

**Interactive comments on “Accuracy assessment of Aqua-MODIS aerosol optical depth over coastal regions: importance of quality flag and sea surface wind speed” by Anderson et al.**

Principal Criteria	Excellent (1)	Good (2)	Fair (3)	Poor (4)
<b>Scientific Significance:</b> Does the manuscript represent a substantial contribution to scientific progress within the scope of Atmospheric Measurement Techniques (substantial new concepts, ideas, methods, or data)?		√		
<b>Scientific Quality:</b> Are the scientific approach and applied methods valid? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?			√	
<b>Presentation Quality:</b> Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)?				√

**General comments and recommendation:**

*This paper represents a way to evaluate the Aqua-MODIS aerosol optical depth over coastal areas, using the popular online collocated AERONET stations with various satellite products through Multi-Sensor Aerosol Sampling System (MAPSS).*

*The study should be of interest to the community and helpful for understanding aerosol retrieval property over coastal regions from satellite (Aqua-MODIS in this case) measurements. As the authors pointed out, there has been less attention to this specific region globally. However, the context of the paper lacks of focus and is really not well-organized. I do believe this paper can turn out to be a good one if authors can re-arrange the content and stay focus on the analysis through following major concerns/revisions of the manuscript before publication.*

**Specific comments:**

1. p5205 Abstract:

Line2: “..., but the underlying surface characteristics are not favorable for the Moderate Resolution Imaging Spectroradiometer (MODIS) algorithms designed for retrieval of 5 aerosols over dark land or open-ocean surfaces.”

*This is partly true, and partly not true. One of the concerns is the satellite’s footprint size. Currently MODIS L2 version 5 has 10 km in the nadir, if the coastal AERONET station is within this spatial range, then the retrieval has to look at the ratio of land-sea to determine which algorithm (Land or Ocean) to be applied. However, this issue may be reduced when MODIS L2 version 6 becomes available. But authors did not mention any of this throughout the paper.*

Line14-18 “Furthermore, the MODIS...in retrieval algorithms.”

*The content is not so clear to me.*

2. p5207 Line22-26

*I do not understand the context of “trend analysis” here in relation to the paper.*

3. p5209 Line 22-25 “Secondly, a simple merge of ....”

*This is not the case. MODIS L2 (MOD04 or MYD04) has 2 merged products, one is QA’ed (variable name is Optical\_Depth\_Land\_And\_Ocean, has QA for land and ocean followed Science Team recommendation) and another one is not QA (variable name is Image\_Optical\_Depth\_Land\_And\_Ocean). Apparently, the authors are not familiar with MODIS products.*

4. p5211 Line 1-2 “To avoid the issues related to MODIS/Terra calibration (Remer et al., 2005)”

*The reference here should be Levy et al 2010 ACP.*

Line 21 *need a space in “vegetatedsurfaces”*

Line 22 *need a space in “wavelengthover”.*

5. p5212 Line 21 *Typo in “AEROENT”*

6. p5213 Line 4 *Typo in “AEROENT”*

*Line 7-24 the whole 2.2 session needs to re-write. Need to indicate the version of MERRA data, and where did you get the data from. From the context in the paper, it seems we can get the data from GMAO. This is very misleading and I thought the MERRA data can only be accessed through NASA GES DISC. Also, need to specify which MERRA variables are using for the study in this session. I finally found out the variable that is used from other following sessions and from figure captions.*

7. p5214 Line19-24 *Is this the criteria for picking out “coastal stations” as long as it has a value in the “Land\_And\_Ocean” variable? If so, you may want to report each station status (e.g., how far away from this station to the shore). This may affect your claim in the differences of the method you use (mean or central method). Also you should list all the stations here graphically, what are global stations, coastal stations, open-oceans, land only. You should move around your analysis/graphs from other sessions.*

8.p5216 & p5217 *You described different statistical tests for determining “statistical significance”, and yet I only see t-test results in Fig 1. Since Fig.2 already indicates the aerosol loading is log-normal distributed, why you still want to use t-test for most of the results?*

9. p5218 *You may want to point out the fact that the linear regression line in the scatter plot may mislead information, because you already mentioned they are not normal distribution.*

10. p5221 Line 17 *Typo in “AEROENT”*

Section 4 Wrong information about the combined product. Please see comment #7.  
11. p5223 Section 5 Wind and cloud impact on the MODIS ocean algorithm  
*It is not clear whether you use the "mean value" of cloud fraction in your ensemble or not.*

12. p5224 Line 17 *You used "Maryland Department of Natural Resources, 2011" as one of the references. This dataset does not represent global surface wind field. I suggest to remove this reference.*

Line 19 *Typo in "MODIS-AEROENT"*

13. p5226 Line 21-25 *I do not understand why you discussed the cloud fraction with surface wind. And they should not have any relationship. Cloud fraction is determined from higher altitude and maybe you should look at different level of the wind field?*

14. p5227 Line 10 *Typo in "AEROENT"*

Line 19-23 *"Furthermore, ...retrieval algorithms" I do not understand this portion of the context.*

15. p5228 Line 11 *Typo in "AEROENT"*

Figure 1. *The caption is not well described. And the information about  $\mu$  and  $\sigma$  actually is coming from Fig. 2.*

Figure 2. *Since it is already indicating as log-normal distribution, why you still use t-test for the significance test?*

Figure 3. *Where is A, B, C, D, E and F in the figure?*

Figure 4 *A should appear early in the paper.*

Figure 7 *Regardless of some missing stations over islands/coastal areas, it will be very helpful to give more detail discussion for certain stations, such as west coastal stations of US, South-East Asia station, etc.*