On the review of the manuscript "New sampling strategy removes imaging spectroscopy solar-smearing bias in sub-km vapour scaling statistics" by Richardson et al.

I didn't read the whole paper. I read the abstract, both reviews and the responses.

I completely agree with RC2 about possible 3D effects on water vapor retrievals. They are important, indeed, and in some cases the effects could be really strong leading to incorrect retrieved atmospheric water vapor. However, I disagree with rejection of the manuscript. Talking about the transition zone between cloudy and clear air, retrieval of water vapor is a difficult problem for all observation: satellite, ground-based and even airborne. We recently published a paper:

Wen G. and A. Marshak. 2021. Precipitable water vapor variation in the clear-cloud transition zone from the ARM shortwave spectrometer. *IEEE Remote Sens. Lett*., doi: 10.1109/LGRS.2021.3064334.

We didn't use 3D retrievals though we applied 3D radiative transfer to check it. I know another (an old one) MODIS WV retrieval papers

Gao B.-C. and Y. J. Kaufman, "Water vapor retrievals using moderate resolution imaging spectroradiometer (MODIS) near-infrared channels," *J. Geophys. Res.*, vol. 108, no. D13, p. 4389, 2003, doi: 10.1029/2002JD003023.

Of course, it didn't use it either.

The authors of the paper gave a detailed response. If they clearly state in the paper that the 3D radiative transfer effects could be important, but they didn't account for them here, it will be appropriate (in their reply they wrote that it is planned to account for the 3D effects in their next airborne experiment). I think that both 1D and 3D retrieval papers are needed; the 3D-based papers will show problems with 1D approaches and the ways to correct (or, at least, to mitigate) these effects but it takes time, especially if we want to make them operational.

I absolutely agree that "*the simulator should be as "realistic" as possible in comparison with the real retrieval to faithfully capture the influences of various factors on the retrieval*." But I also believe that a naïve simulator is needed as well. Long time ago, we ran (with Warren Wiscombe and Anthony Davis) 3D radiative transfer with a "naïve" Henyey-Greenstein phase function rather than a realistic one; this helped us to focus on other 3D problems rather than droplet scattering.

To summarize, I agree with most of the reviewer 2 comments, but I disagree with the conclusion. I don't think that the manuscript should be rejected if it discusses the possible problems with the suggested approach.

Alexander Marshak