

## ***Interactive comment on “Joint retrieval of surface reflectance and aerosol properties with continuous variations of the state variables in the solution space: Part 1: theoretical concept” by Yves Govaerts and Marta Luffarelli***

**Anonymous Referee #2**

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Dear Authors/Editors,

I had mistakenly given a detailed review of this manuscript (AMT-2017-29) at the Quick Review stage. I'm glad to see that the authors clearly improved the draft. However, I feel that more work is needed to make it publishable. I have attached again a marked-up pdf with suggested corrections that should all be addressed; general concerns are reported below.

- The manuscript fails in providing the most interesting piece of information, i.e. HOW to choose the set of vertices for each operational inversion.

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- Major concerns remain towards the real applicability of this inversion given the highly idealized choice of parameters and observation scenario (rather atypical of satellite observations). It's OK to make this the first part of a dual-paper study, but at this point the two manuscripts should be submitted together so that the reviewers could be convinced of the ultimate and general performance of the method. I have looked into [http://www.rayference.eu/CISAR/SEVIRI\\_report.pdf](http://www.rayference.eu/CISAR/SEVIRI_report.pdf) as suggested in the authors' preliminary response, yet that report deals with only one study case where the conclusion seems to be that the AOT is systematically underestimated (by ~50%) with respect to AERONET observations (it is of course possible I'm missing something).

- All figures should be re-plotted with fonts at least twice in size
- I trust that in Figure 2 now the arrows have lengths proportional to the discussed changes. Nonetheless, more wavelengths would be needed to make the figure informative. Perhaps, it could be made into a two-panel figure with Fig. 3?
- Figures 6-12 should be merged in a single figure (or two).
- The comments to Figs. 6 and 7 confuse me: for example, in Fig. 6 it is said that  $w_0$  is well retrieved and the  $g$  parameter systematically underestimated, but the figure shows the opposite. Similar arguments hold for Fig. 7 ( $g$  no longer systematically underestimated,  $w_0$  slightly underestimated).
- Could you make Table 6 into a figure instead? This would also eliminate the need for Table 5, since the true values could be pitted as you did for Figs. 7-12.

I hope this will help!

Please also note the supplement to this comment:  
<http://www.atmos-meas-tech-discuss.net/amt-2017-29/amt-2017-29-RC1-supplement.pdf>