

***Interactive comment on* “Chlorophyll fluorescence remote sensing from space in scattering atmospheres: implications for its retrieval and interferences with atmospheric CO₂ retrievals” by C. Frankenberg et al.**

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This is an interesting and well-written paper, but it also raises some questions, and some irritations as well:

P2489 L5: What is exactly meant by a "full-physics" algorithm? In which cases can an algorithm be considered full-physics and when not?

P2489 L10: "as they are mostly constrained". Is "constrained" the right term here? Aerosol properties are not constrained by strong absorption features. Did you mean

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that the strong absorption features help in the retrieval of aerosol properties?

P2490 L18: "saturated". I would not say that this band around 765 nm is saturated, as this is not really the case. Try to rephrase this more accurately.

P2490 L26: "we have shown". In my opinion you have not shown this. You may have suggested that it might be difficult, but you have not demonstrated that it is impossible. For this, it would be necessary to carry out a complete sensitivity analysis, showing quantitatively the ill-posedness of the retrieval regarding this issue, and this was not done in that paper.

P2492 L1: retrievec » retrieved

P2492 L3: Please include some comment on what has to be done if fluorescence is not isotropic, which appears as a result from simulations with canopy fluorescence models.

Eq. (1): This means that the shape of the canopy fluorescence spectrum is fixed, where it is known that the ratio of A1 and A2 varies. Then it would be interesting to know the influence of A1 on the spectrum in the region around 755 nm!

P2494 L8: chlorophyll emission » chlorophyll fluorescence emission

P2494 : Could you please indicate here on this page which spectral window was used exactly for the retrieval?

P2498 L18: Please avoid insinuations about the FLEX mission which suggest that only oxygen absorption bands would be used for the retrieval of Fs. This is not true. FLEX is expected to use the whole 500 - 780 nm region, and how Fs will be retrieved is still under investigation, but it will certainly not only use the O2 absorption bands!

P2501 L15: "The most appropriate way ...". I disagree with this statement, and I think that your own results point in another direction, since your results and those presented in Guanter et al. (2010) suggest that using a wider window including the O2-A region as well as the region around 755 nm would combine the best of both worlds. I do not

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understand why you did not investigate this possibility, and why you keep claiming that using only the solar Fraunhofer lines would be sufficient or even the "most appropriate way". You mention a number of problems associated with Fs retrieval in the O2-A band, but using only solar Fraunhofer lines as you suggest also has its problems, which you should address as well, such as spectral shifts between library solar spectra and measured data, radiometric calibration problems, non-linearity, zero-level offset, et cetera. How about solar activity changes? Doppler shifts? What is the combined effect of all these factors on the final precision of Fs retrieval in this way?

L2502 L19-22: Here you are absolutely falling into speculations! Retrieval of Fs from space is still considered by most people to be a great challenge, and here you are suggesting that photosynthesis could be quantified even under clouds! This statement bypasses and ignores all the work that is being done by many serious researchers in the world who are trying to find evidence for relationships between fluorescence and photosynthetic activity under cloudfree conditions and who are (in parallel to you) searching for suitable retrieval methods of Fs. And here comes your team, claiming to have all the answers?

L2505 L6: "(not oxygen, like FLEX)". Please remove biased suggestions like this one. If you want to help the chlorophyll fluorescence community or the FLEX mission with unsolicited advice, there are many ways to communicate in more direct ways, but I would not use a scientific paper for that purpose.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 2487, 2012.

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