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# ***Interactive comment on “Towards a long-term global aerosol optical depth record: applying a consistent aerosol retrieval algorithm to MODIS and VIIRS-observed reflectance” by R. C. Levy et al.***

## **Anonymous Referee #1**

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General comments Constructing long-term Climate Data Records from a series of similar satellite instruments is a very important task for their utilization in climate change research. The required accuracy and stability for climate applications are extremely high and therefore usually extra efforts beyond the “normal” mono-sensor processing are needed to meet them. The paper investigates the issues which need to be solved in this challenging task when combining MODIS and VIIRS instruments for producing an AOD (and over ocean Angström coefficient) time series. First the two different algorithms currently in use are analysed and then a common algorithm is applied to both

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sensors, but due to their (small) differences several sensor-specific adaptations are needed (e.g. deviating central band wavelengths). A thorough evaluation of the results in an overlapping period of about two years is conducted and the arising problems are evaluated and discussed. The evaluation uses different means such as daily imagery, seasonal maps, level2 and level3 validation statistics (including thus the step of data aggregation), frequency histograms, global and regional time series which all together allow a comprehensive assessment of the datasets. The paper also discusses a number of relevant technical and practical aspects, which also need to be tackled to produce a consistent time series. The paper is perfectly in the scope of AMT. It addresses a highly relevant topic (long-term consistent satellite data records), which is key to wider utilization of satellite records in climate science. The paper does present novel concepts (retrievability) and contains a thorough discussion of the requirements to produce a multi-annual climate data record from the two instruments. The discussion is elaborate and sound and all material to support the conclusions is prepared well. The work described is embedded into the existing relevant literature. Title, abstract and conclusion are well-prepared and suit the content of the paper well.

Specific comments My major comment is that (for better readability of the printed document) the several images (figures 1, 7, 9, 13, 14) should become larger and for this purpose re-arranging the sub-images may be appropriate (e.g. fig. 1 (7) two (three) images above each other, fig. 9 two images only in one line. On page 6891 / l. 15f it is stated that a seasonal mean requires a minimum of 3 days, which is very low. I think this requires a brief explanation / motivation / justification

Technical corrections p. 6879 / l. 19: delete “monitoring” p. 6884 / l. 15: correct spelling of “Tanre” p. 6906 / l. 3 (at the end): add after “AOD”: “ (0.55  $\mu\text{m}$ )” p. 6909 / l. 3: replace “minimums” by “minima” p. 6947 / l. 3 (fig. 15 caption): replace “provisional” by “validated” as in the figure

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 6877, 2015.

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