

Interactive comment on “Radiation transfer in stratus clouds at the BSRN Payerne site” by D. Nowak et al.

Anonymous Referee #1

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Background

Presented are calculations with a radiative transfer model and ancillary information that simulate stratus cloud situations for selected cases during the period of 2000 to 2005, over the Baseline Surface Radiation Network (BSRN) station of Payerne, Switzerland. The study results in estimates of transmittance, absorption, and reflectance for this type of clouds that tend to occur at this site during stable winter condition. Such estimates are of interest in studies that require information on radiative properties of clouds and therefore, are relevant.

General Comments

1. In several places statements are made that imply that it is the MODTRAN code that

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is being tested in this study. For instance, in the Discussion section it is stated:

The performance of MODTRAN in simulating radiation flux at the surface for an atmosphere including a single stratus cloud layer was satisfactory.

The objective of this study is not to evaluate the MODTRAN code. In particular, since some tuning of the absorbing properties is made and therefore, there is no full closure.

The objective seems to be to estimate cloud optical properties by utilizing ground observations of shortwave radiative fluxes as observed with conventional instrument and those at the Top of the Atmosphere as observed from satellites, under stratus cloud conditions. Tuning of selected cloud parameters was done to reconcile these observations and when that was achieved, the respective cloud properties are reported. Therefore, it is recommended to modify statements regarding the quality of the MODTRAN code. Such evaluation would require a different type of controlled experiments.

2. Atmospheric inputs used in simulations were not the same for all the cases. During the COST experiment, the documentation of the conditions was more extensive. Possibly, such cases can be better utilized to test if the assumptions made during the lesser observing periods work well.

3. Not clear how it was ascertained that there were no cirrus clouds during the cases that were selected.

4. It would be of interest to compare the cloud property estimates to similar such estimates, to give a feel of the extent to which the findings can be generalized.

5. In Section 8 (Conclusions) it is stated that:

The results presented in this study offer a method for the monitoring of the effect of stratiform clouds on the solar radiation. Especially in a changing climate, tracking changes in radiation budgets due to potential cloud changes becomes important (e.g. changes of the stratiform cloud cover have been reported over the United States over a period from 1940 to 2002 by Sun and Groisman, 2004). Additionally cloud radiative

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properties may not remain constant when climate changes (Slingo, 1989).

It is not clear how this study offers a method for monitoring the effect of stratiform clouds on solar radiation or how would it be possible to determine the effect of climate change on the properties of such clouds.

Specific Comments

There is a need for language editing and using consistent notations. Some examples:

In Abstract stated:

(Ohmura et al. 1998)

According to the style of most references should be:

(Ohmura et al., 1998)

Reads:

(e.g. aerosol indirect effect, cloud lifetime effect, response of cloud cover to increasing greenhouse gases, Trenberth et al., 2007).

Should read:

(e.g. aerosol indirect effect, cloud lifetime effect, response of cloud cover to increasing greenhouse gases (Trenberth et al., 2007)).

Reads:

(global mean, Cess et al., 1995)

Remove global mean from the reference.

Also, the references to Anomalous Cloud Absorption do not include the lead papers on this topic.

Reads:

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Nowak et al., 2008a)

Should read:

Nowak et al. (2008a)

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 11453, 2008.

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