

F&E Dienstleistung – Programm VIF 2016

LAUB 

Lärmdämpfung an Verkehrs-
wegen durch **Bewuchsstreifen**



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MOTIVATION

Research Question

Do vegetation lines contribute to noise protection?

Why?

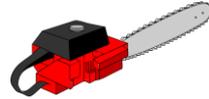
- After maintenance trim, residents often report a worsening of local noise situation
- Sound propagation calculation standards and directives (ÖAL Nr. 28 version 2001, RVS 04.02.11 version 2006 – both were valid at project start) take vegetation hardly into account



INVESTIGATION CONCEPT



Before



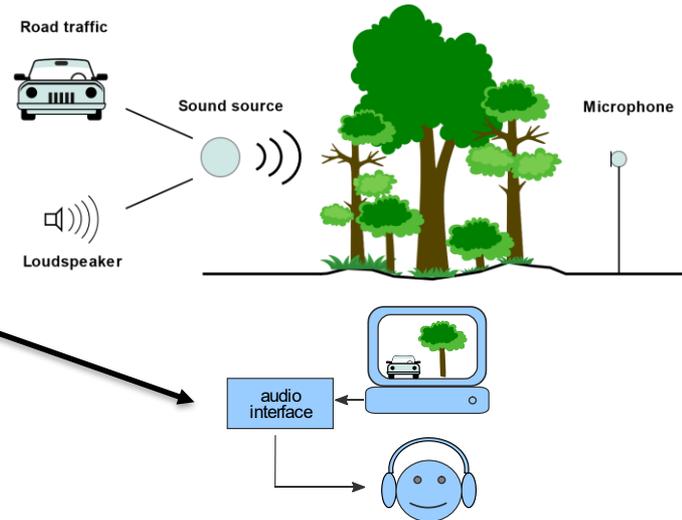
Maintenance trim



After

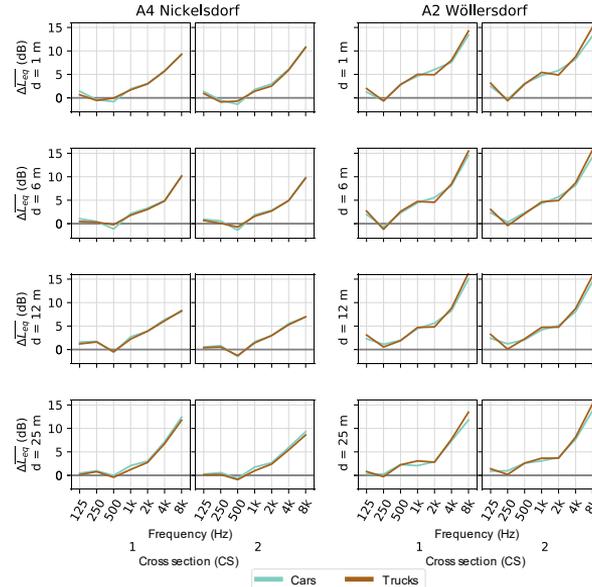
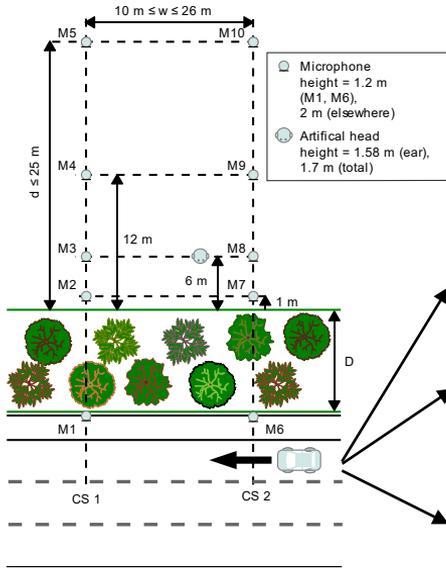
Acoustic investigations and experiments

1. ISO 11819-1 (a) and ÖNORM 1793-6 (b) based measurements with road traffic (a) and a loudspeaker with an MLS signal (b) as source
2. Audio-visual listening experiment to determine perceived noise annoyance difference
3. Sound propagation calculations with road traffic noise and an average representative vegetation line

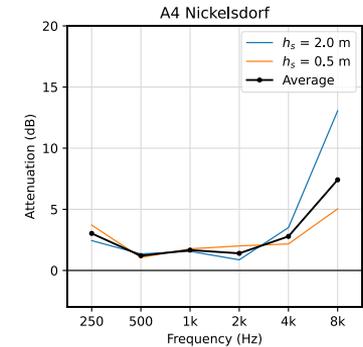


ACOUSTIC MEASUREMENTS

- In total 3 representative vegetation lines along major roads in Austria were selected
- Statistical and controlled vehicle pass-by (SPB and CPB) measurements based on ISO 11819-1 before and after maintenance trim
- Positive values indicate higher measurement results after the maintenance trim



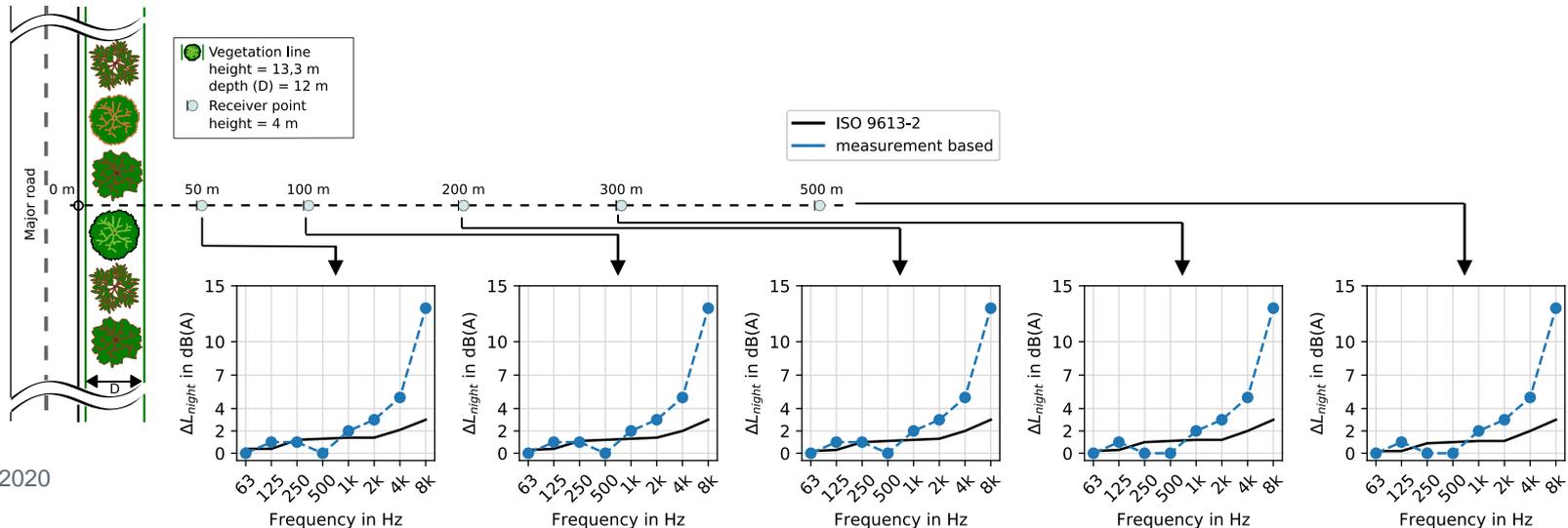
Results MLS loudspeaker measurements for different heights (h_s)



SOUND PROPAGATION CALCULATIONS

Concept

- Estimate vegetation attenuation in larger distances behind vegetation (distances ≤ 500 m)
- Average vegetation line representative along major roads in Austria
- Comparison between calculated L_{night} 's with vegetation attenuation from ISO 9613-2 and attenuation based on LAUB measurement results



CONCLUSIONS

- Investigated dense vegetation lines with foliage showed measurable sound attenuation, if main sound propagation path of road traffic noise runs through vegetation
 - attenuation of 1 – 2 dB(A) for propagation through 10 m of dense vegetation can be expected (→ no substitute for noise barriers!)
 - old Austrian directives do consider ÖAL 28:2001, RVS 04.02.11 2006 too conservatively
 - updated standards ÖAL 28:2019 and RVS 04.02.11 2019 with vegetation attenuation based on ISO 9613-2 show better agreement in terms of A-weighted attenuation. In frequency bands, ISO 9613-2 may underestimate attenuation for octave bands with $f_c \geq 1$ kHz. However, sound propagation calculation methods tend to take attenuation through vegetation into account more conservatively, since the predicted noise indices represent levels averaged over the entire year. This also may include time periods in which the vegetation is without foliage.
- Audio-visual experiment
 - Presence of sufficiently deep and dense vegetation line showed a statistically significant decrease of perceived noise annoyance

THANK YOU!



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