

Author comments on the manuscript “Sentinel-5 SWIR Detector Persistence on Trace Gas Retrievals”, reviewer 3

We thank the referee for the positive assessment of our work and for the constructive comments provided, which have helped us improve the manuscript. Below, we provide point-by-point responses to the reviewer’s comments. The original comments are reproduced in *bold*, followed by our replies. Page, line, and figure numbers refer to the original manuscript unless stated otherwise.

1. **P2 158: Can you add a reference for the MicroCarb and CO2M requirements?**

Adjusted

We have added appropriate references for the MicroCarb and CO2M accuracy requirements in the revised manuscript.

2. **P3 179: "where CNES model applies a temporal sampling of the incoming signal". This was unclear. Would it be more appropriate to call it a "temporal smoothing" and then also reference the appendix where it is described in more detail?**

Adjusted

We agree that the original wording was unclear. We have revised the text to better describe the role of the CNES model as simulating the temporal response of the detector, including persistence effects, and added a reference to Appendix A where the model is described in more detail.

We changed on P2, L78 line:

“The synthetic radiances approximate detector-level signals at each readout and served as input to the persistence-effect simulation, where CNES model (Section 2.2) applies a temporal sampling of the incoming signal.”

To:

“The synthetic radiances approximate detector-level signals at each readout and served as input to the persistence-effect simulation, where the CNES model (Section 2.2) simulates the temporal response of the detector to the incoming signal, including persistence effects due to charge trapping and de-trapping (see Appendix A for details).”

3. **P4 1116: Was HITRAN08 used for all of the line parameters? Why? What profile was assumed?**

We have clarified in the revised manuscript that the spectroscopic parameters are based on the HITRAN database (Rothman et al., 2009), supplemented by additional datasets for methane and related species, and that the atmospheric profiles used in the forward simulations are derived from an ECHAM model simulation.

We changed P4, L114 from:

“The accurate modeling of absorption by molecules relies on spectroscopic databases, which provide the absorption cross-section of the target absorber CH₄ as well as of the interfering gases CO, CO₂, H₂O and O₂ (Tran et al., 2006; Rothman et al., 2009; Scheepmaker et al., 2013). In order to construct the synthetic S5 radiance spectra, we used a standard model profile for the trace gases.”

To:

“Molecular absorption is modeled using spectroscopic parameters from the HITRAN database (Rothman et al., 2009), with additional spectroscopic data for methane and related species from Tran et al. (2006) and Scheepmaker et al. (2013). Line-by-line absorption cross-sections are computed for CH₄ and the interfering gases CO, CO₂, H₂O, and O₂, consistent with the spectroscopic setup used in the RemoTeC retrieval framework. The atmospheric profiles for trace gases, temperature, and pressure are derived from an ECHAM model simulation, and are kept fixed across all simulations.”

4. P6 1165: I'm not sure what the '(numerical range)' indicates

Adjusted

This was a typographical issue arising from a formatting error. The text has been corrected accordingly.

Changed to: “Additionally, the NIR band (745–773 nm) is used to constrain atmospheric scattering properties.”

5. P6 1175: 'extend' -> extent

Adjusted

6. Fig7: font very small

Adjusted