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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The effect of optically thin cirrus clouds on solar radiation in Camagüey, Cuba" *by* B. Barja and J. C. Antuña

Anonymous Referee #1

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Review of the paper: The effect of optically thin cirrus clouds on solar radiation in Camagüey, Cuba B. by B. Barja and J. C. Antuña, Atmos. Chem. Phys. Discuss., 11, 8777–8799, 2011 www.atmos-chem-phys-discuss.net/11/8777/2011/ doi:10.5194/acpd-11-8777-2011

Recommendation: accept after minor revision

This paper is devoted to the analysis of radiative effects of cirrus clouds. This topic of research is important for understanding of the current climate and estimates of the future climate change because the radiative effect of cirrus clouds is traditionally one of the most uncertain in the climatic system. Therefore, a large number of the field campaigns and theoretical studies were performed over the last 2 decades, e.g., FIRE-1 and FIRE-2, SUCCESS, INCA with aircraft measurements, and others. The effects

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of cirrus can be different in various geographical regions. For example, the project INCA revealed that effects of cirrus can be different in the southern and northern hemispheres due to stronger pollutions in the Northern hemisphere. Verification and validation of such big aircraft projects require long-term surface based experiments in various points of the globe.

The paper by B. Barja and J. C. Antuña is devoted to this purpose and represents a good example of the long-term series of the lidar sensing of cirrus clouds that are subsequently analyzed using a good radiative code. Thus, the paper is actual, has a practical meaning. Both the experimental methods (lidar measurements) and theoretical calculations (radiative transfer) seem to be correct and validated, the results will be useful for weather and climate research. The summary of the radiative balance given in Table 1 can serve as a good constraint for tuning climate models and satellite measurements. Therefore, I can recommend the paper for publication after minor revisions. A few specific remarks are outlined below.

Specifis remarks.

1) To my opinion, a description of the radiative code and its connection with the lidar measurements is too short. It would be worthy to add a few equations with a clear description how the lidar backscatter coefficient is recalculated to the total extinction coefficient and how it participates in the radiative transfer equations, how it depends on the crystal size and ice water content. Half a page or so with equations would help to a reader to better understand the work.

2) Some symbols in figures and their legends seem to be too small. I would advise to increase and to check if they are readable on the pages of the journal format.

3) If the authors plotted the statistical dependencies of the radiative heating and forcing on cirrus optical depth, could they suggest at least a simple and crude, but an analytical parameterizations? This seems to be possible based on these figures (perhaps not in this but in a subsequent work).

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4) It seems, the English in the paper may need some checking and polishing.

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