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Discussions

Interactive comment on "Modelling the residual mean meridional circulation at different stages of stratospheric warming events" *by* Andrey V. Koval et al.

Anonymous Referee #2

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The authors present simulations with the mechanistic model MUAM to analyse circulation changes in the middle atmosphere after SSW events. This topic is of general interest as SSWs have dramatic consequences on the dynamical state of the polar stratosphere with possible impact on tropospheric weather phenomena but also for the coupling of the stratosphere to the upper atmosphere.

The authors perform idealistic model experiments by applying prescribed planetary wave activity and are able to excitate SSWs in their model. They analyze the change of the circulation in the middle atmosphere by means of the transformed Eulerian mean analysis and apply the residual circulation on the given ozone distribution to derive

fluxes in the course of the SSW event.

Whereas the topic and methodology seems to be an interesting approach, the authors miss in my opinion a deeper analysis. It is not clear for me to what extent the paper goes beyond previous studies. The authors are often very vague in their conclusions and seem not to reflect the current status of discussions in the literature. With respect to tracer transport the authors do not use the TEM formulation for tracer transport, but only apply v* and w* to zonal mean values of their 3D ozone field, which I think is not consistent.

In addition, their SSW seem to show no elevation of the stratosphere and the corresponding strong downward transport in the upper mesosphere which is often observed and simulated after mid-winter SSWs. This could be related to their GW drag parameterization but this is not discussed in the paper.

I find the paper not publishable in its present form. More specific comments can be found in the attached pdf.

Please also note the supplement to this comment:
https://angeo.copernicus.org/preprints/angeo-2020-71/angeo-2020-71-RC2-supplement.pdf

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