

***Interactive comment on “A cavity ring-down spectroscopy sensor for measurements of gaseous elemental mercury – Part 1: Development for high time resolution measurements in ambient air” by A. Pierce et al.***

**Anonymous Referee #3**

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This is an interesting paper and the authors have done a very careful job in improving the reliability and performance of their GEM measurement instrument. As I read the paper, however, I definitely had the impression that this is far instrument is still far from a field-ready sensor. Considerable care and expertise are required to perform the measurements, and even then there are some issues such as the effect of temperature fluctuations that are not completely understood and that still affect the accuracy and precision of the measurements. On the whole though, I support publication of the

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manuscript. A couple of minor revisions are suggested:

1. One very interesting aspect of the manuscript was the fast piezoelectric tuning of the dye laser wavelength, on and off resonance with GEM absorption lines at 25 Hz. It is unclear from the manuscript how this was implemented. Is this an option offered by Sirah or was this a custom modification performed by the authors. A diagram to provide more information on the piezoelectric tuning element is strongly recommended.
2. What was the time period between dye changes? Dyes that are pumped with the 355-nm Nd:YAG output typically last on the order of hours, which would seem to be a major obstacle to the development of a field instrument.
3. Is there some reason not to scan the dye laser wavelength over GEM absorption lines and record the absorption spectrum? In many ways this would simplify the instrument, eliminating the need for the wavelength locking cell and the fast piezoelectric tuning, for example. The authors should discuss why scanning measurements were not performed.

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Interactive comment on Atmos. Meas. Tech. Discuss., 5, 8995, 2012.

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