Atmos. Meas. Tech. Discuss.,
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Atmospheric Measurement Techniques Discussions

Interactive comment on "Improvements to a laser-induced fluorescence instrument for measuring SO_2: impact on accuracy and precision" *by* Pamela S. Rickly et al.

Anonymous Referee #2

Received and published: 31 December 2020

This manuscript describes improvements performed on a laser induced fluorescence instrument dedicated to airborne atmospheric measurements of SO2 to (1) improve both precision and limit of detection and (2) assess whether other fluorescent species could interfere during ambient measurements.

The work reported in this publication was carefully performed and is described in a clear and concise manner. This publication will be of interest for the scientific community. I therefore recommend publication with only a few minor comments:

L123-126: "...while precision sufficient for measurements in the UT/LS was achieved, the detection limit was determined by the background from scattered photons ..." -

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Discussion paper

Please indicate the precision reached on this version of the instrument and the main sources of noise contributing to the background signal.

L269-270: “Furthermore, the detection limit shows a decreasing trend with increasing pressure (Fig. 8) due to a linear increase in fluorescence signal in this regime.” – When the pressure increases in the measurement cell, wouldn’t we expect a reduction of the fluorescence yield due to an increase of collisional quenching. If so, why is the fluorescence signal increasing linearly with the pressure?

Section 6: It seems that calibrations were performed under dry conditions. Could the SO2 fluorescence signal be impacted by quenching from ambient water vapor?

Figure 11 (right panel: FIREX-AQ): not discussed in the text

Figure 11 (insert): Please add significant figures for the uncertainty reported on the slope

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