

Interactive comment on “Simulating the effects of mid- to upper-tropospheric clouds on microwave emissions in EC-Earth using COSP” by M. S. Johnston et al.

Anonymous Referee #1

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This manuscript describes a new version of COSP that includes simulation of cloudy scenes in the microwave spectrum, where the previous version only included clear sky scenes. I think this is an important topic since being able to simulate more than just clear sky scenes has a great impact on analysis that can be done, however, I find this manuscript to be lacking in-depth discussion of the topic. Only one microwave frequency is analyzed, and at only one look angle. The authors just speculate on the causes of biases in the results, rather than actually do a study to find out what could be the cause of the biases. A more comprehensive analysis should be done.

This study only focuses on 190.31 GHz, but I think it would greatly enhance the study

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to include more frequencies. The authors mention (11767, line 9) that including more frequencies could help in identifying the source of the biases in the model. Including that analysis would add more depth to the manuscript. Also, the authors focus only on near-nadir looks of MHS. Even if you would only use the one frequency 190.31, wouldn't using other look angles help to identify the sources of bias in the model since you'll be able to get information about the atmospheric profile? I think it would be very interesting to see how the biases change as a function of look angle.

I was a bit confused by Fig. 1 when I first read through the manuscript since you had just finished explaining the various filters you were going to use on the data show in Eq. 2 and Table 1, but then Fig. 1 looks like it uses all data without any filters. Perhaps make it more obvious in the text (11763, 1st paragraph) that you're first going to show all data with no filters. However, in the conclusions (11766, line 12) you say clear-sky calculations are omitted from the study. Does this mean you did not include clear-sky conditions in Fig. 1? This was not obvious in the text.

11764, paragraph 2. This is a confusing paragraph to follow. Is there some way to graphically show what you are doing?

Technical comments:

11754, line 16. I believe "underestimation" should be "overestimation"

11758, line 8. Take out all the 'ands' and make a list: "cloud ice, cloud water, precipitating ice (snow), and rain"

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