

“Assessing Spatial and Temporal Urban Air Quality Variabilities with the Vaisala AQT530 Monitor”

General Comments

The manuscript presents the assessment of the Vaisala AQT530 Monitor in Cyprus. It is a long-term study (19 months) of two units deployed in an urban background and traffic location which has reference grade instrumentations for the co-monitored pollutants (CO, NO, NO₂, O₃, PM_{2.5} and PM₁₀). The authors showed that only the CO and to lesser extent PM readings had reasonable agreement with the reference monitoring data in terms of temporal (diurnal, seasonal) and spatial (background vs traffic) variability. They attributed the poor performance of the Vaisala AQT530 for the other species to the impact of environmental factors like RH and temperature. The strength of this work is the detailed statistical analysis carried out by the authors during the assessment of the AQT530.

Specific comments

The reviewer is of the opinion that this work shows the performance limitation of the commercial LCS device that the authors used rather than a general conclusion of the limitations of LCS application in ambient AQ monitoring because there are large body of work that shows this, the authors need to capture this in some form in their conclusions.

Technical corrections

The abbreviation ‘cf.’ is incorrectly being used throughout the manuscript. It means “to compare to” and I think the authors are using it to mean “see”. Authors need to correct this.

Authors sometimes also make statements that are not really justified in the first instance but are subsequently justified later on in the manuscript. For instance, in the final paragraph on page 6, the authors introduced periods classified as dust and non-dust period without justification or any citation to back this up, but did subsequently add a citation on page 8 second sentence when discussing the dust event. I would suggest the authors look into instances of this and make corrections.

On page 8, the reviewer also struggle to agree with authors the general conclusion that systematic bias in the LCS PM reading between the background site (UBS) and the traffic site (TRS) is mainly due to the former having less particles with diameter < 600 nm compared to the traffic site and the inability of the Vaisala unit to detect below this cutoff. This conclusion cannot explain why the LCS UBS is still significantly biased high compared to the TRS during dust episodes (Fig. 4e) when the PM is expected to be dominated by large diameter sized particles

Page 8 first paragraph “ PM₁₀ concentrations, however, are generally higher at the TRS compared to the UBS, as indicated by the reference instruments (Fig. 3g), which is in contrast to what the LCS measurements indicate (Fig. 3h)” Figures 3g and 3h are scatter plots for CO and NO₂ respectively that have no relation to PM₁₀. Authors need to correct this.

Page 8 second paragraph “ while those measured by the reference instruments were below 6–10 µg/m³” this statement is wrong. The difference for the reference instruments is never negative between the TRS and USB site as shown in Fig. 4f (solid line).

Authors need to add legends to Fig 4, Fig 5, Fig S14 and Fig S15 to help the readers.

Suggest the authors annotate Fig S2 to show when the firmware was changed for the NO₂ and O₃ sensors.

Table 4 appears to be an “image” and the font size is too small making it difficult to read. I suggest presenting this as an actual table and to increase the font size.