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Atmospheric Measurement Techniques Discussions

Interactive comment on "Calibration and assessment of electrochemical air quality sensors by co-location with reference-grade instruments" *by* David H. Hagan et al.

Anonymous Referee #2

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This is a well written manuscript that provides a potentially useful mathematical framework and method for extrapolating and interpreting lower cost sensor data against reference grade instrumentation. The work involves a large dataset of both experimental and reference data, and a thorough review of some simple machine learning routines to improve sensor predictions. The manuscript itself is particularly clear in its writing, and is easy to follow. I would recommend publication if the authors could address the following comments:

Minor Comments: There was an inconsistent use in the spelling of Hawaii (or Hawai'i) throughout the manuscript.

Major Comments:

Temperature dependence still seems to be an issue and warrants further explanation. For example, in Fig 7, it appears that low temps bias predicted concentration high, and high temps bias the predicted concentration low. This isn't always true in their data, but it would be useful if the authors would describe why such a consistent bifurcation persists.

The conclusion that this regression algorithm 'can be applied to any other sensor system' (page 22, line 16) seems to be an over reach and is without supporting data. While one may certainly elect to apply any algorithm to any dataset, whether it is useful or not remains to be seen. This is particularly true if one were sampling in strictly ambient levels for gases, where the wide dynamic range observed in this study would not necessarily exist.

While the study location is certainly convenient for observing a wide, dynamic range of SO2, this range is very unlikely to be observed in many other places across the world. The authors correctly note this as a limitation of the study, but the range of largest uncertainty is precisely where typical ambient concentrations of SO2 live. Describing (Fig 8) as 'lower levels of SO2' as less than 50ppb seems misleading; SO2 concentration in the US and across most of the EU is less than 20 ppb and trending lower. Further, the data in Fig 8 appear much tighter in the 20-50ppb range, and may be strongly biasing the regression.

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