LÄRM FORSCHUNG EISEN BAHN
FAHRBAHNLABOR

MÜLLER-BBM
RAIL TECHNOLOGIES

Monthly report

Railway Field Laboratory

March 2026

Güterverkehr auf der Schiene.
Mit Forschung und Investitionshilfe des Bundes.

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:	8.4.2026

1. Status railway field laboratory

Construction work on the tracks:

- none

Downtimes of the measurement systems:

- none

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)

Maintenance and sensor exchange:

- none

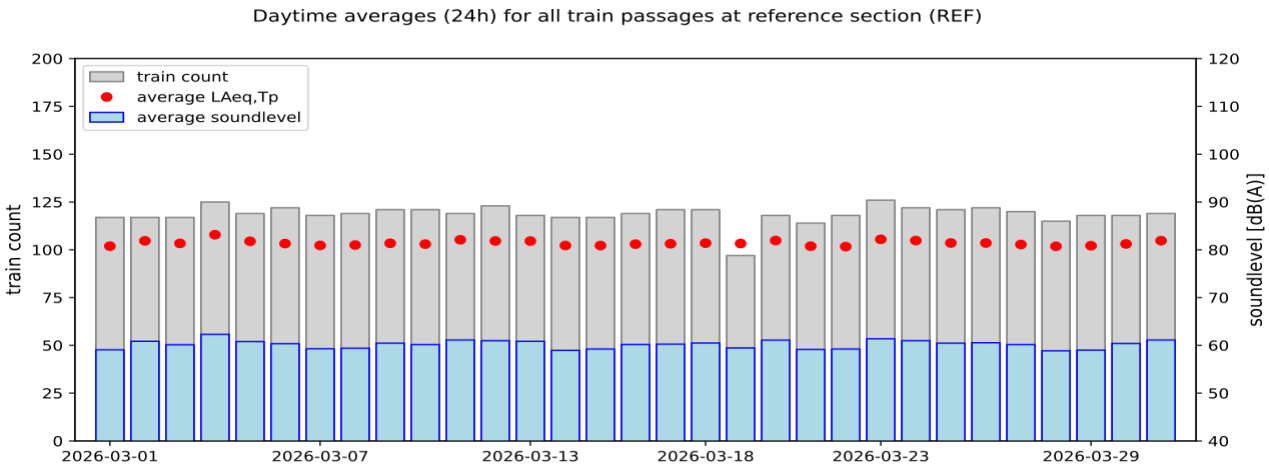
Modifications to the data, database, or analysis:

- none

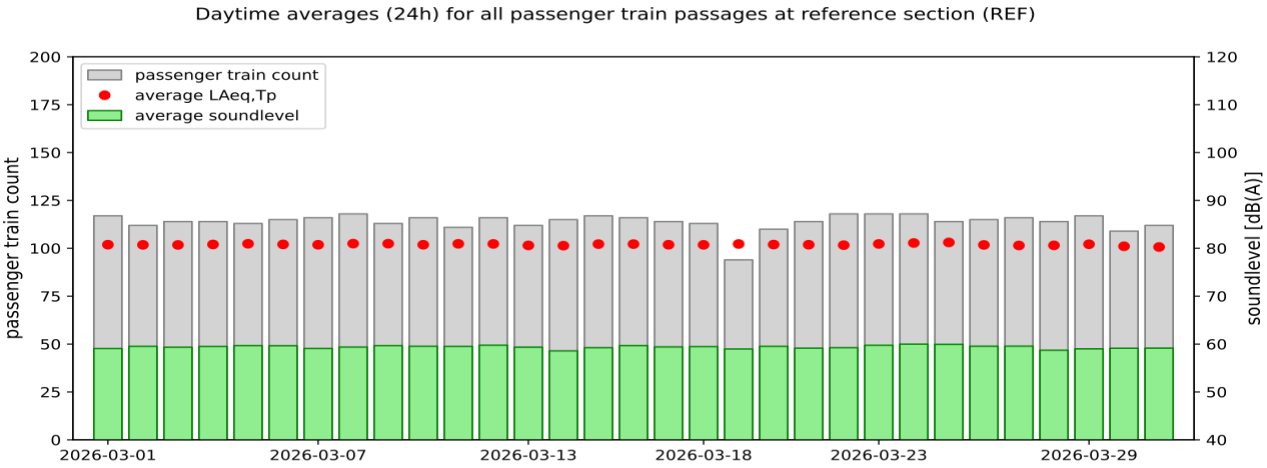
Monthly data volume collected:

- 608 GB

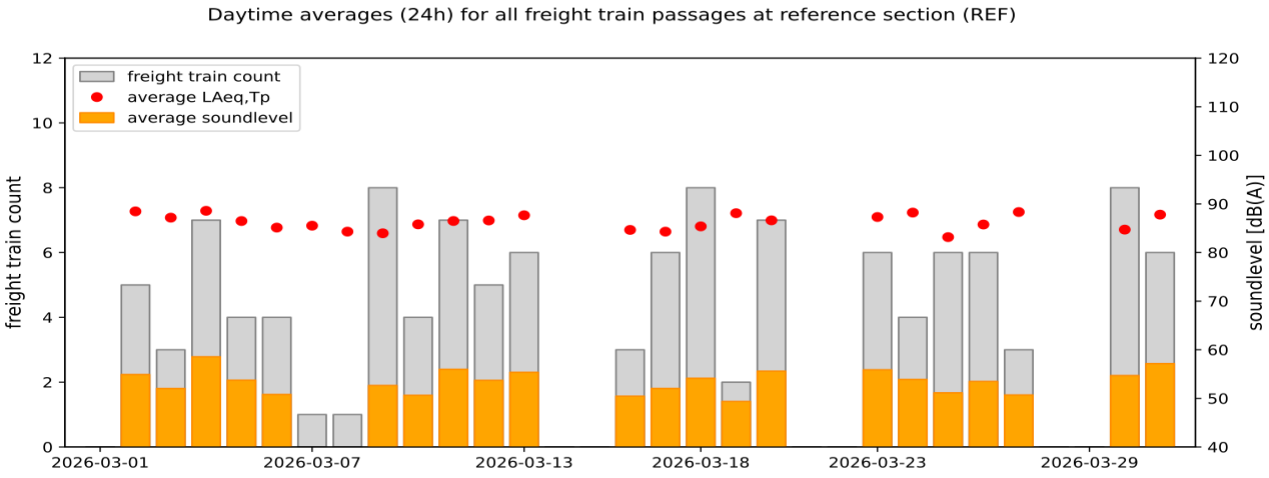
2. Measurement data



date	location	train count	passenger train count	freight train count	service train count	average LAeqTp	average soundlevel
01.03.2026	REF	117	117	0	0	80,8	59,1
02.03.2026	REF	117	112	5	0	81,9	60,9
03.03.2026	REF	117	114	3	0	81,3	60,1
04.03.2026	REF	125	114	7	4	83,2	62,3
05.03.2026	REF	119	113	4	2	81,8	60,8
06.03.2026	REF	122	115	4	3	81,3	60,4
07.03.2026	REF	118	116	1	1	80,9	59,3
08.03.2026	REF	119	118	1	0	81,0	59,4
09.03.2026	REF	121	113	8	0	81,4	60,5
10.03.2026	REF	121	116	4	1	81,2	60,2
11.03.2026	REF	119	111	7	1	82,1	61,1
12.03.2026	REF	123	116	5	2	81,9	61,0
13.03.2026	REF	118	112	6	0	81,8	60,8
14.03.2026	REF	117	115	0	2	80,9	58,9
15.03.2026	REF	117	117	0	0	80,9	59,2
16.03.2026	REF	119	116	3	0	81,2	60,2
17.03.2026	REF	121	114	6	1	81,3	60,3
18.03.2026	REF	121	113	8	0	81,4	60,5
19.03.2026	REF	97	94	2	1	81,3	59,5
20.03.2026	REF	118	110	7	1	81,9	61,1
21.03.2026	REF	114	114	0	0	80,8	59,2
22.03.2026	REF	118	118	0	0	80,7	59,2
23.03.2026	REF	126	118	6	2	82,2	61,4
24.03.2026	REF	122	118	4	0	81,9	61,0
25.03.2026	REF	121	114	6	1	81,4	60,5
26.03.2026	REF	122	115	6	1	81,4	60,6
27.03.2026	REF	120	116	3	1	81,1	60,2
28.03.2026	REF	115	114	0	1	80,7	58,9
29.03.2026	REF	118	117	0	1	80,9	59,0
30.03.2026	REF	118	109	8	1	81,2	60,4
31.03.2026	REF	119	112	6	1	81,9	61,1
month	**REF**	**3679**	**3531**	**120**	**28**	**81,5**	**60,3**

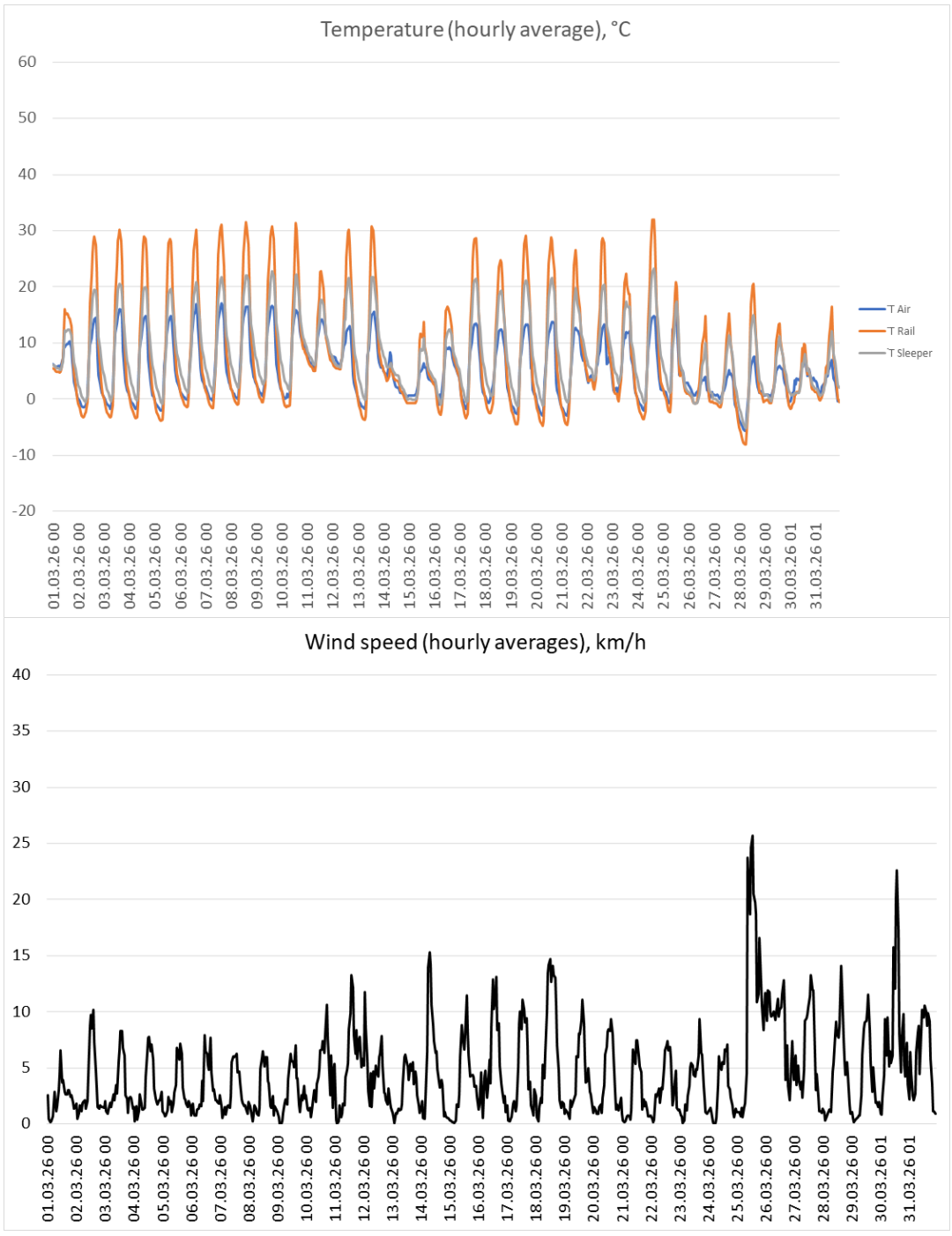


date	Location	passenger train count	average speed	average length	average axlecount	average LAeqTp	average soundlevel
01.03.2026	REF	117	112,1	140,5	20,7	80,8	59,1
02.03.2026	REF	112	112,8	168,4	24,7	80,7	59,5
03.03.2026	REF	114	113,9	164,0	24,1	80,7	59,4
04.03.2026	REF	114	113,5	165,0	24,3	80,8	59,5
05.03.2026	REF	113	113,0	165,3	24,3	81,0	59,7
06.03.2026	REF	115	113,8	169,2	24,8	80,8	59,7
07.03.2026	REF	116	111,6	141,1	20,7	80,7	59,1
08.03.2026	REF	118	111,1	141,2	20,9	81,0	59,4
09.03.2026	REF	113	112,2	164,9	24,2	81,0	59,7
10.03.2026	REF	116	112,7	164,3	24,1	80,8	59,6
11.03.2026	REF	111	113,5	167,1	24,6	80,9	59,5
12.03.2026	REF	116	112,2	164,5	24,2	80,9	59,8
13.03.2026	REF	112	113,1	167,6	24,6	80,6	59,4
14.03.2026	REF	115	114,6	139,5	20,6	80,6	58,6
15.03.2026	REF	117	110,8	140,9	20,9	80,9	59,2
16.03.2026	REF	116	109,9	161,5	23,7	80,9	59,7
17.03.2026	REF	114	112,4	163,9	24,1	80,8	59,4
18.03.2026	REF	113	112,0	162,7	23,9	80,7	59,5
19.03.2026	REF	94	111,5	171,4	25,3	80,9	59,0
20.03.2026	REF	110	114,1	175,2	25,8	80,8	59,5
21.03.2026	REF	114	112,6	150,6	22,4	80,8	59,2
22.03.2026	REF	118	111,3	151,0	22,5	80,7	59,2
23.03.2026	REF	118	112,6	163,9	24,1	80,9	59,8
24.03.2026	REF	118	112,6	164,5	24,2	81,1	60,0
25.03.2026	REF	114	113,4	164,0	24,1	81,2	60,0
26.03.2026	REF	115	112,4	165,3	24,4	80,7	59,6
27.03.2026	REF	116	111,5	170,4	25,1	80,6	59,6
28.03.2026	REF	114	112,6	140,3	20,7	80,6	58,7
29.03.2026	REF	117	113,7	139,3	20,7	80,9	59,0
30.03.2026	REF	109	112,4	169,3	24,8	80,4	59,1
31.03.2026	REF	112	111,2	170,2	25,0	80,3	59,2
month	**REF**	**3531**	**112,5**	**159,3**	**23,5**	**80,8**	**59,4**



date	location	freight train count	average speed	average length	average axle count	average LAeqTp	average soundlevel
01.03.2026	REF						
02.03.2026	REF	5	91,7	185,2	37,2	88,5	54,9
03.03.2026	REF	3	86,9	214,2	44,0	87,2	52,0
04.03.2026	REF	7	89,6	294,8	63,1	88,6	58,6
05.03.2026	REF	4	88,1	267,7	58,5	86,5	53,7
06.03.2026	REF	4	84,3	189,7	37,5	85,1	50,8
07.03.2026	REF	1	99,5	63,5	12,0	85,5	39,8
08.03.2026	REF	1	94,9	63,6	12,0	84,3	38,7
09.03.2026	REF	8	72,3	145,9	28,8	84,0	52,7
10.03.2026	REF	4	86,8	160,8	32,5	85,8	50,6
11.03.2026	REF	7	86,7	257,8	55,7	86,5	56,0
12.03.2026	REF	5	93,3	225,4	47,2	86,6	53,7
13.03.2026	REF	6	89,5	213,3	43,7	87,7	55,4
14.03.2026	REF						
15.03.2026	REF						
16.03.2026	REF	3	89,7	248,1	52,0	84,7	50,5
17.03.2026	REF	6	79,8	166,3	32,0	84,3	52,0
18.03.2026	REF	8	86,5	188,6	38,9	85,4	54,1
19.03.2026	REF	2	82,5	125,3	18,0	88,1	49,4
20.03.2026	REF	7	85,6	218,3	45,3	86,6	55,6
21.03.2026	REF						
22.03.2026	REF						
23.03.2026	REF	6	90,6	250,0	57,3	87,3	55,9
24.03.2026	REF	4	88,4	193,4	37,5	88,2	53,9
25.03.2026	REF	6	85,3	207,9	46,0	83,2	51,1
26.03.2026	REF	6	77,8	180,4	39,7	85,8	53,5
27.03.2026	REF	3	96,4	129,6	21,7	88,3	50,7
28.03.2026	REF						
29.03.2026	REF						
30.03.2026	REF	8	84,5	231,0	51,1	84,7	54,7
31.03.2026	REF	6	95,9	314,6	72,0	87,8	57,2
month	**REF**	**120**	**86,5**	**210,6**	**44,3**	**86,6**	**52,7**

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 µPa (reference pressure), [Pa]

$Tp = T_2 - T_1$ = 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 µPa (reference sound pressure), [Pa]

$Tp = T_2 - T_1$ = 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:

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

where

T_0 = 1 [s]

Tp = 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:

$$average\ soundlevel = 10 \cdot log10 \left(\sum 10^{\frac{SEL}{10}} \right) - A1 \quad (4)$$

where

A1 = $10 \cdot log10(n \cdot 24 \cdot 3600)$ 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:

$$average\ L_{Aeq,Tp} = 10 \cdot log10 \left(\sum T_p \cdot 10^{\frac{L_{Aeq,Tp}}{10}} \right) + 10 \cdot log10 \left(\frac{1}{\sum T_p} \right) \quad (5)$$

where

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

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