

## ***Interactive comment on “Assessing modelled spatial distributions of ice water path using satellite data” by S. Eliasson et al.***

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[a4paper,10pt]article

### **1 Overall:**

Thank you for your valuable comments. We realize that currently the general aim of the paper is not clear enough. The main aim is to make people aware of the problems associated with combining or comparing IWP datasets. We agree that in order to give more concise answers on the model IWP distributions, we should at least try to remove the precipitation from the CloudSat data.

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Following are the answers to your comments and questions.

### **2 Major comments:**

#### **2.1 Ideally we should first simulate the signals using the output from the model.**

For this article, we have decided to use the AR4 archive in order to get a general idea about how the models are doing. This data are in a monthly mean format, and we can't simulate measurements using these. For a follow-up study directly after this article, we plan to pursue the model discrepancies using simulated data in a much more quantitative approach, but this is outside the scope of this article.

#### **2.2 Exclude precipitation from CloudSat**

This is a major point and we agree that some effort must be made to clear precipitation from CloudSat. Instead of removing all profiles that contain rain, we plan on removing boxes in the vertical profile that have a reflectivity larger than a certain threshold. We can then recalculate the column integrated values based on the remaining vertical boxes in the profile. The new results and method will change the discussion section considerably.

#### **2.3 Almost no discussion on the reason for model discrepancies**

The aim of including the models in this article is to increase awareness on the differences between themselves and compared to observations in terms of IWP. We will include a description of the microphysics used in the models as suggested, and mention the known issues with them. However, in order to satisfactorily discuss these

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discrepancies, major input from the modelers is needed. This is very important, but is beyond the scope of this paper.

### **3 Minor comments:**

#### 3.1 Choose the some horizontal resolutions for the observations:

The different horizontal resolutions are from the original level 3 data. We can re-grid them onto a common grid ( $5^{\circ}$ ).

#### 3.2 Be clear on the actual definitions of IWP for datasets and simulations, e.g. multiplied by cloud fraction or not:

Yes, the gridded level 3 datasets (ISCCP, PATMOS-x and MODIS) contain both IWP and cloud-fraction. It should be clearer that we are using cloud-fraction weighted IWP, in order to match the models. CloudSat and MSPPS gridded IWP are derived from a level 2 pixel level product containing 0's (cloud free).

#### 3.3 Justify cloud-ice column ratio in line 13-14, page 12196:

Yes, this is, as mentioned in the article, an ad hoc approach. We adopted this approach as the cloud-ice column ratios are not available in the AR4 archive. We will justify this more clearly.

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#### 3.4 Figures:

We can give Fig. 1 & Fig. 2 the same vertical axis, but they are not really the same quantity. Fig. 1 shows the IWP data from the observations as they are given. Fig. 2 contains CloudSat as a reference after first weighting the IWP with the cloud-ice column ratios given in the two models in the waliser et. al. 2009 paper.

We will also include a figure with the absolute IWP values before normalizing.

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