Environmental Noise after Covid-19: Issues and Opportunities

Dr Antonio J Torija Martinez – University of Salford (UK)

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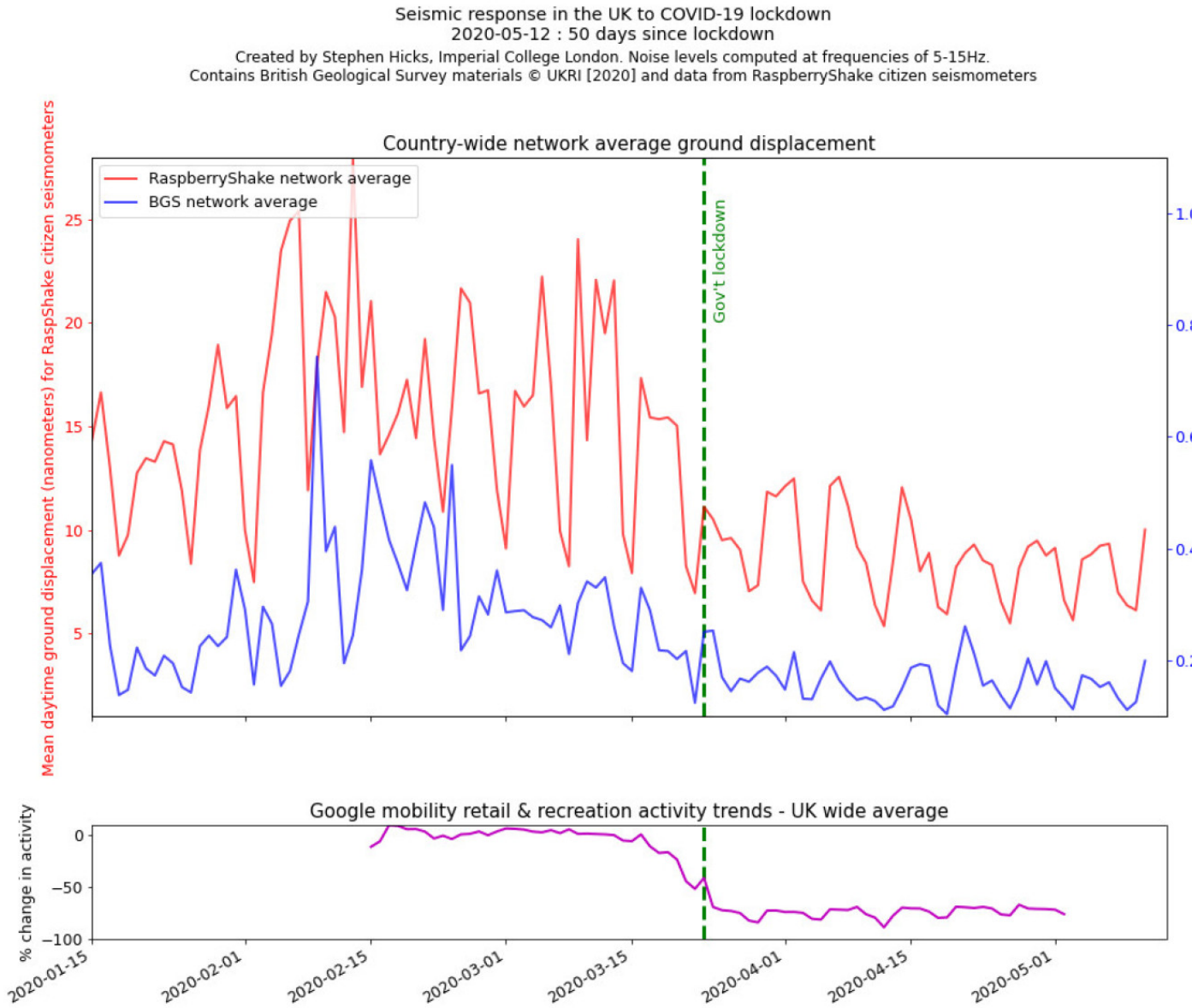
Outline

- Worldwide Noise Before/After Lockdown
- Issues and Opportunities for Urban/Peri-urban Traffic After Covid
- Opportunities for Noise Mapping
- Noise in the Build-Environment After Covid
- Noise vs. Indoor Air Quality
- Noise Issues of Decarbonisation Interventions

Worldwide Noise Before/After Lockdown

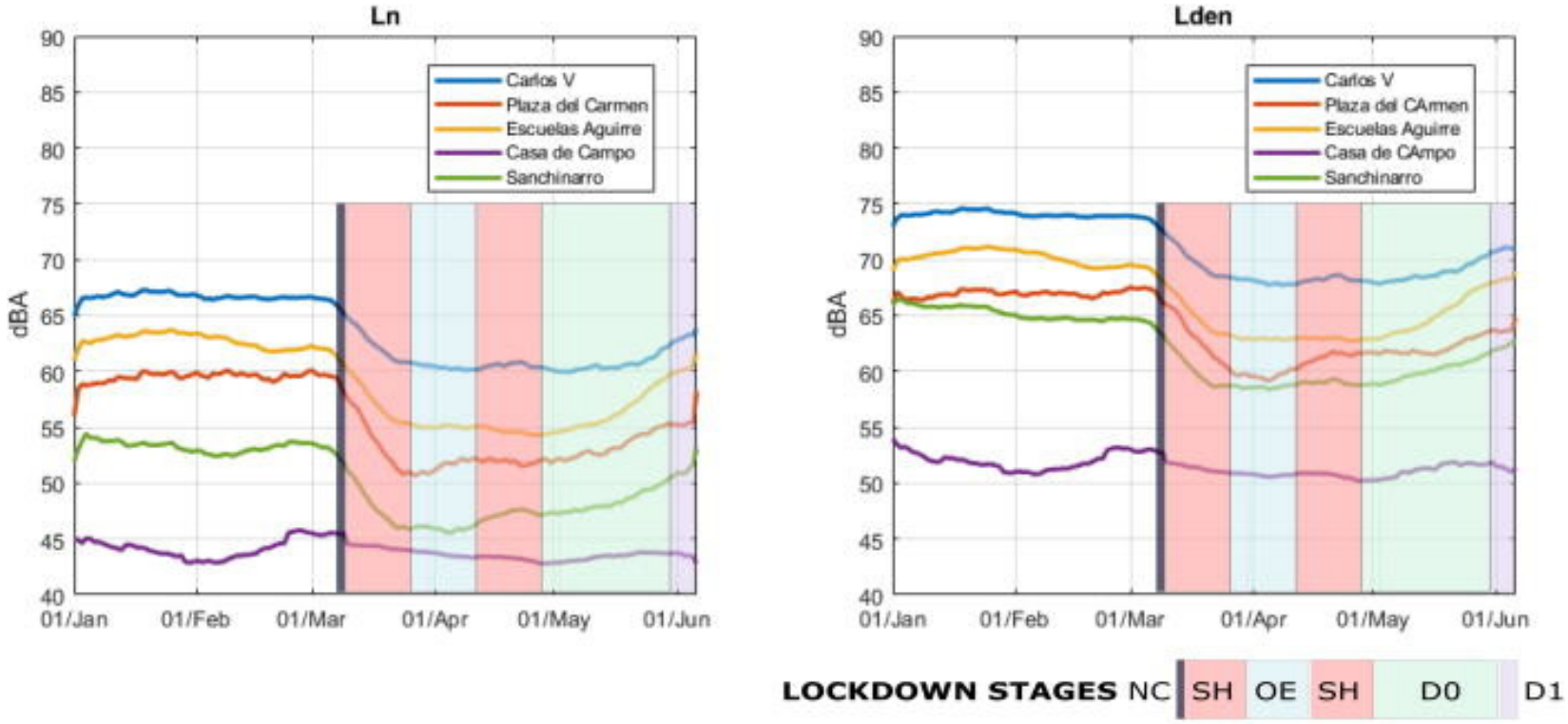
The lack of human activity during lockdown caused human-linked vibrations in the Earth to drop by an average of 50% between March and May 2020.

"Global quieting of high-frequency seismic noise due to COVID-19 pandemic lockdown measures" by Thomas Lecocq et al., published Thursday 23 July 2020 in *Science.*



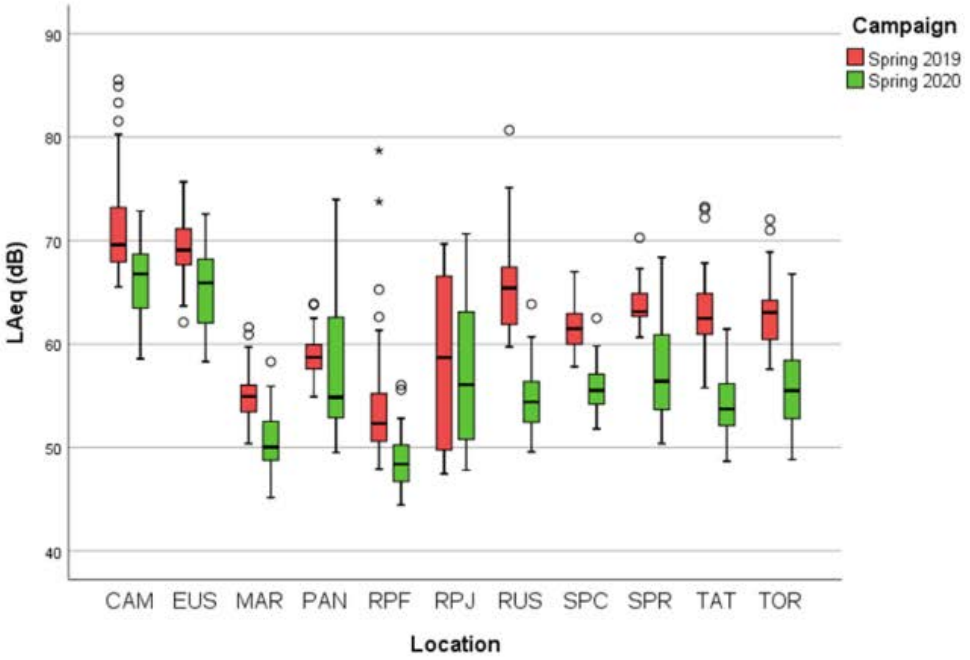
Worldwide Noise Before/After Lockdown

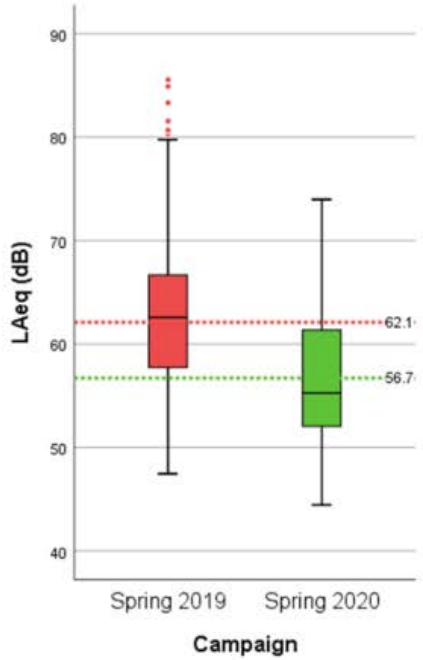
The reduction in the sound level ranged from 4 to 6 dBA

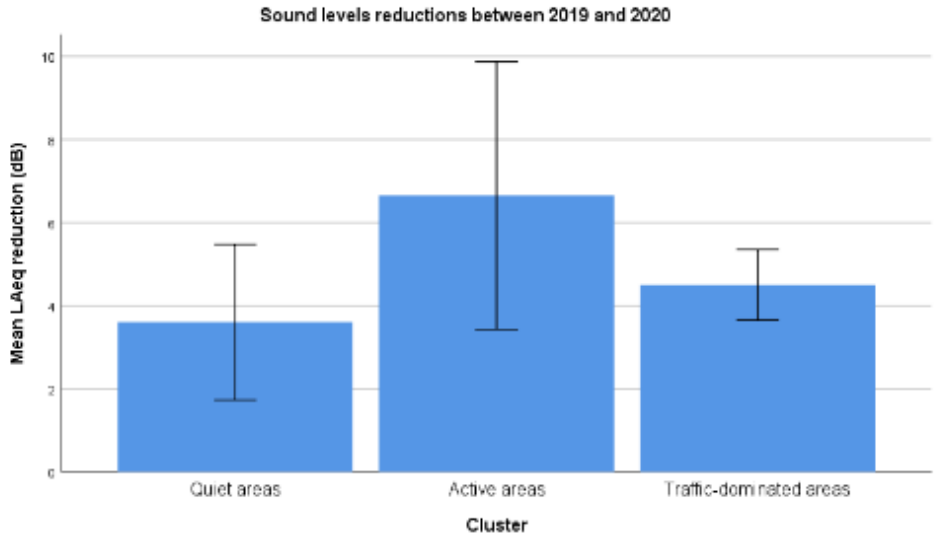


Published in: César Asensio; Ignacio Pavón; Guillermo de Arcas; *The Journal of the Acoustical Society of America* **148,** 1748-1755 (2020)
DOI: 10.1121/10.0002008

UK Noise Before/After Lockdown







Also IoA 'The Quiet Project': https://youtu.be/rHNoBsjmLxs

Aletta et al., 2020
DOI: https://doi.org/10.1515/noise-2020-0011

Urban/Peri-urban Traffic

Opportunities

- Transition to active modes of transportation (e.g. cycling, walking).
- Decrease of urban noise climate, improve local air quality and meet zero-carbon goals.
- Access to quiet areas.

Risks

- Decline in use of public transport
- Growth of private cars movements to pre-lockdown levels and beyond.
- Increase of urban noise climate, carbon emissions, and poorer local air quality.

Research on environmental noise modelling and assessment to inform decision-making.

Noise Mapping

Round 4 of Noise Mapping

- Hybrid prediction and measured models coupled with Machine Learning.
  - Categorise dominant sources using monitoring (traffic, people, etc)
- Multi-layer maps:
  - E.g. Layer 1 being strategic and Layer 2 more locally customised (e.g. Tranquillity, Pleasantness and Vibrancy of soundscape)
- Integrate ISO Soundscape into Noise Mapping.

Noise in the Built Environment

- Lockdown: ‘Noisy neighbours are ruining my life’*
- 103 councils in the UK asked if they'd been getting more noise complaints since the lockdown began in March.
  - **44 out of 51 reported some kind of rise.**
- Decrease in outdoor noise levels make neighbour noise more noticeable.
- Home working: New requests for indoor soundscapes in the built environment

Revisit relationship between indoor noise levels and occupants behaviour

*https://www.bbc.co.uk/news/newsbeat-52579586

Noise vs. Indoor Air Quality

- It is important that improved indoor air pollution isn't at the expense of health disbenefits created by noise.
- Mechanical Ventilation Systems:
  - Noisy ventilation systems lead to systems being disabled and therefore poor air quality. Noise annoyance must be reduced if we are to improve indoor air quality"
  - Acoustics Ventilation And Overheating: Residential Design Guide
- Acceptable noise levels for mechanical ventilation systems? How does this relate to BS8233:2014?
- Noise Metrics?
  - dBA,
  - NC, NR, NCB, PNC, RC and RCII (primarily used in office design by recommended in BS8233:2014 for dwellings)
  - Sound quality metrics (e.g. tonality)

Noise Issues of Decarbonisation Interventions (1/2)

Noise Issues of Air Source Heat Pumps

- Air Source Heat Pumps (ASHP) have an important role to play in achieving the UK Commits to Net Zero CO2 emissions by 2050.
- Noise disturbance caused by ASHP is one of the main barriers for further market growth and acceptance.
- Acoustic challenges for planning approval:
  - ASHPs are classed as permitted development: provided certain conditions are met, planning permission is not required.
  - Permitted Development requires the sound pressure level not exceeding 42 dBA $L_{Aeq,5min}$ when measured at a point one metre away from the neighbour's nearest door or window.
  - To get planning approval, night-time noise levels must be 5 dB lower than background noise.
  - Recommended internal target levels for overall noise in bedrooms = 30 dBA $L_{Aeq,8hr}$

Noise Issues of Decarbonisation Interventions (2/2)

Noise Issues of Air Source Heat Pumps

- Recommendations Department of Energy and Climate Change (DECC):
  - “Manufacturers should include sound power levels, sound pressure levels at a range of distances in addition to a tonal penalty figure calculated in accordance with JMN2 or ISO 1996-2.”
  - “Dose response investigations in order to ascertain the subjective acceptability of air source heat pumps in a domestic environment. This would serve to further inform on the suitability of any suggested ASHP noise criteria.”

Final Thoughts

- Opportunities in environmental noise after covid-19 lockdown:
  - Innovate in noise mapping.
  - Evidence to re-design urban and peri-urban traffic

- Noise issues should be carefully addressed for wider adoption of air quality and decarbonisation interventions.

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MANY THANKS FOR YOUR ATTENTION

Dr Antonio J Torija Martinez – University of Salford (UK)

A.J.TorijaMartinez@salford.ac.uk

Twitter: @ajtorija