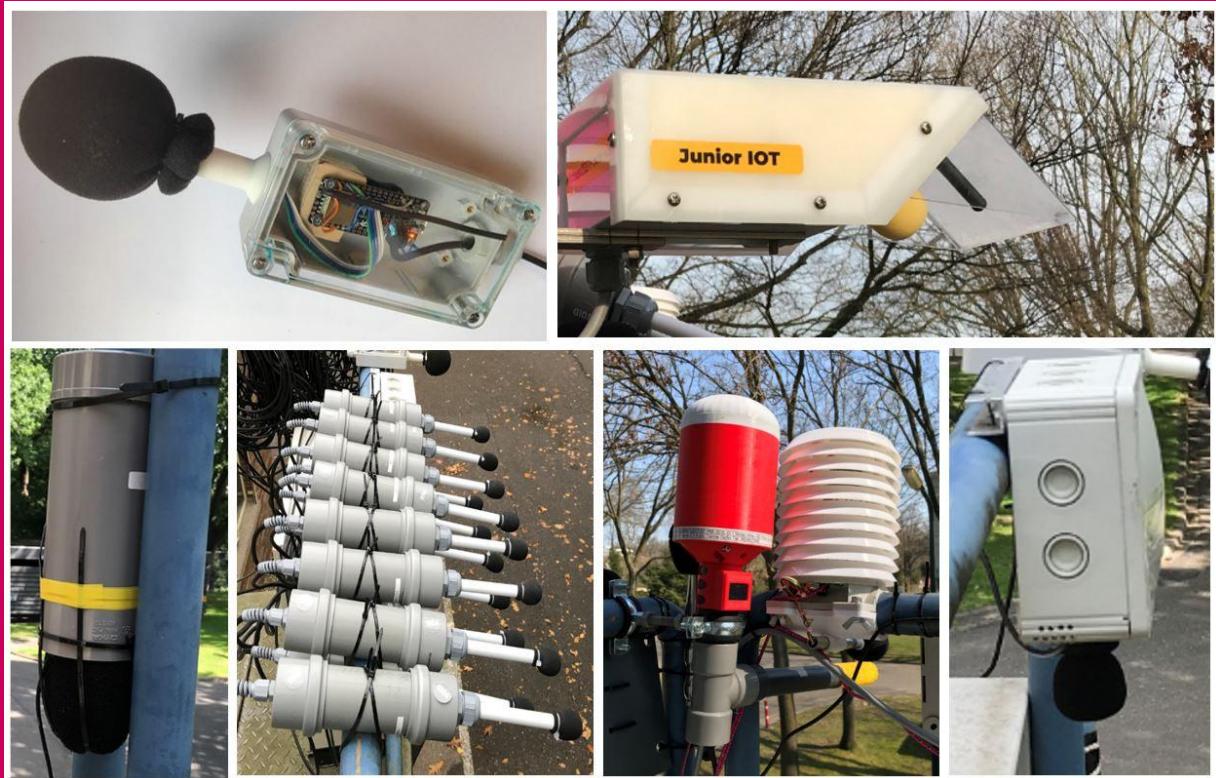




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Citizen science and noise

Nick Mabjaia, RIVM

nick.mabjaia@rivm.nl



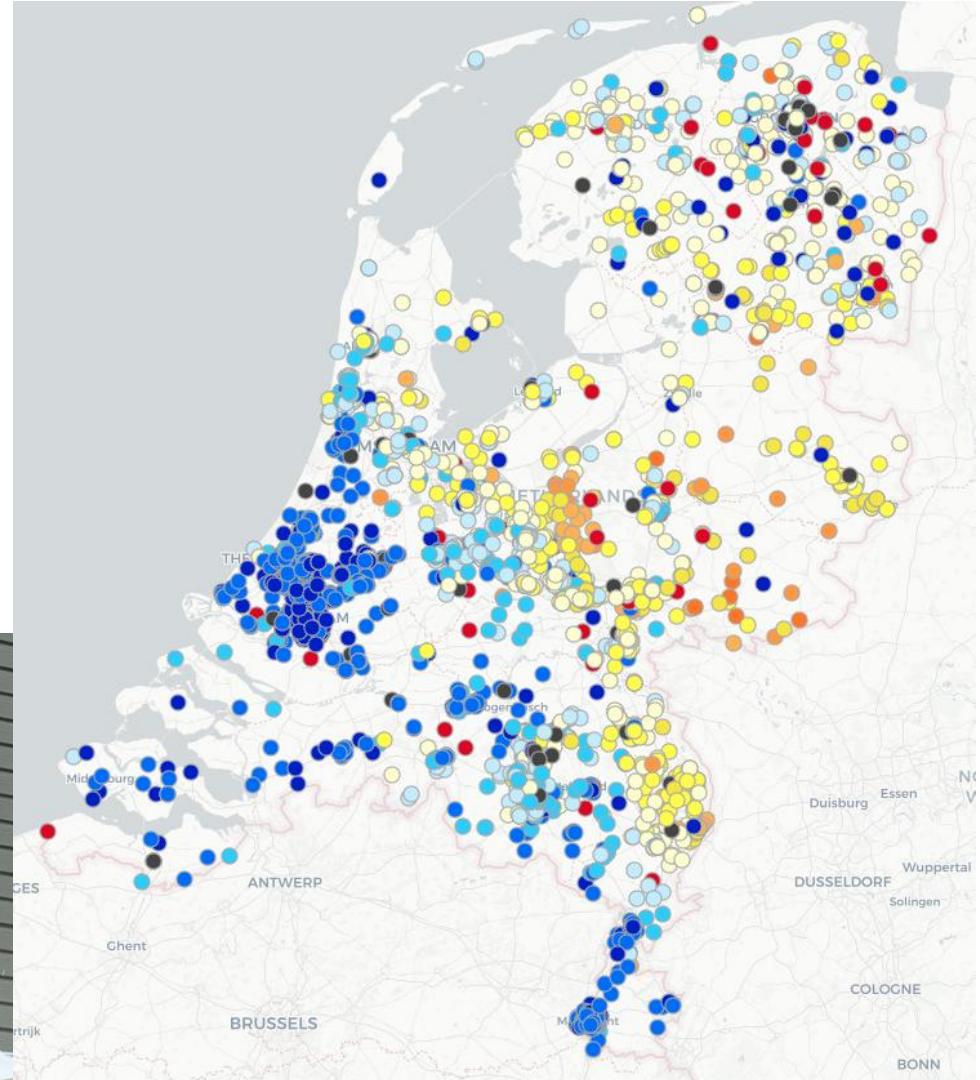
Citizen science and noise

- › Intro
- › Smartphones
- › DIY noise monitors
- › Example: Annoyance study
- › Outro



Intro

- Environmental monitoring
- Democratization of data





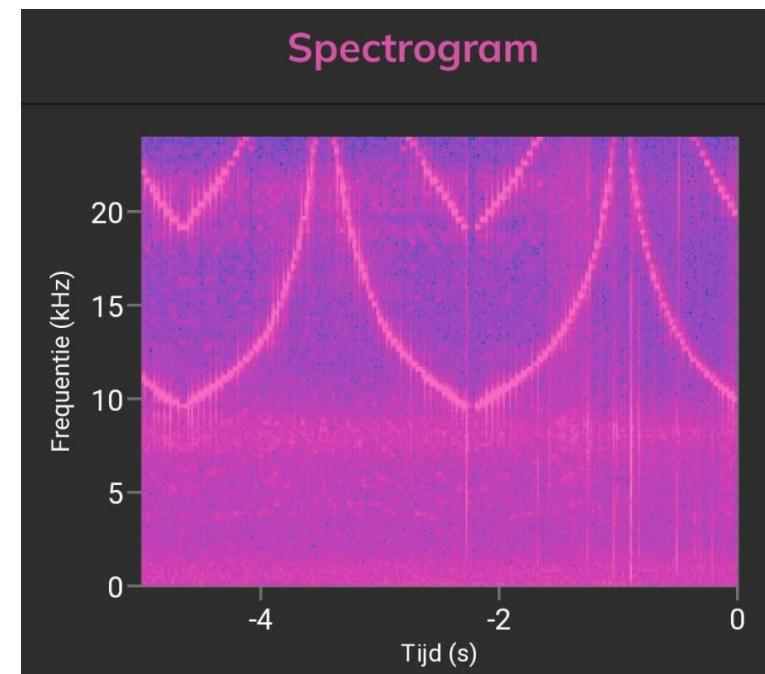
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Smartphones

- Frequencies ✓
- Noise levels ?
 - Calibration
 - Microphone/processing/app





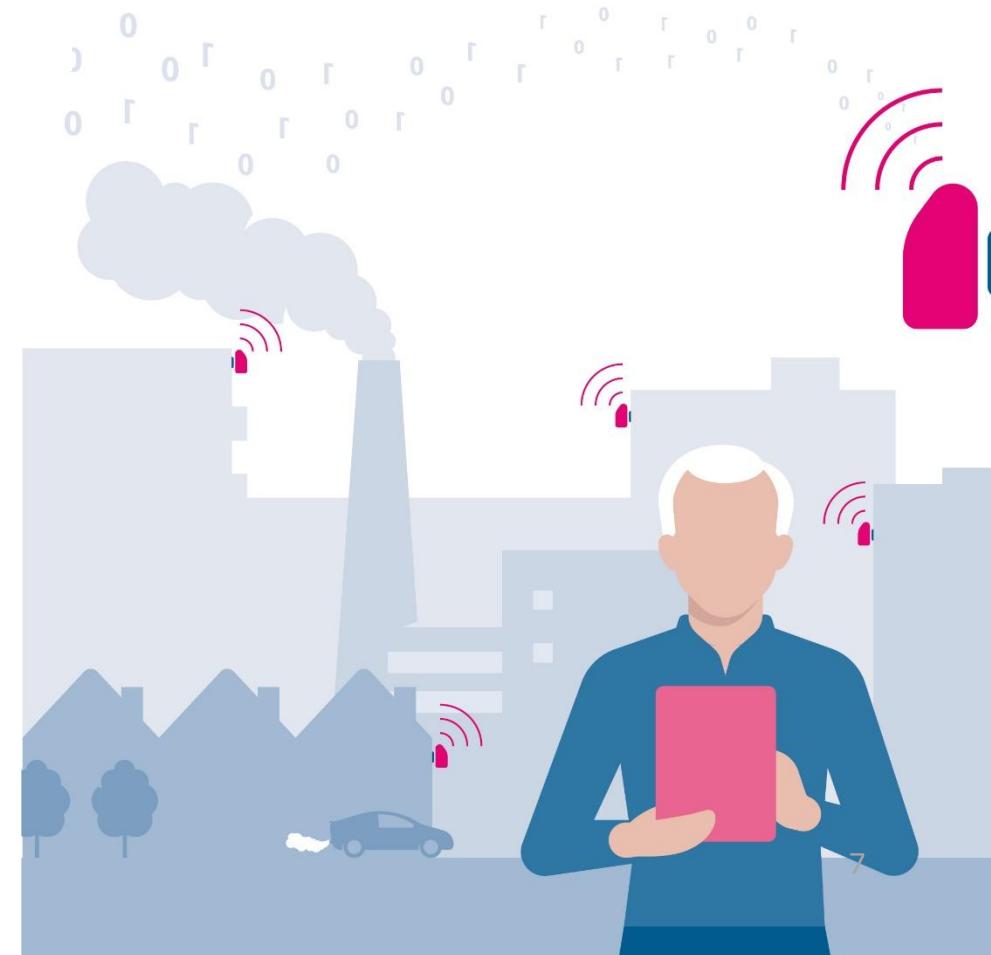
Citizen science and noise

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DIY noise monitors

- Low Cost
- Long term monitoring
- Outside





Sensors in our test

- > Stability ✓
- > User friendly ~
- > Accuracy ...

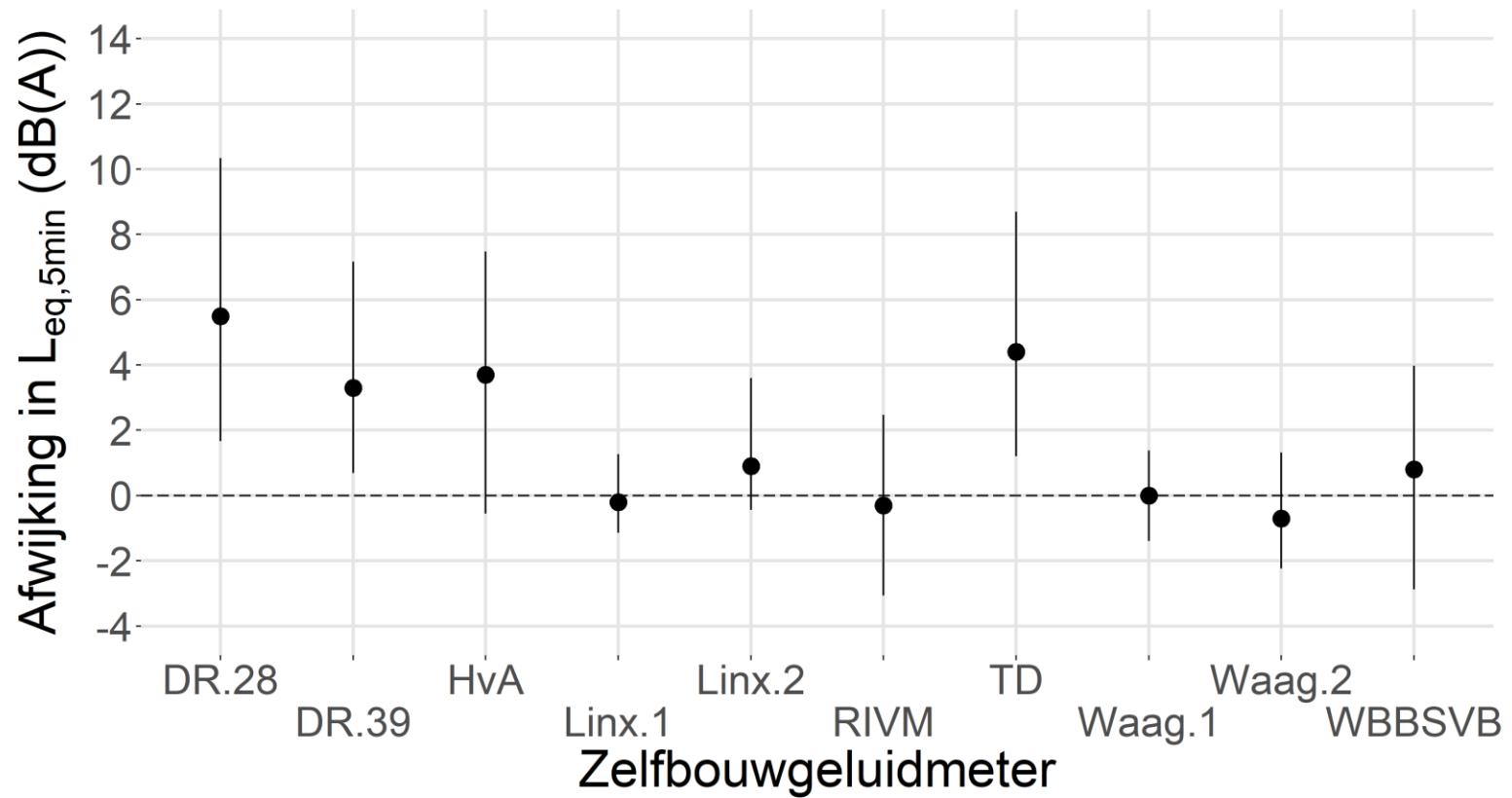
The collage includes:

- A close-up of a black microphone probe connected to a clear plastic enclosure containing electronic components.
- A white rectangular sensor unit mounted on a pole, labeled "Junior IOT".
- A vertical stack of several cylindrical sensors with black caps, mounted on a metal frame.
- A red cylindrical sensor with a white protective套筒, mounted on a pole.
- A close-up of a white rectangular sensor unit with two circular ports.
- A screenshot of the Sensor Community website showing a map of Europe with sensor locations marked by colored dots (yellow, blue, orange). A color scale bar on the left indicates noise levels from 0 dBA (blue) to 100 dBA (red). The interface includes tabs for "HOME", "GUIDES", "FORUM", "DONATE", and "GB".

SENSOR.COMMUNITY

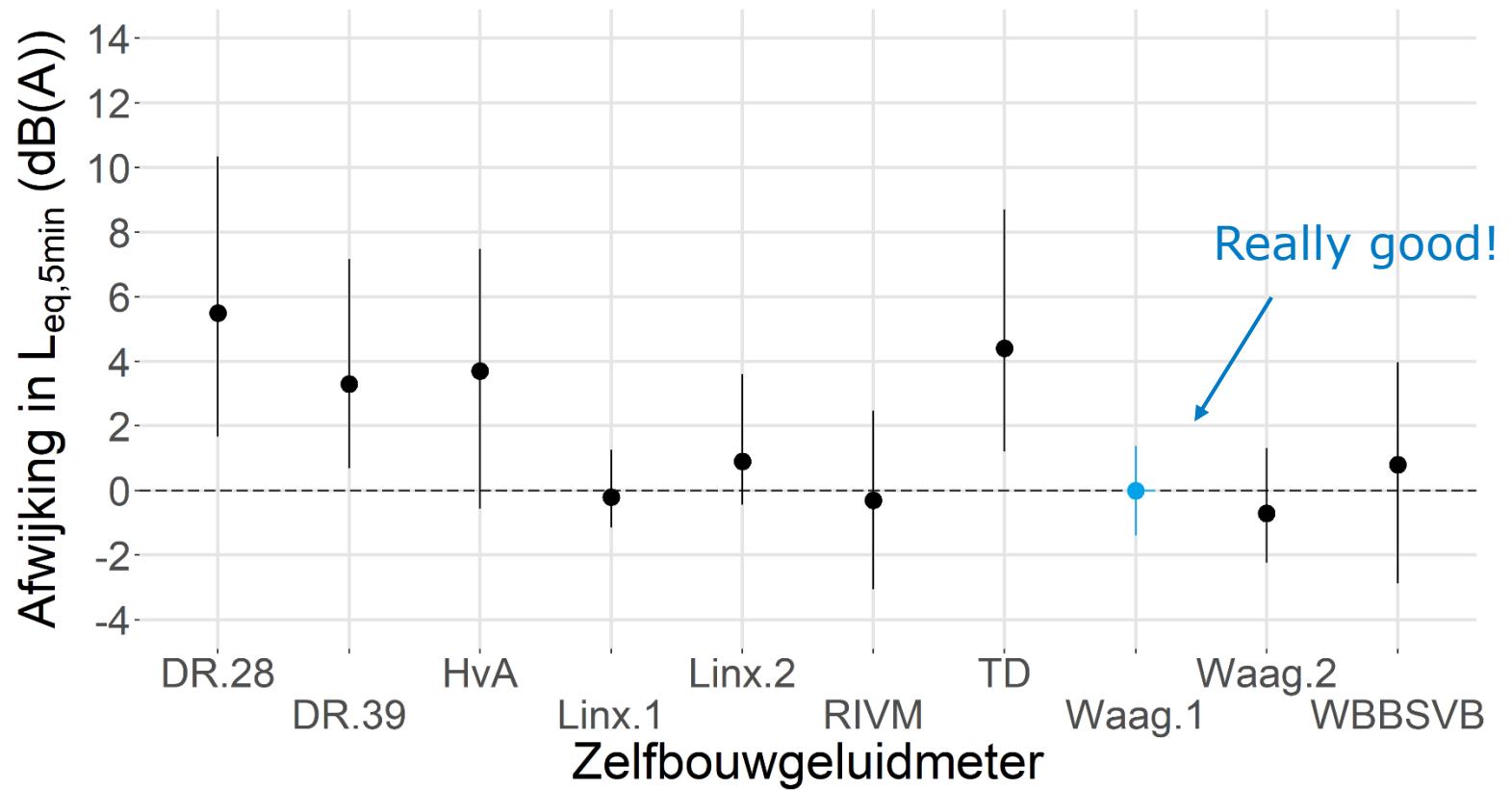


Accuracy



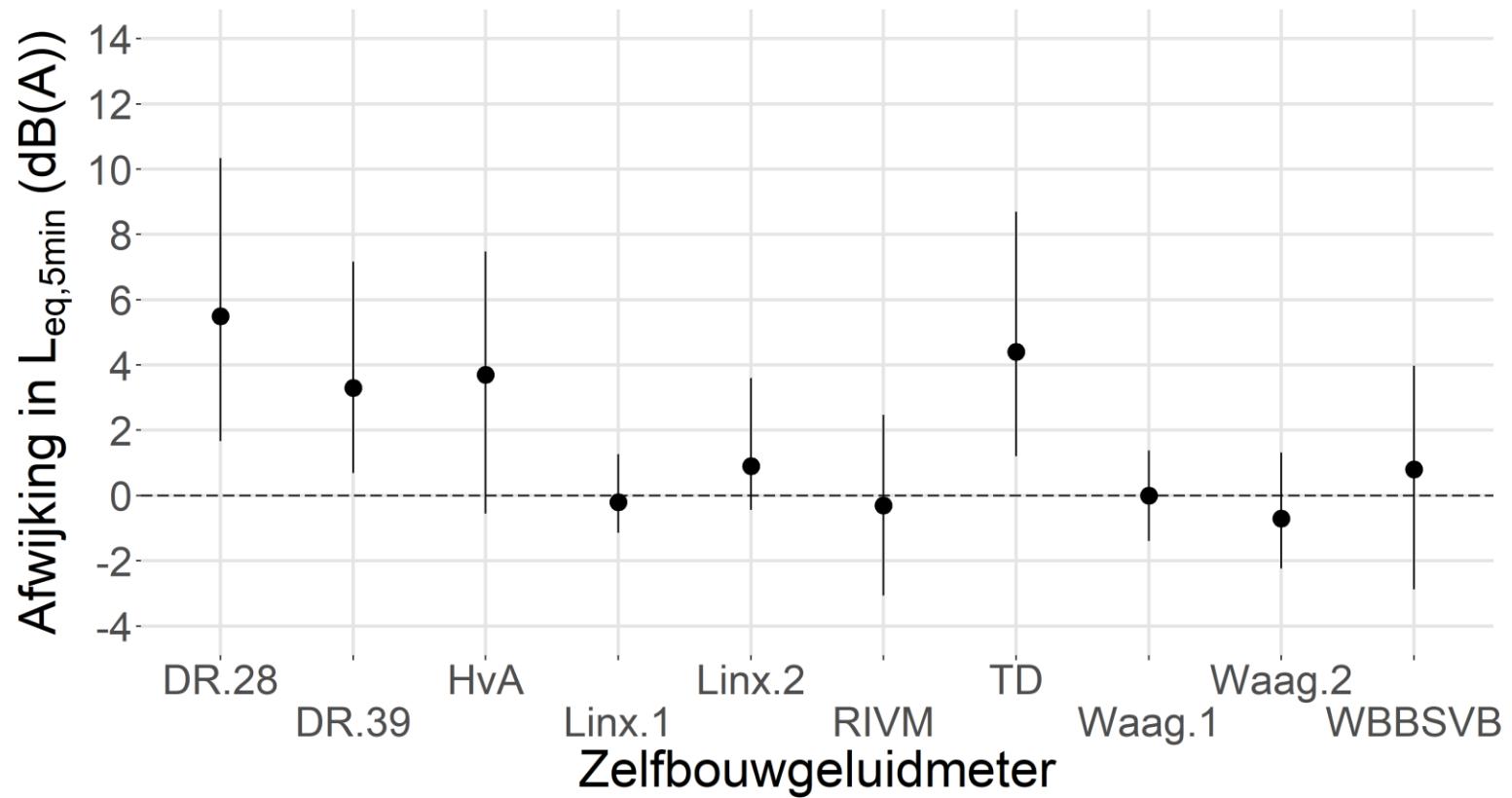


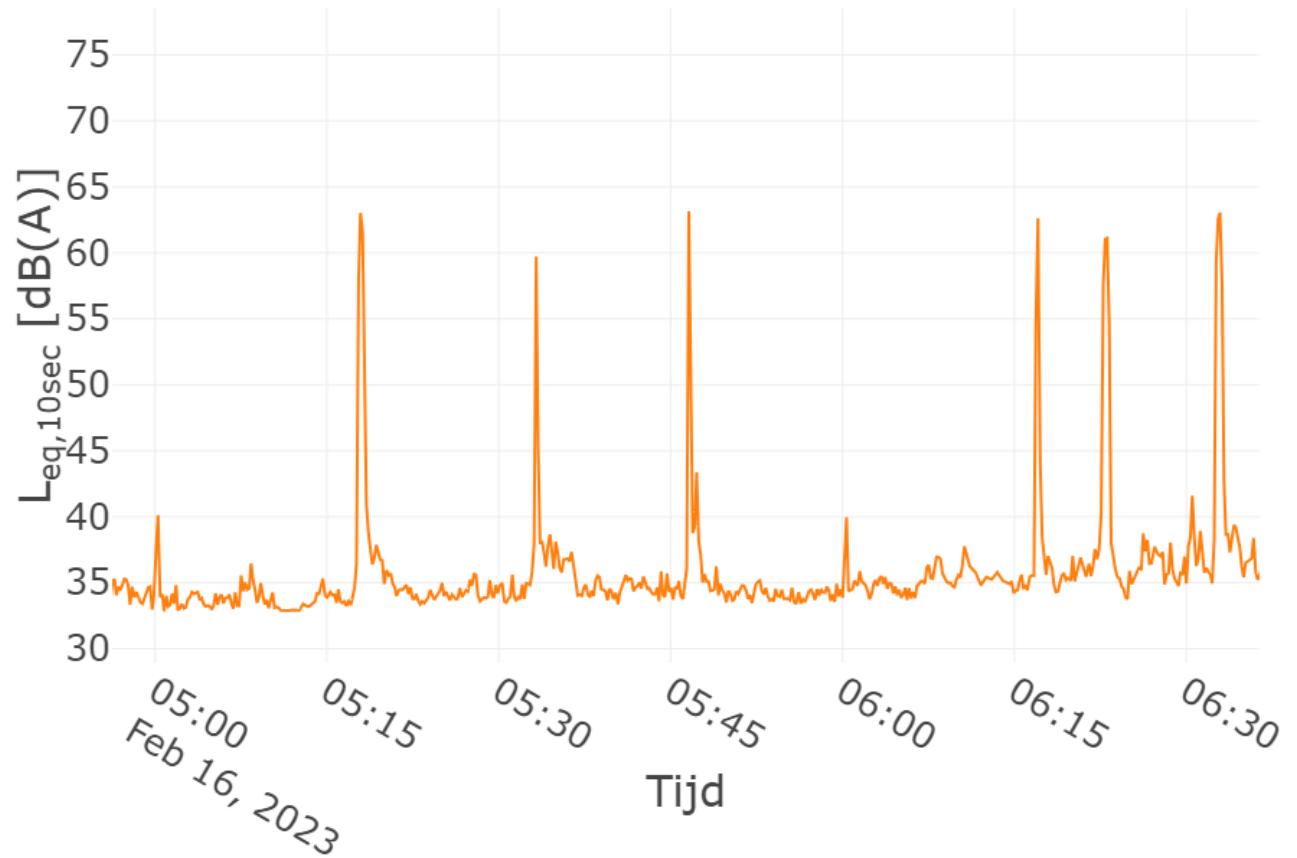
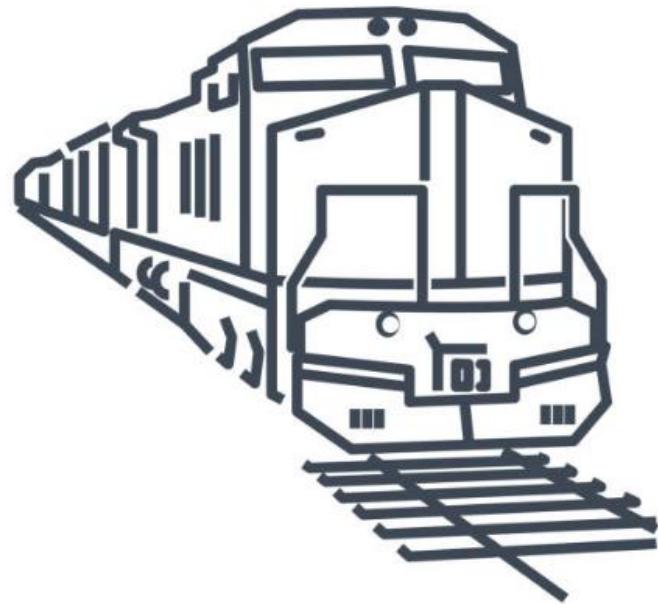
Accuracy

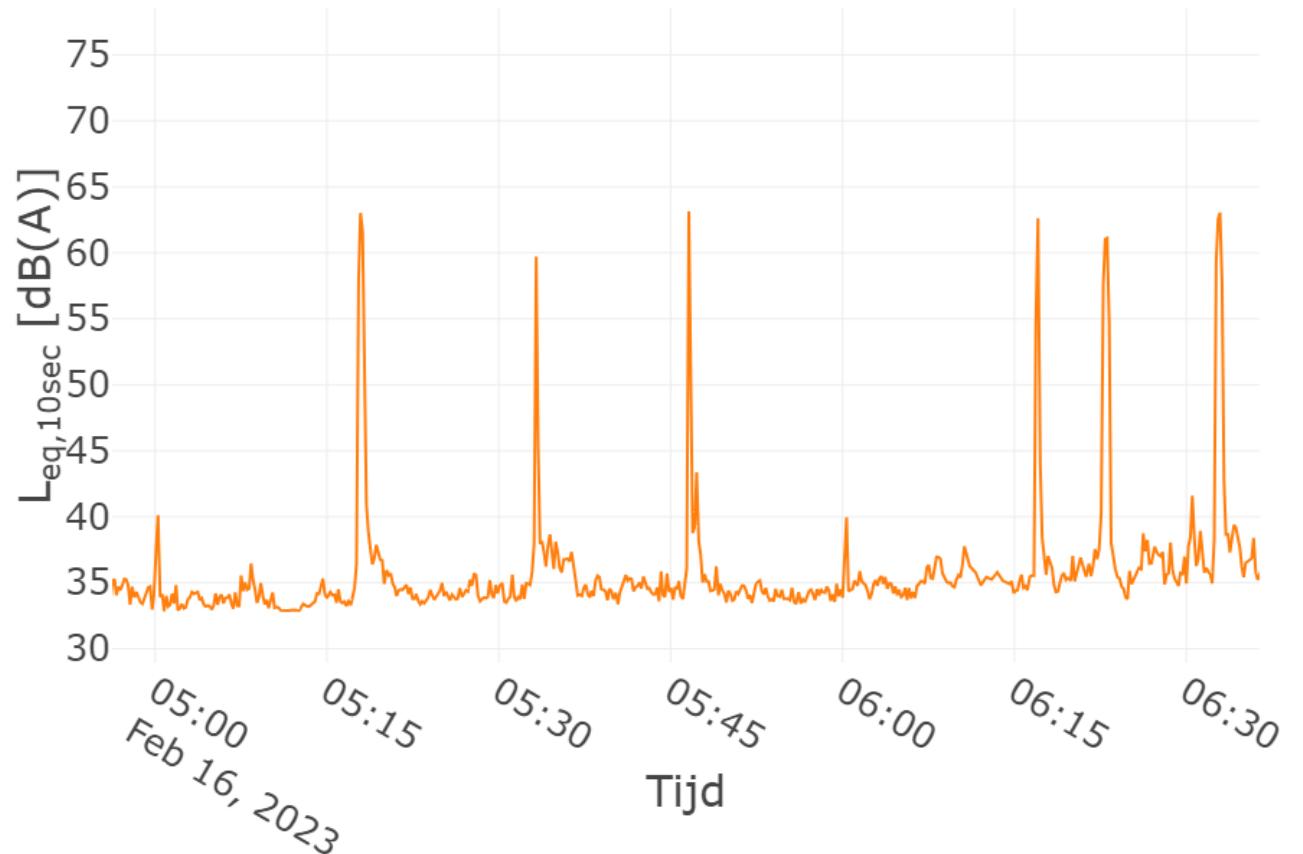




Accuracy vs goals









Citizen science and noise

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Annoyance study: America

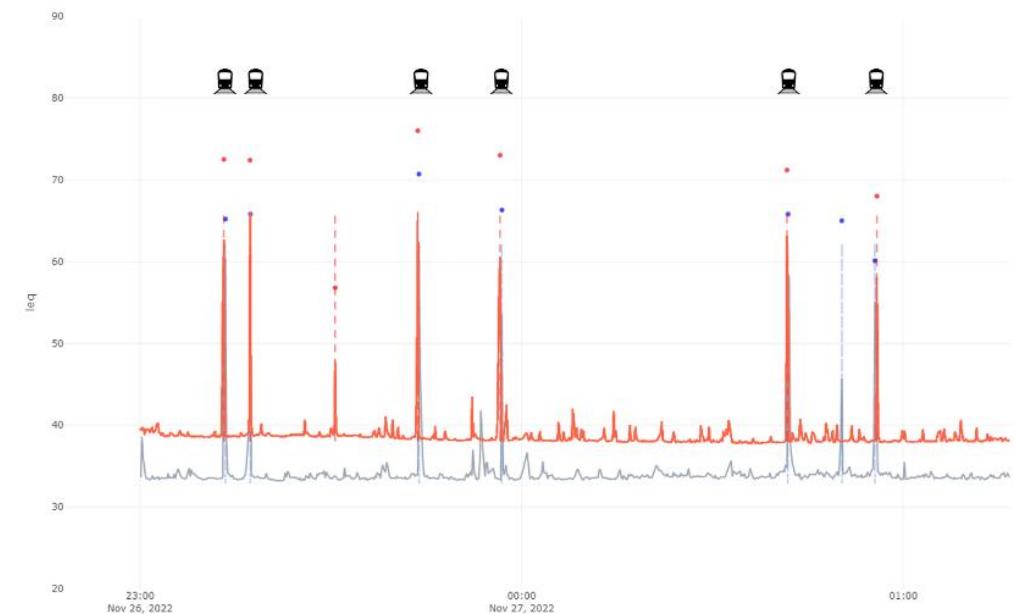
- › 20 DIY sensors + app survey





Annoyance study: America

- › 20 DIY sensors + app survey

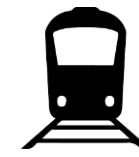




Annoyance study: America

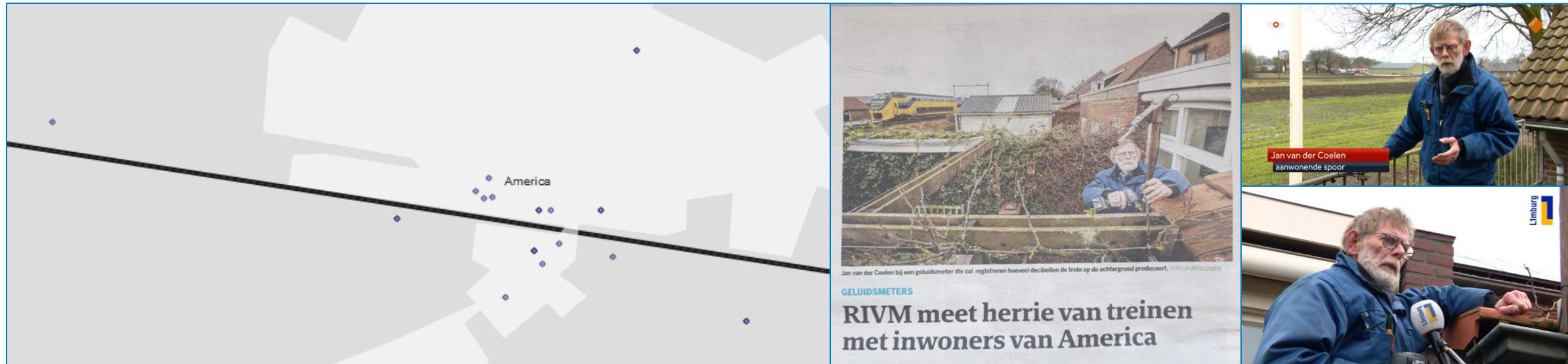
- › 20 DIY sensors + app survey





Annoyance study: America

- › 20 DIY sensors + app survey



Report: <https://www.rivm.nl/nieuws/burgerwetenschap-geeft-in-america-meer-inzicht-in-hinder-treinverkeer>



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samenmeten.rivm.nl

sensor.community

nick.mabjaia@rivm.nl

Summary

- › Measure noise yourself
- › DIY sensors can perform great!
- › Goals
- › Annoyance surveys

DIY noise level meters: www.rivm.nl/publicaties/vergelijkende-metingen-met-betaalbare-zelfbouwgeluidmeters

America: <https://www.rivm.nl/nieuws/burgerwetenschap-geeft-in-america-meer-inzicht-in-hinder-treinverkeer>

Schiphol: <https://www.rivm.nl/publicaties/samen-meten-aan-geluid-en-beleving-rond-luchthaven-schiphol-verkennend-citizen-science>



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EXTRA SLIDES



Annoyance study: Schiphol

- 28 DIY sensors



Annoyance study: Schiphol

- 28 DIY sensors





Annoyance study: Schiphol

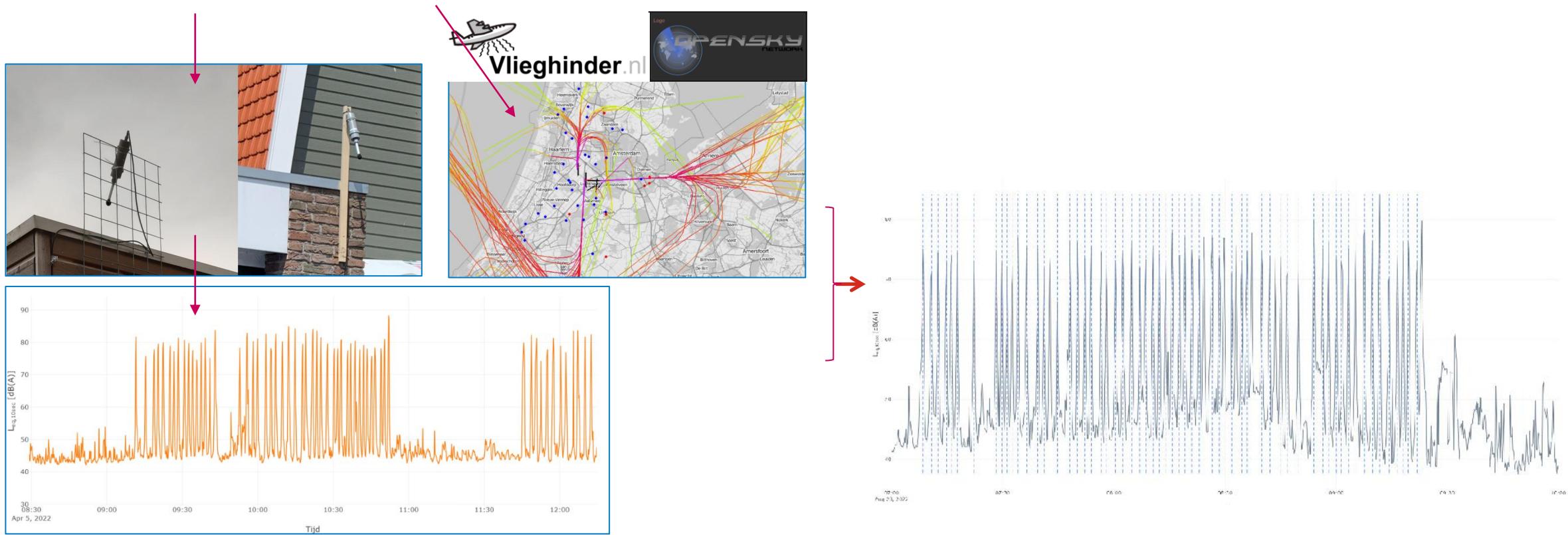
- 28 DIY sensors + flight data





Annoyance study: Schiphol

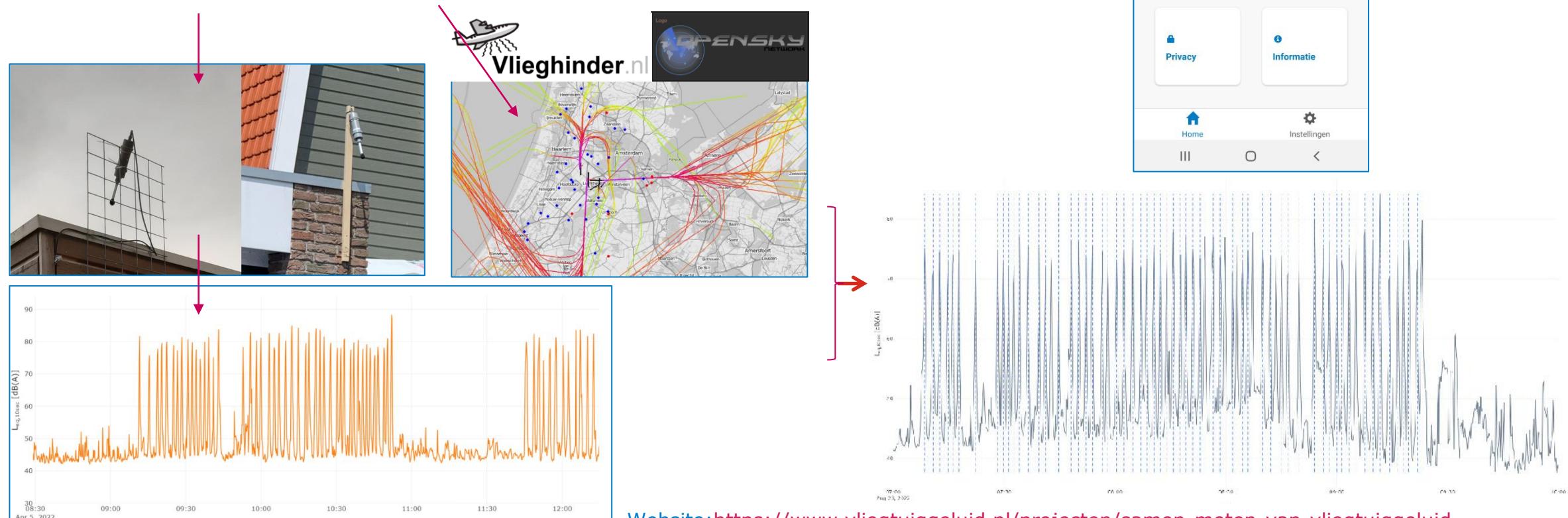
- 28 DIY sensors + flight data





Annoyance study: Schiphol

- 28 DIY sensors + flight data + app survey

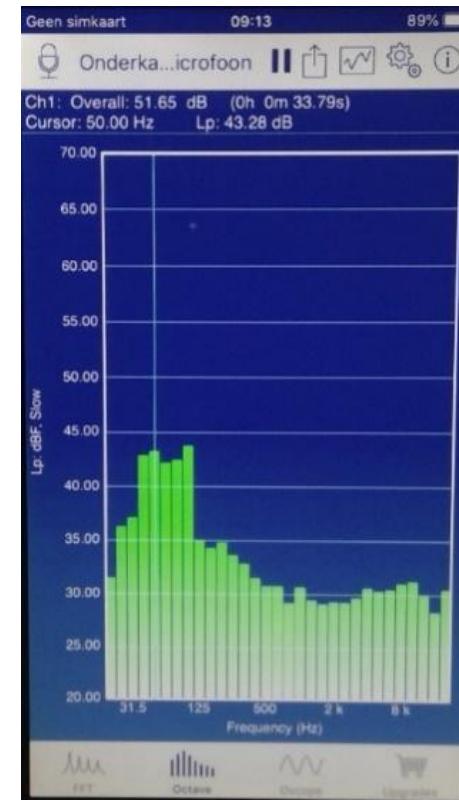


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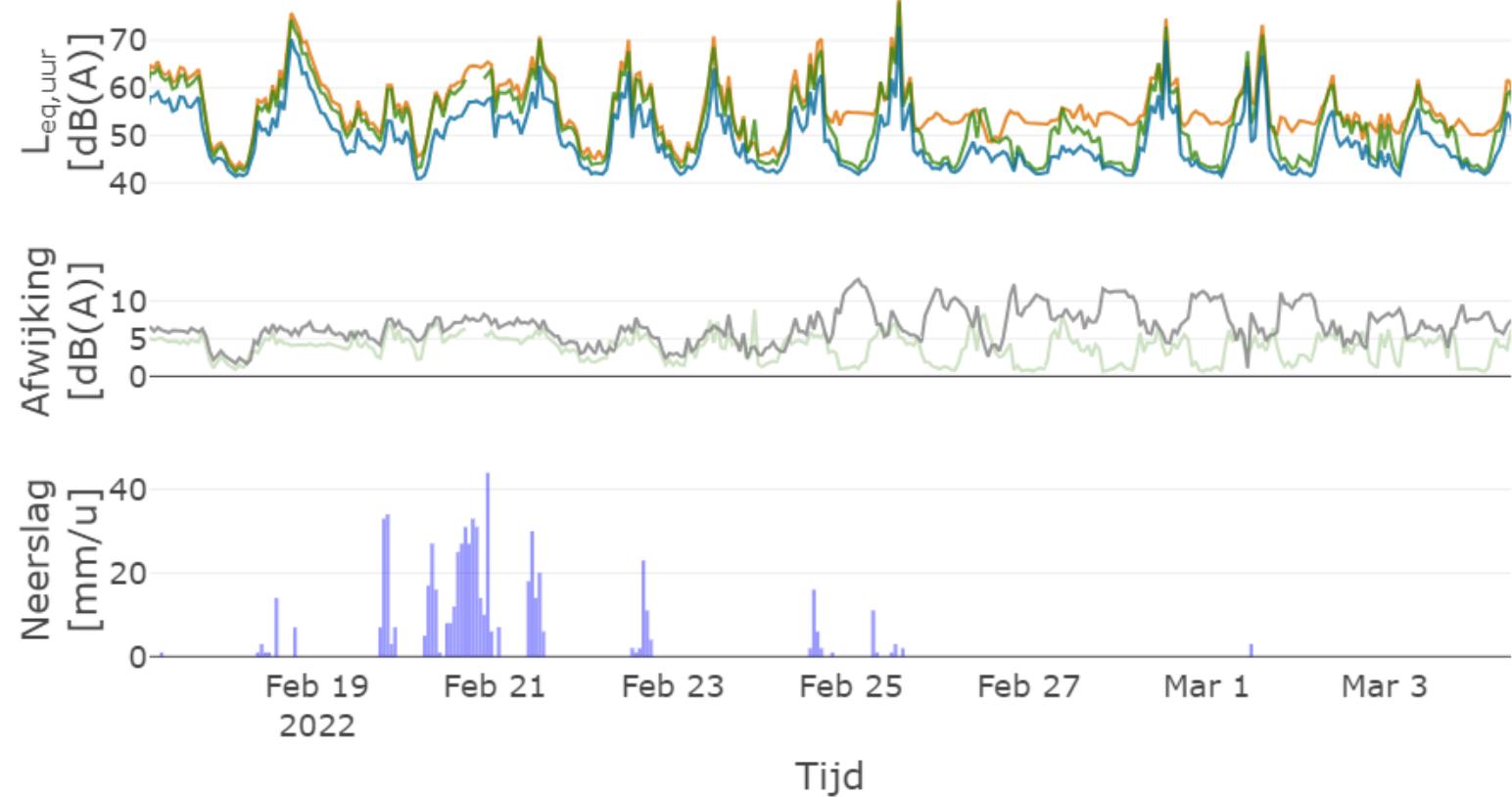
Smartphones: LFG meten met iphones

- Laagfrequent geluid (LFG)
 - ≤ 100 Hz
- GGD pilot 2024
- Gehinderde meet zelf
- LFG aanwezig?



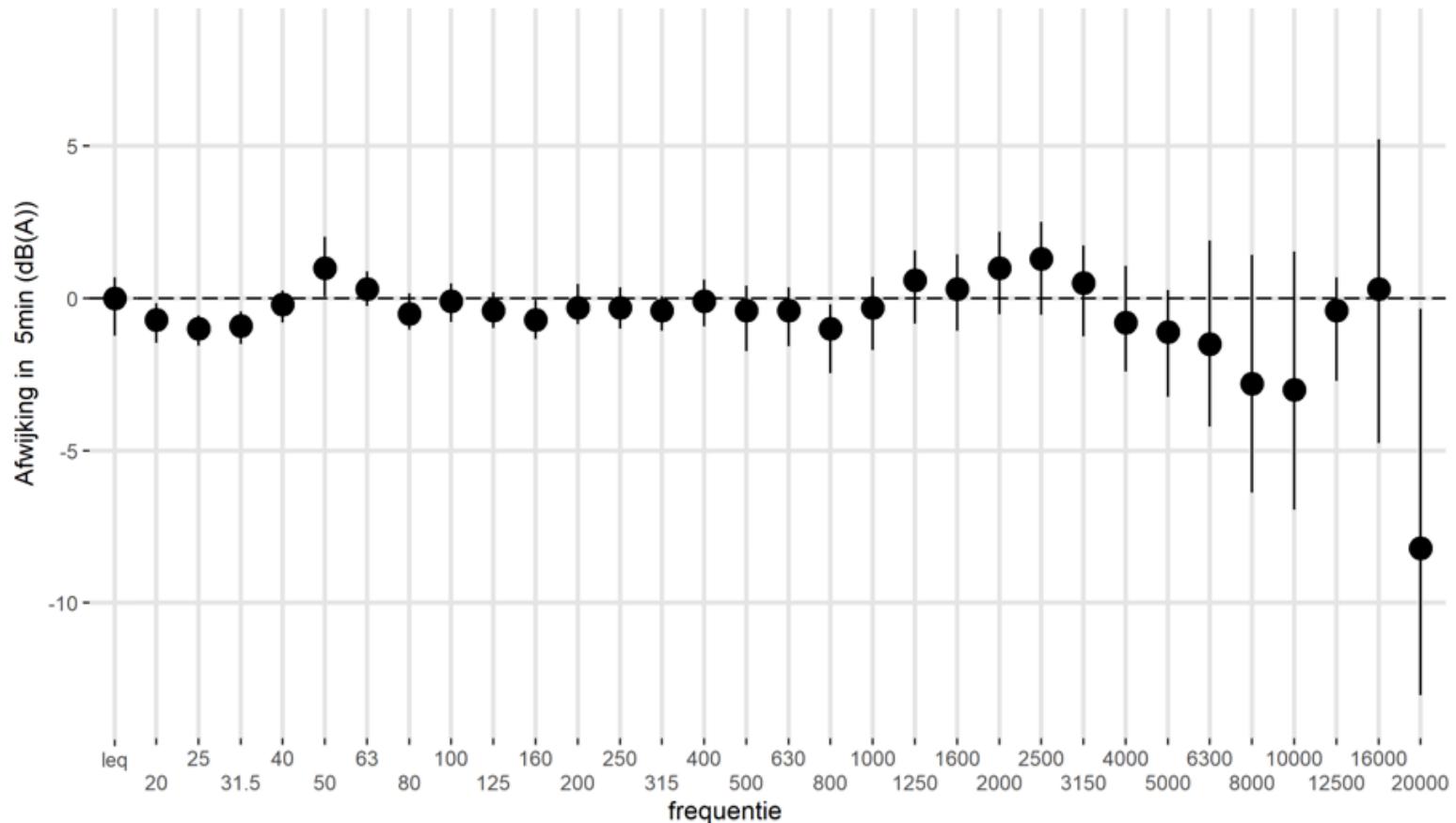


Resultaten: Lange termijn effecten





Frequencies





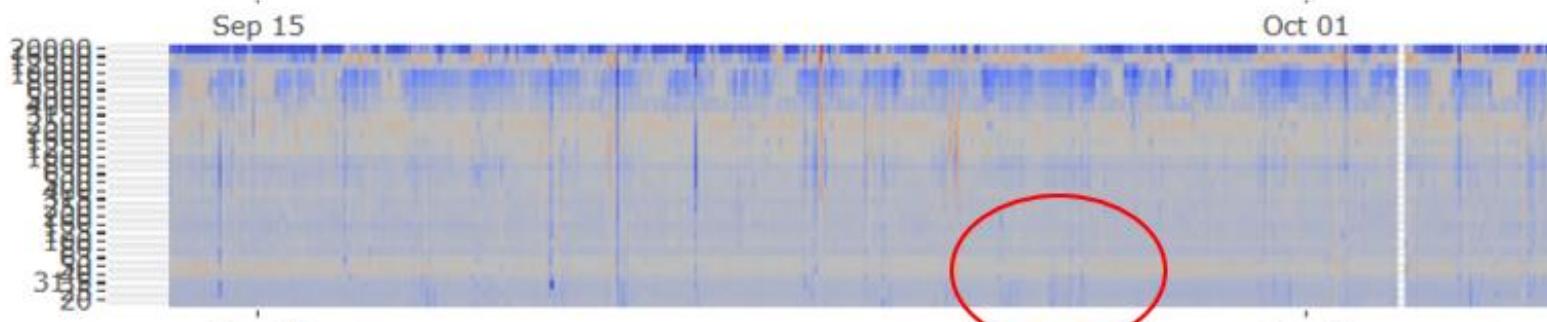
Max allowed wind speeds at microphone (dutch regulations)

pass by LA,max [dB(A)] 40 50 60 70

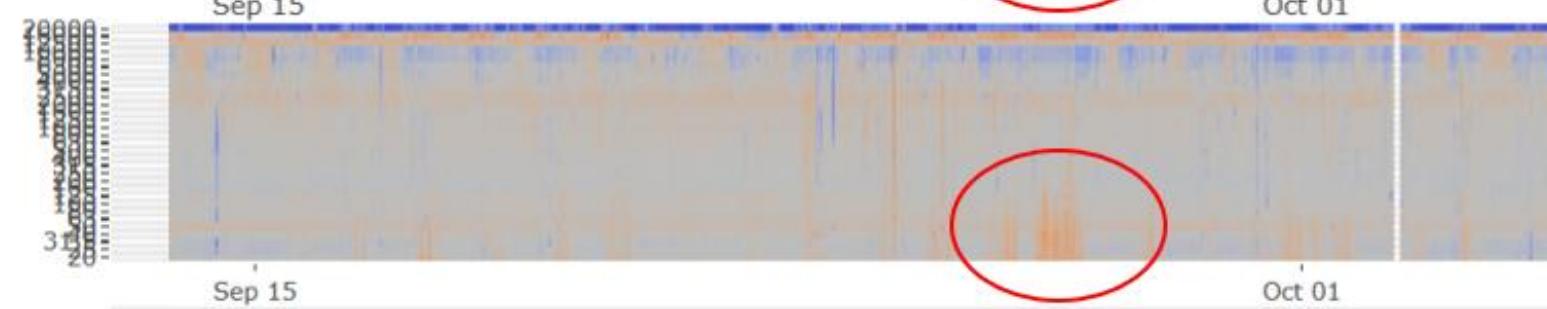
Hourly average wind speed [m/s] 4 6 8 11

Weather effects: wind

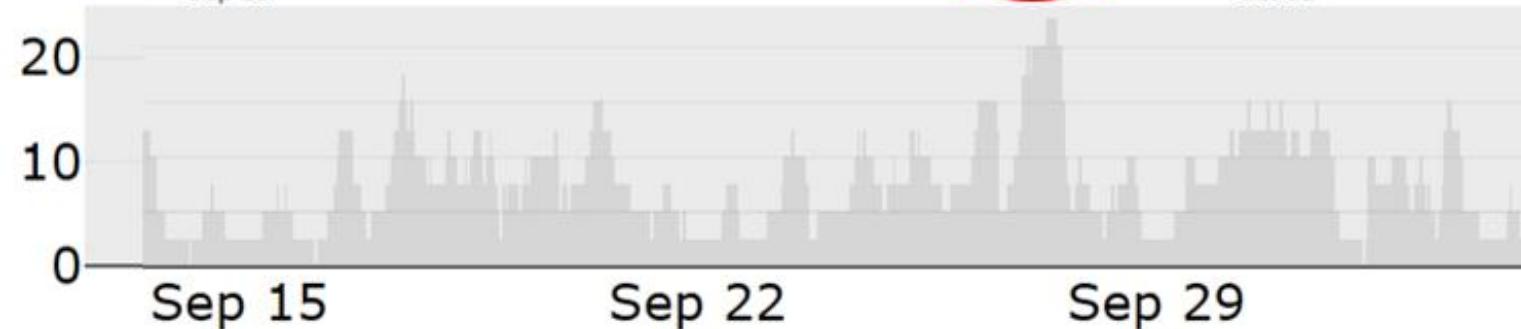
ISO 3891 (airplane noise)
5 m/s



bad windscreen



good windscreen



Wind in m/s

30

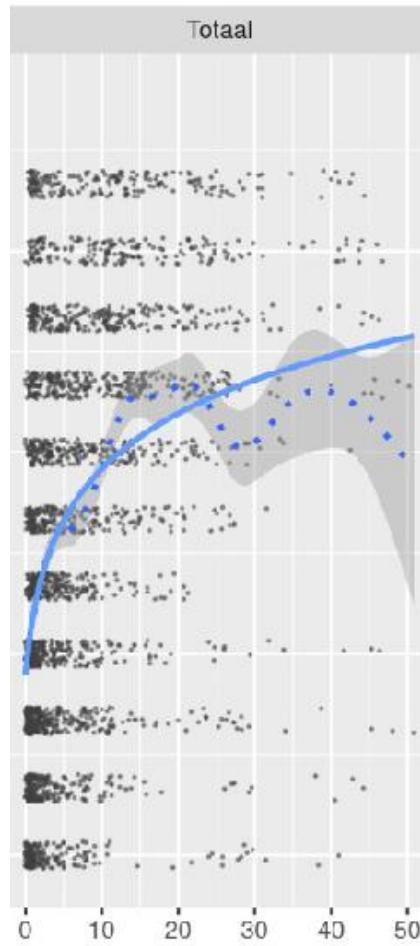
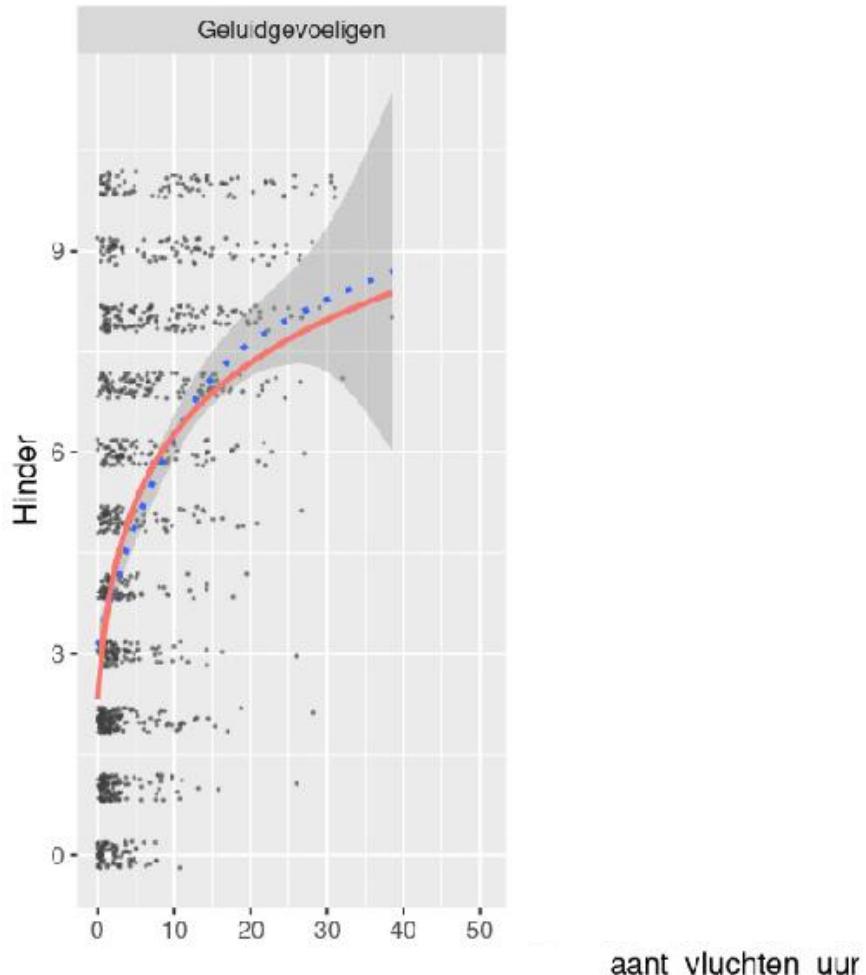


Goals of noise monitoring

- > Measurement devices
 - Accuracy
 - Measurement interval
- > Location
 - Near source
 - Near you
- > Duration
 - Seconds, hours
 - days, years



Annoyance study: Schiphol

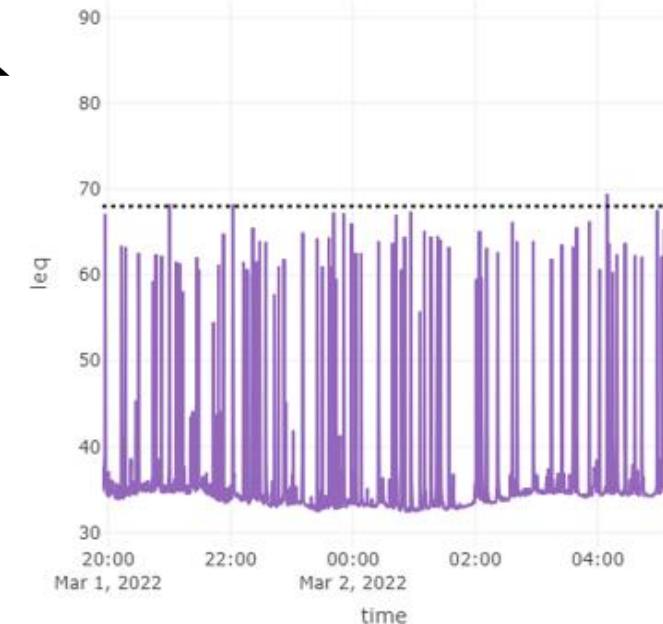


- Short term annoyance
- Dose-Respons curves
- Important indicators:
 - SEL x L95
 - NA₇₅ x aantal/uur
 - NA₆₀

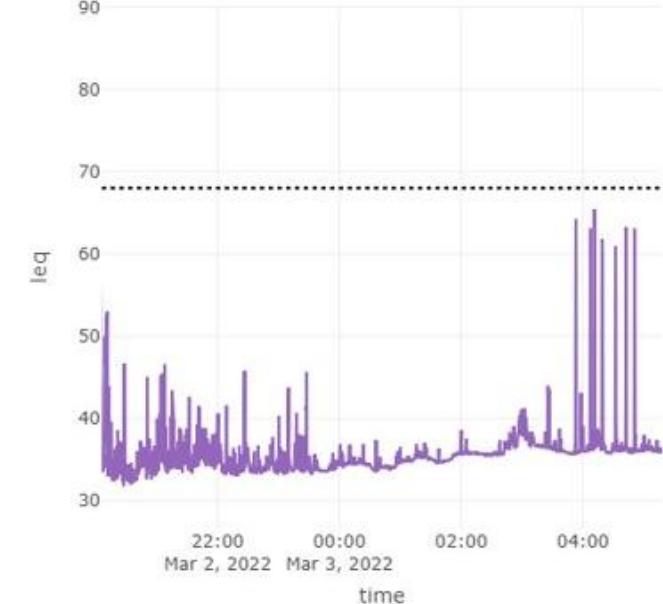


Annoyance study: America

- › 20 DIY sensors + app survey



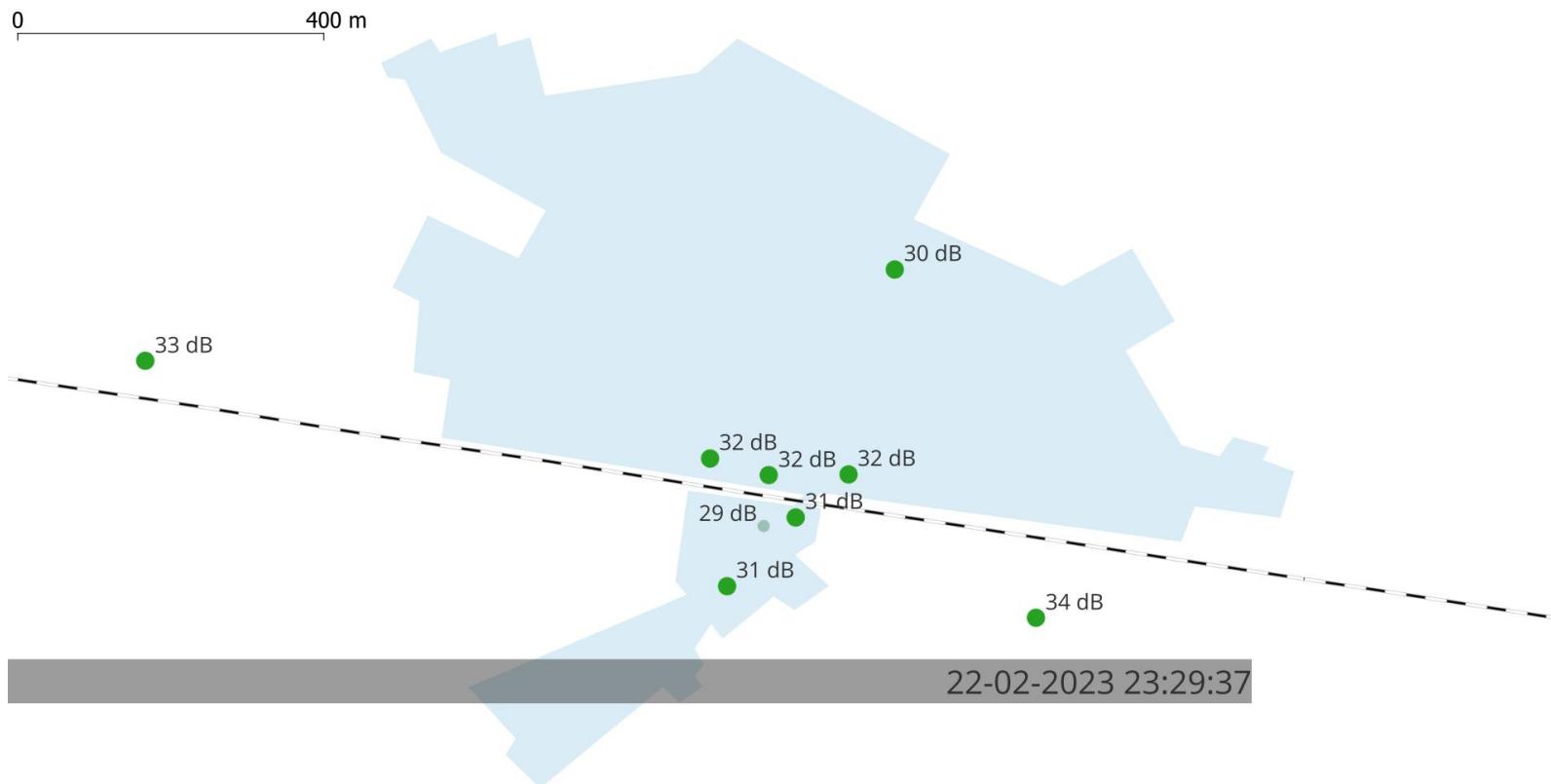
Normal night



No trains due to
works on railway



Annoyance study: America





Belevingsonderzoeken: ervaringen

- › Harvesting knowledge and insights of citizens
- › Potentieel relaties verbeteren
- › Inzicht in lokale situatie
- › Hinder acuut/korte termijn in beeld



Sensors in our test

- Waag FutureLab
- Hart van Alkmaar
- WBBSVB
- RIVM
- Sensor.Community





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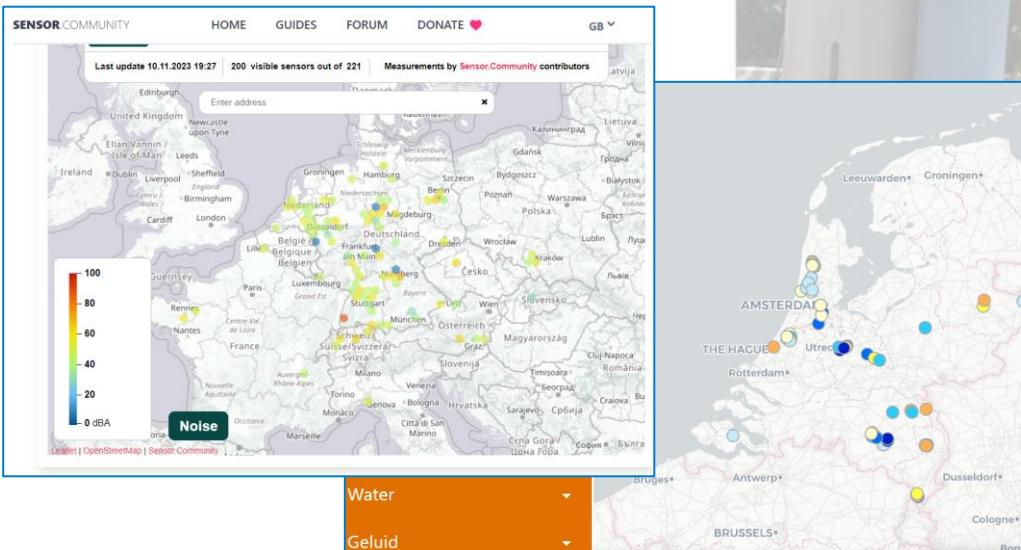
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SENSOR.COMMUNITY



Verdict:

- › Stability ✓
- › User friendly ~
- › Accuracy ...