Atmospheric
Measurement
Techniques

Discussions

Interactive comment on "High spatiotemporal resolution pollutant measurements of on-board vehicle emissions using ultra-fast response gas analyzers" *by* Martin Irwin et al.

Anonymous Referee #3

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This is an interesting paper showing how emissions of nitrogen oxides from driving cars in real-world driving conditions can be measured with very high temporal resolution. The combination of GPS data, and carefully constructed NOx measurement with a gas analyser that samples tailpipe emissions, allowed the authors to map some interesting features of NOx emissions as they occur in the real world. This clearly shows that NOx emissions are spatiotemporally heterogenous: much higher emissions are observed when cars accelerate after roadbumps, traffic lights, etc.

I found that the introduction of the paper lacked a bit of context. The authors should sketch who they think would be interested in these measurements, and why. Can they

be applied by national emission agencies for better emissions estimates, or are they useful for inspection authorities checking whether vehicles comply with EU-standards? Such information is missing from the paper. For illustration: the introduction now ends with wahet is "beyond the scope of this paper", but it would be better to formulate clearly what will be addressed in the paper. Also, I strongly support the suggestion by Referee #1 who calls for a link of the observations to Euro emission standards for good perspective.

Another concern I have is on the accuracy and the precision of the ultimate data provided (g/s and g/km emitted). The authors did not make any statement on the uncertainties in measuring the NOx concentrations at the tailpipe. This should be repaired, and I also think an uncertainty estimate should be provided for the emission strength estimates.

IF the authors wish to make the case that their method is superior to a conventional technique as PEMS, I think it would be good if they attempt to quantify how much better the detail is that they can detect now. Would that be relevant given the potential application of these data for e.g. vehicle compliance monitoring?

Specific issues P2, L20: dependant → dependent

P3, L11: Bajaj et al (2002) should be entirely between brackets.

P4, L22: "the deposition concentrations" is formulated a bit weird. With deposition, most atmospheric scientist understand the process of atmospheric constituents being deposited at the Earth's surface. Here it appears to describe the constituents emitted to the atmosphere. Please clarify to avoid confusion.

P12, caption Figure 3: please also include in the caption that this figure holds for a diesel car.