

## ***Interactive comment on “Observation of absorbing aerosols above clouds over the South-East Atlantic Ocean from the geostationary satellite SEVIRI – Part 1: Method description and sensitivity” by Fanny Peers et al.***

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Dear Editor:

This manuscript outlines a technique to simultaneously retrieve above-cloud aerosol optical properties and underlying cloud properties from Meteosat Second Generation (MSG) Spinning Enhanced Visible and Infrared Imager (SEVIRI) over the southeast Atlantic. This work demonstrates a cogent pathway for estimating the aerosol direct radiative effects in the southeast Atlantic by using high temporal resolution data to

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synchronously evaluate diurnal cycles of aerosol and cloud properties. Overall, this paper is concisely and coherently written with minor technical issues. Thus, I support the publication of this manuscript in the Special issue of Atmos. Chem. Phys. upon addressing the comments and suggestions.

Best regards,

-Ian Chang

General Comments:

The criteria for rejecting aggregated retrievals using standard deviations of AOT and inhomogeneity parameters of CER to remove high AOT uncertainty grids are performed to ensure that the accepted retrievals are reliable. However, such filtering would discard some reliable pixels. I suggest the authors discuss the number of cloudy pixels that are removed using this filtering technique since removing an excessive number of cloudy pixels may have a significant impact on estimating the above-cloud aerosol direct radiative effects. Also, have the authors tested the filtering at finer grid resolutions in order to retain a higher number of reliable retrievals? Despite the remarks, I anticipate that Part 2 of this manuscript will elaborate on these points.

A major objective of this paper addresses the sensitivity of retrievals due to aerosol model assumptions. This analysis is presented using a case study from 28 August 2017 at 1012 UTC. Since this paper aims to demonstrate the validity of simultaneous above-cloud AOT and underlying COT retrievals throughout the day, a sensitivity analysis should be presented at different times of the day instead of only at a particular time of the day. Hence, the authors should present these details during other hours of the day (unless the uncertainty variations are negligible throughout the day) if there are sufficient time and space to consolidate this information. Alternatively, the authors need to explicitly indicate that this uncertainty estimate is limited to a case study and discuss the anticipated uncertainties during other times of the day. The abstract should state the ranges of modified parameters that are used to conduct the sensitivity analysis and

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mention the time period that the uncertainties represent.

Specific Comments:

Page 7 Lines 267-269: Is the negligible retrieval sensitivity associated with aerosol/cloud altitude assumptions quantified or is the negligibility a mere presumption? Both Jethva et al. (2013) and Meyer et al. (2015) have quantified retrieval uncertainties associated with aerosol top height assumptions.

Page 10 Lines 398-399: The above-cloud AOT retrievals are stable within two times the standard deviation of the retrievals but not necessarily stable within one standard deviation. Thus, it is only more stable relative to one standard deviation. I suggest the authors justify the validity of defining the stability with respect to two standard deviations.

Technical Corrections:

Page 2 Line 84: "polar orbiting" => "polar-orbiting"

Page 3 Line 89: "from satellite platforms than currently available" => from geostationary satellite platforms instead of polar-orbiting satellite platforms that have coarser temporal resolutions.

Page 4 Line 160: "MODIS, and hence" => "MODIS. Hence, SEVIRI is significantly"

Page 5 Line 174: Remove "and" and "one"

Page 5 Line 212: "of hydration" seems redundant in this sentence.

Page 6 Line 220: "are" => "include"

Page 6 Line 255: "are close" => "are close to each other"

Page 7 Line 268: "due of" => "due to"

Page 7 Line 286: "around" => "approximately"

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Page 7 Line 286: "observations" is vague in the context of this sentence. I suggest "pixels" as a more suitable word.

Page 8 Line 297: "on the 28" => "on 28"

Page 8 Line 334: "10% indicating" => "10%, indicating"

Page 9 Line 380: It would be helpful to mention that the uncertainty of each component is computed from the averaged absolute values between the positive and the negative biases of the modified parameter.

Page 10 Line 420: "from" => "for"

Page 11 Line 431: "polar orbiting" => "polar-orbiting"

Page 11 Line 435: "in" => "of"

Page 11 Line 439: "the" => "their"

Page 11 Line 441: "contribution" is a bit vague. I suggest replacing this term with "absorption" or a more definitive term.

Page 12 Line 485: "above cloud" => "above-cloud"

Page 18 Line 729: "Cloud optical thicknesses (COT) and aerosol optical thicknesses (AOT)" => "COTs and AOTs"

Page 18 Line 733: "COT and CER" => "COTs and CERs"

Page 18 Line 734: "absorbing aerosols above" => "overlying absorbing aerosols"

Page 20 Line 748: "ones" => "lines"

Page 21 Line 758: "composite" => "composite for"

Page 22 Line 779: Remove "the"

Page 24 Line 798: "ones" => "areas"

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