

## ***Interactive comment on “Photoacoustic hygrometer for icing wind tunnel water content measurement: Design, analysis and intercomparison” by Benjamin Lang et al.***

### **Anonymous Referee #1**

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This is a high quality work, definitely worth publishing. so only have one general and a few specific questions, primary related to the photoacoustic system. My major question is about the minimum detectable concentration of the presented instrument. For some reasons it is rather high. In the literature there are papers about water vapour measuring PA systems with sub-ppm MDC. The authors should compare their systems with other ones and explain the reasons of this deficiency. Further here are my small questions: 1. Page 5, line 8: It is written: “it exhibits minimal line shift with pressure, high absorption cross section”. These parameters should be quantified. Also these parameters of the selected absorption line should be compared quantitatively with the parameters of those absorption lines of water vapour which are in this wavelength

C1

range too. 2. Page 5, line 9. The authors apply square wave modulation. They should explain why do they prefer it instead of sinusoidal modulation. 3. Page 5, line 10-11. It is written: “just below the lasing threshold”. In my opinion a modulation which has the lower level just above the lasing threshold is preferable, e.g. as far as the lifetime of the laser is concerned, because the laser effect is not destroyed and re-built in each modulation cycle. 4. Page 5, line 22: response time. The authors should quantify the response time. 5. Page 6, line 6: “Optimum measurement pressure is primarily defined by the valve position of the pressure controller, due to flow noise generated at the valve”. This is a strange sentence (but of course it can be true) because normally other parameters, such as the pressure dependent sensitivity of the PA system should decide the applied measurement pressure. It should be explained why this is not the case here.

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C2