

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

### **Anonymous Referee #1**

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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, regardless of the reflecting surface conditions. This novel method is expected to be

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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.

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)” Please explain briefly the reason of the refractive index ( $1.4 + 0.01i$ ) of dust particles assumed in the model, whether the selection of different refractive index will affect the modeling results.

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.” The date of PARASOL data used in this manuscript should be the same. Please check it.

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