Breathe London network-based calibration method

Since physical co-locations for a large network are resource intensive, alternative methods like the remote network calibration became advantageous. Developed by the University of Cambridge, this method dramatically reduced the level of effort needed to operate the stationary sensor network by enabling calibration without extensive co-location studies. Based on earlier work reported in Heimann et al. (2015) and Popoola et al. (2018), the method separates three signals: local, near-field and far-field/background. The local contributions are due to emissions near the receptor (1 – 10 m), the near-field contributions vary on scale of 10 – 1000 m and represent the contribution from dispersed sources local to the environment, while the far-field/background contribution is uniform over 1-100 km. By selecting periods when non-local pollutant levels are likely to be relatively homogeneous over the study area the method can be used to determine relative pod calibration parameters. The entire network can be scaled relative to a single AQMesh pod co-located with a reference monitor.

Breathe London used the network calibration method to determine NO_2 scaling factors for sensors without a valid gold pod co-location and for all $PM_{2.5}$ data. For NO the network calibration was used as a basis for deriving offsets, which were applied to regressions used to determine the sensor sensitivities from gold pod co-locations. Breathe London provided an extensive testbed for quantifying the performance of the method due to the density of the existing reference network, which enabled the widespread use of physical co-locations for validation purposes.

The network calibration methodology and an evaluation of this method's performance to that of gold pod co-locations are currently being adapted for publication in a scientific journal and will be made available in due course.