

The reply to D. Baumgardner (Referee, RC1)

Dear Mr. Baumgardner,

We are grateful to you for the positive assessment of our study, for insightful remarks and for the valuable recommendations.

Below, your comments are given in **bold courier font and blue colour**.

The text added to the revised version of the manuscript is marked by **red colour**.

My only disappointment came when I was expecting to find the analysis put into the context of how important these differences are with respect to how they impact climate models since they begin the analysis by talking of the urgency of understanding how the lack of understanding clouds in this region is a major problem.

We completely agree with this remark. When we started our investigation we also kept in mind the problem of the utilization of LWP data in climate models. However in the process of investigations we decided to focus only on the remote sensing aspect since quite a lot of problems relative to comparison of satellite and ground-based data have been identified.

When they began using the reanalysis data to look at diurnal cycles, I thought they would take the next logical step and either use a simple climate model to demonstrate the sensitivity of radiative forcing to differences in LWP, or at the least, test the statistical significance of the differences.

The sensitivity study that you propose would be of course very interesting (we agree with you on that). But such a study does not fall into the scope of the present article which is devoted to the remote sensing aspects and to the problems of data comparison. We consider your recommendation as very valuable but we can not implement it as the part of the present study since it would require first the solution of the problems that have already been identified, and also the amount of data for such a study should be considerably increased.

The lack of such a final analysis will not prevent me from recommending publication; however, providing some type of final analysis, either statistical testing or sensitivity analysis, I think would increase the scientific value of this paper.

As far as the statistical significance is concerned, we have the opinion that this task should be divided into two parts at least: the analysis of so-called “instantaneous” measurements and the analysis of the characteristics that are not much influenced by mistime, misdistance and averaging procedure: median values and frequency distributions. We have shown that for instantaneous measurements the analysis of the specific cases should be done, the statistics is not very helpful. However, in the revised version the new Figure is introduced which presents the two-dimensional histogram of the instantaneous measurements and corresponding analysis in Section 5.1:

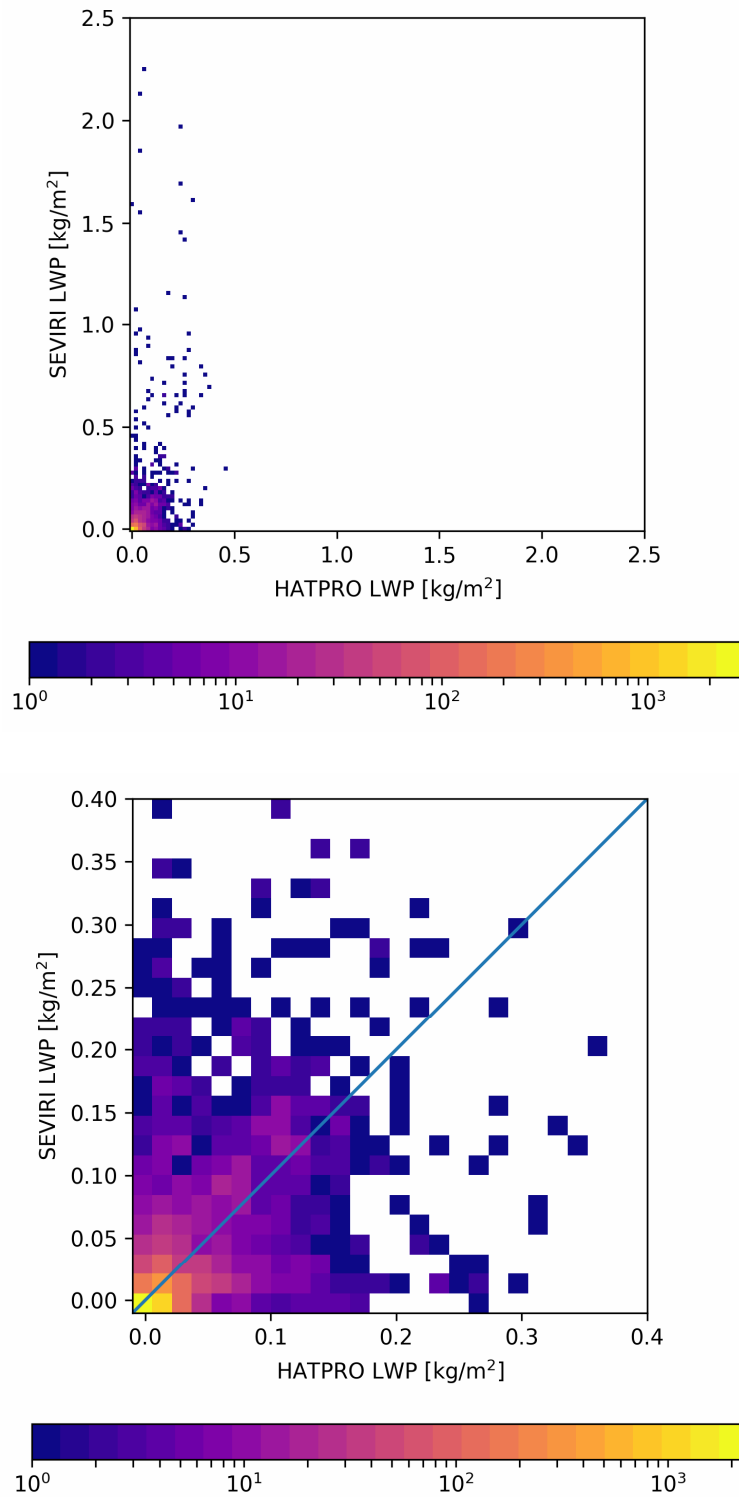


Figure 9: Comparison of the HATPRO and SEVIRI “instantaneous” measurements by means of two-dimensional histogram with number of occurrence colour scale. Upper panel: extra high LWP values are shown, lower panel: only $LWP < 0.4 \text{ kg m}^{-2}$ are shown.

“We begin our analysis making a comparison of the instantaneous HATPRO and SEVIRI measurements of LWP by means of a two-dimensional histogram with the number of occurrence colour scale that is displayed in Fig. 9. This plot gives an impression about the overall agreement of measurements disregarding seasonal features. First of all, attention should be paid to the presence of a noticeable number of very high LWP values

detected by the SEVIRI instrument and reaching 2.3 kg m^{-2} . However, the number of occurrence of these measurements is very small if compared to the number of occurrence of the small values. The two-dimensional histogram for $\text{LWP} < 0.4 \text{ kg m}^{-2}$ shown in the lower panel of Fig. 9 demonstrates that the largest number of occurrence is observed for small LWP not exceeding 0.03 kg m^{-2} . The agreement between HATPRO and SEVIRI data for these values is good. For higher values, the agreement is not evident. This fact is not surprising since the agreement between instantaneous measurements is influenced by mistime, misdistance, weather conditions, type of cloudiness and the parameters of time averaging of the HATPRO data.”