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Atmospheric Measurement Techniques Discussions

Interactive comment on "On the absolute calibration of SO_2 cameras" *by* P. Lübcke et al.

Anonymous Referee #3

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This paper presents a valuable contribution to ensuring that an accurate calibration for the high temporally and spatially resolved SO2 cameras is performed. It provides a thorough characterization of the detector sensitivity and inter-comparison between various techniques currently used in monitoring SO2 from volcanic plume sources. The paper is well structured and written and I recommend publication after some mostly minor changes.

Major comments

Page 6185 line 3 light dilution requires definition as many readers will be rather unfamiliar with what this is referring to

Page 6186 line 11 time resolution of 1Hz – and elsewhere often time resolution is actually given as a frequency and vice versus, these are different quantities, do not

use interchangeably.

Page 6187 line 10, the discussion of aerosol's wavelength dependence is also true for the strong ozone absorption which occurs in this wavelength region and should be introduced here.

Page 6190 line 18 why is the range of 305 – 320 used for the band centred on 315nm with a FWHM of 10nm? Related the acronym CW is not necessary remove and write in full.

Page 6191 line 25 – is the push broom method providing a truly independent second spatial dimension, as the description leads the reader to believe? Or rather is a higher sensitivity to the second spatial dimension, but is not independent of the first spatial dimension, and a complex retrieval algorithm is required to obtain the vertical and horizontal dimensions? If the latter, then here is a good place to describe the necessity of performing a complex radiative transfer retrieval to obtain the two spatial dimensions.

Page 6196 the peak transmission information is repeated in this section, it is more informative on page 6197 line 8. Please be consistent with the use of peak versus central wavelength etc – central is more accurate.

Page 6198 line 7 are mass mixing ratios the preferred units (over volume mixing ratios)? Either way how is the temperatures within the plume dealt with – where do the temperature and pressure profiles to convert the number densities to mixing ratios come from?

Page 6204 line 6 point the reader to the calibration curve later (rather bring the calibration figure forward as it is relevant here).

Page 6204 line 12 When was the change discovered, i.e. back in the laboratory after the measurement campaign was complete – i.e. the return transport could have also played a role? Or in the field at the end of the measurement campaign?

Page 6205 line 12 translate, rotate shear and scale ? The mathematically robustness

is questionable with manually identifying features then applying a matrix, why are the features not able to readily found through correlations between the datasets and thus aligned? With the IDOAS sampling outside the FOV of the camera, a true alignment is compromised, and in fact the instruments are simply sampling the plume differently (though with much overlap). Relative to the comprehensive treatment of the DOAS comparison the IDOAS comparison is weak, the paper would benefit from a more robust comparison here.

Page 6211 line 24 radiation dilution effect – light dilution early, be consistent – and use a term more descriptive or well known in the literature such as scattering of radiation into the FOV due to the plume or something better.

Minor comments

Page 6184 line 27 extend should be extent

Page 6193 line 23 insert this – but this increases. . .

Page 6194, line 10 insert for: corrected for by. . .

Page 6194, line 22 move definition of light dilution to earlier in the text.

Page 6195 line 17 replace behind with with

Page 6198 line 15 here and 6201 line 3 less than (not then)

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 6183, 2012.