

# The MONICA project

## Acoustic control loop

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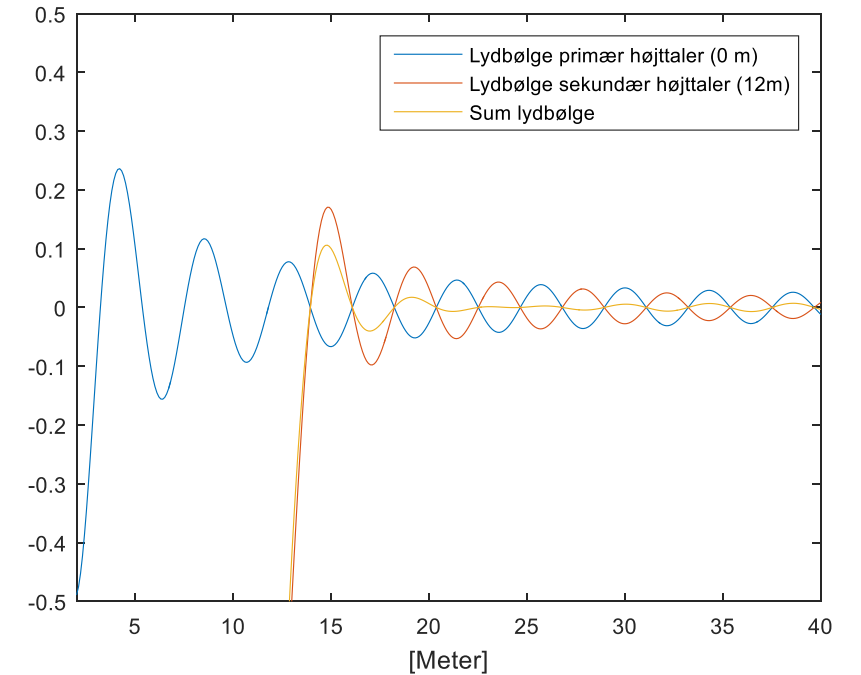
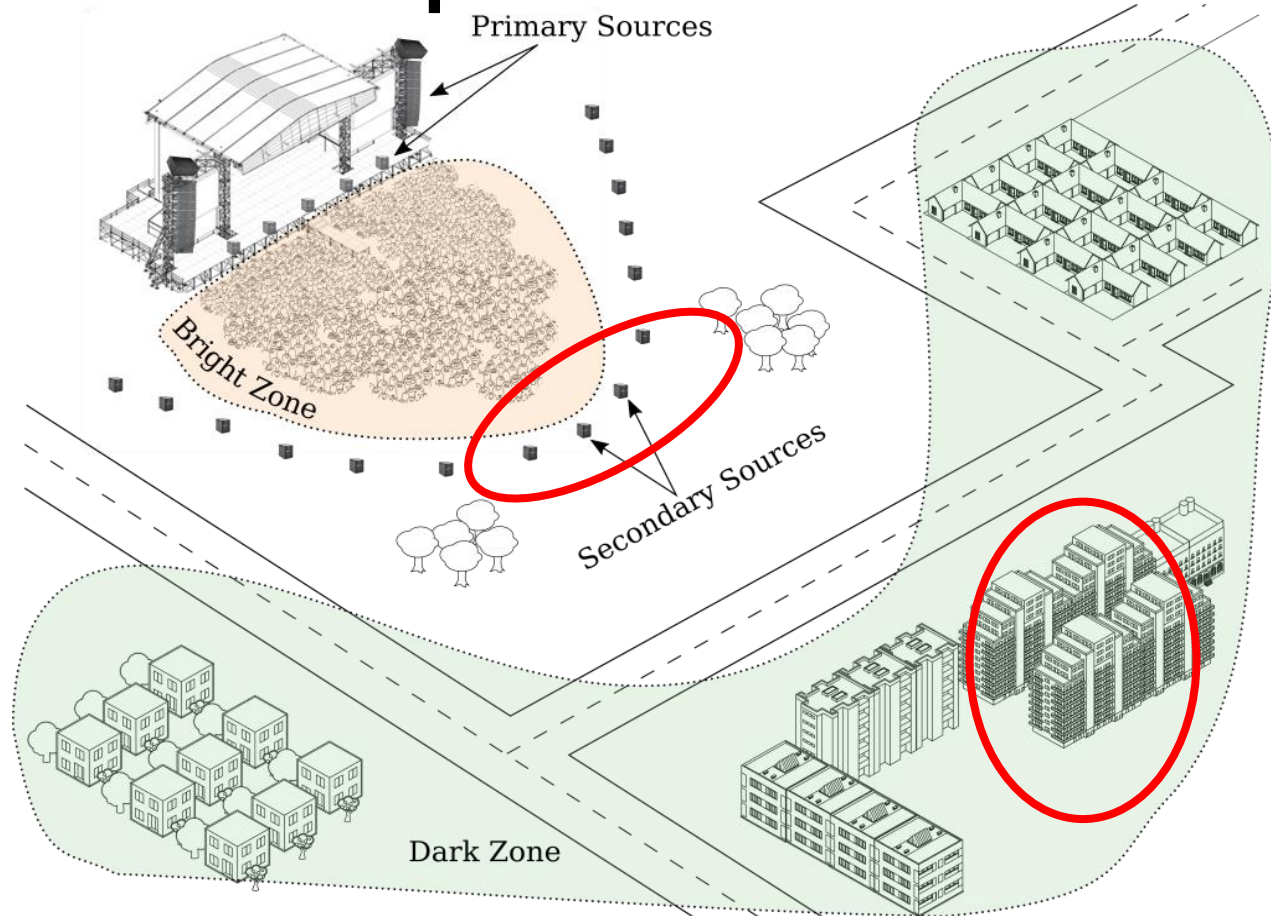
# Reducing noise levels by anti phase sound



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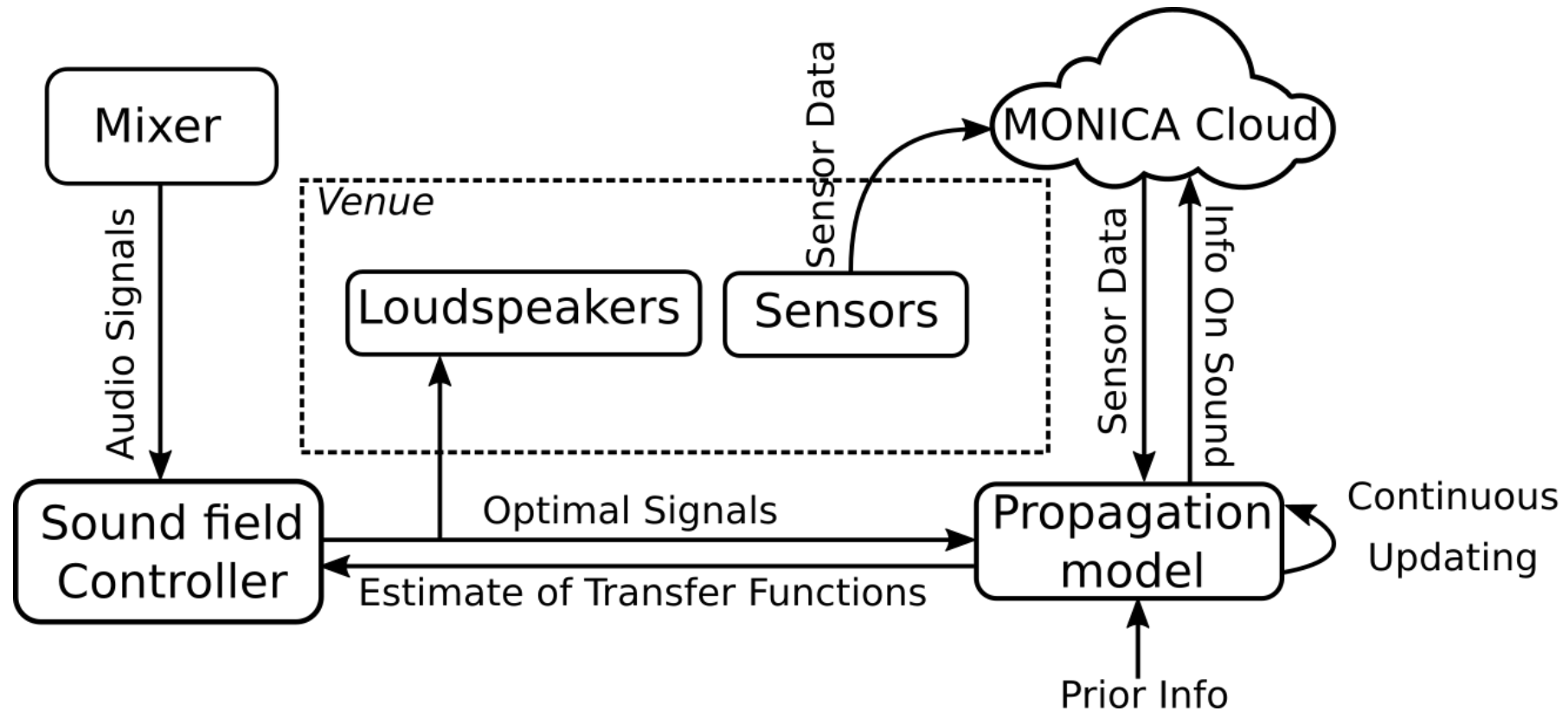


# The Adaptive Sound Field Control System



$$\min_{\mathbf{w}} \kappa \|\mathbf{H}_B^s \mathbf{w}^s\|^2 + (1 - \kappa) \|\mathbf{H}_D^s \mathbf{w}^s + \mathbf{H}_D^p \mathbf{w}^p\|^2 + \lambda \|\mathbf{w}\|^2$$

# The Adaptive Sound Field Control System



# Networking components

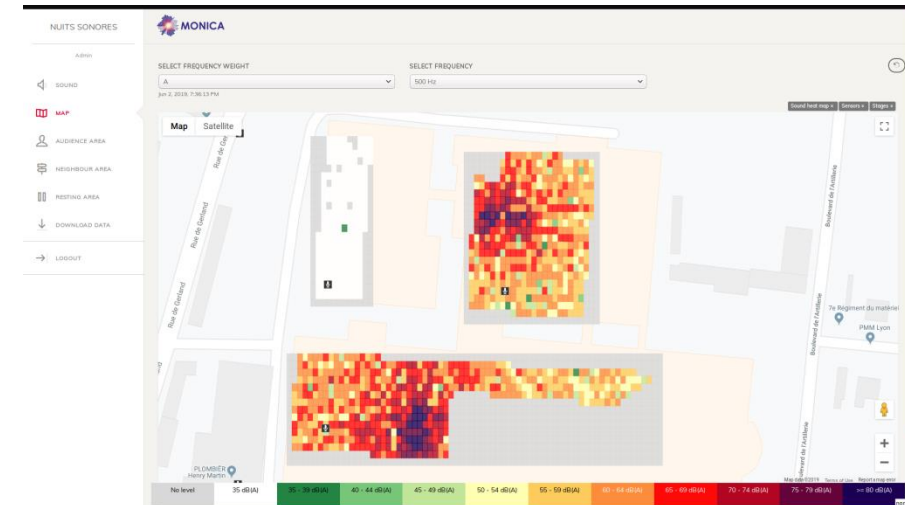
- Audio signal network : DANTE (local ethernet)



IoT Sound level meters (B&K)



Real time sound level map data (COP)



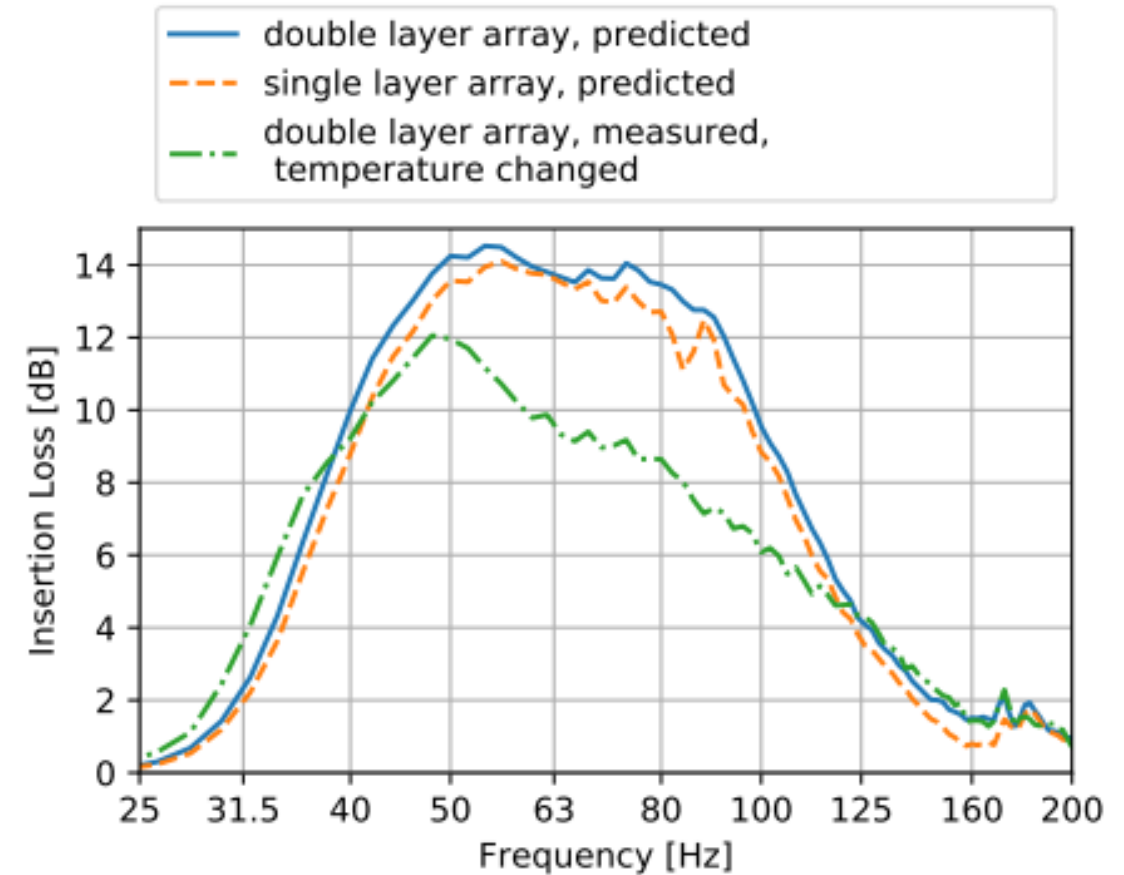
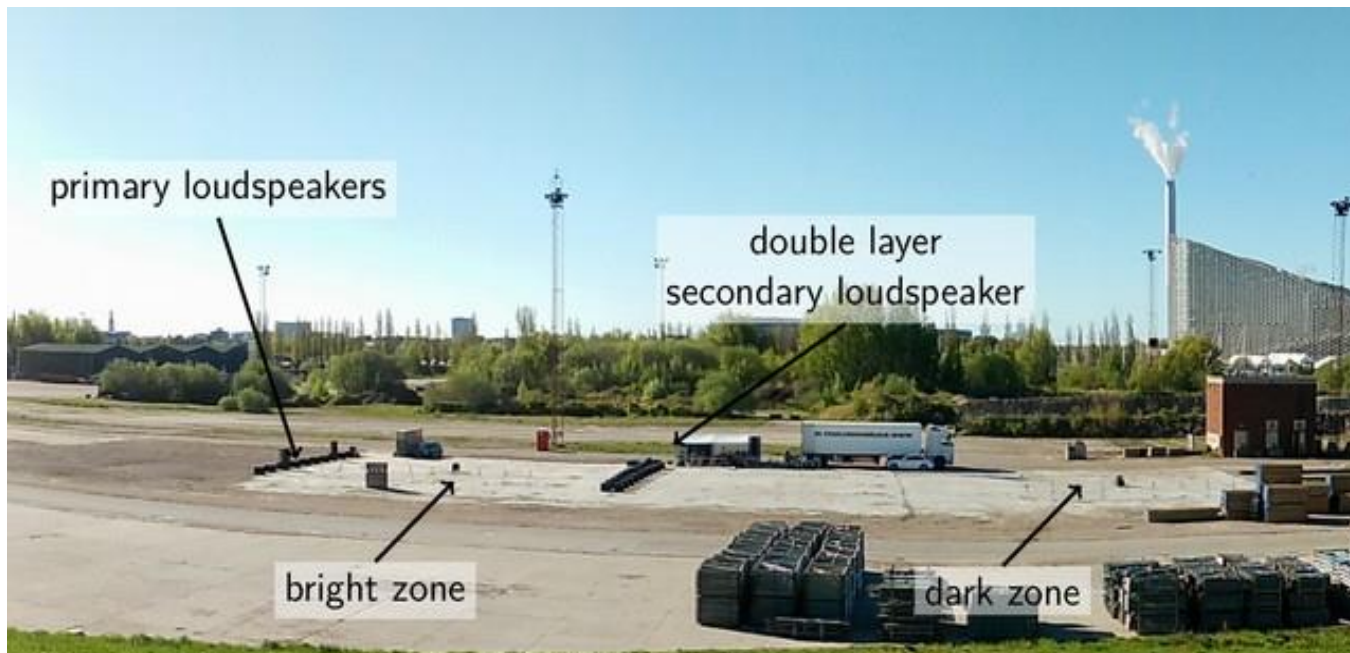


## Tests so far

- Laboratory tests in anechoic chamber (December 2017 and onwards)
- Pre-test Refshaleøen, Copenhagen (May 2018)
- Pilot test Kappa FuturFestival, Torino (July 2018)
- Pilot test Tivoli, Copenhagen (August 2018)
- Sound propagation and weather test Risø, Roskilde (December 2018)
- Pre-test Roskilde (June 2019)
- Pilot test Kappa FuturFestival, Torino (July 2019)
- Pilot test Tivoli, Copenhagen (September 2019)



# Pre-test Refshaleøen



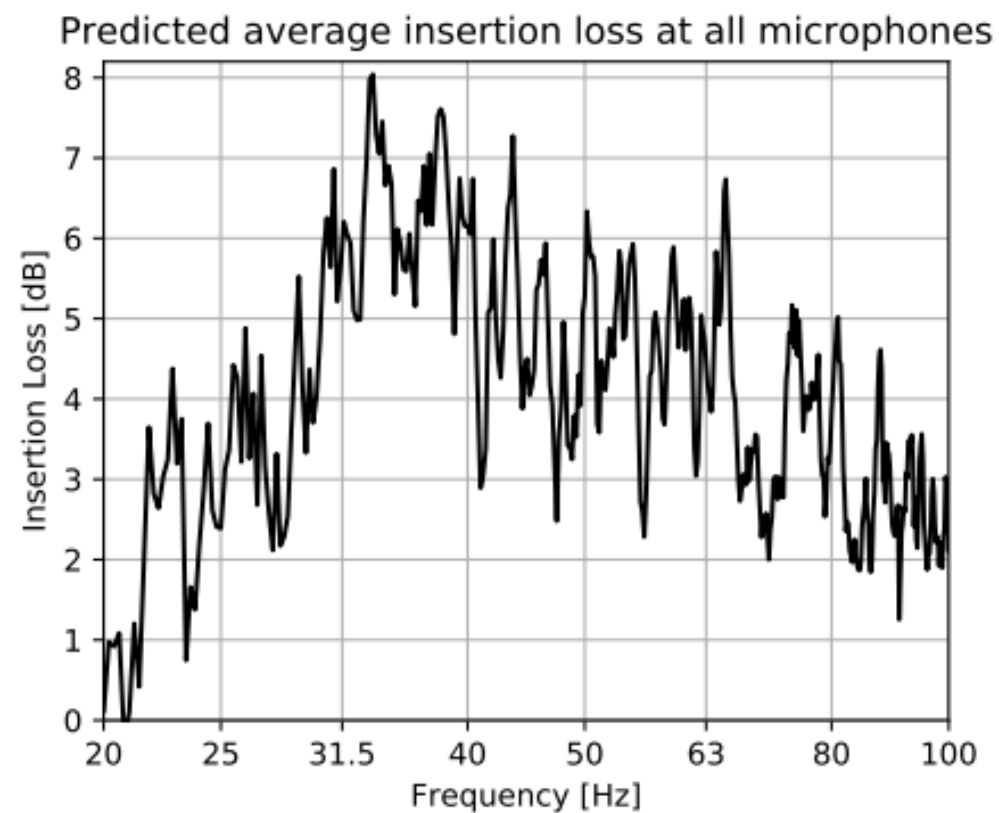
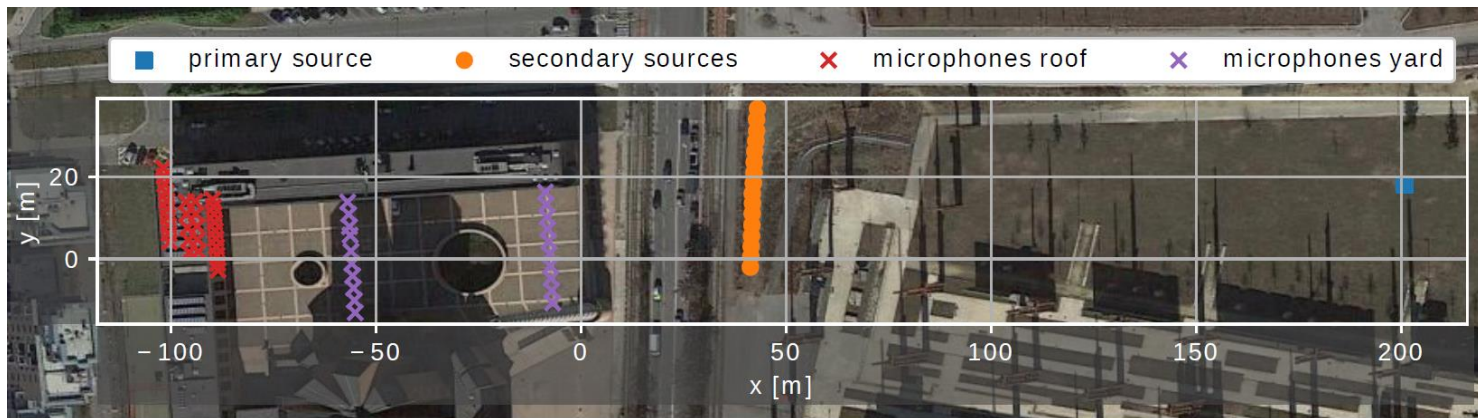


# Pre-test Refshaleøen





# Pilot test Kappa FuturFestival 2018



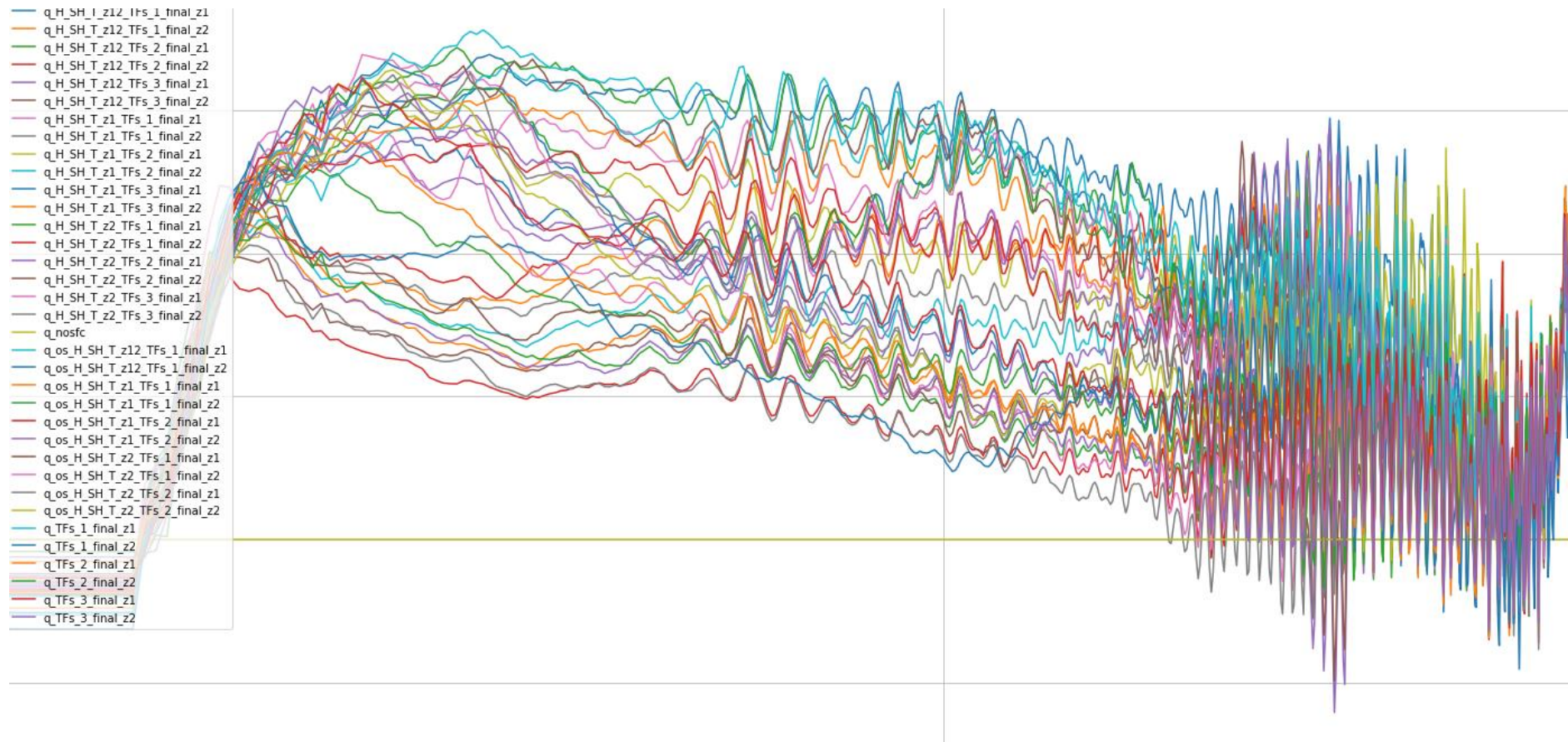


# Pre-test Roskilde (June 2019)

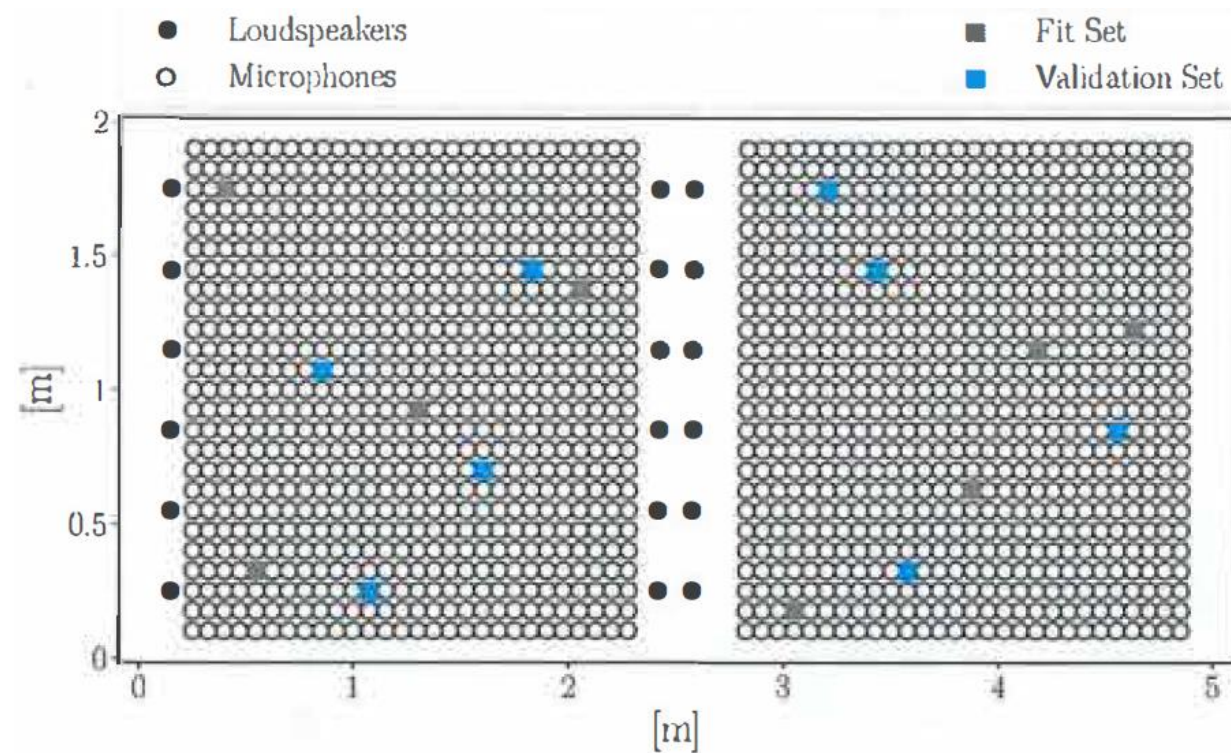
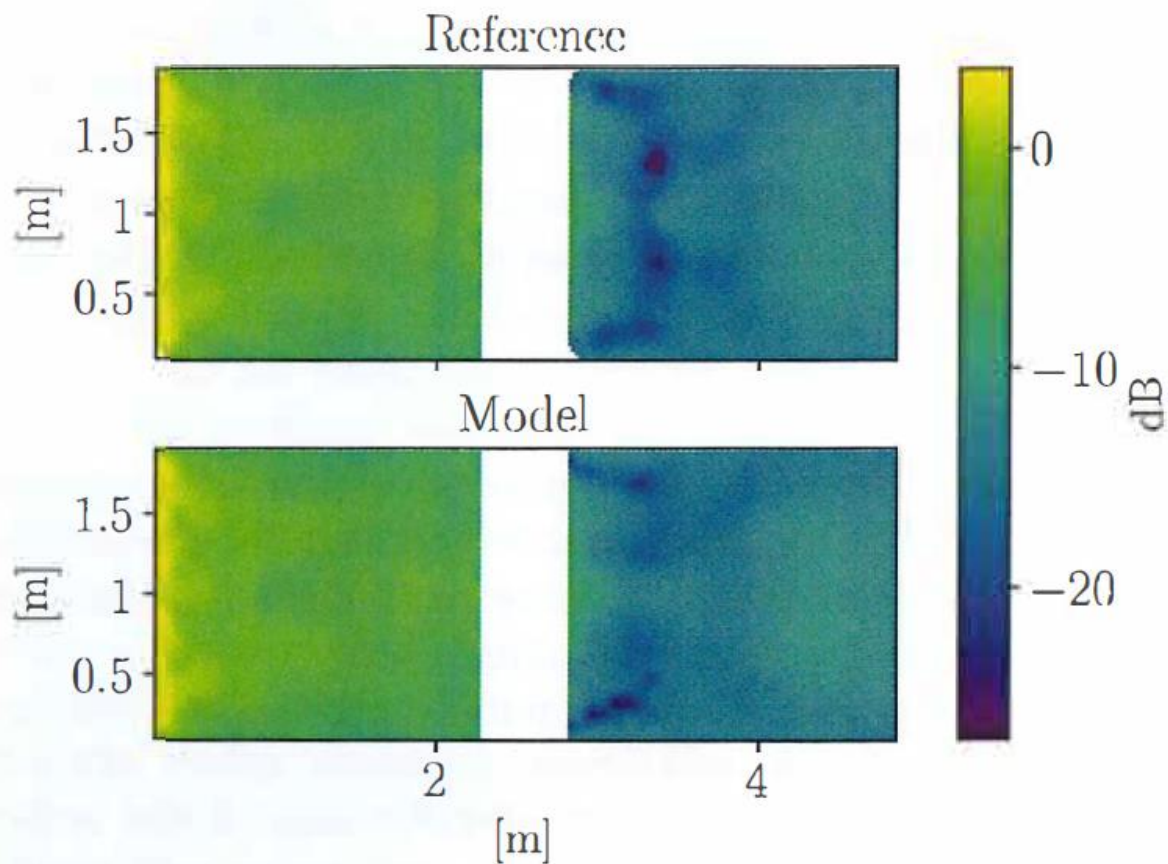




# Fresh data!!



# Source Radiation Model





## Concluding remarks

- Outdoor Sound Field Control works fine in controlled conditions
- Adaptation to changing conditions relies on IoT microphones
- Real time noise level estimation
- Increasing the geometrical complexity degrade the performance
- Number of measured transfer functions needs to be reduced
  - Combined model and measurements have now been tested in ongoing test
- The system needs to go adaptive, adjusting for weather conditions
  - testing ongoing this summer