

Aerosol measuring equipment for teaching and research at DTU Sustain

Aerosols are particles that are suspended in the atmosphere. We find many local aerosol sources in the urban environment, but larger particles (PM_{2.5}) are also transported long distances. They all harm human health, and particle air pollution is the most extensive environmental problem related to human health in Denmark and most countries in the world. The equipment supported is two TSI DustTrak II handheld Model 8532 and one TSI P-Trak Model 8525. The Dust Traks measure the size distribution of particles in four fractions from 10µm down to 0.1µm in µg/m³, and the P-Trak measures particle number from 1 µm to 0.02 µm. The TSI equipment will be used in research projects to quantify particle size distributions in different environments and in nature-based solutions for reducing aerosol concentrations in the urban environment.

Both types of equipment will be used in different research projects. In January 2023, a BSc project will continue research on measuring aerosol concentrations inside homes using woodstoves. Here, we expect to document highly variable results related to the woodstove type, the chimney draft, and how it is used.

Another two-student BSc project will, from January 2023, measure possible aerosol uptake by vegetation in a wind tunnel. Different plant types, physiological states, densities, and wind speeds will be applied in the experimental setup. We expect to elucidate the importance of the ability of certain plants to capture aerosols.

For the two projects above, it is the intention that the data will be bundled together with results from other BSc and MSc projects and published. Some are already conducted, and some might be completed later.

In February 2023, a MSc project is going to start. Here, we are testing a newly developed chimney filter for houses using a wood stove. Both instruments will be used, potentially leading to a significant drop in particle emissions from woodstoves.

The instruments will also be included in a more extensive application related to indoor pollution from woodstoves. The application will be based on knowledge gained via BSc and MSc projects. Finally, the use of the instruments in a new facility at campus Risø is planned. A DKKM 35 reconstruction of our plant growth facility is scheduled to be finished in 2024. In the new Ecotron DTU, particle uptake from plants and ecosystems will be closer to nature experiments and, thereby, more realistic.