Answers to referee comments "Impact of 3D Cloud Structures on the Atmospheric Trace Gas Products from UV-VIS Sounders – Part I: Synthetic dataset for validation of trace gas retrieval algorithms"

We thank the reviewer for providing further comments and suggestions.

We included all text changes as suggested:

Page 2, line 9 change to "and it was found that cloud"
Done.

Page 2, line 12 change to "or photon path length correction"
Done.

Page 2, line 13. Provide several references where the three effects ae included in operational cloud correction methods.
We refer here to the references mentioned in the sentence before. This has now been clarified.

Page 2, line 20 change to "studies have shown that 3D cloud"
Done.

Page 3, line 4 change to "box-clouds. Yu et al (2021) systematically analyzes the VCD retrieval error in terms of the following"
Done.

Page 3, line 9 change to "using both synthetic and"
Done.

Page 3, line 11 change to "the first part of the synthetic data"
Done.

Page 3, line 25 change to "as Lambertian or by a Bidirectional"
Done.

Page 3, line 31 change to "and always agreed well to other participating radiative transfer codes"
Done.

Page 4, line 17 change to "DOAS technique (Platt, 2017):"
Done.

Page 4, line 28 change to "MYSTIC calculates layer-AMFS"
Done.

Page 5, line 1 change to "partial column density (of NO2) for layer"
Done.

Page 5, line 20 change to "atmosphere of Anderson"
Done.

Page 5, line 22 change to "cm2, with most of"
Done.

Page 13, line 4 change to "with the 1D cloud layer included"
Done.

Page 13, line 12 change to "or by gas molecules"

Done.

Page 16, line 5. Define the H-metric and provide a reference.
Thank you for this comment. We have now included the definition of the H-metric:

"For the calculation of the H-metric of a $7 \times 7\,\mathrm{km}^2$ area corresponding to the size of a TROPOMI pixel we take into account 36 simulated band reflectences contained in this area. The H-metric is the standard deviation of these reflectances divided by their mean value and it provides an estimate of the variation of reflectance within a TROPOMI pixel (Kylling et al., 2021)."

Page 17, line 6 change to "to figure out which type of "
Done.

Page 17, line 18 change to "and it was found that SZA"
Done.

Page 23, line 13 change to "region of the O2"
Done.

Page 24, line 17 change to "to ensure that the LES"
Done.

References

Kylling, A., Emde, C., Yu, H., van Roozendael, M., Stebel, K., Veihelmann, B., and Mayer, B.: Impact of 3D Cloud Structures on the Atmospheric Trace Gas Products from UV-VIS Sounders – Part III: bias estimate using synthetic and observational data, Atmos. Meas. Tech. Discuss., submitted, 2021.