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Atmospheric Measurement Techniques Discussions

Interactive comment on "In-orbit Earth reflectance validation of TROPOMI on board the Sentinel-5 Precursor satellite" *by* Lieuwe G. Tilstra et al.

Anonymous Referee #1

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I wish to thank the authors for a well-written paper. It is structured and organized, making it easy to follow. In most cases the descriptions are precise, so that the meaning is not left to interpretation by the reader. The conclusions are reasonable; the authors do not over-interpret their results.

Following are several issues I would like addressed.

Section 1 The authors state their objective is to evaluate TropOMI radiometric accuracy using the best available surface albedo data sets. This implies they wish to address its absolute accuracy and not merely the TropOMI calibration relative to that of OMI and SCIAMACHY. Given this broader objective there should be an assessment of OMI/SCIA radiometric accuracy, and a discussion of how representative the respective LER data sets are of the underlying calibrations (an accurate calibration does not

necessarily mean the LER data sets are equally accurate). Section 5 discusses one deficiency of these LER databases, but it would be better if this paper addresses data set accuracy in Section 3 rather than as only a data screening issue in Section 5.

Section 3.2 No mention is made of Raman scattering. Should the readers assume that it is not modeled? Since it is an important effect for evaluating the spectral radiometric response of the instrument (as much as 1-2% at TropOMI wavelengths shorter then 400 nm), perhaps it should be stated explicitly.

Section 5.1 The information provided in this section is not entirely clear. It is not immediately obvious that the FRESCO false cloud identification over land is caused by an overestimation of surface reflectivity in the underlying databases. Also, the underestimation of land reflectivity, while an established effect, has not been established for these particular databases as their sole or even primary error. In many locations the OMI LER dataset values are higher than other standards, presumably as a result of sub-pixel cloud contamination. I will presume that SCIAMACHY LER suffers similarly.

Section 5.2 The alternative methods presented in this section appear to be designed to eliminate scenes for which the LER databases are affected by non-Lambertian surface characteristics. Since these errors are as much a function of viewing conditions as they are surface type, isn't the TropOMI LER subject to similar errors? Is it legitimate to screen the reference data and not the measured data as well?

Section 6.2 It is not clear where the referenced 772 nm slope and intercept are coming from. Is it Figure 6 or Figure 8?

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