

**Advanced Multicomponent
Seismic Software**

**Analysis of seismic data recorded in January 2026
by network C8 (stations SV1S-SV5S)
at Aquistore test site**

Report AQ-2026-01-IM

May 3, 2026

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1. Station performance

Station performance for January 2026 is summarized in Figure 1, and state-of-health data are shown in Figure 2.

As shown in power supply voltage graphs in Figure 2, all stations experienced intervals of low power. Most of the power usage in the stations is due to cell modems, and the modems installed in the summer appear to be using more power than the previous. To remedy this situation, starting from December 6 to January 31, the modems at stations SV1S, SV3S, and SV4S were powered down. Stations SV2S and SV5S were kept online for their real-time use by NRCan and also because station SV2S was unable to store more than two weeks of data. The internet communications were restored and data retrieved after January 31 (Figure 1).

Because of the power issues, Stations SV2S and SV5S stopped recording on January 2-4, and SV2S had several brief interruptions later (Figure 1).

Figure 2 and the data records later in this report also show that sensor state-of-health parameters (“Mass positions”) and data quality also varied abruptly during intervals of low power and interruptions.

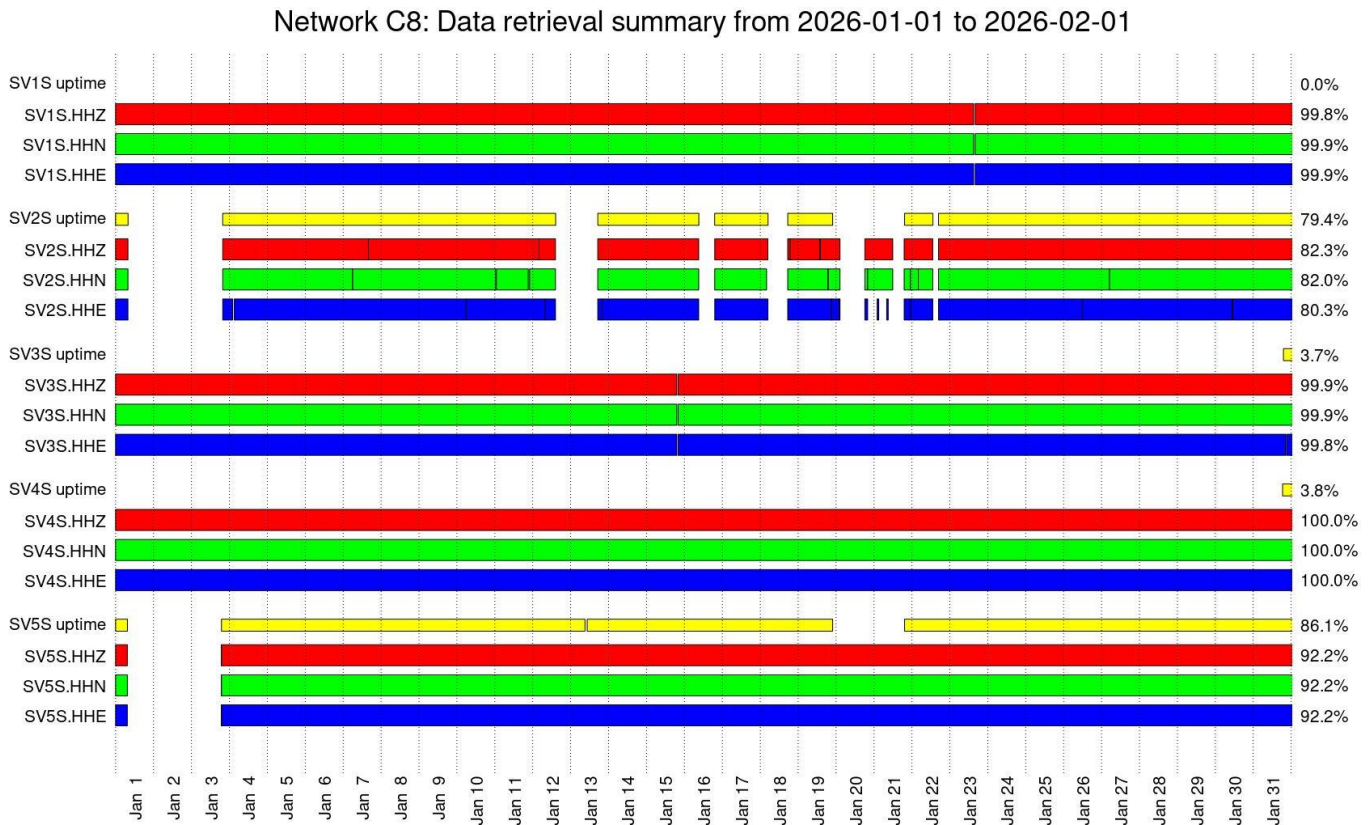


Figure 1. Retrieved data intervals for all channels (red, green, and blue bars) and uptimes (yellow). Total percentages of measured uptime and data retrieval are shown on the right. Gaps show intervals of station shut-downs.

State of health for station C8.SV1S (NE01) from 2026-01-01 to 2026-02-01

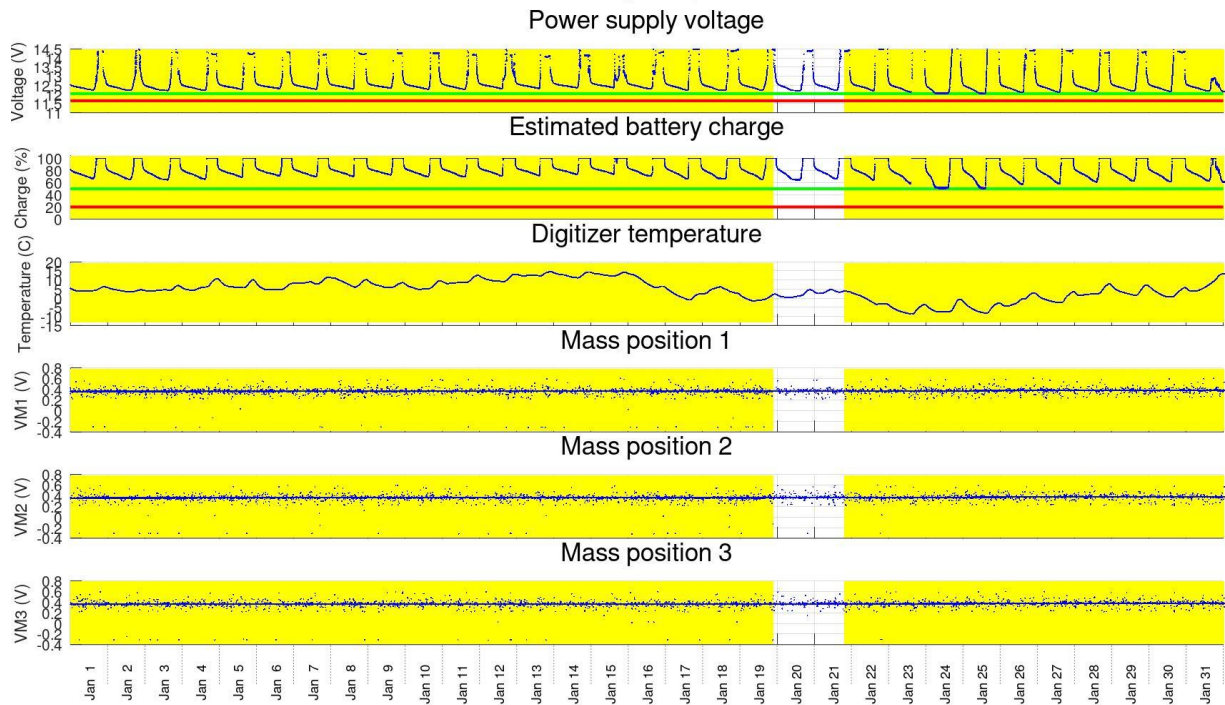


Figure 2. State of health parameters for each station (SV1S here). Image headings: power supply voltage, estimated battery charge levels, temperature on board, voltages measuring mass positions. Wide yellow gaps indicate the power outages and disabled communications after December 6.

State of health for station C8.SV2S (SW01) from 2026-01-01 to 2026-02-01

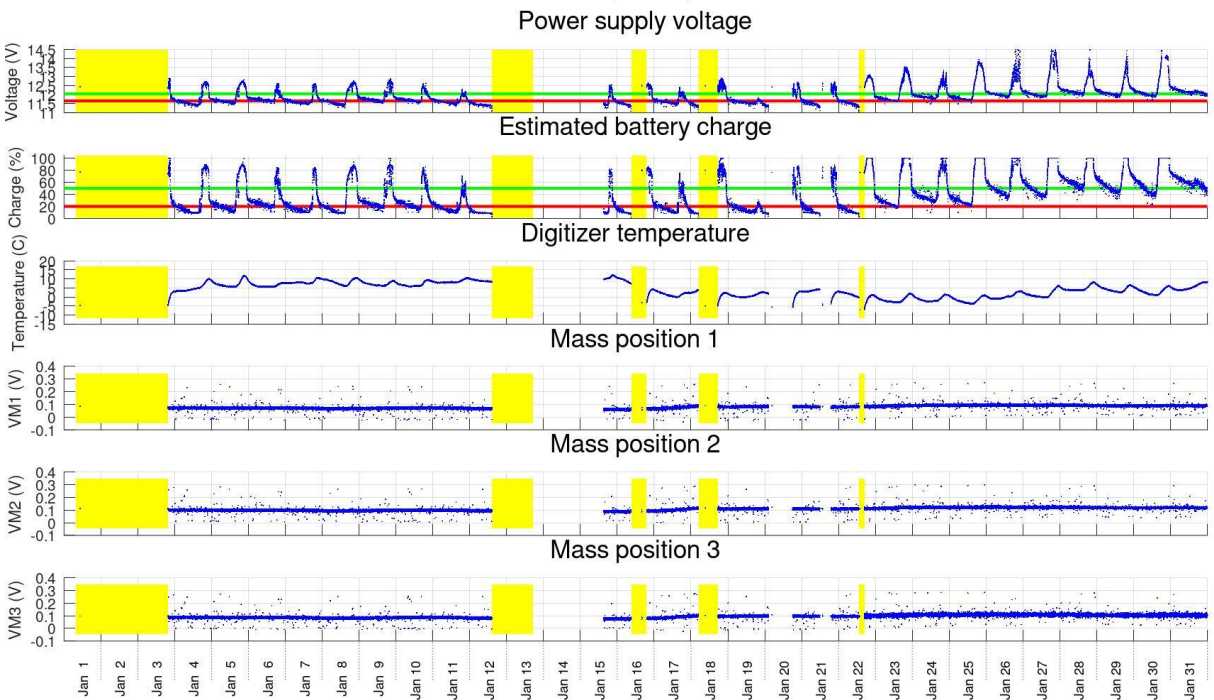


Figure 2, continued, station SV2S.

State of health for station C8.SV3S (NW01) from 2026-01-01 to 2026-02-01

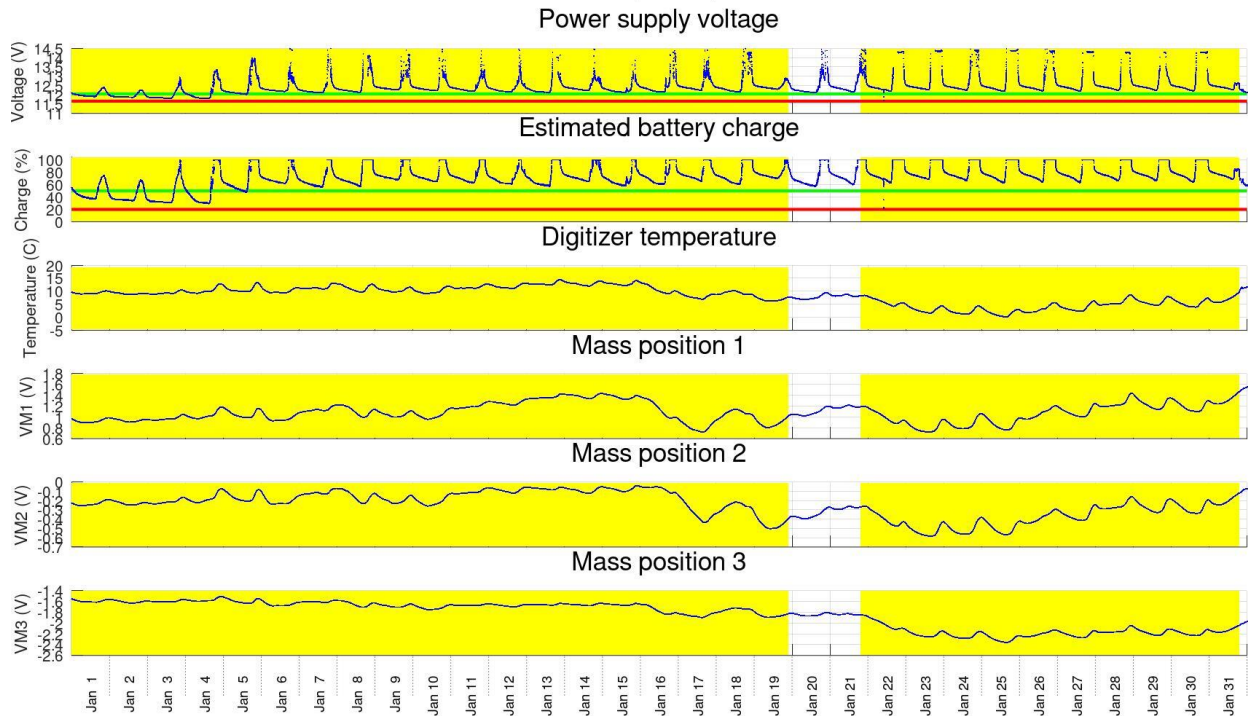


Figure 2, continued, station SV3S.

State of health for station C8.SV4S (SE01) from 2026-01-01 to 2026-02-01

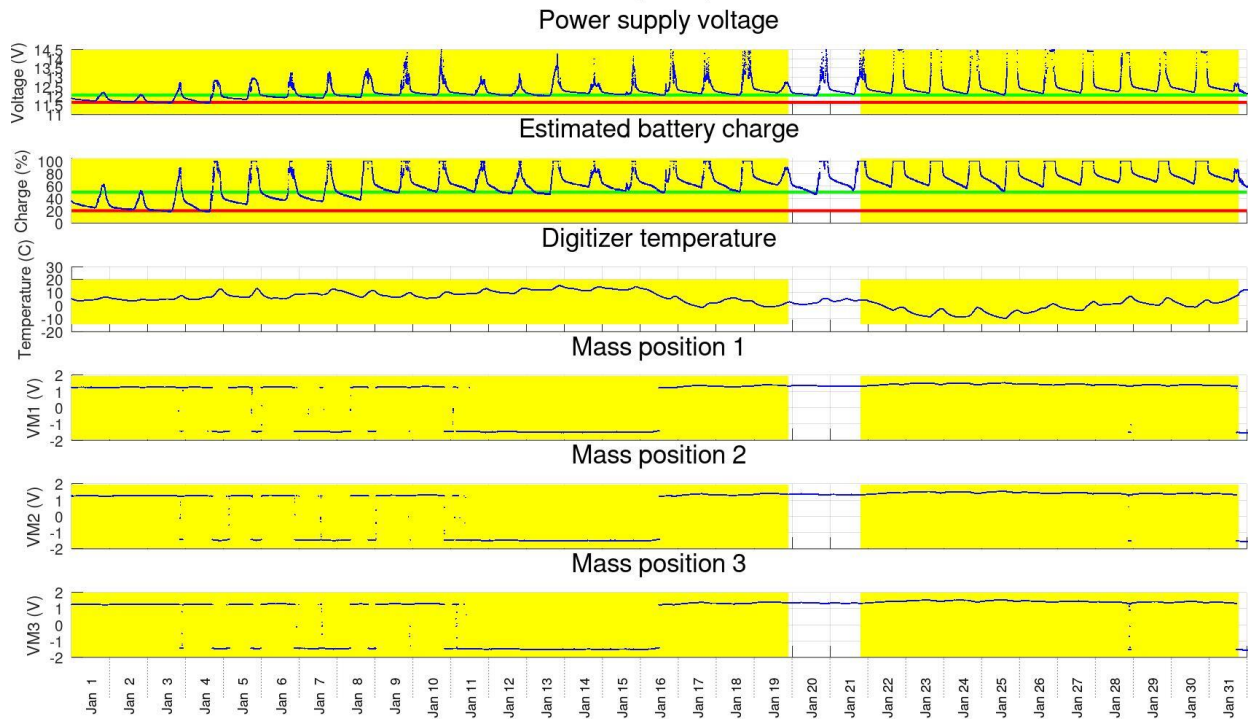


Figure 2, continued, station SV4S.

State of health for station C8.SV5S (NE02) from 2026-01-01 to 2026-02-01

Power supply voltage

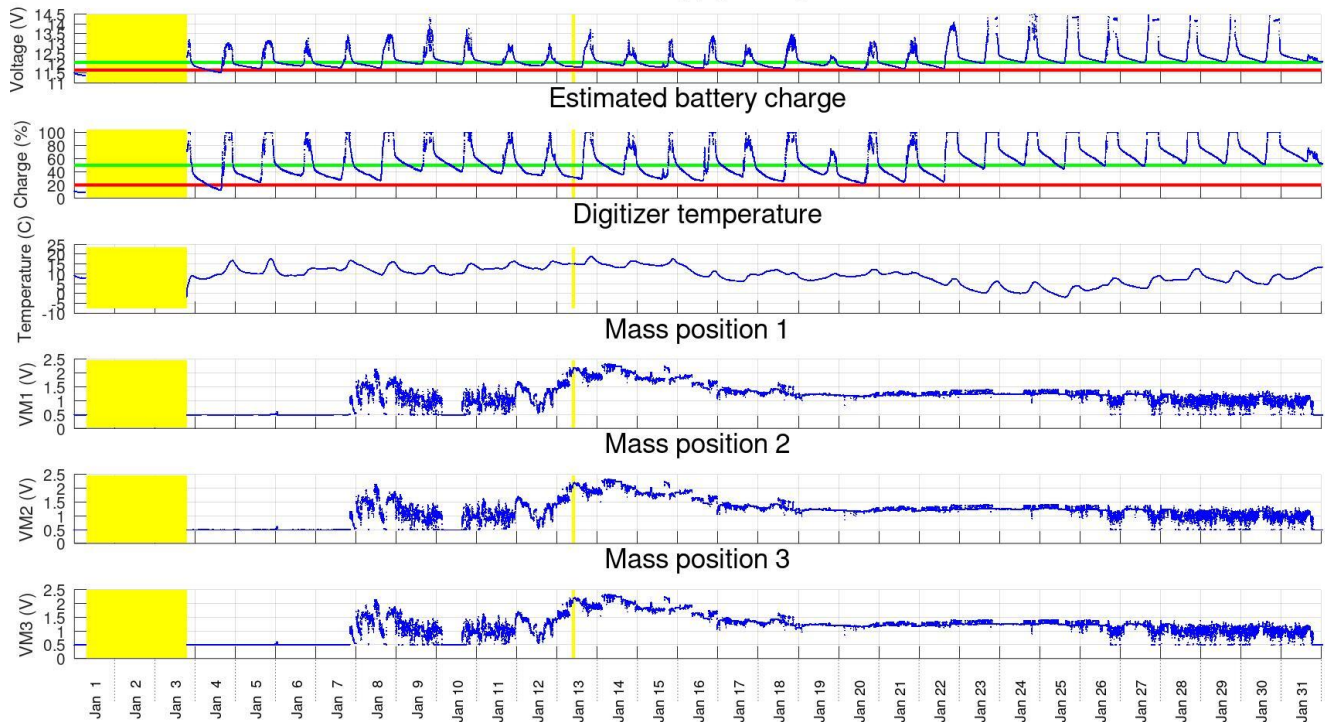


Figure 2, continued, station SV5S.

Data recovery

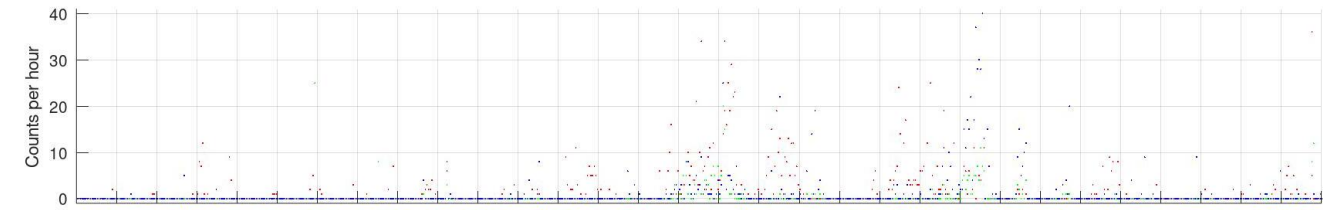
Data recovery was at about 80% for station SV2S and SV5S, and nearly 100% from the stations which were taken offline (Figures 1 and 2).

2. Data quality

Figure 3 shows two measures of data quality evaluated for each channel:

- 1) Numbers of spikes and tears (sharp changes of DC level) within 1-hour time intervals;
- 2) 1-hour root-mean square (RMS) average amplitudes in each channel.

Station C8.SV1S (NE01): Data quality from 2026-01-01 to 2026-02-01
Spikes and tears in records



RMS amplitudes after despiking

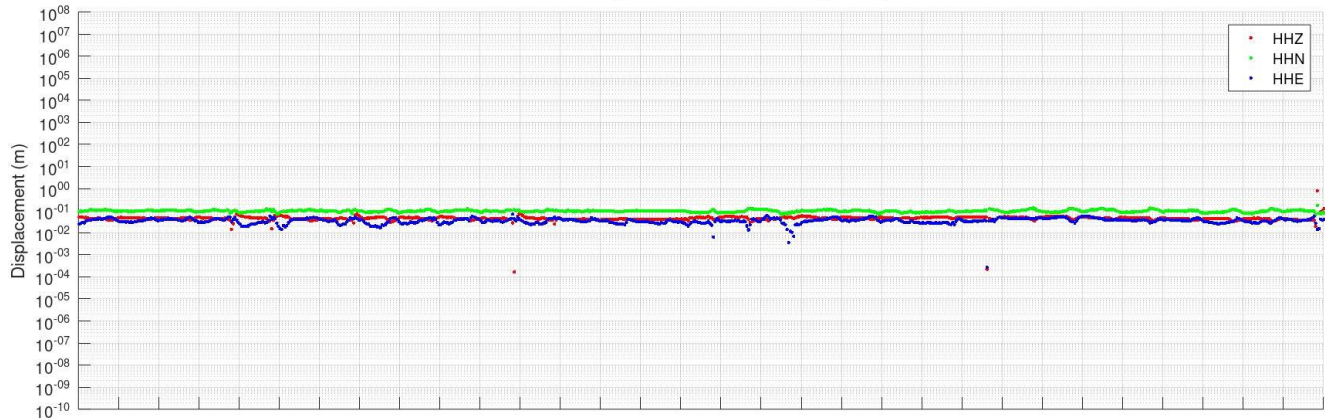
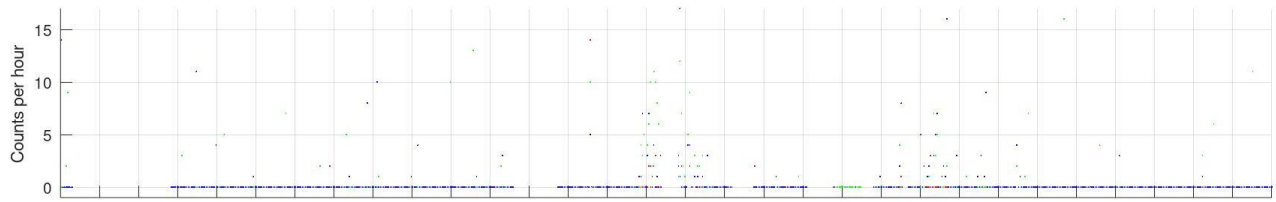


Figure 3. Measures of data quality in hour-long intervals. Station names and time intervals are indicated in plot headings (SV1S in this plot). Red, green, and blue colours correspond to channels HHZ, HHN, and HHE, respectively (as in Figure 1).

Top panels: Numbers of spikes and tears per hour auto-detected in data records.

Bottom panels: RMS ground displacements (meters).

Station C8.SV2S (SW01): Data quality from 2026-01-01 to 2026-02-01
Spikes and tears in records



RMS amplitudes after despiking

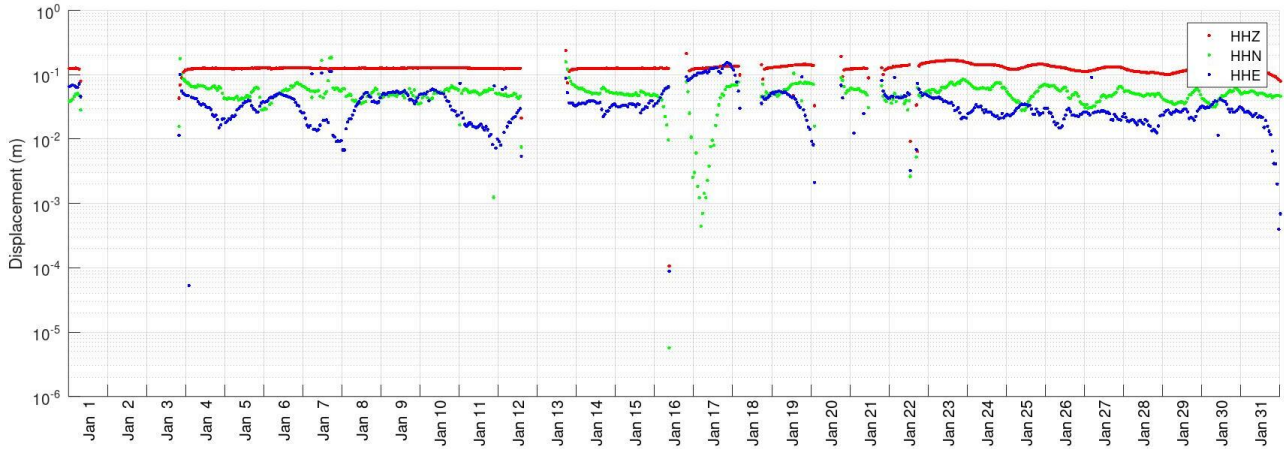
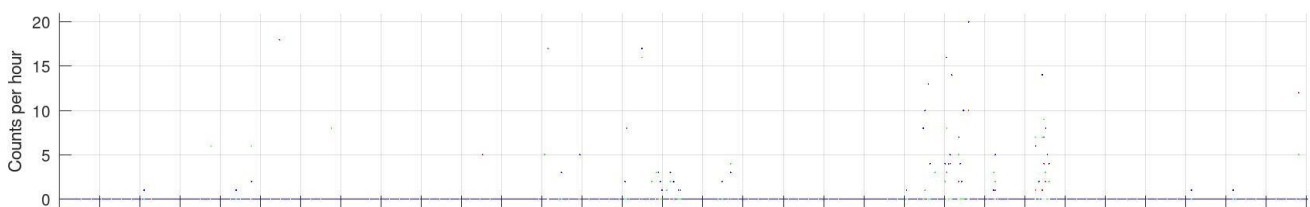


Figure 3, continued. Station SV2S.

Station C8.SV3S (NW01): Data quality from 2026-01-01 to 2026-02-01
Spikes and tears in records



RMS amplitudes after despiking

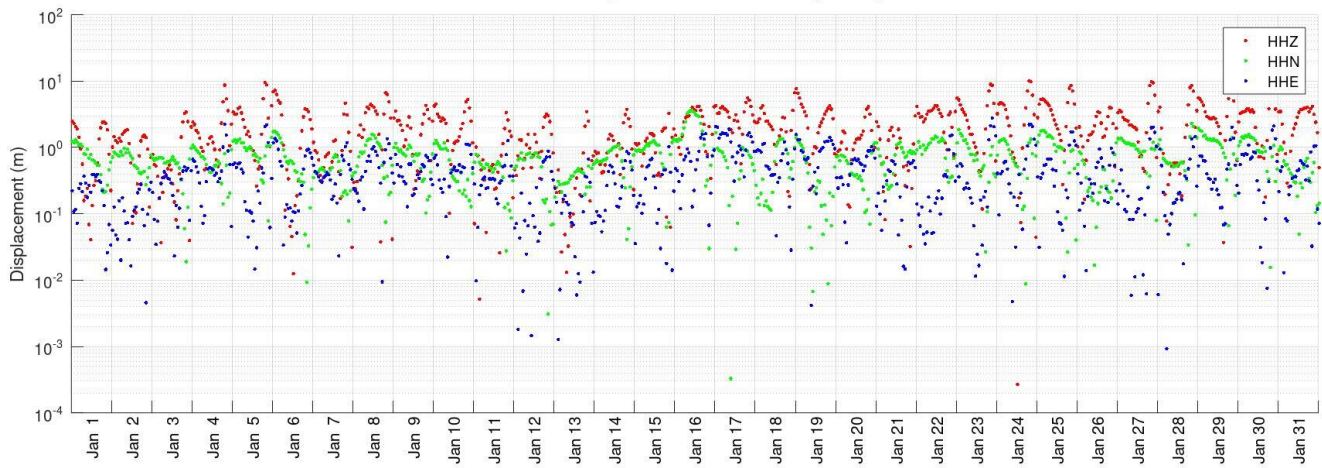
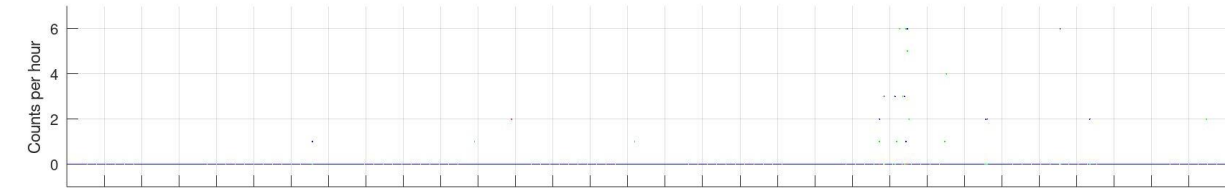


Figure 3, continued. Station SV3S.

Station C8.SV4S (SE01): Data quality from 2026-01-01 to 2026-02-01
Spikes and tears in records



RMS amplitudes after despiking

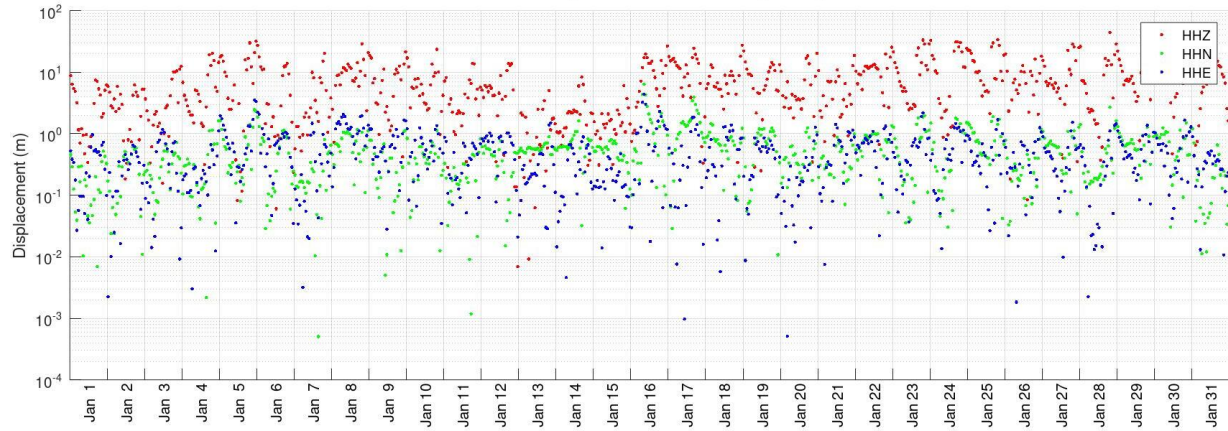
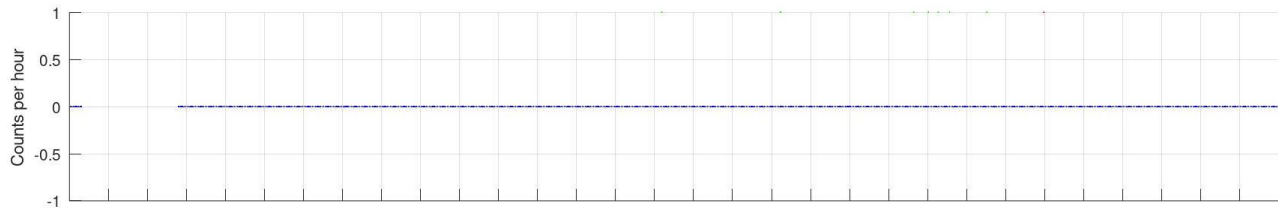


Figure 3, continued. Station SV4S.

Station C8.SV5S (NE02): Data quality from 2026-01-01 to 2026-02-01
Spikes and tears in records



RMS amplitudes after despiking

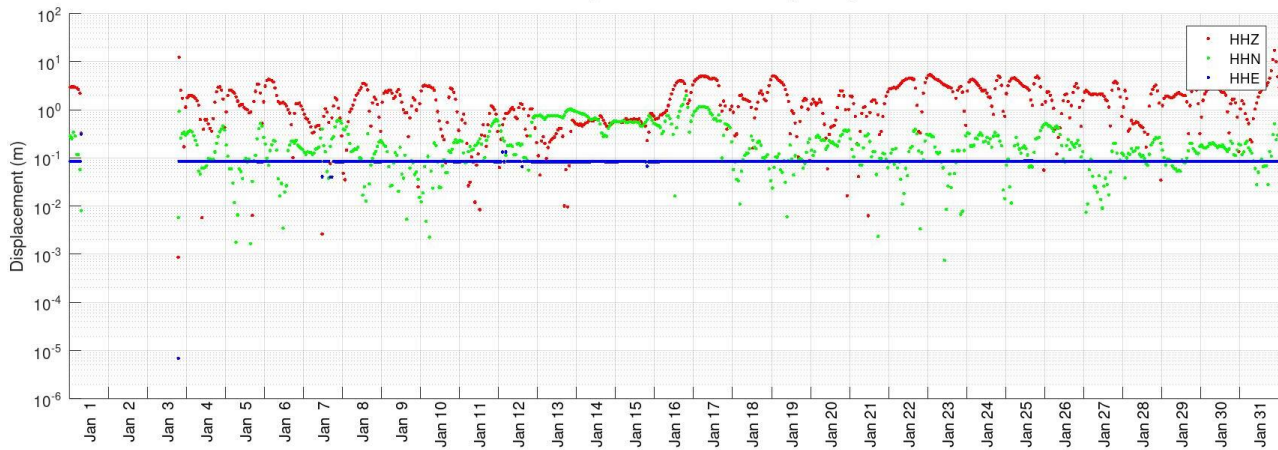


Figure 3, continued. Station SV5S

3. Processing procedure and parameters

Processing procedure and parameters were the same as in previous reports.

4. Seismic event detection

The classification of seismic events used in these reports and numbers of events detected in January 2026 are shown in Table 2.

Table 2. Classification of seismic events and numbers of detections at the Aquistore broadband seismic array

Event class code	Class name	Identification criteria	Number of detections in this report
1	Teleseismic	Hypocentral distance $D > 1000$ km, presence in catalogues	10
2	Regional	$100 < D < 1000$ km, presence in catalogues	2
3	Local	Approx. $4 < D < 100$ km	-----
3a	Possible mine blasts	Characteristic waveforms, amplitudes, back-azimuths east of Aquistore, D about 12-15 km	19
3b	Mining-related	Low frequencies, extended repeated wavetrains low arrival velocities related to surface waves	6 (selected from numerous occurrences)
4	Proximity (close local)	$D < 3$ -4 km, deviation of array moveouts from plane-wave patterns, high frequency	-----
4a	Surface sources near array	Large travel-time moveouts, variable back-azimuths	5
4b	Target zone	Source at recognizable nonzero depth, small travel-time moveouts, high frequency	0

Automatic detections

The procedure of multichannel automatic detections is currently being revised and not shown in the present report.

Event bulletins

Earthquake data bulletins for the period of this report were obtained from NEIC (USGS) and NRCAN web services (Figure). Events larger than magnitude 2.5 were taken from USGS, and all available events obtained from NRCAN. Events with magnitudes above the selected $magnitude \propto distance^{1.5}$ threshold (dashed green line in Figure) were reviewed interactively (next section).

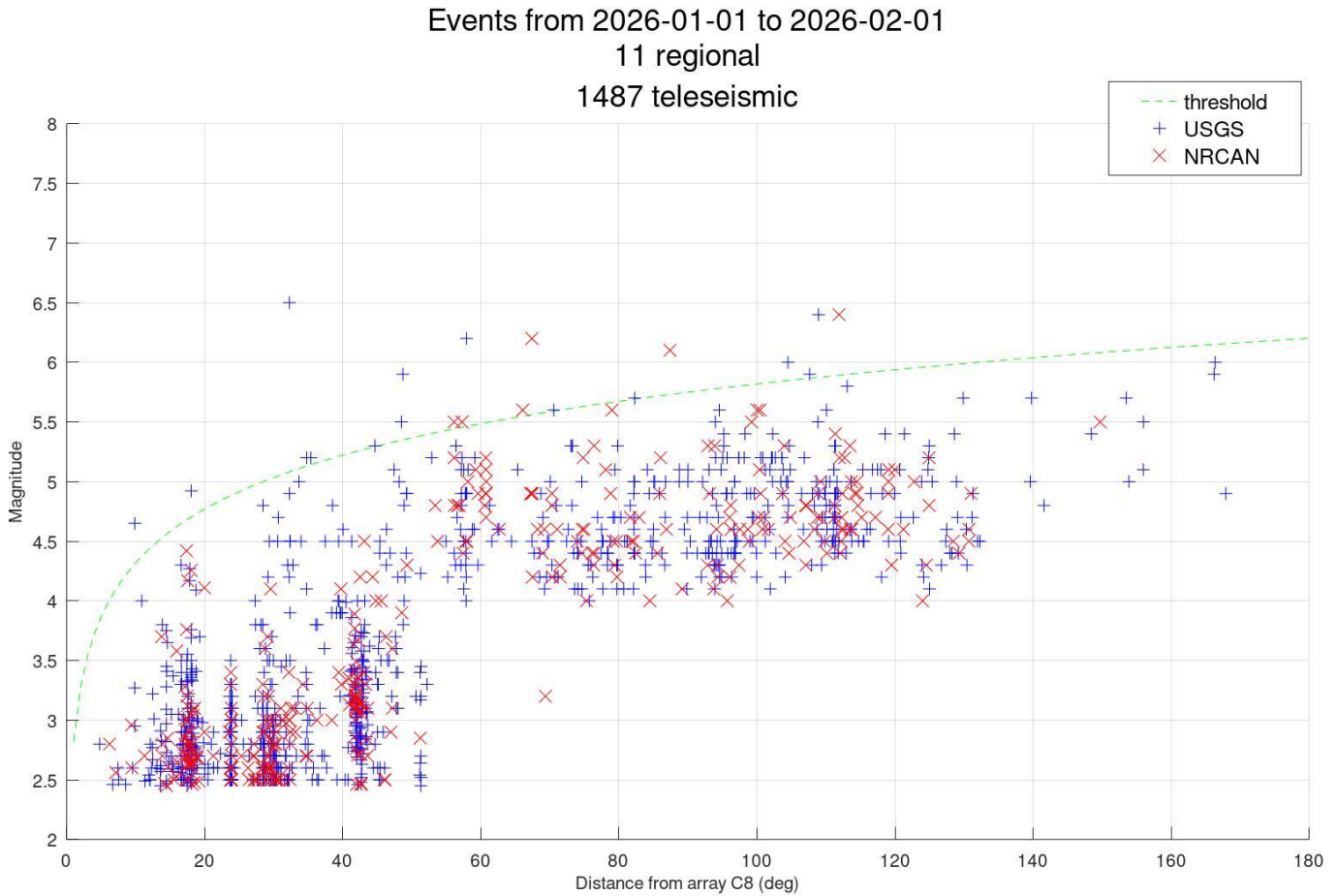


Figure 5. Magnitudes and distances from Aquistore for earthquake parameters downloaded from USGS and NRCAN databases (legend). Dashed green line shows the detection threshold above which a manual review of events was performed.

Teleseismic events (class 1)

Above the threshold line in Figure 5, ten teleseismic events (class 1 in Table 2) were identified in January 2026 (Figure 6). Time zeros in Figure 6 plots are located at the times of P-wave arrivals at the Aquistore array predicted in the reference model IASP91 and corrected interactively. Blue bars near $time = 0$ are interactive picks of P-wave arrival times.

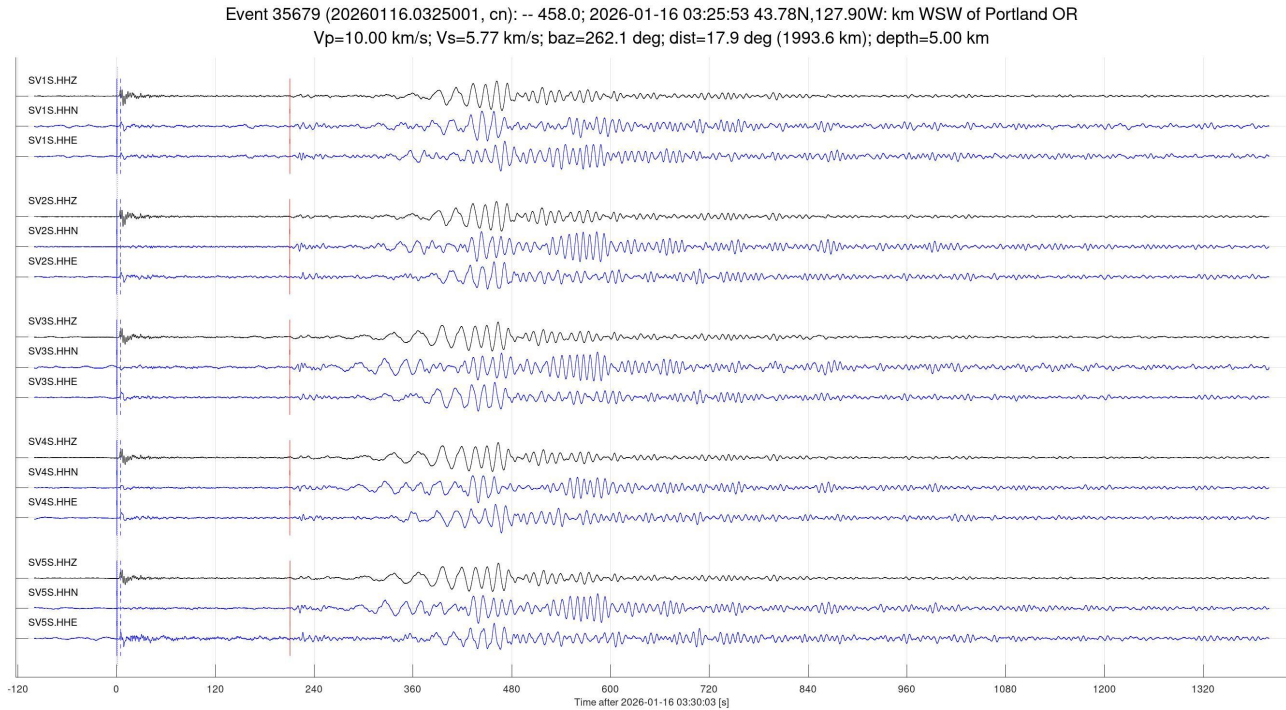


Figure 6. Teleseismic events detected at Aquistore in January 2026. Plot headings show catalogue IDs, times, distances in degrees, source coordinates and localities, back-azimuths ('baz='), distances ('dist=') and source depths. Vertical-component records are shown in black, and horizontal components in blue. Blue and red bars indicate the P-wave and S-wave picks, respectively. Ignore the (experimental) cyan and dashed bars.

Event 36776 (us7000rpcg, us): mww 6.2; 2026-01-13 07:34:09 44.55N, 149.28E: 133 km SE of Kuril'sk, Russia
Vp=10.00 km/s; Vs=5.77 km/s; baz=312.4 deg; dist=67.4 deg (7514.5 km); depth=36 km

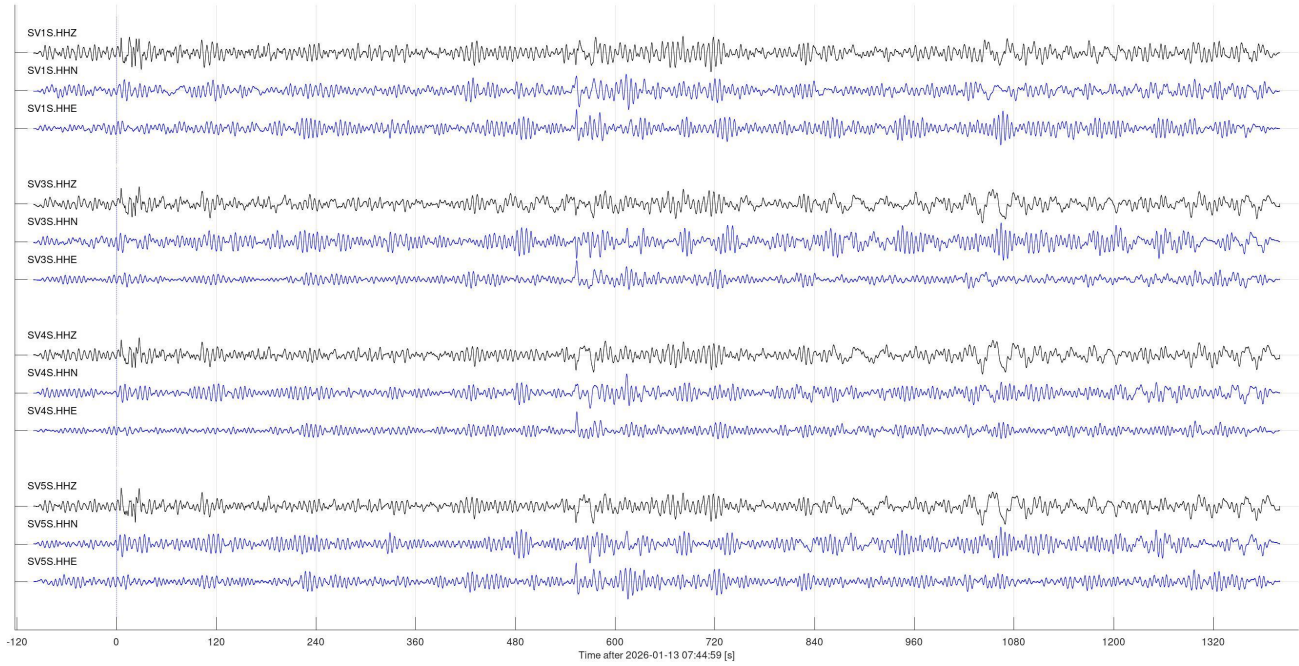


Figure 6, continued.

Event 36894 (us7000rwd, us): mww 6.4; 2026-01-10 14:58:23 3.70N, 126.99E: 245 km NNW of Tobelo, Indonesia
Vp=10.00 km/s; Vs=5.77 km/s; baz=304.5 deg; dist=111.9 deg (12475.5 km); depth=31 km

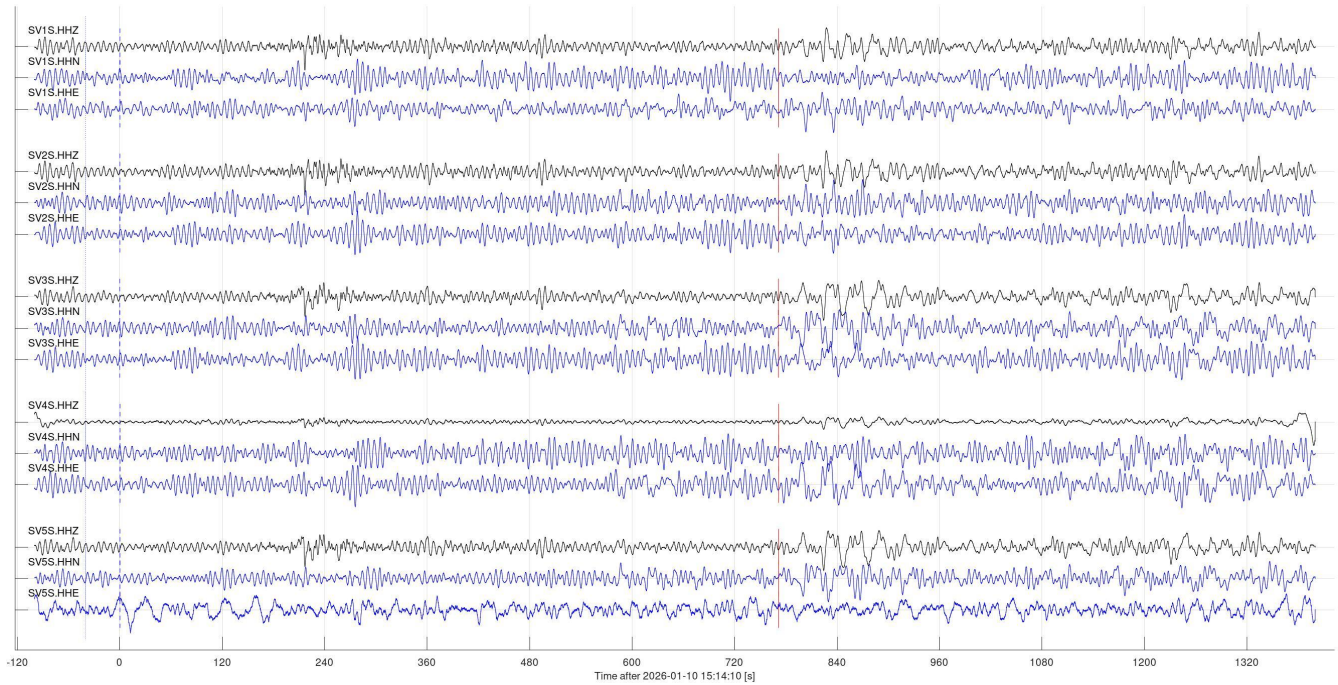


Figure 6, continued.

Event 37043 (us7000rr5g, us): mww 6.1; 2026-01-21 16:37:46 23.11N,142.64E: Volcano Islands, Japan region
Vp=10.00 km/s; Vs=5.77 km/s; baz=302.8 deg; dist=87.4 deg (9746.1 km); depth=25 km

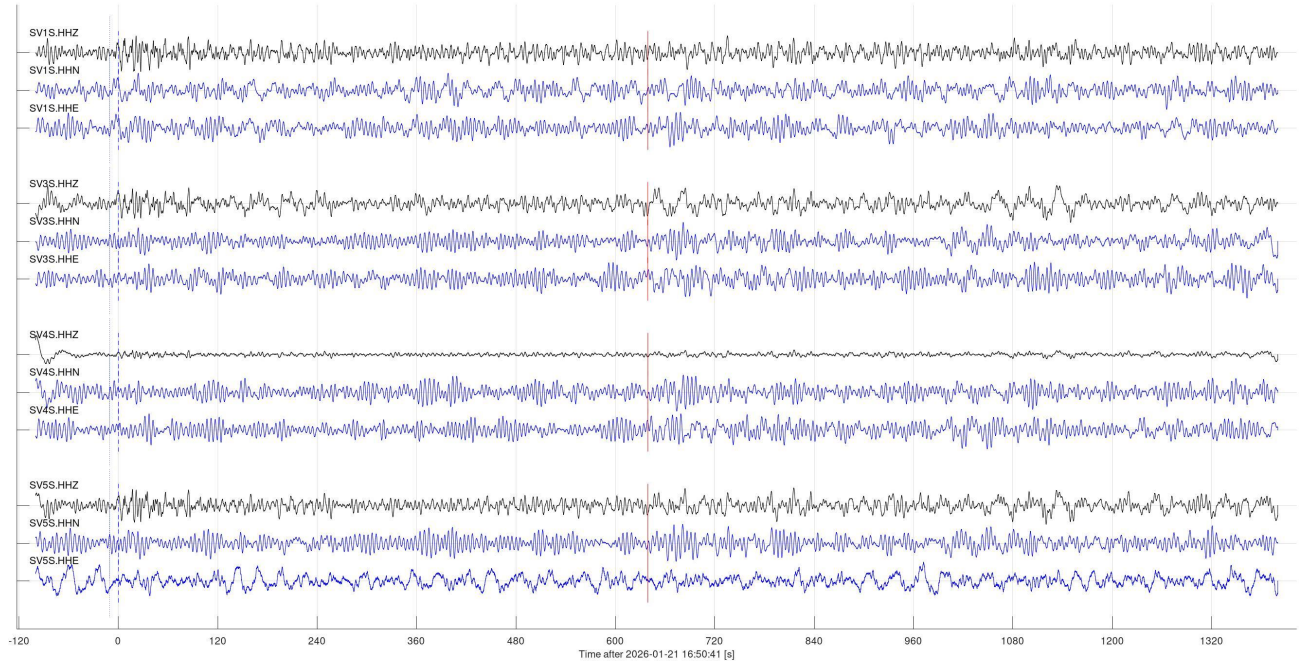


Figure 6, continued.

Event 37149 (ci41162719, ci): mw 4.9; 2026-01-20 01:56:14 33.89N,116.17W: 20 km NNE of Indio, CA
Vp=10.00 km/s; Vs=5.77 km/s; baz=217.5 deg; dist=18.0 deg (2011.1 km); depth=3.09 km

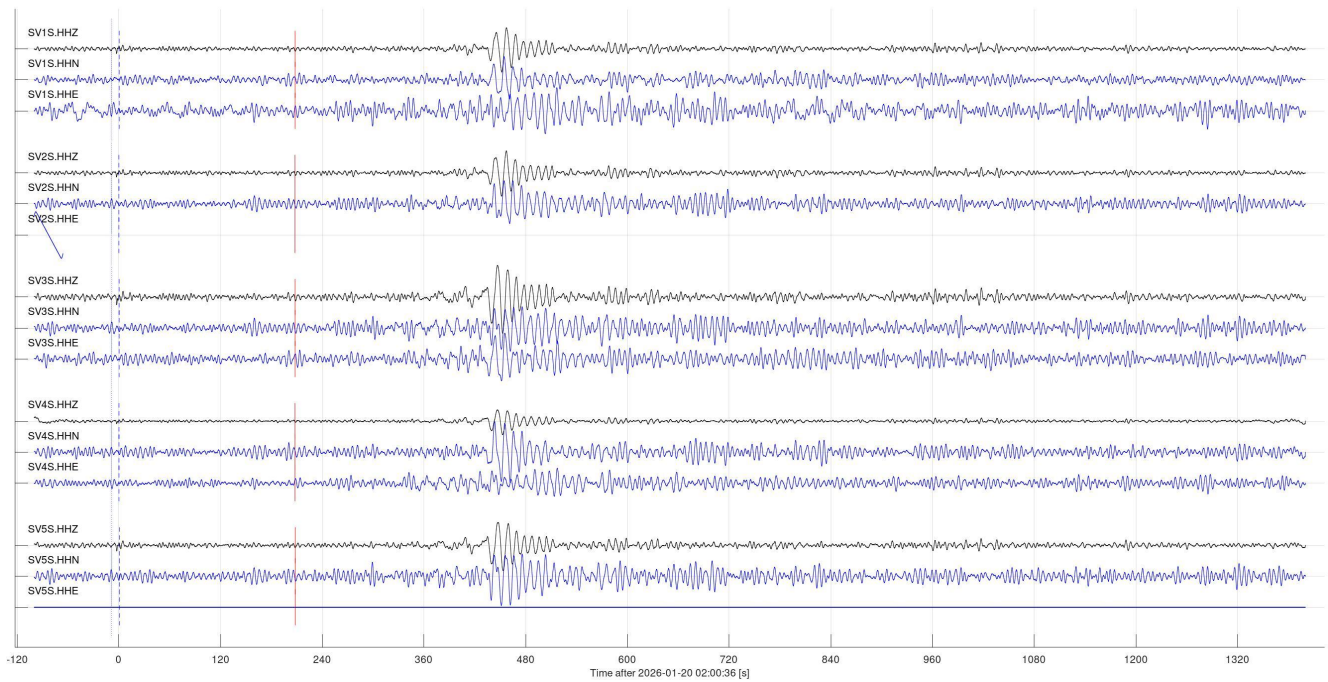


Figure 6, continued.

Event 37361 (us7000rptl, us): mww 5.9; 2026-01-15 08:52:47 51.75N,176.75E: 271 km ESE of Attu Station, Alaska
Vp=10.00 km/s; Vs=5.77 km/s; baz=305.4 deg; dist=48.7 deg (5430.3 km); depth=41 km

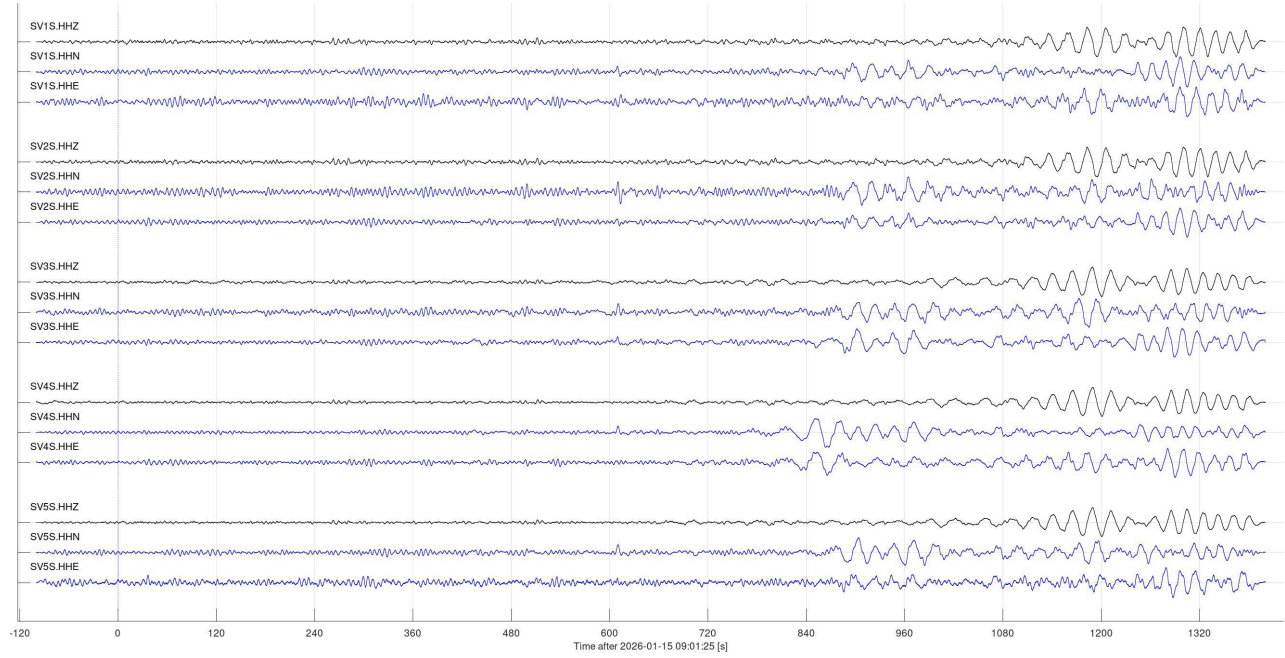


Figure 6, continued.

Event 37743 (us7000rn2z, us): mww 6.4; 2026-01-07 03:02:56 7.39N,126.72E: 16 km ESE of Baculin, Philippines
Vp=10.00 km/s; Vs=5.77 km/s; baz=306.8 deg; dist=108.9 deg (12146.5 km); depth=35 km

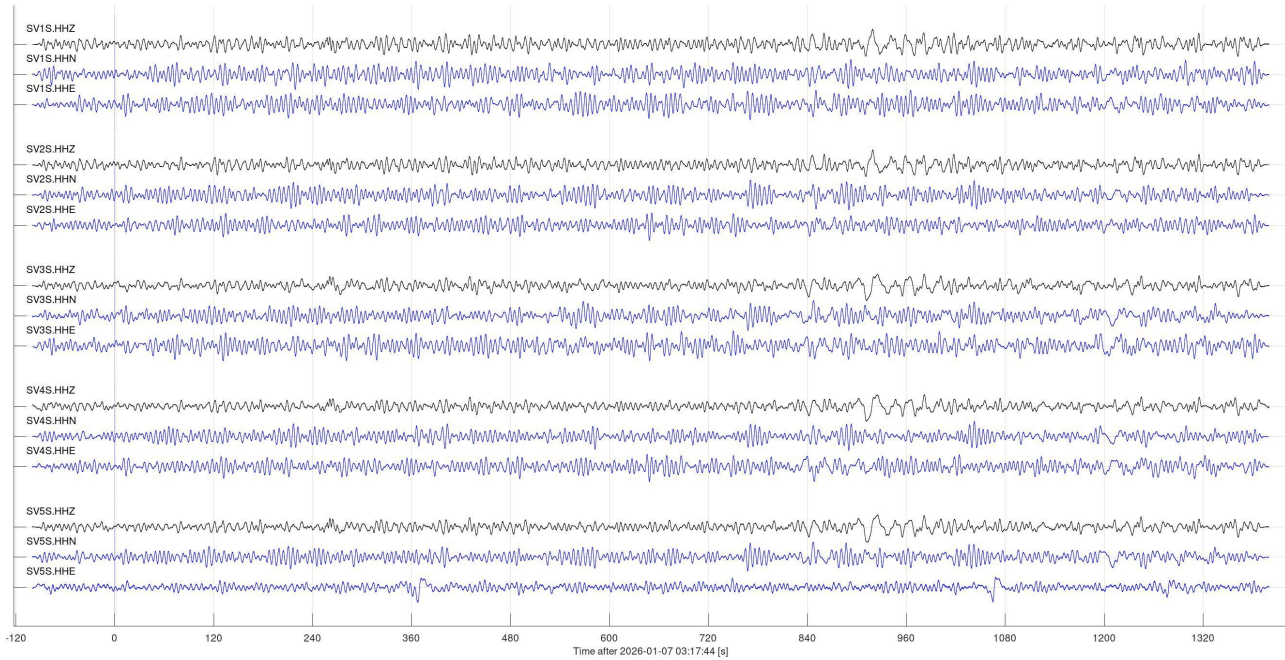


Figure 6, continued.

Event 37954 (us7000m3k, us): mww 6.5; 2026-01-02 13:58:18 16.90N,99.30W: 4 km NNW of Rancho Viejo, Mexico
Vp=10.00 km/s; Vs=5.77 km/s; baz=173.2 deg; dist=32.3 deg (3596.5 km); depth=35 km

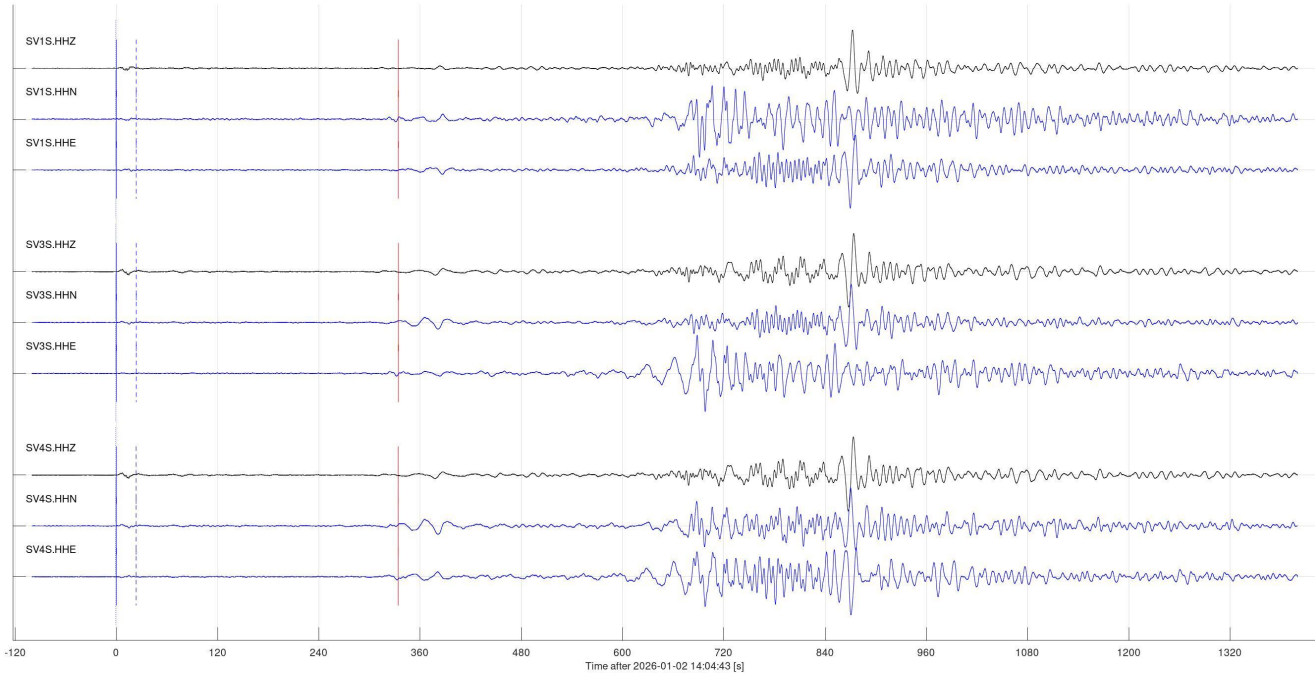


Figure 6, continued.

Event 38310 (us7000rrfr, us): mww 5.2; 2026-01-22 19:38:50 54.31N,159.89W: 120 km SSE of Sand Point, Alaska
Vp=10.00 km/s; Vs=5.77 km/s; baz=300.7 deg; dist=34.8 deg (3876.0 km); depth=41 km

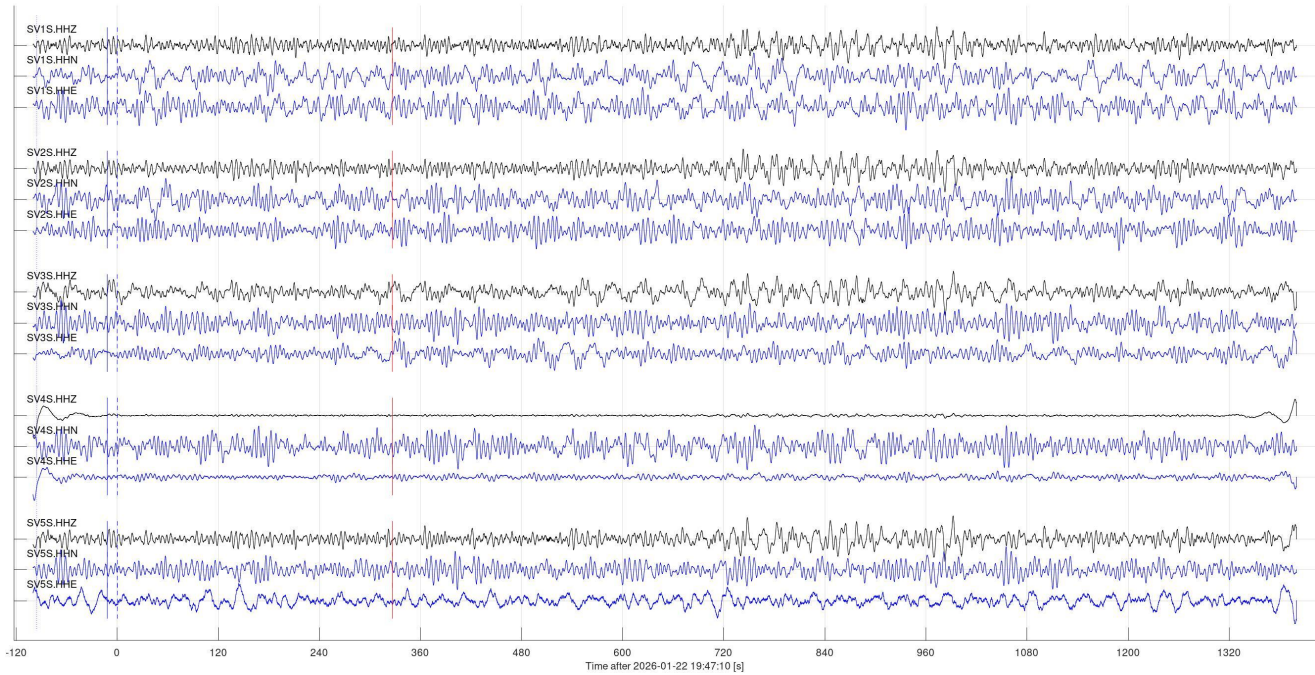


Figure 6, continued.

Event 38315 (uu80127891, uu): ml 4.7; 2026-01-22 14:49:21 40.91N,110.87W: 40 km S of Evanston, Wyoming
Vp=8.00 km/s; Vs=4.62 km/s; baz=216.9 deg; dist=9.9 deg (1100.2 km); depth=15 km

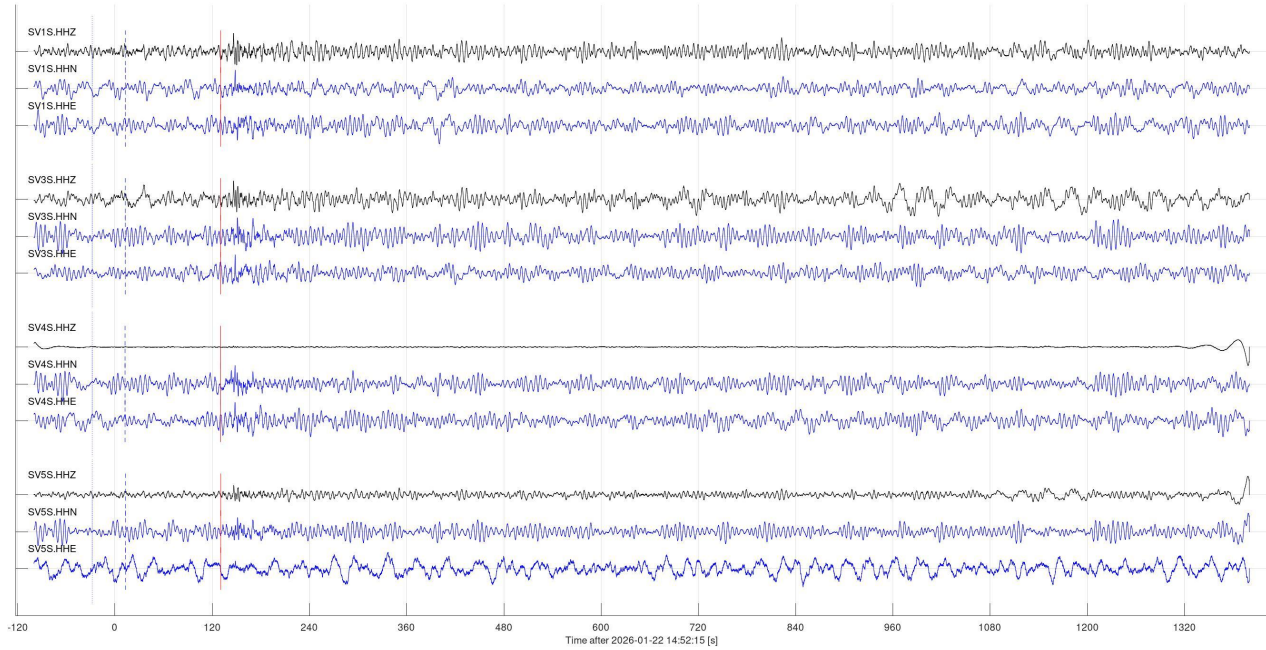


Figure 6, continued.

Regional events (class 2)

Two regional seismic events (class 2 in Table 2) were identified at Aquistore stations during the reporting period. These events were not reported from NRCAN database (Figure Error: Reference source not found). From the difference between S- and P-wave arrival times, the distance to these events was roughly estimated as 150-180 km. This distance could correspond to locations near the Esterhazy potash-mining related earthquake cluster.

Event 43038 at 2026-01-29 19:42:34, 'Regional': Unidentified Regional
Vp=6.20 km/s; Vs=3.50 km/s; baz=90.0 deg; dist=1.3 deg (150.0 km); depth=0.00 km

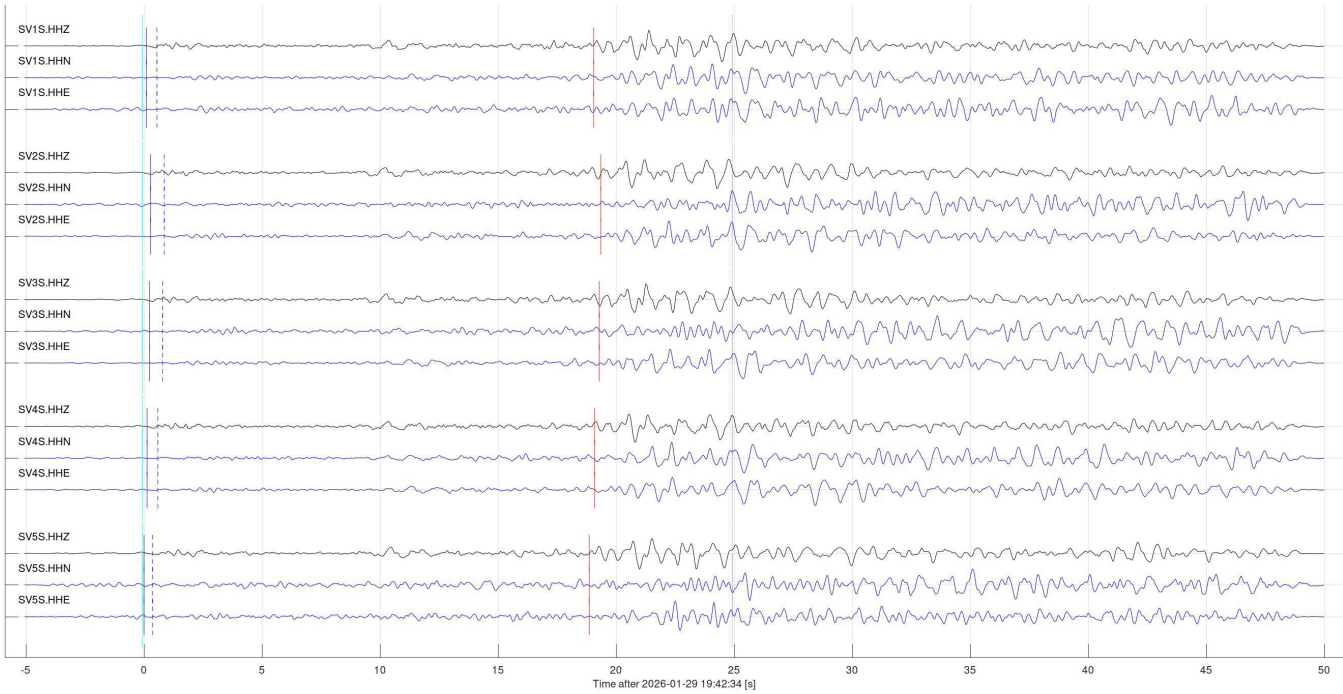


Figure 7. Regional seismic events detected at Aquistore in January 2026. Plot headings and colours are as in Figure 6.

Event 43262 at 2026-01-05 21:00:42, 'Regional': Unidentified regional event (near Esterhazy?)
Vp=6.20 km/s; Vs=3.50 km/s; baz=90.0 deg; dist=1.3 deg (150.0 km); depth=0.00 km

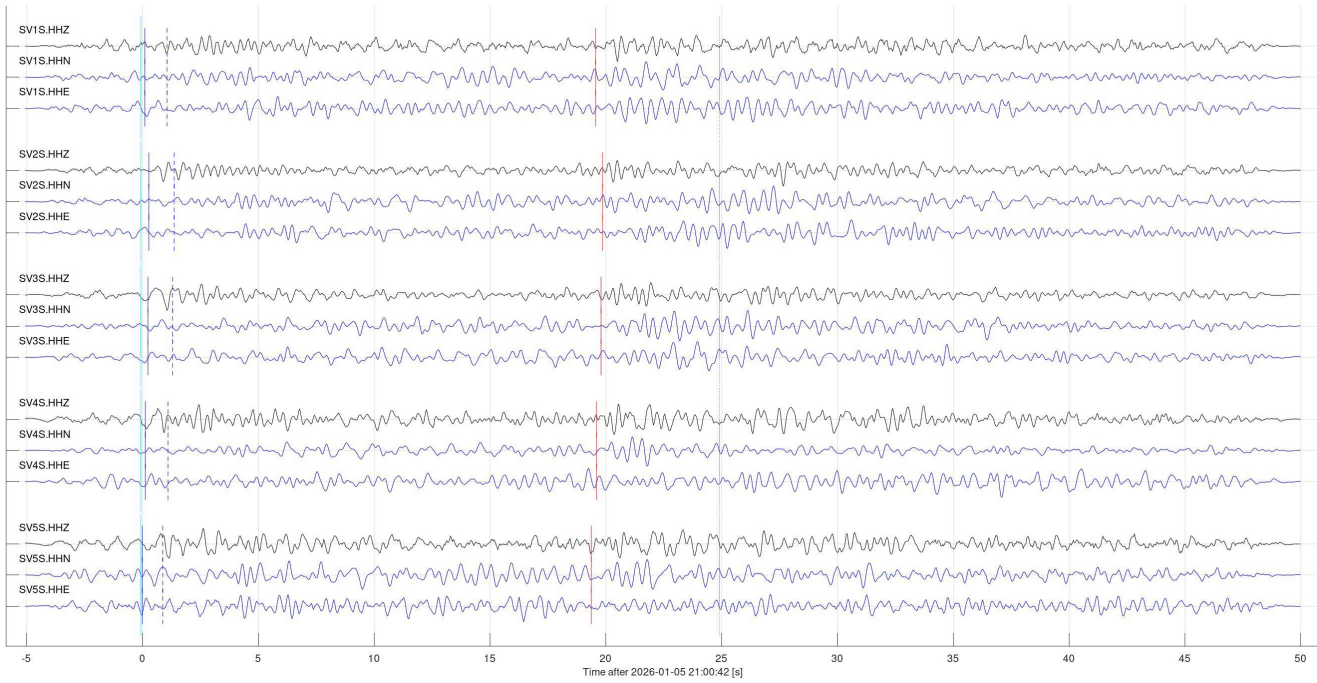


Figure 7, continued.

Local events (classes 3 and 4)

The following subsections summarize observations of event classes 3 and 4 in Table 2.

Possible mine blasts at the Estevan mine (class 3a)

Nineteen events were identified as mine blasts in the area of Estevan coal mining (Figure 8).

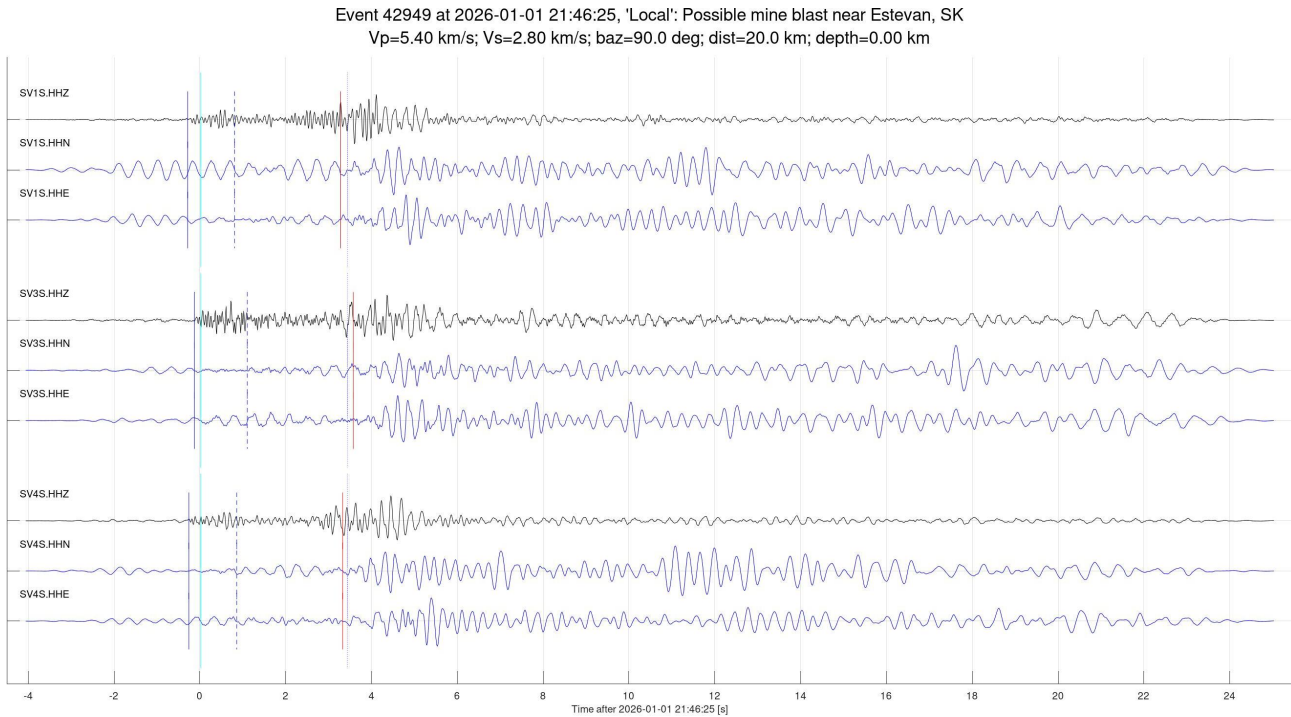


Figure 8. Seismic arrivals produced by mine blasts at the Estevan mine. Colours and labels are as in Figure 6.

Event 42952 at 2026-01-03 21:20:17, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=20.0 km; depth=0.00 km

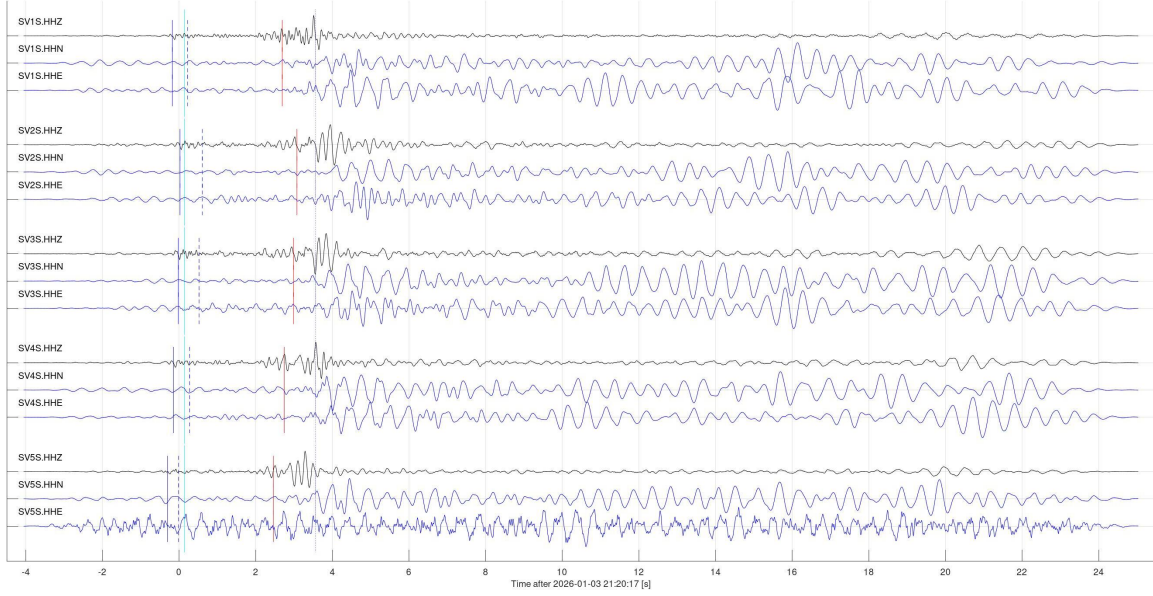


Figure 8, continued.

Event 42955 at 2026-01-04 21:23:36, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=20.0 km; depth=0.00 km

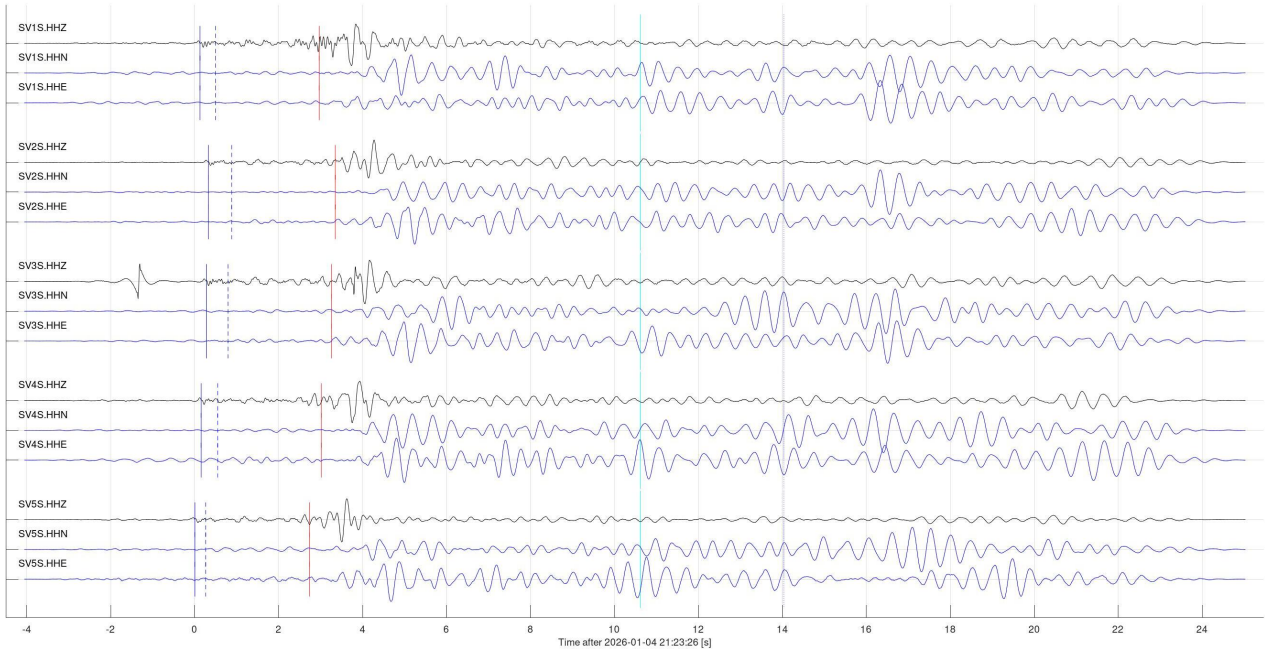


Figure 8, continued.

Event 42956 at 2026-01-05 21:14:39, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=20.0 km; depth=0.00 km

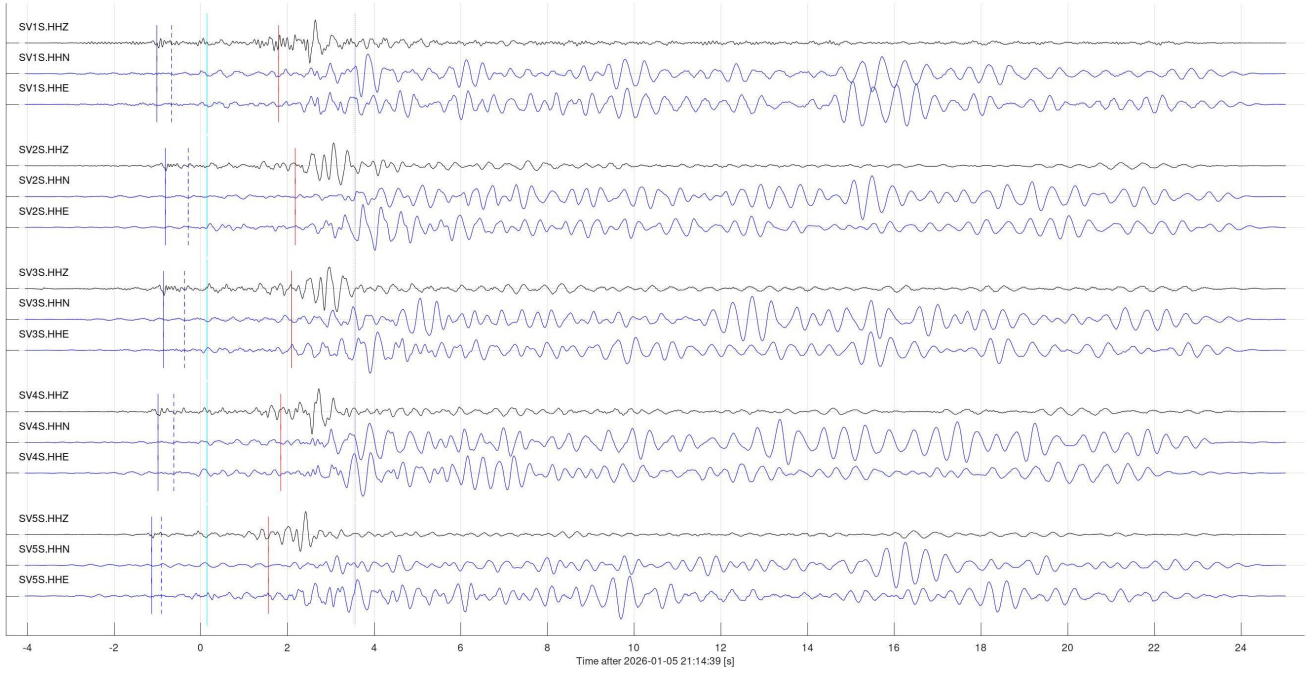


Figure 8, continued.

Event 42957 at 2026-01-05 21:44:25, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=20.0 km; depth=0.00 km

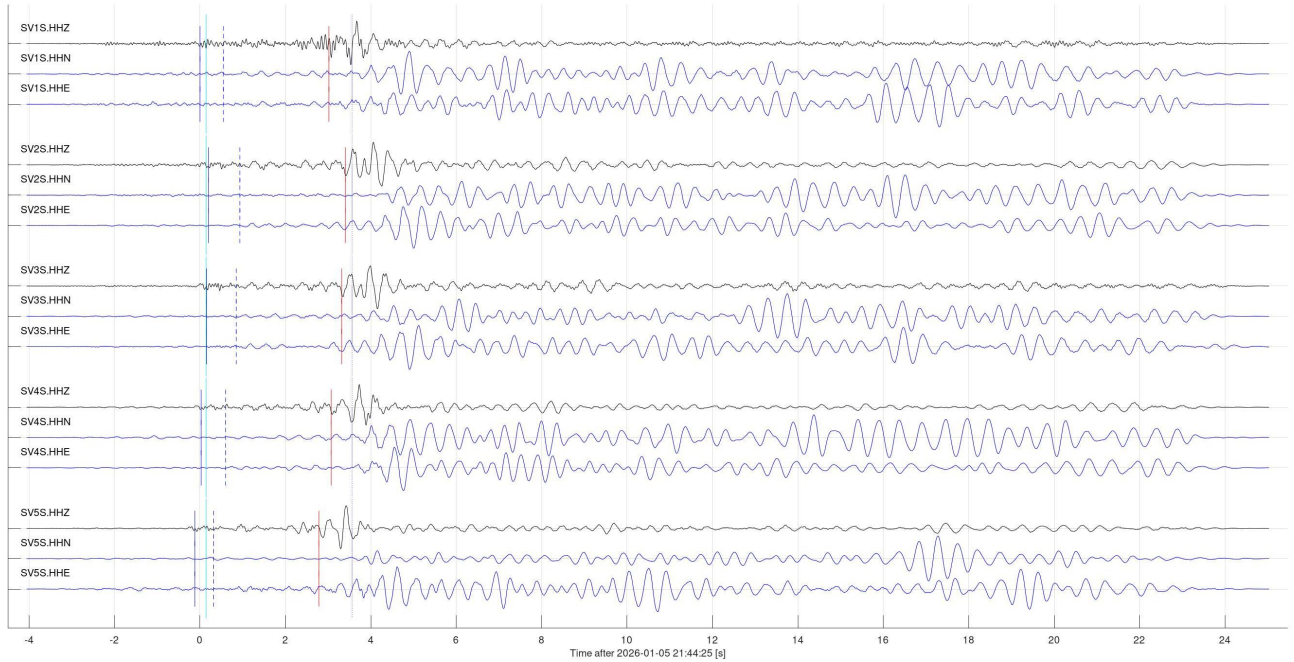


Figure 8, continued.

Event 42960 at 2026-01-06 21:52:25, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

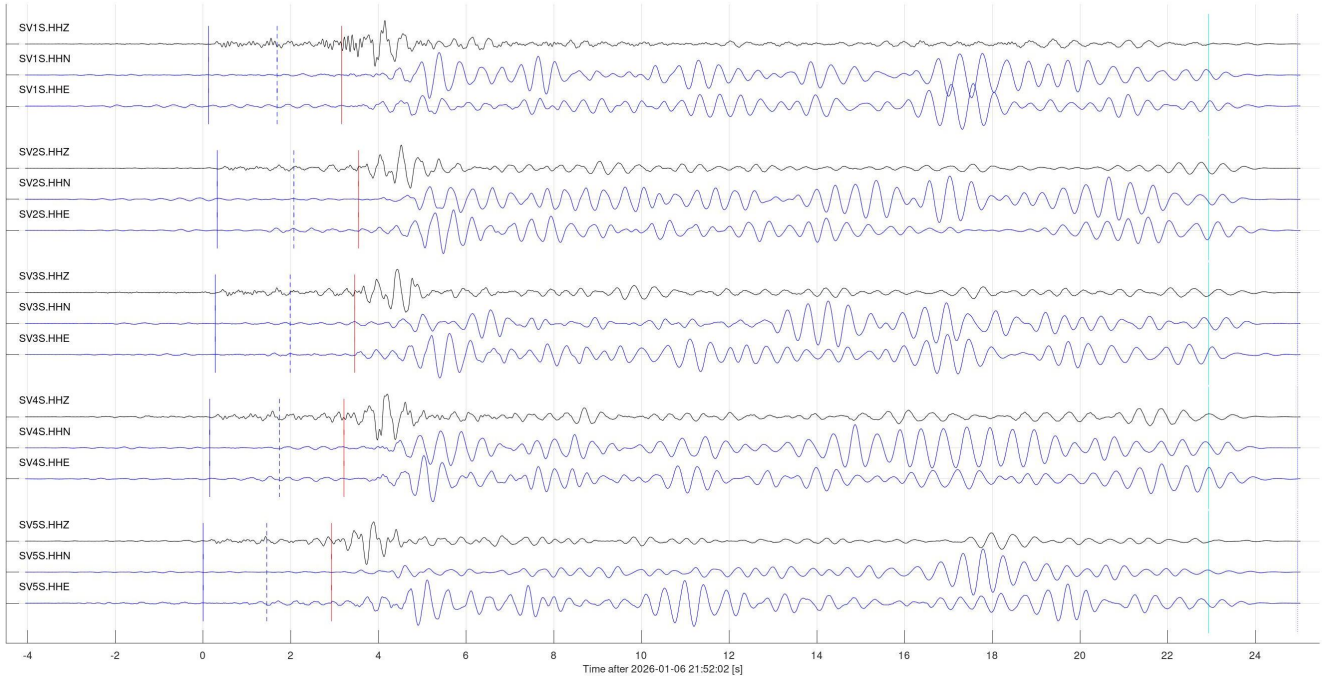


Figure 8, continued.

Event 42961 at 2026-01-07 21:50:46, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

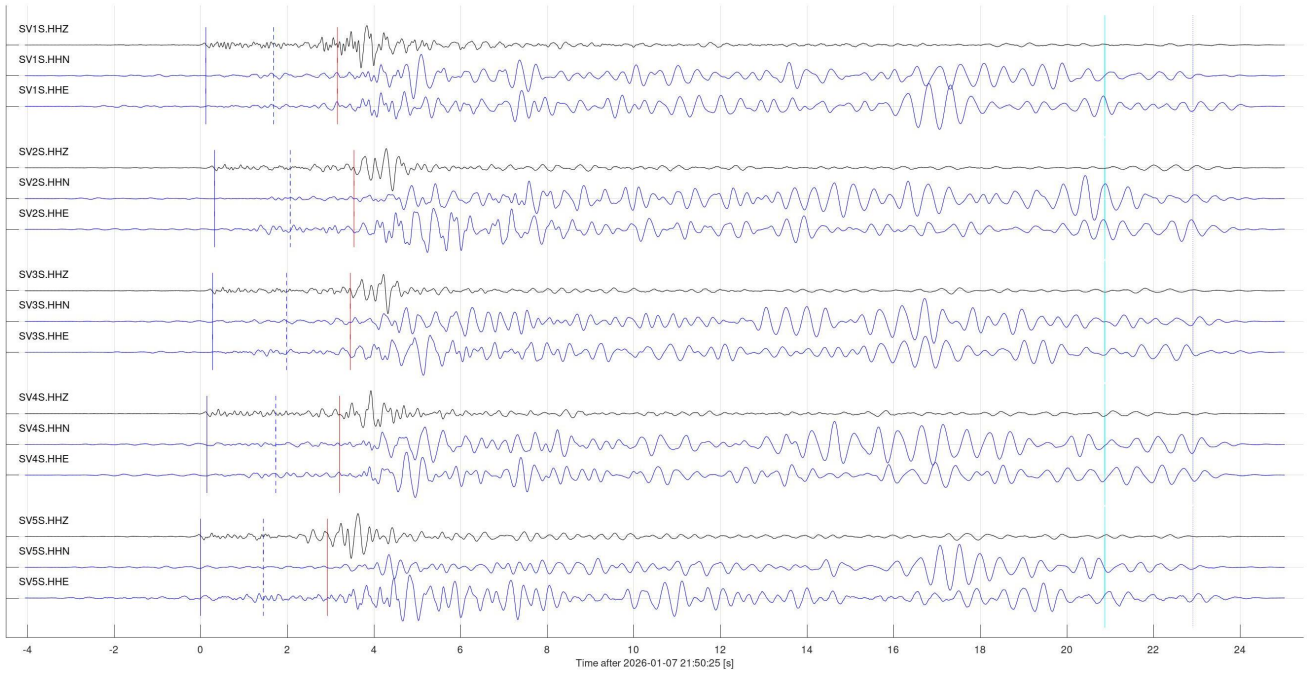


Figure 8, continued.

Event 42962 at 2026-01-08 21:19:42, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

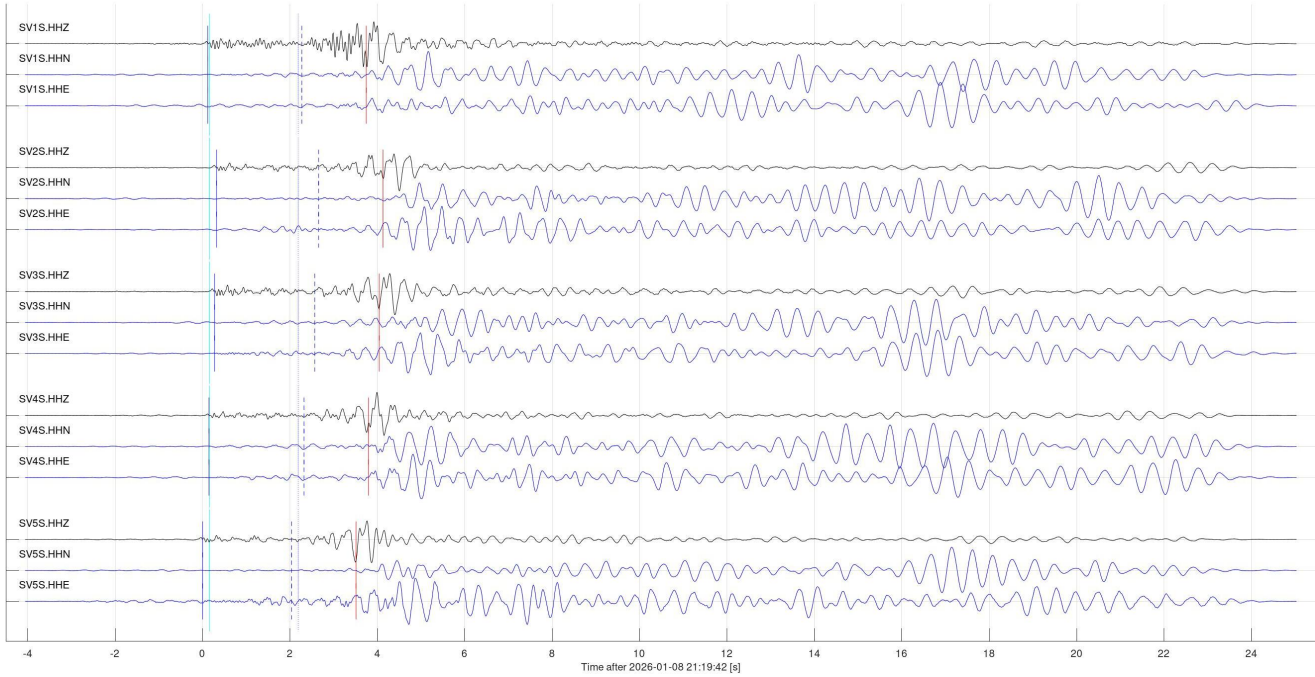


Figure 8, continued.

Event 43023 at 2026-01-09 21:07:39, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

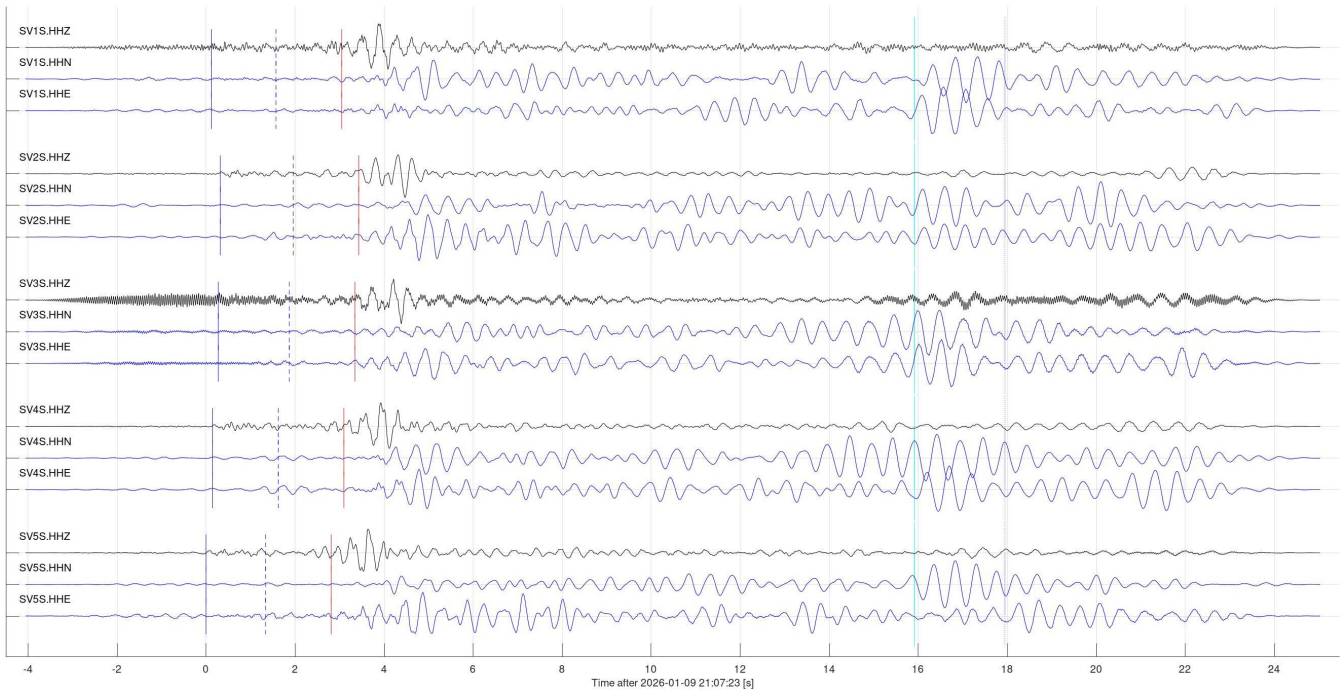


Figure 8, continued.

Event 43025 at 2026-01-11 21:52:27, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

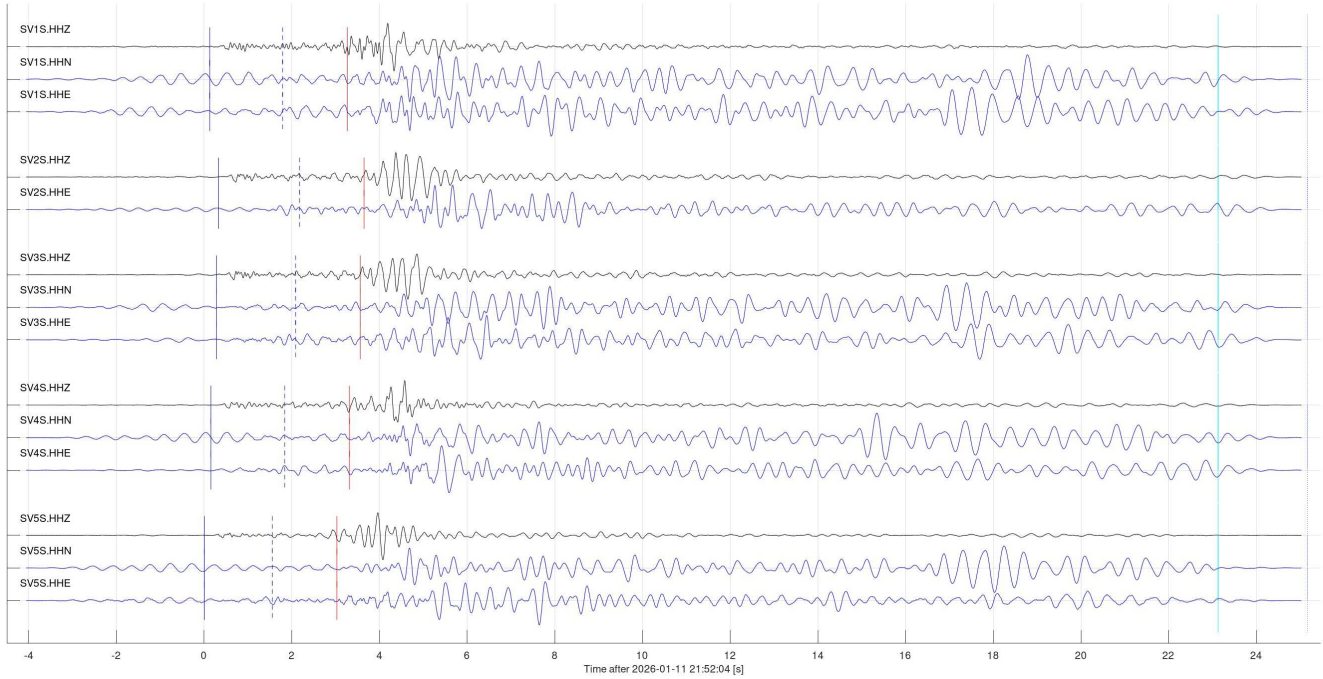


Figure 8, continued.

Event 43027 at 2026-01-12 21:13:42, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

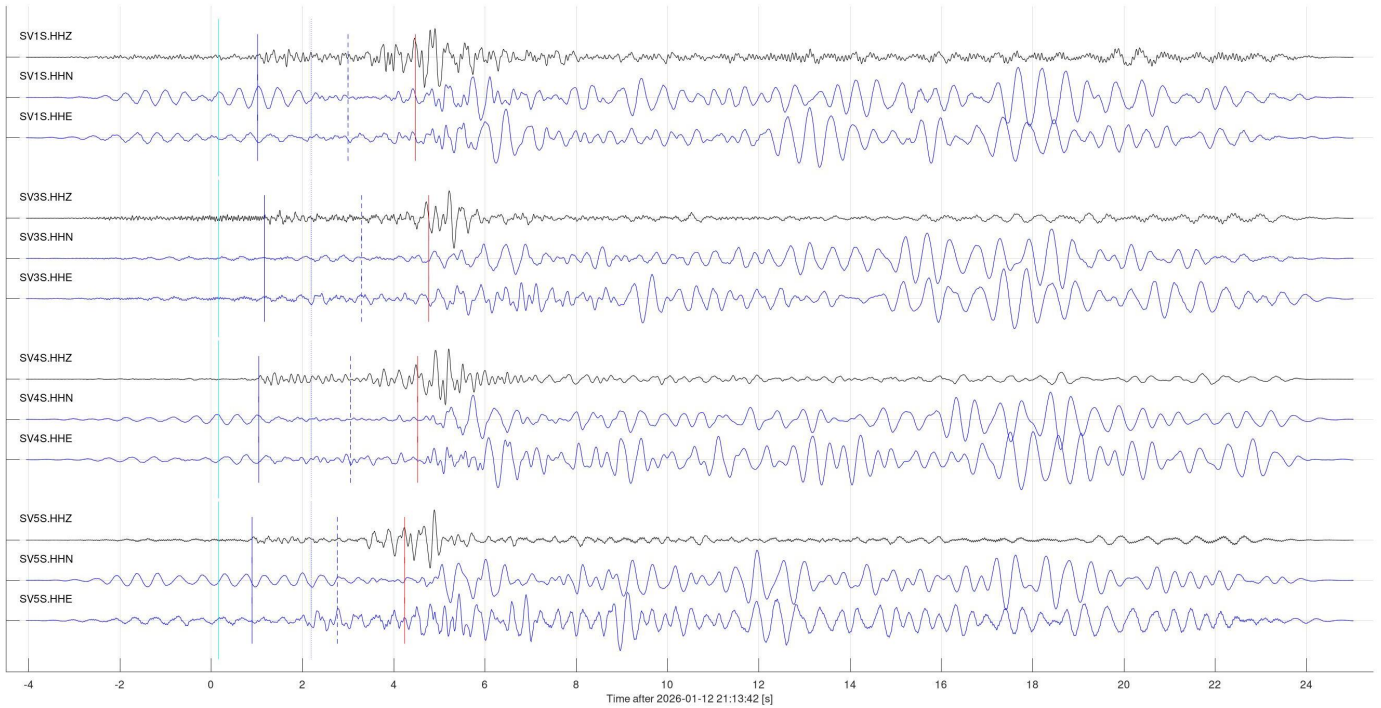


Figure 8, continued.

Event 43028 at 2026-01-13 21:22:03, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

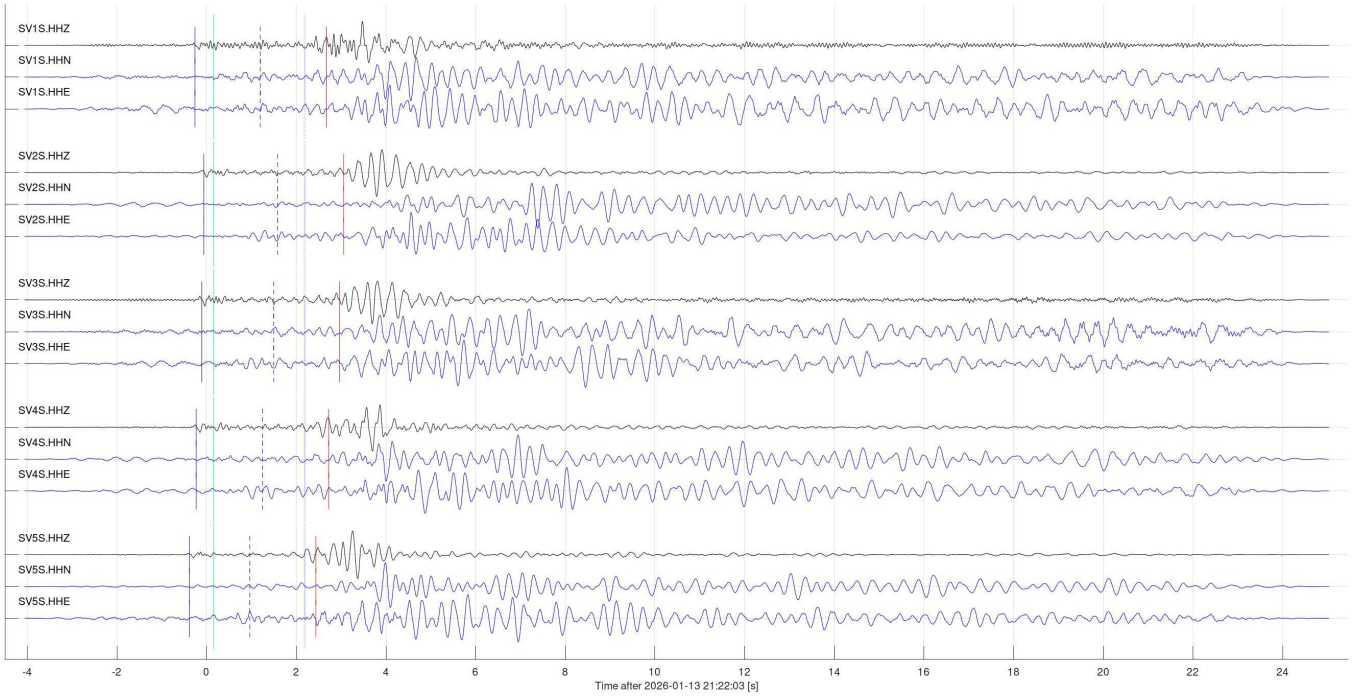


Figure 8, continued.

Event 43029 at 2026-01-14 21:16:58, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

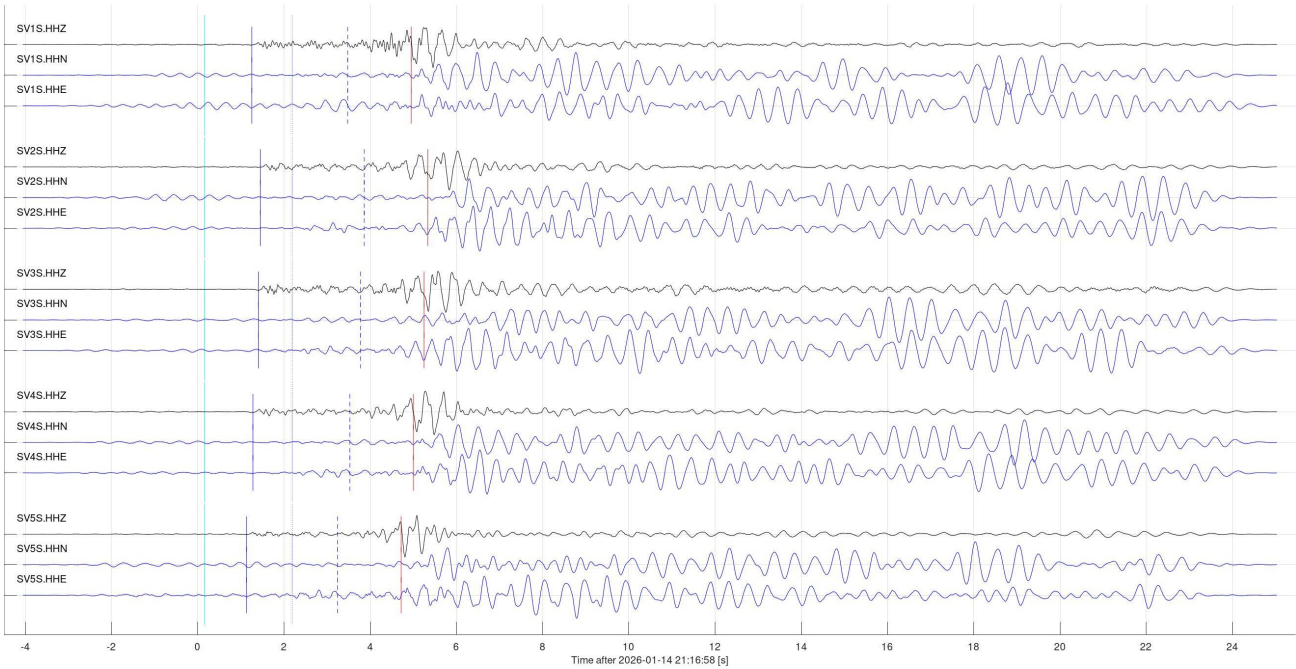


Figure 8, continued.

Event 43030 at 2026-01-18 22:19:19, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

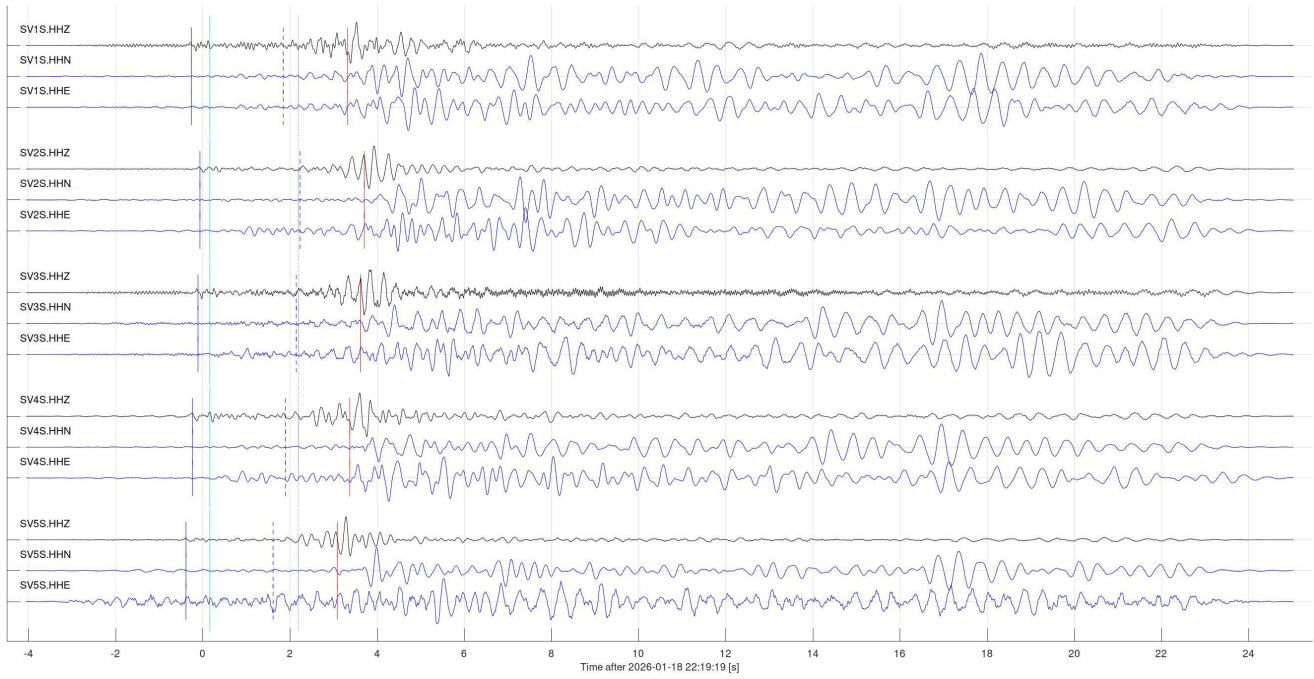


Figure 8, continued.

Event 43031 at 2026-01-19 21:16:21, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

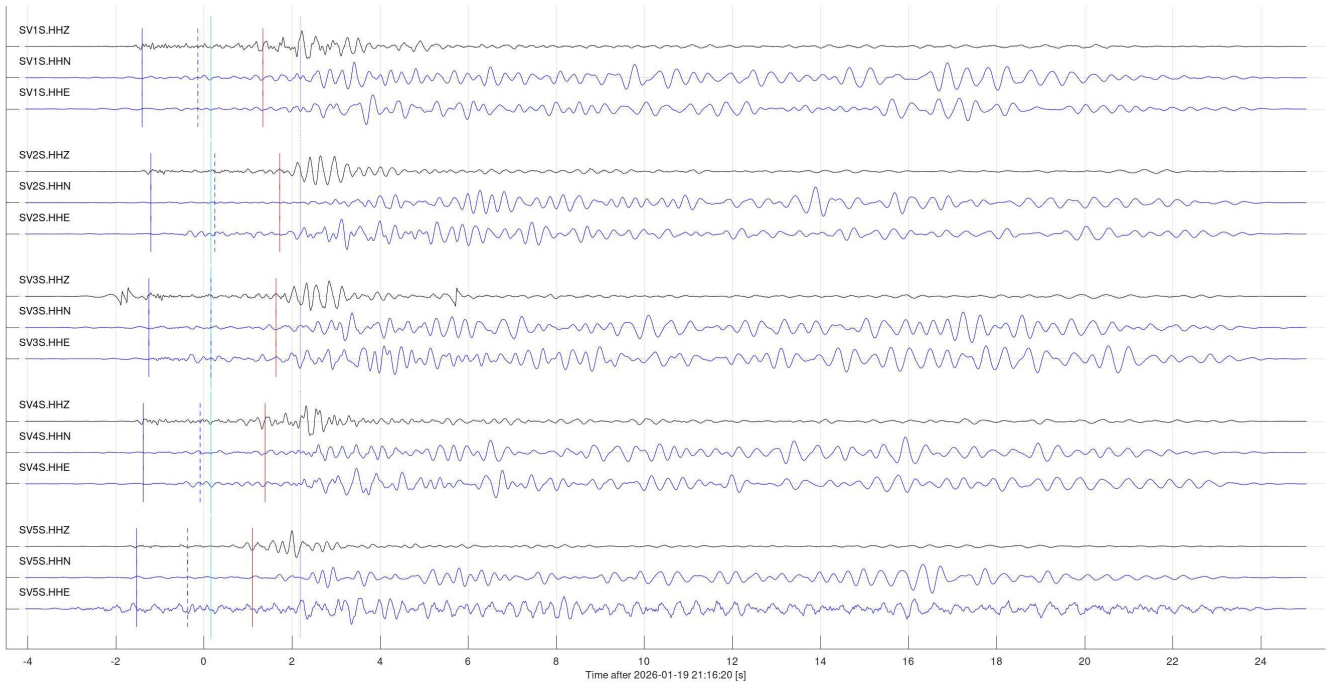


Figure 8, continued.

Event 43032 at 2026-01-20 21:13:17, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

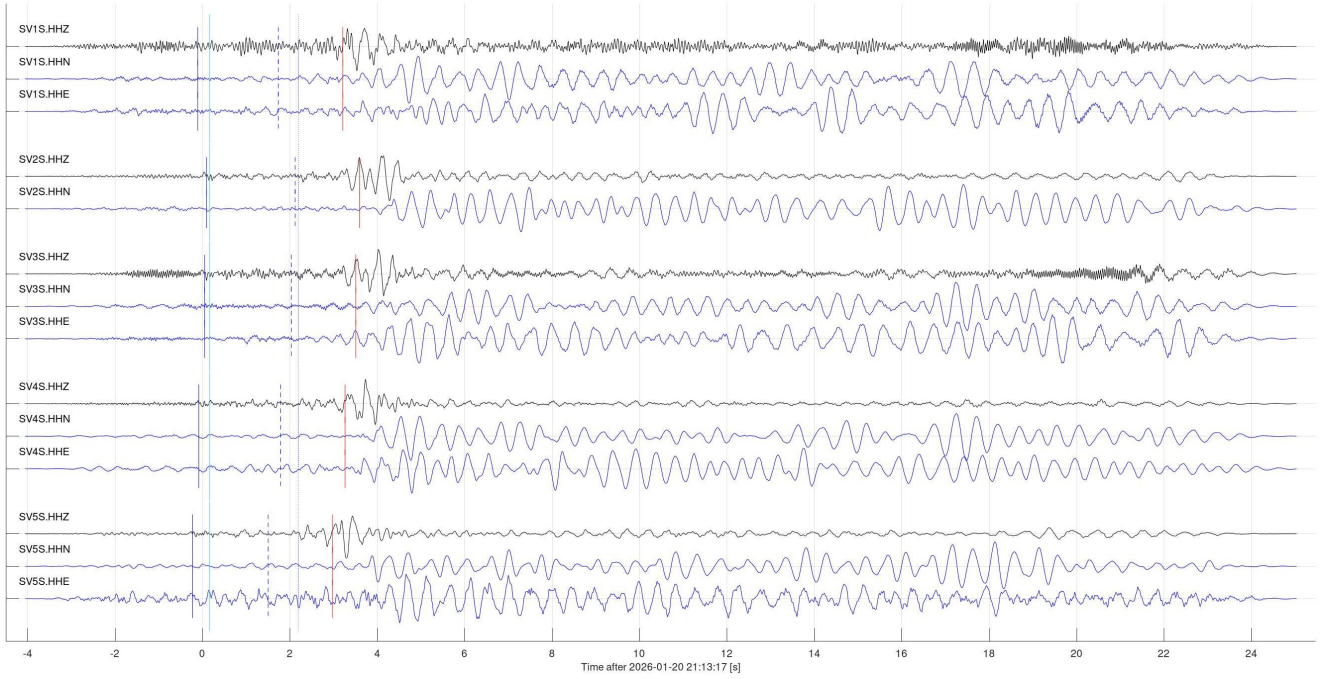


Figure 8, continued.

Event 43033 at 2026-01-21 21:11:22, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

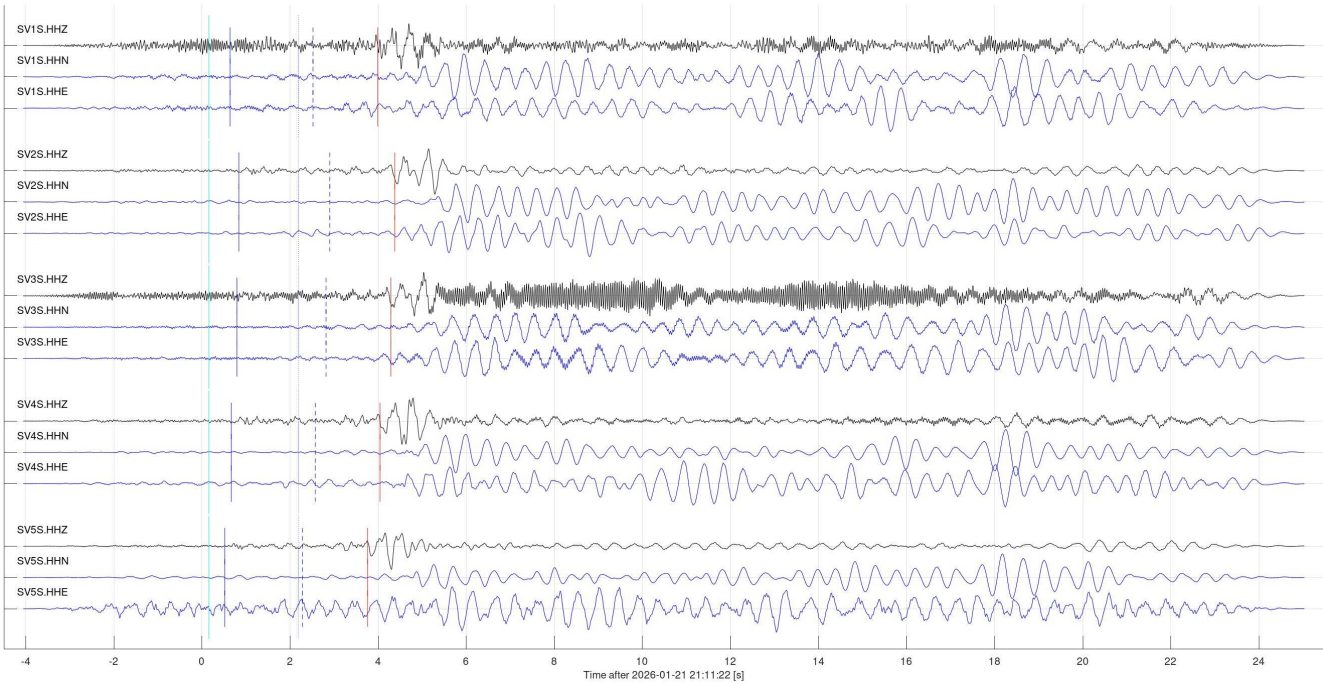
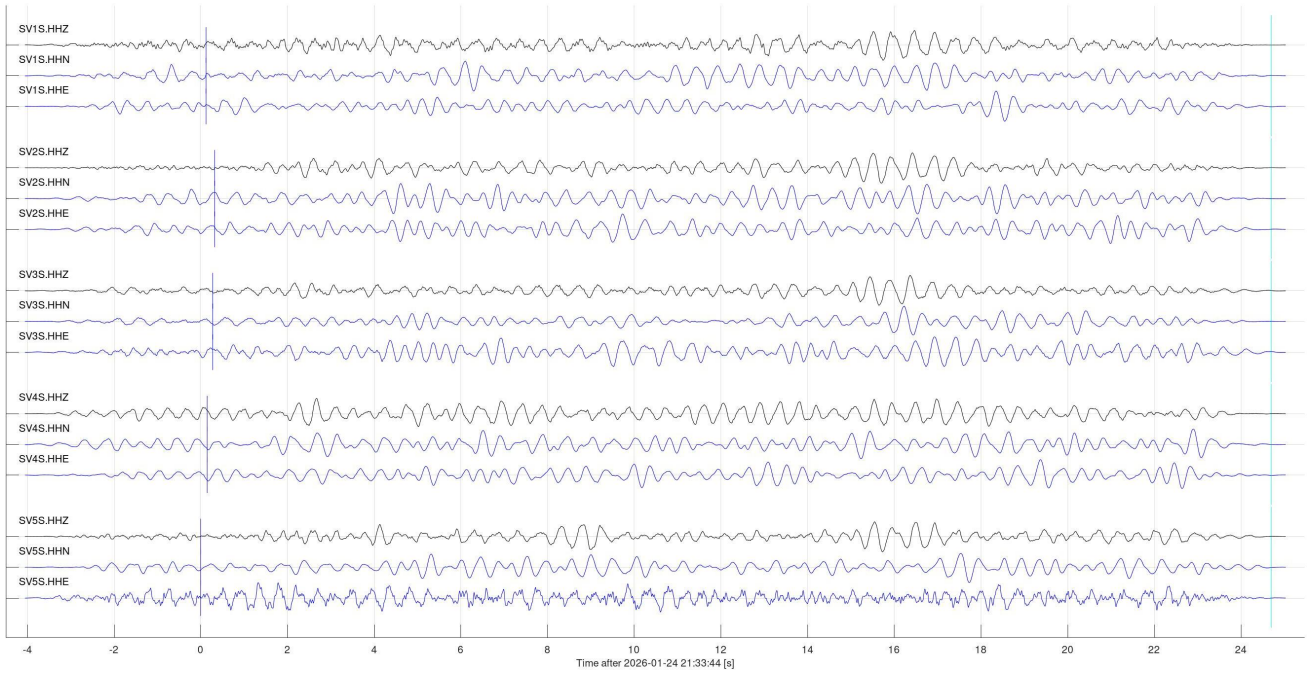
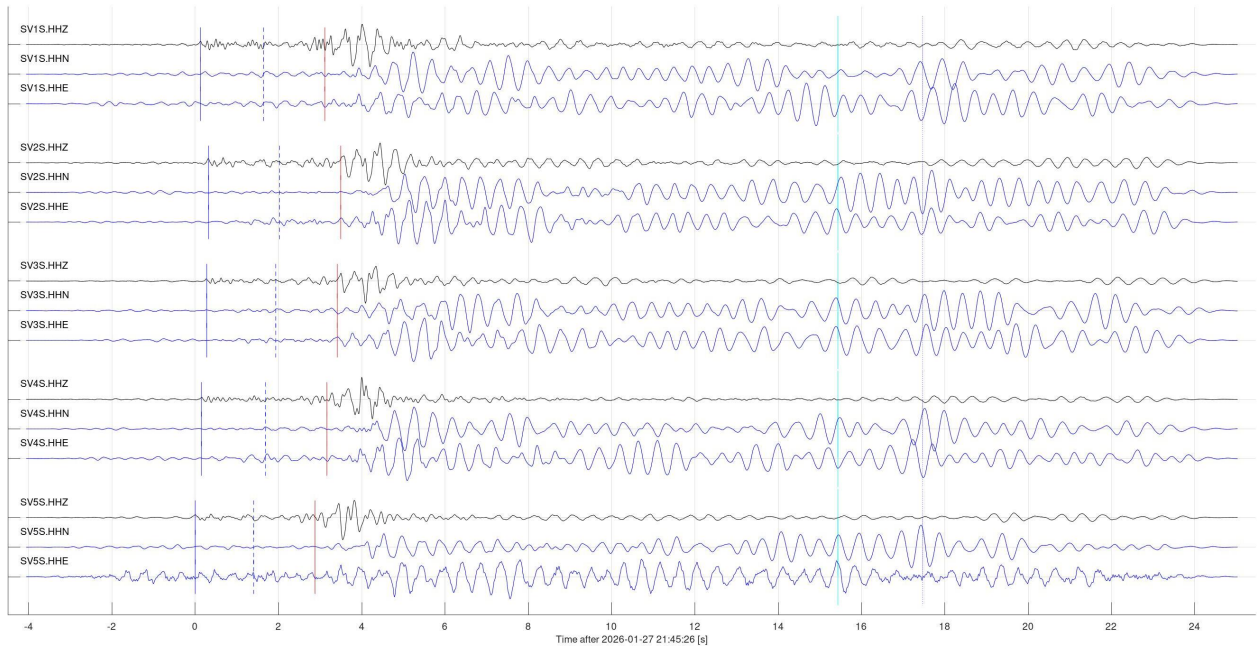


Figure 8, continued.

Event 43034 at 2026-01-24 21:34:09, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km



Event 43036 at 2026-01-27 21:45:42, 'Local': Possible mine blast near Estevan, SK
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km



Events related to mining operations (class 3b)

Numerous mining- and industrial-operations related seismic events were observed in the area. Many such events may be produced by trains. Figure 9 illustrates six such events.

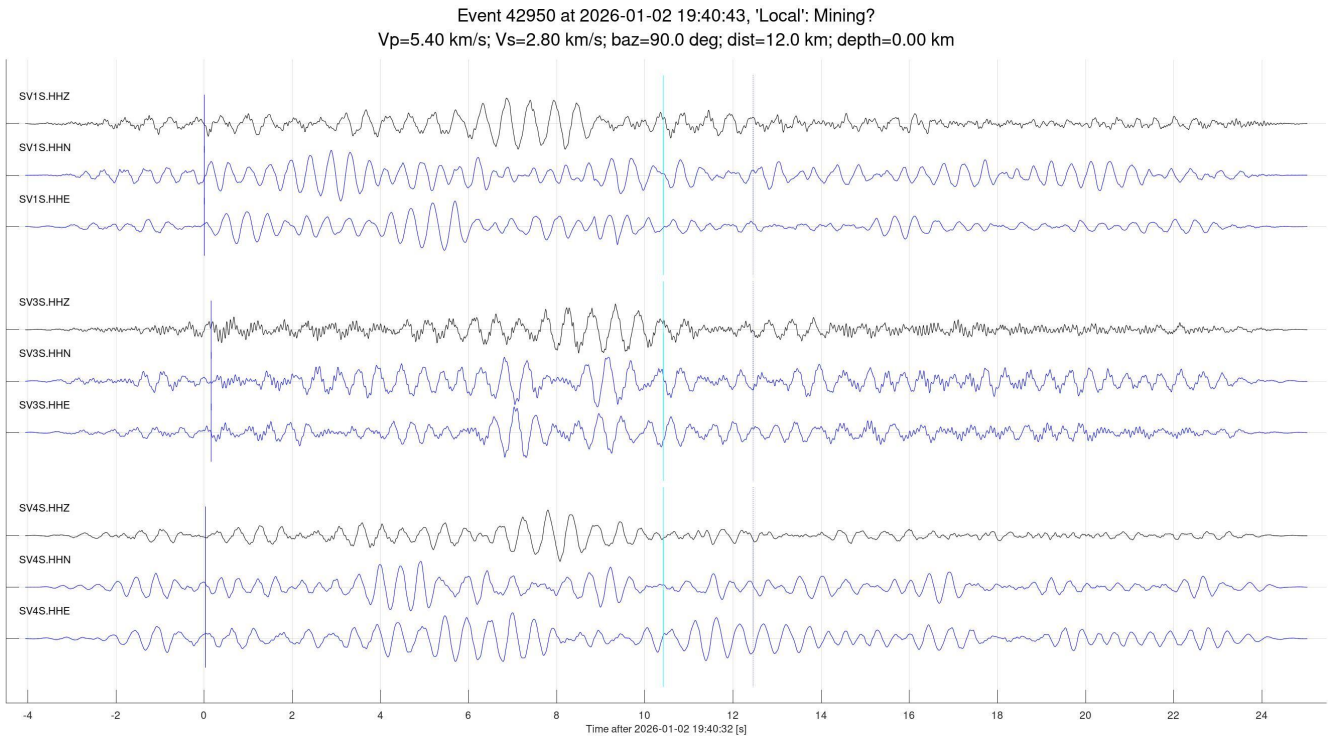


Figure 9. Sample events interpreted as due to mining activity in the area. Lines, color bars and labels are as in the preceding figures.

Event 42954 at 2026-01-04 19:02:25, 'Local': Mining?
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

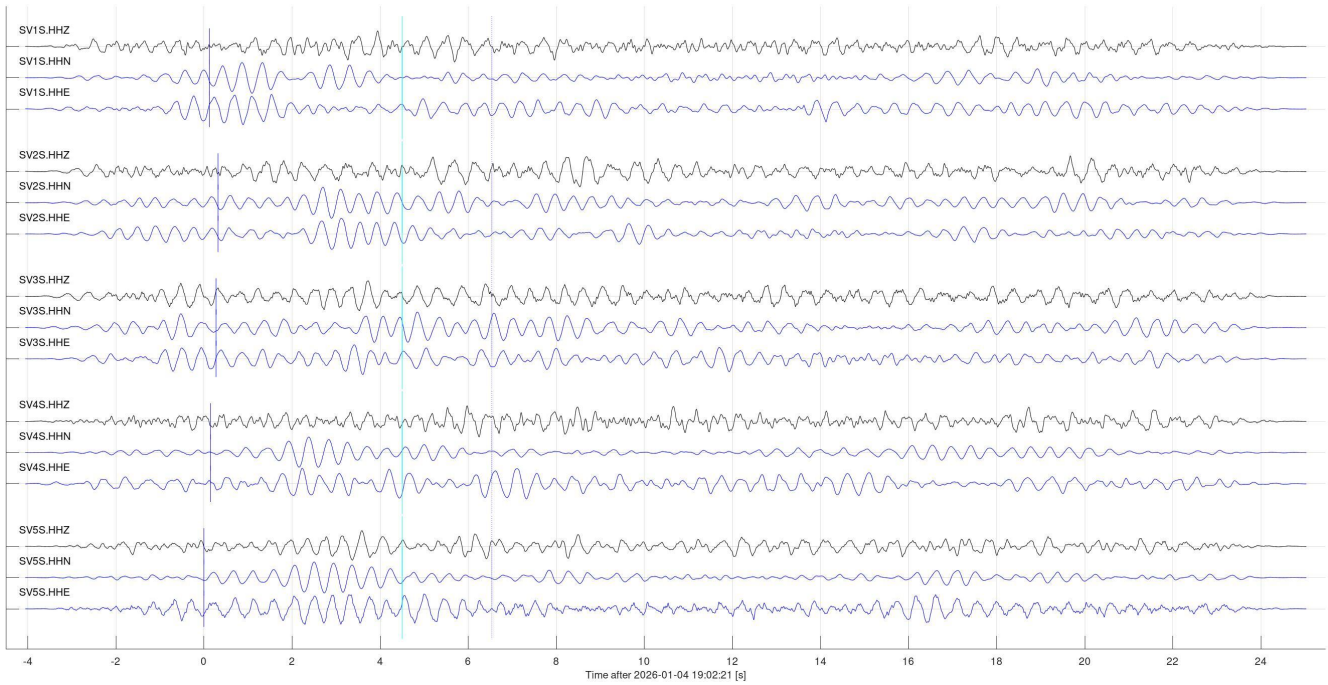


Figure 9, continued.

Event 42958 at 2026-01-05 23:32:32, 'Local': Mining or train?
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

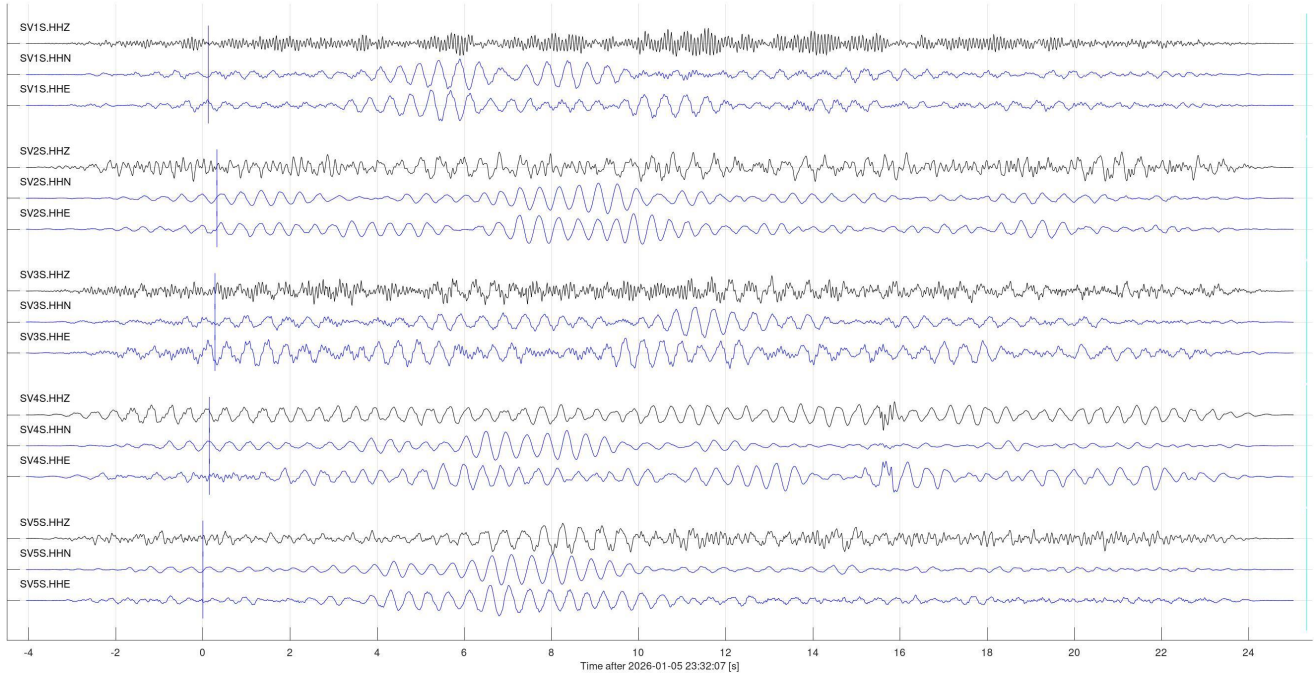


Figure 9, continued.

Event 42959 at 2026-01-06 19:48:42, 'Local': Mining?
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

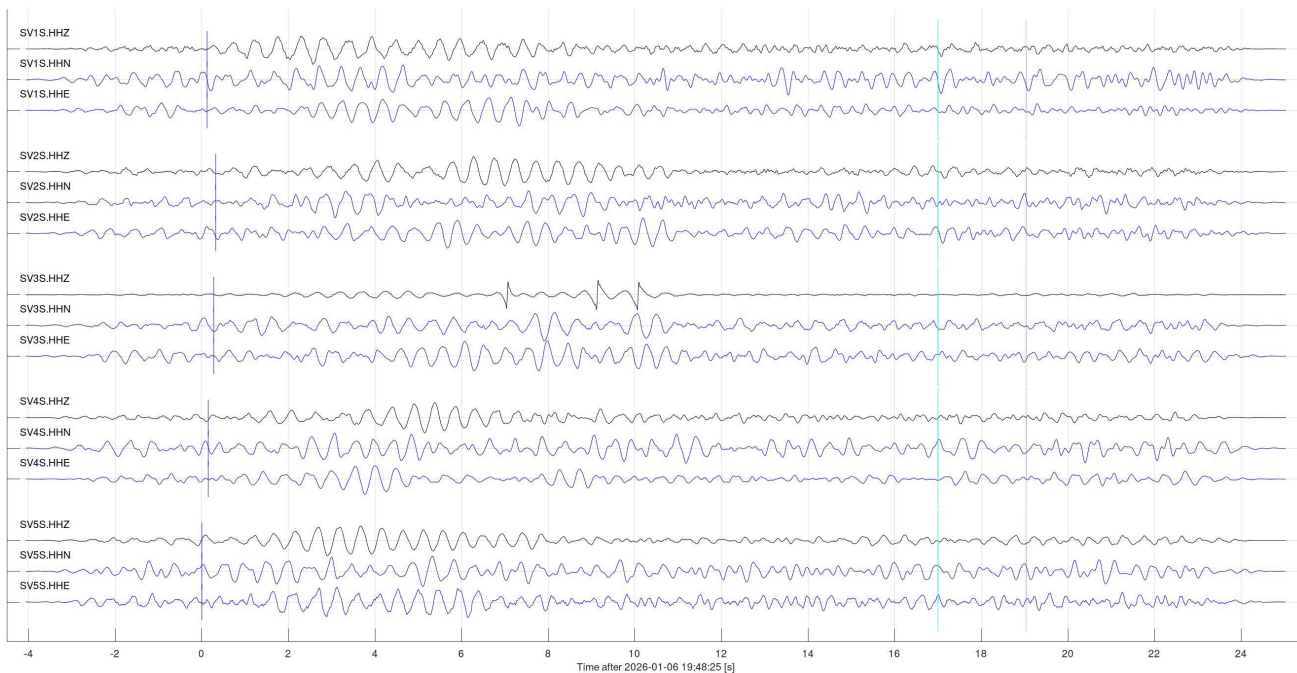


Figure 9, continued.

Event 43022 at 2026-01-09 19:43:20, 'Local': Mining?
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

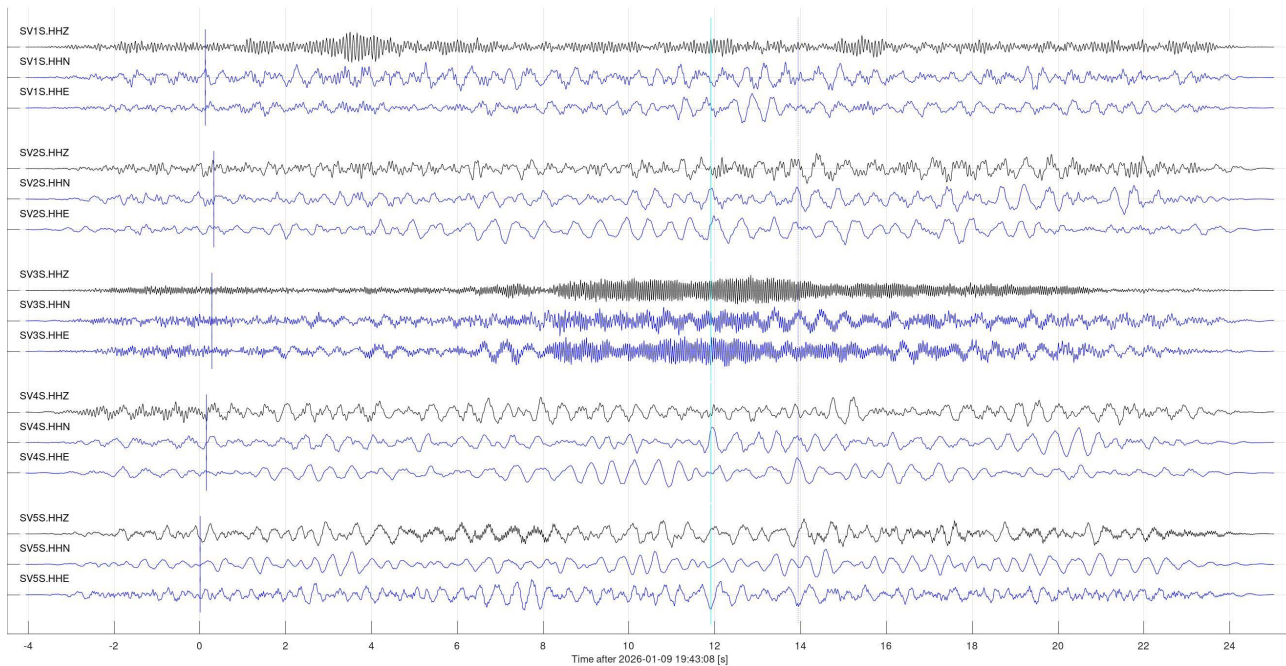


Figure 9, continued.

Event 43037 at 2026-01-29 19:14:45, 'Local': Mining?
Vp=5.40 km/s; Vs=2.80 km/s; baz=90.0 deg; dist=12.0 km; depth=0.00 km

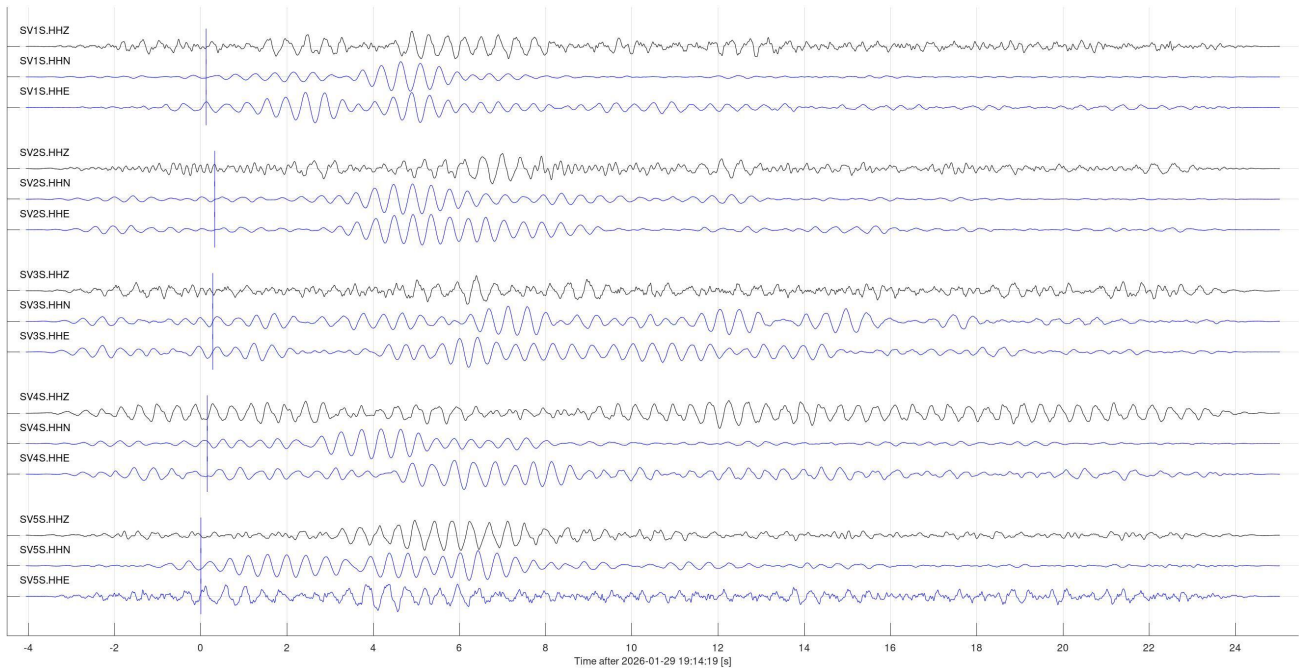


Figure 9, continued.

Events in array proximity (classes 4a and 4b)

Five seismic events were identified as possibly occurring in the proximity of the array (class 4a) (Figure 10). Clear identification of such events and separation from class 3b and recordings of trains is difficult. However, no events which could be related to fracturing within the target zone (class 4b, impulsive and higher-frequency) were found.

Event 42951 at 2026-01-03 20:23:53, 'Near': train?
Vp=2.40 km/s; Vs=1.20 km/s; baz=90.0 deg; dist=1.0 km; depth=0.00 km

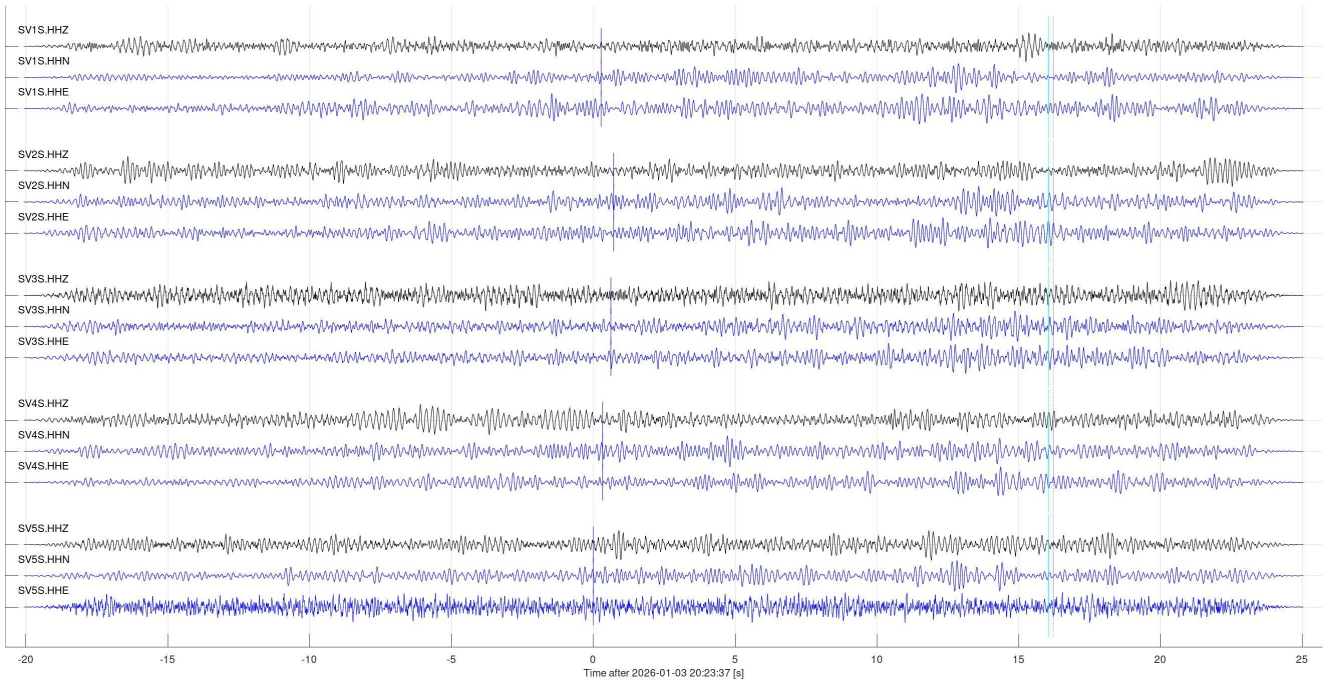


Figure 10. Events interpreted as occurring near surface in the proximity of the array (class 4a in Table 2). Lines, colour bars and labels are as in the preceding figures. Seismic velocity estimates shown in the headers (particularly P-wave) are from an averaged model and require further analysis.

Event 42963 at 2026-01-08 21:43:47, 'Near': Train?
Vp=2.40 km/s; Vs=1.20 km/s; baz=90.0 deg; dist=1.0 km; depth=0.00 km

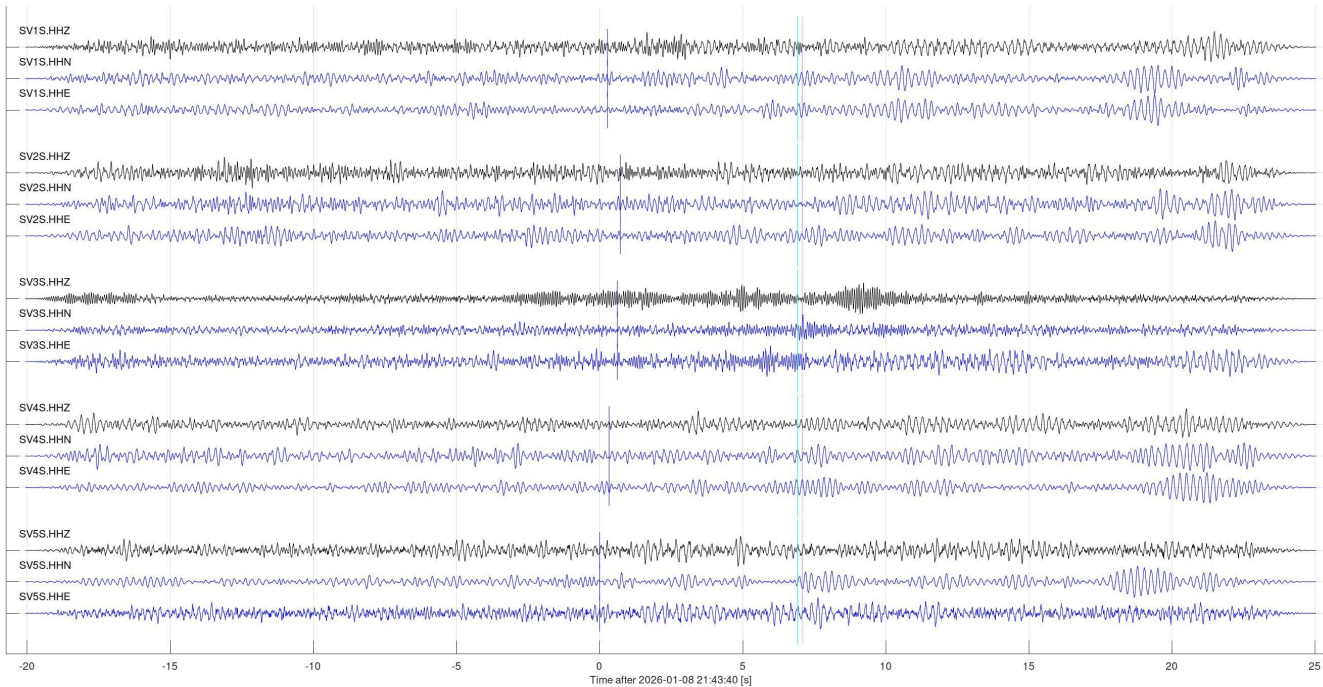


Figure 10, continued

Event 43024 at 2026-01-09 22:25:18, 'Near': Near array?
Vp=2.40 km/s; Vs=1.20 km/s; baz=90.0 deg; dist=1.0 km; depth=0.00 km

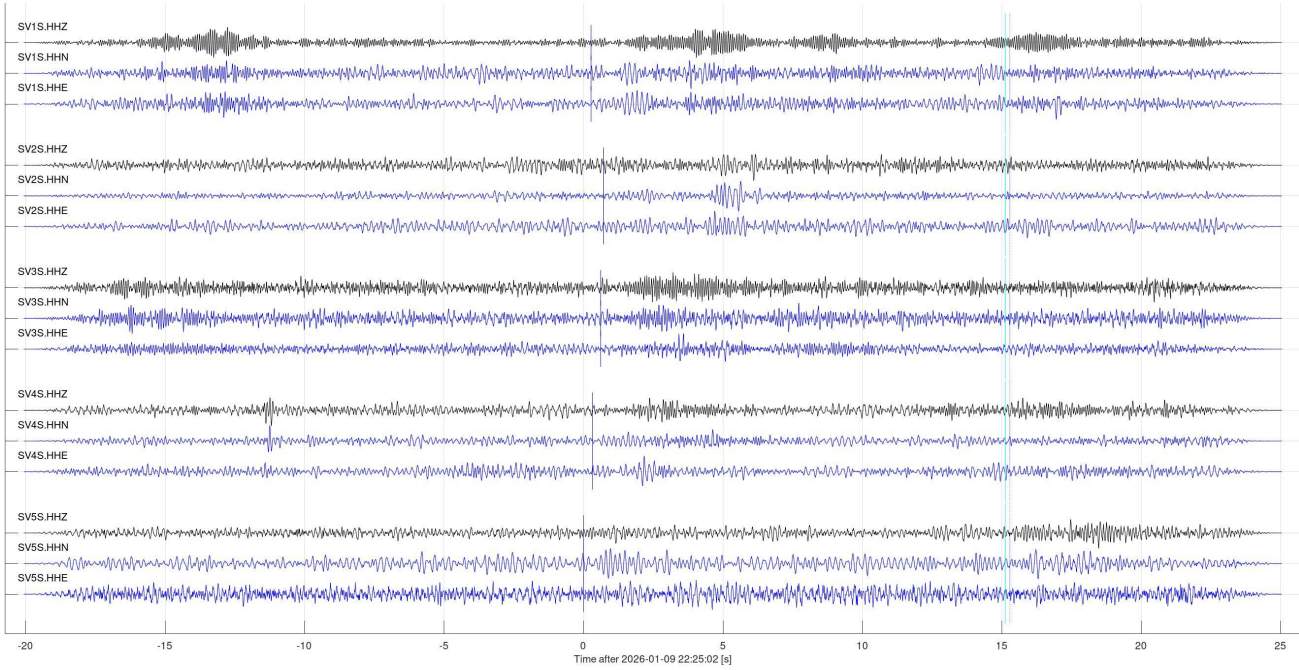


Figure 10, continued

Event 43026 at 2026-01-11 23:24:33, 'Near': Near array?
Vp=2.40 km/s; Vs=1.20 km/s; baz=90.0 deg; dist=1.0 km; depth=0.00 km

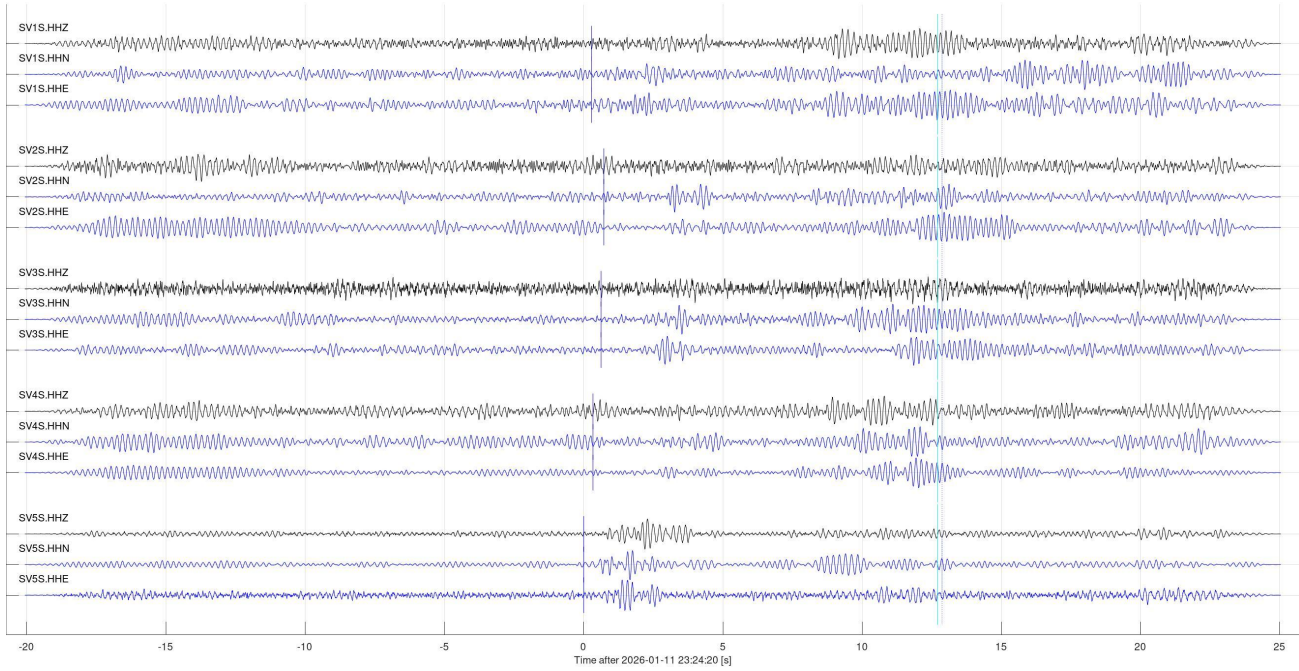


Figure 10, continued

Event 43035 at 2026-01-25 23:21:37, 'Near': Near array?
Vp=2.40 km/s; Vs=1.20 km/s; baz=90.0 deg; dist=1.0 km; depth=0.00 km

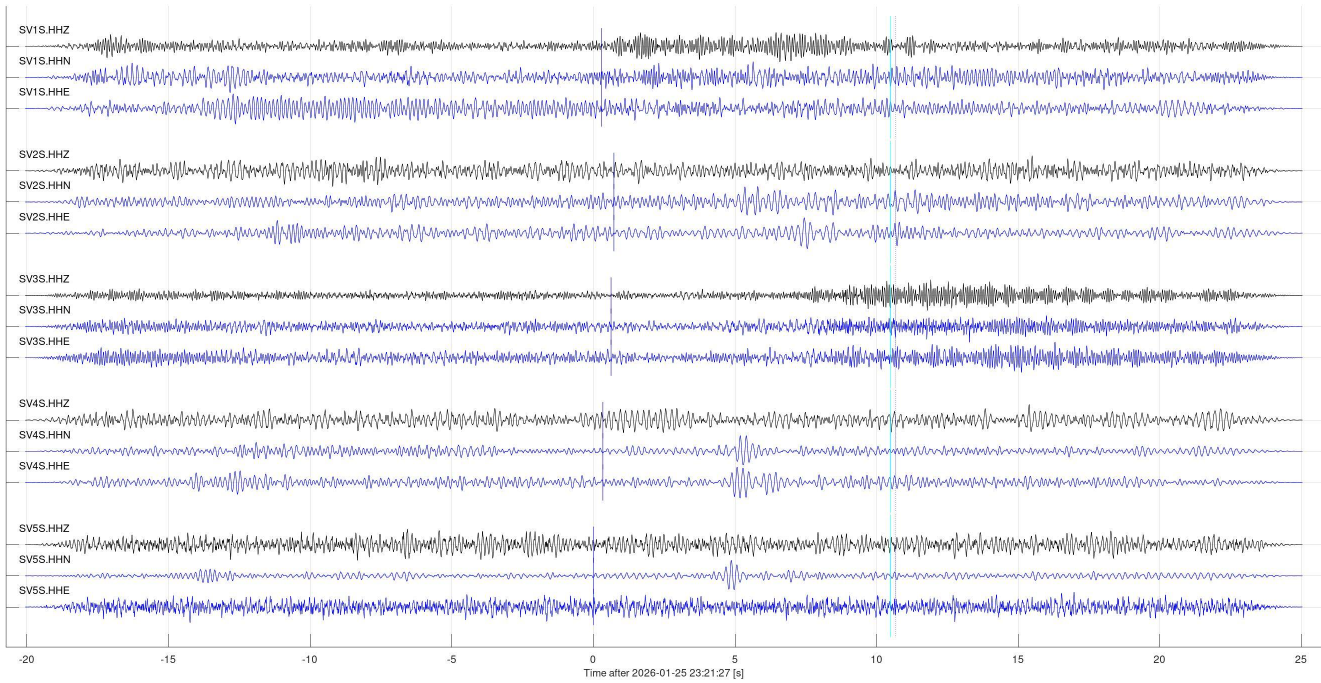


Figure 10, continued

5. SEGY files

Event time windows are provided in SEGY format in the attached zipped archive, separately for teleseismic and regional event detections. Subdirectory names and file naming convention and header formats are described in our reports for August and October 2024.

6. Conclusions and recommendations

Seismic array operation:

- Due to the shutting down the cellular Internet service modems in December 2025, data loss in January 2026 was minimized. Only about 20% data loss from stations SV2S and SV5S was sustained.
- However, the situation with high power consumption by the current SaskTel modems needs to be resolved during the summer.

Data and observations:

- 10 teleseismic events, 2 regional events, and 19 mine blasts were detected in January 2026.
- Numerous local events were detected, likely related to mining operations or freight trains. These events were not catalogued or analyzed in detail.
- Several events occurring near-surface in the vicinity of the array were noted. No events occurring at the reservoir level were identified.