

## ***Interactive comment on “An over-land aerosol optical depth data set for data assimilation by filtering, correction, and aggregation of MODIS Collection 5 optical depth retrievals” by E. J. Hyer et al.***

**Anonymous Referee #2**

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The manuscript entitled “An over-land aerosol optical depth data set for data assimilation by filtering, correction, and aggregation of MODIS Collection 5 optical depth retrievals” by E.J. Hyer et al. presents a comprehensive quantitative evaluation of MODIS Collection 5 over-land aerosol product using AERONET observations considering the influence of MODIS detected clouds, snow cover, MODIS viewing geometry, as well as surface boundary conditions and assumed microphysical models. The paper extensively analyzes MODIS regional biases with thorough explanations and quantifications

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of regional bias variability. This work establishes important criteria for determining satellite aerosol data quality that is needed for many transport model applications and climate studies such as model data assimilation, model regional aerosol behavior constraints as well as global aerosol climatology analysis. The paper is of very high quality and certainty appropriate for publication in Atmos. Meas. Tech.

General comment:

The paper expands Zhang and Raid, 2006 MODIS data assessment over the ocean to more complex land retrievals. As the authors noted, land surfaces in general have strong spatial variability, and observations near aerosol sources have both temporal and spatial variability that may not be fully captured by point observations at AERONET stations.

As a minor revision, the authors should comment on the importance of field experiments and other surface observations to constrain the physics of aerosol processes near sources that are also needed to evaluate and constrain satellite retrieval algorithms.

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