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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "Satellite monitoring of different vegetation types by differential optical absorption spectroscopy (DOAS) in the red spectral range" *by* T. Wagner et al.

**Anonymous Referee #1**

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## General comments

The paper presents a method for satellite monitoring of vegetation types. The main idea of the paper is to fit the contribution of different vegetation spectra together with trace gas columns. This is a solid approach, and to my knowledge it has not been applied earlier to satellite measurements. However, I find the conclusions too speculative and the validity of the approach has not been demonstrated convincingly enough. Therefore, I propose revisions as given below. After these revisions I believe this will be a good paper and acceptable for publication in ACP.

## Specific comments

- To give the reader more confidence in the proposed approach, it should be demonstrated using simulated measurements. The DOAS approach followed in the paper basically is a retrieval approach with an approximate forward model. The forward model equation, with its approximations, should be given explicitly in the paper. For many trace gas retrievals the DOAS approach has been demonstrated to be very useful, i.e. the assumptions made in the forward model are valid. However, for this new application the validity of DOAS is not obvious and should be demonstrated again. The validity of the approach could be demonstrated by performing retrievals from measurements simulated by a radiation transfer model including scattering by molecules and aerosols.

- The authors give several possible causes for the problems they encounter. These causes should be investigated in more detail. I suggest that the authors perform a sensitivity study based on (again) synthetic measurements. In this way it can be investigated how important spectral resolution issues are, and how sensitive the result is to imperfect vegetation spectra. In fact, the authors claim that the quality of the vegetation spectra is not sufficient. It would be helpful if the authors would indicate what requirements the vegetation spectra should fulfil (based on the sensitivity study).

- The retrieval results should be “validated”. Although I realize that it is not possible to validate the fitting coefficients, it could be investigated if the results are qualitatively consistent with vegetation products from other satellite sensors. Furthermore, a validation of the trace gas columns would also give an indication of the quality of the vegetation retrievals. Especially, it would be interesting to see the improvement in the trace gas columns due to the inclusion of the vegetation spectra in the fit.



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- I suggest that the authors include an albedo spectrum representative for oceanic chlorophyll and derivative products (see for example: Morel, A., S. Maritorena, Bio-optical properties of oceanic waters: A reappraisal, J. Geophys. Res., 106(C4), 7163-7180, 10.1029/2000JC000319, 2001, and references therein). This would make the retrievals over the ocean much more meaningful.

## Technical

In the title apparently the word vegetation is missing, please correct.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 7945, 2006.