN and processed here. BBP = simulated. The first two should agree closely; where they do not, the ShakeMap quality flags usually explain why.

Station	Dist (km)	Vs30 BBP	Vs30 ShakeMap	Chan	PGA (g) ShakeMap	PGA (g) obspy	PGA (g) BBP	PGV (cm/s) ShakeMap	PGV (cm/s) obspy	PGV (cm/s) BBP	PGD (cm) obspy	PGD (cm) BBP	PGD (cm) obs/sim	ln(obs/sim)	Flags
BK.BARR	6.9	730	730	HNE	0.4188	0.4122	0.1210	14.1	15.3	5.9	2.02	1.16	1.74x	+1.226	—
NC.GVA	8.8	758	758	HNE	0.1586	0.1579	0.0842	22.9	22.7	3.6	5.01	0.73	6.89x	+0.628	—
BK.DCMP	15.1	709	709	HNE	0.1026	0.0668	0.1368	3.5	3.3	5.4	0.86	1.21	0.71x	-0.717	—
NC.GWR	18.5	500	500	HNE	0.0867	0.0836	0.0770	2.9	2.9	5.5	0.41	0.66	0.62x	+0.083	—
CE.79344	19.7	542	542	HNE	0.0853	0.0846	0.0645	3.0	3.0	4.2	0.71	0.97	0.73x	+0.271	—
CE.79666	19.8	348	348	HNE	0.1408	0.1381	0.0841	8.1	8.2	6.1	1.59	1.84	0.86x	+0.496	—
BK.ORRS	20.3	497	497	HNE	0.1008	0.0995	0.0839	11.1	10.7	5.9	2.11	1.40	1.51x	+0.170	—
BK.BEVN	28.2	754	754	HNE	0.1108	0.1104	0.0349	7.6	7.5	1.4	0.77	0.23	3.36x	+1.152	—
BK.SHWD	28.3	496	496	HNE	0.0273	0.0273	0.0544	2.6	2.7	4.4	0.79	0.85	0.93x	-0.691	—
NC.GCWB	29.0	753	753	HNE	0.0426	0.0406	0.0292	2.6	2.7	2.8	0.56	0.47	1.20x	+0.331	—
BK.HULL	30.0	756	756	HNE	0.0208	0.0209	0.0272	2.4	2.5	1.8	0.48	0.38	1.26x	-0.262	—
NC.GMR	32.8	496	496	HNE	0.0268	0.0268	0.0394	2.2	2.1	2.5	0.76	0.46	1.66x	-0.386	—
NC.GNR	39.3	495	495	HNE	0.0363	0.0358	0.0265	3.2	3.1	2.3	0.80	0.55	1.46x	+0.303	—
BK.ETSL	42.6	755	755	HNE	0.0031	0.0031	0.0210	0.6	0.6	1.4	0.20	0.16	1.26x	-1.910	Outl
BK.BONV	43.0	689	689	HNE	0.0234	0.0232	0.0290	1.6	1.7	1.5	0.29	0.15	1.93x	-0.224	—
BK.HOPS	43.2	734	734	HNE	0.0147	0.0144	0.0236	1.3	1.3	1.7	0.55	0.37	1.49x	-0.494	—
NC.GHGB	43.6	746	746	HNE	0.0328	0.0323	0.0204	2.0	2.0	1.1	0.47	0.23	2.02x	+0.462	—
NC.GHO	44.4	494	494	HNE	0.0232	0.0232	0.0291	2.7	2.7	1.5	0.56	0.33	1.71x	-0.227	—
BK.MNDO	44.7	414	414	HNE	0.0245	0.0242	0.0277	1.9	1.9	1.6	0.45	0.48	0.95x	-0.133	—
NC.GSN	47.0	616	616	HNE	0.0100	0.0099	0.0224	1.5	1.5	1.5	0.46	0.38	1.21x	-0.815	—
NC.GBL	49.5	443	443	HNE	0.0356	0.0355	0.0247	2.9	2.8	1.7	0.61	0.44	1.38x	+0.363	—
CE.79016	50.5	366	366	HNE	0.0081	0.0078	0.0293	0.6	0.5	2.1	0.16	0.25	0.65x	-1.323	—
BK.GTSB	54.1	755	755	HNE	0.0066	0.0066	0.0136	1.0	1.0	0.9	0.24	0.13	1.86x	-0.725	—
NC.KIP	54.1	522	522	HNE	0.0077	0.0075	0.0195	0.8	0.8	1.7	0.20	0.32	0.63x	-0.957	—

Station summary — three independent sources (2/2)

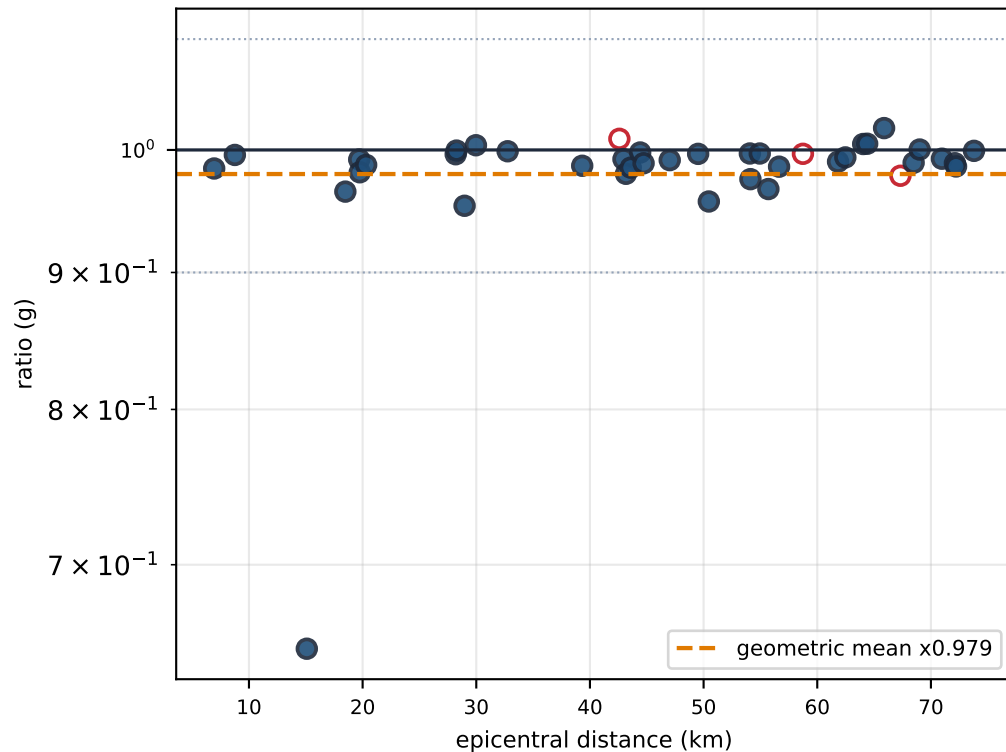
ShakeMap = amplitudes the seismic network reported in stationlist.json. obspy = the same recordings fetched from FDSN and processed here. BBP = simulated. The first two should agree closely; where they do not, the ShakeMap quality flags usually explain why.

PGD is the animation pipeline's own number on both sides, read from the displacement each side hands to Blender — a different processing chain from the PGA and PGV columns, and from each other. See the displacement pages at the end.

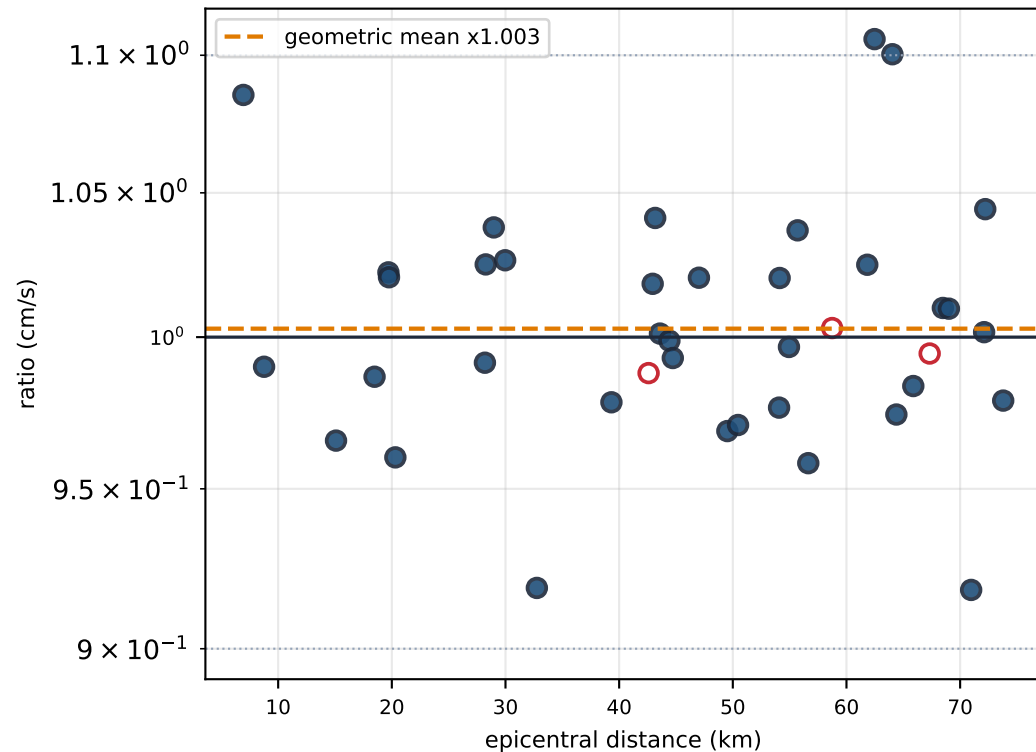
Station	Dist (km)	Vs30 BBP	Vs30 ShakeMap	Chan	PGA (g) ShakeMap	PGA (g) obspy	PGA (g) BBP	PGV (cm/s) ShakeMap	PGV (cm/s) obspy	PGV (cm/s) BBP	PGD (cm) obspy	PGD (cm) BBP	PGD obs/sim	ln(obs/sim)	Flags
NC.GSR	54.9	750	750	HNE	0.0176	0.0175	0.0155	1.7	1.7	0.9	0.37	0.12	3.04x	+0.124	—
BK.GALB	55.7	486	486	HNE	0.0064	0.0061	0.0177	0.6	0.6	1.2	0.26	0.24	1.07x	-1.059	—
BK.SPAN	56.6	494	494	HNE	0.0274	0.0271	0.0180	2.2	2.1	1.3	0.41	0.27	1.51x	+0.406	—
NC.GTK	58.7	708	708	HNE	0.0305	0.0304	0.0134	3.8	3.8	0.9	1.20	0.20	5.95x	+0.821	Outl
BK.RVIT	61.8	752	752	HNE	0.0120	0.0119	0.0117	1.2	1.3	0.7	0.26	0.19	1.35x	+0.011	—
NC.GPM	62.5	708	708	HNE	0.0151	0.0150	0.0138	1.3	1.5	0.8	0.42	0.26	1.61x	+0.086	—
CE.68035	64.0	705	705	HNE	0.0121	0.0121	0.0135	1.4	1.6	0.8	0.46	0.20	2.33x	-0.107	—
NC.GWW	64.4	493	493	HNE	0.0190	0.0191	0.0208	2.2	2.2	1.1	0.35	0.14	2.43x	-0.085	—
BK.HALS	65.9	495	495	HNE	0.0081	0.0083	0.0151	1.5	1.5	0.9	0.21	0.26	0.81x	-0.602	—
NC.GRT	67.3	710	710	HNE	0.0489	0.0478	0.0120	5.0	5.0	0.6	0.69	0.15	4.63x	+1.386	Outl
NC.GCVB	68.5	607	607	HNE	0.0096	0.0095	0.0115	0.8	0.9	0.8	0.29	0.27	1.07x	-0.191	—
NC.KBSB	69.0	751	751	HNE	0.0049	0.0049	0.0143	1.1	1.1	0.8	0.31	0.22	1.39x	-1.061	—
BK.GCKB	71.0	532	532	HNE	0.0042	0.0041	0.0150	1.0	0.9	1.2	0.25	0.23	1.08x	-1.286	—
NC.GDXB	72.1	728	728	HNE	0.0025	0.0025	0.0138	0.4	0.4	0.7	0.20	0.19	1.05x	-1.720	—
NC.GWKB	72.2	749	749	HNE	0.0119	0.0117	0.0109	1.4	1.5	0.8	0.36	0.10	3.64x	+0.076	—
NC.GGPC	73.8	691	691	HNE	0.0054	0.0054	0.0098	0.7	0.7	0.8	0.21	0.21	0.97x	-0.599	—

Cross-check — two processings of the same recordings

PGA — obspy / ShakeMap-reported
39 of 40 within $\pm 10\%$

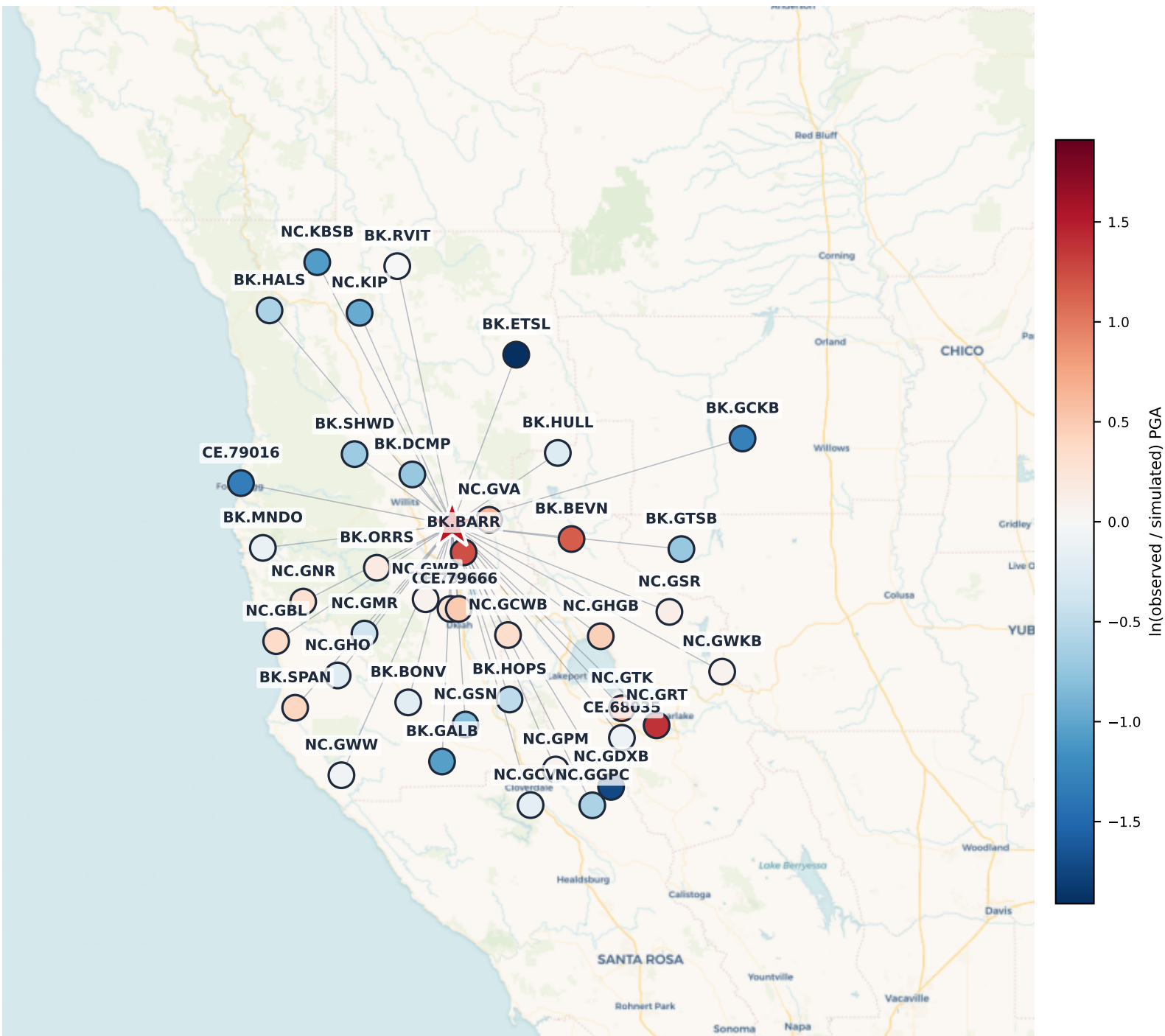


PGV — obspy / ShakeMap-reported
38 of 40 within $\pm 10\%$

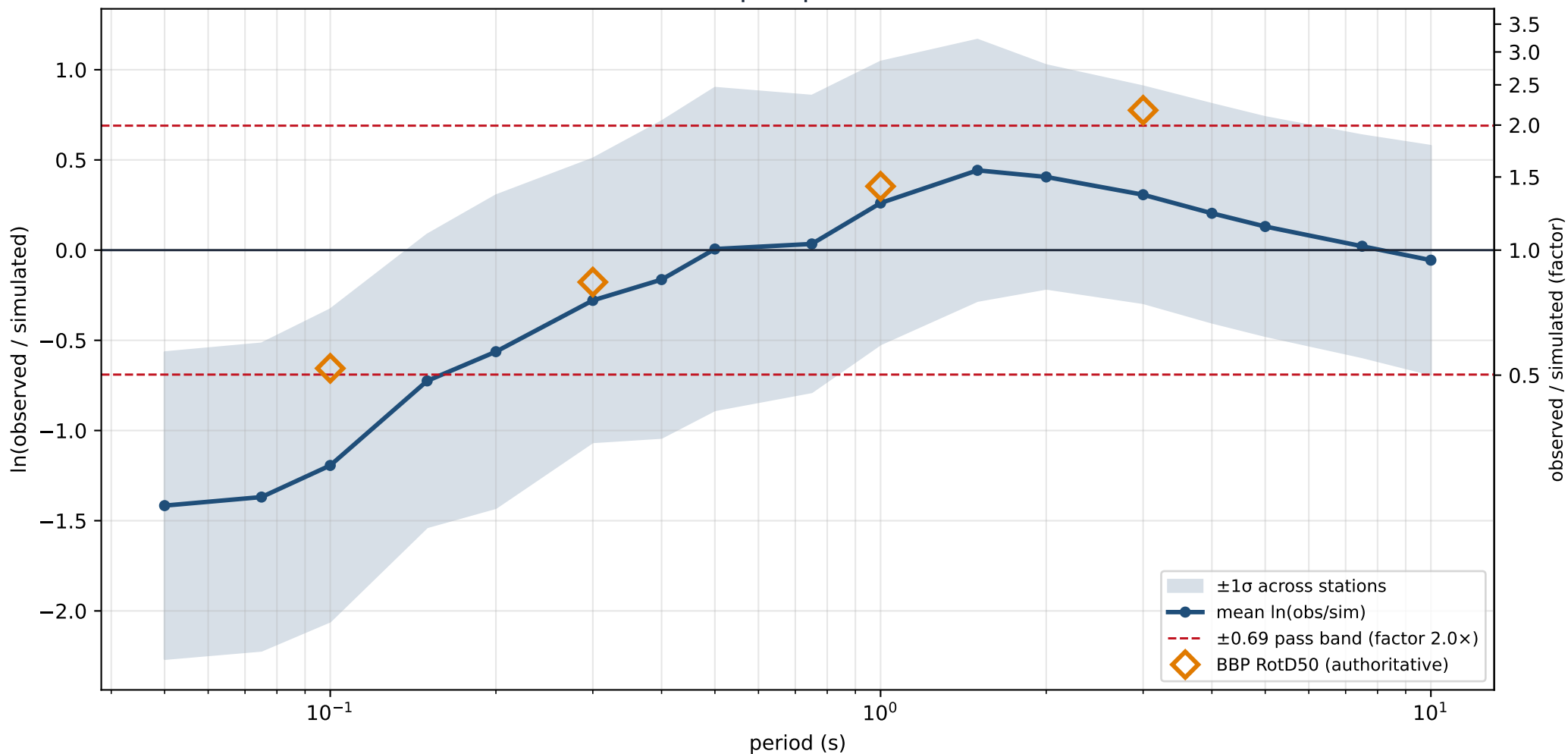


Low red markers are stations ShakeMap flagged (IncompleteRecord, Outlier, ...). Dotted lines are $\pm 10\%$. A consistent offset would mean our processing differs systematically from the network.

Station geometry — nc75382936 M5.59
star = epicentre; marker colour = $\ln(\text{obs}/\text{sim})$ PGA residual (red = observed larger)



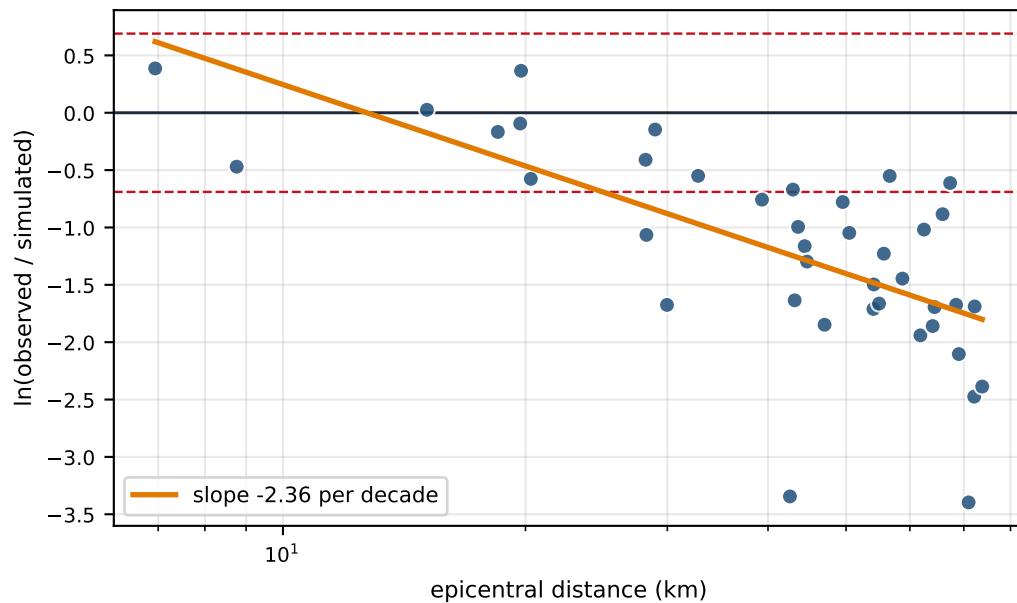
Goodness of fit — log residual by period
this report's spectra: mean |bias| = 0.446 (factor 1.56×)
BBP RotD50: mean |bias| = 0.370 (factor 1.45×)



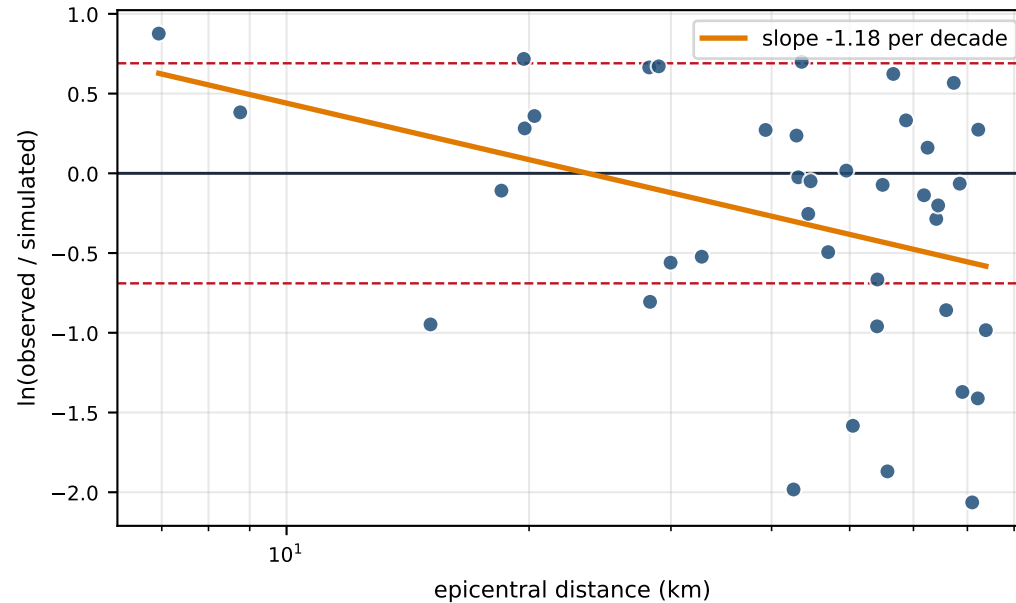
Positive = the simulation under-predicts (real shaking was larger). Negative = it over-predicts.

Residual versus distance — is the error constant, or does it grow?

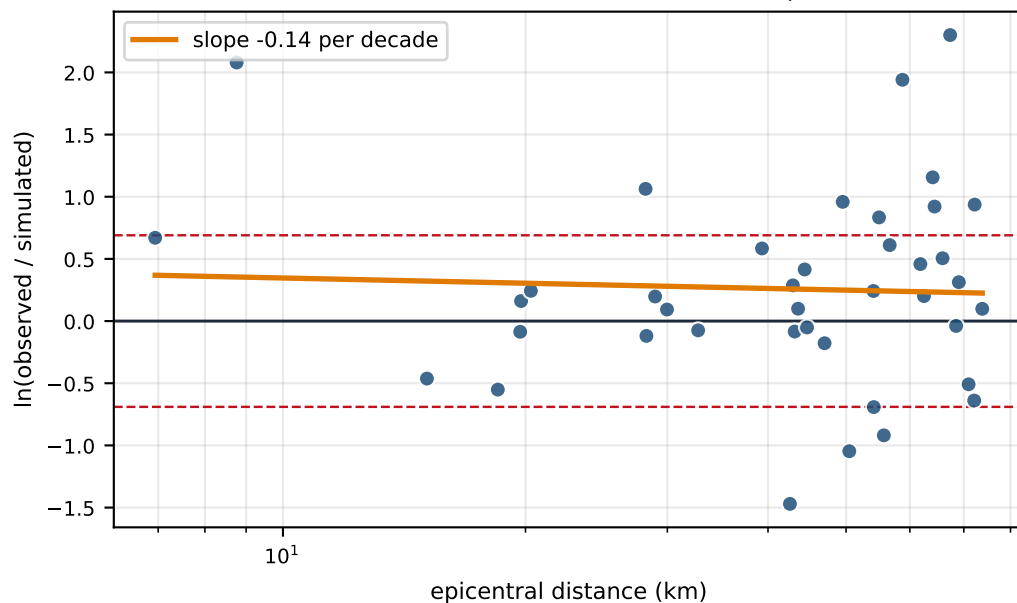
T = 0.1 s mean -1.194 (factor 3.30x over-predicted)



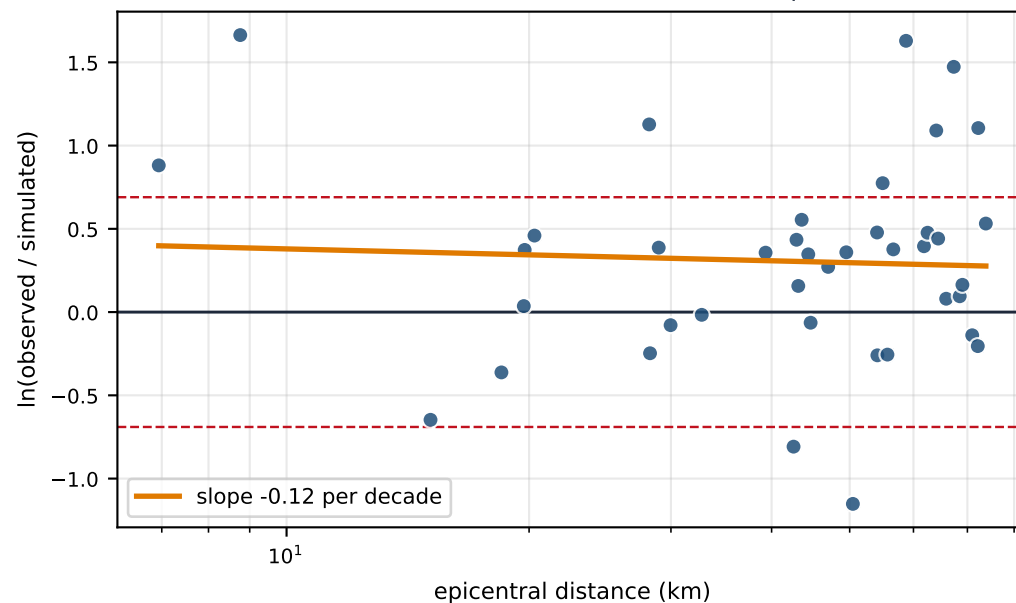
T = 0.3 s mean -0.279 (factor 1.32x over-predicted)



T = 1 s mean +0.261 (factor 1.30x under-predicted)

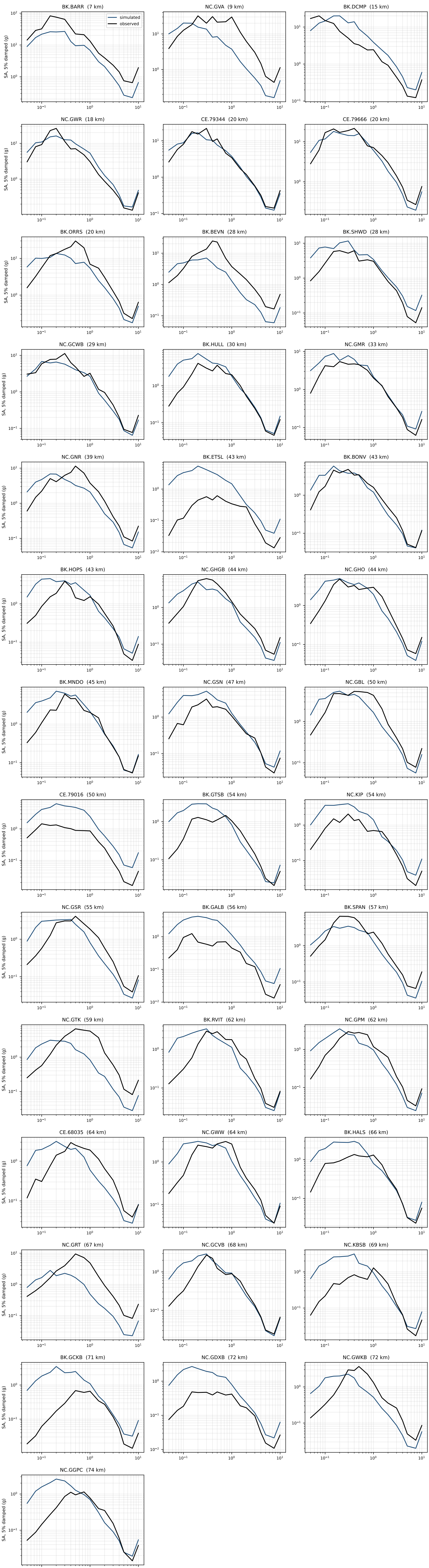


T = 3 s mean +0.307 (factor 1.36x under-predicted)

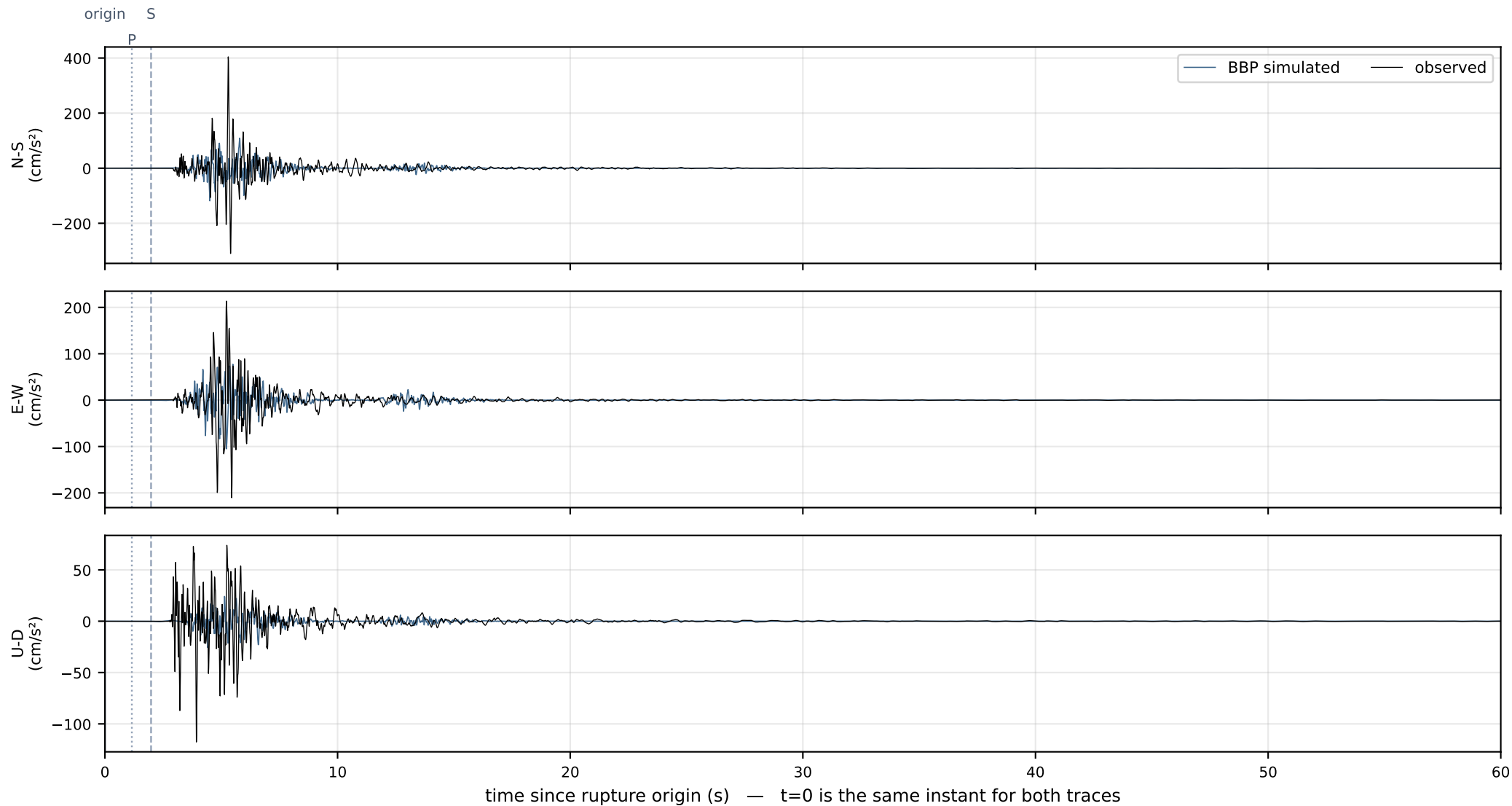


Flat offset = amplitude/site problem. Sloping = attenuation problem. Dashed lines are the ± 0.69 pass band.

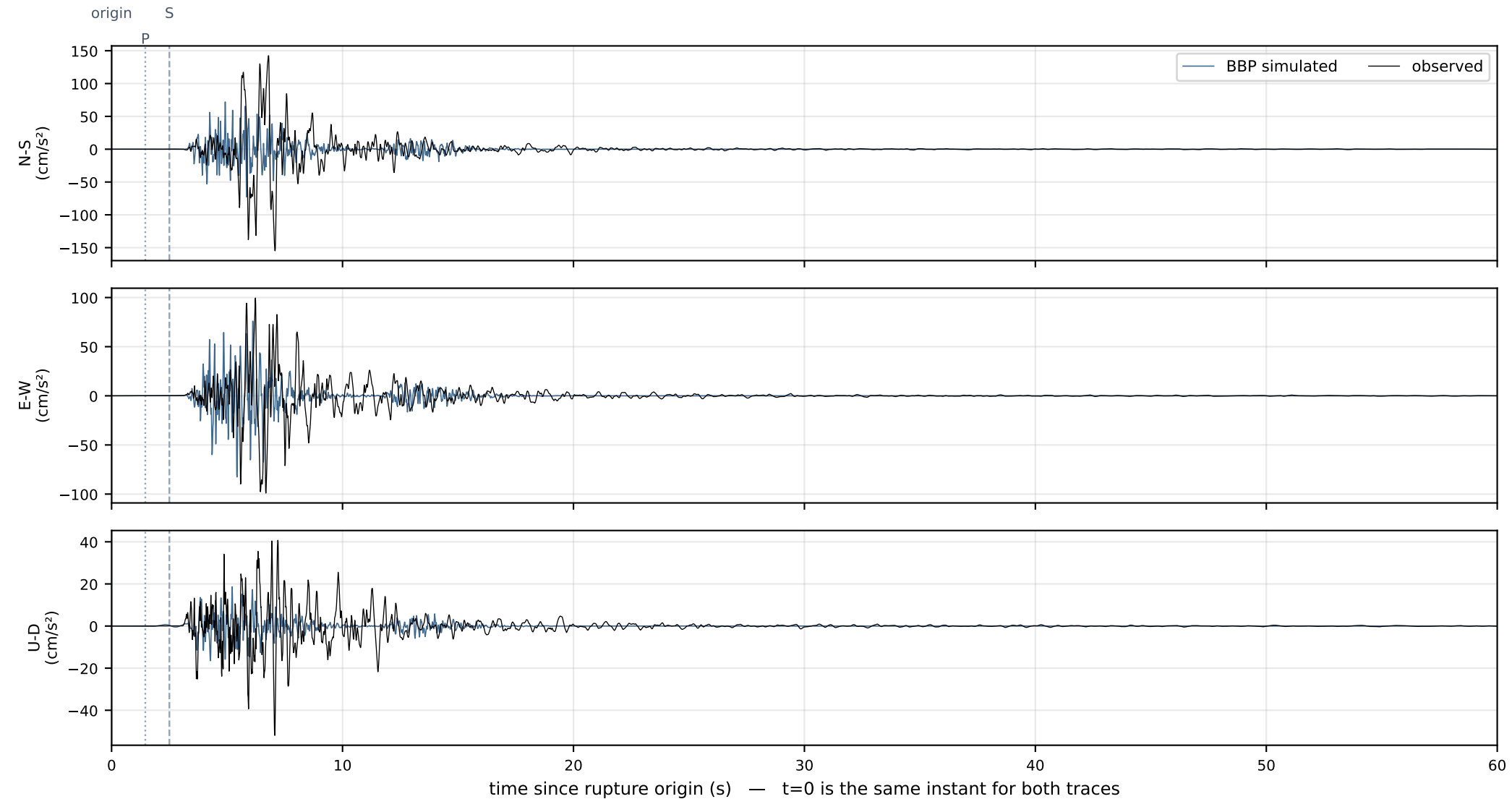
Response spectra — observed vs simulated (geometric-mean horizontal)



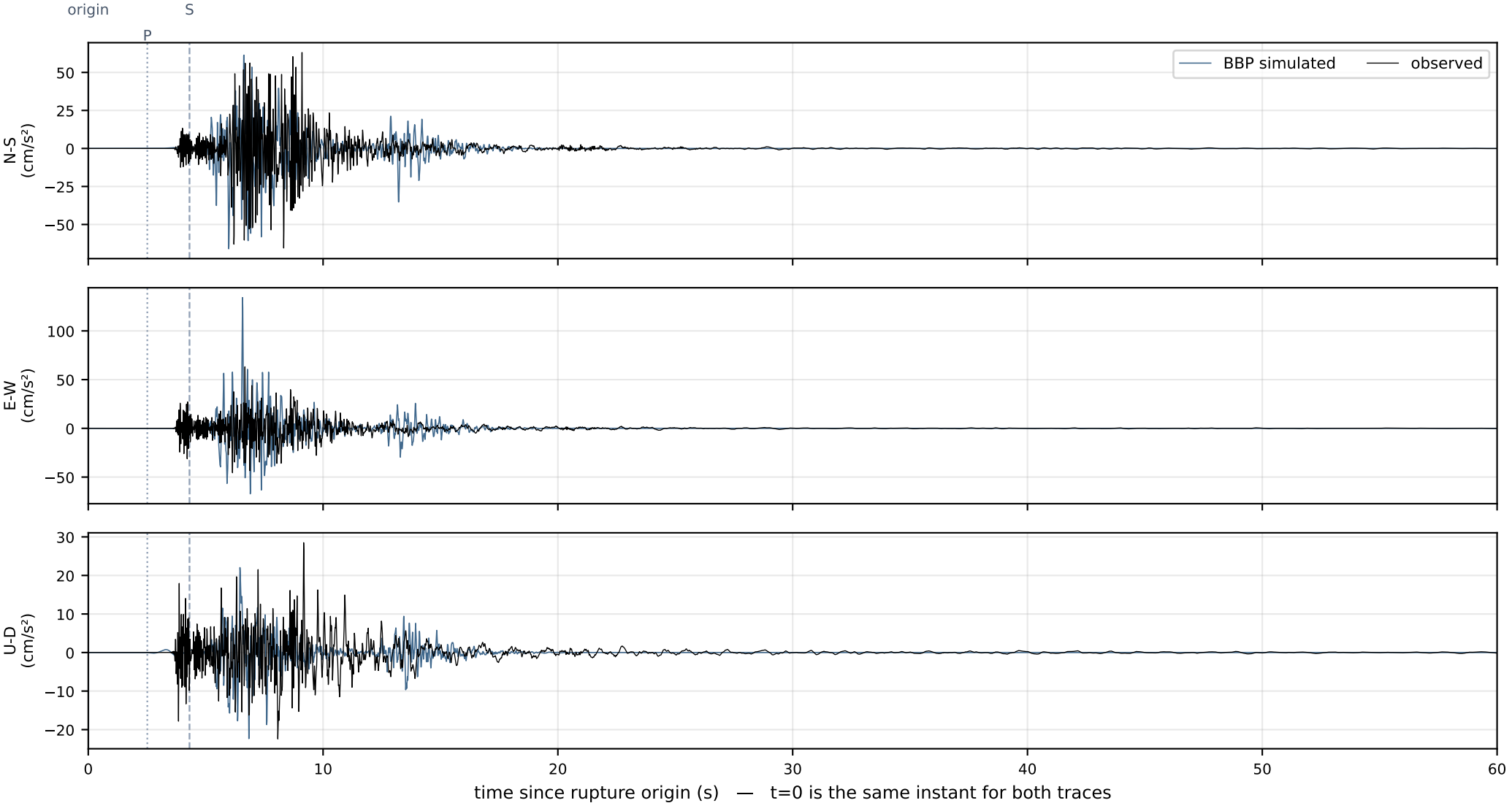
BK.BARR — 6.9 km, Vs30 730 m/s, HNE (NCEDC)
observed PGA 0.4122 g · simulated PGA 0.1210 g · $\ln(\text{obs}/\text{sim}) = +1.226$ · observed peak at +5.3 s
observed record starts 60.0 s before origin



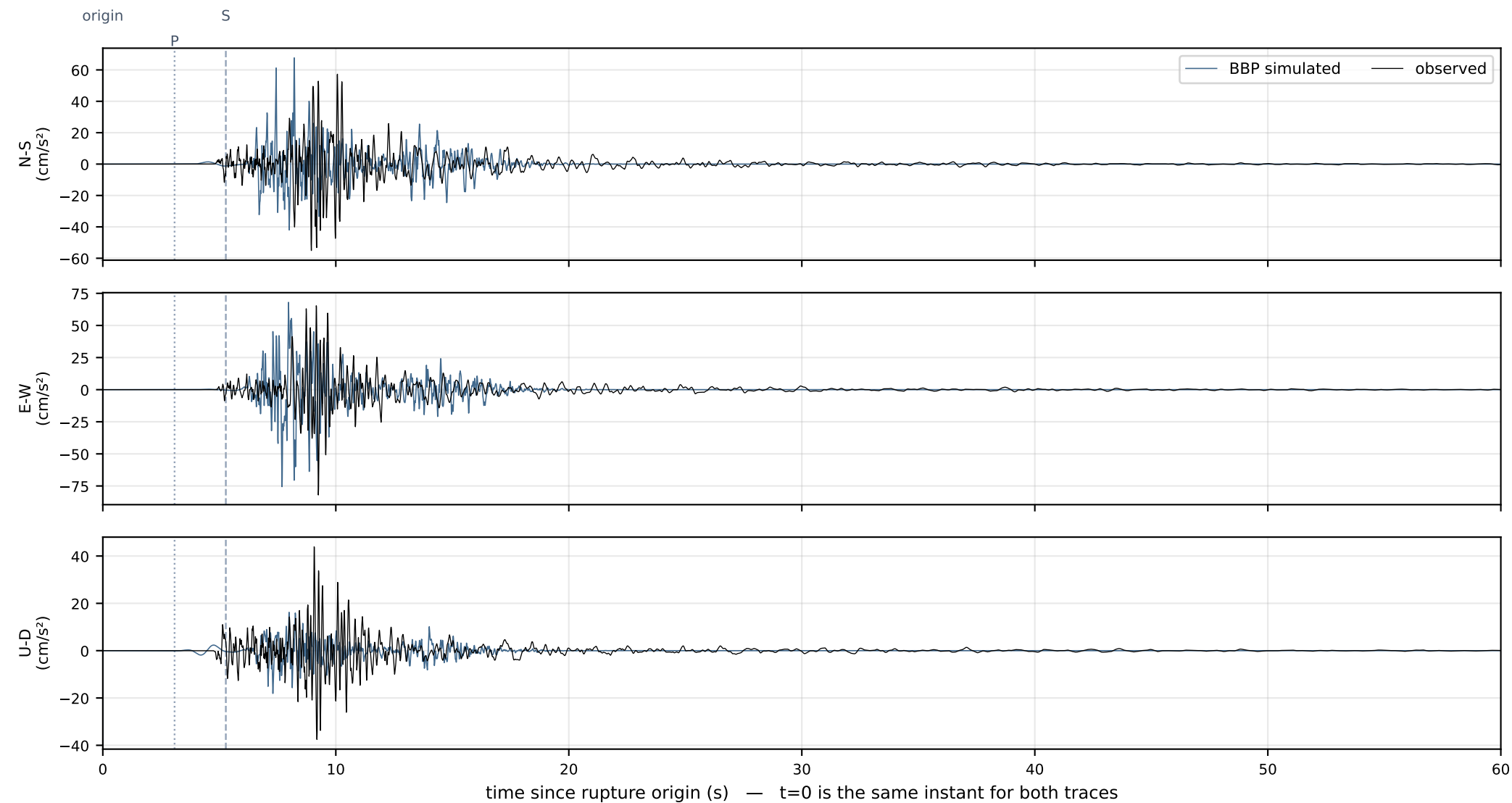
NC.GVA — 8.8 km, Vs30 758 m/s, HNE (NCEDC)
observed PGA 0.1579 g · simulated PGA 0.0842 g · $\ln(\text{obs}/\text{sim}) = +0.628$ · observed peak at +7.1 s
observed record starts 60.0 s before origin



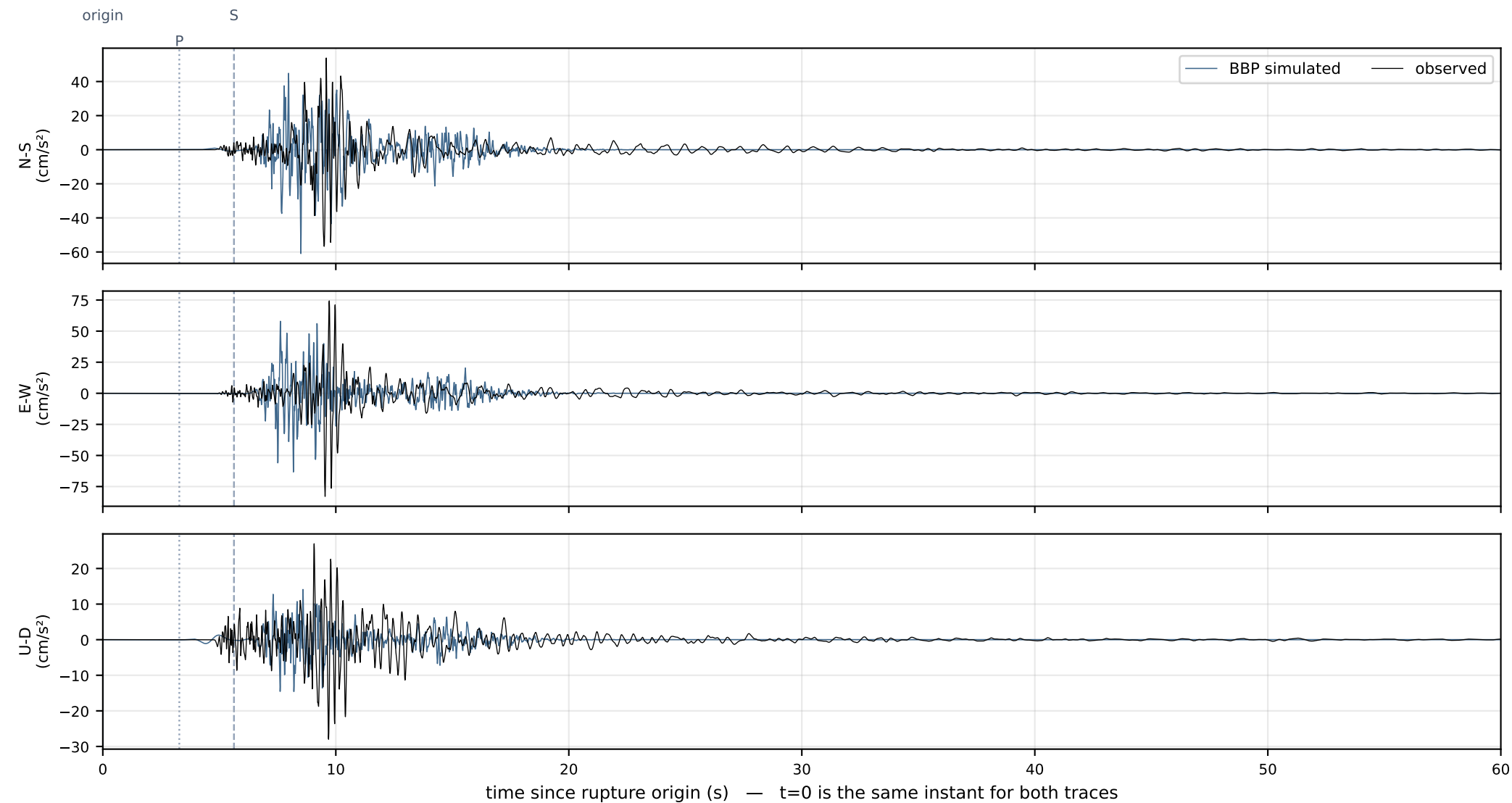
BK.DCMP — 15.1 km, Vs30 709 m/s, HNE (NCEDC)
observed PGA 0.0668 g · simulated PGA 0.1368 g · $\ln(\text{obs}/\text{sim}) = -0.717$ · observed peak at +8.3 s
observed record starts 60.0 s before origin



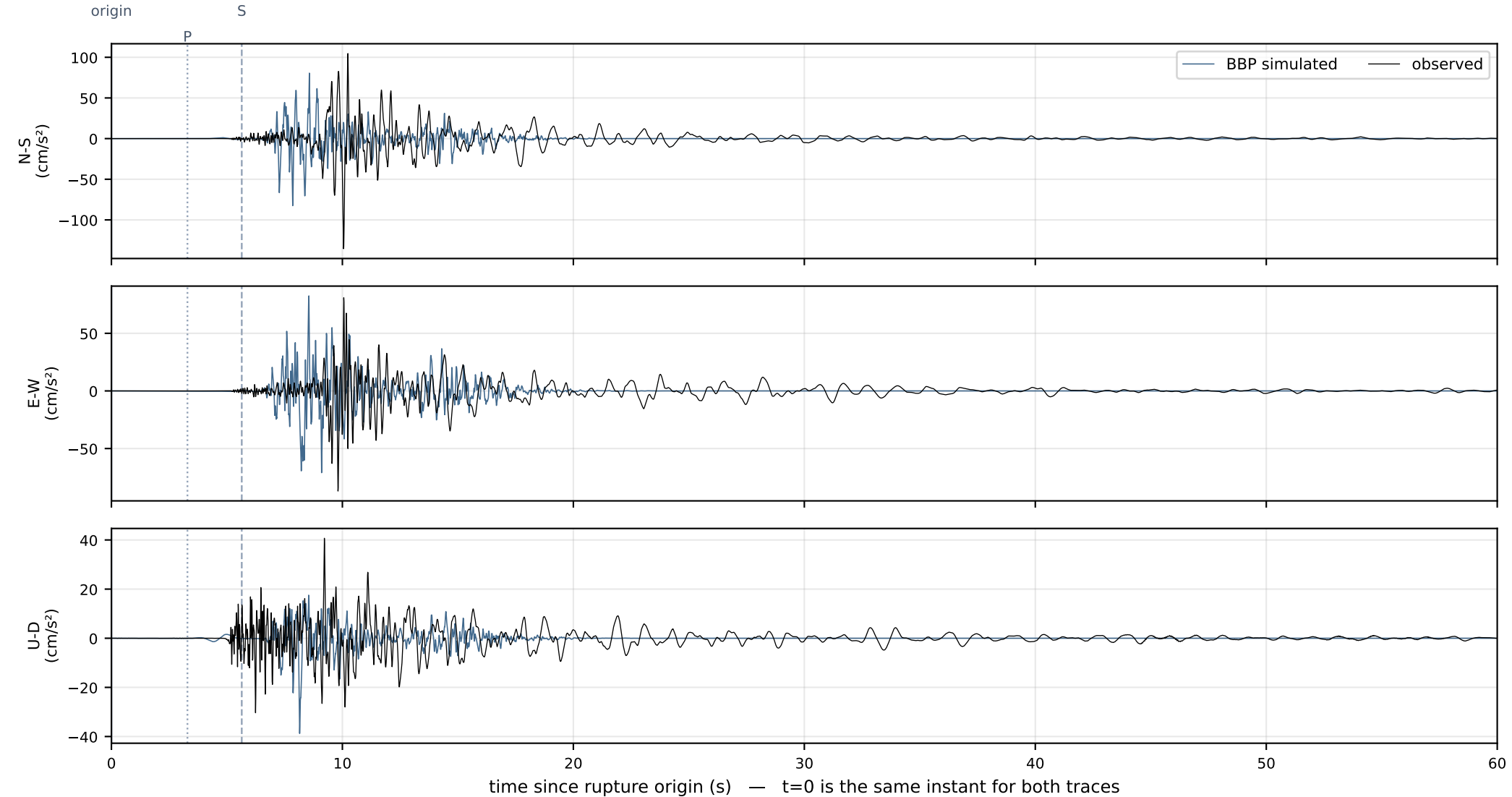
NC.GWR — 18.5 km, Vs30 500 m/s, HNE (NCEDC)
observed PGA 0.0836 g · simulated PGA 0.0770 g · $\ln(\text{obs}/\text{sim}) = +0.083$ · observed peak at +9.2 s
observed record starts 60.0 s before origin



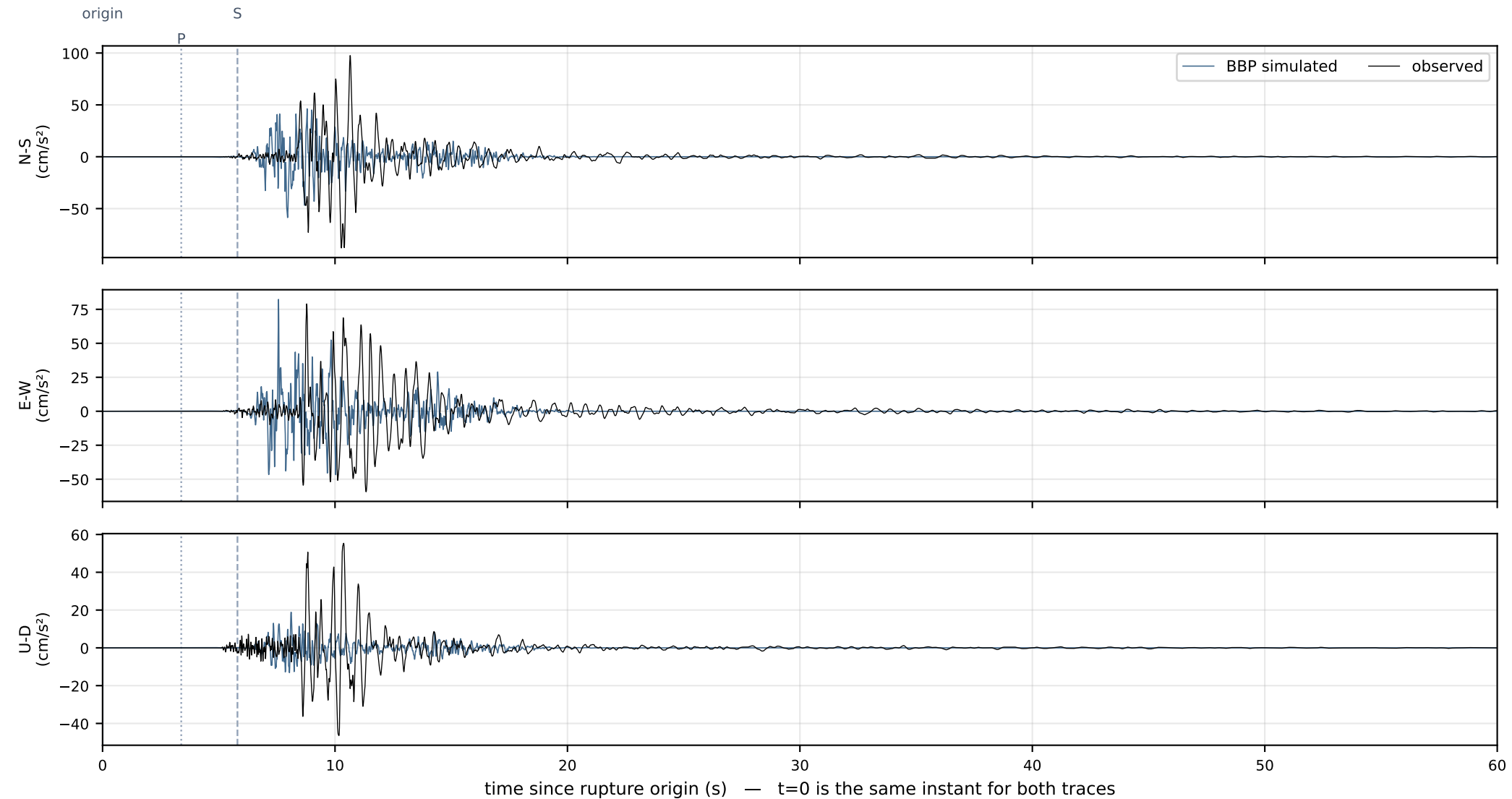
CE.79344 — 19.7 km, Vs30 542 m/s, HNE (NCEDC)
observed PGA 0.0846 g · simulated PGA 0.0645 g · $\ln(\text{obs}/\text{sim}) = +0.271$ · observed peak at +9.5 s
observed record starts 60.0 s before origin



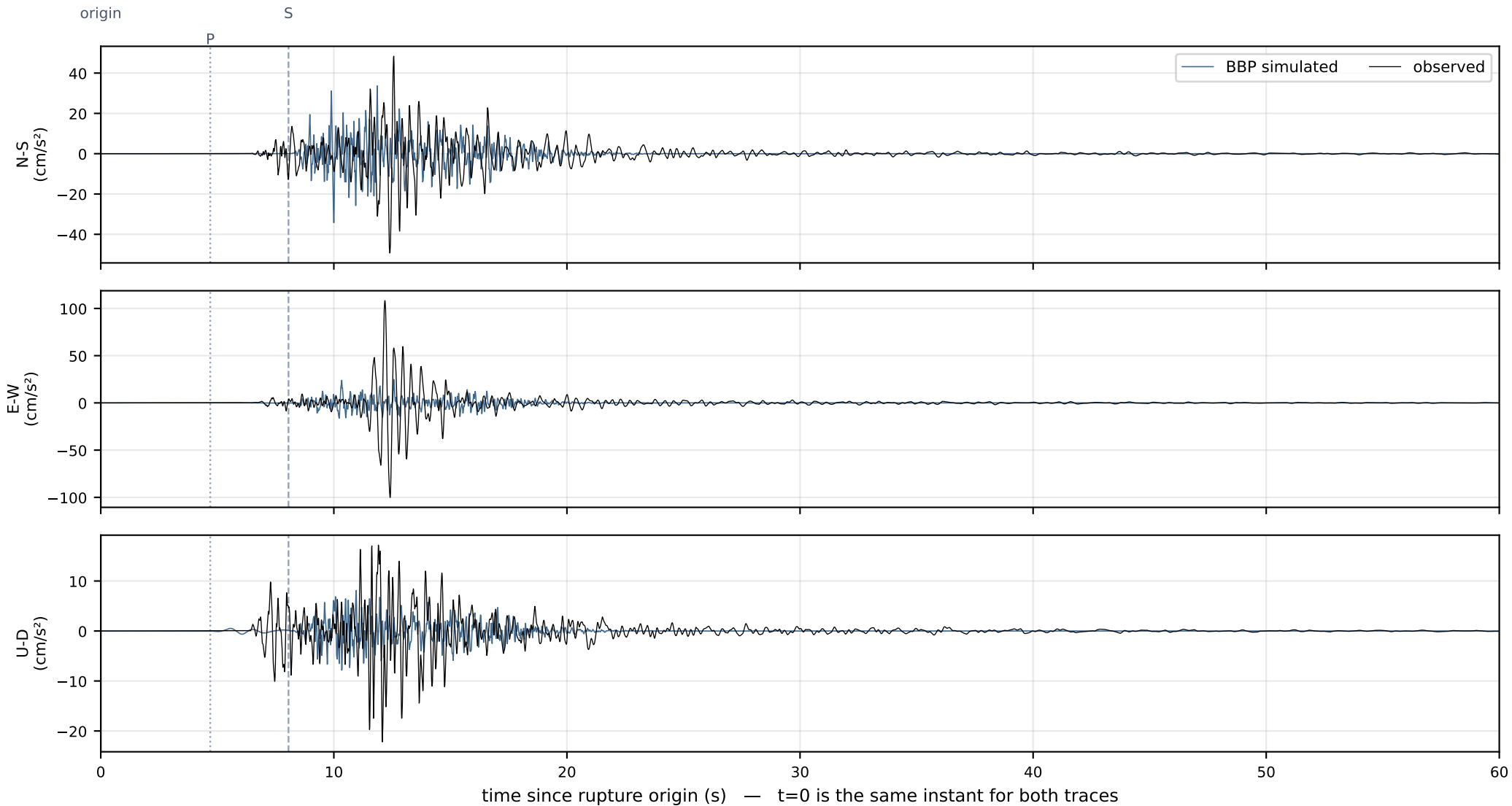
CE.79666 — 19.8 km, Vs30 348 m/s, HNE (NCEDC)
observed PGA 0.1381 g · simulated PGA 0.0841 g · $\ln(\text{obs}/\text{sim}) = +0.496$ · observed peak at +10.0 s
observed record starts 60.0 s before origin



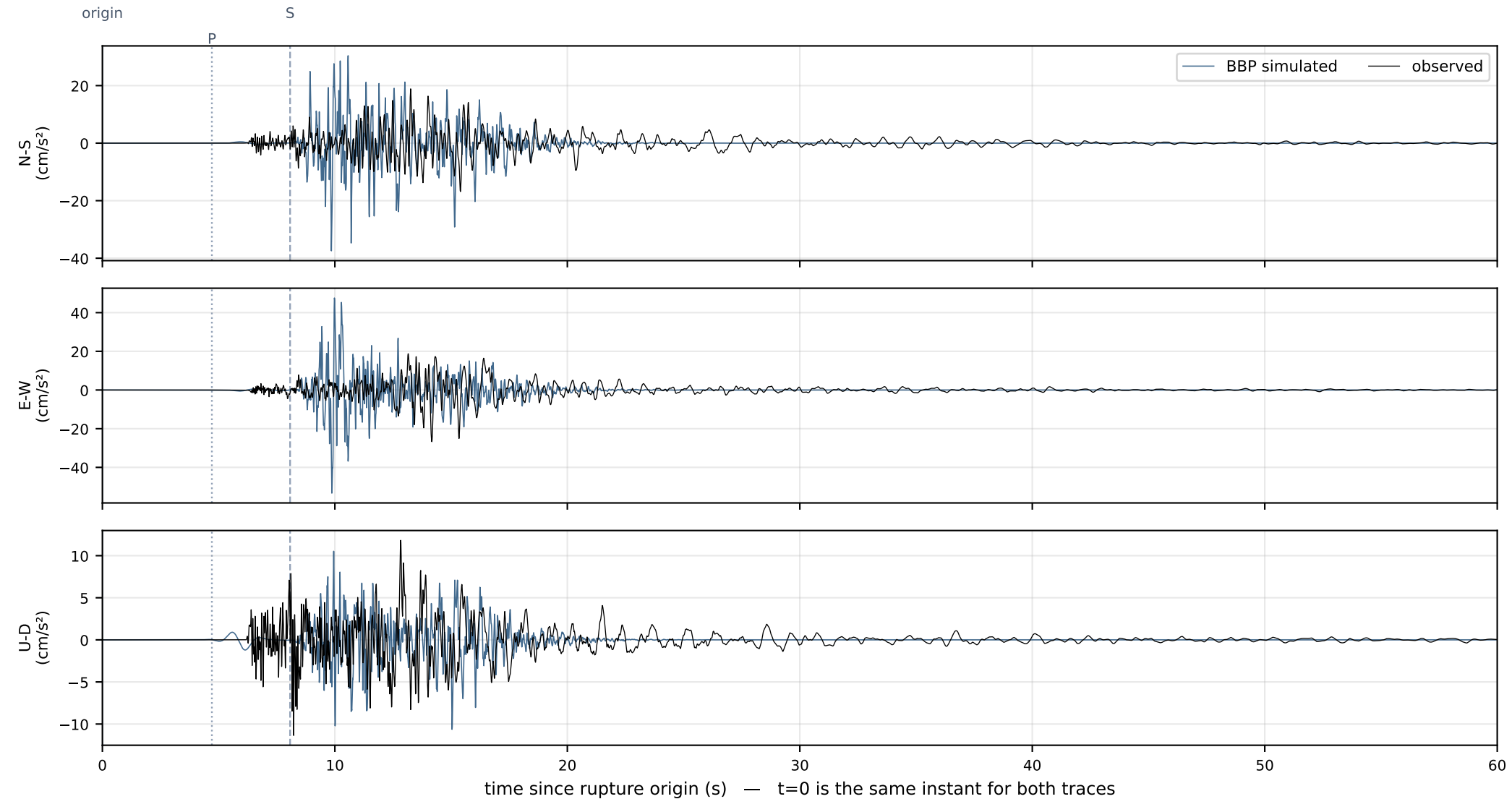
BK.ORRS — 20.3 km, Vs30 497 m/s, HNE (NCEDC)
observed PGA 0.0995 g · simulated PGA 0.0839 g · $\ln(\text{obs}/\text{sim}) = +0.170$ · observed peak at +10.7 s
observed record starts 60.0 s before origin



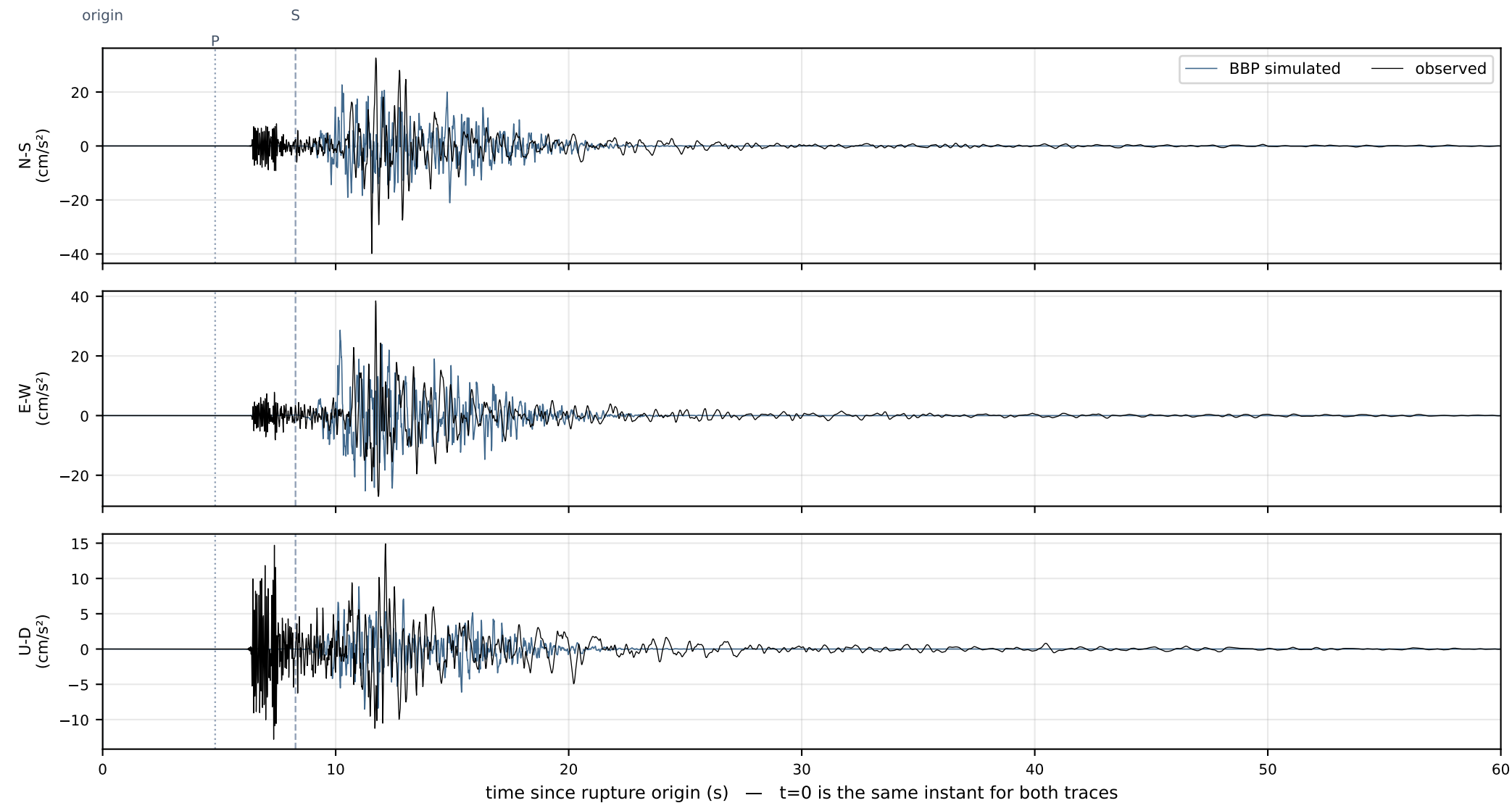
BK.BEVN — 28.2 km, Vs30 754 m/s, HNE (NCEDC)
observed PGA 0.1104 g · simulated PGA 0.0349 g · $\ln(\text{obs}/\text{sim}) = +1.152$ · observed peak at +12.2 s
observed record starts 60.0 s before origin



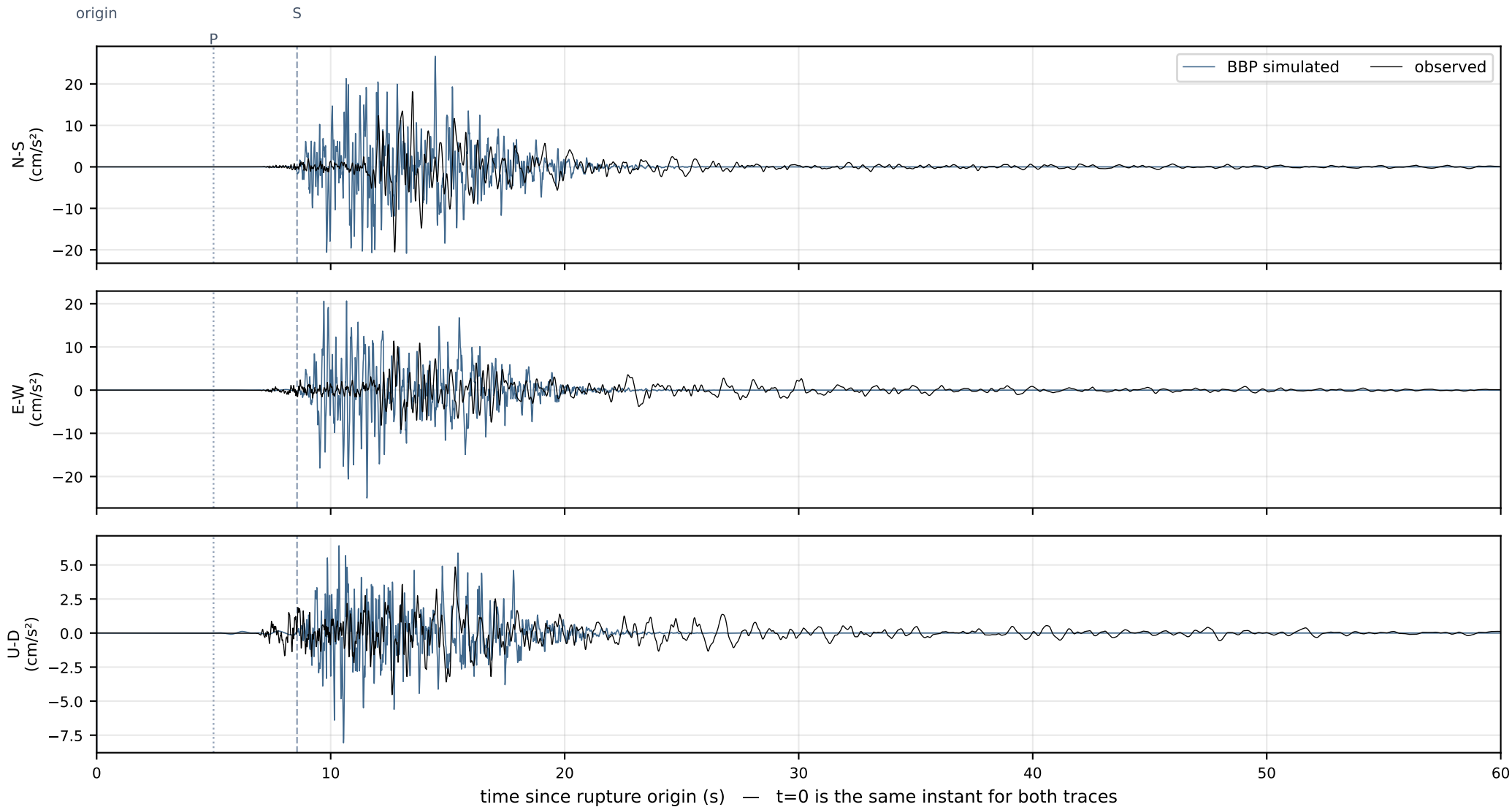
BK.SHWD — 28.3 km, Vs30 496 m/s, HNE (NCEDC)
observed PGA 0.0273 g · simulated PGA 0.0544 g · $\ln(\text{obs}/\text{sim}) = -0.691$ · observed peak at +14.2 s
observed record starts 60.0 s before origin



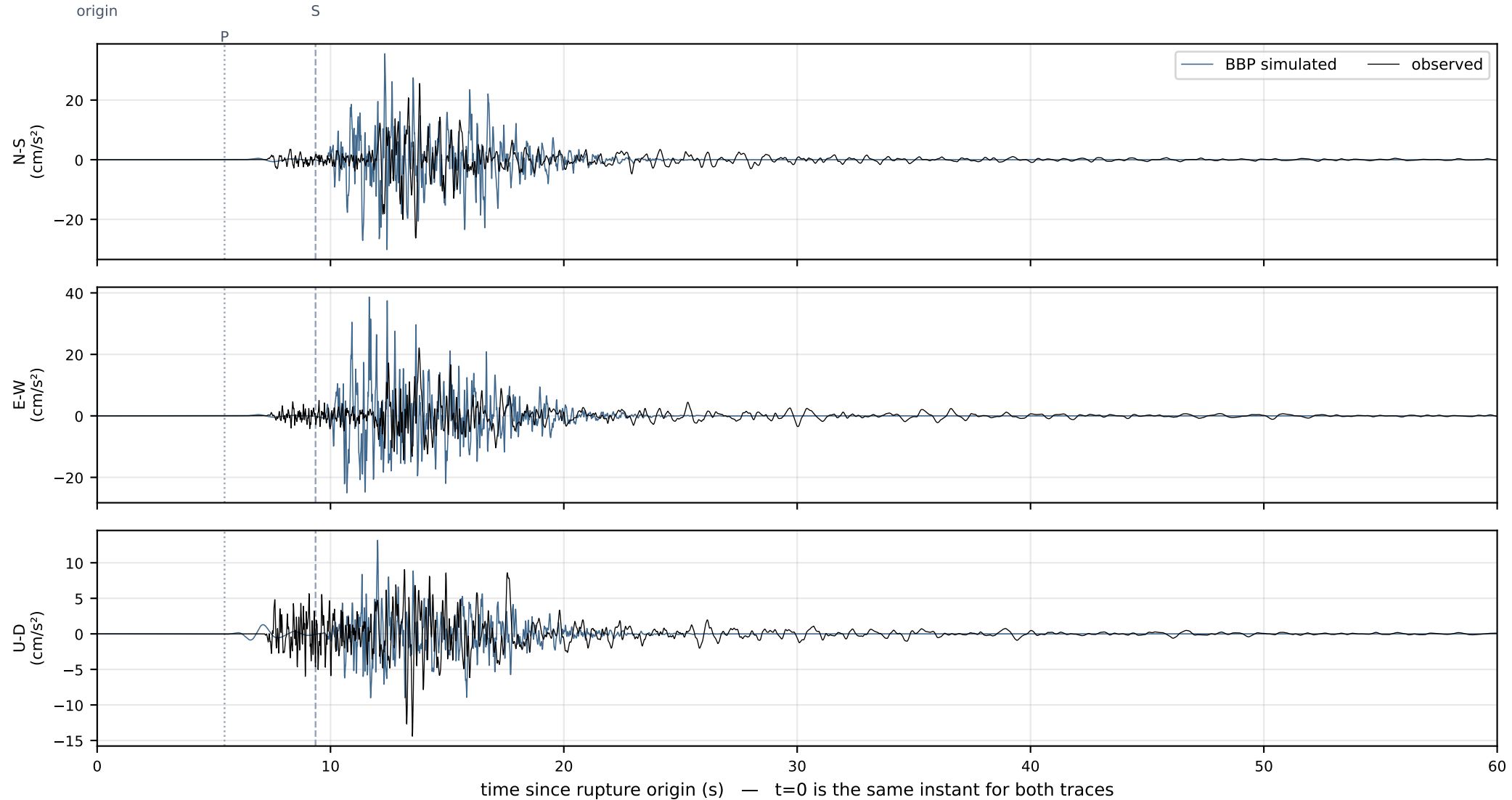
NC.GCWB — 29.0 km, Vs30 753 m/s, HNE (NCEDC)
observed PGA 0.0406 g · simulated PGA 0.0292 g · $\ln(\text{obs}/\text{sim}) = +0.331$ · observed peak at +11.5 s
observed record starts 60.0 s before origin



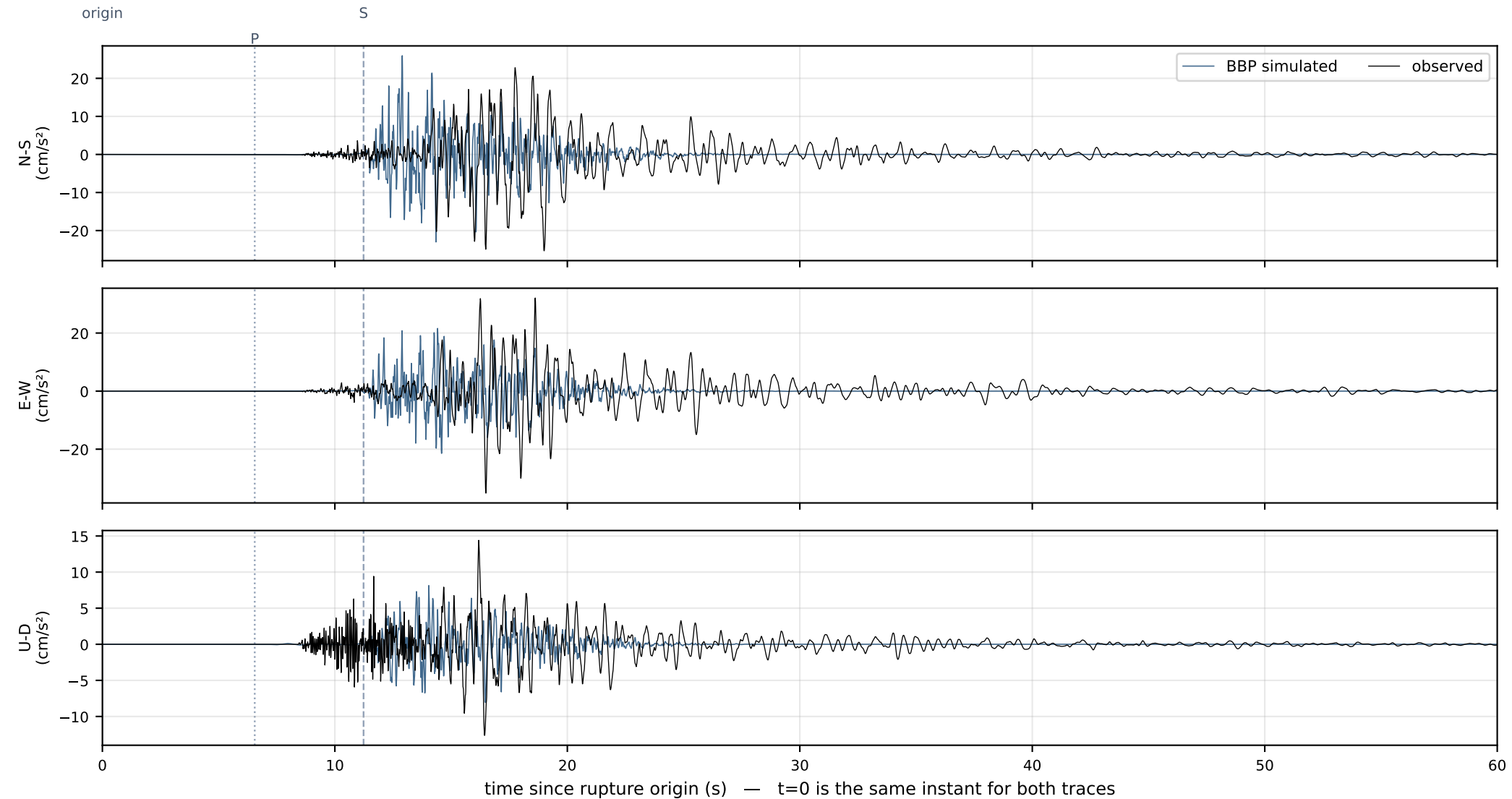
BK.HULL — 30.0 km, Vs30 756 m/s, HNE (NCEDC)
observed PGA 0.0209 g · simulated PGA 0.0272 g · $\ln(\text{obs}/\text{sim}) = -0.262$ · observed peak at +12.7 s
observed record starts 60.0 s before origin



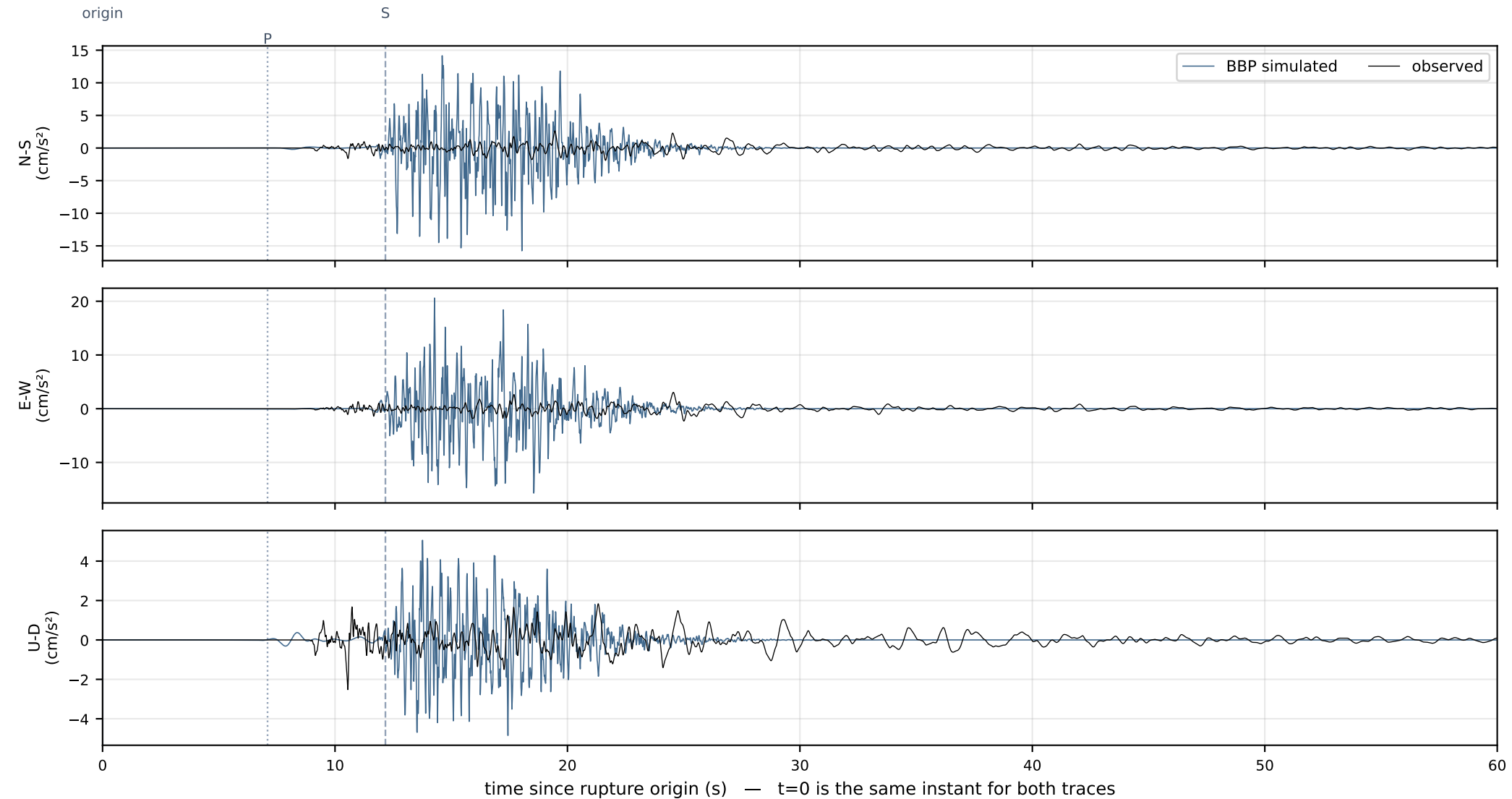
NC.GMR — 32.8 km, Vs30 496 m/s, HNE (NCEDC)
observed PGA 0.0268 g · simulated PGA 0.0394 g · $\ln(\text{obs}/\text{sim}) = -0.386$ · observed peak at +13.7 s
observed record starts 60.0 s before origin



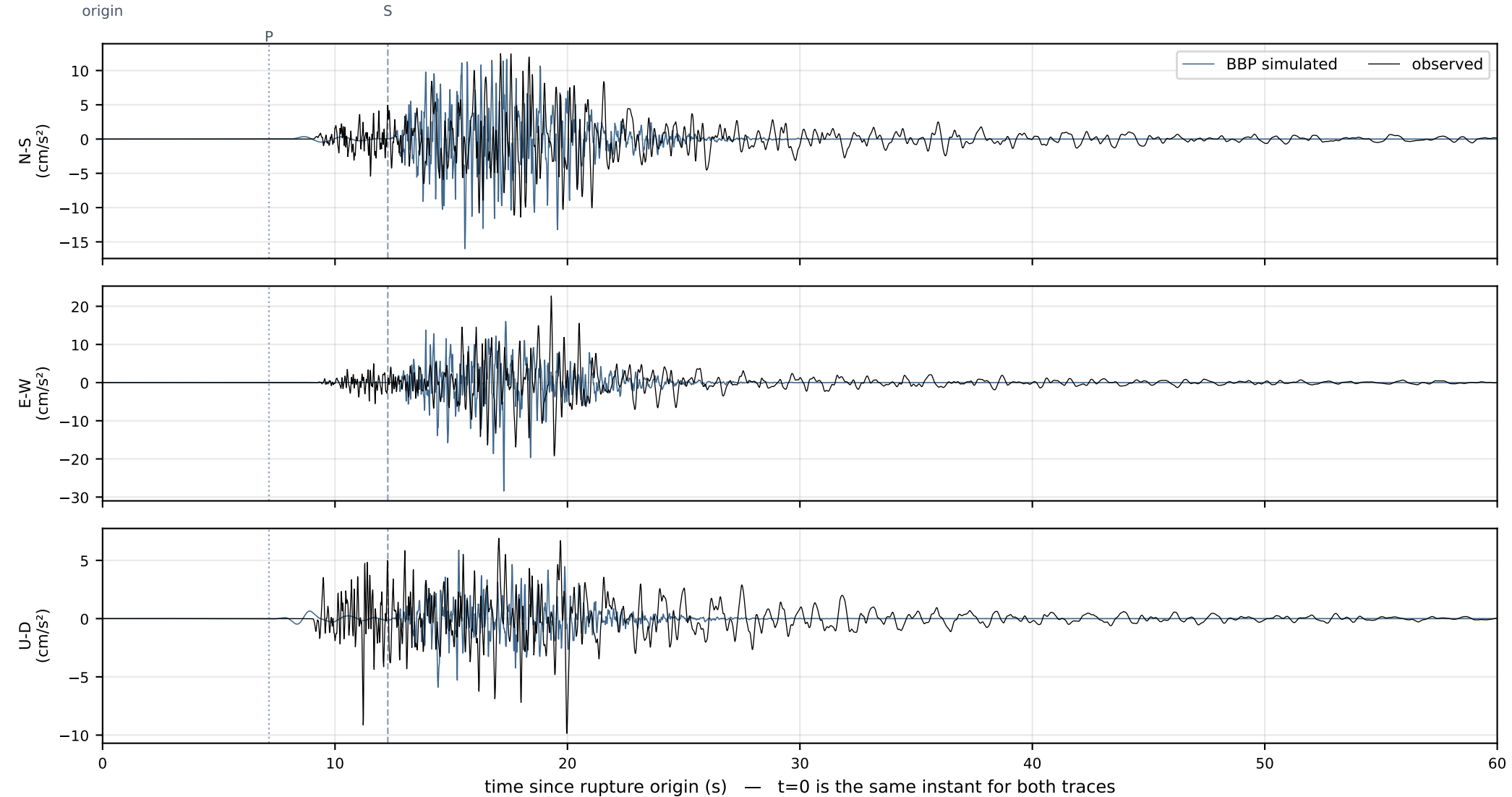
NC.GNR — 39.3 km, Vs30 495 m/s, HNE (NCEDC)
observed PGA 0.0358 g · simulated PGA 0.0265 g · $\ln(\text{obs}/\text{sim}) = +0.303$ · observed peak at +16.5 s
observed record starts 60.0 s before origin



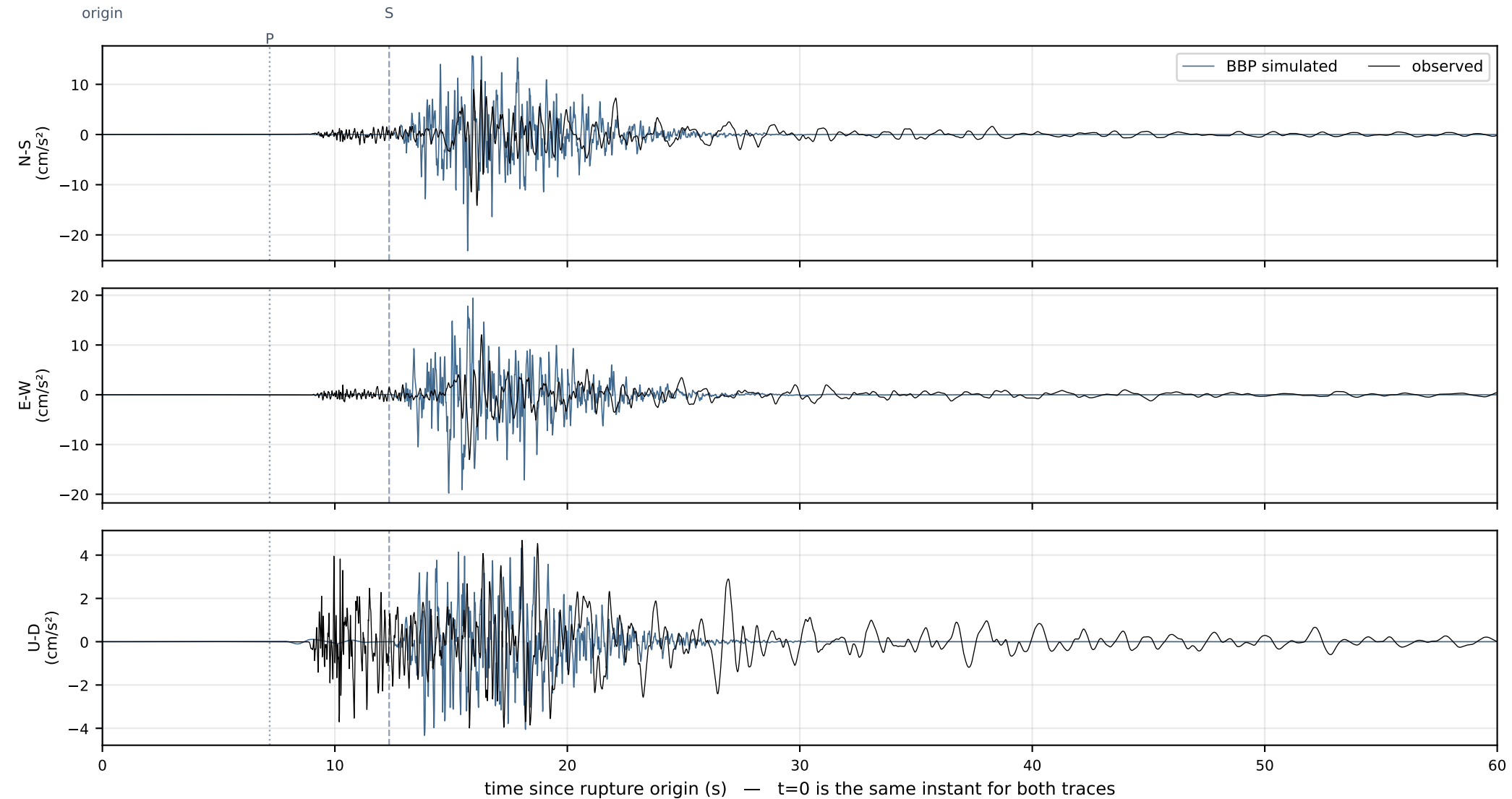
BK.ETSL — 42.6 km, Vs30 755 m/s, HNE (NCEDC)
observed PGA 0.0031 g · simulated PGA 0.0210 g · $\ln(\text{obs}/\text{sim}) = -1.910$ · observed peak at +24.6 s
observed record starts 60.0 s before origin



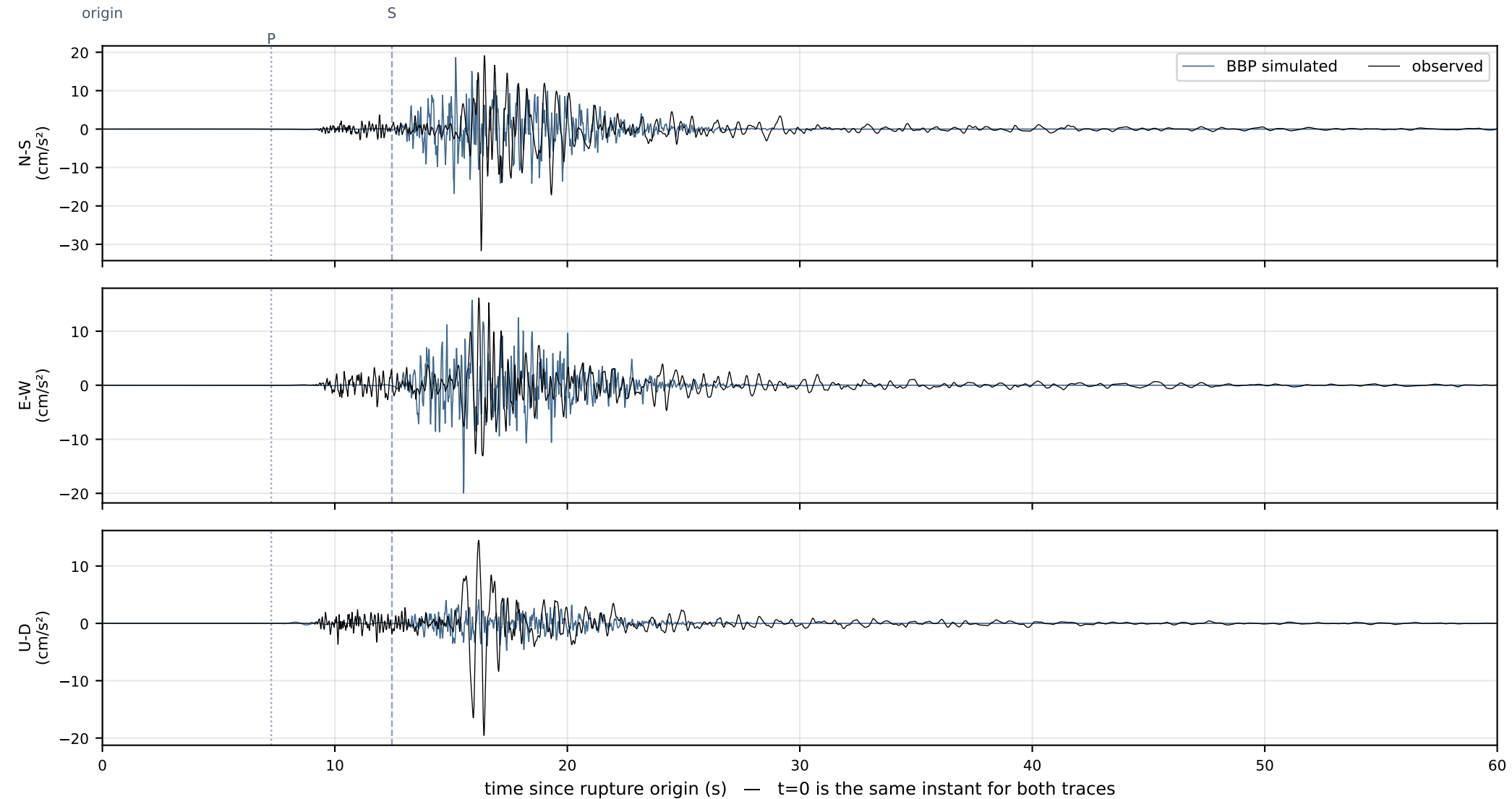
BK.BONV — 43.0 km, Vs30 689 m/s, HNE (NCEDC)
observed PGA 0.0232 g · simulated PGA 0.0290 g · $\ln(\text{obs}/\text{sim}) = -0.224$ · observed peak at +19.3 s
observed record starts 60.0 s before origin



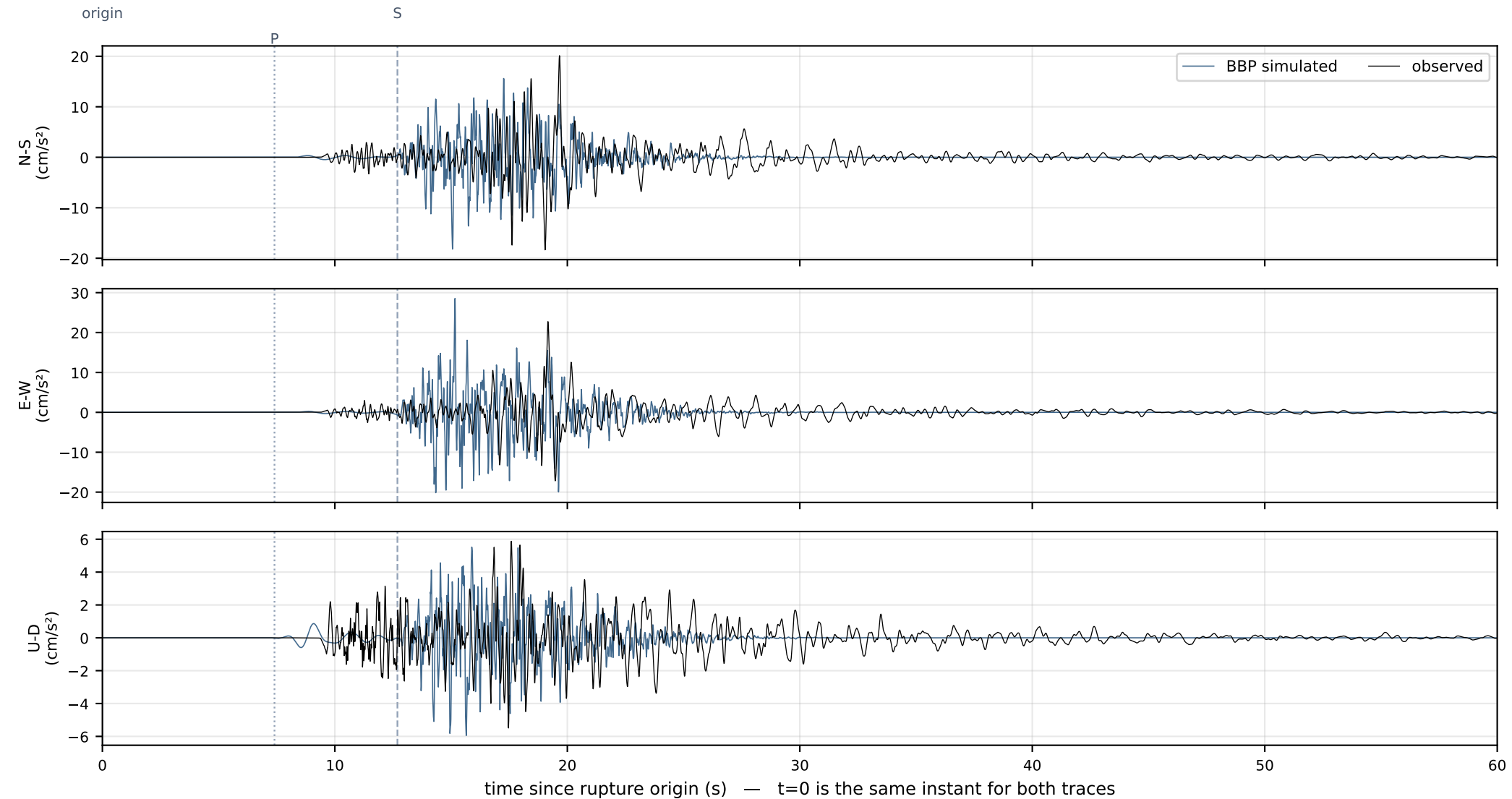
BK.HOPS — 43.2 km, Vs30 734 m/s, HNE (NCEDC)
observed PGA 0.0144 g · simulated PGA 0.0236 g · $\ln(\text{obs}/\text{sim}) = -0.494$ · observed peak at +16.1 s
observed record starts 60.0 s before origin



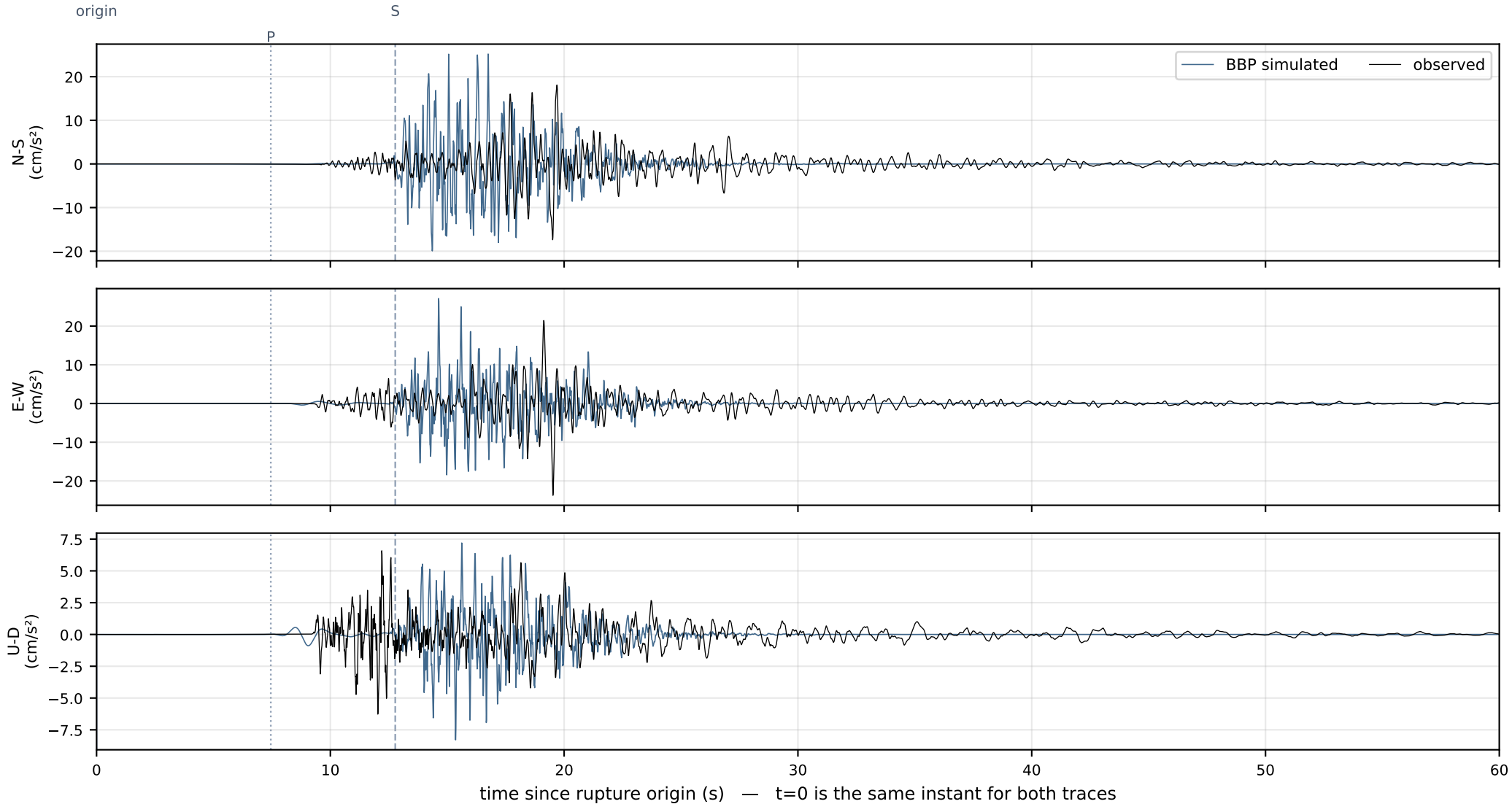
NC.GHGB — 43.6 km, Vs30 746 m/s, HNE (NCEDC)
observed PGA 0.0323 g · simulated PGA 0.0204 g · $\ln(\text{obs}/\text{sim}) = +0.462$ · observed peak at +16.3 s
observed record starts 60.0 s before origin



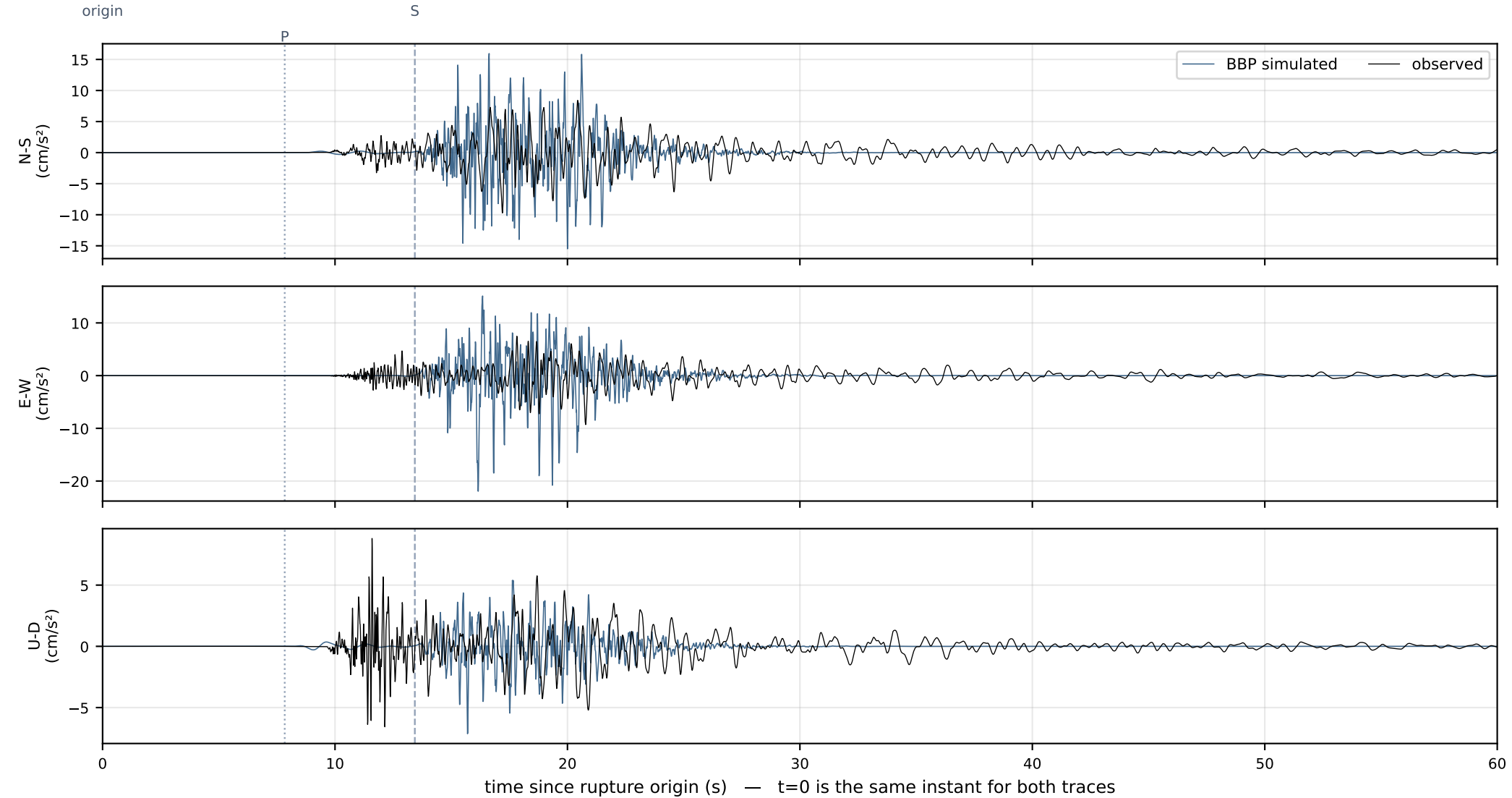
NC.GHO — 44.4 km, Vs30 494 m/s, HNE (NCEDC)
observed PGA 0.0232 g · simulated PGA 0.0291 g · $\ln(\text{obs}/\text{sim}) = -0.227$ · observed peak at +19.2 s
observed record starts 60.0 s before origin



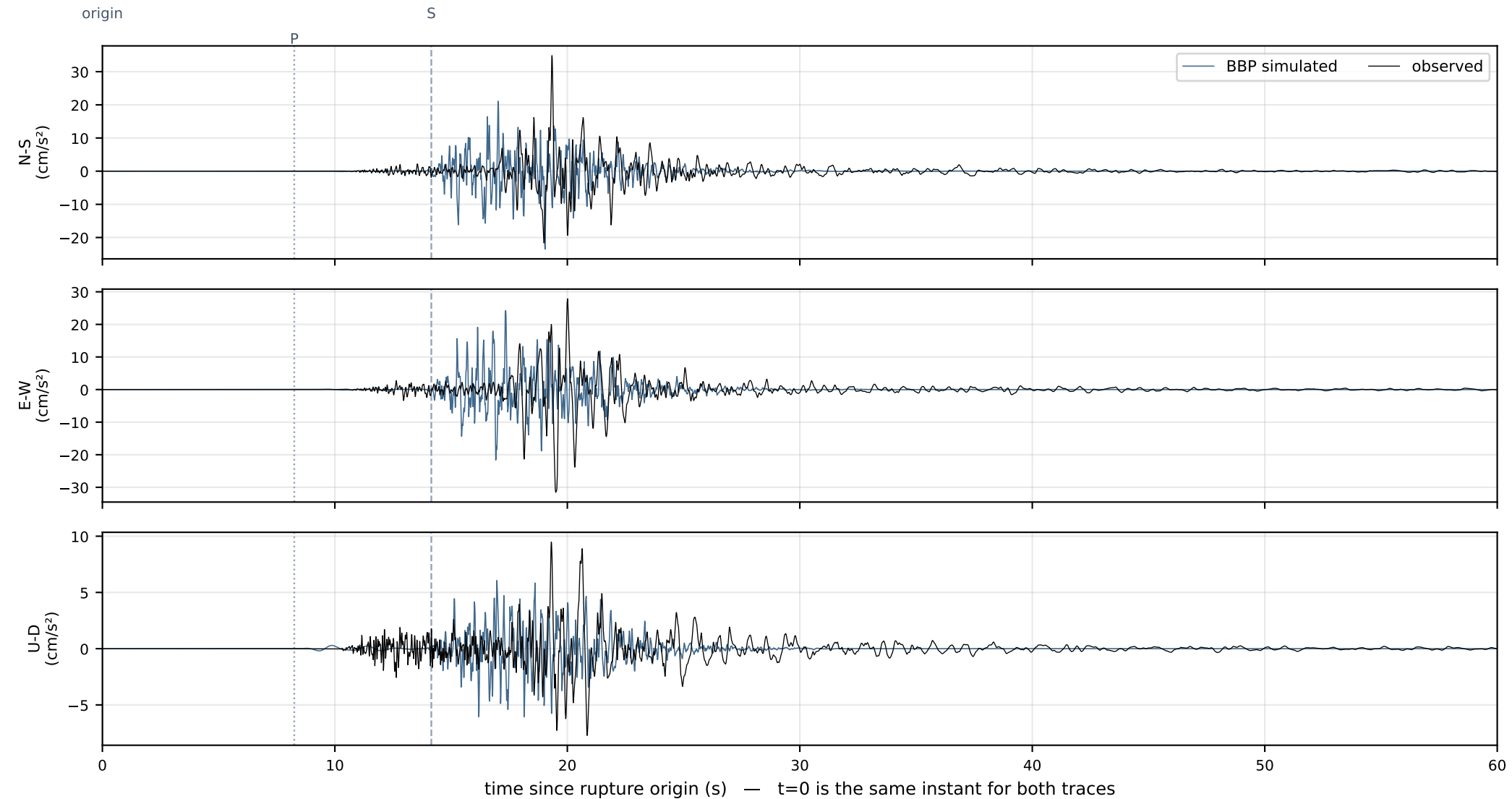
BK.MNDO — 44.7 km, Vs30 414 m/s, HNE (NCEDC)
observed PGA 0.0242 g · simulated PGA 0.0277 g · $\ln(\text{obs}/\text{sim}) = -0.133$ · observed peak at +19.5 s
observed record starts 60.0 s before origin



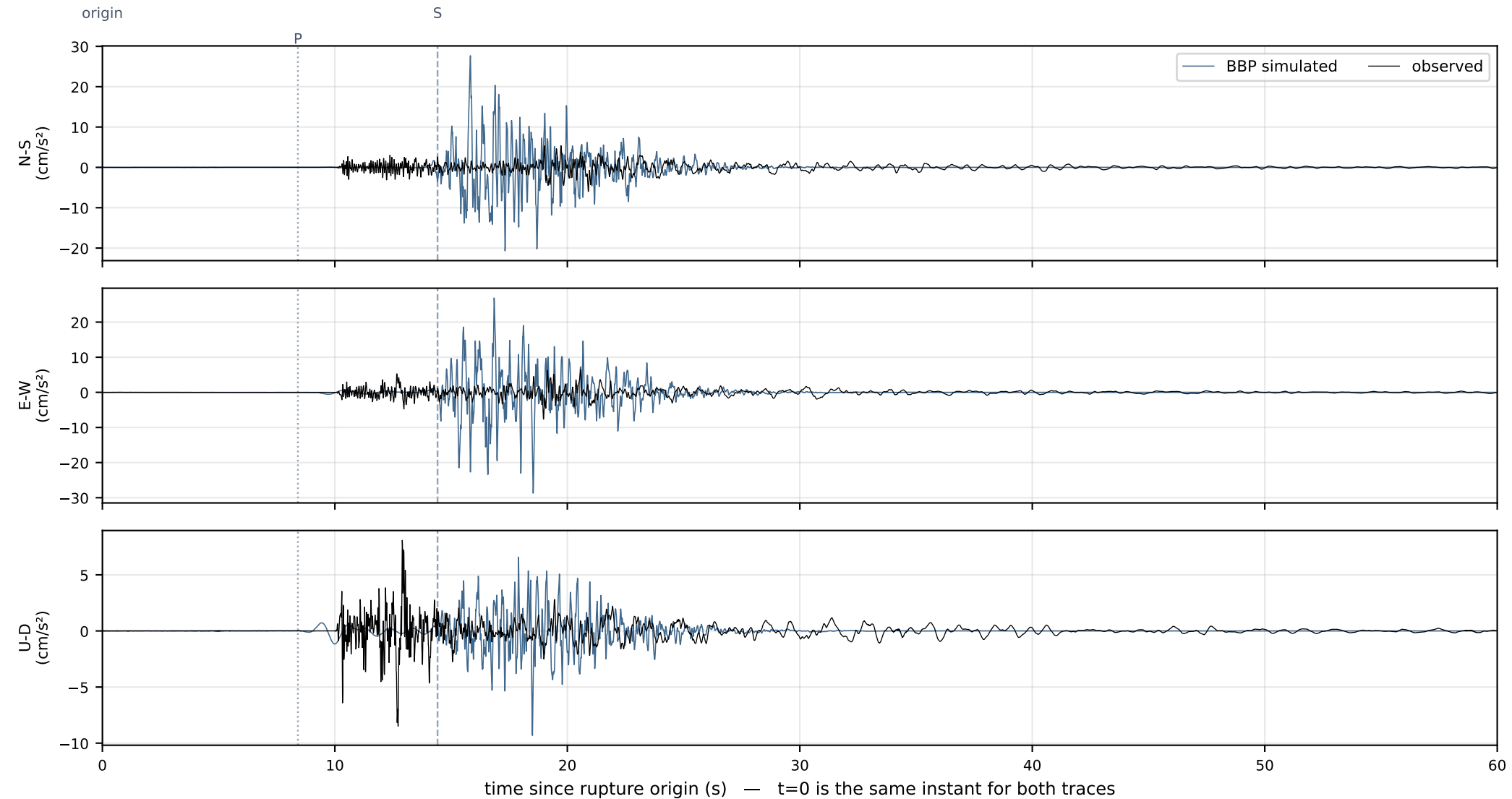
NC.GSN — 47.0 km, Vs30 616 m/s, HNE (NCEDC)
observed PGA 0.0099 g · simulated PGA 0.0224 g · $\ln(\text{obs}/\text{sim}) = -0.815$ · observed peak at +17.2 s
observed record starts 60.0 s before origin



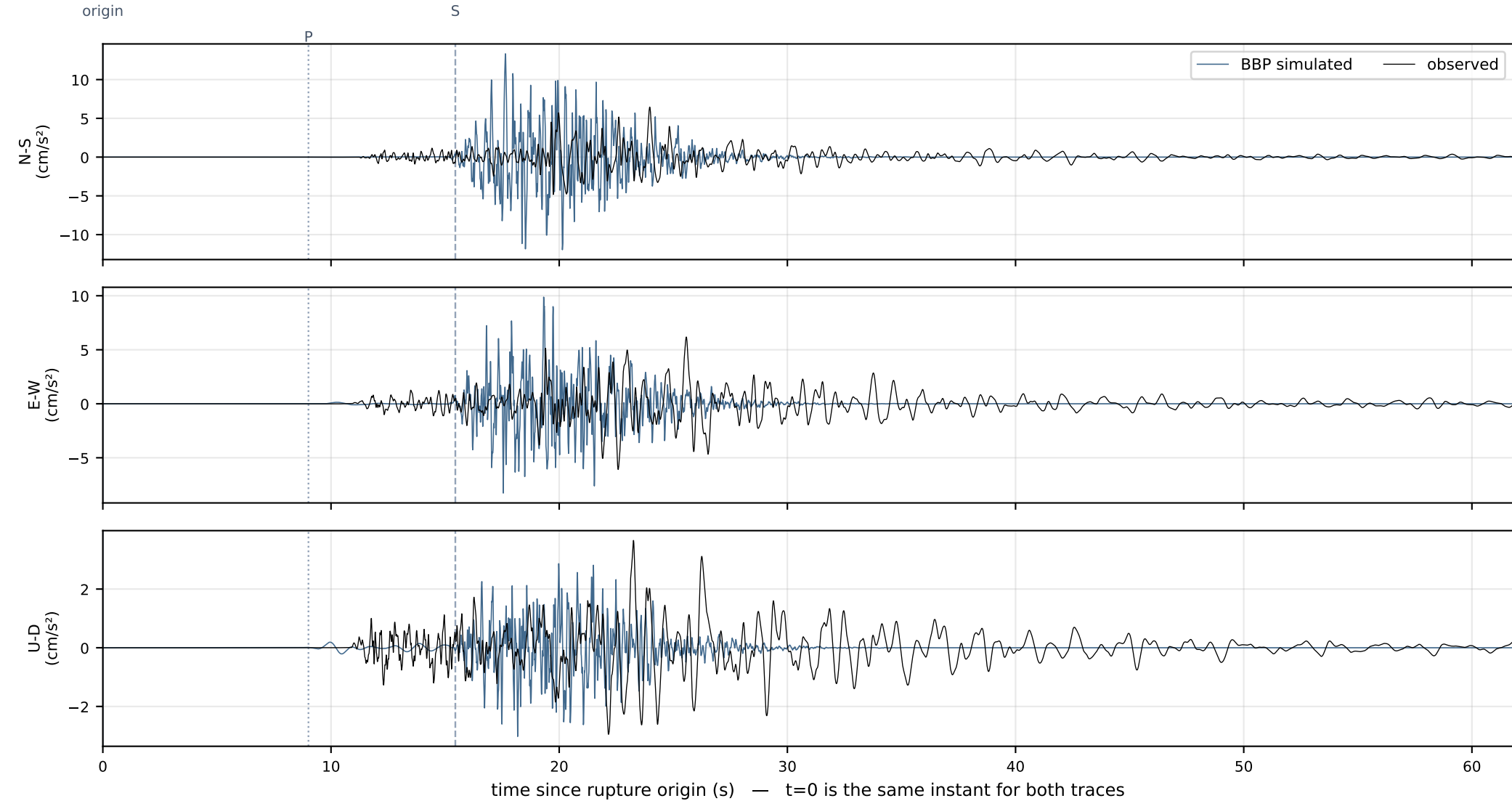
NC.GBL — 49.5 km, Vs30 443 m/s, HNE (NCEDC)
observed PGA 0.0355 g · simulated PGA 0.0247 g · $\ln(\text{obs}/\text{sim}) = +0.363$ · observed peak at +19.3 s
observed record starts 60.0 s before origin



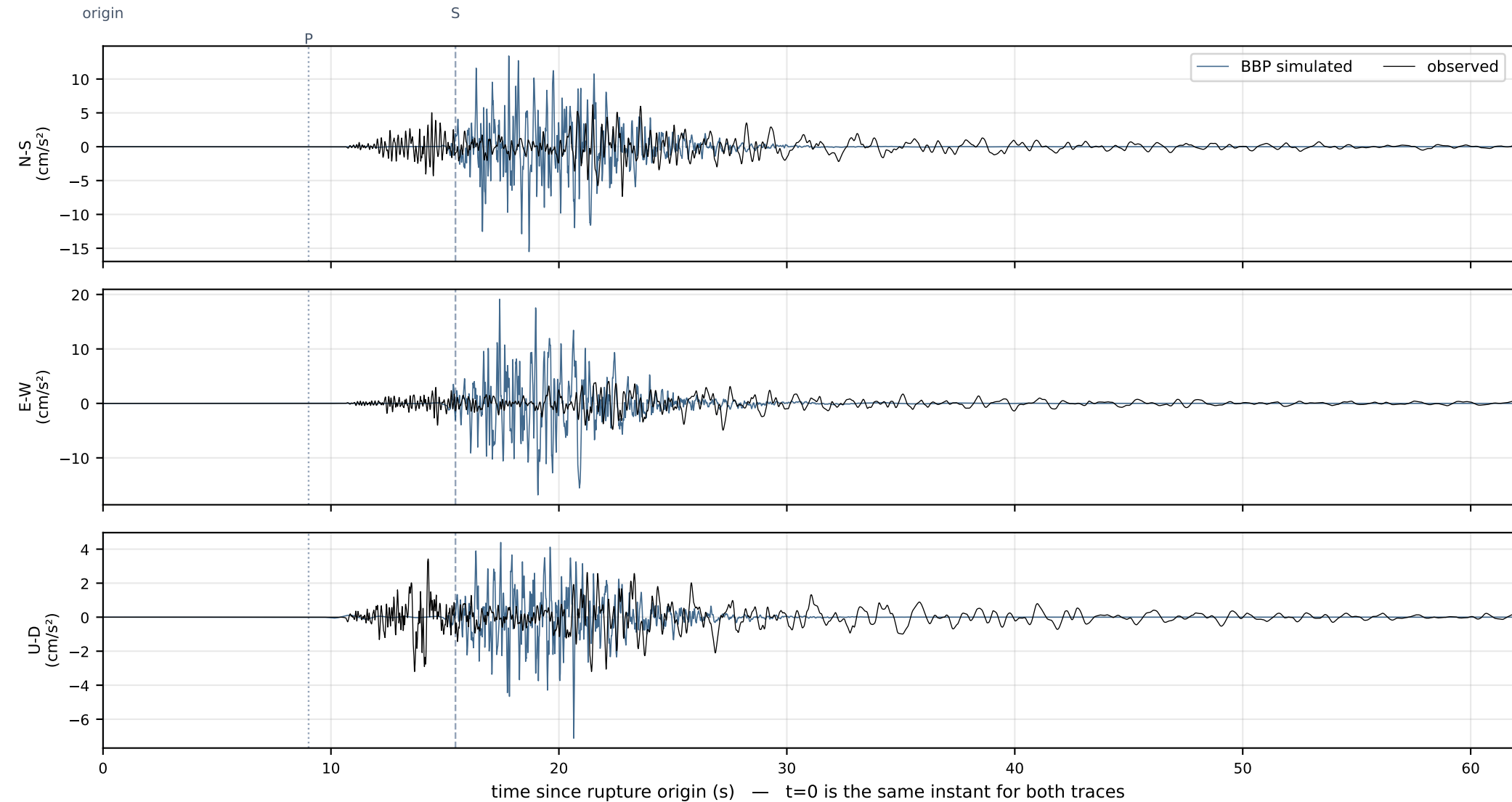
CE.79016 — 50.5 km, Vs30 366 m/s, HNE (NCEDC)
observed PGA 0.0078 g · simulated PGA 0.0293 g · $\ln(\text{obs}/\text{sim}) = -1.323$ · observed peak at +19.0 s
observed record starts 60.0 s before origin



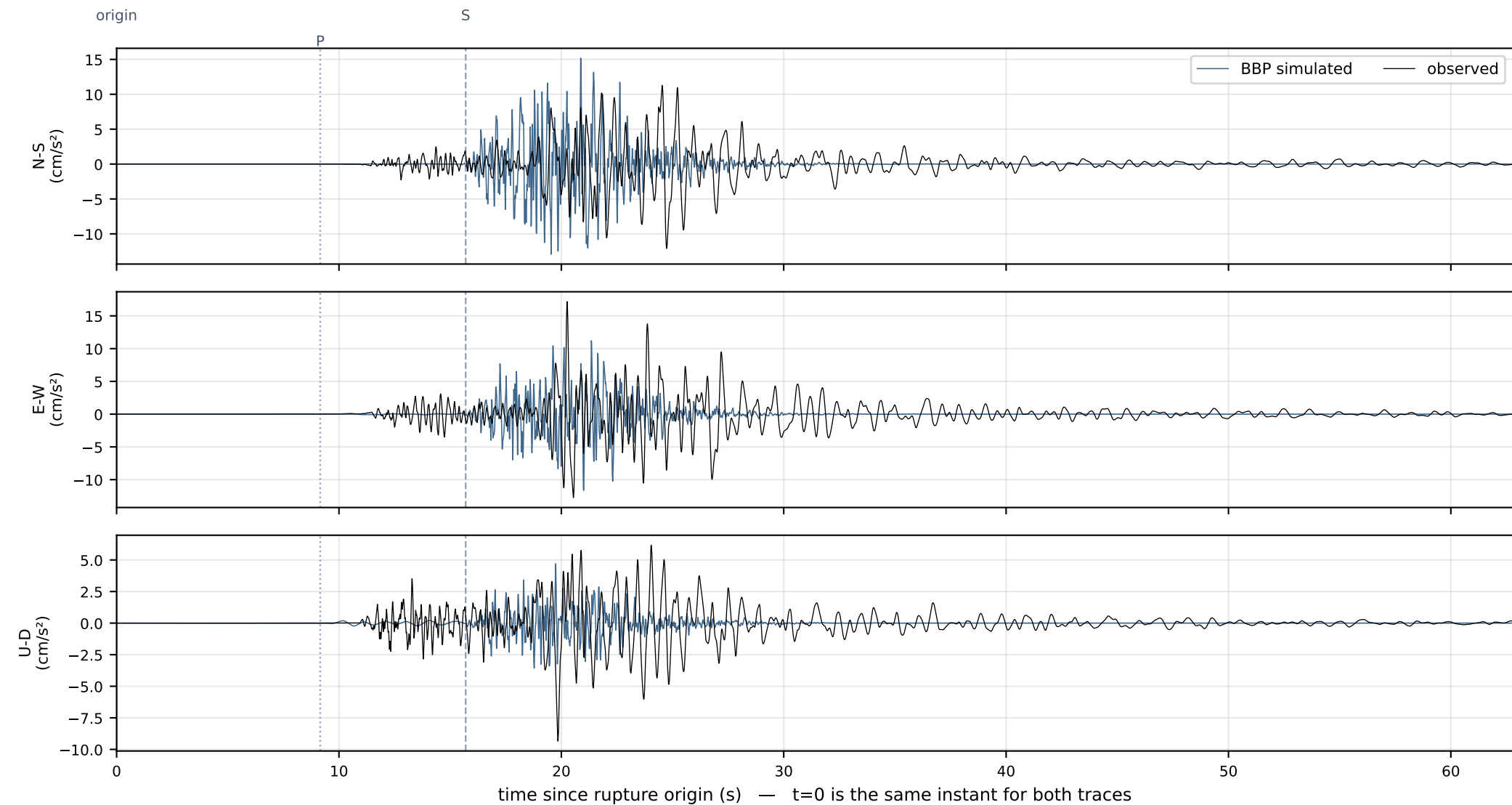
BK.GTSB — 54.1 km, Vs30 755 m/s, HNE (NCEDC)
observed PGA 0.0066 g · simulated PGA 0.0136 g · $\ln(\text{obs}/\text{sim}) = -0.725$ · observed peak at +24.0 s
observed record starts 60.0 s before origin



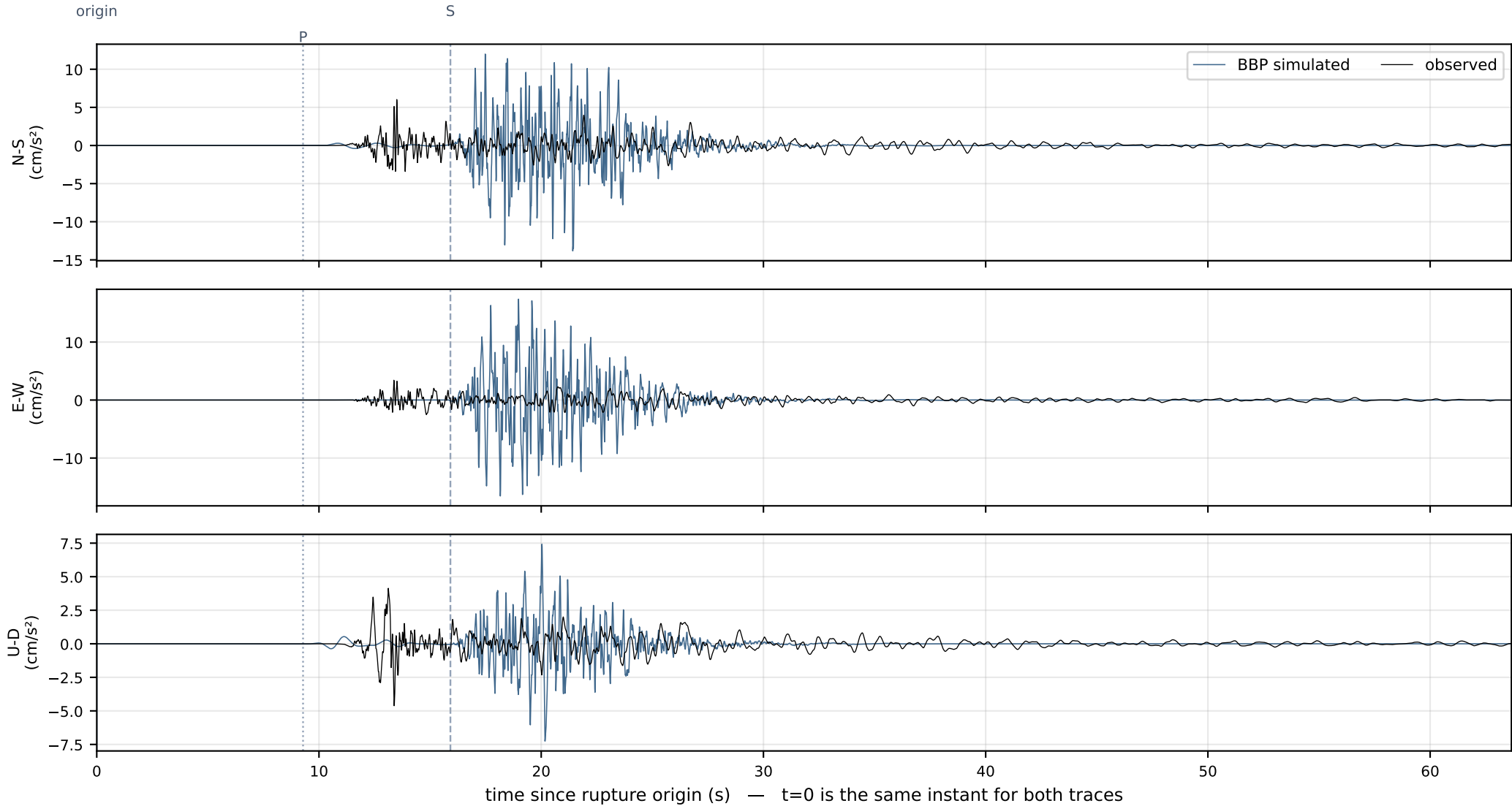
NC.KIP — 54.1 km, Vs30 522 m/s, HNE (NCEDC)
observed PGA 0.0075 g · simulated PGA 0.0195 g · $\ln(\text{obs}/\text{sim}) = -0.957$ · observed peak at +22.8 s
observed record starts 60.0 s before origin



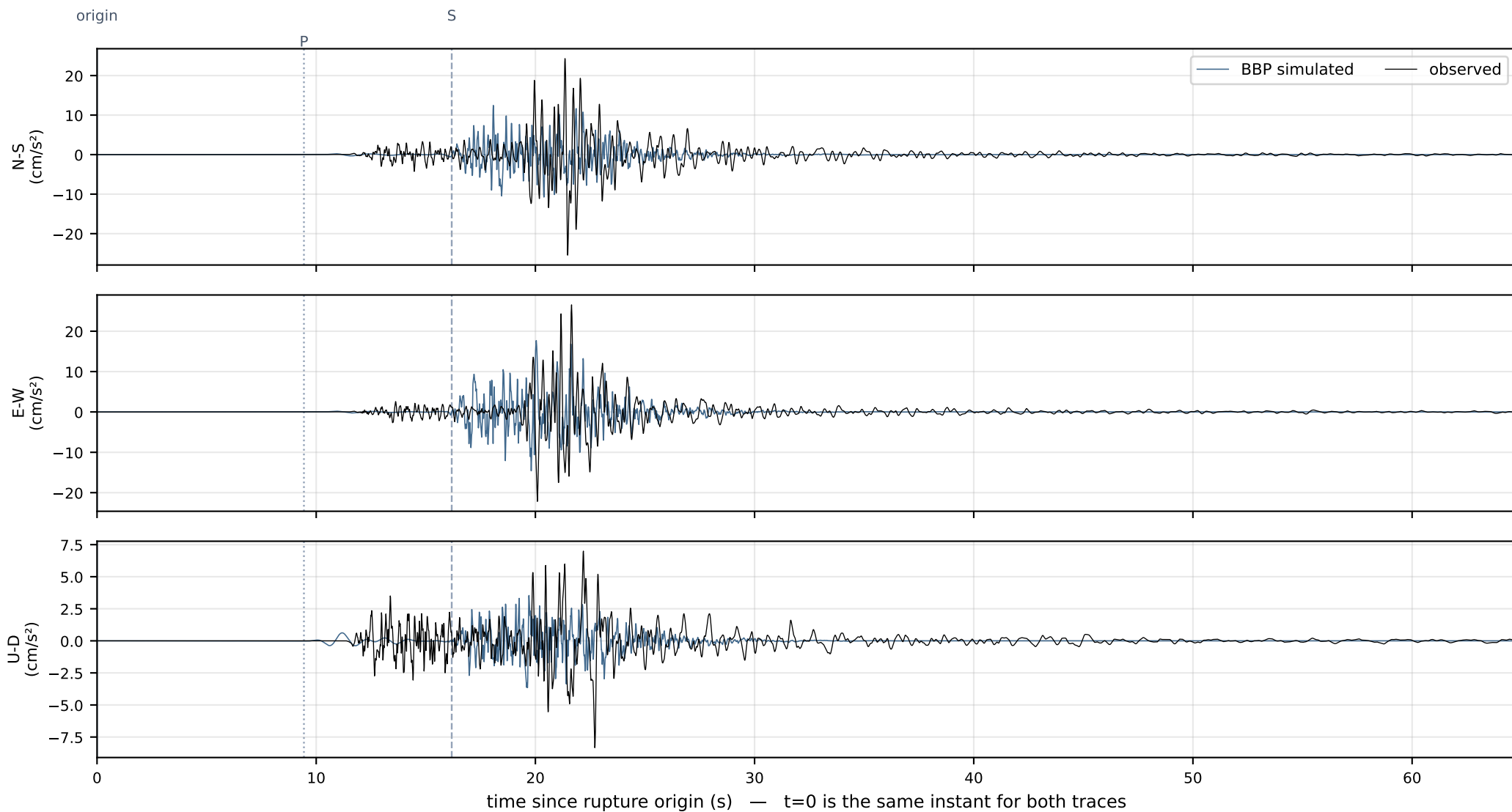
NC.GSR — 54.9 km, Vs30 750 m/s, HNE (NCEDC)
observed PGA 0.0175 g · simulated PGA 0.0155 g · $\ln(\text{obs}/\text{sim}) = +0.124$ · observed peak at +20.3 s
observed record starts 60.0 s before origin



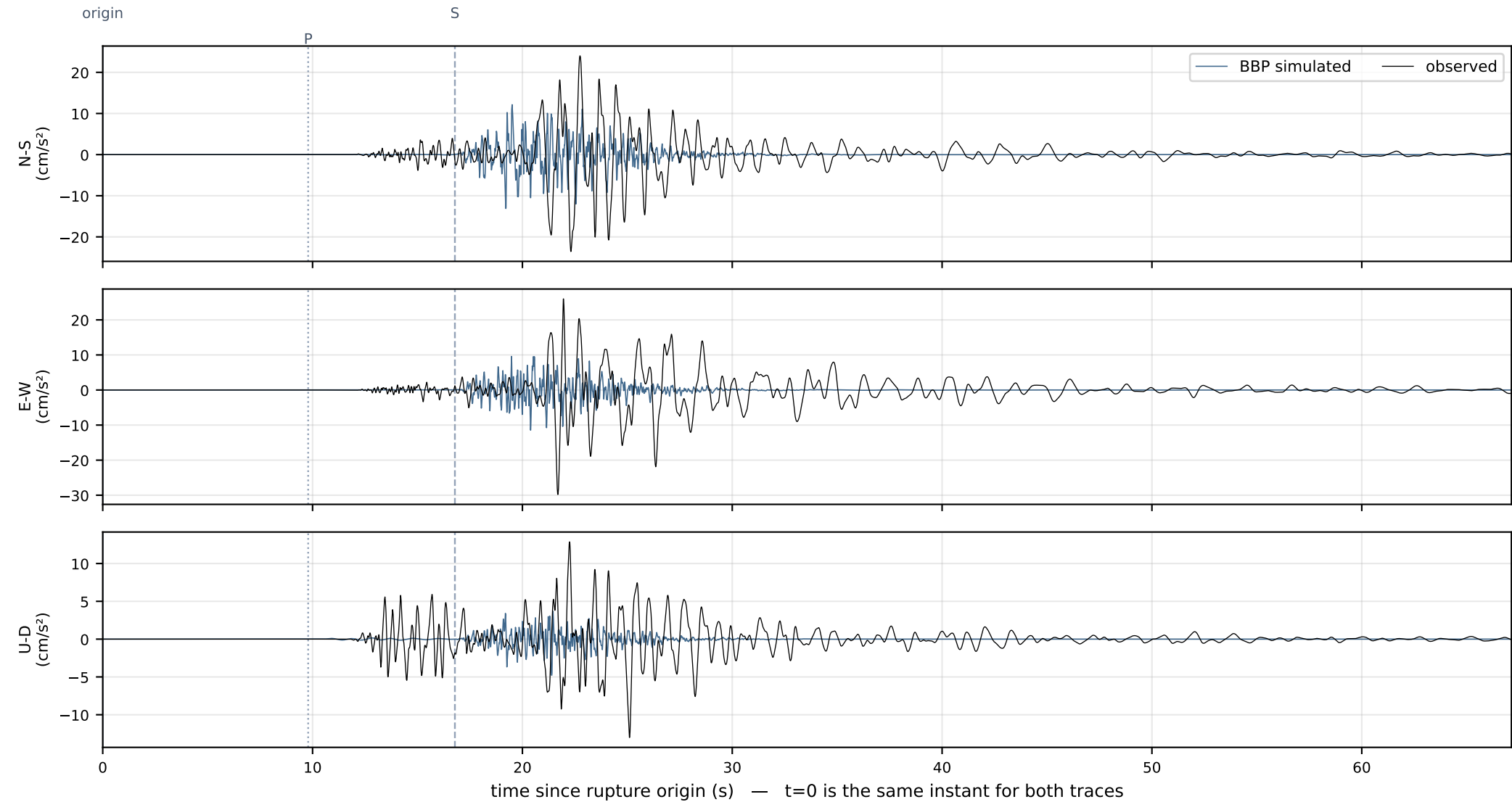
BK.GALB — 55.7 km, Vs30 486 m/s, HNE (NCEDC)
observed PGA 0.0061 g · simulated PGA 0.0177 g · $\ln(\text{obs}/\text{sim}) = -1.059$ · observed peak at +13.5 s
observed record starts 60.0 s before origin



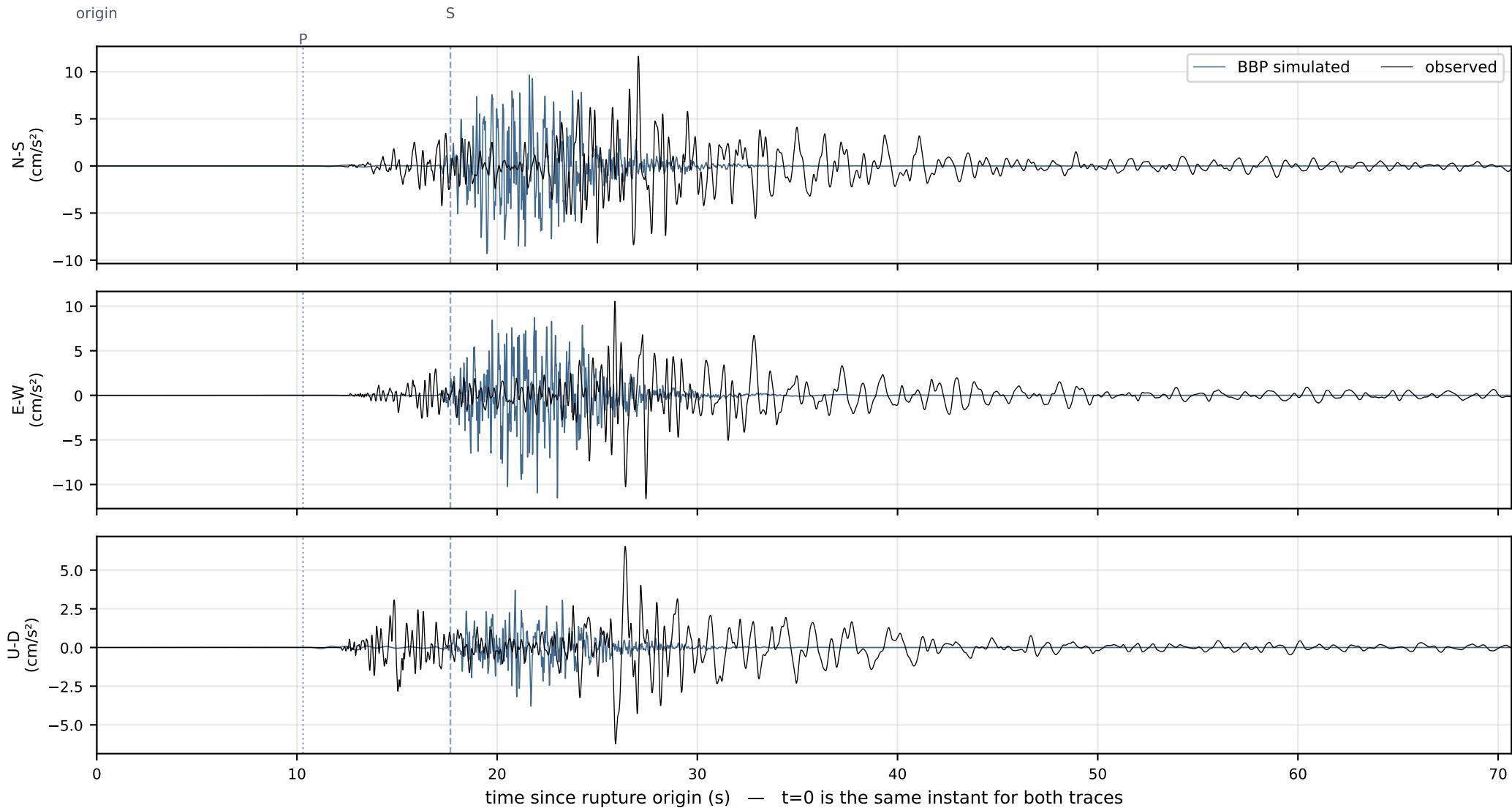
BK.SPAN — 56.6 km, Vs30 494 m/s, HNE (NCEDC)
observed PGA 0.0271 g · simulated PGA 0.0180 g · $\ln(\text{obs}/\text{sim}) = +0.406$ · observed peak at +21.7 s
observed record starts 60.0 s before origin



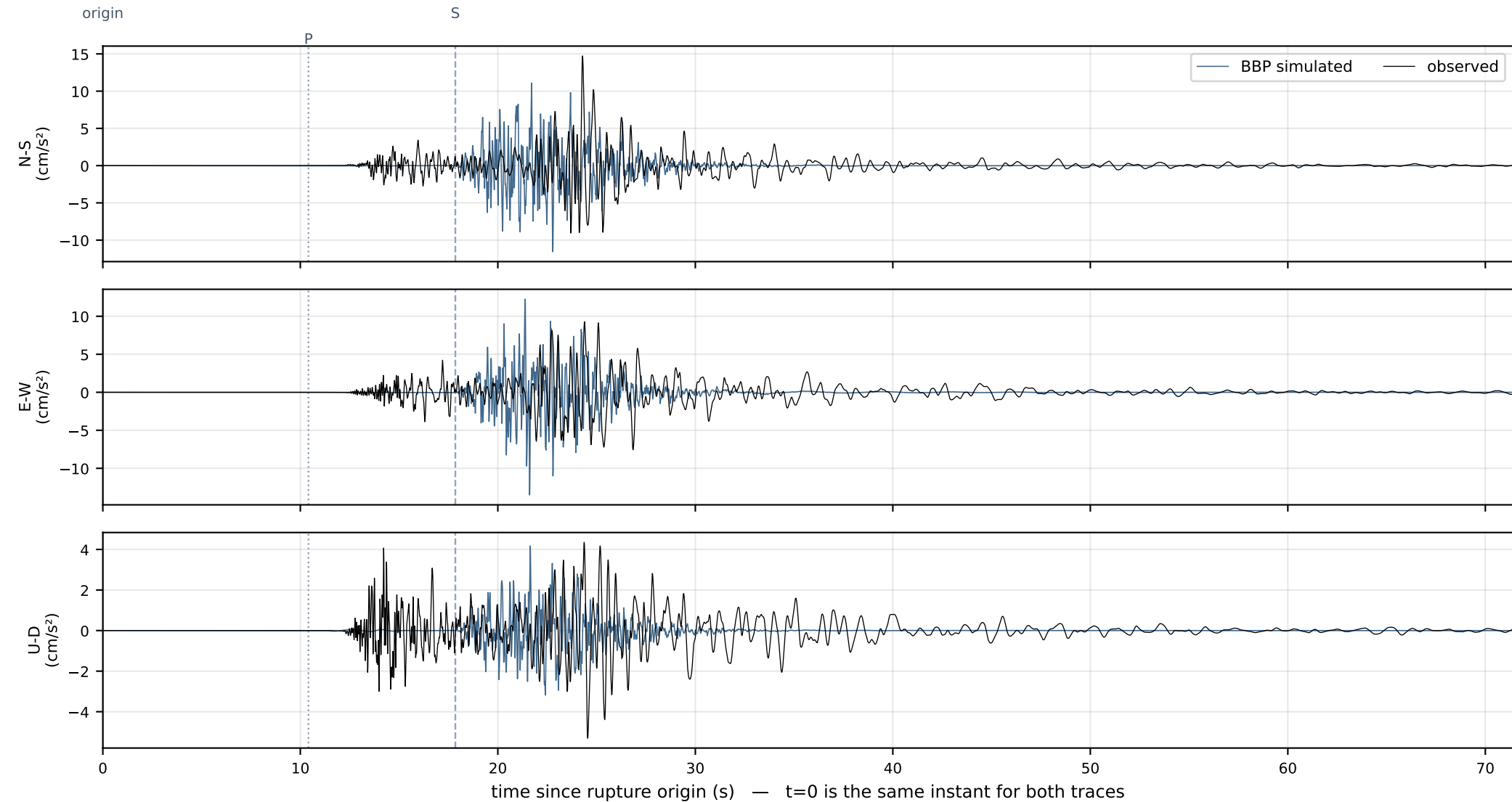
NC.GTK — 58.7 km, Vs30 708 m/s, HNE (NCEDC)
observed PGA 0.0304 g · simulated PGA 0.0134 g · $\ln(\text{obs}/\text{sim}) = +0.821$ · observed peak at +21.7 s
observed record starts 60.0 s before origin



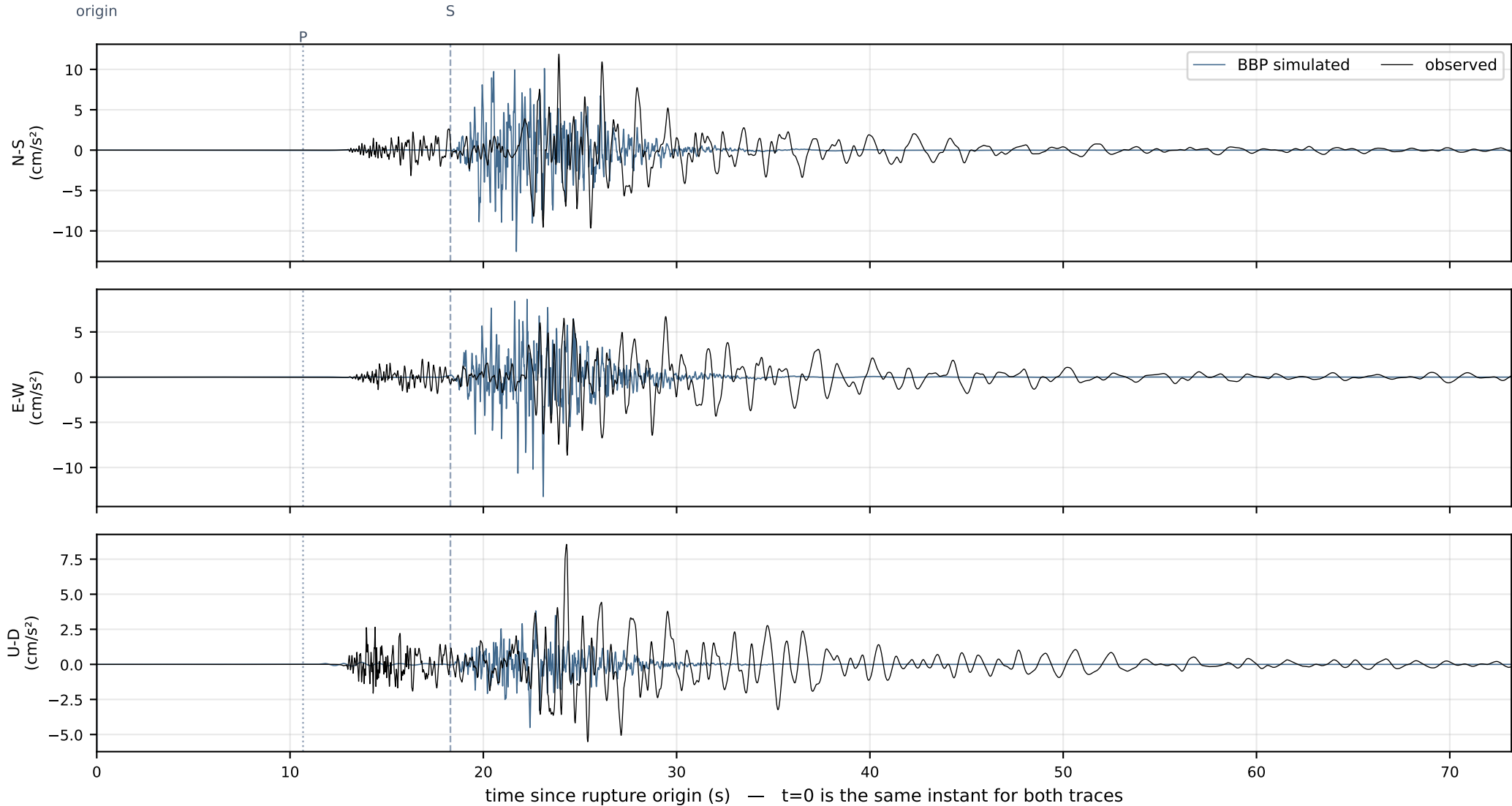
BK.RVIT — 61.8 km, Vs30 752 m/s, HNE (NCEDC)
observed PGA 0.0119 g · simulated PGA 0.0117 g · $\ln(\text{obs}/\text{sim}) = +0.011$ · observed peak at +27.1 s
observed record starts 60.0 s before origin



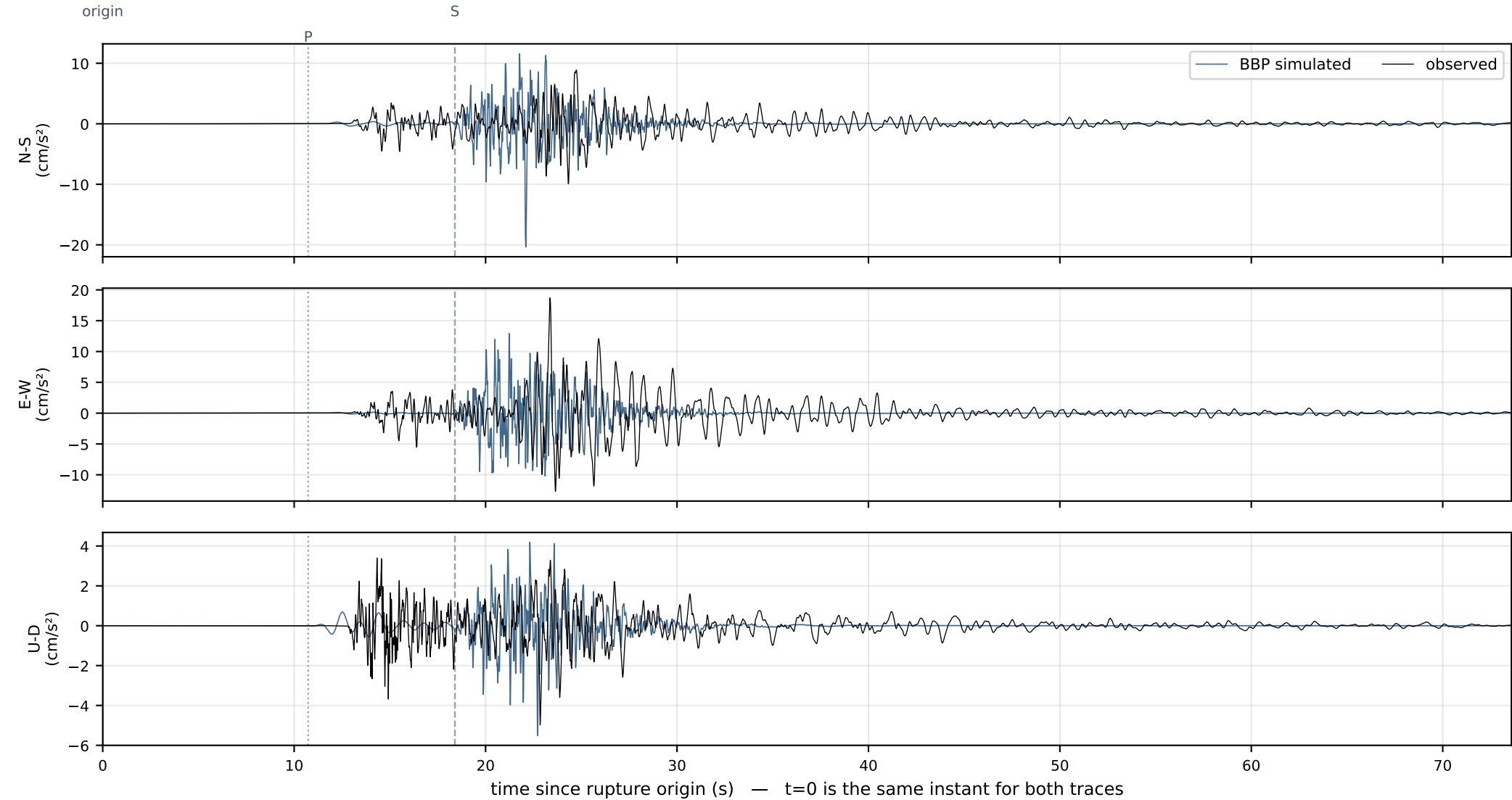
NC.GPM — 62.5 km, Vs30 708 m/s, HNE (NCEDC)
observed PGA 0.0150 g · simulated PGA 0.0138 g · $\ln(\text{obs}/\text{sim}) = +0.086$ · observed peak at +24.3 s
observed record starts 60.0 s before origin



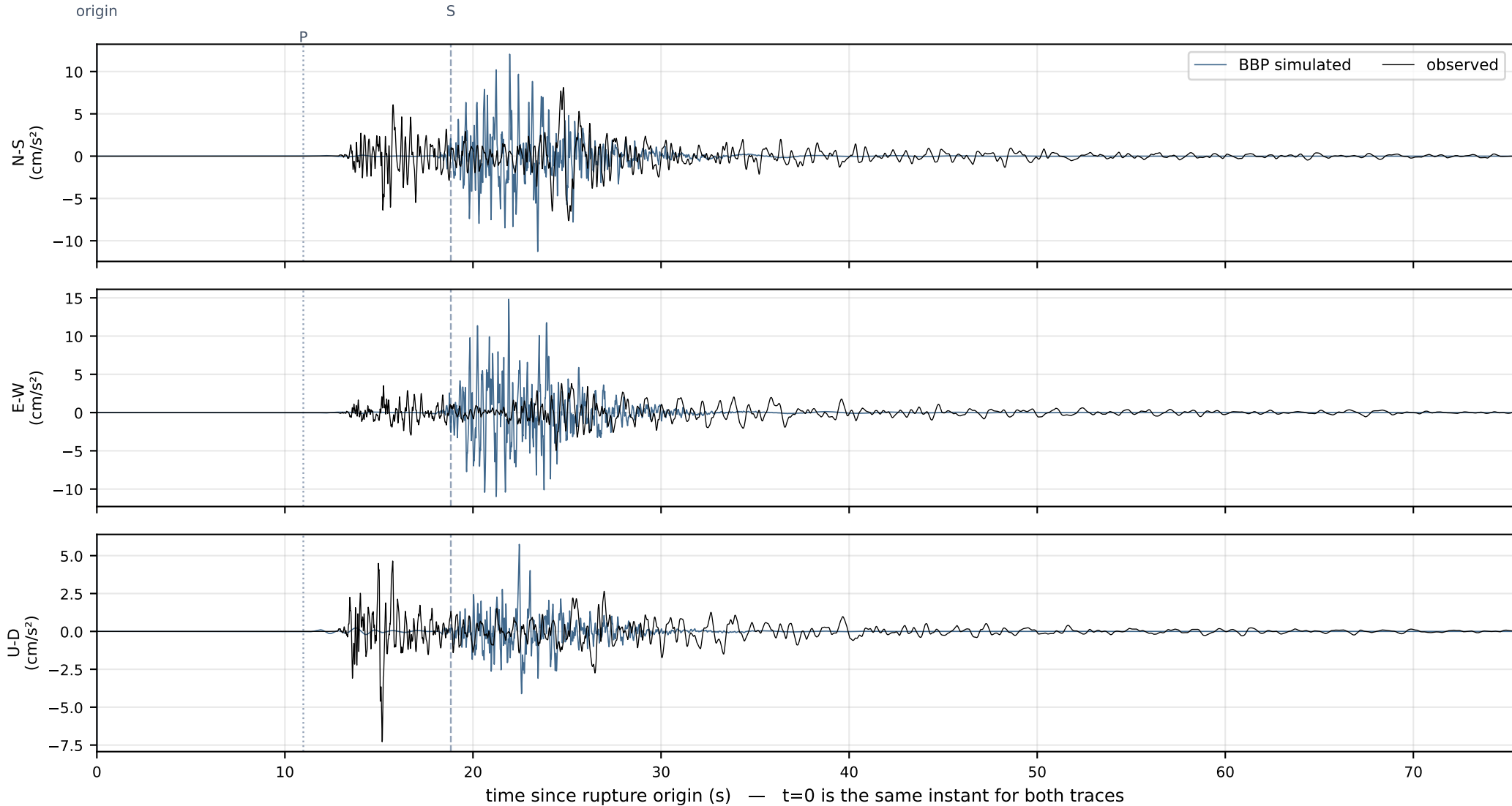
CE.68035 — 64.0 km, Vs30 705 m/s, HNE (NCEDC)
observed PGA 0.0121 g · simulated PGA 0.0135 g · $\ln(\text{obs}/\text{sim}) = -0.107$ · observed peak at +23.9 s
observed record starts 60.0 s before origin



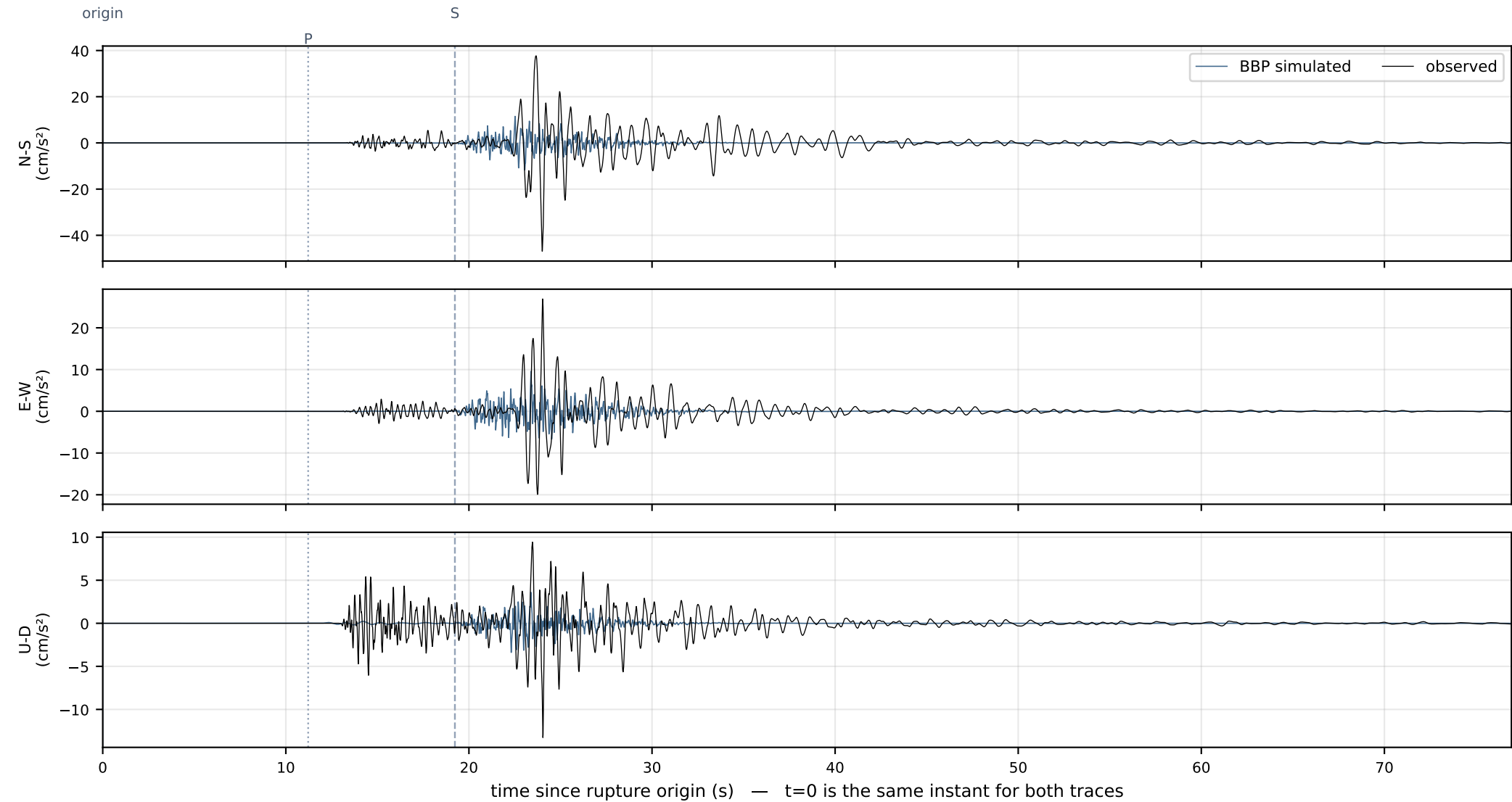
NC.GWW — 64.4 km, Vs30 493 m/s, HNE (NCEDC)
observed PGA 0.0191 g · simulated PGA 0.0208 g · $\ln(\text{obs}/\text{sim}) = -0.085$ · observed peak at +23.4 s
observed record starts 60.0 s before origin



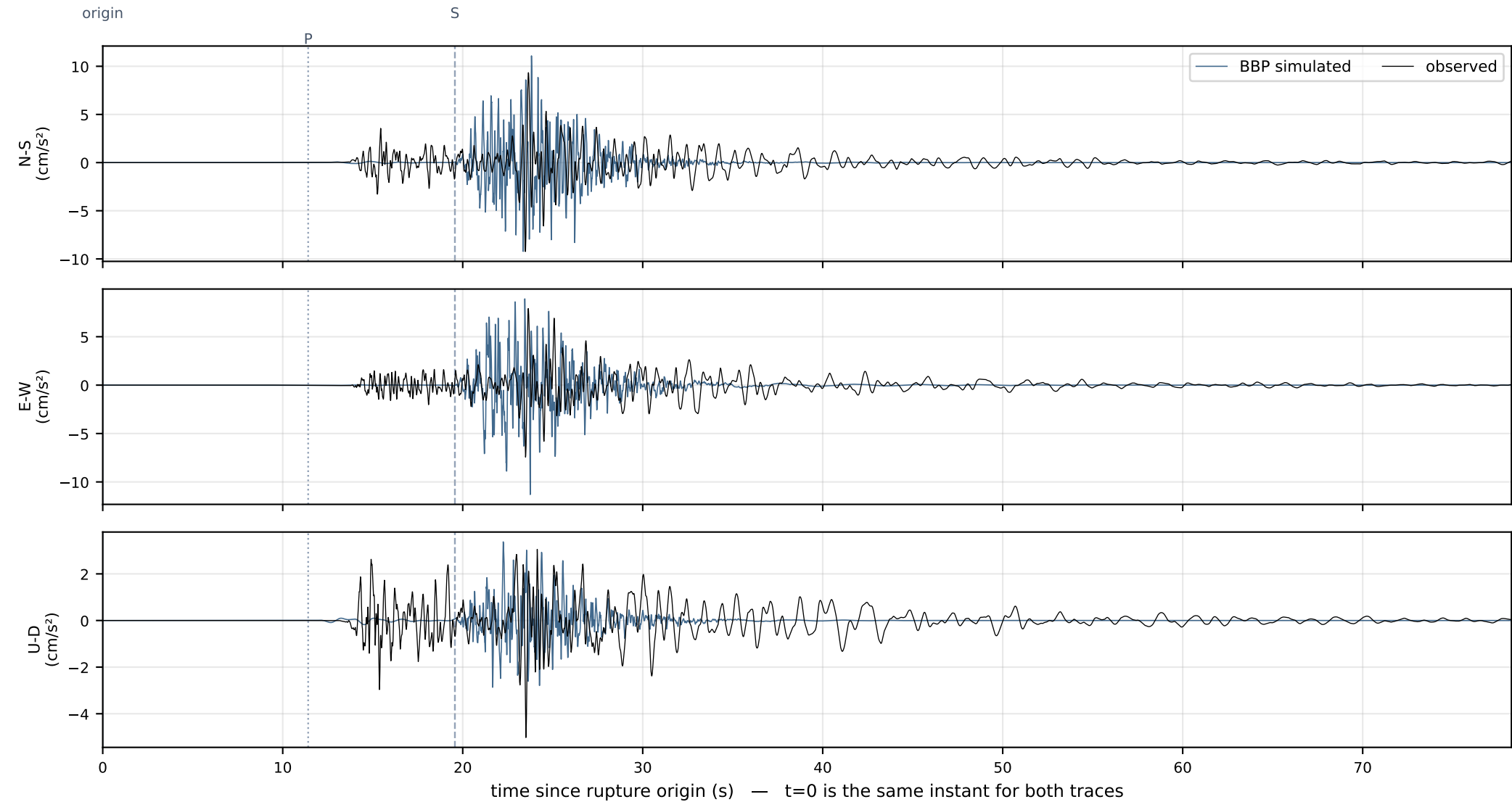
BK.HALS — 65.9 km, Vs30 495 m/s, HNE (NCEDC)
observed PGA 0.0083 g · simulated PGA 0.0151 g · $\ln(\text{obs}/\text{sim}) = -0.602$ · observed peak at +24.8 s
observed record starts 60.0 s before origin



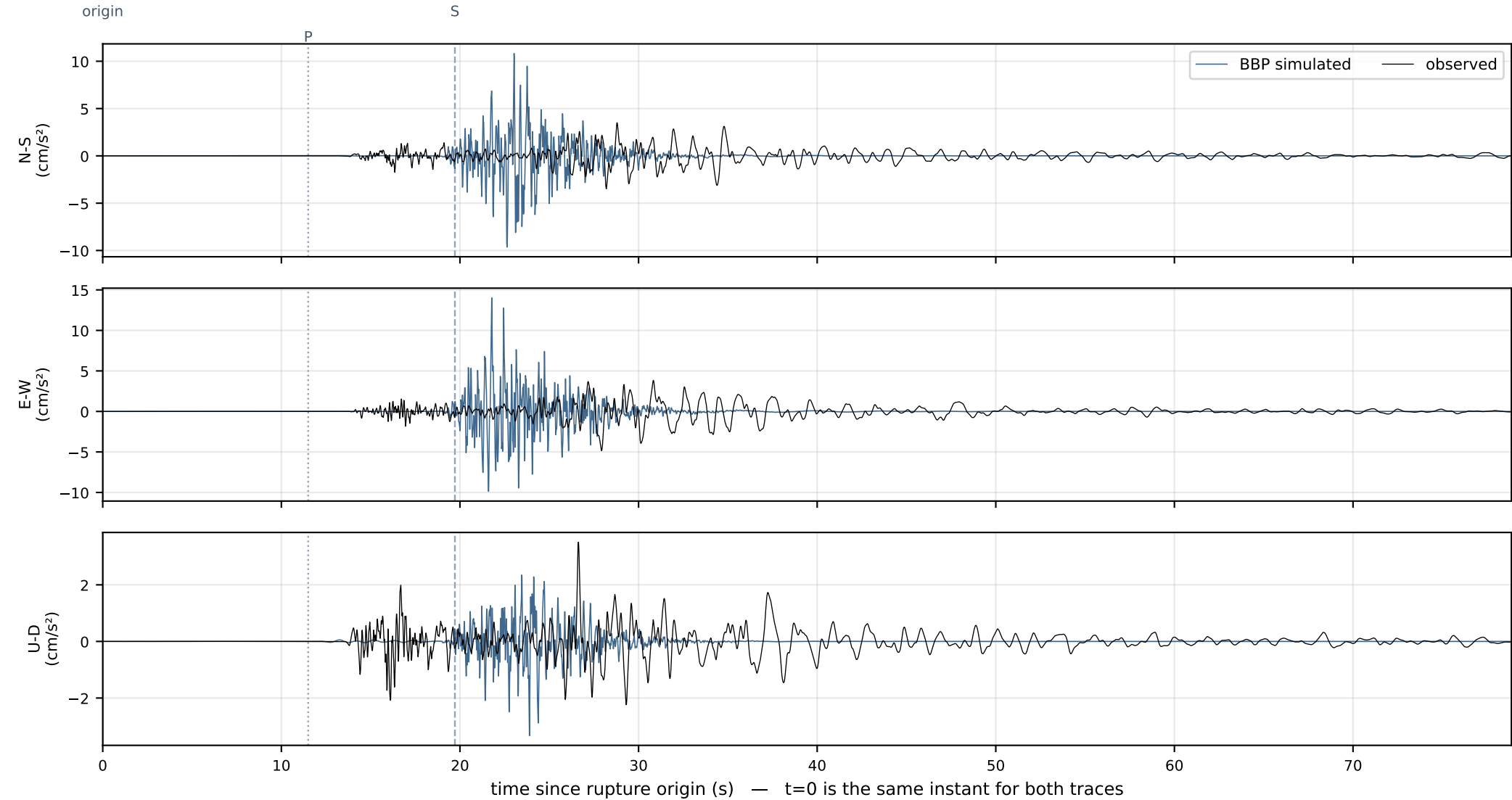
NC.GRT — 67.3 km, Vs30 710 m/s, HNE (NCEDC)
observed PGA 0.0478 g · simulated PGA 0.0120 g · $\ln(\text{obs}/\text{sim}) = +1.386$ · observed peak at +24.0 s
observed record starts 60.0 s before origin



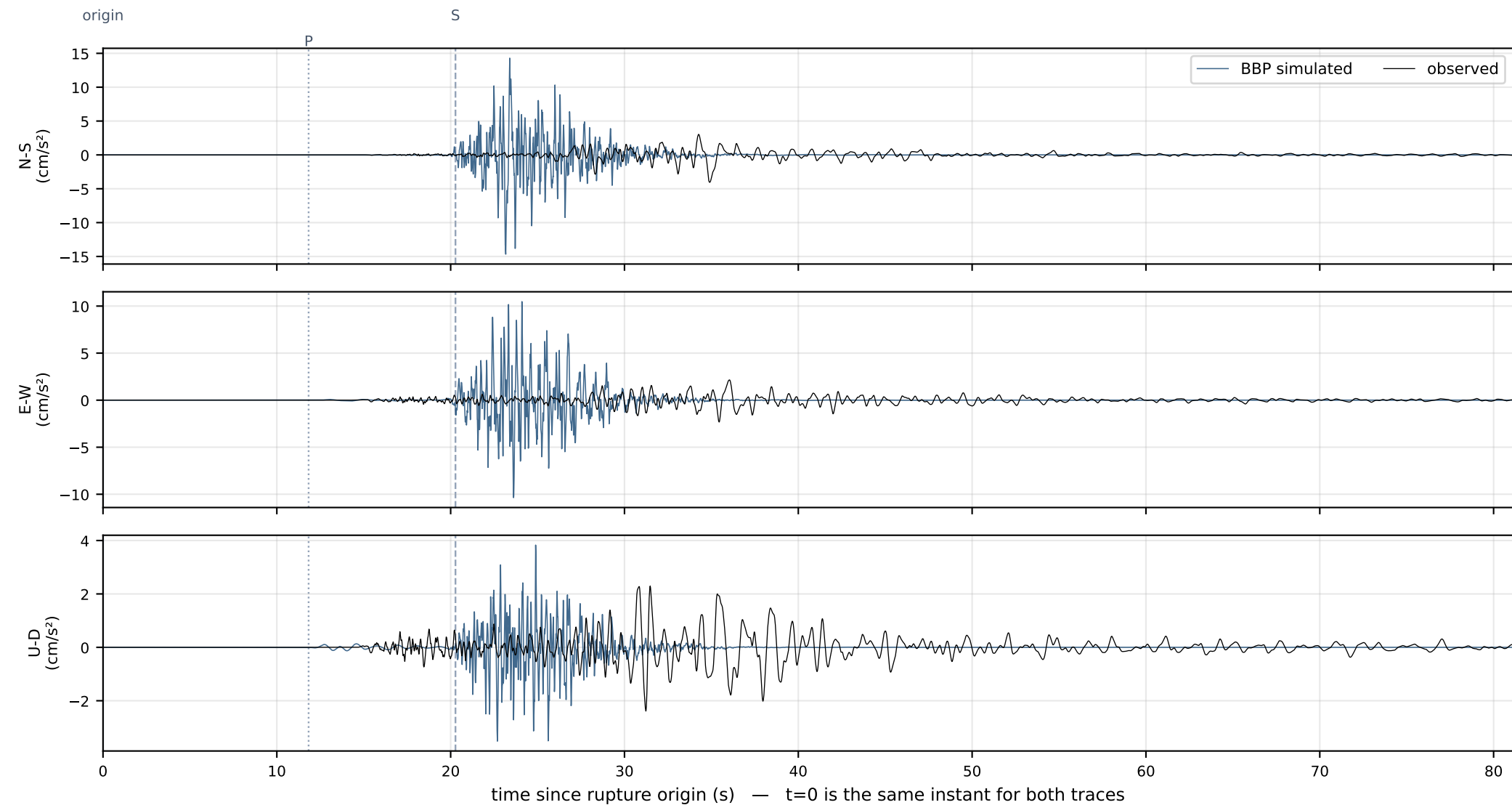
NC.GCVB — 68.5 km, Vs30 607 m/s, HNE (NCEDC)
observed PGA 0.0095 g · simulated PGA 0.0115 g · $\ln(\text{obs}/\text{sim}) = -0.191$ · observed peak at +23.7 s
observed record starts 60.0 s before origin



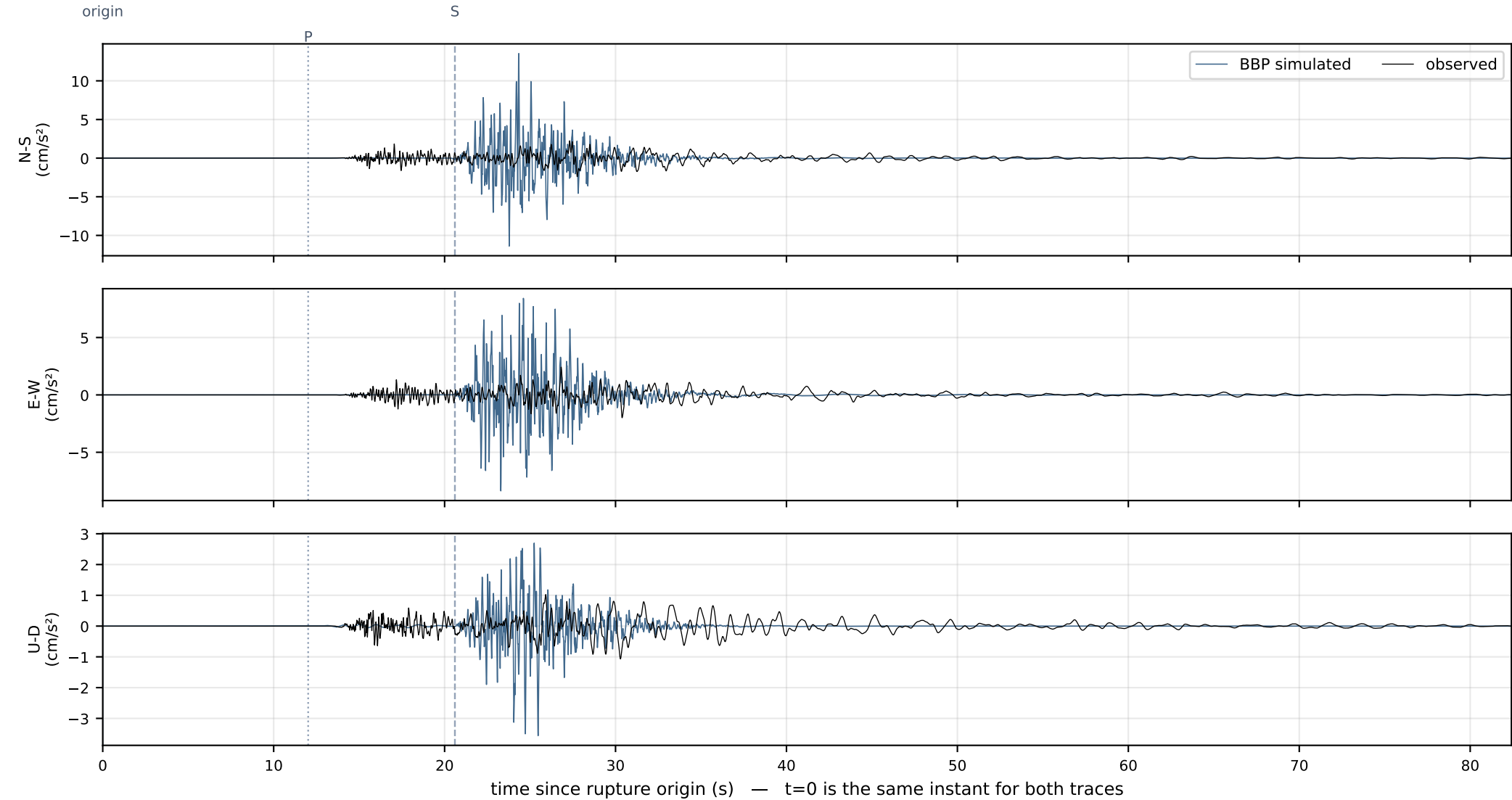
NC.KBSB — 69.0 km, Vs30 751 m/s, HNE (NCEDC)
observed PGA 0.0049 g · simulated PGA 0.0143 g · $\ln(\text{obs}/\text{sim}) = -1.061$ · observed peak at +27.9 s
observed record starts 60.0 s before origin



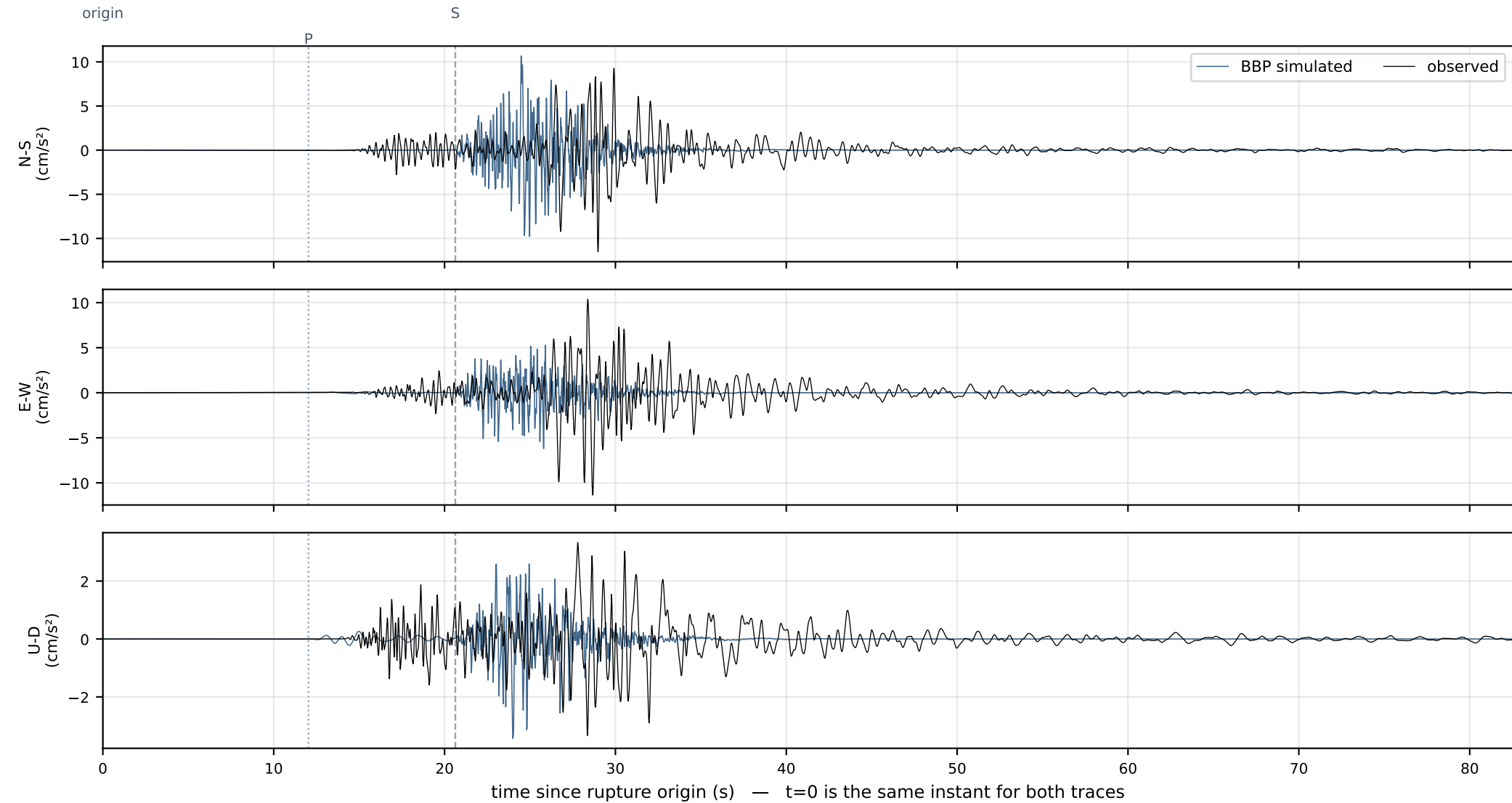
BK.GCKB — 71.0 km, Vs30 532 m/s, HNE (NCEDC)
observed PGA 0.0041 g · simulated PGA 0.0150 g · $\ln(\text{obs}/\text{sim}) = -1.286$ · observed peak at +34.9 s
observed record starts 60.0 s before origin



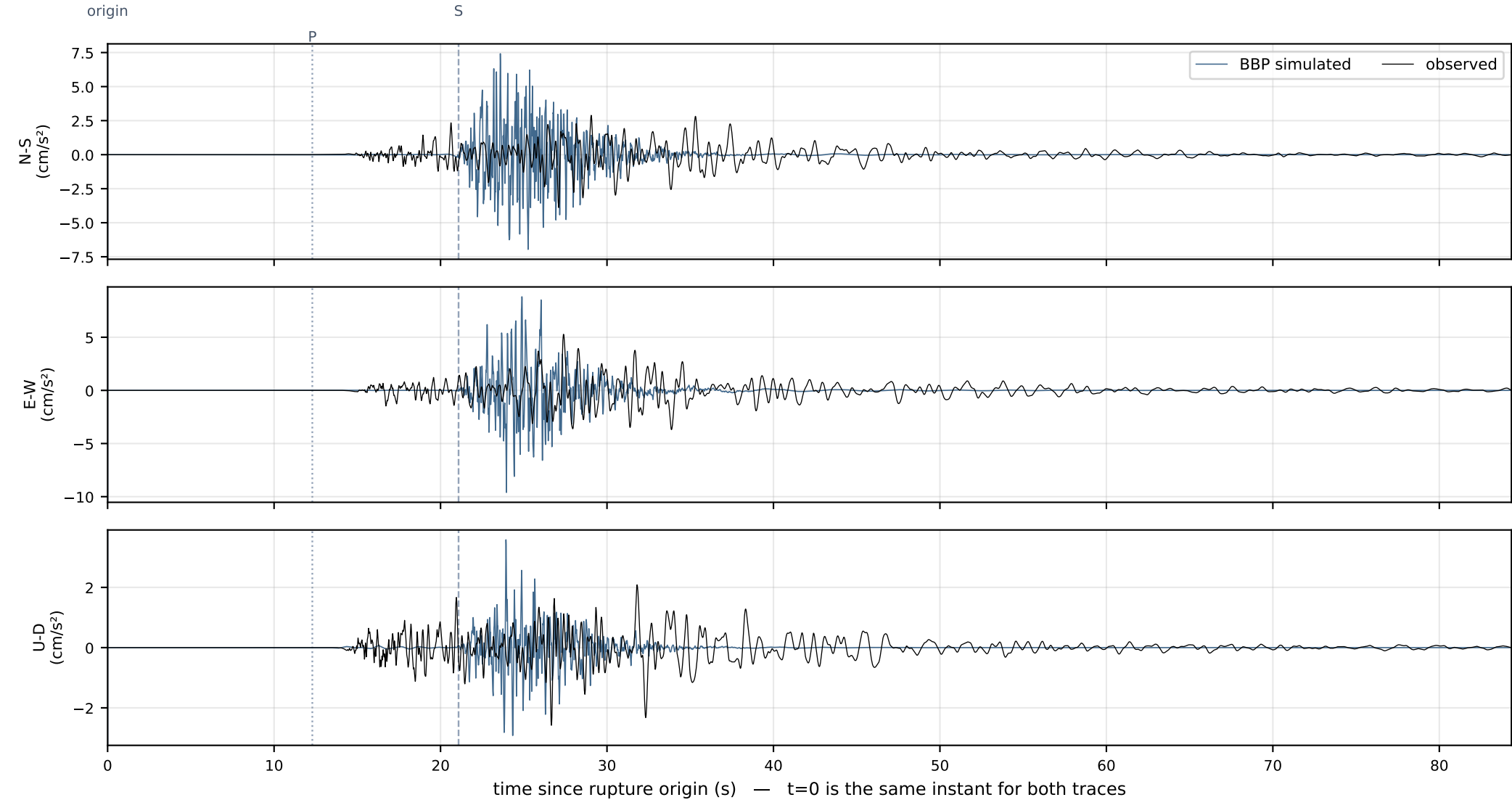
NC.GDXB — 72.1 km, Vs30 728 m/s, HNE (NCEDC)
observed PGA 0.0025 g · simulated PGA 0.0138 g · $\ln(\text{obs}/\text{sim}) = -1.720$ · observed peak at +26.8 s
observed record starts 60.0 s before origin



NC.GWKB — 72.2 km, Vs30 749 m/s, HNE (NCEDC)
observed PGA 0.0117 g · simulated PGA 0.0109 g · $\ln(\text{obs}/\text{sim}) = +0.076$ · observed peak at +29.0 s
observed record starts 60.0 s before origin



NC.GGPC — 73.8 km, Vs30 691 m/s, HNE (NCEDC)
observed PGA 0.0054 g · simulated PGA 0.0098 g · $\ln(\text{obs}/\text{sim}) = -0.599$ · observed peak at +27.4 s
observed record starts 60.0 s before origin



Animation input — displacement

the time series the Blender scenes render, per station

WHAT THESE PAGES SHOW

	The displacement time series handed to the Blender scene for each station: the array in the .npz file passed as --displacement-file. Everything earlier in this report concerns acceleration and response spectra, which is what goodness of fit is defined on. This is the quantity that becomes movement on screen.
observed	worker/observed_seismogram.py – response removed to acceleration, double-integrated with a detrend after each step, bandpassed, clipped from origin -5 s to the S-wave arrival + 10 s.
simulated	worker/bbp_seismogram.py – BBP's velocity output integrated once with a demean and a linear detrend, clipped to the peak -5 s / +15 s.
then, both	animations/ground_motion.clip_for_scene – a further clip to [first motion - 2 s, peak + 15 s] with the DC offset removed. That is the shaded band on each page, and it is what the table actually follows.

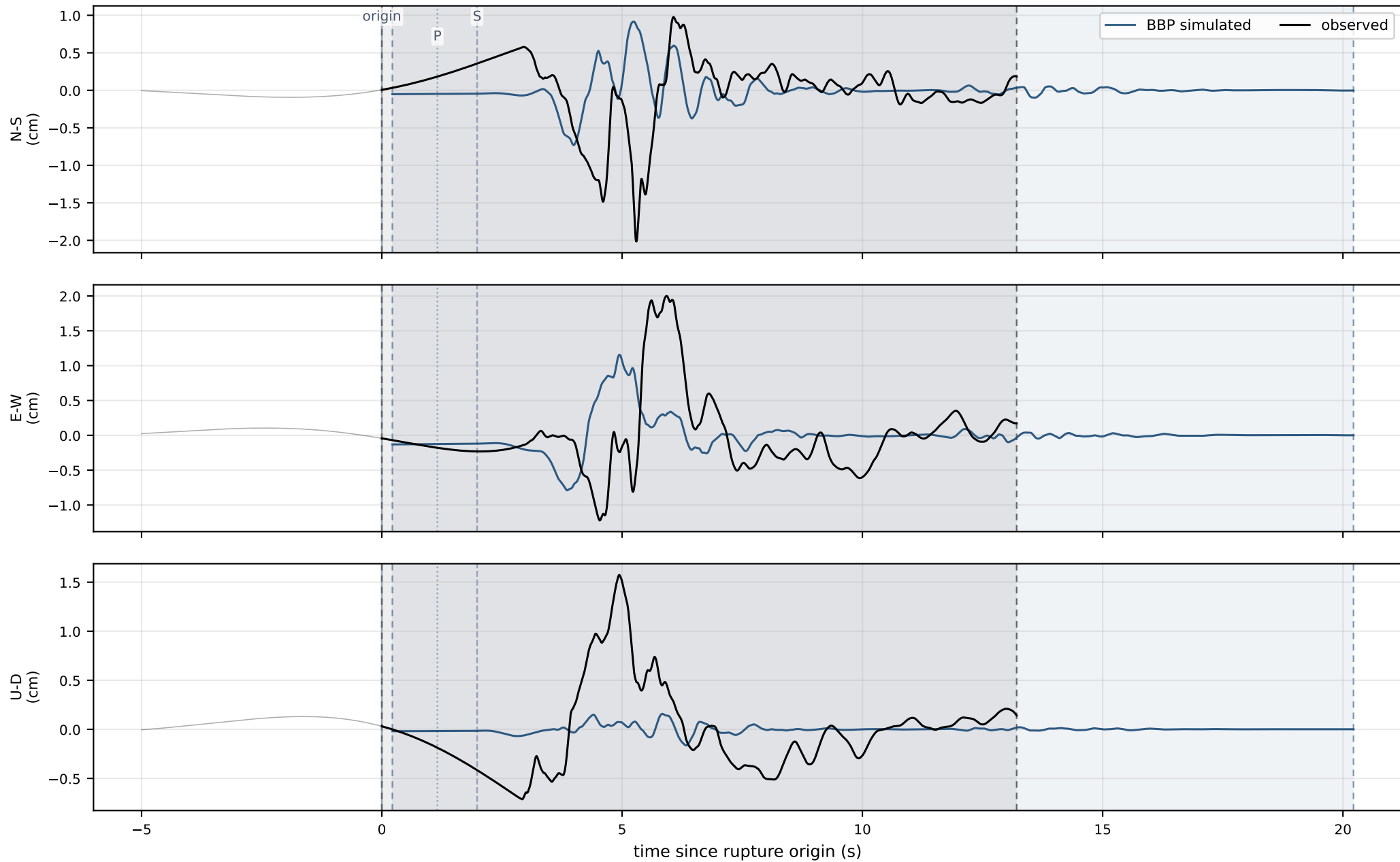
HOW TO READ A DISAGREEMENT

not a residual	The two traces come from different code over different windows, so a difference here is part processing and part physics and this page cannot separate them. The acceleration overlays and the spectra are where the model is judged.
what it does show	Whether the animation was driven by a physically sensible record – right arrival, right duration, right order of magnitude – and whether the simulated and recorded motion would look like the same earthquake.
amplitude is the point	Peak displacement sets how far the table travels. A factor of two in PGD is a visibly different animation, where the same factor in PGA is not.

COVERAGE

both records	40 station(s)
observed only	0 station(s)
simulated only	0 station(s)
PGD ratio	geometric mean observed/simulated = 1.48x
simulated source	BBP simulated

BK.BARR — 6.9 km · displacement handed to the animation
 observed PGD 2.02 cm · simulated PGD 1.16 cm · obs/sim = 1.74x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

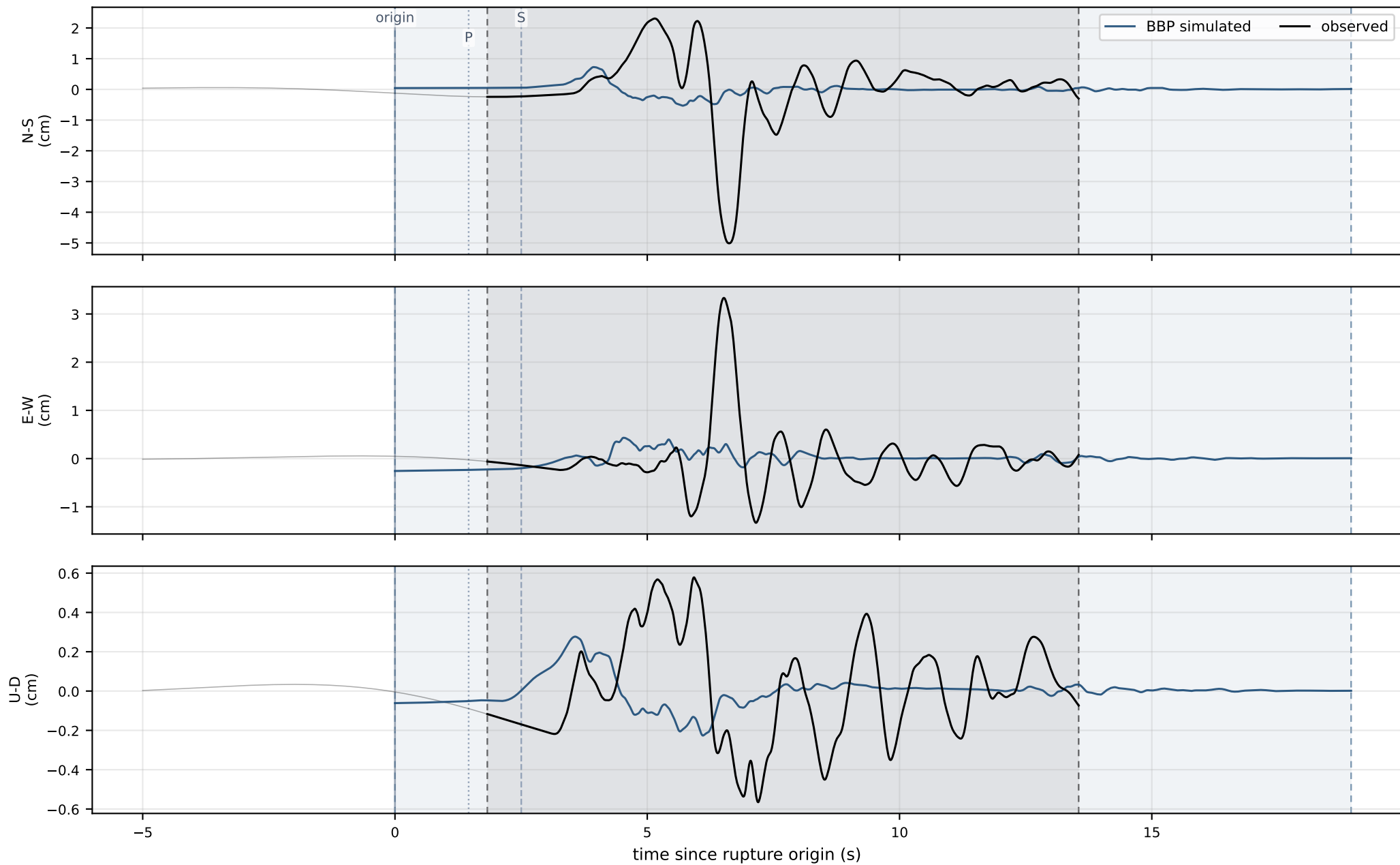


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GVA — 8.8 km · displacement handed to the animation

observed PGD 5.01 cm · simulated PGD 0.73 cm · obs/sim = 6.89x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

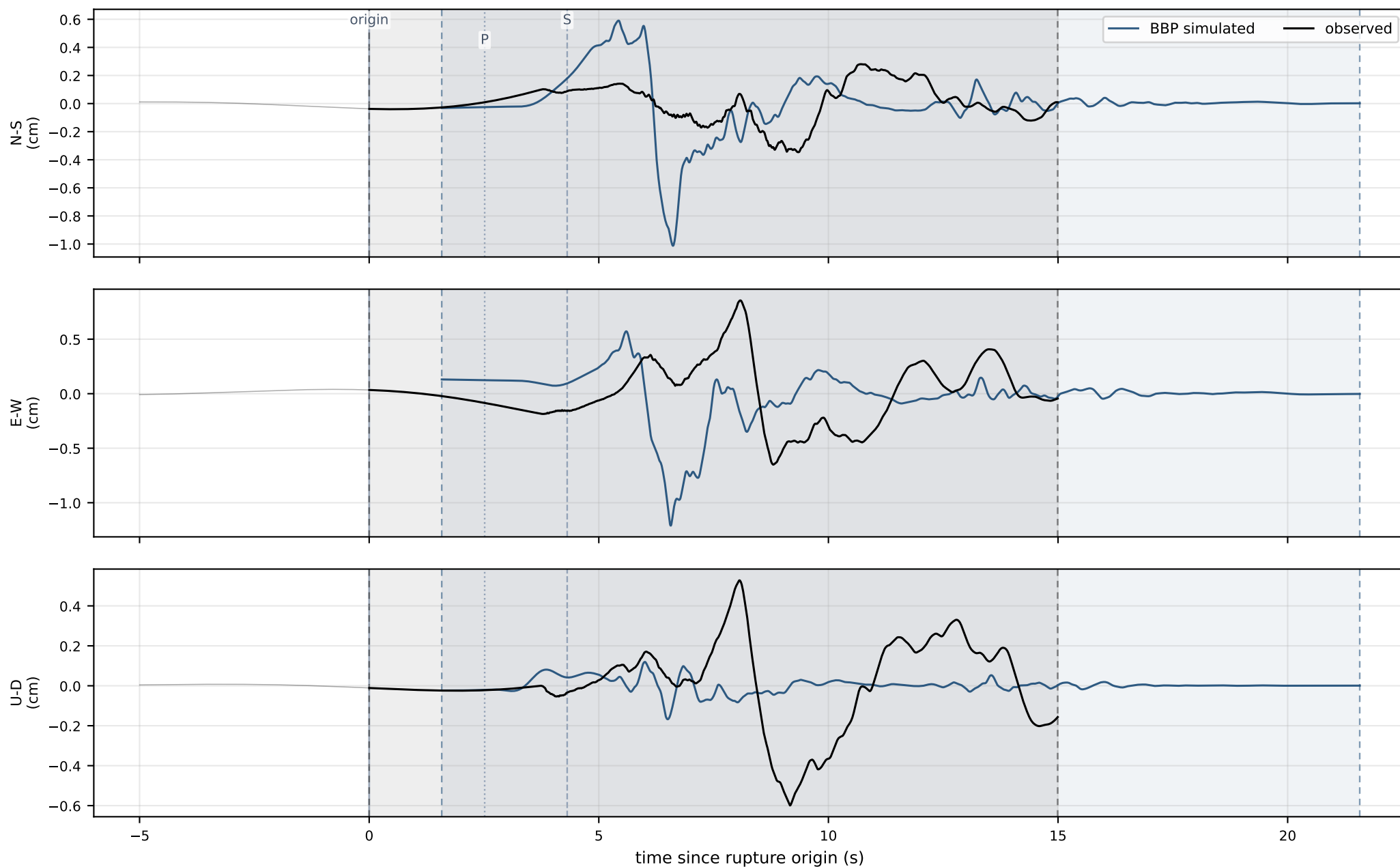


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.DCMP — 15.1 km · displacement handed to the animation

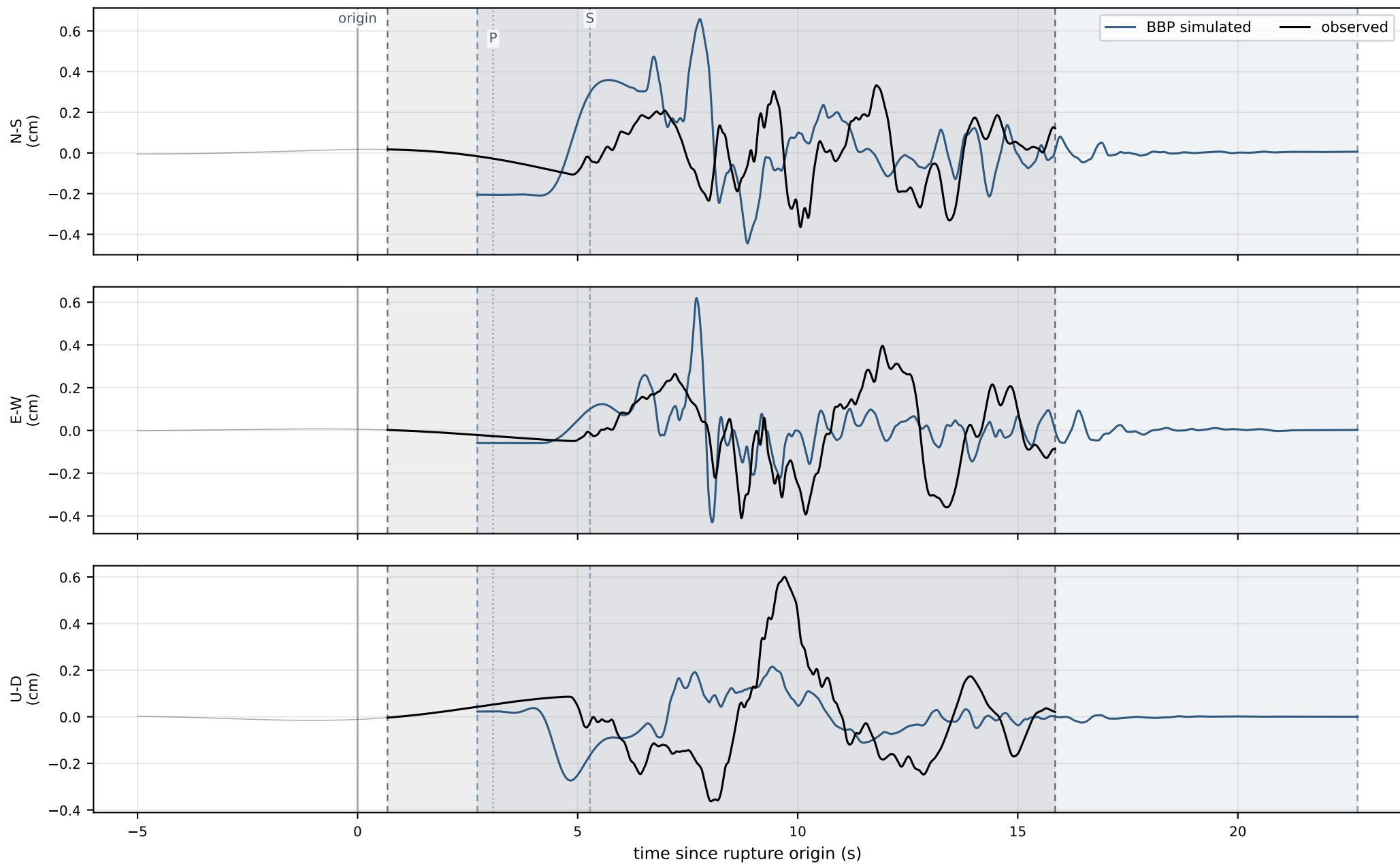
observed PGD 0.86 cm · simulated PGD 1.21 cm · obs/sim = 0.71x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GWR — 18.5 km · displacement handed to the animation
 observed PGD 0.41 cm · simulated PGD 0.66 cm · obs/sim = 0.62x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

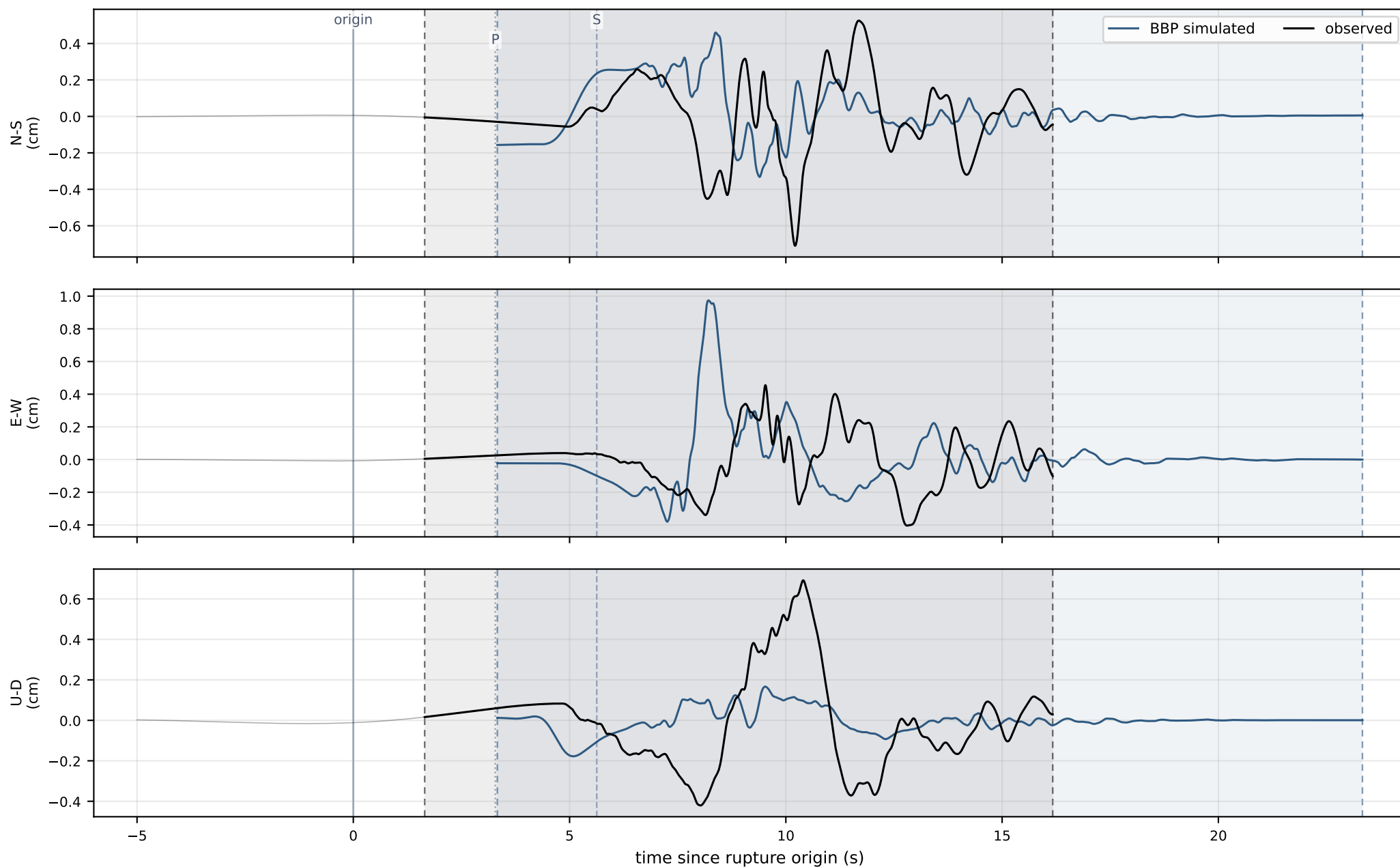


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

CE.79344 — 19.7 km · displacement handed to the animation

observed PGD 0.71 cm · simulated PGD 0.97 cm · obs/sim = 0.73x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

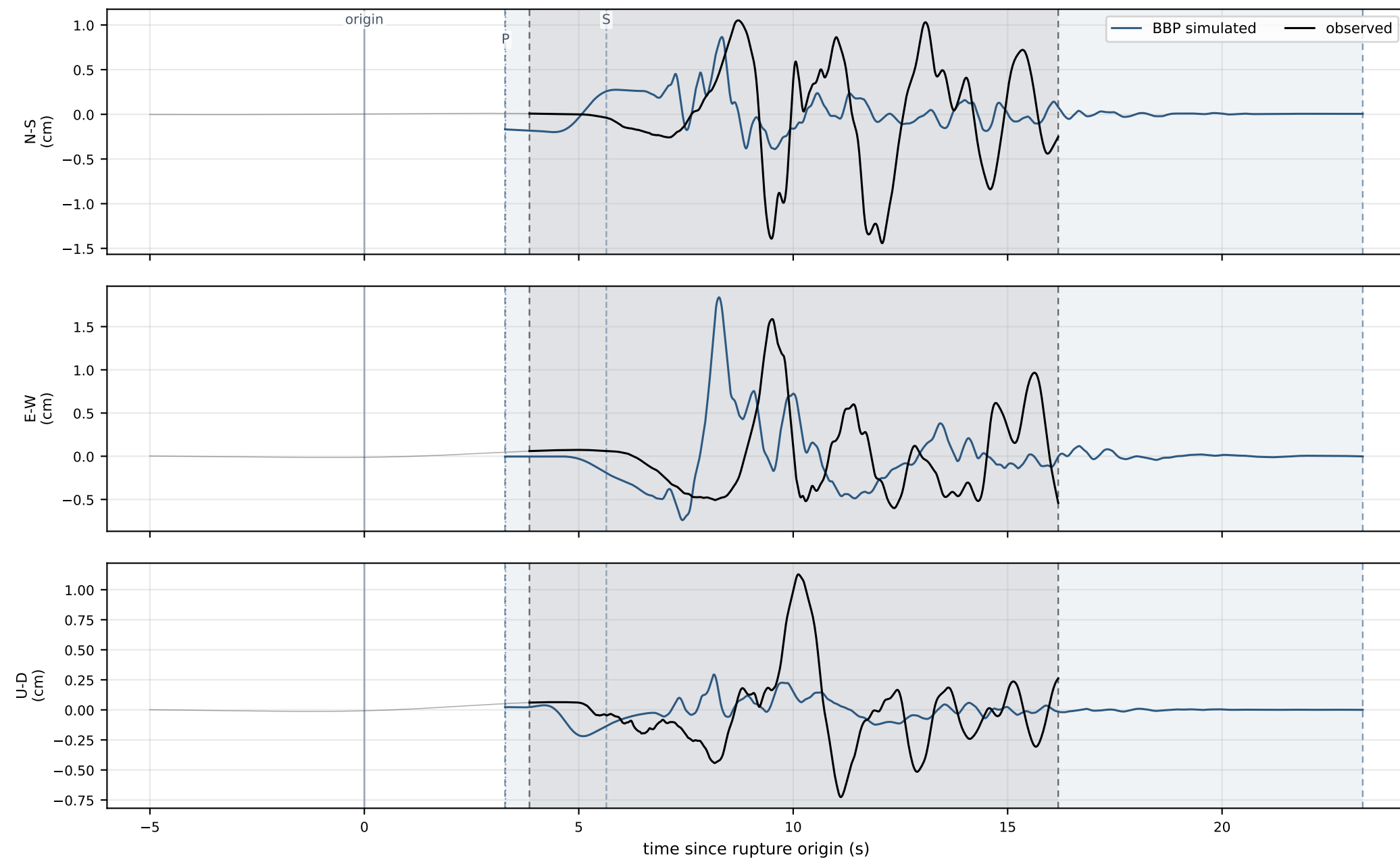


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

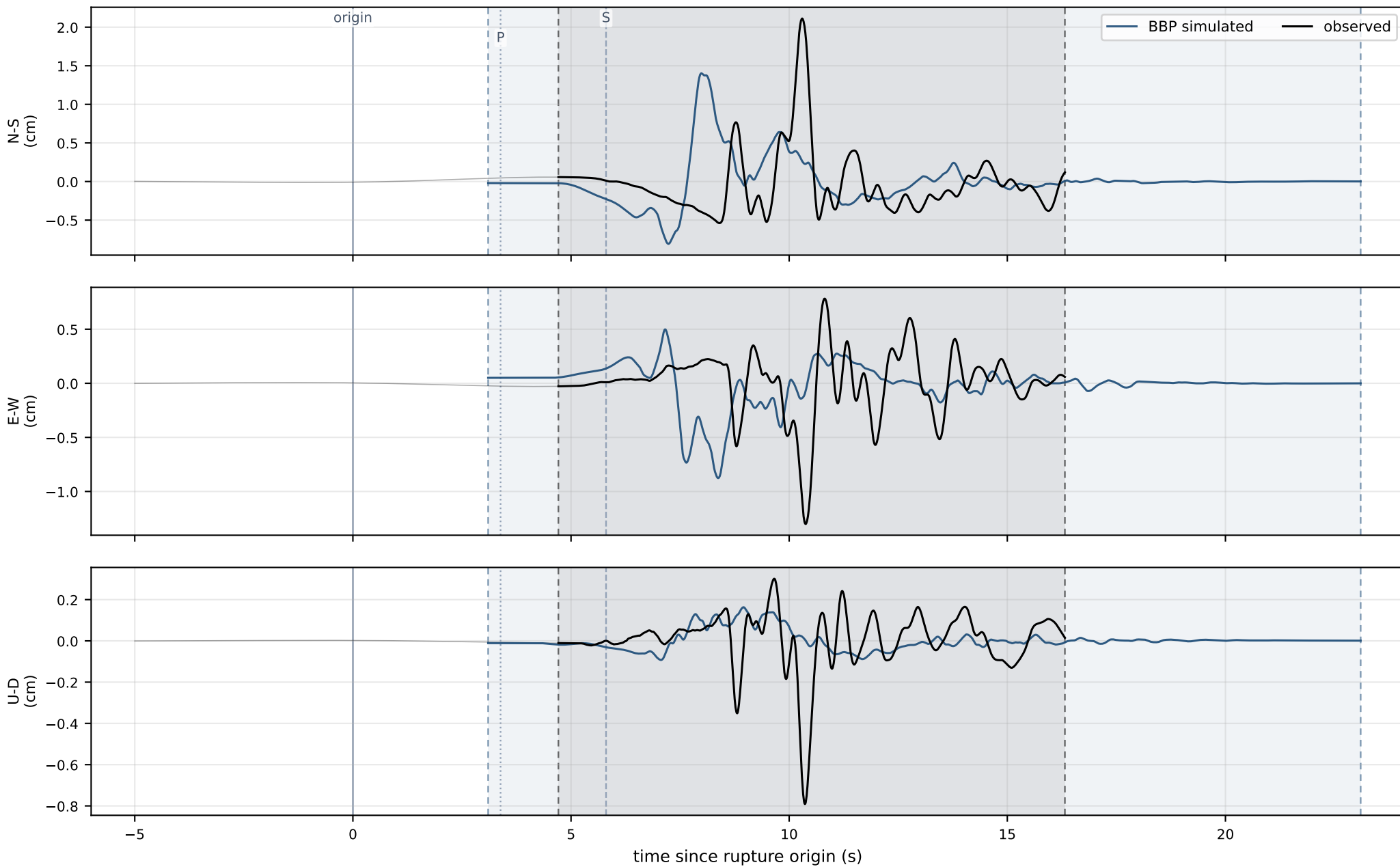
CE.79666 — 19.8 km · displacement handed to the animation

observed PGD 1.59 cm · simulated PGD 1.84 cm · obs/sim = 0.86x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

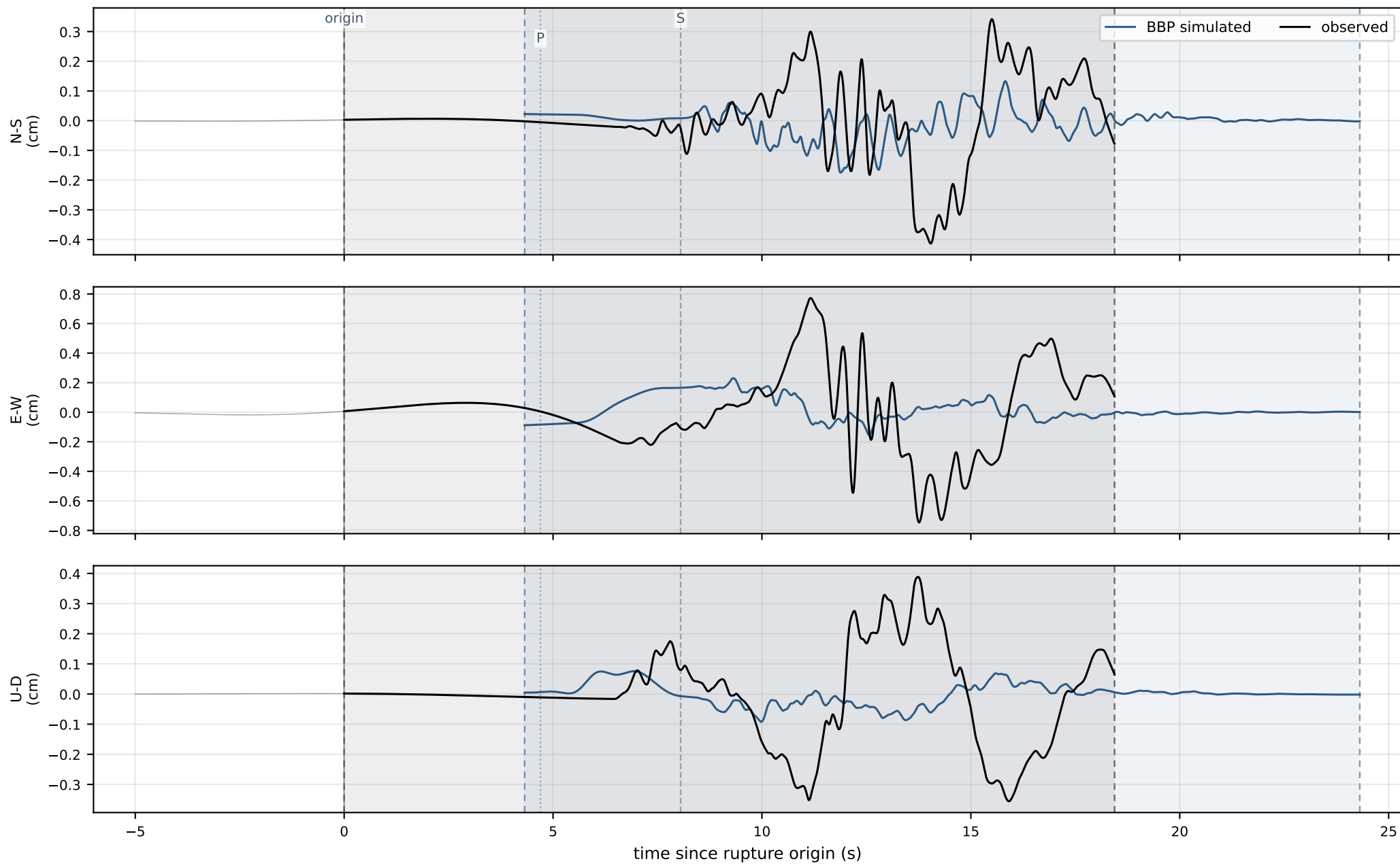


BK.ORRS — 20.3 km · displacement handed to the animation
 observed PGD 2.11 cm · simulated PGD 1.40 cm · obs/sim = 1.51x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.BEVN — 28.2 km · displacement handed to the animation
 observed PGD 0.77 cm · simulated PGD 0.23 cm · obs/sim = 3.36x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

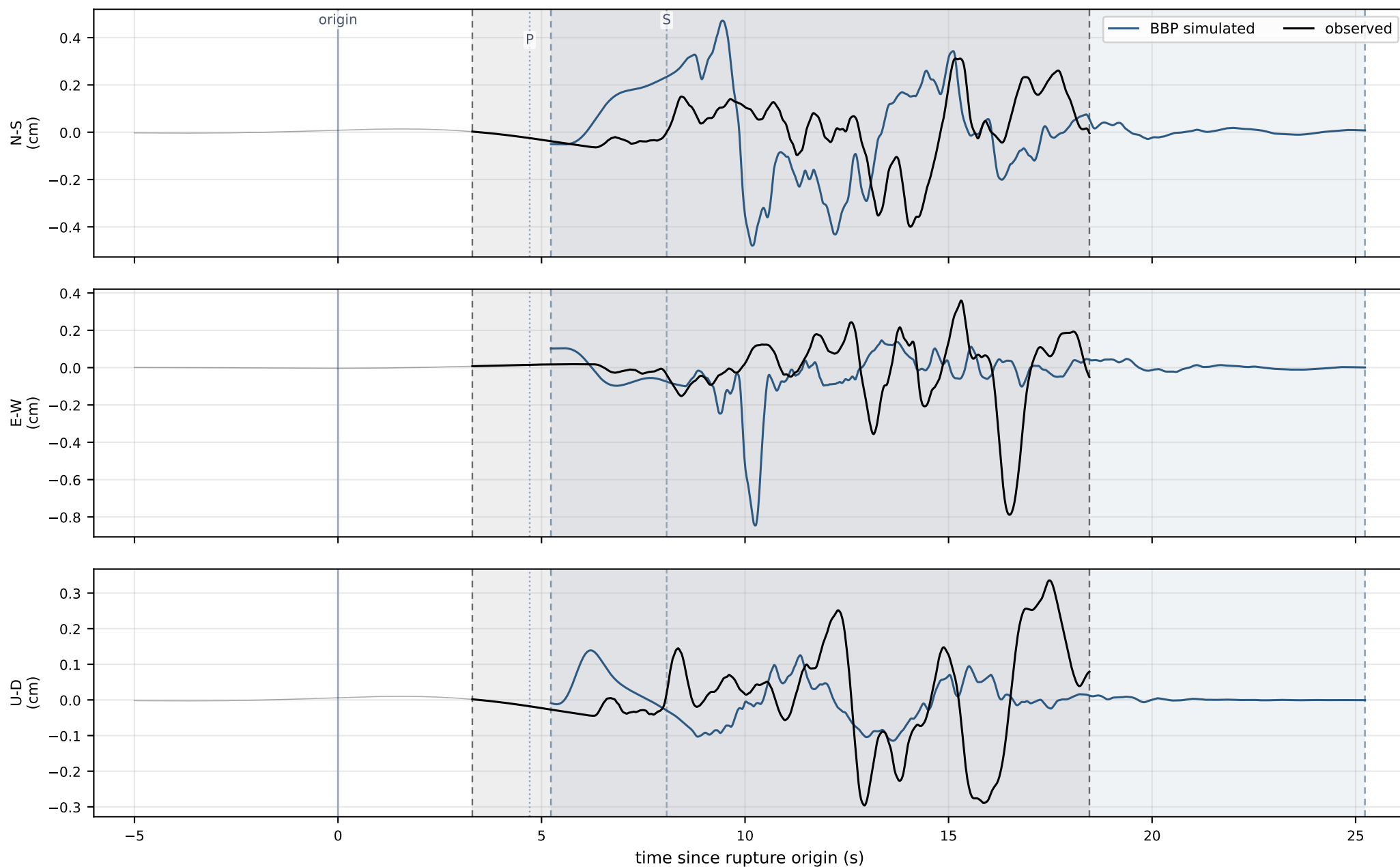


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.SHWD — 28.3 km · displacement handed to the animation

observed PGD 0.79 cm · simulated PGD 0.85 cm · obs/sim = 0.93x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

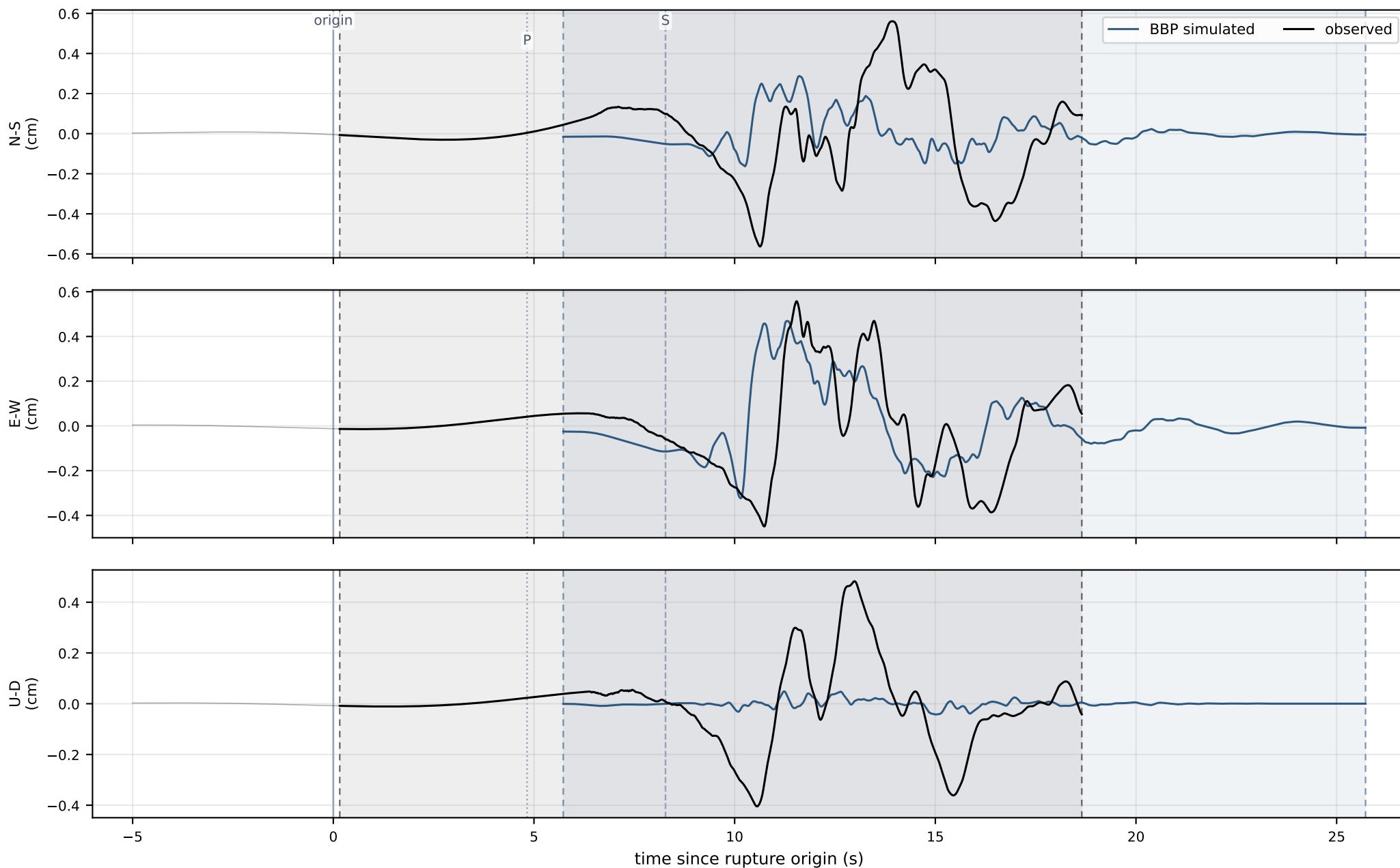


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GCWB — 29.0 km · displacement handed to the animation

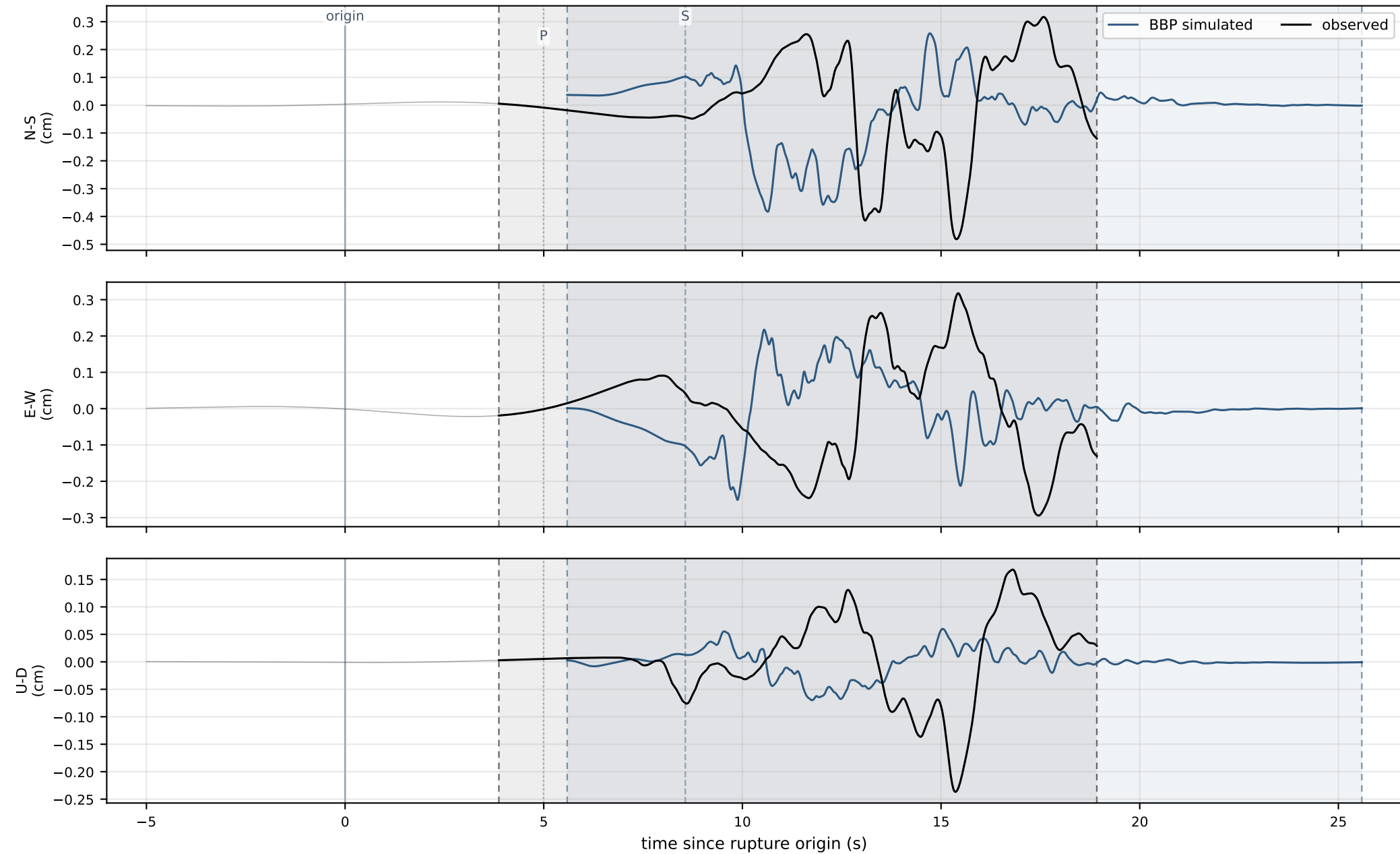
observed PGD 0.56 cm · simulated PGD 0.47 cm · obs/sim = 1.20x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.HULL — 30.0 km · displacement handed to the animation
 observed PGD 0.48 cm · simulated PGD 0.38 cm · obs/sim = 1.26x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

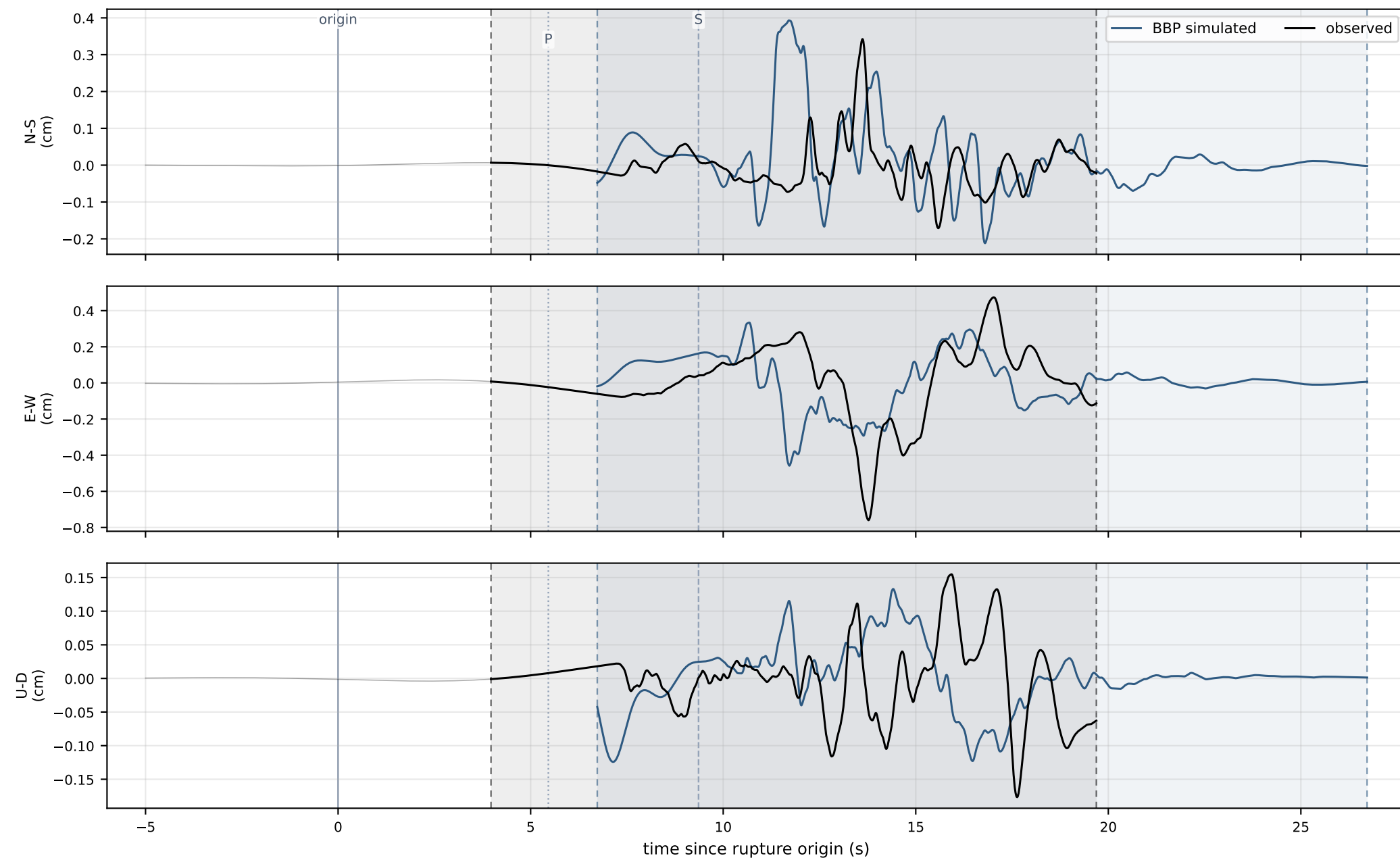


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GMR — 32.8 km · displacement handed to the animation

observed PGD 0.76 cm · simulated PGD 0.46 cm · obs/sim = 1.66x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

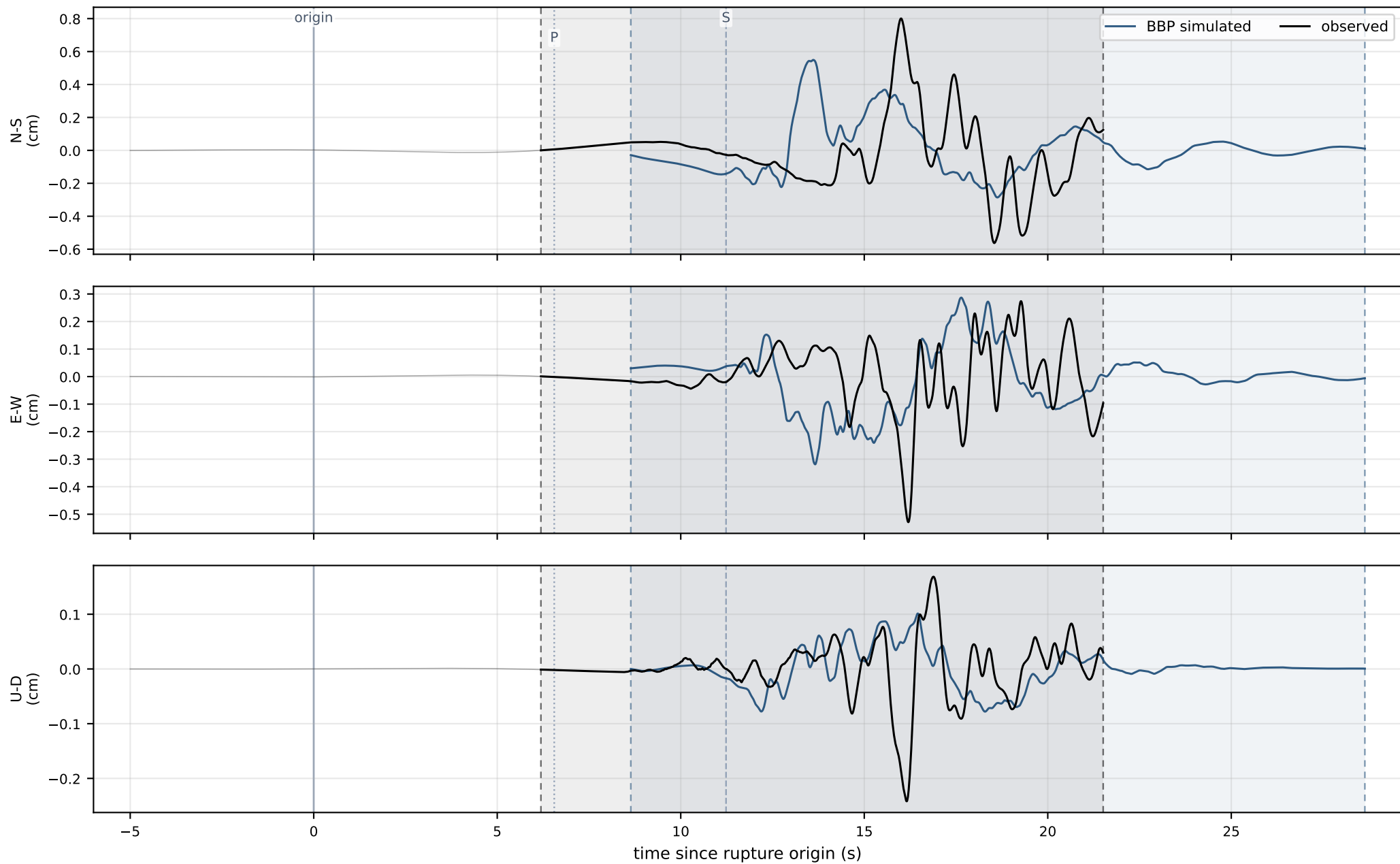


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GNR — 39.3 km · displacement handed to the animation

observed PGD 0.80 cm · simulated PGD 0.55 cm · obs/sim = 1.46x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

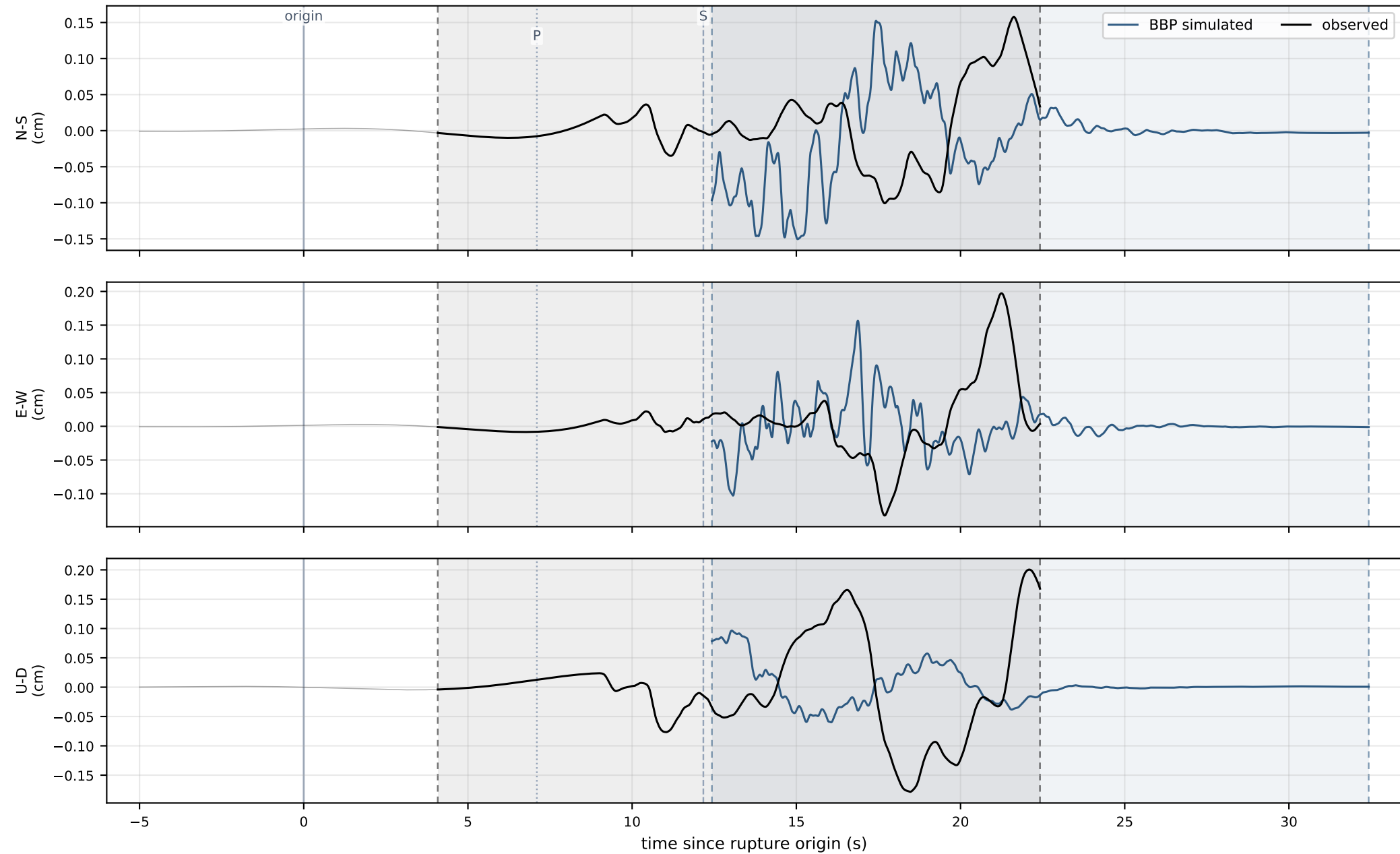


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.ETSL — 42.6 km · displacement handed to the animation

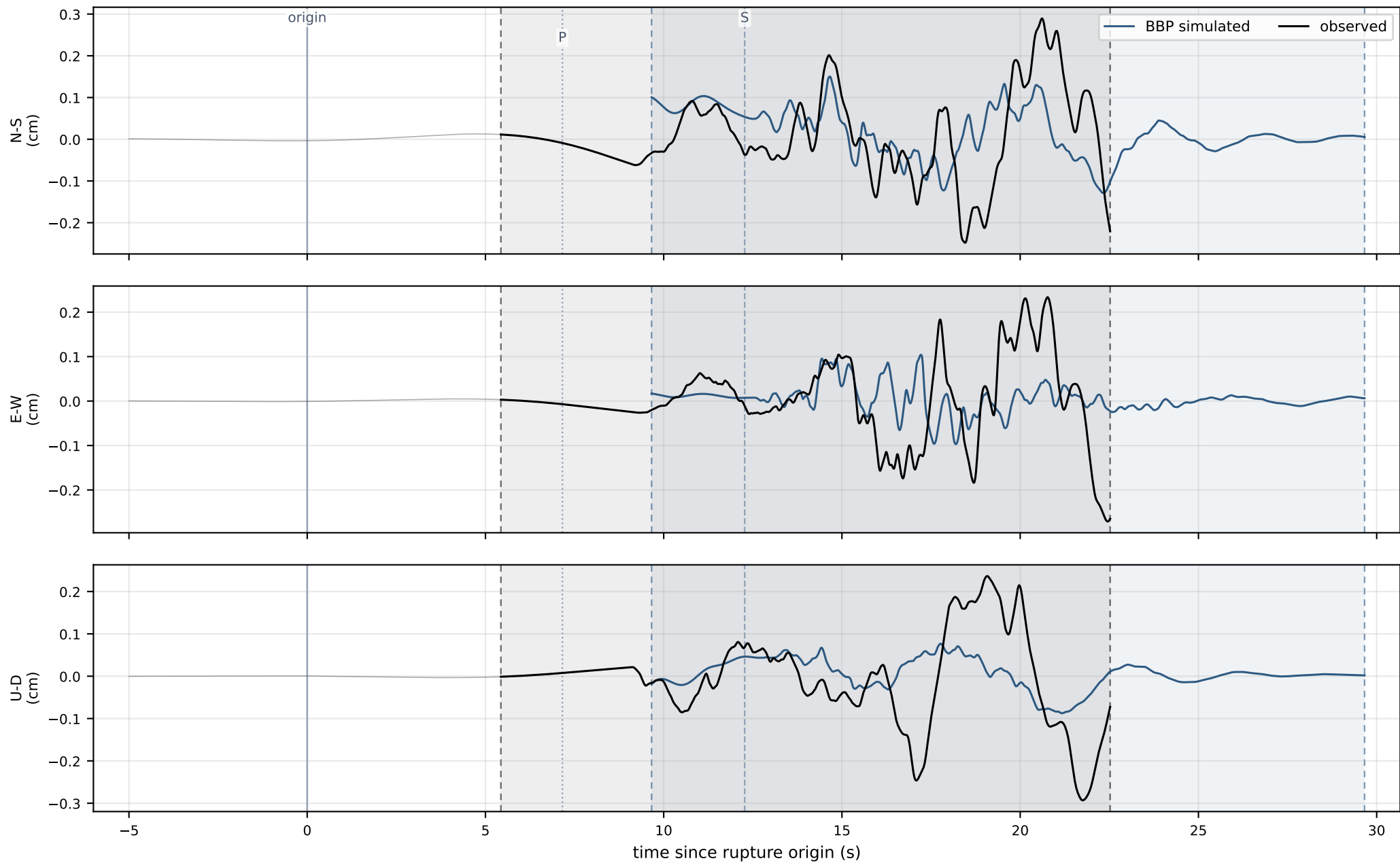
observed PGD 0.20 cm · simulated PGD 0.16 cm · obs/sim = 1.26x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



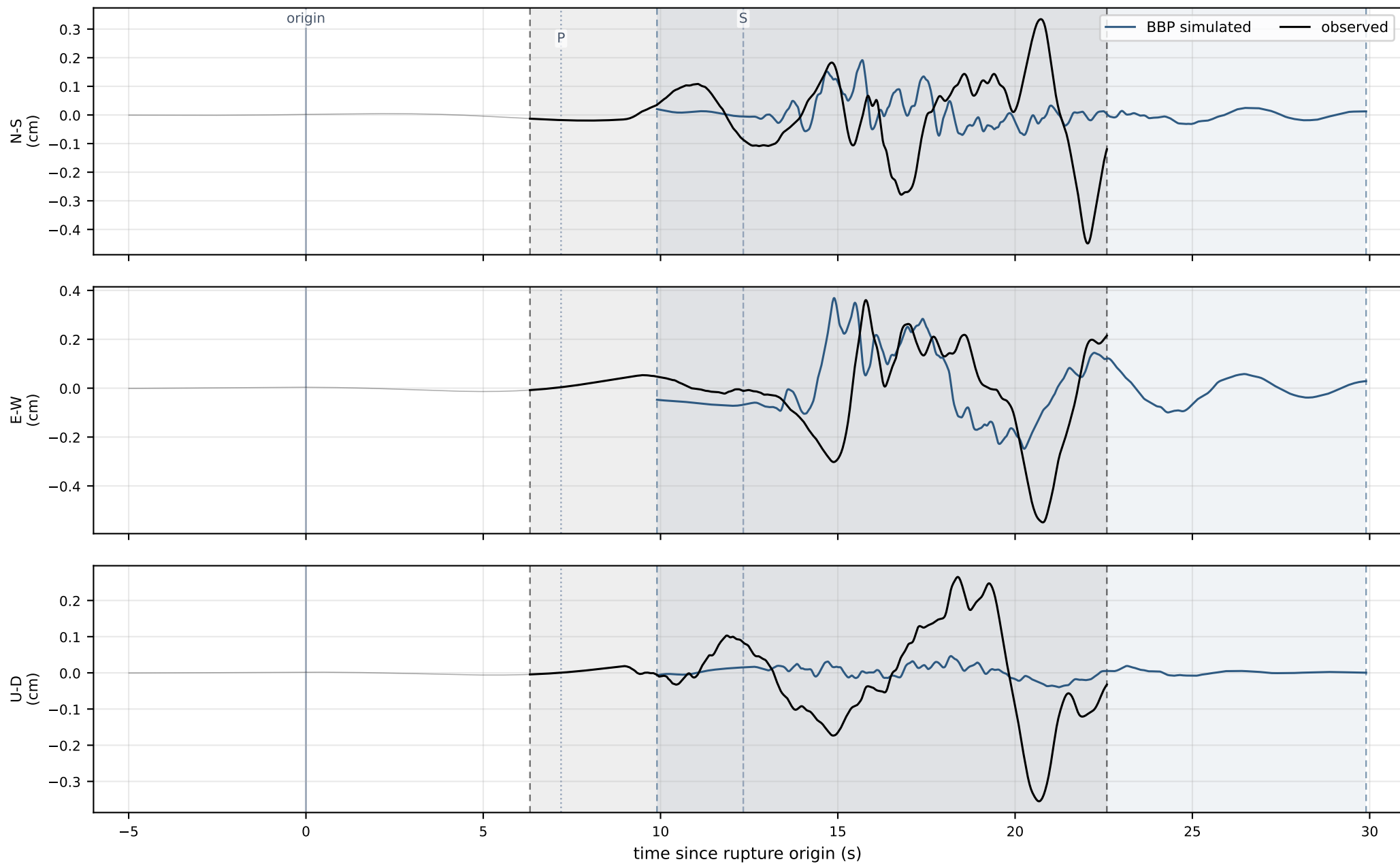
Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.BONV — 43.0 km · displacement handed to the animation
 observed PGD 0.29 cm · simulated PGD 0.15 cm · obs/sim = 1.93x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.HOPS — 43.2 km · displacement handed to the animation
 observed PGD 0.55 cm · simulated PGD 0.37 cm · obs/sim = 1.49x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

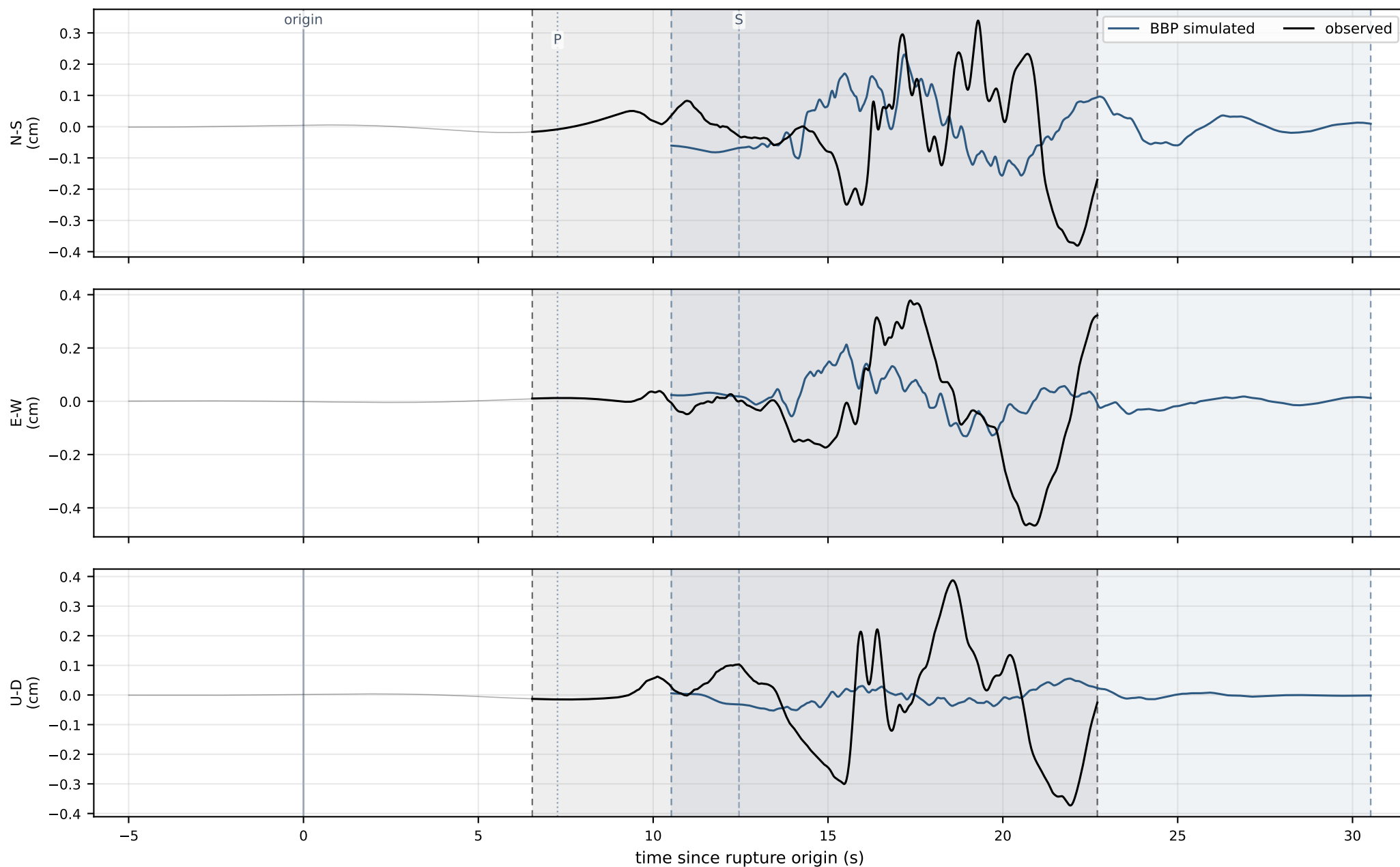


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GHGB — 43.6 km · displacement handed to the animation

observed PGD 0.47 cm · simulated PGD 0.23 cm · obs/sim = 2.02x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

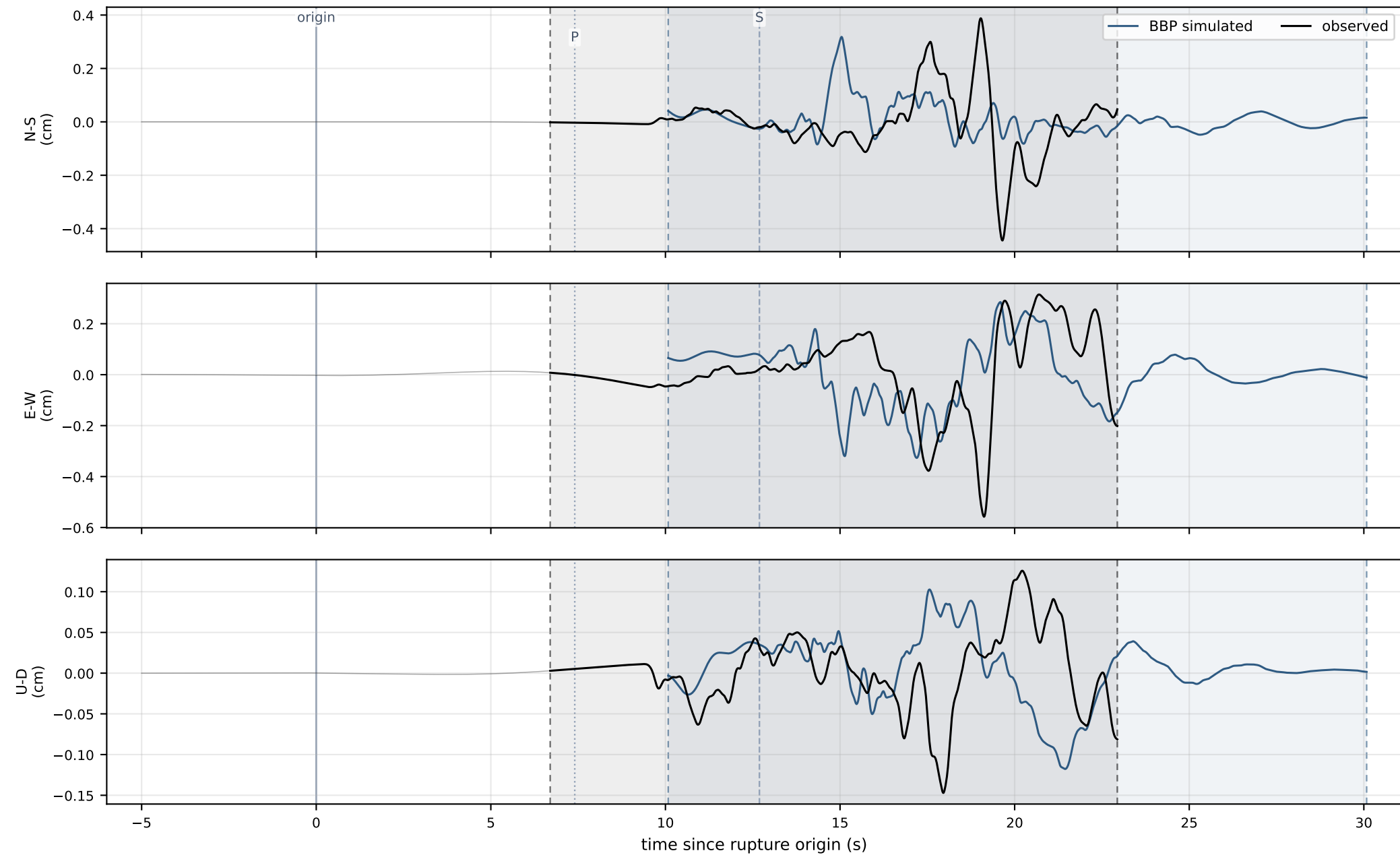


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GHO — 44.4 km · displacement handed to the animation

observed PGD 0.56 cm · simulated PGD 0.33 cm · obs/sim = 1.71x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

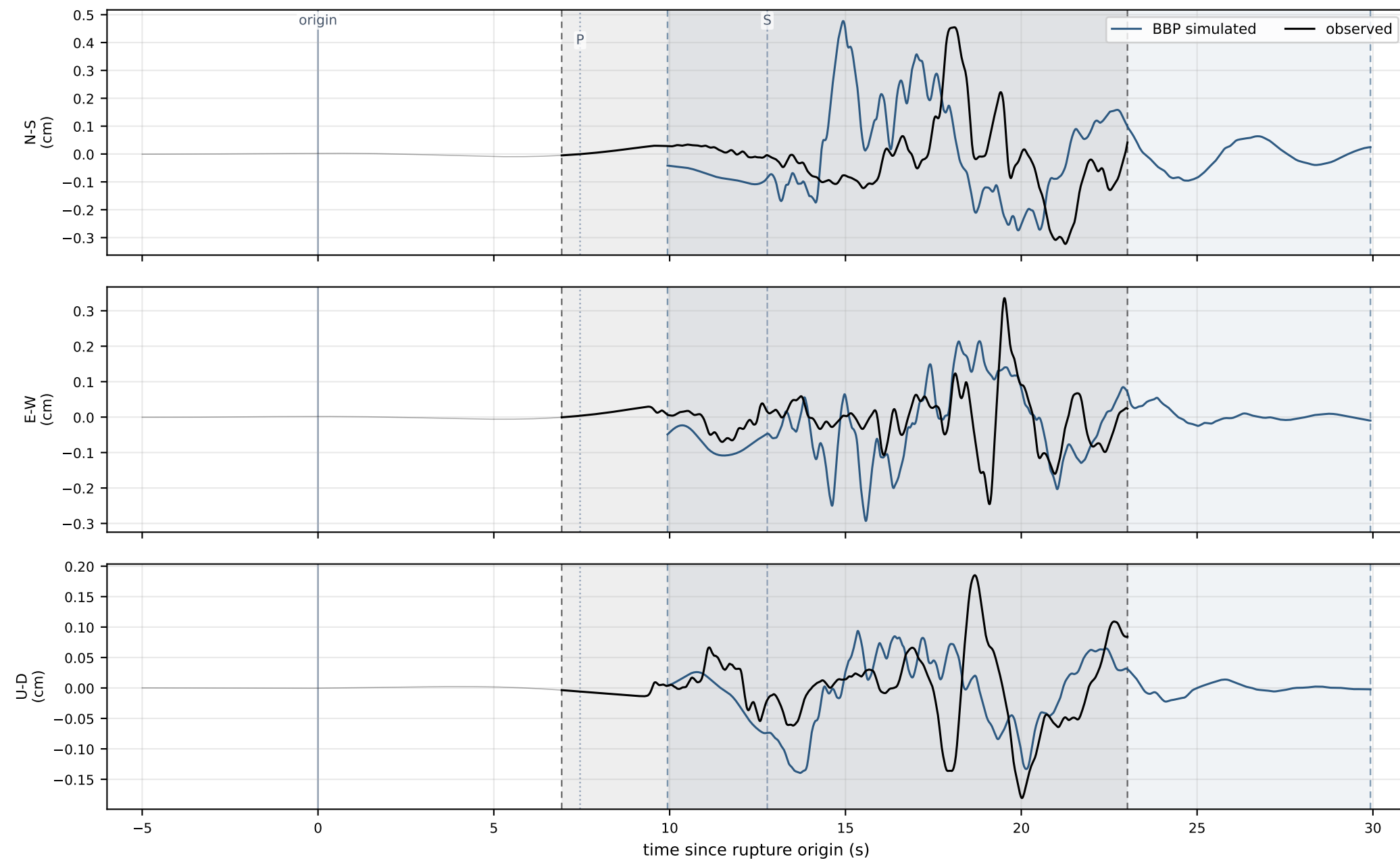


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.MNDO — 44.7 km · displacement handed to the animation

observed PGD 0.45 cm · simulated PGD 0.48 cm · obs/sim = 0.95x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

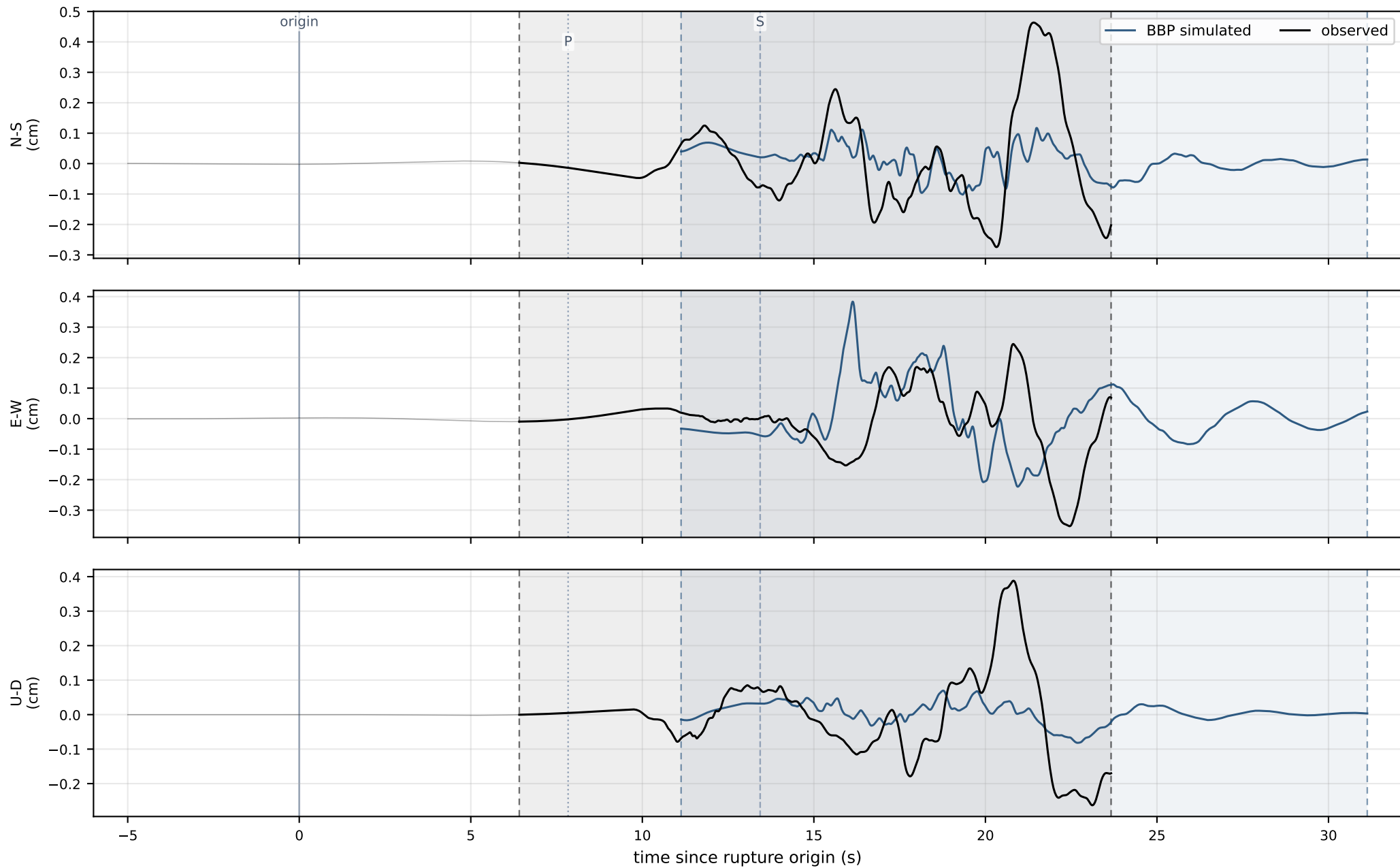


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GSN — 47.0 km · displacement handed to the animation

observed PGD 0.46 cm · simulated PGD 0.38 cm · obs/sim = 1.21x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

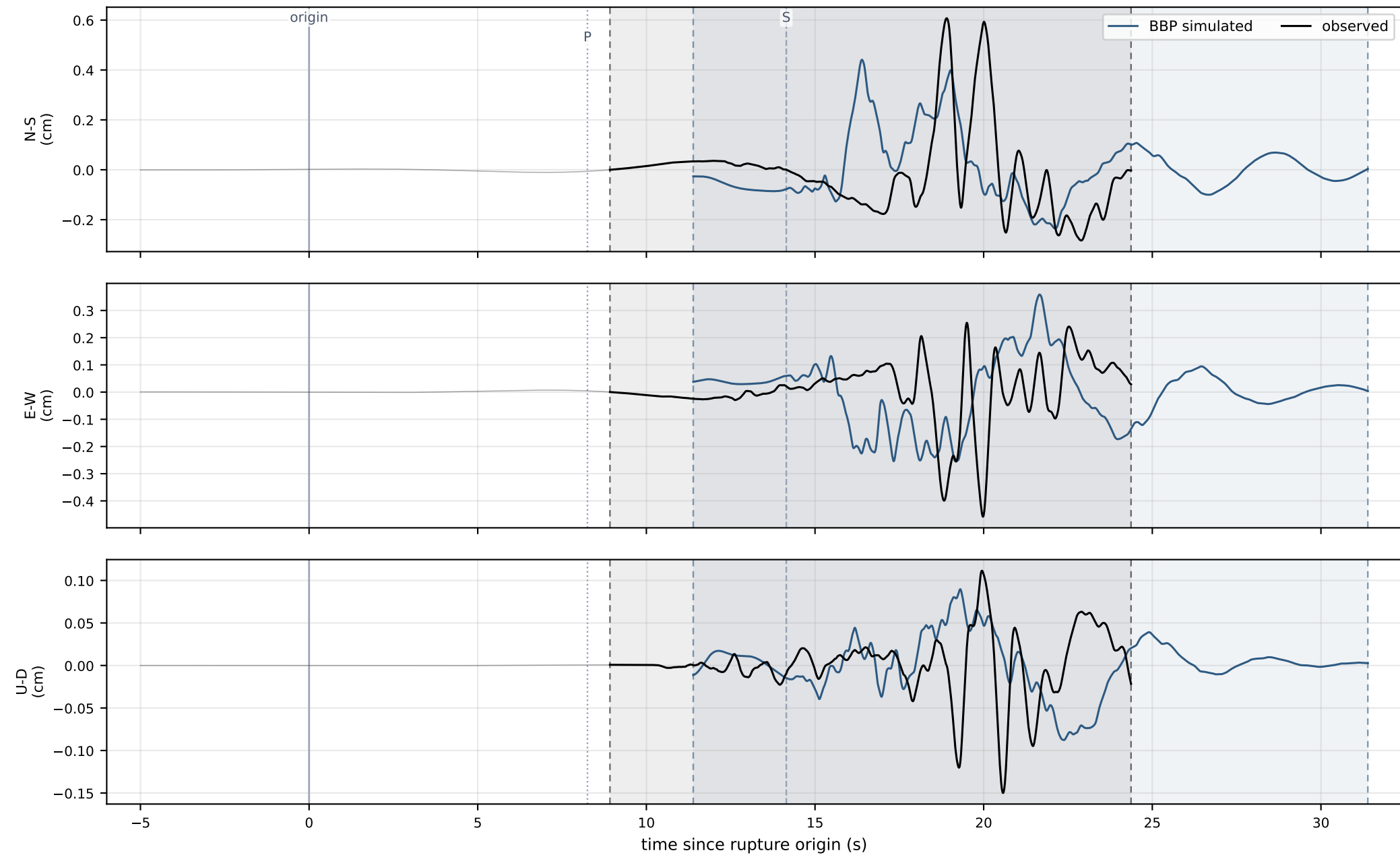


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GBL — 49.5 km · displacement handed to the animation

observed PGD 0.61 cm · simulated PGD 0.44 cm · obs/sim = 1.38x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

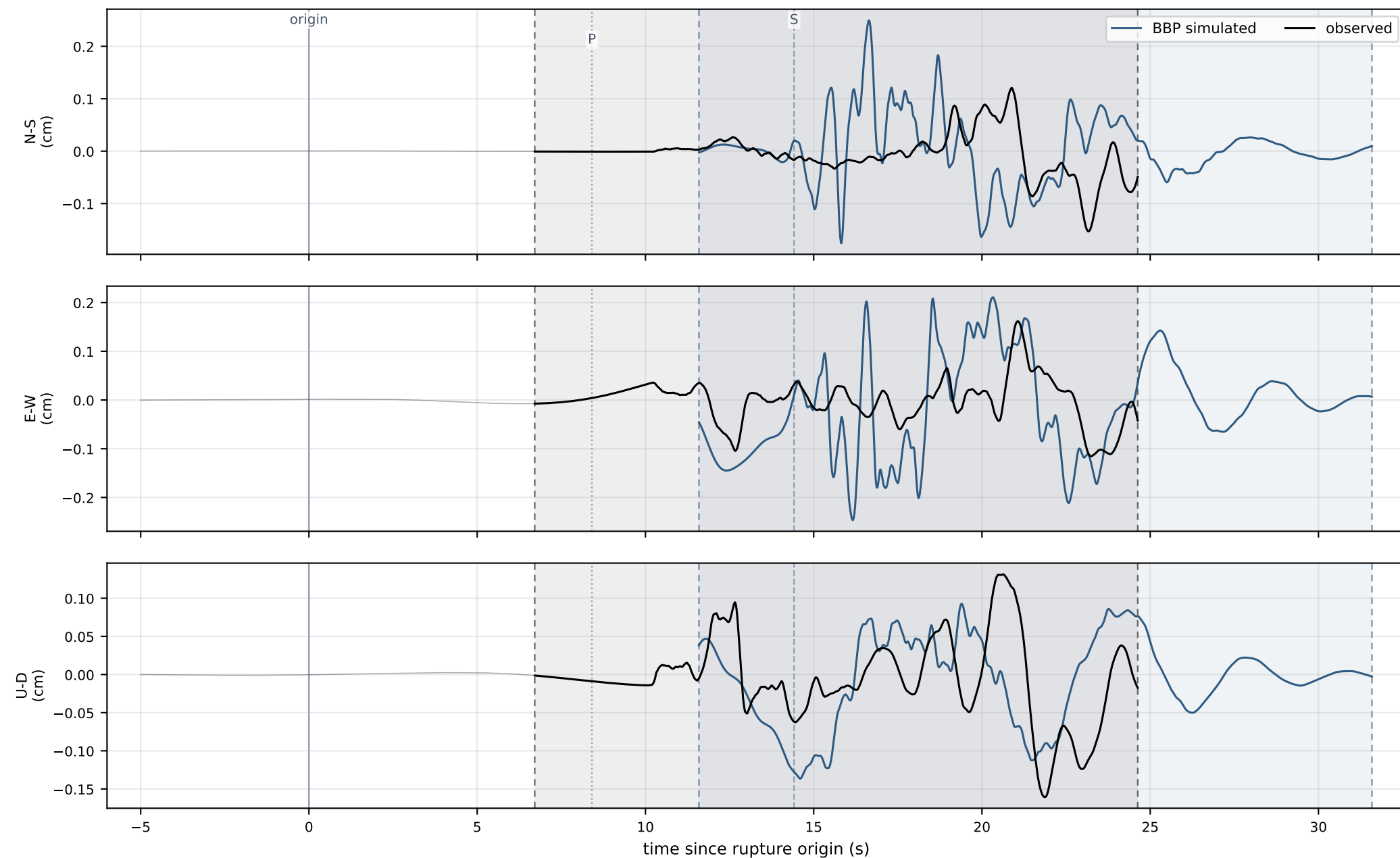


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

CE.79016 — 50.5 km · displacement handed to the animation

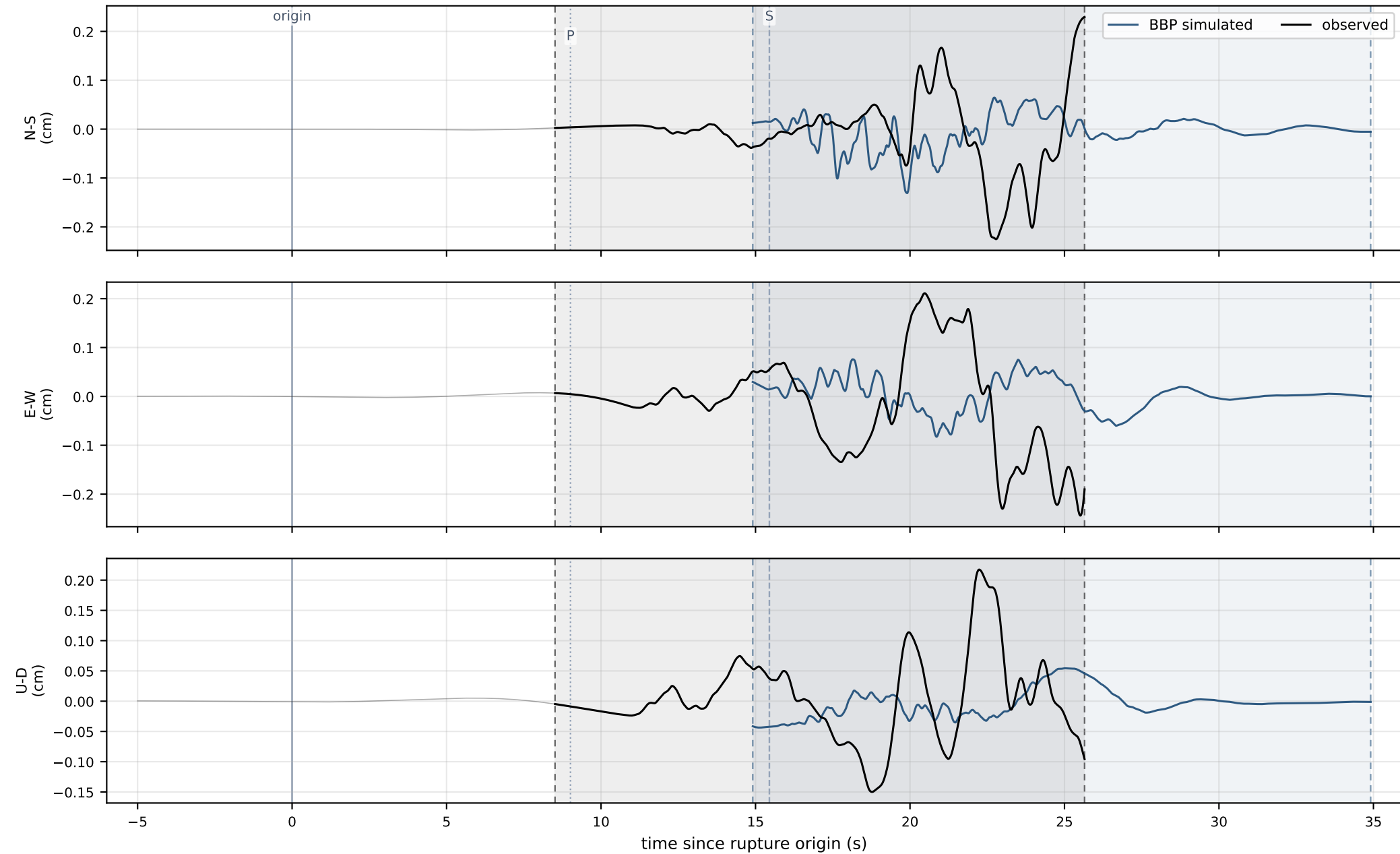
observed PGD 0.16 cm · simulated PGD 0.25 cm · obs/sim = 0.65x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.GTSB — 54.1 km · displacement handed to the animation
 observed PGD 0.24 cm · simulated PGD 0.13 cm · obs/sim = 1.86x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

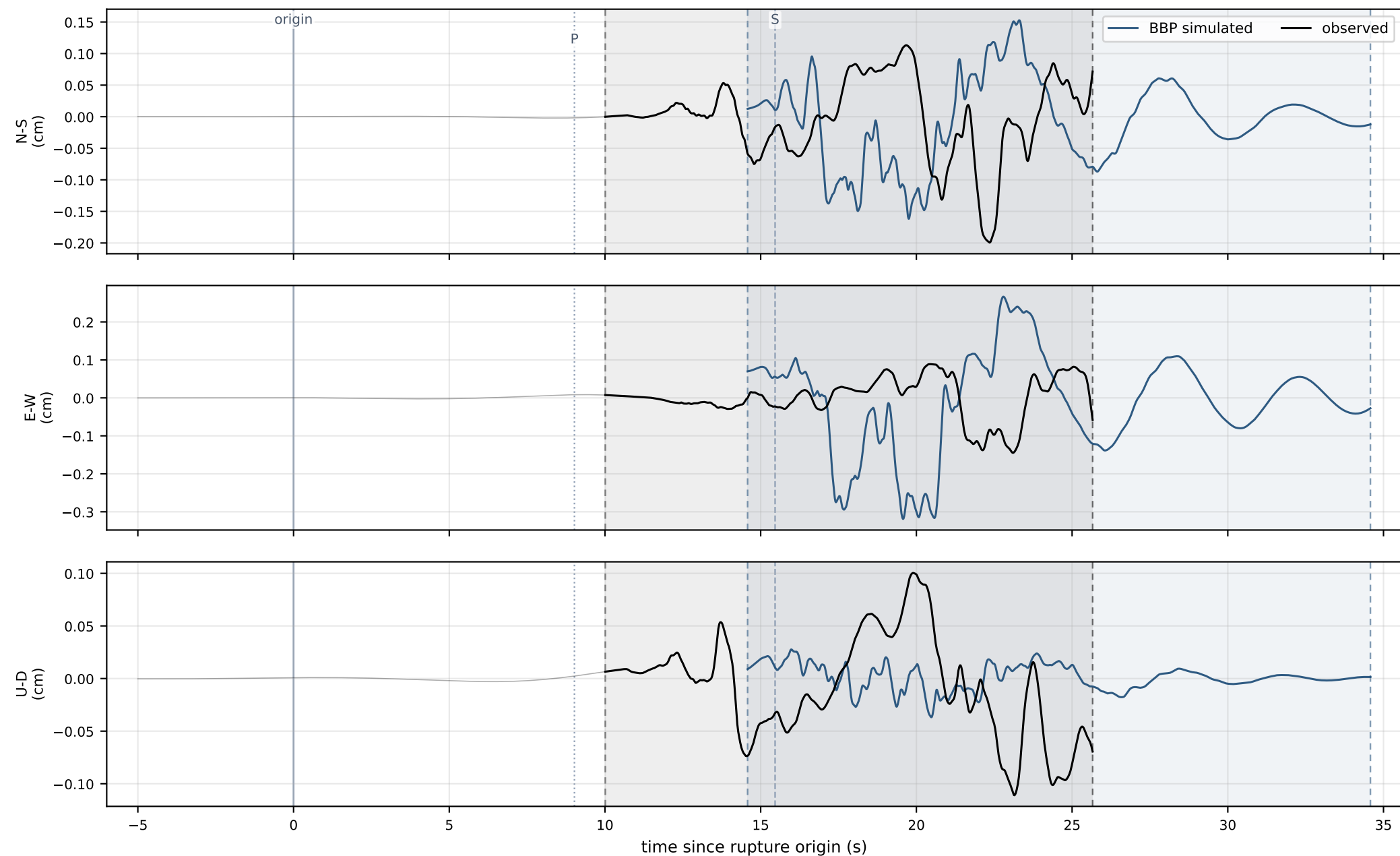


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.KIP — 54.1 km · displacement handed to the animation

observed PGD 0.20 cm · simulated PGD 0.32 cm · obs/sim = 0.63x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

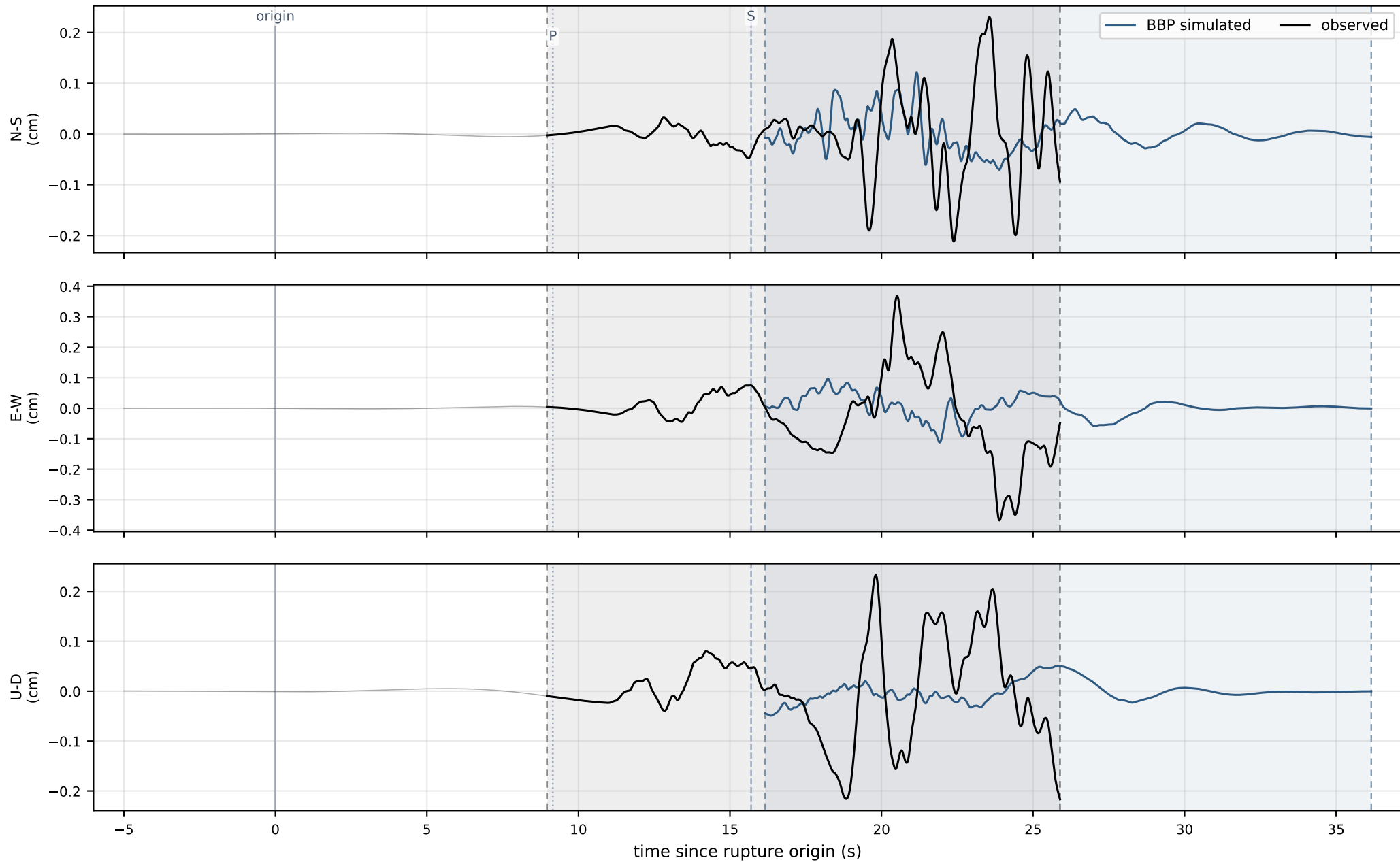


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GSR — 54.9 km · displacement handed to the animation

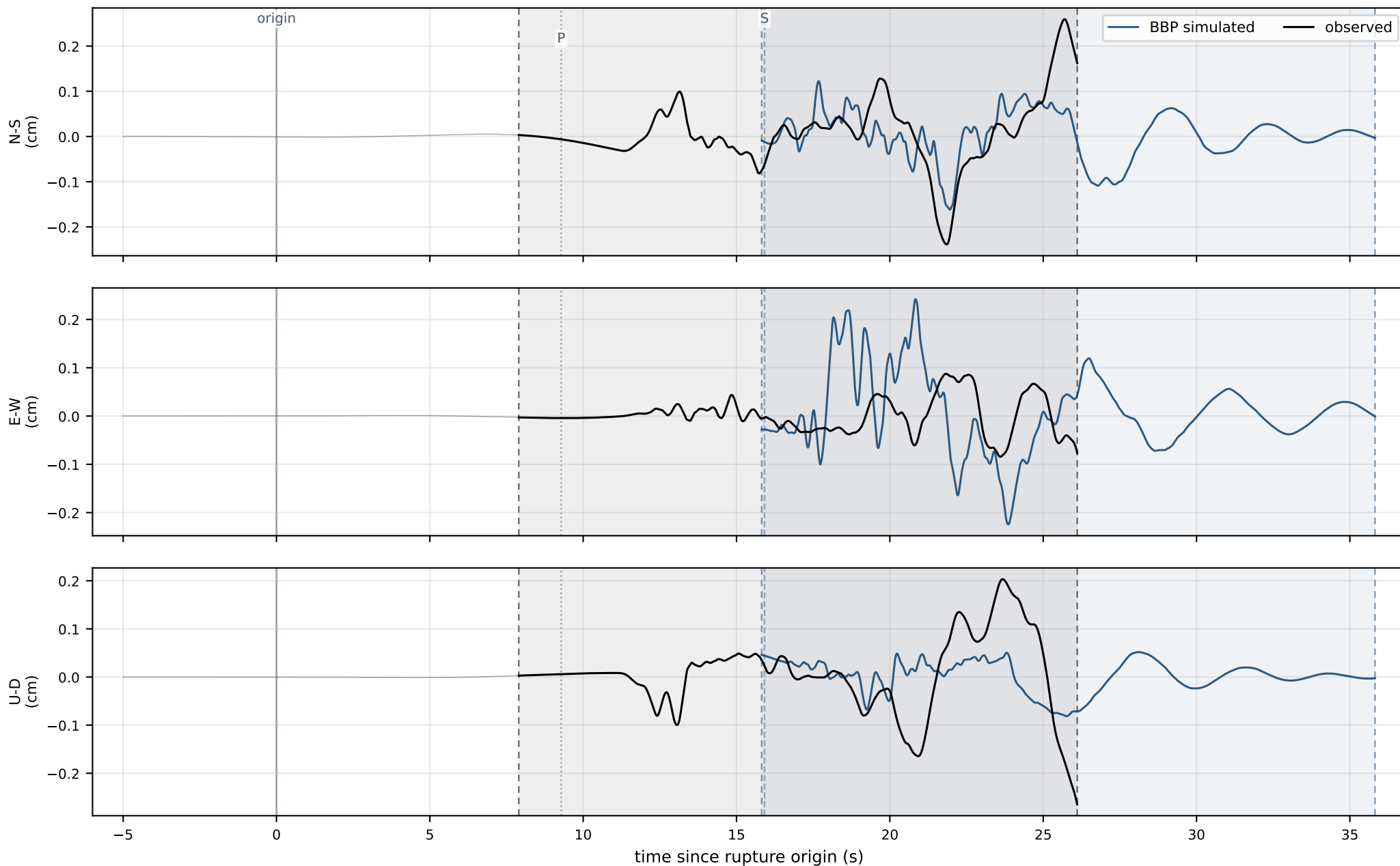
observed PGD 0.37 cm · simulated PGD 0.12 cm · obs/sim = 3.04x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



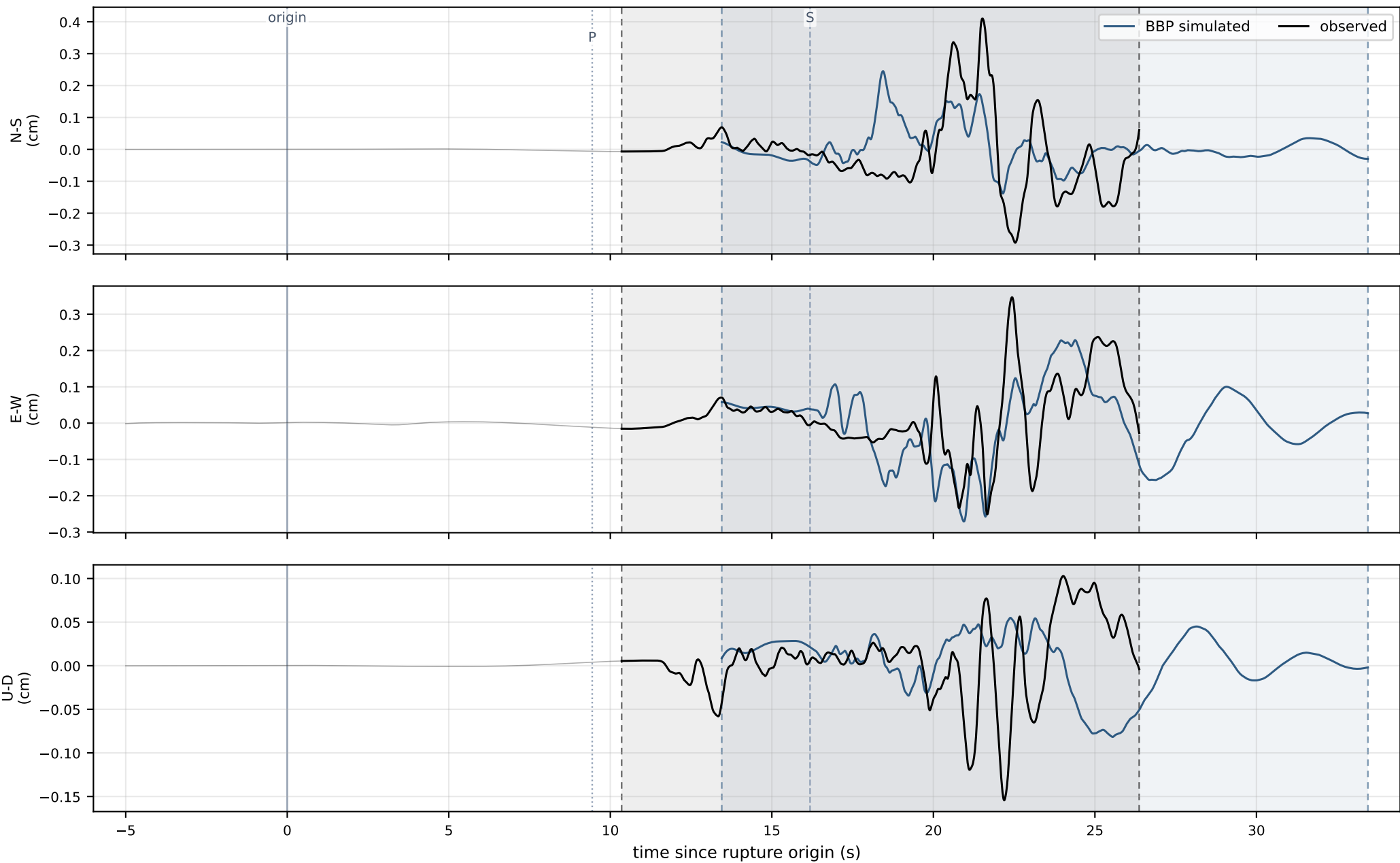
Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.GALB — 55.7 km · displacement handed to the animation
 observed PGD 0.26 cm · simulated PGD 0.24 cm · obs/sim = 1.07x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



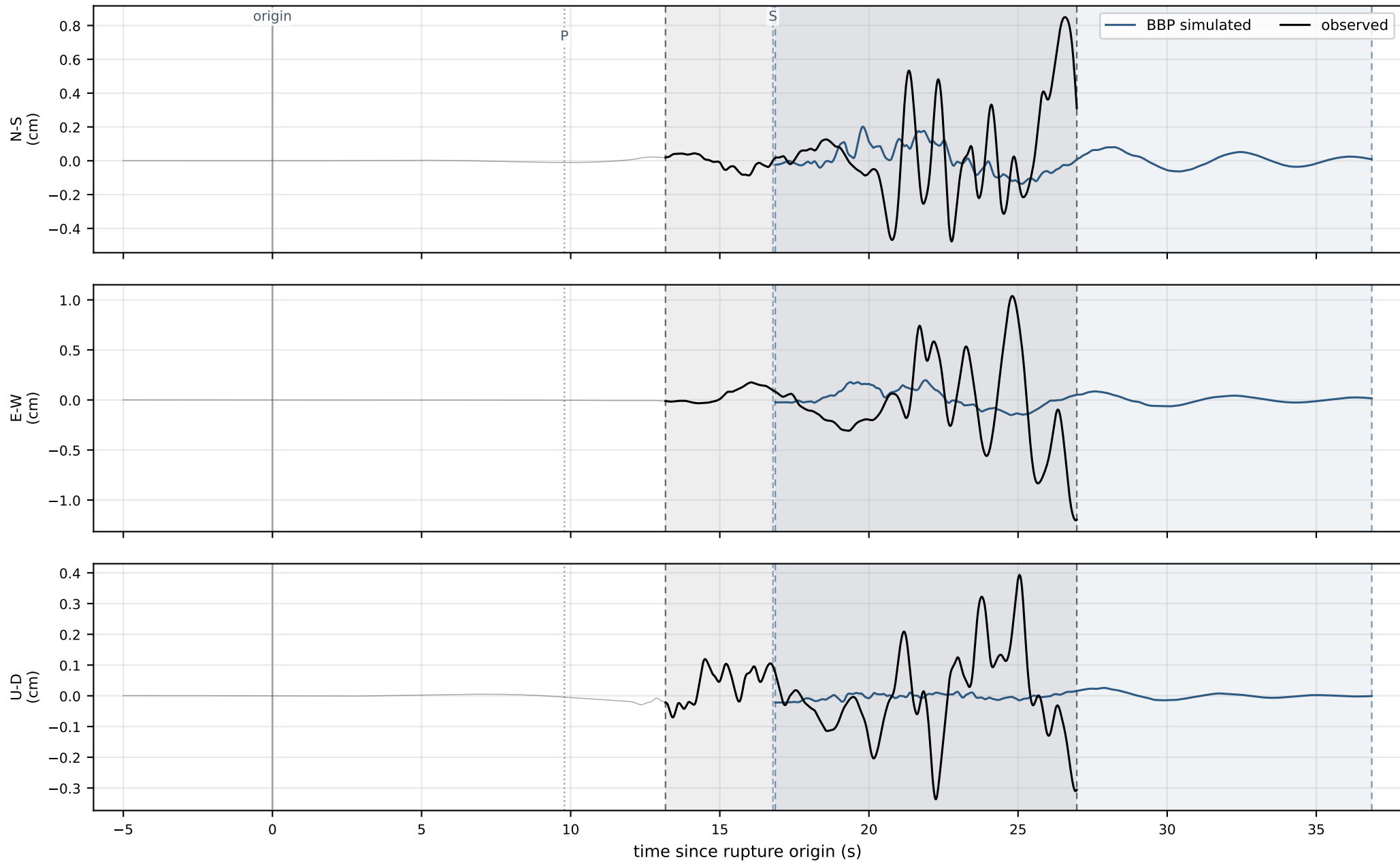
Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.SPAN — 56.6 km · displacement handed to the animation
observed PGD 0.41 cm · simulated PGD 0.27 cm · obs/sim = 1.51x
observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GTK — 58.7 km · displacement handed to the animation
 observed PGD 1.20 cm · simulated PGD 0.20 cm · obs/sim = 5.95x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

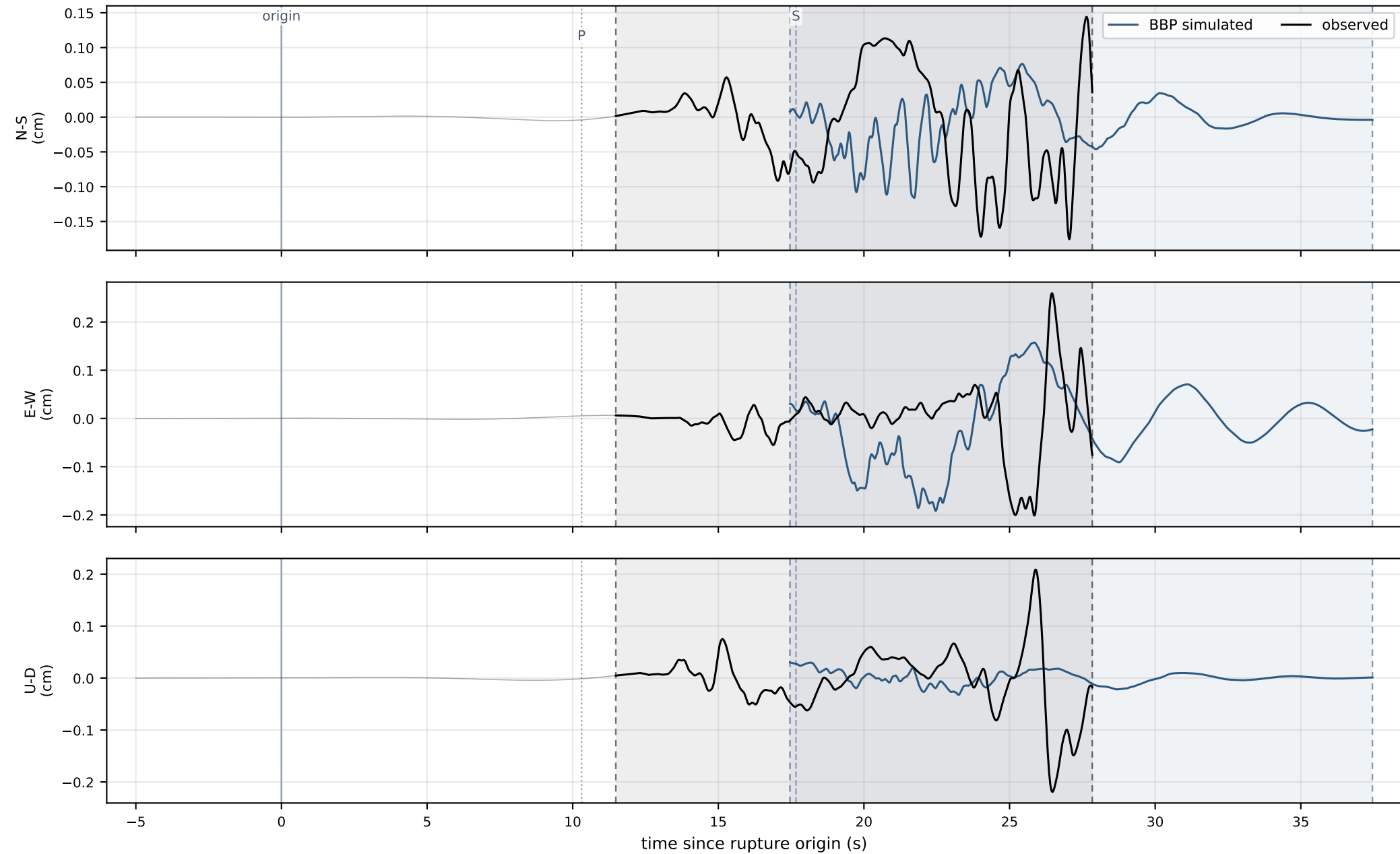


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.RVIT — 61.8 km · displacement handed to the animation

observed PGD 0.26 cm · simulated PGD 0.19 cm · obs/sim = 1.35x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

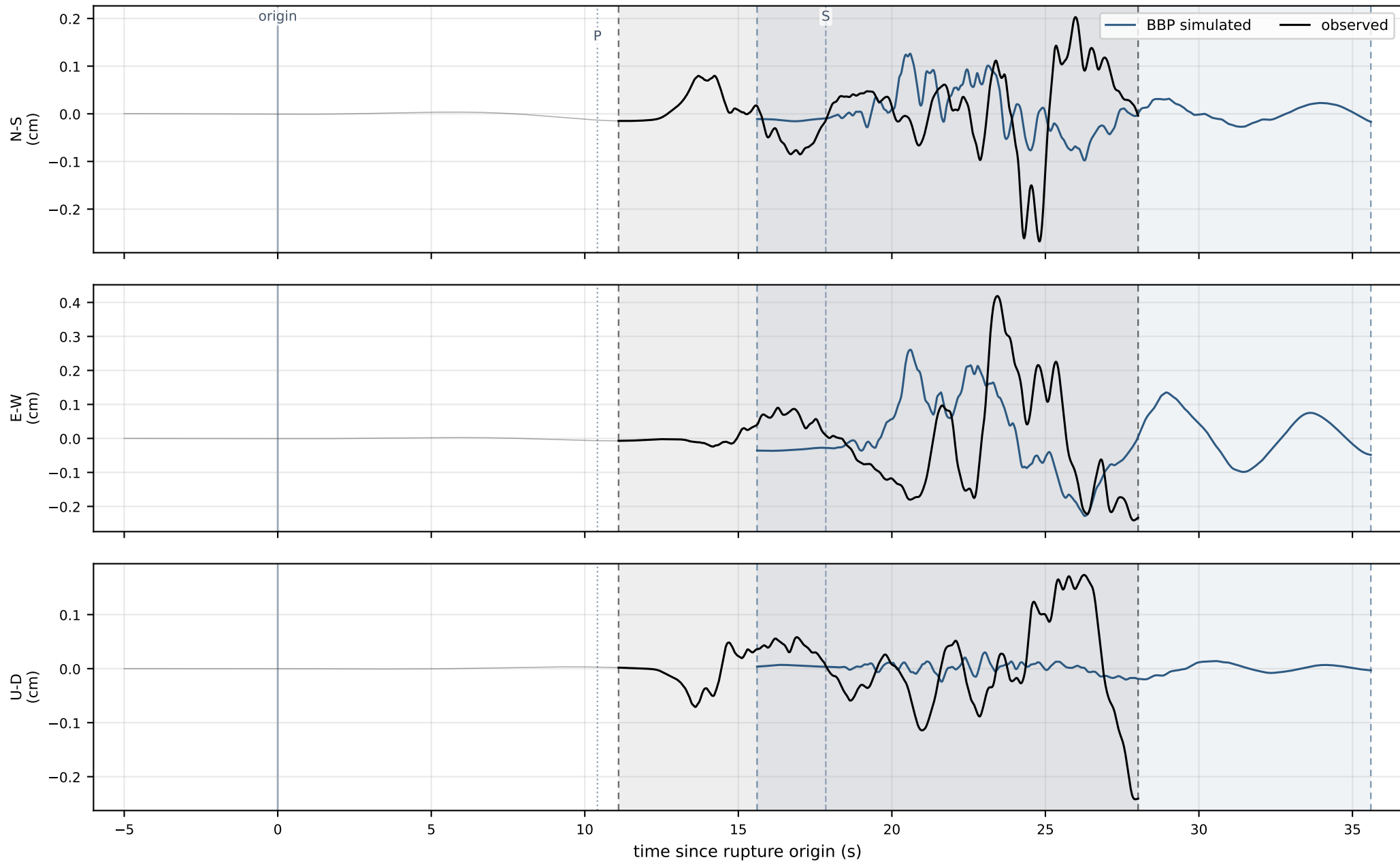


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GPM — 62.5 km · displacement handed to the animation

observed PGD 0.42 cm · simulated PGD 0.26 cm · obs/sim = 1.61x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

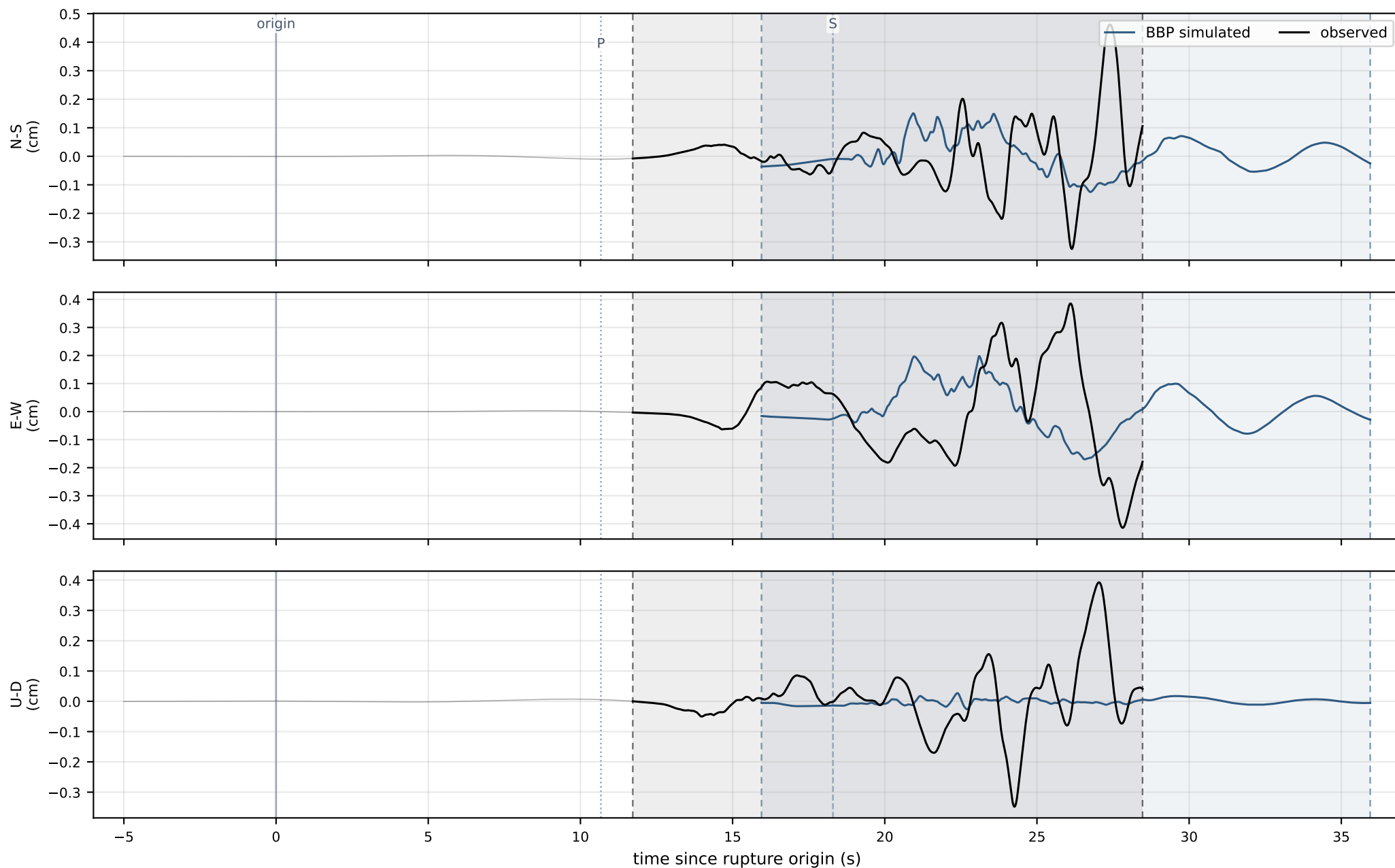


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

CE.68035 — 64.0 km · displacement handed to the animation

observed PGD 0.46 cm · simulated PGD 0.20 cm · obs/sim = 2.33x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

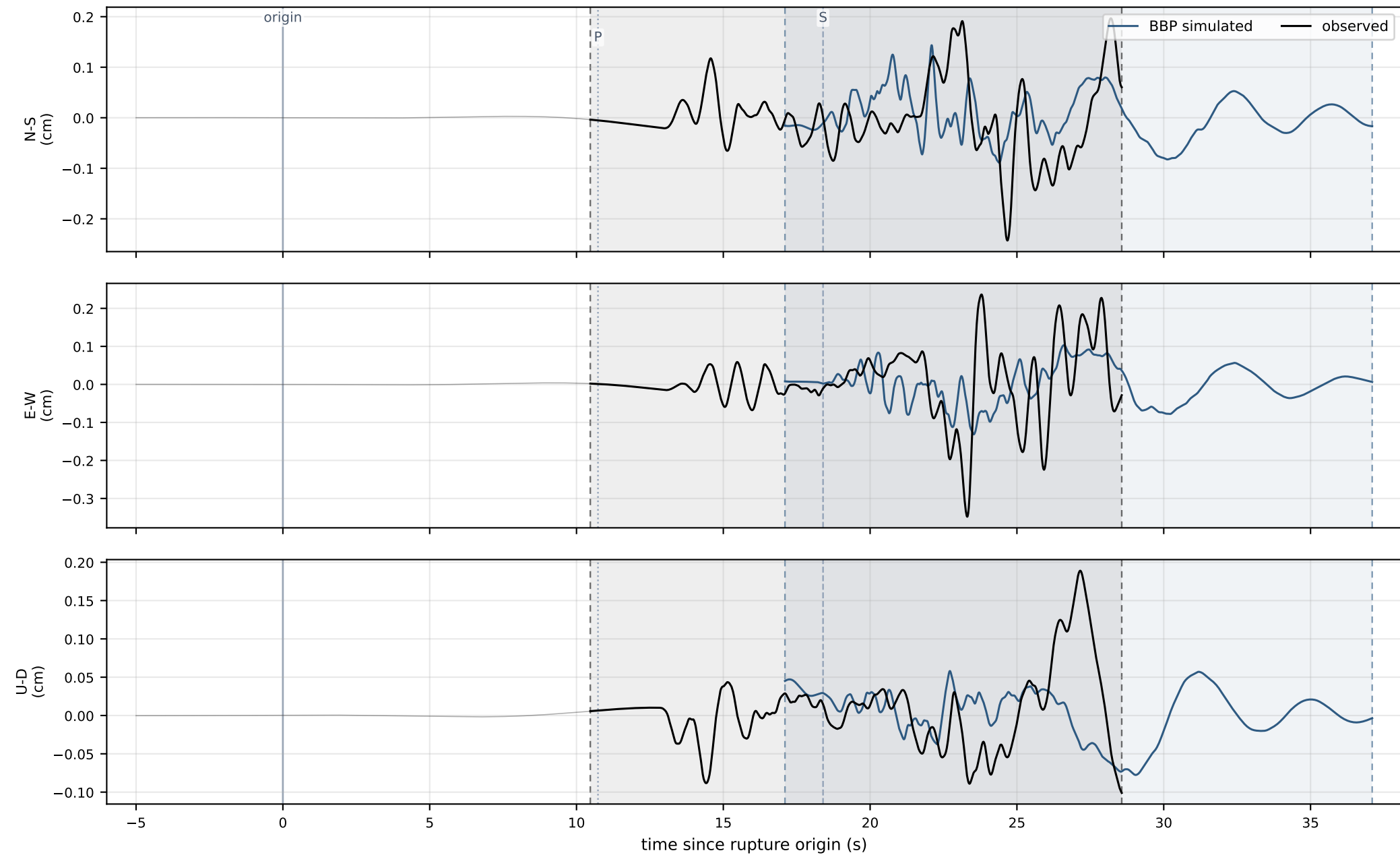


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GWW — 64.4 km · displacement handed to the animation

observed PGD 0.35 cm · simulated PGD 0.14 cm · obs/sim = 2.43x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

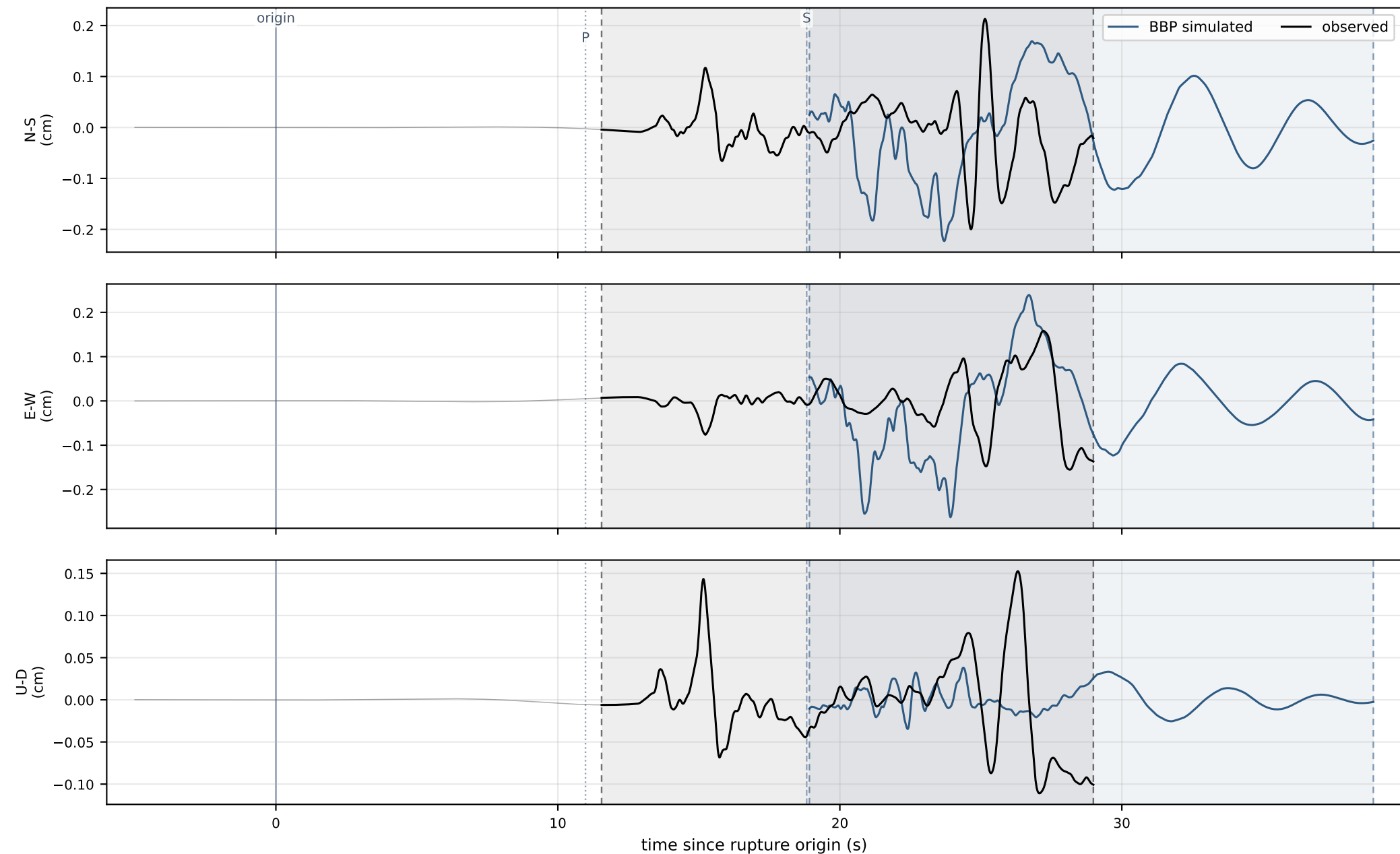


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

BK.HALS — 65.9 km · displacement handed to the animation

observed PGD 0.21 cm · simulated PGD 0.26 cm · obs/sim = 0.81x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

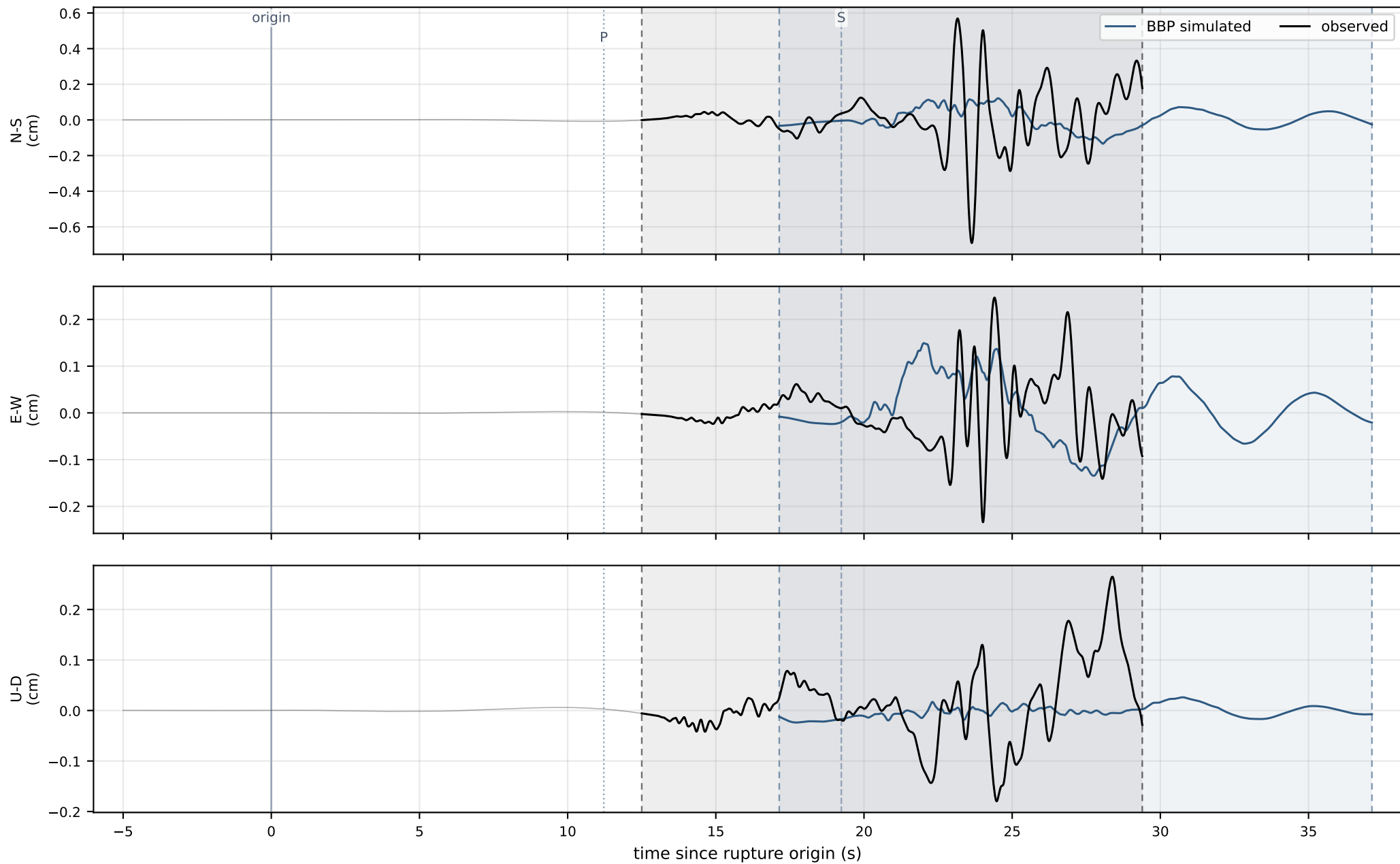


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GRT — 67.3 km · displacement handed to the animation

observed PGD 0.69 cm · simulated PGD 0.15 cm · obs/sim = 4.63x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s

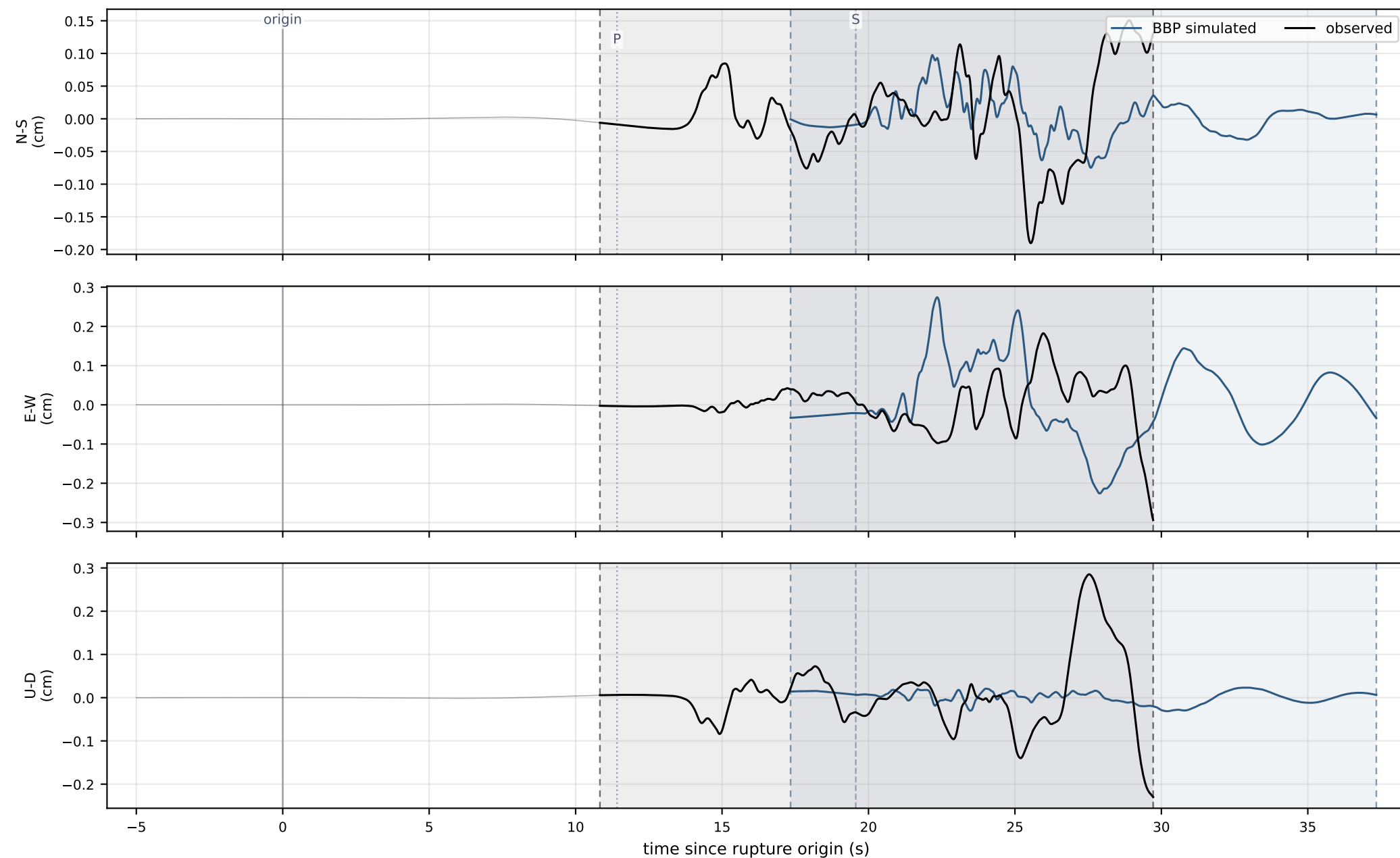


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GCVB — 68.5 km · displacement handed to the animation

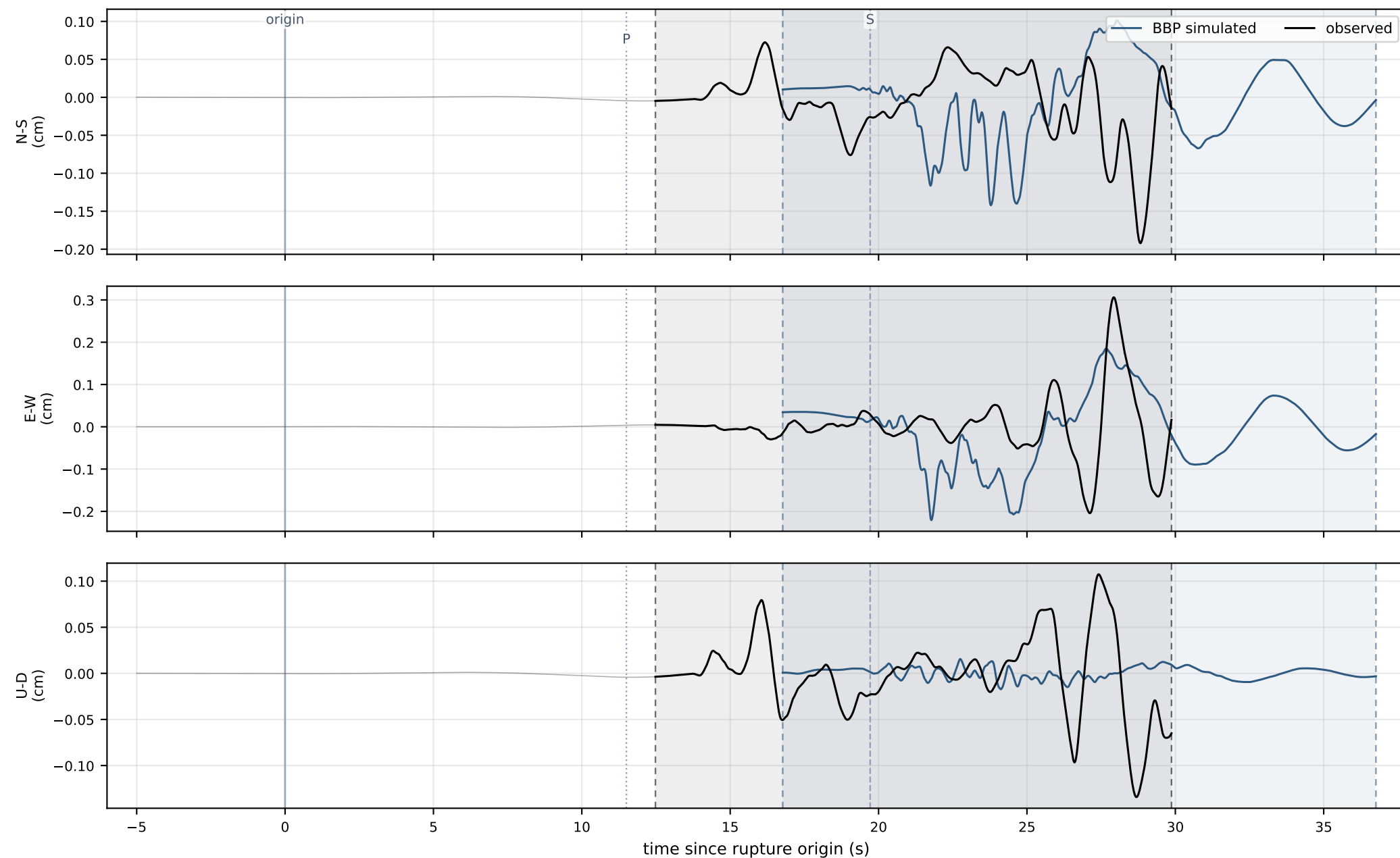
observed PGD 0.29 cm · simulated PGD 0.27 cm · obs/sim = 1.07x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



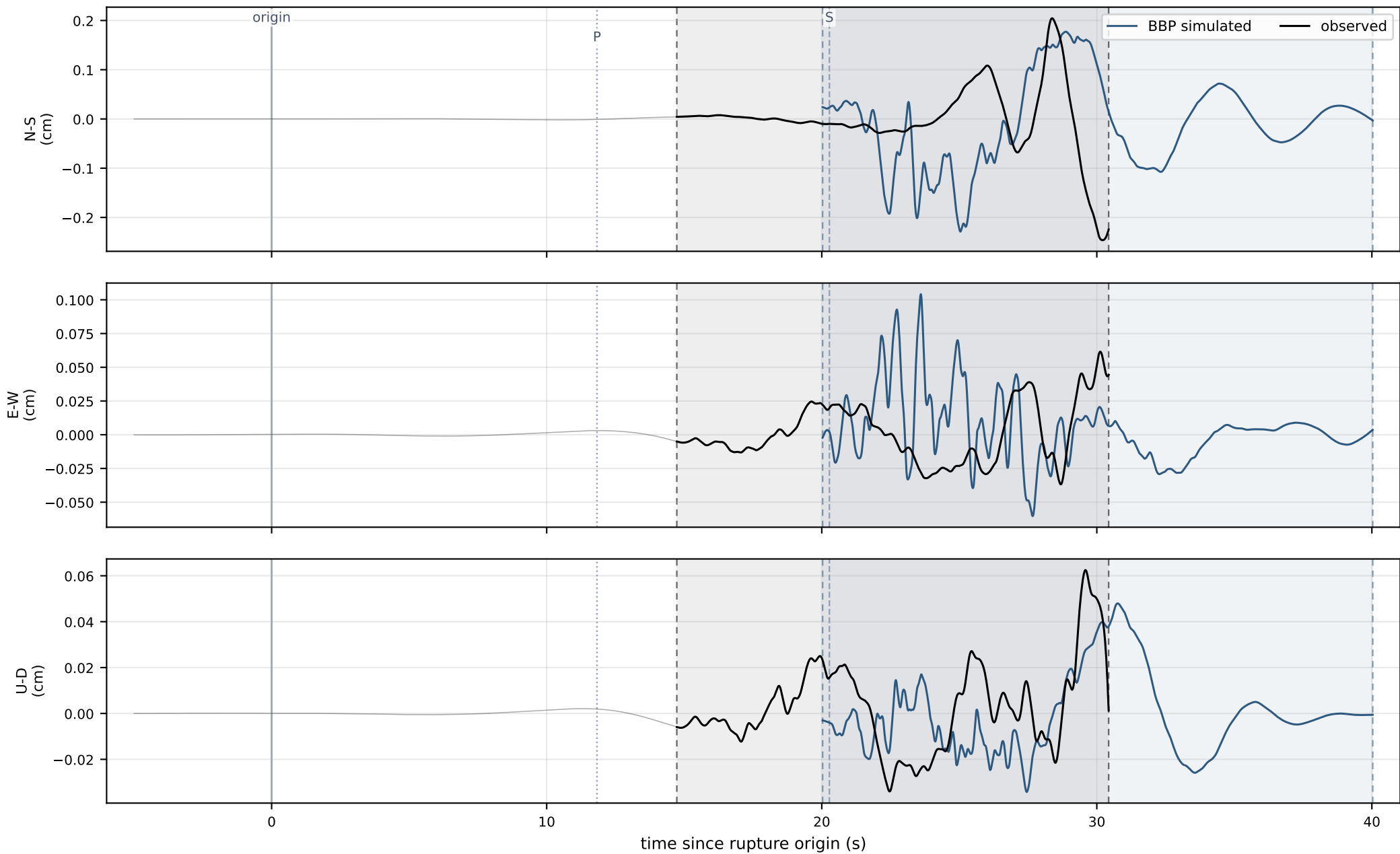
Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.KBSB — 69.0 km · displacement handed to the animation
 observed PGD 0.31 cm · simulated PGD 0.22 cm · obs/sim = 1.39x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

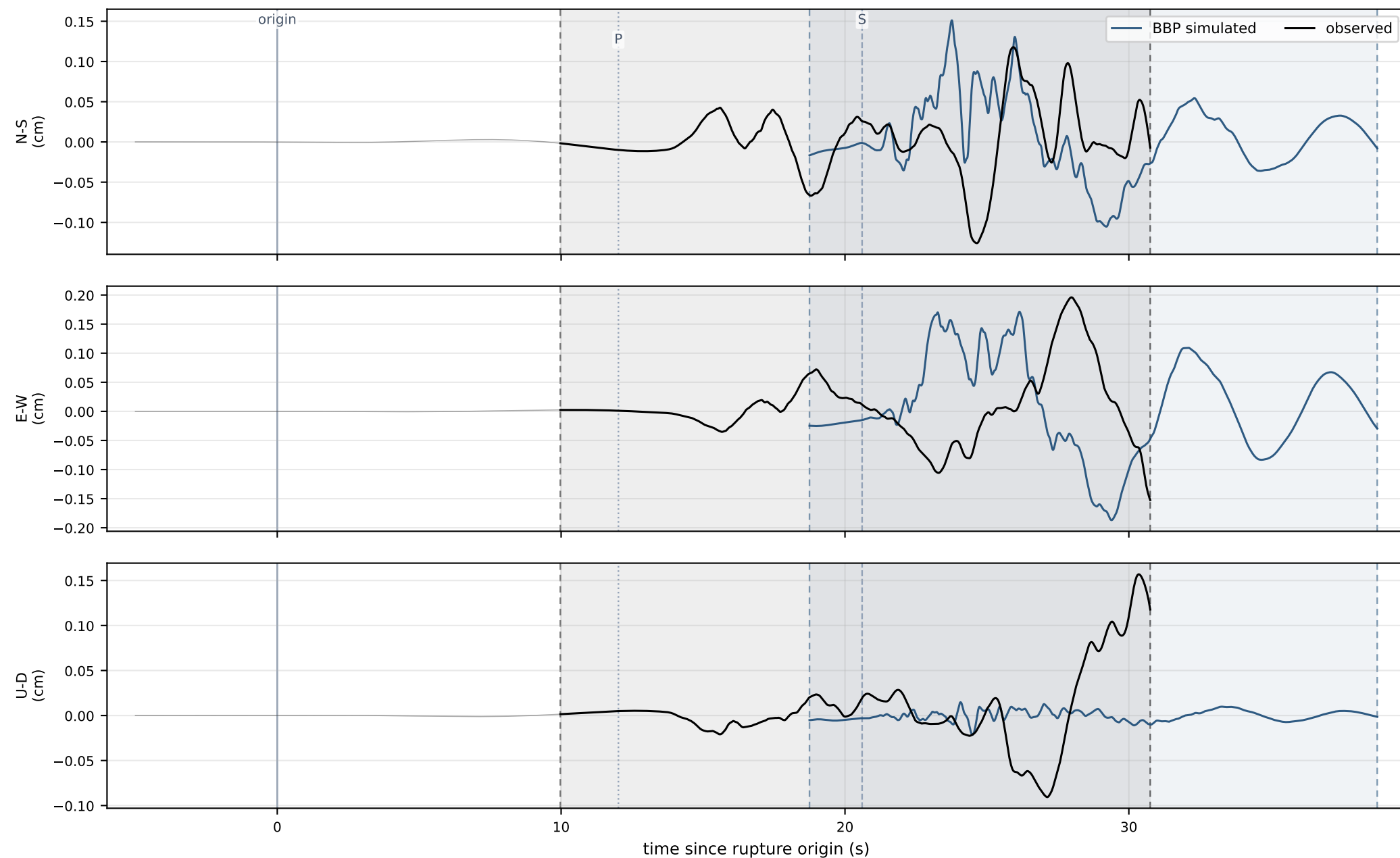
BK.GCKB — 71.0 km · displacement handed to the animation
 observed PGD 0.25 cm · simulated PGD 0.23 cm · obs/sim = 1.08x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GDXB — 72.1 km · displacement handed to the animation
observed PGD 0.20 cm · simulated PGD 0.19 cm · obs/sim = 1.05x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s

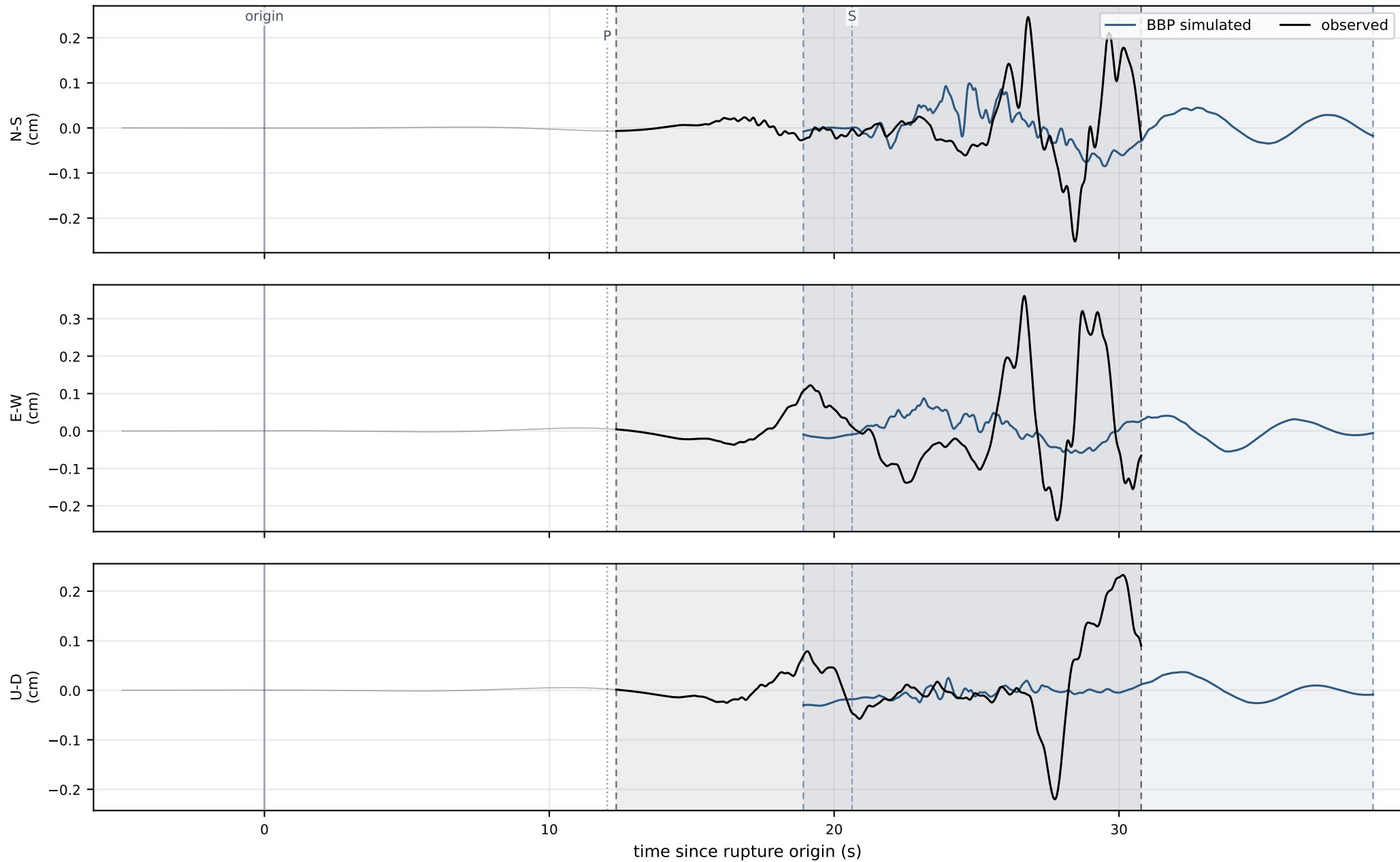


Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GWKB — 72.2 km · displacement handed to the animation

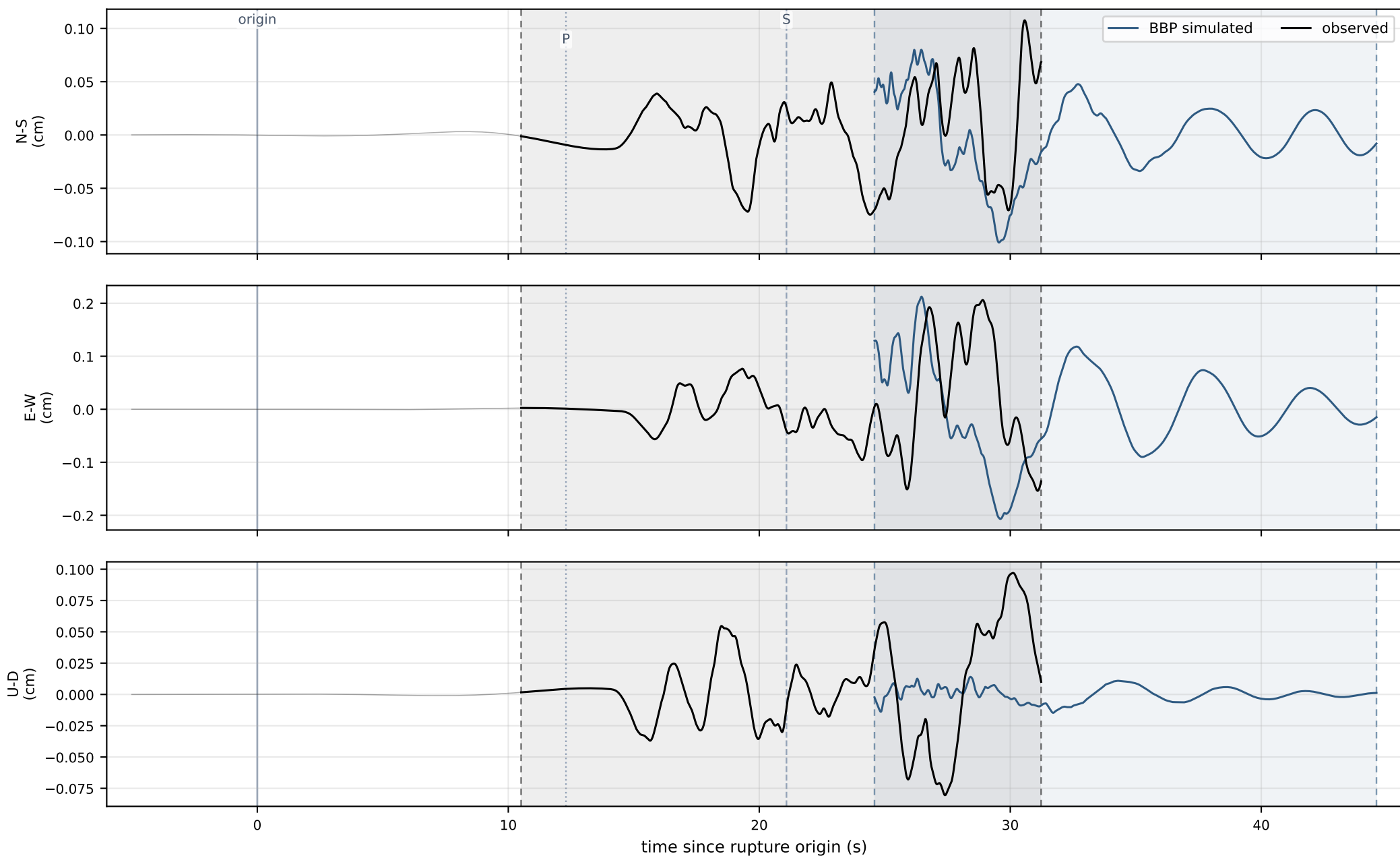
observed PGD 0.36 cm · simulated PGD 0.10 cm · obs/sim = 3.64x

observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak $\pm 5/15$ s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.

NC.GGPC — 73.8 km · displacement handed to the animation
 observed PGD 0.21 cm · simulated PGD 0.21 cm · obs/sim = 0.97x
 observed: response→acceleration, double-integrated, clipped to S+10 s · simulated: BBP velocity, integrated once, clipped to peak ±5/15 s



Each source has its own shaded band, dashed edges in its own colour: the window `shake_scene.py` renders.
 Bold inside it is what the table follows; faint outside is the rest of the record that source was handed.