

## ***Interactive comment on “Comparing ERA-Interim clouds with satellite observations using a simplified satellite simulator” by Martin Stengel et al.***

### **Anonymous Referee #1**

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This paper describes a new satellite simulator software compatible with the Cloud\_cci AVHRR datasets, and presents an initial application to ERA Interim reanalysis. The topic is relevant and the paper is clearly written. However I have two major concerns: the analysis is relatively superficial, limiting its utility, and the description of the simulator lacks detail in some respects. I believe this paper requires a major revision before it can be accepted for publication. Please see more elaborated comments below.

- The abstract, introduction, and conclusions insist that the approach presented here supports a clearer understanding of model deficiencies. This seems to me like a very general statement that is not properly supported by the evaluation presented here. I

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think this stems from the fact that the analysis presented here is rather superficial, and therefore it is difficult to see how the model can be modified to address some of the errors discussed in this paper.

- As far as I can see, the CTP calculation is not explained with enough detail, specially how it depends on the COT thresholding. According to L10-11 in Page 10, the COT threshold removes the cloud cells above the level where the COT threshold is reached. However, it is not clear how the cloud top phase is affected by this. How this is done may have significant impacts in multi-layer situations: if a thin, high cloud layer is removed, the algorithm will report a much larger CTP, but in observations the retrieval algorithm is applied to the entire column, introducing an inconsistency in the simulator CTP.

- In recent years, several papers looking at the evaluation of cloud phase in models have been published (e.g. papers by G. Cesana and J. Kay). It would be worth citing some of these papers.

- P8, L8-13. Is this approach consistent with the subcolumn generation algorithm used in IFS?

- As far as I know, at least one study has been published that applies a simulator to ERA-I clouds: <https://link.springer.com/article/10.1007/s00382-016-3204-6>

- How the specific value of COT=0.15 is chosen? Is it an estimate of the sensitivity of the Cloud\_cci retrieval?

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