

Atmos. Chem. Phys. Discuss., author comment AC2
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Reply on CC1

Flora Kluge et al.

Author comment on "Airborne glyoxal measurements in the marine and continental atmosphere: comparison with TROPOMI observations and EMAC simulations" by Flora Kluge et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-416-AC2>, 2022

Dear Mriganka Sekhar Biswas,

thank you very much for your comments (indicated in **bold**) regarding our manuscripts. Detailed replies to your questions are outlined below.

Please note however that we do not report on MAX-DOAS but rather on airborne Limb (at constant elevation angle) and Nadir measurements using DOAS in the spectral retrieval.

- **NO₂ retrievals using different NO₂ reference spectra**

Since high NO₂ was predominantly encountered when flying within the planetary boundary layer, our glyoxal retrieval accounts for NO₂ absorption by including a NO₂ absorption cross section at 294K (compare lines 165 and following as well as tables 1 and 2 of the manuscript). For more details on the sensitivity of the inferred glyoxal as a function of NO₂, please inspect our response to comment 10 of Anonymous Referee #1. There, for large NO₂ conditions two example retrievals of glyoxal are compared, including and excluding a second NO₂ cross section.

For your orientation how well our NO₂ measurements compare with others, simultaneously measured NO₂ was investigated in a comparison study including several NO₂ instruments deployed on two aircrafts as well as photochemical modelling, see Schumann et al., <https://zenodo.org/record/4427965>, fig. 49).

- **Glyoxal retrievals using different wavelength ranges**

In the analysis, the impact of the wavelength range for the glyoxal retrieval is investigated by applying both suggested fitting windows to all measurements. The test retrievals indicate that relative to the two discrete fitting windows, the continuous wavelength range decreases the spectral residual on average by a factor of three for comparable signal to noise ratios. For more details, please inspect our responses to comment number 11 of the Anonymous Referee #1. It also shows a figure on the impact of the employed wavelength range on the inferred dSCDs, signal to noise, and spectral residuum.

- **Figures 6 and 7**

In fact, the idea of Figs. 6 and 7 is to show where the distributions coincide and in which cases they do not. For better comparability, both distributions are intentionally plotted one top of each other, such that for an ideal comparison one would only see a single distribution.

With my best regards,

Flora Kluge