



## **Evaluation of low cost and mid cost sensors for fine particulate matter at urban sites**

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High ambient air concentrations of fine particulate matter are a problem in many European cities, especially in traffic loaded street canyons. Therefore, the introduction of traffic restricted or traffic reduced areas is discussed as a countermeasure in several towns. However, at that point it is not always clear, in what extent the restriction of traffic in presently overloaded streets causes the exceeding of limit values in other areas of the town after the redirection of the traffic. Presently this cannot be recorded appropriately, when the concentrations of fine particulate matter are monitored only at rarely distributed single points by the official measurement systems of the environmental state agencies.

On the other hand, meanwhile there are low cost and mid cost sensors for the measurement of fine particulate matter available, which enable the parallel monitoring with many measurement systems in an extended area of the town. By this way, the effect of traffic restrictions on the distribution of fine particulate matter in the city can potentially be observed. However, at this point the question arises, how reliable the results are, which are delivered by the low and mid cost sensors for fine particulate matter.

For this reason different low cost and mid cost sensors have been evaluated for this study and intercompared with certified reference measurement systems for fine particulate matter. The study comprised the sensors SDS011 (Nova Fitness), which is in use already for several citizen science projects in Germany, SPS30 (Sensirion), OPC-R1 (Alphasense), OPC-N2 (Alphasense) and OPC-N3 (Alphasense).

This study was performed at urban sites in Düsseldorf (Germany) for several weeks and covered different traffic loads and different meteorological situations, in order to get representative results. As atmospheric humidity can influence the measurement results, the humidity was measured in parallel to the fine particulate matter. It could be shown that the validity of the measurement results of fine particulate matter could be improved, when the parallel readings of the humidity were taken into account.