

Monthly report

Railway Field Laboratory

July 2026

Client: Swiss confederation; Federal Offices for the Environment (FOEN) and Transport (FOT),
CH-3003 Bern
The FOEN and the FOT are offices of the Federal Department of the Environment, Transport, Energy and Communications (DETEC).

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Version: V1

Date: 12.8.2026

1. Status railway field laboratory

Construction work on the tracks:

- None

Downtimes of the measurement systems:

- MQ 21, MQ 22, MQ 23: from 16.7.2026 at 00:00 to 20.7.2026 at 10:00 due to a computer failure
- MQ 12: failure of a measurement card from 15.7.2026 at 15:00 to 21.7.2026 at 19:00 (presumably due to a lightning strike).
affected sensors:
a-mq12-3-uy, a-mq12-3-uz,
a-mq12-3-lx, a-mq12-3-ly, a-mq12-3-lz,
a-mq12-4-rf, a-mq12-4-rh, a-mq12-4-rw
- MQ 13: failure of a measurement card from 15.7.2026 at 15:00 to 21.7.2026 at 19:00 (presumably due to a lightning strike).
affected sensors:
a-mq13-3-uy, a-mq13-3-uz,
a-mq13-3-lx, a-mq13-3-ly, a-mq13-3-lz,
a-mq13-4-rf, a-mq13-4-rh, a-mq13-4-rw

Downtimes of the sensors:

- MQ 21: a-mq21-5-lx/y/z and a-mq21-5-ux/y/z (as of 11.9.2024 cable probably cut during mowing work)
- MQ 11: p-mq11-M30 from 9.7.2026 at 02:00 to 21.7.2026 at 19:00
- MQ 12: a-mq12-4-rf from 15.7.2026 at 15:00 to 22.7.2026 at 18:00 (presumably due to a lightning strike)
- MQ 13: a-mq13-4-rh from 15.7.2026 at 15:00 to 22.7.2026 at 18:00 (presumably due to a lightning strike)

Maintenance and sensor exchange:

- MQ 12: replacement of the defective measurement card on 21.7.2026
- MQ 13: replacement of the defective measurement card on 21.7.2026
- MQ 11: replacement of the defective microphone p-mq11-M30 on 21.7.2026
- MQ 12: replacement of the defective sensor a-mq12-4-rf on 22.7.2026
- MQ 13: replacement of the defective sensor a-mq13-4-rh on 22.7.2026
- REF: replacement of sensor a-ref-2-rh on 22.7.2026 in order to test a new sensor type
- REF: replacement of sensor a-ref-2-rw on 22.7.2026 in order to conclude the test of a new sensor type that had been ongoing since 24.9.2025

Modifications to the data, database, or analysis:

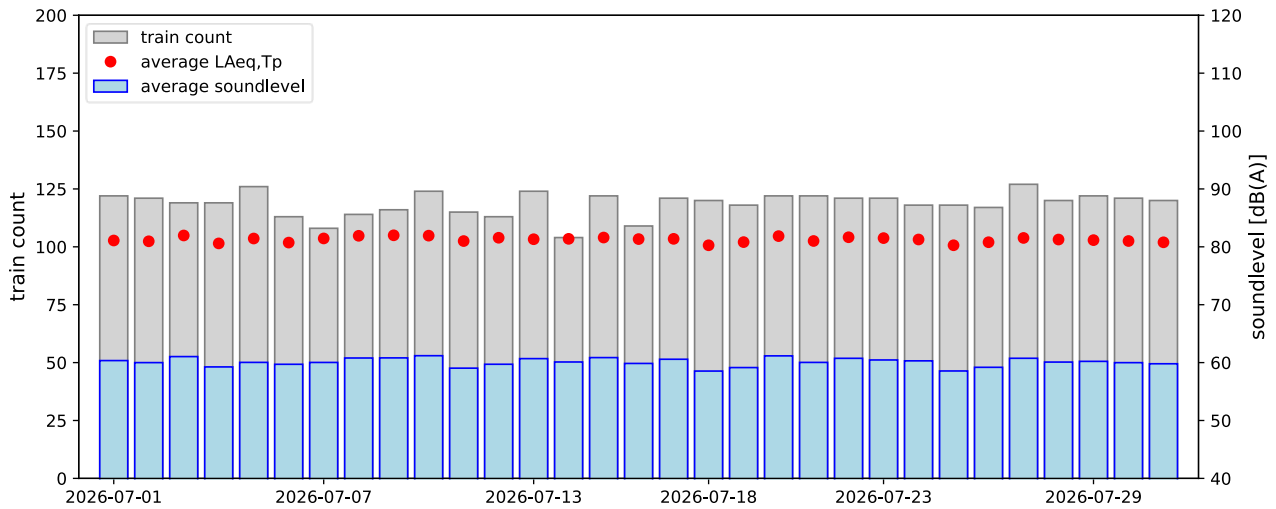
- None

Monthly data volume collected:

- 558 GB

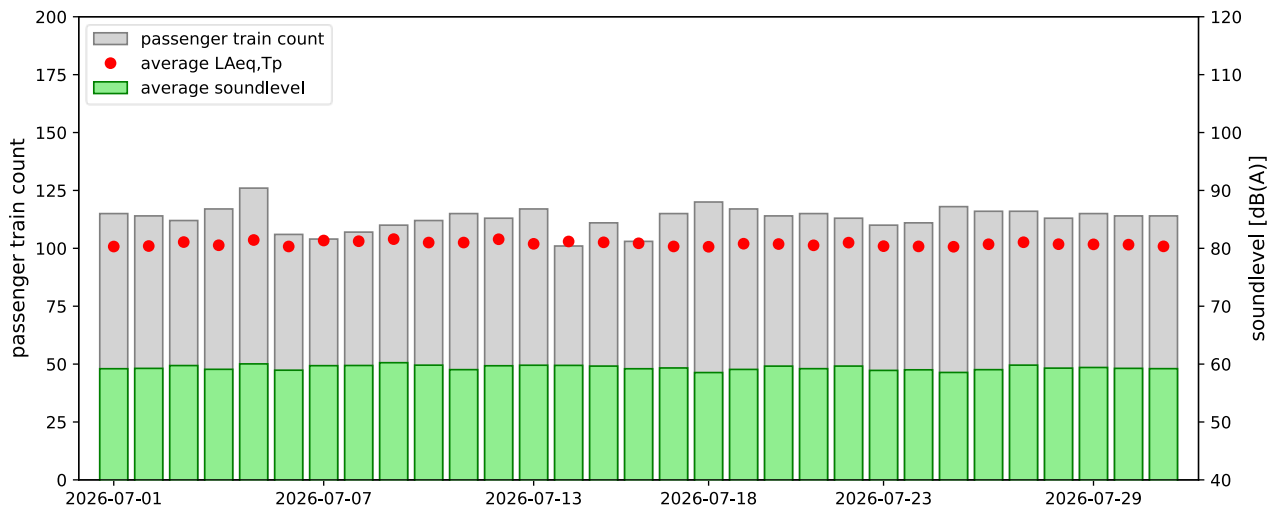
2. Measurement data

Daytime averages (24h) for all train passages at reference section (REF)



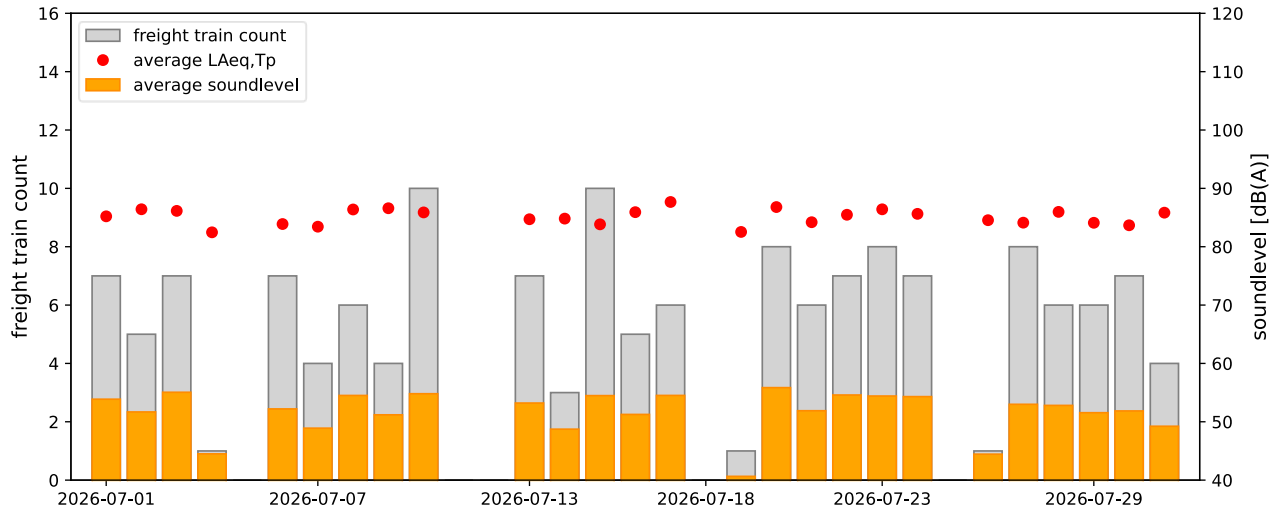
date	location	train count	passenger train count	freight train count	service train count	average LAeqTp	average soundlevel
01.07.2026	REF	122	115	7	0	81,1	60,4
02.07.2026	REF	121	114	5	2	81,0	60,0
03.07.2026	REF	119	112	7	0	82,0	61,0
04.07.2026	REF	119	117	1	1	80,6	59,3
05.07.2026	REF	126	126	0	0	81,4	60,0
06.07.2026	REF	113	106	7	0	80,7	59,7
07.07.2026	REF	108	104	4	0	81,4	60,0
08.07.2026	REF	114	107	6	1	81,9	60,8
09.07.2026	REF	116	110	4	2	82,0	60,8
10.07.2026	REF	124	112	10	2	81,9	61,2
11.07.2026	REF	115	115	0	0	81,0	59,0
12.07.2026	REF	113	113	0	0	81,6	59,7
13.07.2026	REF	124	117	7	0	81,3	60,7
14.07.2026	REF	104	101	3	0	81,4	60,1
15.07.2026	REF	122	111	10	1	81,6	60,9
16.07.2026	REF	109	103	5	1	81,3	59,9
17.07.2026	REF	121	115	6	0	81,4	60,6
18.07.2026	REF	120	120	0	0	80,3	58,5
19.07.2026	REF	118	117	1	0	80,8	59,1
20.07.2026	REF	122	114	8	0	81,9	61,2
21.07.2026	REF	122	115	6	1	81,0	60,0
22.07.2026	REF	121	113	7	1	81,7	60,7
23.07.2026	REF	121	110	8	3	81,5	60,5
24.07.2026	REF	118	111	7	0	81,3	60,3
25.07.2026	REF	118	118	0	0	80,3	58,6
26.07.2026	REF	117	116	1	0	80,8	59,2
27.07.2026	REF	127	116	8	3	81,5	60,7
28.07.2026	REF	120	113	6	1	81,3	60,1
29.07.2026	REF	122	115	6	1	81,2	60,2
30.07.2026	REF	121	114	7	0	81,0	60,0
31.07.2026	REF	120	114	4	2	80,8	59,8
month	REF	3677	3504	151	22	81,3	60,2

Daytime averages (24h) for all passenger train passages at reference section (REF)



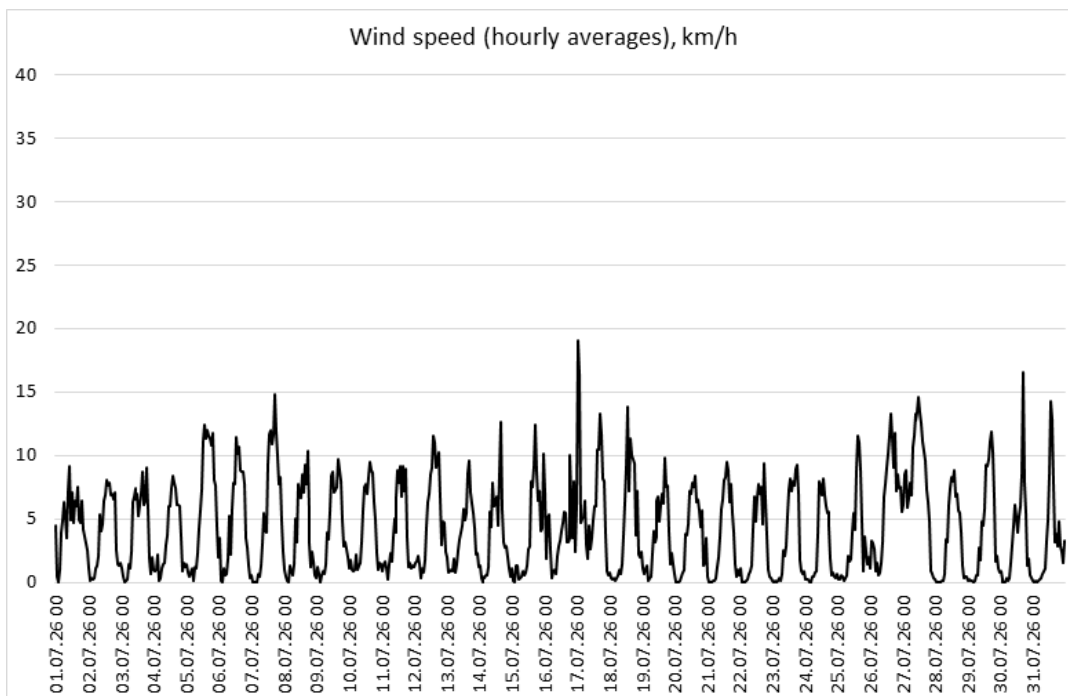
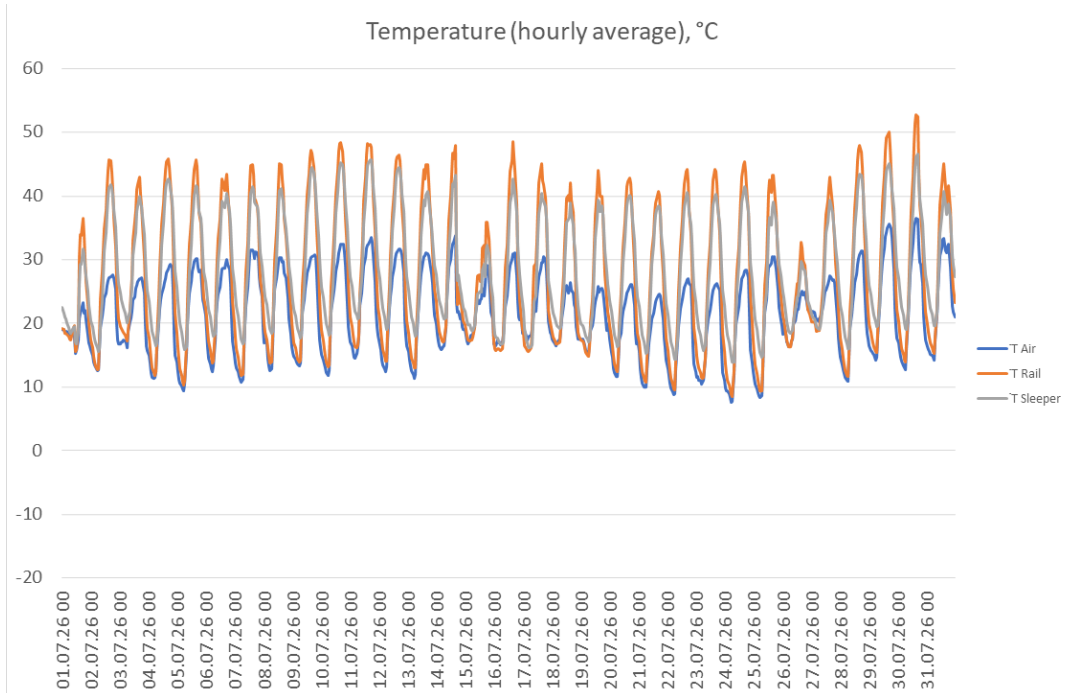
date	location	passenger train count	average speed	average length	average axlecount	average LAeqTp	average soundlevel
01.07.2026	REF	115	112,6	169,3	24,9	80,3	59,2
02.07.2026	REF	114	112,4	166,0	24,4	80,4	59,3
03.07.2026	REF	112	113,7	171,2	25,1	81,1	59,7
04.07.2026	REF	117	112,5	152,4	22,3	80,5	59,1
05.07.2026	REF	126	112,6	144,4	21,2	81,4	60,0
06.07.2026	REF	106	112,7	169,7	24,9	80,3	58,9
07.07.2026	REF	104	114,4	172,5	25,3	81,3	59,7
08.07.2026	REF	107	114,8	174,8	25,7	81,2	59,8
09.07.2026	REF	110	113,4	170,0	25,0	81,6	60,2
10.07.2026	REF	112	112,1	171,5	25,1	81,0	59,8
11.07.2026	REF	115	113,2	139,9	20,6	81,0	59,0
12.07.2026	REF	113	112,9	146,4	21,6	81,6	59,7
13.07.2026	REF	117	111,3	163,5	23,9	80,8	59,8
14.07.2026	REF	101	109,5	169,0	24,6	81,2	59,8
15.07.2026	REF	111	112,6	165,5	24,4	81,0	59,7
16.07.2026	REF	103	109,8	156,6	22,8	80,9	59,2
17.07.2026	REF	115	113,0	173,5	25,4	80,3	59,3
18.07.2026	REF	120	113,0	138,5	20,4	80,3	58,5
19.07.2026	REF	117	113,6	143,9	21,2	80,8	59,1
20.07.2026	REF	114	112,5	171,6	25,0	80,7	59,7
21.07.2026	REF	115	113,2	162,4	23,8	80,5	59,2
22.07.2026	REF	113	111,9	163,1	24,0	81,0	59,7
23.07.2026	REF	110	113,6	165,6	24,2	80,4	58,9
24.07.2026	REF	111	114,8	169,1	24,6	80,3	59,0
25.07.2026	REF	118	114,1	140,7	20,7	80,3	58,6
26.07.2026	REF	116	112,3	146,9	21,7	80,7	59,0
27.07.2026	REF	116	113,9	163,5	24,2	81,0	59,8
28.07.2026	REF	113	115,8	166,7	24,2	80,7	59,3
29.07.2026	REF	115	114,4	165,7	24,1	80,7	59,4
30.07.2026	REF	114	114,5	164,7	24,0	80,6	59,3
31.07.2026	REF	114	113,7	172,3	25,2	80,3	59,2
month	REF	3504	113,1	161,3	23,6	80,8	59,4

Daytime averages (24h) for all freight train passages at reference section (REF)



date	location	freight train count	average speed	average length	average axle count	average LAeq,Tp	average soundlevel
01.07.2026	REF	7	84,6	203,4	42,3	85,2	53,9
02.07.2026	REF	5	84,4	134,4	20,8	86,4	51,7
03.07.2026	REF	7	85,9	214,6	46,0	86,1	55,1
04.07.2026	REF	1	76,8	286,0	38,0	82,5	44,5
05.07.2026	REF						
06.07.2026	REF	7	86,3	195,8	39,0	83,9	52,2
07.07.2026	REF	4	77,4	150,6	22,0	83,4	48,9
08.07.2026	REF	6	97,7	244,0	48,4	86,4	54,5
09.07.2026	REF	4	98,5	164,4	26,5	86,6	51,2
10.07.2026	REF	10	98,8	183,4	35,0	85,9	54,8
11.07.2026	REF						
12.07.2026	REF						
13.07.2026	REF	7	91,9	211,5	40,3	84,7	53,2
14.07.2026	REF	3	90,3	172,8	25,3	84,8	48,7
15.07.2026	REF	10	84,7	210,4	46,6	83,8	54,5
16.07.2026	REF	5	84,9	134,3	20,0	85,9	51,3
17.07.2026	REF	6	98,5	191,2	36,0	87,7	54,5
18.07.2026	REF						
19.07.2026	REF	1	61,3	85,6	18,0	82,5	40,6
20.07.2026	REF	8	85,9	182,5	38,0	86,8	55,8
21.07.2026	REF	6	80,1	167,2	29,7	84,2	51,9
22.07.2026	REF	7	90,6	238,5	51,0	85,5	54,6
23.07.2026	REF	8	93,1	157,8	29,8	86,4	54,4
24.07.2026	REF	7	93,1	230,7	48,0	85,6	54,3
25.07.2026	REF						
26.07.2026	REF	1	80,8	183,8	48,0	84,5	44,4
27.07.2026	REF	8	85,7	192,0	37,8	84,1	53,0
28.07.2026	REF	6	97,5	191,8	40,4	86,0	52,8
29.07.2026	REF	6	89,4	183,3	37,0	84,1	51,6
30.07.2026	REF	7	83,6	186,7	33,4	83,7	51,9
31.07.2026	REF	4	94,9	125,6	19,5	85,8	49,2
month	REF	151	89,1	189,0	36,7	85,4	52,0

3. Weather data



Appendix: measurement quantities

Transit Exposure Level *TEL*

A-weighted sound pressure level of a single train pass-by as energetic average over the entire exposure duration T and averaged over the pass-by duration T_p .

$$TEL = 10 \log \left(\frac{1}{T_p} \int_0^T \frac{p_A^2(t)}{p_0^2} dt \right) \quad (1)$$

Where

$p_A(t)$ = the A-weighted sound pressure, [Pa]

$p_0 = 20 \mu\text{Pa}$ (reference pressure), [Pa]

$T_p = T_2 - T_1$ = pass-by duration of the train, time interval during which a train is within the measurement cross-section and which starts with the entry time T_1 into the measurement cross-section and ends with the exit time T_2 , [s]

T = time interval which starts when the smoothed sound pressure level (sound pressure level smoothed as a function of time with the frequency weighting A and a time weighting F („fast“) or averaging over a duration period of time, e.g. 100 ms) is for the last time 10 dB below that prevailing at the time of entering the measurement cross-section and which ends when the smoothed sound pressure level is for the first time 10 dB below the one at the time of leaving the measurement cross-section. [s]

A-weighted equivalent sound pressure level of the train pass-by $L_{Aeq,Tp}$

The A-weighted equivalent sound pressure level equals the (energetic) average of the sound pressure level over the train pass-by time T_p according to the following equation:

$$L_{Aeq,Tp} = 10 \log \left(\frac{1}{T_p} \int_{T_1}^{T_2} \frac{p_A^2(t)}{p_0^2} dt \right) \quad (2)$$

where

$p_A(t)$ = the A-weighted sound pressure, [Pa]

$p_0 = 20 \mu\text{Pa}$ (reference sound pressure), [Pa]

$T_p = T_2 - T_1$ = pass-by duration of the train, [s]

Sound Exposure Level *SEL*

The sound exposure level *SEL* references the acoustic energy of the entire pass-by event to one second. The *SEL* is used in calculating average sound level contributions from trains over longer periods of time (i.e. days/months/year). The *SEL* is related to the transit exposure level *TEL* through:

$$SEL = TEL - 10 \log (T_0 / T_p) \quad (3)$$

where

$$T_0 = 1 \text{ [s]}$$

T_p = pass-by duration of the train, [s]

Average sound level (period)

Average (energetic) A-weighted sound pressure level measured over a given period of time.

For the average sound level contributions from train pass-byes this equals the sum (energetic) of all sound exposure levels during the period for a given measurement position:

$$average \ soundlevel = 10 \cdot \log_{10} \left(\sum 10^{\frac{SEL}{10}} \right) - A1 \quad (4)$$

where

$A1 = 10 \cdot \log_{10}(n \cdot 24 \cdot 3600)$ for a 24-hour period

SEL (see equation 3) taken from measurement data

n = number of days being averaged over

Average $L_{Aeq,Tp}$

Average (energetic) sound level of all the A-weighted sound pressure levels from the individual equivalent sound level of all train pass-byes in a given period of time (day/month/year).

Calculated per train category and per period day/night, month, year, etc. and per measurement location:

$$average \ L_{Aeq,Tp} = 10 \cdot \log_{10} \left(\sum T_p \cdot 10^{\frac{L_{Aeq,Tp}}{10}} \right) + 10 \cdot \log_{10} \left(\frac{1}{\sum T_p} \right) \quad (5)$$

where

T_p = pass-by duration of the train [s]

$L_{Aeq,Tp}$ (see equation 2) is calculated directly from the measurement data