

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-674

Anonymous Referee #2

Referee comment on "Establishment of an analytical model for remote sensing of typical stratocumulus cloud profiles under various precipitation and entrainment conditions" by Huazhe Shang et al., Atmos. Chem. Phys. Discuss.,
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This study developed an analytical cloud profile model based on the dominant patterns of LWC and ER that derived from simulations of stratocumulus. Cloud profile retrieval from passive satellites is very challenging, this study simplifies the characterization of cloud profiles and enables the potential predication of precipitating or entraining level. The analytical cloud profile model is a very interesting tool for the futuristic retrievals with these main profile patterns are all involved. Overall, this work is very well organized and elaborated, the figures are displayed in a good manner. This work could be accepted for publication after clarifying some minor issues:

- I noticed that the authors extract the EOFs for ER and LWC simultaneously by grafting the two profiles. The EOFs that derived from this way would be different from extracting ER and LWC separately. I would suggest add discussion on this.
- The analytical model is based on 4 prominent patterns of LWC and ER profiles that extracted from stratocumulus, does the model works for other liquid clouds?
- line 65, In order to reconcile the retrievals performed using different spectral channels some studies assumed that the cloud ER profiles are linear or polylinear with no more than one turning point so that retrieval can be implemented by either a lookup table method. whether the polylinear are triangle shaped as well?
- Line 91, the acronym 'LWP' is first introduced here, liquid water content?
- Line 105, what do you mean by "with different levels of complexity"
- Line 108, probably add more references for airborne measurements of cloud profiles.
- Line 109, the ground-based cloud profiling measurements is another choice for validating cloud profile retrievals.
- Line 150 temperature – potential temperature