

## ***Interactive comment on “Satellite retrievals of dust aerosol over the Red Sea, 2005–2015” by Jamie R. Banks et al.***

### **Anonymous Referee #2**

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This paper analyses the inter-annual variability of dust aerosol over the Red Sea with respect to the summer time latitudinal gradient in dust loading using satellite based measurements of aerosol optical depth (AOD). AOD products from both the geostationary SEVIRI instrument and the polar orbiting MODIS instrument are used over a period ranging from 2005–2015. This represents a significant extension in the time period used previously in a similar study from 2008–2012 (Brindley et al., 2015). In addition, this previous study used MODIS Collection 5 whereas the current study uses MODIS collection 6. The SEVIRI and MODIS AOD retrievals are validated against ship based measurements and AERONET measurements made at the KAUST AERONET site. MISR based AOD retrievals are used as another point of comparison. Finally, the performance of the retrieval over the Red Sea is compared to that over the Persian Gulf.

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I recommend that the paper be accepted for publication after considering some minor comments that I've given below.

- **Page 4, line 4:** The MODIS 'Dark Target' algorithm typically refers to the dark target algorithm over land not ocean. It is important to make it clear that the retrieval over ocean is different and distinct to the dark target retrieval over land.
- **Page 4, line 8:** MODIS is 250 m, 512 m and 1 km (depending on band), not 10 km.
- **Page 10, line 8:** The SEVIRI retrieval uses measurements over a smaller spectral range (630–1610 nm) than that of the MODIS retrieval (550–2110 nm). Is it possible that the larger wavelength at 2110 nm provides additional sensitivity to large dust particles for the MODIS retrieval compared to the SEVIRI retrieval? Likewise the measurements used for the MISR retrieval have even a smaller maximum wavelength and likewise the MODIS AODs are positively biased relative to the MISR AODs.
- **Page 11, line 4:** Maybe say "Taking MISR retrieved AODs" or in some other way make it clear that MISR is still just another retrieval and should not be taken as truth.
- **Page 11, line 10:** In addition to the non-spherical dust analogues present in the MISR retrieval, as pointed out by the author, MISR makes measurements at multiple view angles which will help resolve a larger range of the single scattering phase function than possible with either SEVIRI or MODIS. This should be taken into account if further discussion of the implication of the sphericity assumption is added.
- **Page 11, line 10:** It may be instructive to compare plots of phase functions for dust particles with and without the spherical assumption for this discussion.

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- **Page 19, figure 1, line 3:** A new sentence should start between “contour” and “note”.
- The tendency for the MODIS AODs to be positively biased against both the ship borne measurements and SEVIRI AODs may have something to do with the Ångström exponent due to its use to scale the AOD at 550 nm to that at 675 nm and 630 nm, respectively. It may be useful to compare the MODIS Ångström exponent to the AERONET retrieved exponent at the KAUST AERONET site or to that of the SEVIRI retrieval.
- It might be instructive to compare the Ångström exponent of dust over the Red Sea from east and west sources. Likewise, it may be useful to do the same thing when comparing dust over the Red Sea with that over the Persian Gulf.
- The fonts on some of the plots are a bit small and should be increased in size.

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