

Interactive comment on “Quantifying climate feedbacks in the middle atmosphere using WACCM” by Maartje Sanne Kuilman et al.

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I hereby answer some of the major questions asked by reviewer #3 that are crucial in understanding what we have done. I note that all these issues also already have been raised and addressed in the pre-review. I am working at the same time to rewrite the paper in a way that makes it more clear what the purpose of the work is.

What we try to do in this paper is to apply a new method to quantify the temperature responses to different feedback processes that arise in response to changing the CO₂-concentration. This is one of the first studies with which can calculate how much of the temperature change in a specific place in the atmosphere is attributed to which feedback process. The method we applied here can quantify the temperature response,

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but to provide a complete explanation of all the responses and the exact mechanism behind all the feedback processes is outside the scope of this paper.

Just in the abstract: "feedback processes" (l 51) but which processes? The "feedback processes" we mean chemical, physical and dynamical processes, which can feedback to the radiation and further change the temperature.

Ozone feedback is mentioned (l 63), but what is assumed for ozone in the upper stratosphere? We know upper stratospheric ozone is "recovering" over the coming decades (WMO, 2018); is this the point here?

We are not speaking here about the changes in O₃-concentration due to the ozone hole, but rather changes in ozone concentration that are resulting from changes in the CO₂ concentration. The ozone concentration in the control run is for pre-

Several tropospheric issues are "of minor importance", but why is this issue discussed in an abstract of a paper on the "middle atmosphere"?

We calculate the temperature changes in the middle atmosphere, due to different feedback processes, such as the ozone feedback. We know the albedo and cloud feedback are important for the troposphere, but with CFRAM, we can quantify the importance of these feedback processes for the middle atmosphere. We imagine that some processes in the troposphere also affect the temperature changes in the middle atmosphere. In fact, this is what we see is happening in the lower stratosphere, where we do see effects of the cloud, albedo and water vapour feedback.

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