

Interactive comment on “In-operation Field of view Retrieval (IFR) for satellite and ground-based DOAS-type instruments applying coincident high-resolution imager data” by Holger Sihler et al.

Anonymous Referee #1

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The paper by Sihler et al. presents a method to retrieve the field of view of low spatial resolution (LR) instruments by using coincident high resolution (HR) measurements. The method is applied and its results are discussed for three pairs of LR/HR instruments: GOME-2/AVHRR, OMI/MODIS, and a spectrometer used alongside a so2 camera.

Overall, the paper is interesting and well-written, it fits in the scope of AMT, and the method and results will be useful to the community. Therefore I recommend publication, after the authors have taken into account the following remarks.

Major comments _____

C1

- there is no error analysis for the regularized solution used for OMI and the SO2 camera. Could the the sensitivity studies on lambda (fig 15)could be used to infer some estimation of this error? If this is not the case, the author should stress that the error analysis for the regularized problem is difficult also in the conclusion, not only in the appendix.

- SO2 camera: it s difficult to rule out the effect of the mountain edge in the observed FOV heterogeneity. In principle (not doable with the presented dataset in practice) it seems easy to check that by shifting a bit upward the instrument so that the mountain does not impact the measurements. If the authors agree with that, this could be mentioned in the corresponding section and in the conclusion, as it could be useful for other teams using the method.

-the 'artefact' of the small wings on the swath edges for OMI. The formulation is ambiguous here since 'artefact' usually refers to an artificial effect introduced by the experiment. In the conclusions, the authors write that this observed pattern ('artefact') could either originate from stray light (in that case, it would be something physical) or from an effect due to the incomplete FOV model (this would be an artefact of the method not related to something physical). This should be rephrased for clarity.

Minor comments _____

Introduction

-the authors could add the space borne instruments corresponding to the laboratory FOV characterization (p2 L.15)

-It would be useful to give a few words on how the present study differs from DeGraaf 2016 (p 3, l. 4)

-the structure of the paper should be presented more clearly in the last paragraph of the introduction

Method

C2

- p 5 l.1 how long is the period after averaging ?
- is there not a reference paper for AVHRR?
- P.9 L. 2 'ground based stray light DOAS' -> stray light? Should not it be 'scattered light' ?
- p.10 l.1 please add manufacturer of USB2000 (Ocean Optics?)
- p10, l 7, please add geographical coordinates of the volcano
- p11, l.5. The paragraph is not very clear. The second rotation seems to be the one described above in point 2 (?). Could you include it for clarity?
- p 12 from eq 2 to eq 3, you add a the constant c_0 but this should be described before eq 3 since it means that the equation 2 is not just 'rearranged'

Results

- p19, l19,20 There is a mix between along and across track between the text and the fig 14. And 'there is a difference between...' could the author be quantitative on that?
- p.22, l.8 , 'b3 was always positive, ... clearly visible in Fig.16 '. Is it clearly visible? The integrated values seem to peak at 0 on Fig. 16.

Technical comments ---

- p 4, l 4. Comma missing before Calies
- p 4 , l .18 MCSs should be MSCs
- p5, l .12 The -> the
- p.6 l. 10 missing comma before Levelt
- p25 l. 24 8b should be 8a
- p.28 l.28, an independent method IFR -> reads weird, should be rephrased eg 'the

C3

independent method IFR'

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C4