

Interactive comment on “Dependence of cloud fraction and cloud top height on surface temperature derived from spectrally resolved UV/vis satellite observations” by T. Wagner et al.

T. Wagner et al.

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The authors argue that climate models should aim to reproduce their results. However, climate models work with "true" cloud parameters and not with the effective ones. It could be of advantage if authors show how their effective cloud parameters correlate with "true" cloud fractions and cloud top heights. The word "effective" is missing in the title. Authors state that the errors in the cloud fraction are below 5%. The paper will be improved if the procedure to assess errors is outlined.

Many thanks for the constructive comments!

A) It is true that we present effective cloud products which are difficult to be simulated from model output. We still believe that already the correlation of the effective

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cloud quantities to surface temperatures provides interesting insights on the cloud-temperature relationships. However, the suggestions are well considered in the revised version of our manuscript. First, we included a much more detailed comparison to ISCCP cloud products (new section 2.5), which gives important information on the relationship of the effective quantities to the 'true' quantities. In addition, as suggested by one of the reviewers we added a section (3.3) on the development of a GOME simulator for climate models. Such a simulator could provide the missing link between GOME observations and model results.

B) We added 'effective' in various parts of the manuscript. We also changed the title to 'Dependence of cloud properties derived from spectrally resolved visible satellite observations on surface temperature' to avoid misunderstandings

C) As already stated in the original version of our manuscript, the errors of the GOME CTH are difficult to assess, because of the complexities of vertical (and horizontal) cloud structures. In our study we suggested to use the relation of ST and CTH primarily as a qualitative information. Note that these uncertainties might be largely reduced if a GOME simulator is used in future studies (see point A above). Concerning the errors of the HICRU effective cloud fraction, the error was estimated from sensitivity studies (as stated already in the original version of our manuscript). We now added that the accuracy for low cloud fractions was determined from the scatter of the lower limit of CF around zero. The uncertainties of the O₂ analysis is derived from the non-linear least squares fitting routine. We added this information to the revised version of our manuscript.

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