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Results of two intensive observation periods for evaluating a Smart Air Quality Network in Augsburg, Germany

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As part of the project “Smart Air Quality Net” funded by the German Federal Ministry of Traffic and digital Infrastructure, two intensive operation periods (IOP) measuring particulate matter distribution were conducted in the city of Augsburg in the autumn of 2018. The objectives of the SmartAQnet project are among others to validate the benefits of low cost sensors in urban air pollution measurements and establish an experimental traffic routing and pollution forecasting. During the before mentioned IOPs several mobile and stationary measurements with low cost sensors (i.e. Alphasense OPC-N2) were performed. The mobile measurements were via bicycles on a fixed route through the city and furthermore, two hexacopters were used to measure vertical particle matter distribution on two sites.
In addition to the two IOPs, continuous mobile measurements were performed throughout the year, beginning in March 2018. For this purpose, the commuter tracks of four employees were used in order to measure particulate matter via bicycle on their way to work and back home, respectively.
The used Alphasense OPC-N2 sensor is best in the range of PM2.5. However, the data show a strong dependency on relative humidity, which has been recorded by a SHT75 sensor. The humidity error has been corrected with an algorithm based on the κ-Koehler theory. After an additional bias correction, the values have a good correlation to high quality sensors.
In this study especially the spatial gradients in the urban environment, due to approximation to sources and sinks as well as ventilation conditions are focused.