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Comment

## ***Interactive comment on “Critical evaluation of cloud contamination in the MISR aerosol products using MODIS cloud masking products” by Y. Shi et al.***

### **Anonymous Referee #3**

Received and published: 24 February 2014

#### General Comments:

The paper “Critical evaluation of cloud contamination in the MISR aerosol products using MODIS cloud masking products” by Shi et al. (2014) performed careful assessment of cloud contamination on MISR aerosol products using MODIS cloud masking product. Cloud contamination on satellite aerosol retrieval is an important issue and needs to be studied and documented for each satellite aerosol products. The study on this issue by an independent research team other than the original satellite aerosol team is especially critical and welcome by the user community. The study performed in this paper is thorough and the results are convincing and should be very useful for the users

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of MISR aerosol product. The paper is already in a very good shape and I only have five minor comments below for authors to consider.

Comment 1: The results of this study clearly indicate the AOT bias due to cloud contamination from non-thin cirrus cloud is even bigger than that caused by thin cirrus cloud. For example, global AOT bias due to non-thin cirrus cloud contamination can be up to 0.03 over ocean and 0.015 over land (see Fig. 4). Why do authors only emphasize the bias (0.01) due to thin cirrus cloud (see the abstract and conclusion section)? I think both biases from non-thin cirrus and thin cirrus should be emphasized in abstract and conclusion. Otherwise, it can be miss-leading to casual readers that only thin cirrus cloud contamination exists in MISR AOT product.

Comment 2: A nice general review on the existing studies of cloud contaminations on aerosol retrievals is provided in the introduction. Instead of causing bias in retrieved AOT values, another important consequence of the contamination is on the long-term trend of aerosol loading and the studies on this consequence is missing in the review and should be added.

Comment 3: According to MODIS aerosol team (see Martins et al., "MODIS Cloud screening for remote sensing of aerosols over oceans using spatial variability", GRL, 2002), the MODIS cloud mask product (MOD35) is not sufficient for selecting clear-sky pixels for aerosol retrieval and additional tests (such as uniformity tests) need to be added for better cloud screening. However, current paper indicates the parameters (such as  $F_{cc}$ ) contained in the MODIS MOD35 cloud mask product can be used to screening the cloud contamination effectively. Hope some clarification can be provided to clear my confusion.

Comment 4 (page 12, line 5): Regarding the unknown reason for the suppression in AOT found in high latitude northern oceans. Cloud contamination over broad regions of winter storm tracks in high latitude northern oceans may be the explanation, which is very similar to the cloud contamination over elevated AOT belt of southern oceans.

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This winter cloud contamination may still be evident in annual mean plot of Fig. 3. To confirm this suggested explanation, authors can check the seasonal plots (especially for winter) in addition to the annual plots in Fig.3.

Comment 5 (page 17, line 25): Reference Zhao et al. (2013) should be updated “J. Geophys. Res.-Atmos., 118, 2849-2857, doi:10.1002/jgrd.50278, 2013”.

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Interactive comment on Atmos. Meas. Tech. Discuss., 6, 10057, 2013.

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