

Weather Clim. Dynam. Discuss., referee comment RC1
<https://doi.org/10.5194/wcd-2021-76-RC1>, 2021
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.



Comment on wcd-2021-76

Anonymous Referee #1

Referee comment on "Diabatic processes modulating the vertical structure of the jet stream above the cold front of an extratropical cyclone: sensitivity to deep convection schemes" by Meryl Wimmer et al., Weather Clim. Dynam. Discuss., <https://doi.org/10.5194/wcd-2021-76-RC1>, 2021

This study presents a detailed analysis of the influence of using two different deep convection parameterization schemes on the wind speed in the mid-troposphere and associated PV structure above the cold front of an extratropical cyclone. Therefore, two simulations with different convection schemes are compared to each other, as well as to three (re-) analysis data sets and airborne observations of ice water content and wind speed. Furthermore, backward trajectories are used to show that differences in the PV structure in both simulations are related to diabatic processes behind and ahead of the cold front. The authors find that using different convection schemes results in differences in the representation of diabatic heating ahead of the cold front, which modifies diabatic PV modification and finally influences the tropopause structure, associated PV gradients, and the jet in the middle troposphere. Although various different datasets are employed in this study, it remains elusive as to which convection scheme is more realistic, as both model simulations are in between the (re-) analyses, both models strongly underestimate ice water content, and both show a bias in the jet structure. While this analysis focuses on one specific time and vertical cross-section only, the (systematic) impact of the different convection schemes is a timely question and fits the scope of Weather and Climate Dynamics. I recommend the publication of this manuscript, however, I have several comments and questions that should be addressed before publication. Please find general and detailed comments and questions in the attached file.

Please also note the supplement to this comment:

<https://wcd.copernicus.org/preprints/wcd-2021-76/wcd-2021-76-RC1-supplement.pdf>