PanDeNoise: Traffic Noise During the First Lock-Down

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Introduction

The aim of the PanDeNoise project is to quantify effects of the COVID-19 lockdown on the noise level. Unfortunately, there were hardly any noise measurements during the lockdown, so the analysis is based on permanent measuring points to record noise and traffic. The measuring points at Vienna Airport and Innsbruck Airport are evaluated. Additionally, traffic counts at five measuring points in Graz are investigated.

Traffic counting in Graz

Data from five permanent measurement points in Graz is available. These measurement points record traffic counts but not the noise levels. Therefore, the noise reduction during the first lockdown is estimated assuming a constant mixture of automotive vehicles and the same speed of the vehicles before and during the lockdown. The five measurement points are located at Keplerbrücke (Fig. 1), Bertha-v.-Suttner Brücke (Fig. 2), Rösselmühlgasse (Fig. 3), Don Bosco (Fig. 4) and Glacis (Fig. 5). We compare the data for the calendar weeks CW04 (black) before the lockdown, CW11 (blue) at the begin of the lockdown and CW12 (green) during the lockdown.

A comparison of data from CW04 and CW12 is illustrated in the following table. There, the energy equivalent noise level averaged over the whole week is used as a basis. The results are presented in Table 1. The amount of traffic is reduced to 40% up to 50%. Assuming that the composition of the traffic and the speed of the vehicles are unchanged results in a reduction of the noise level between 3 and 4 dB.

Table 1: Traffic counting in Graz before and during the lockdown

Measurement Point	Traffic count CW12/CW04	Reduction in noise level dB
Keplerbrücke	0,40	4,0
Bertha-v.-Suttner Brücke	0,44	3,6
Rösselmühl-gasse	0,49	3,1
Don Bosco	0,47	3,3
Glacis	0,41	3,9

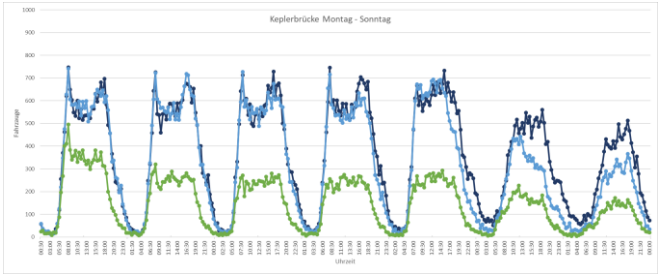

Figure 1: Traffic counting Keplerbrücke

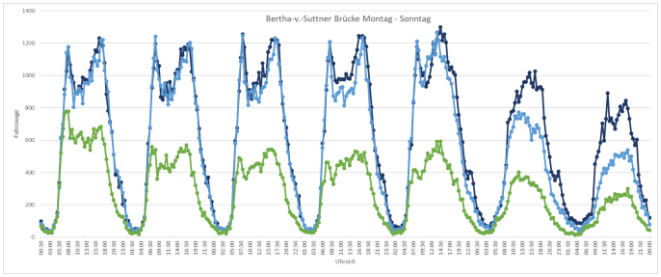

Figure 2: Traffic counting Berta-v.-Suttner Brücke

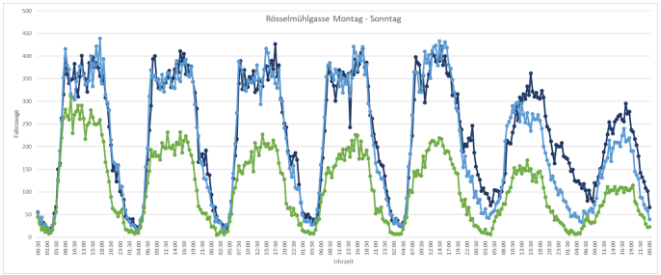

Figure 3: Traffic counting Rösselmühlgasse

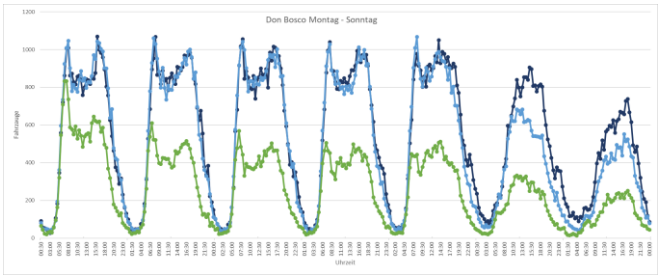

Figure 4: Traffic counting Don Bosco

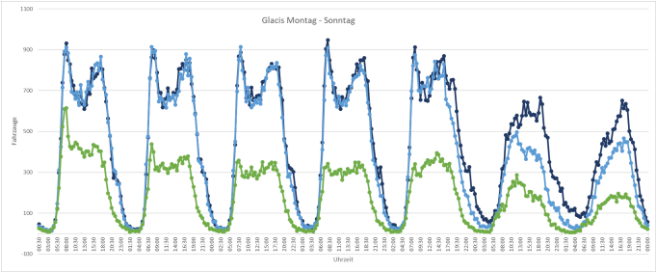

Figure 5: Traffic counting Glacis

Permanent measurement points at Innsbruck Airport

Three measurement points for aircraft noise exist in Innsbruck. They are located at Ursulinen, Völs and Allerheiligen. Compared are the monthly averages from January and April to obtain a representative number of flights for a statistical evaluation. It should be noted, however, that Innsbruck Airport is heavily dependent on winter tourism. Therefore, even under normal conditions, there is less air traffic in April than in January. Flights during the night are rare. Therefore, mainly the day averages of aircraft noise during the day L_D are taken into consideration. The ambient noise is almost the same in January and April. But the aircraft noise is reduced by 15,1 to 16,5 dB. The data is taken from website [1] and collected into Table 2.

Glossary

The equivalent continuous sound pressure level L_{eq} is a single value, that is energetically equivalent to the energy of an arbitrary noise event. Daytime is the time from 06:00 am to 07:00 pm. Evening time is the time from 07:00 pm to 10:00 pm. Night time is the time from 10:00 pm to 06:00 am. Daytime noise index L_D is the A-weighted equivalent continuous sound pressure level for the daytime. The Evening time noise index L_E is the A-weighted equivalent continuous sound pressure level for the evening time. The Night time noise index L_N is the A-weighted equivalent continuous sound pressure level for the night time. The day-evening-night noise index L_{DEN} is the A-weighted equivalent continuous sound pressure level for the whole day (24 hours) with additions for the evening time of +5dB and the night time of +10dB. The rating level for aircraft noise L_{DN} is the A-weighted equivalent continuous sound pressure level for the total operation time of the airport from 06:00am to 11:00 pm, in which noise events from 10:00 pm to 11:00 pm are increased by +10 dB.

Permanent measurement points for the detection of aircraft noise in the vicinity of Vienna International Airport

The data is taken from website [2] and reproduced in Tables 3 and 4. Comparing the sound pressure levels from January and April yields a reduction up to 16 dB. It has to be mentioned that the large number of flight trajectories at the airport leads to a wide spread of the noise levels. The measurement points with the smallest absolute levels have also the smallest improvements. One exception is the measurement point Kleinneusiedl. The values for the night time in Table 4 have larger spread and are not taken into account for the evaluation of the effect of the lockdown.

Acknowledgement

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References

[1] https://www.tirol.gv.at/arbeit-wirtschaft/esa/laerm/fluglaerm/

[2] http://www.flugspuren.at

Table 2: Comparison of averaged values over one month for January and April 2020 at the Innsbruck Airport

Place Time	L_{DN} Flight	L_{DN} Surr.	L_D Flight	L_D Surr.	L_E Flight	L_E Surr.	L_N Flight	L_N Surr.	L_{DEN} Flight	L_{DEN} Surr.
Ursulinen January	62,7	52,6	63,2	53,3	60,6	49,6	50,9	44,9	63,0	54,0
April	45,9	58,9	46,7	53,1	42,7	45,8	34,1	44,3	46,1	53,3
Difference	**16,8**	**-6,3**	**16,5**	**0,2**	**17,9**	**3,8**	**16,8**	**0,6**	**16,9**	**0,7**
Völs January	57,9	64,6	58,9	65,8	51,5	49,9	24,0	45,2	56,8	63,4
April	42,5	65,9	43,2	65,8	27,5	48,5	35,0	46,0	43,5	63,4
Difference	**15,4**	**-1,3**	**15,7**	**0,0**	**24,0**	**1,4**	**-11,0**	**-0,8**	**13,3**	**0,0**
Allerheiligen January	57,7	52,1	58,5	52,8	54,5	48,4	37,6	43,9	57,1	53,3
April	42,7	51,4	43,4	52,1	35,1	48,2	33,0	47,1	43,0	54,6
Difference	**15,0**	**0.7**	**15,1**	**0,7**	**19,4**	**0,2**	**4,6**	**-3.2**	**14,1**	**-1,3**

Table 3: Equivalent Noise Level in the year 2020 – Day values Vienna International Airport

Place	Jan	Feb	March	April	May	Average	**Diff Jan-April**
Wien-Donaustadt	48,4	48,9	46,8	39,9	38,8	46,2	**8,5**
Groß-Enzersdorf	53,7	53,7	51,6	43,7	41,9	51,1	**10,0**
Fischamend	32,4	37,4	34,6	33,5	32,5	34,5	**-1,1**
Kleinneusiedl	49,2	55,3	52,3	49,5	51,6	52,1	**-0,3**
Enzersdorf/ Fischamend	52,9	57,1	53,8	42,6	43,7	52,9	**10,3**
Schwadorf	52,6	56,6	53,6	42,6	43,0	52,5	**10,0**
Margarethen/ Moos	59,8	62,9	59,0	44,8	48,1	58,7	**15,0**
Rauchenwarth	26,8	33,0	25,8	21,4	24,9	28,1	**5,4**
Zwölfaxing	54,1	54,8	51,9	42,6	44,9	51,8	**11,5**
Schwechat	53,5	54,8	52,4	38,3	34,5	51,5	**15,2**
Wien-Simmering	50,2	52,1	49,6	34,5	31,8	48,6	**15,7**
Himberg	43,4	44,0	40,2	29,8	31,7	40,7	**13,6**
Karlsdorf	41,2	46,7	43,6	37,1	38,0	42,7	**4,1**
Wien-Liesing	38,5	40,2	38,0	24,4	27,5	36,9	**14,1**
Maria Lanzendorf	46,7	47,2	44,1	34,8	37,5	44,2	**11,9**

Table 4: Equivalent Noise Level in the year 2020 – Night values Vienna International Airport

Place	Jan	Feb	March	April	May	Average	**Diff Jan-April**
Wien-Donaustadt	44,5	45,0	42,4	32,9	23,5	42,0	**11,6**
Groß-Enzersdorf	48,5	48,6	46,2	36,9	28,8	45,8	**11,6**
Fischamend	34,6	37,0	37,2	31,0	27,3	34,7	**3,6**
Kleinneusiedl	54,0	56,1	53,4	46,8	48,4	52,9	**7,2**
Enzersdorf/ Fischamend	23,8	27,6	20,2	0,0	0,0	22,6	**23,8**
Schwadorf	23,9	0,0	0,0	0,0	19,7	18,5	**23,9**
Margarethen/ Moos	24,3	31,9	0,0	0,0	0,0	25,5	**24,3**
Rauchenwarth	31,0	33,6	29,9	22,1	22,2	29,8	**8,9**
Zwölfaxing	39,3	40,7	38,9	34,8	35,0	38,3	**4,5**
Schwechat	31,0	31,0	26,8	16,0	20,1	28,0	**15,0**
Wien-Simmering	0,0	0,0	0,0	0,0	0,0	0,0	**0,0**
Himberg	24,5	27,6	24,0	21,8	17,7	24,2	**2,7**
Karlsdorf	40,1	43,1	40,1	34,5	31,8	39,5	**5,6**
Wien-Liesing	0,0	0,0	0,0	14,9	0,0	9,2	**-14,9**
Maria Lanzendorf	0,0	0,0	14,4	26,8	0,0	20,1	**-26,8**