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Discussions

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Interactive comment on "Improved SIFTER v2 algorithm for long-term GOME-2A satellite retrievals of fluorescence with a correction for instrument degradation" *by* Erik van Schaik et al.

Anonymous Referee #2

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1. What is the main achievement obtained through this study (it sounds more like a technical report)? 2. "Our results support the use of SIFTER v2 data to be used as an independent constraint on photosynthetic activity on regional to global scales." Where is this justified from the current paper?

While this study provides a well written overview of the improved algorithm for SIF retrievals, I am worried that it lacks original scientific content. The majority of the work presented is incremental in nature and reads, to the most part, like a well-written tech report. What I am missing are real scientific discussions on WHY these algorithm changes are important, why the omission of some absorption bands is so crucial (see

later, this is a hot topic, it would be good to discuss this), etc. I just feel that the authors need to do a better job in outlining what is really part of their original work and what is not. Adding a more in-depth case study as to why the O2 band is hurting the retrieval might help fill the gap in current originality. I don't want to be overly demanding but as nice as the paper reads at the moment, the authors have to be honest and clearly outline what is original vs. a reproduction of most basic concepts of the Joiner and Koehler approaches. Without this, it would remain a tech report only and I would have to defer the publication decision to the editor.

Please find a few more detailed comments below:

SIFTER needs to be explained in abstract already.

P2 Line 4: 19% released as heat: This sounds oddly specific. In fact, the heat quenching is highly variable, please make this clear

P2 Line 9: SIF doesn't know about the CO2 concentration (at least not directly). See Rev #1.

P2 Line 31: KNMI needs to be explained in the first instance (not everyone knows it).

P6-7: Lines 23++: Are any of these steps new? Which ones are identical to Joiner et al? Which ones are identical to SIFTER 1? Which ones come from this paper?

P7 -Lines 21-22: Maybe a copy&paste error? What does that sentence mean anyhow, I am not really sure (too vague).

P7 L30: Please make clear that the impact of transmission function is only of importance for the large spectral windows as needed for GOME-2

P8-Lines 6++: If I look at the list of changes made here, they really look rather incremental, fine-tuning some retrieval settings. The big question is whether this warrants publication in a peer reviewed journal as "original" work. You will have to justify this to some degree. (i.e. why is this more than an internal tech report?)

P8-Line 12: I think it is important to underline (again) that the exclusion of the O2-A band actually helps the retrieval. This is the topics of a long-standing debate and the original algorithm included the O2A band under the assumption that it "helps" the retrieval. It would be good to elaborate more on that specific issue and show the community clearly why it harms the actual retrieval. This could be a valuable addition.

P13-Lines 25 and around: Again, you are converging to a similar fitting window as Joiner et al did for a long time already. The only thing new is that you provide some more tests (of which I am sure Joiner did as well).

Page 15, lines 4++ Temperature can have a profound effect on water vapor absorptions (due to a wide range of lower state energies), just using the Sahara might under-represent this change in spectroscopy. P18 L 1++: Why should the bias depend on latitude at all (and not, say Air Mass Factor alone)? 1 degree also sounds really fine. What I am missing in most discussions is the lack of a mechanistic motivation for certain choices. Why is the latitude dependent bias not symmetric? Why do you assume it is there in the first place?

P21,Figure 6: I don't understand what this figure is telling me. Why "should" the uncertainty depend on the SIF signal? What is being tested here? I am a bit lost. What would make sense is to plot the uncertainty against continuum level radiance, thus to the overall SNR of the spectrum. Absolute SIF will get noisier at higher signals (which can then lead to some correlations of SIF uncertainty and SIF signal as vegetation is very bright in the NIR). Here, however, the single pixel sigma is used, which is so large that it is hard to see these effects.

Section 5.2: Wo what does this tell us? It is all purely descriptive. Sentences like "We find that both data products capture the seasonality of SIF, which suggests that actual fluorescence in response to photosynthesis is being measured" are rather vague. Is the final key point of the paper that you managed to reproduce the Joiner retrievals?