Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-557-RC1, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Assessing the ability to derive rates of polar middle-atmospheric descent using trace gas measurements from remote sensors" *by* Niall J. Ryan et al.

Anonymous Referee #1

Received and published: 23 June 2017

The study significantly contributes to the derivation of the descent rate in the polar middle atmosphere. The authors find that previous studies underestimated the descent rate by a factor of 3 or more. Their data analysis is careful and the good agreement of the SD WACCM CO VMR time series with the observations are good reasons to believe their new finding of a fast descent rate. Thus, the study is appropriate for a publication in ACP and I only suggest some minor corrections.

1) I was not aware that the model descent rate differs so much from the observed descent rate. Straub et al. (2012) found a small descent rate of 325 m/day for the SD WACCM simulation. Please can you argue why SD WACCM is now faster in your

simulation?

2) p.1 line 28 and at other places. I would not use "concentration" since you only work with the volume mixing ratios (VMR). I would introduce VMR in the beginning and then you can always write CO VMR instead of CO concentration.

3) p.3 line 8 it is unclear for me what you mean with a "quiet winter"

4) p.4 line 18 discuss instead of discusses

5) p.7 line 17 "negative" means poleward? I guess the sign depends on the hemisphere and you mean the northern hemisphere?

6) p.7 line 28 Is it Hoffman or Hoffmann like in the Bibliography?

7) p.10 line 6 what do you mean with "fall short"?

8) Conclusions : I am missing a statement that trace gas monitoring by ground-based microwave radiometers in the polar region remains invaluable , e.g., for tuning of the SD WACCM model parameters. Otherwise the paper may give the impression that the observations are useless for derivation of the descent rate.

9) Figure 1 The grey background should be changed by a white background since the contrast is not so good.

10) You may mention somewhere the connection between the polar descent rate and the Brewer-Dobson circulation.

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-557, 2017.