Indoor and outdoor air quality investigations in daycare centers

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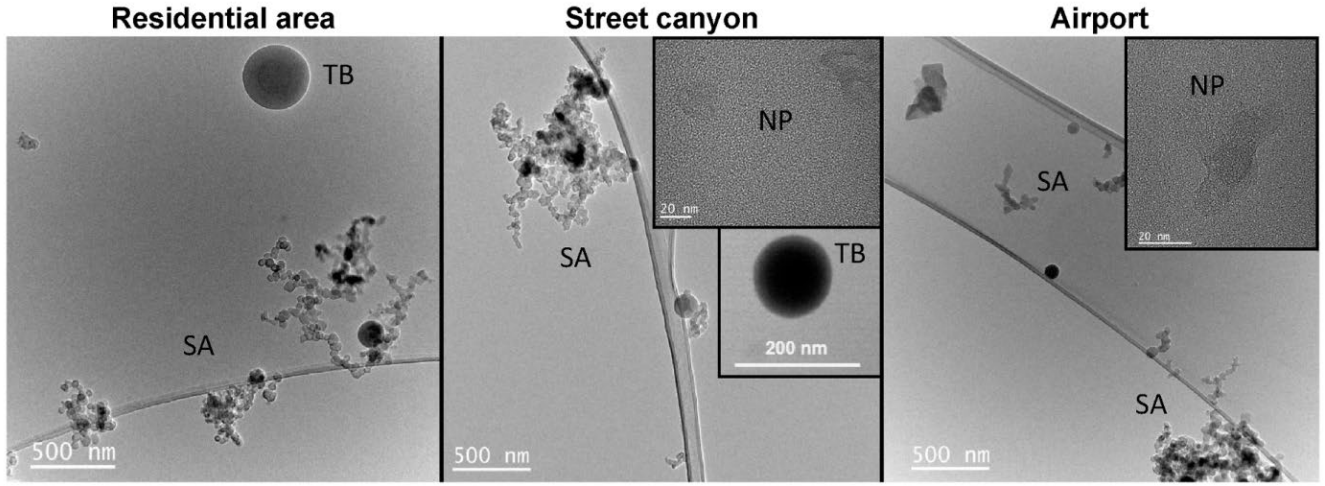
Objectives

- To understand the aerosol environment in daycare centers
- To understand how people are influencing the indoor aerosols in daycare centers



Lepistö et al., 2023. Snapshots of wintertime urban aerosol characteristics: Local sources emphasized in ultrafine particle number and lung deposited surface area. Environmental Research 231 (2023) 116068. https://doi.org/10.1016/j.envres.2023.116068

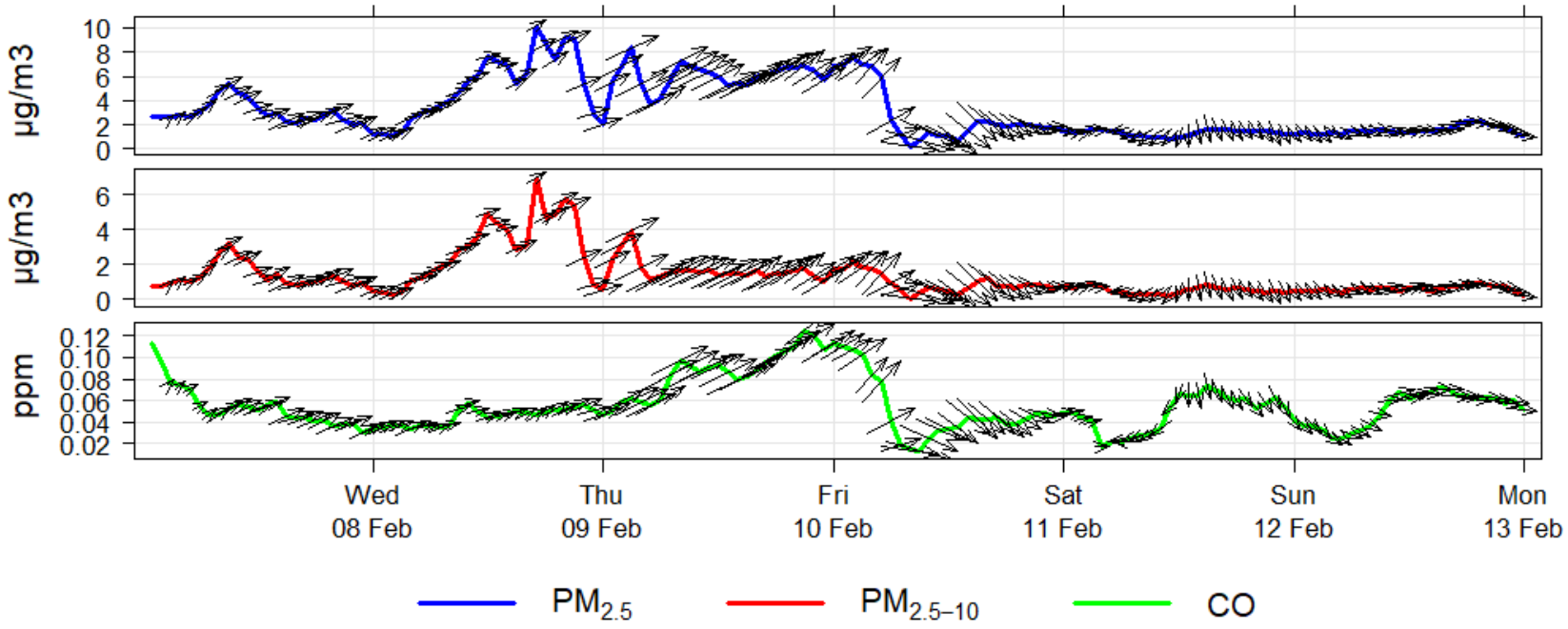
- To provide air quality information to support medical studies
- To study the impact of air cleaning intervention on the indoor aerosol concentrations.
- To evaluate whether infectious disease outbreaks in daycare centers can be monitored through indoor environmental monitoring.

Implementation

- Continuous sensor-type measurements in daycare centers for gaseous compounds and particles of indoor air: PM_{10}, $PM_{2.5}$, CO_2, T, RH, TVOC
- Continuous measurements of outdoor air quality parameters at one daycare center
- Continuous passive collection of airborne, settling dust
- Intensive measurement periods to enable more detailed aerosol investigations

  - ➢ Fibers, particle number, lung depositing surface area of particles, I/O ratios, contribution of outdoor air pollutants, ventilation rates
  - ➢ ATMo-Lab mobile laboratory

Results



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Outdoor particle number concentration in the area of the daycare centers

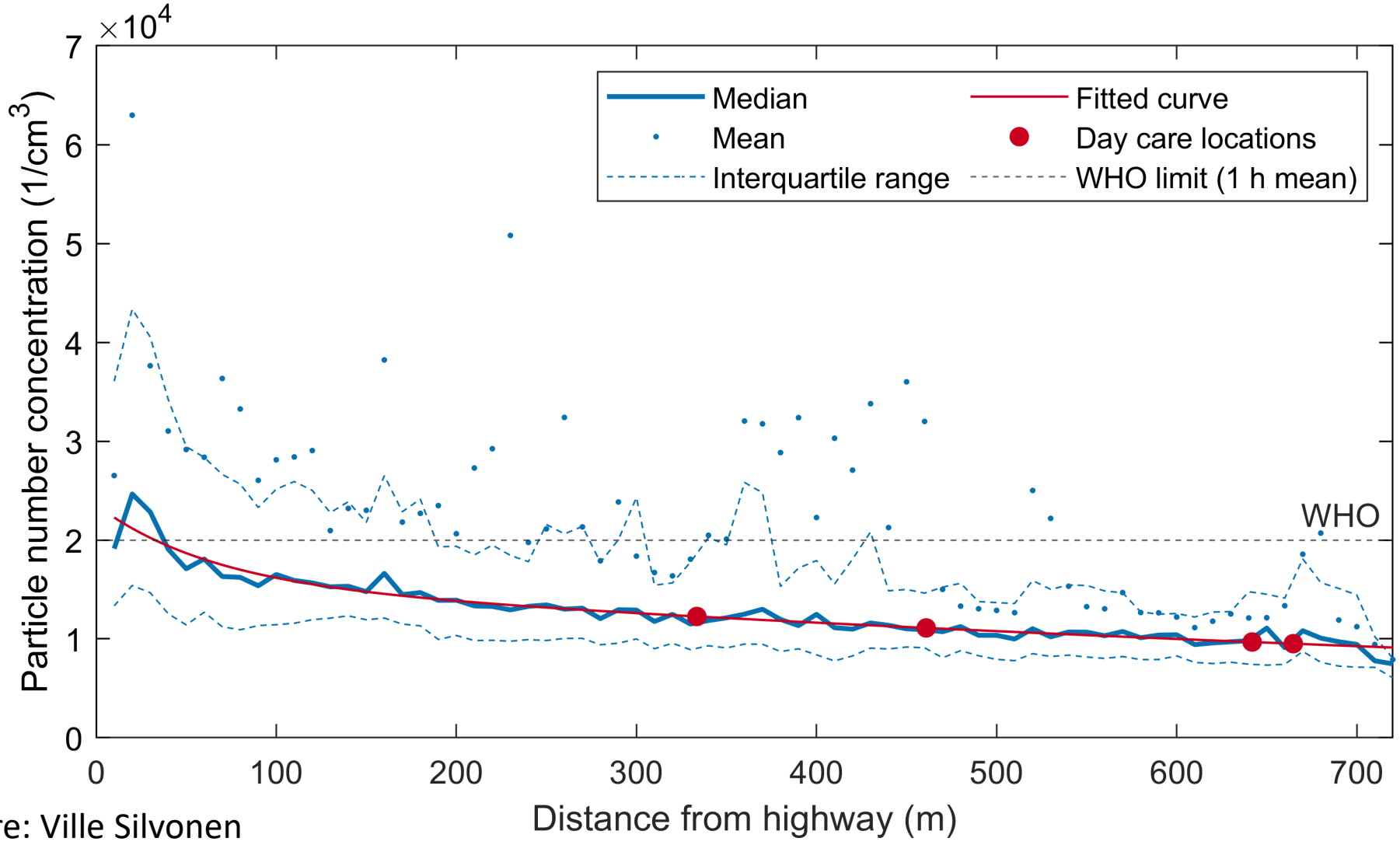
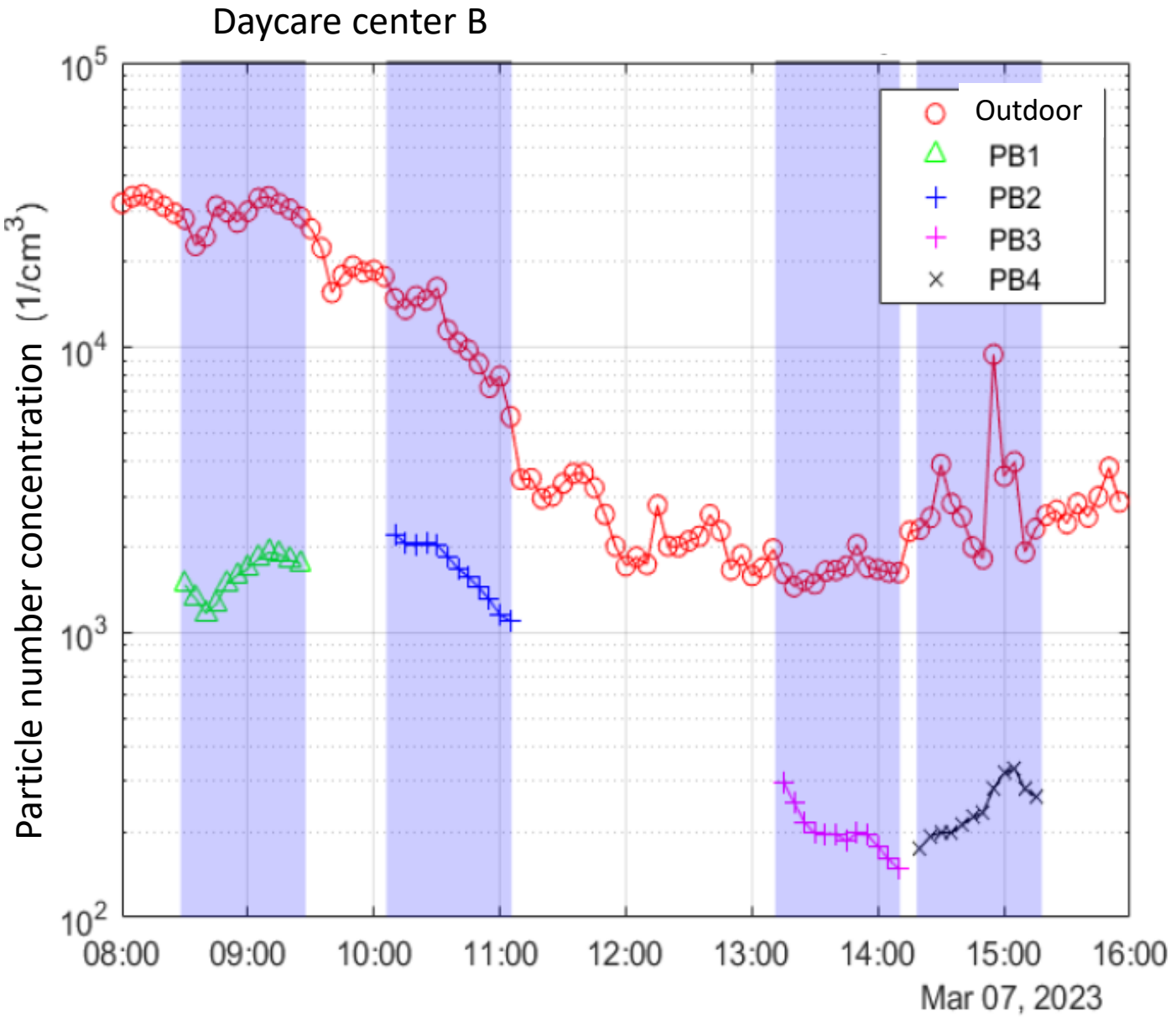


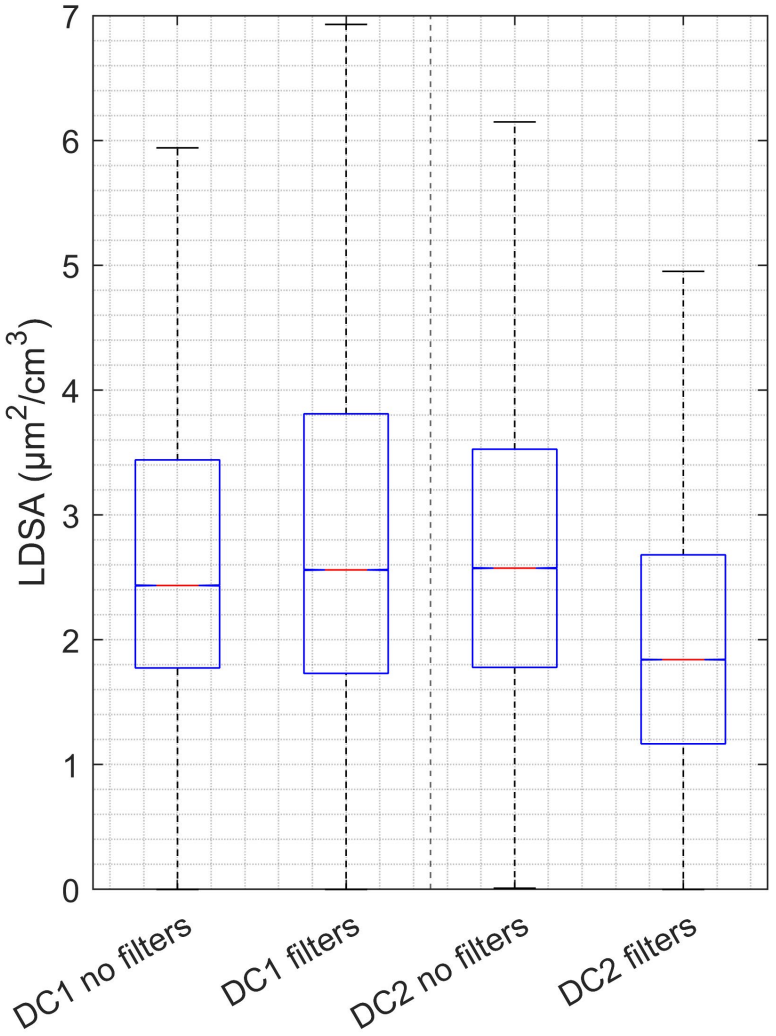
Figure: Ville Silvonen

Outdoor pollution contributes to indoor aerosol



Roosa Valijärvi, 2023. Hiukkasten lukumäärä- ja keuhkodeposoituva pinta-alapitoisuus päiväkotien sisäilmassa. Kandidaatin työ, Tampere.

Indoor particle LDSA concentration and the effect of air filtration units, an example



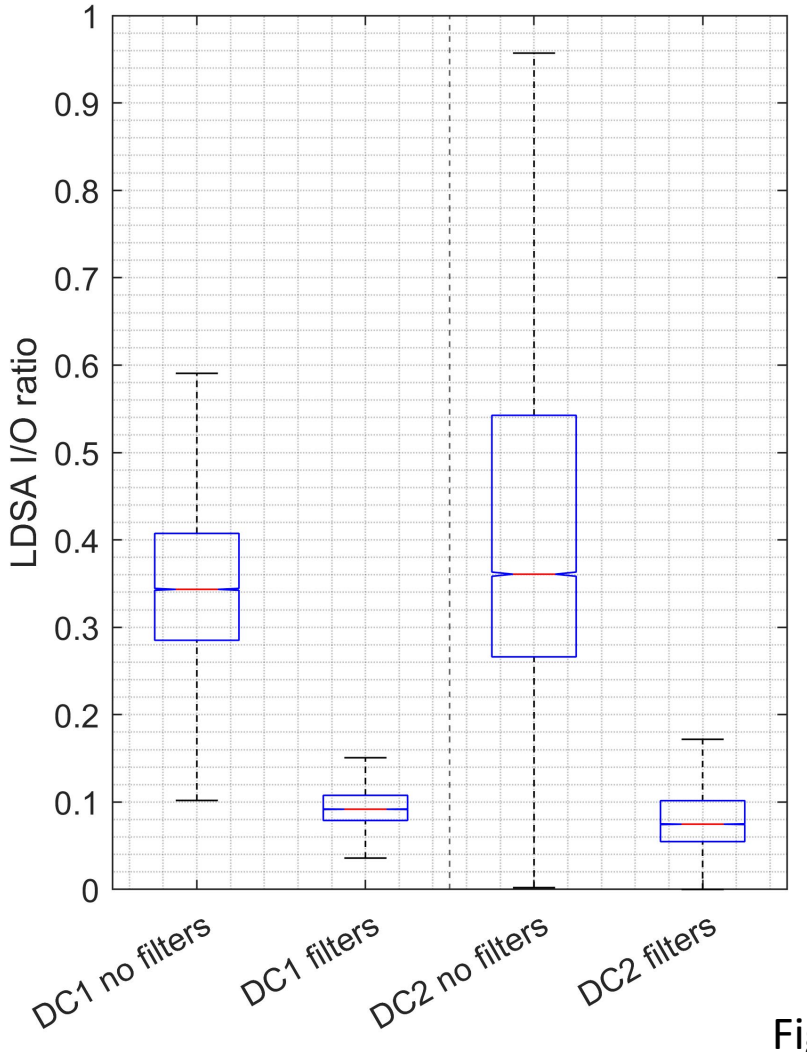
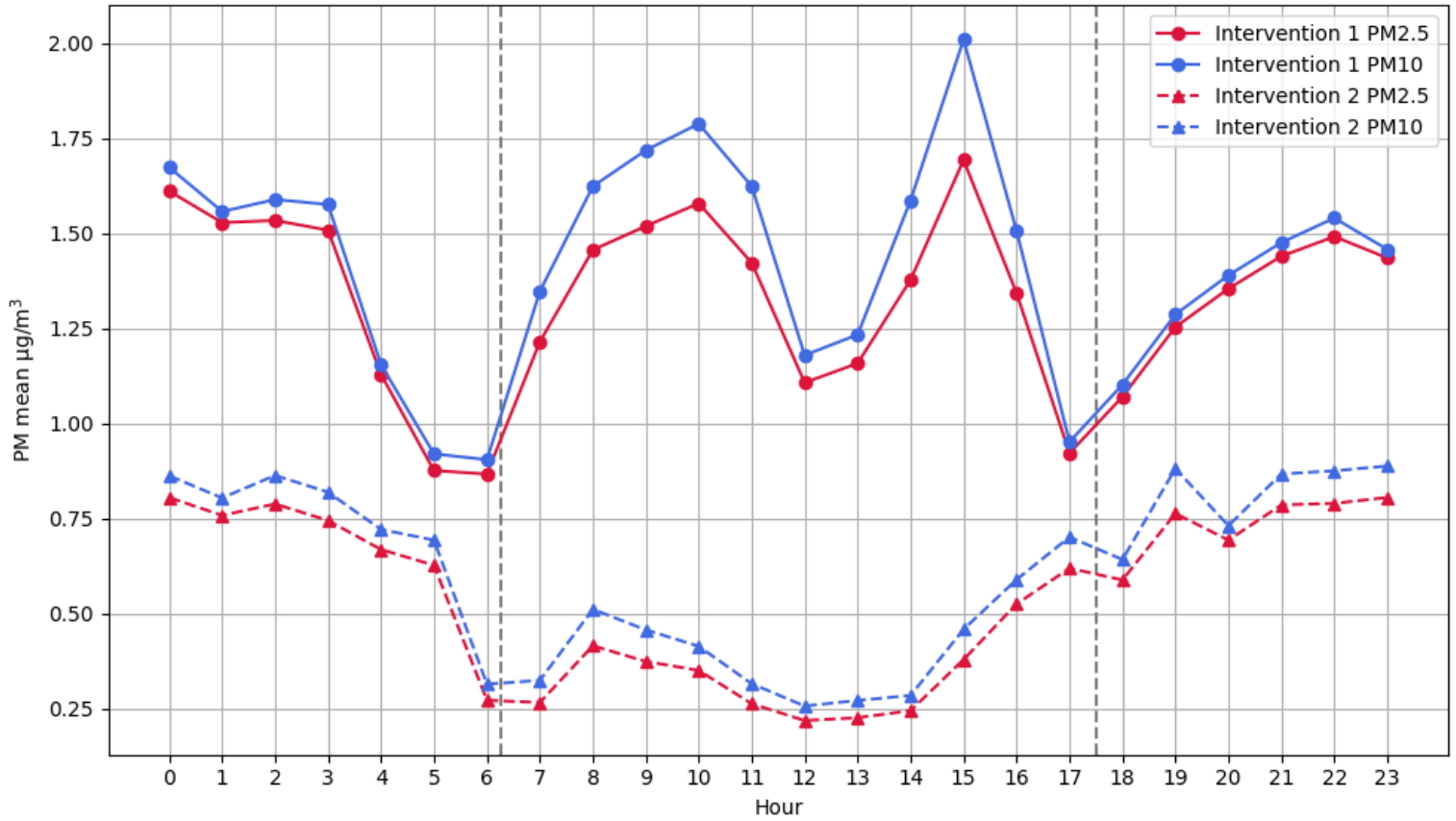


Figure: Ville Silvonen

An example of the effects of air purification units: diurnal trends



Daycare center open times: 6.15 am -17.30 pm
Air cleaners were in use during intervention 2.

Figure: Kai Lindberg

Summary:

- *Large amount of information is needed to fully understand indoor aerosol concentrations, sources and related risks*
- *Strong influence of outdoor particle concentrations to indoor aerosols*
- *Portable air filtration units can significantly reduce indoor particle concentrations*
  - *Need for validation by air quality measurements*
- *Urban planning / city level air quality actions can help reduce particle exposure*

Contributions:

- *Airlyse, ISEC, City of Helsinki*
- *TAU, TAMK, FMI, VTT, THL, HUS, Tamlink*

Thank you for your attention!

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