

## ***Interactive comment on “A simple method for retrieval of dust aerosol optical depth with polarized reflectance over oceans” by Wenbo Sun et al.***

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>Comments on the manuscript entitled “A simple method for retrieval of dust aerosol optical depth with polarized reflectance over oceans” by Wenbo Sun, et al. >General comments: The current passive satellite instruments can only measure the total intensity of solar >radiation, which couldn't detect the optically super-thin cirrus clouds due to the uncertainty in surface >reflection. This manuscript proposes a novel and robust algorithm of using passive polarimeter and can >detect the super-thin clouds and dust aerosols. The optical depth of dust aerosols in the neighborhood of the >backscatter angle can be also retrieved by using the degree of polarization of reflected light, >re-

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ardless of the reflecting surface conditions. This novel method is expected to be used in the planned >NASA-Korea CubeSat mission for detecting the super-thin clouds and dust aerosol over midlatitude and >tropical oceans. Overall, I think the idea and algorithm proposed by this manuscript are innovative and the >English writing is fine, and I recommend this manuscript is appropriate for publishing after minor revision.

The authors thank this reviewer for the helpful comments. The manuscript was revised following the comments rigorously.

>Minor comments: 1. Page 2, lines 81-83: "In the modeling, we assume the dust particles are nonspherical >debris aggregates with a refractive index of  $1.4 + 0.01i$  (Zubko >et al. 2006; 2009; 2013)" âĖ Please explain briefly the reason of the refractive index  $\checkmark(1.4 + 0.01i)$  of dust particles assumed in the model, whether the selection of different >refractive index will affect the modeling results.

Since dust refractive index has big uncertainty due to different components and moisture, we chose this representative refractive index just for demonstrate the method, this will affect the modeling result a little bit (especially when imaginary part is very big), but not affect any conclusions in the paper.

>2. Page 2, lines 79-81: "Also shown in the figure are results from 12 days of PARASOL >level-1 reflectance and level-2 ocean aerosol and clouds data (Deschamps et al. 1994; >Buriez et al. 1997; Tanre et al. 2011) across May to August of 2006." Page 3, Figure >1, line 107: "12 days of PARASOL data in May-August, 2018 are used for this study." >âĖ The date of PARASOL data used in this manuscript should be the same. Please  $\checkmark$  >check it.

This is a typo, "2018" should be "2006". We corrected it.

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