EGUsphere, referee comment RC2
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Comment on egusphere-2022-407

Anonymous Referee #2

Referee comment on "Are dense networks of low-cost nodes really useful for monitoring air pollution? A case study in Staffordshire" by Louise Bøge Frederickson et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-407-RC2, 2022

General Comments

Frederickson et al., presented results of a one-year measurement campaign with 18 low-cost sensors measuring NO2 and PM2.5 measurements in Newcastle-under-Lyme, Staffordshire, UK. They describe a remote calibration strategy for electrochemical NO2 measurements that accounts for the temperature-dependent response of the sensors used. They use spectral analysis to identify different frequencies in the PM and NO2 time series and allocate PM2.5 and NO2 to local, urban, and regional sources based on 3-defined periodicity ranges. In all, this paper highlights a successful measurement campaign and an insightful method for source attribution. This manuscript may be accepted for publication after addressing the following comments:

Specific Comments

This paper does not claim to validate the results, but a brief comparison to modeled NO2 and PM2.5 concentrations would significantly strengthen the findings and the claim that low-cost sensor networks offer additional benefits and insights beyond the ability of AQMs or expensive sensors. This could also be addressed by simply comparing the results of the Fourier Transform with an emission inventory for the area. Does this result tell us something new about the sources of NO2 and PM2.5 or does it validate the inventory?

Please comment on the remote NO2 sensitivity correction using the monitoring station at Stoke -on-Trent Centre, why do we expect the same variation at this reference site as in Newcastle-under-Lyme? Particularly given the difference in source apportionment between the AirNodes and this reference site seen in Figure 11, is this a reasonable assumption?

No correction used for SDS-011. Can you please comment on the validation of these sensors?

Please comment on the choice of <1 day and >3 days as the cutoffs for the regional or urban contribution frequencies.

Line 255. Is the observed difference as expected? Is there a reason to expect the reference to peak 2 hours later in the morning?

Figure 3 and 5 show comparison of a single AirNode, are these data characteristic of all of the AirNodes?

Line 302 is misleading because the seasonal effect is likely still the dominant effect. Which months were impacted by lockdown strategies?

Line 245-252 Can you show more details on the performance of modeled temperature data? On "the correction methodology even with the modeled temperature data, yields corrected readings that follow expected trends, giving confidence in sensor accuracy." If some sensors are shaded and others are in full sun, the temperature inside the sensor package can vary dramatically from the outside temp.

Technical Corrections

Line 175 missing a space: "Q0.25,AirNode"

Line 219 "a upper" -> "an upper"

Line 221 "on Figure 2" -> "in Figure 2"

Line 280 remove comma

Line 334 "speed" -> "speeds"

Line 380 "odccurs" -> "occurs"