

Interactive comment on “Validation of a modified AVHRR aerosol optical depth retrieval algorithm over Central Europe” by M. Riffler et al.

Anonymous Referee #1

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General comments ————— The paper addresses a highly relevant subject, since AVHRR provides the only opportunity to derive a 25 year historic dataset over land with medium resolution. However, the approach developed is not fully independent from AERONET data as claimed since it uses AERONET inversion products to prescribe single scattering albedo. Secondly, I find the frequent reference to sections later in the paper somewhat confusing. I thus recommend minor revisions to make the structure of the paper more stringent and to extend the discussion of the results.

Specific comments ————— 1) Relevance: this is out of doubt definitely a highly relevant topic for aerosol remote sensing 2) Innovation: the approach chosen is innovative and clearly means an improvement over older methodology 3) Conclusions: As stated above I am not fully convinced of the independence from AERONET as inver-

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sion products are used to better characterize onega0 in the retrieval - this should be clearly stated in the discussion section 4) Methods and assumptions: the methodology used is explained - in some cases a critical statement on the impact or validity of assumptions made would be helpful 5) Results: The validation done clearly shows the impact of the changes in methodology made. 6) Traceability of results: The retrieval methodology is described with enough detail and also the validation undertaken is clearly summarized. I recommend that all elements of the methodology description which are currently distributed over two sections (3, 5.1) should be provided in only one integrated methodology section for easier reading. 7) Earlier and related work: This is clearly identified and credited 8) Title: It provides a good summary of the paper content 9) Abstract: The abstract provides a good overview of the paper. However, the restriction of the entire study to Europe must be mentioned (not only for one part of the validation). 10) Structure: As mentioned above I find it confusing that several times a statement like "this will be discussed later in the paper" is made. To ease reading this should be avoided and all relevant information provided in the first place it is important. Also some sections are very short (2.1 - 2.4, 4 - only about 10 lines) so that they should be better combined with other parts of the paper. 11) Language: The paper is well written with very few grammar errors 12) Mathematics, units: The common notation in this community is used 13) Parts which need improvements: As said under point 10 some very short sections should be combined with other parts. 14) References: These are appropriate 15) Supplementary material: The figures and tables provided contain the relevant information to elaborate the approach and results of the paper.

Technical corrections ————— p 786/l 6: mention limitation "for Europe" p 786/l 10: "thresholds" needs explanation here p 787/l 7: also Kokhanovsky et al., 2009 (Springer) could be added with a more actual overview p 787/l 17: "spectral properties" of what? p 788/l 8; "assess" - and develop, isn't it p 788/l 10: applicability to pre-AERONET era - this needs thorough analysis and discussion of calibration stability - a statement should be added p 789/l 9: micro-physical properties are not derived, but used p 789/l 11: "EXT" - needs explanation p 789/sect. 2.2: MERIS AOD is not

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(yet) well accepted in the community and (as also your results) show not a good choice as reference product; also missing thermal IR bands and consecutively weak cloud flagging is an issue that needs to be mentioned p 789/l 18/9: what is the impact on the accuracy of this extended product? p 788-790: for all products known accuracies should be quoted p 790/l 2: VISvs2.12 needs explanation for non AOD retrieval experts p 791/l 9: "with a pre-defined aerosol model" - this is one place where explanation is only provided later in the paper which makes it hard to understand here p 792/l 17: fig. 1 has almost all values of ρ_{surface} higher than 0.07 - so it will be difficult to meet this condition - please explain? p 792/l 25: how many AERONET sites were used? p 794/paragraphs 1 and 2: GlobCover only provides land cover, not aerosol model p 794/ first paragraph: an aerosol model must also include size / Angstrom coefficient, not only absorption p 794/l 26: "negative variations" - better: "under estimations" or "negative errors" p 794/l 27 "boxcar average": what is the impact of this step? ("slightly" quantified!) p 795/l 6 and l11/12: other potential reasons should be discussed: time of the day, BRDF, solar elevation, water sediments, ... p 795/l 26: "absorbent" - wrong word! p 796/l 8: "derived" - from what? p 795/last paragraph: only here you explain the aerosol model used - this is too late! Also it remains unclear if is this one fixed assumption with adapted ω_0 per site? p 796/l 11: "Owing to quality reasons" what do you mean by this? Explain! p 796: so the AERONET data are needed to determine the aerosol absorption - not fully independent as claimed p 797/l 16: ALPHA is not explained p 798/l 9: "insufficient" better: "under-estimated" p 799/l17: the reason is not the repeat cycle of the ENVISAT satellite (similar to TERRA), but the narrower swath of MERIS instrument p 801/ section 5.3.3: discussion of different time of the day is needed p 801/l 22: "What is more" - weak expression p 801/l 23: "absorbent" again p 802/first paragraph: good N17/N18 agreement despite different time of the day - add a statement p 802/l 8/9: "Although, ..." - this sentence is not complete P 802: a discussion of different overpass times, calibration and impact of AERONET-determined ω_0 should be added table 1: you could add columns with mean Angstrom coefficient and land cover per station table 2 caption: instead "proposed method" better "new method"

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or "adapted method" table 3 caption: these are not comparisons with various satellites, but with AVHRR AOD retrievals from them; last sentence better: "Abbreviations for the AERONET sites are explained in table 1." table 3 and figure 1: RHO surface - add wavelenght/band

language and spelling errors: p 788/l 3: towards p 788/l 9: on AERONET data for correction p 788/l 12: assumptions on p 788/l 21: data validation method p 789/l 5: sites from AERONET p 795/l 8: At the same time p 795/l 12: comparison of monthly p 802/l 21: differences between

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