

Atmos. Meas. Tech. Discuss., author comment AC2
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Reply on RC2

Luka Drinovec et al.

Author comment on "A dual-wavelength photothermal aerosol absorption monitor: design, calibration and performance" by Luka Drinovec et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-21-AC2>, 2022

amt-2022-21 - Answer to referee #3

We thank the referee for her/his comments which have enabled us to improve the manuscript.

Atmos. Meas. Tech. Discuss., referee comment RC2

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Comment on amt-2022-21

Anonymous Referee #3

Referee comment on "A dual-wavelength photothermal aerosol absorption monitor: design, calibration and performance" by Luka Drinovec et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-21-RC2>, 2022

Drinovec et al. provides a detailed characterization and thorough discussion on the design, calibration and performance as well as the associated uncertainty of a dual-wavelength photothermal aerosol absorption monitor in determining aerosol light absorption. The paper is well written and enough details are provided for the readers to understand the instrument and the tests performed. I have a few comments/suggestions for authors to consider. I recommend publication after these comments are addressed.

Page 5, Line132 stated "NO₂, which absorbs strongly in the blue-green part of the spectrum, is a commonly used calibration gas." And immediately in Line 134: "Calibration

with NO₂ is very common, especially for climate studies, because it is usually performed at green wavelengths, where the solar spectrum features a maximum." The two sentences are redundant. The authors can choose to keep one.

Author's response: We have decided to keep the second sentence.

Page 10, Line 294 mentioned "A new photothermal interferometer configuration...". Here it's not clear as written if the new configuration is relative to what was described above or older design documented elsewhere, and the authors should clarify it.

Changes to the manuscript: »Our photothermal interferometer configuration utilises an axicon to focus the pump beams into the sample chamber«

Page 12, Line 359: What is the selected optimum modulation frequency? Also can the authors comment on the larger error bars in the signal response observed for the 1064 nm channel?

Author's response: The criteria and selected modulation frequencies are introduced one paragraph lower in the manuscript. The sentence »The optimum modulation frequency is selected by the best signal-to-noise ratio.« is removed.

Author's response: Larger error bars for the 1064 nm channel are observed at long modulation intervals (low modulation frequencies: 6 and 9 Hz). This may be due to less efficient beam homogenisation for 1064 nm channel. The noise levels in 90-100 Hz frequency region are similar for both channels.

Page 16, Line 441: "...which proved very stable over a very long period...". It's difficult to assess what is considered "very stable" and "very long period". The authors should add more support to this statement.

Author's response: The alignment stability is already discussed in Section 3.1: »During one and a half years of instrument testing (including road shipment in excess of 3000 km to the two measurement campaigns) there was no need to realign the optics.«.

Changes to the manuscript: We change the text at Line 441 to: »The instrumental response depends on the overlap between probe and pump beams. After beam alignment both channels need to be calibrated.«