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Interactive comment on “Rapid, optical measurement of the atmospheric pressure on a fast research aircraft using open-path TDLAS” by B. Buchholz et al.

Anonymous Referee #2

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The paper by Buchholz et al., describes a new method to derive an accurate pressure from the measurement of an absorption of an atmospheric species. They use the the direct absorption of H₂O measured by the HAI-spectrometer using dTDLAS during the TACTS/ESMVal campaign to derive in addition to the water vapour absorption the pressure from pure spectroscopic parameters. The advantage of the method is, that no additional devices are needed, such that the derived pressure directly resembles the measurement conditions valid for the absorption. This is superior to additional sensors, which suffer from (even small) displacements or dead volumes relative to the absorption. The authors motivate their method from the basic spectroscopic equations

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carefully discussing the relevant parameters. They consider the additional broadening effects on the line shape and carefully discuss potential error sources acting on the line shape. The pressure values are compared to a 'traditional' micro mechanical sensor and the onboard measurements. The comparison demonstrate a good agreement between the MMP and the spectroscopic pressure and illustrate the validity of the methods. It is particularly impressive to see, that the method works during ascent and descent as well as for H₂O, although water vapour is varying by orders of magnitude in the atmosphere. The paper is fluently written, well structured and clearly explains the method and the steps performed (including the uncertainties acting on the line shape). I found the paper very convincing and therefore recommend it for publication almost as it is.

Minor remark: Considering Fig. 9 and 10, does the correlation in Figure 10 represent the data in Figure 9? If yes, how well is the performance over the whole TACTS campaign, given the fact, that the spectroscopic pressure seems to be always higher than the MMP as stated on page 4795?

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 4775, 2014.

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