5.054 Assessment of calibration models for small sensor measurements of nitrogen dioxide and ozone using metal-oxide sensors .

Early Career Scientist

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Abstract:

Air pollution is linked to about nine million premature deaths worldwide in 2015 according to the last Lancet commission report. The classical view of urban air pollution monitoring is based on well-established and expensive reference methods installed in scarce and static monitoring stations. The use of small sensors as a complementary tool for air quality monitoring could give us high spatial density and temporal resolution relevant for city scale measurements and more information related to air pollution exposure of the population. This potential is however associated with challenges, such as interferences and the impact of environmental influences that require significant evaluation and calibration of the sensors to ensure data quality.
In summer 2017, in the framework of the project “Urban Climate Under Change”, a field campaign was carried out in Berlin, Germany where nitrogen dioxide (NO_2) and ozone (O_3) were measured using low-cost, small air quality sensors (Earthsense prototype Zephyrs). As part of the deployment, the sensors were co-located with reference instruments to develop calibration models. The co-locations took place before and after deployment for measurement experiments, such as the vertical distribution of pollutants in a street canyon. A number of calibration models were explored to assess the fits for the metal-oxide sensors, including simple univariate regression, multivariate linear regression, and a machine learning technique. Differences in the model performance will be presented, as well as their application to and the results from the vertical profile

experiments.