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

Anonymous Referee #2

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Overall, it is an interesting paper that provides some useful information about MOD-TRAN_TM testing results for 1-layer St clouds. Authors showed that MODTRAN_TM computations can be compared reasonably well with surface and TOA broadband solar flux observations. In general, presented results are consistent with many previous studies (many of them referenced in the manuscript), and demonstrate MODTRAN_TM application for modeling a number of single layer cloud cases observed over the Payerne site in Switzerland. Despite interesting contents and useful MODTRAN_TM testing results, the overall novelty and originality of the paper is quite modest. In my opinion, paper does not propose a new concepts or original methods or substantial results that were not known or utilized before.

There are some other additional critics.

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1) It is not quite clear how authors ensured that Cirrus clouds are excluded from analysis.

2) End of Section 5. ..." the vertical cloud extinction was adjusted within limits adequate for stratus cloud, in order to minimize the differences between modeled and observed surface diffuse SDR". If cloud parameters were tuned to the observed surface fluxes then why Table 1 and Figure 1 contains biases and scattering? There should be a perfect match with correlation 1 and all biases equal to zero, as one can always find a suitable cloud optical thickness to reproduce the surface observed flux for reasonable single cloud layer atmospheric conditions.

3) Cloud droplet size has never been mentioned. Is there any information about cloud microphysical properties in this region?

4) It is not clear what values of surface albedo (reflectance or BRDF) were used for MODTRAN_TM calculations. The surface boundary conditions have never been discussed.

5) An attempt to link climate change and cloudiness properties and ..."to determine how clouds affect radiation" look somewhat awkward and too mbitious, as the study present basic RTM calculations using a standard MODTRAN_TM tool for 32 (18) stand-alone cases. Study does not have any obvious links with climate change impacts on cloud properties.

6) It is not clear what aerosol information was used in the simulations.

7) End of section 4. It is not clear how useful is MERIS is cloud analysis, as MERIS is mostly an ocean sensor with a limited value for cloud analysis.

8) Section 6.2 . Authors proposed two reasons to explain observed differences between model and CERES data. Frankly speaking, this text can hardly be called as an explanation. These are very general arguments about possible causes, not a scientific explanation.

9) The broadband SW flux comparison has a limited value. The longwave and spectral fluxes should be also compared to ensure that model and observations are indeed in a good agreement.

10) Section 8. "This study presents a method to deduce absorption, absorbance, transmittance and reflectance of solar radiation in stratiform clouds, determined with a state of the art RTM and with widely available atmospheric observations." "The results presented in this study offer a method for the monitoring of the effect of stratiform clouds on the solar radiation"

This seems to be an exaggeration of the significance of this paper.

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

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