Review of Evald et al. paper "Remote Sensing of Cloud Droplet Radius Profiles using solar reflectance from cloud sides. Part I: Retrieval development and characterization"

This is a well-written manuscript and I enjoyed reading it. It definitely falls into the scope of AMT and I am sure it will be well referenced by the community. The first cloud side droplet size retrieval papers, I am aware of, are already more than 10 years old and this paper is a very timely. It uses extensively three-dimensional (3D) radiative transfer calculations to study the impact of unknown cloud surface geometry on droplet size retrievals. It is a significant piece of work. I recommend publishing it after minor revision that addresses my questions and suggestion below.

Page 3. Eqs. (1) and (2) are unclear.

Page 5; line 7. I don't think that
Wiscombe,W. and Warren, S.: A Model for the Spectral Albedo of Snow. I: Pure Snow, JAS, 37, 2712–2733,1980
is a good reference for Mie calculations. A much better one is
Wiscombe, W. 1980. "Improved Mie scattering algorithms." *Appl. Opt.*. 1505-1509.

Page 6; line 10. Correct the word 'thie'.

Page 7. Remove the word 'the' in the last paragraph.

Page 10. What are the photon weights?
Page 10. I understood that $<r_{eff}>$_app is the apparent effective radius. What is the $<r_{eff}>$_mc? Is it also apparent radius, as written on page 10?
Page 10; line 13. Fig. 3b shows LWC rather than r_{eff}?

Page 12; caption to Fig 7. Figure 7 => Figure 6?
Page 12; Fig 7. What varies here: illumination and viewing angles?

Page 13; Fig 8. What are the gray and color spheres here? Is it the principle plane? What are the green and red dots there?
Page 13; Fig 8. What is the variable here?

Page 16; line 9. I feel like we need a few more sentences here explaining the geometry of gradient classifier *g*_class.
Page 16; line 20. Not clear how D_H=0.25 and D_L=1.5 was found

Page 18; line 4. Did you account for large drops here? In case of large drops $R_{2.1}$ is much smaller and can be confused with shadows. A plot from DISORT with the ratio $R_{0.87}/R_{2.1}$ for r_{eff}=12 and 24 um will be helpful here.

Page 19; line 16. When you consider aerosol properties, do they depend on humidity? If not, I'd recommend using aerosols swollen according to the humidity field.

Page 21; Eqs. (13)-(14). Why? Please clarify.

Page 23; Fig. 16 caption. Remove the word 'left'.

Page 23; Fig. 24. Why is the error bar here almost the same for small and large r_{eff}? Based on Fig. 16, for large r_{eff} uncertainties are much larger.
Page 25; Fig. 18 caption. You have only panels (a), (b) and (c) here.