



EGUsphere, referee comment RC1  
<https://doi.org/10.5194/egusphere-2022-736-RC1>, 2022  
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## Comment on egusphere-2022-736

Anonymous Referee #1

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Referee comment on "Evaluation of the spectral misalignment on the Earth Clouds, Aerosols and Radiation Explorer/multi-spectral imager cloud product" by Minrui Wang et al., EGUsphere, <https://doi.org/10.5194/egusphere-2022-736-RC1>, 2022

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Full title: Evaluation of the smile effect on the Earth Clouds, Aerosols and Radiation Explorer (EarthCARE) /Multi-Spectral Imager (MSI) cloud product

Authors: Wang et al.

This paper investigated the potential errors of retrieved cloud properties (COT, CER) for EarthCARE/MSI based on both theoretical calculation and numerical simulation. Results indicate that errors caused by the smile effect were generally within 10% for typical shallow warm clouds and deep convective clouds. Results are interesting, and can be used as references for other instruments. Overall, this manuscript is clear. However, there are several issues that need to be taken care of before this paper becomes acceptable for publication.

Specific comments:

- radiation transfer model, or radiative transfer model? Please check which is better. I think the words "radiative transfer model" are better.
- L121, the cloud particle size distribution in this paper is

$$n(r) = c/r \exp[-(\ln r - \ln r_0)^2 / (2\sigma^2)]$$

While the Nakajima and Nakajima (1995), the  $n(r)$  is:

$$n(r) = N / (\sqrt{2\pi} \sigma) \exp[-(\ln r - \ln r_0)^2 / (2\sigma^2)].$$

Why your eq. for the first term contains "r", while the Nakajima's is "N"?

Nakajima, T.Y., Nakajima, T., 1995. Wide-Area Determination of Cloud Microphysical Properties from NOAA AVHRR Measurements for FIRE and ASTEX Regions. *Journal of the Atmospheric Sciences*.

- L160, the reciprocal of  $dL / d\ln r$  is  $d\ln r / dL$ , not  $dt/dL$ . Please check it.
- L195, where is the Fsw from? Please give the reference. And what's the  $S_0$ ,  $n$ ,  $k$  mean in Eq. (5)-(11)?
- L209, Eq. (13) presents the relation between Fsw and CDR, if CDR decreased by 10%, Fsw would decrease by about  $4.2 \text{ Wm}^{-2}$ . So, what the relationship between Fsw and COT? I want to know that how COT changes, resulting Fsw changes?
- The CAPCOM can used for retrieval of COT, CER, and CTT or CTH. The authors investigated the smile error on COT and CER, how about the CTH?