

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

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### **1 Overall:**

Thank you for your candid comments, and sorry for the late response due to the holidays. In general, I will reiterate that the aim of the article is to make the community aware of the problems associated combining or comparing IWP datasets. It is clear that we will do a better job at making sure the aim of the article comes across clearer in the abstract and introduction in the revised version.

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### **2 Is it right to compare IWP from different data sets?**

IWP for all observations and model are defined equally (column integrated ice water content), and only by comparing the data sets can we begin to make progress in utilizing the IWP data available, and to understand the strengths and limitations of using data based on different techniques.

It is known that the differences in IWP between the observations are largely due to the different instrument sensitivities, hence they in practice retrieve information from different parts of the ice column. E.g. retrievals from IR-only instruments only gives us the IWP of clouds up to an optical depth of about 3, whereas for IR/VIS the optical depth threshold is over 40 or so, etc. This is why the datasets should not return the same IWP values, and is mentioned throughout the article, but this will be emphasized yet more strongly in the new version. There are also differences not due to sensitivity, but rather on the microphysical assumptions that are made in the retrieval, and the readers should also be made aware of this.

### **3 About IWP retrievals from passive microwave data**

Throughout the article it is mentioned that the physical characteristics of passive microwave measurements, do not enable the retrieval of thin ice clouds. Therefore the quantity IWP is underestimated compared to other datasets, but this is expected. I've included 2 figures (Fig. 7 and 8 from *Holl et al. (2010)*) which can be used to better understand the differences in the average IWP between CloudSat and MSPPS (AMSU-B).

The left figure includes the collocated AMSU-B channel 20 brightness temperature (used in the retrieval) to CloudSat IWP measurements. From the figure one can deduce that in general there is no sensitivity to ice clouds that contain less IWP than around

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100  $g/m^2$ . The right figure shows IWP from MHS (equivalent to AMSU-B) collocated with CloudSat IWP. Notably, it is illustrated here that for clouds that are thick enough to be detected by passive microwave sensors, there is a systematic difference in the retrieved IWP (at least a factor 4). This is likely due to differences in the microphysical assumptions made.

#### 4 Method section

Currently, the methods used in each results section are explained in the section at hand. But we have no general method section. We believe that this improves the readability of the paper compared to a central method section.

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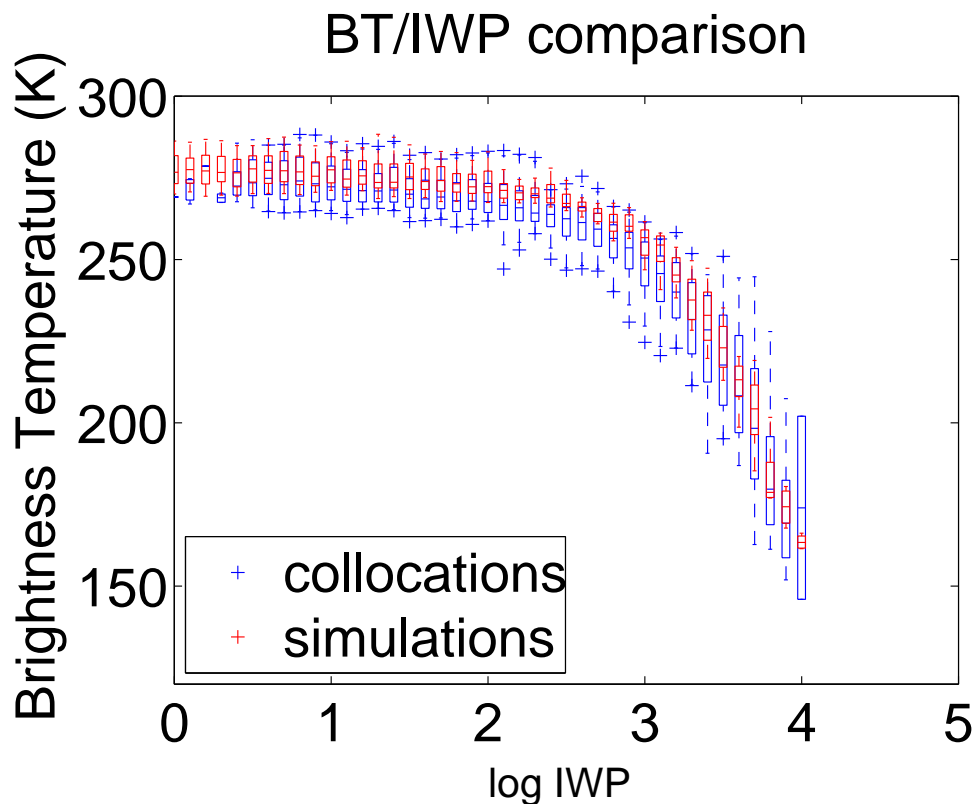


Fig. 1. something1

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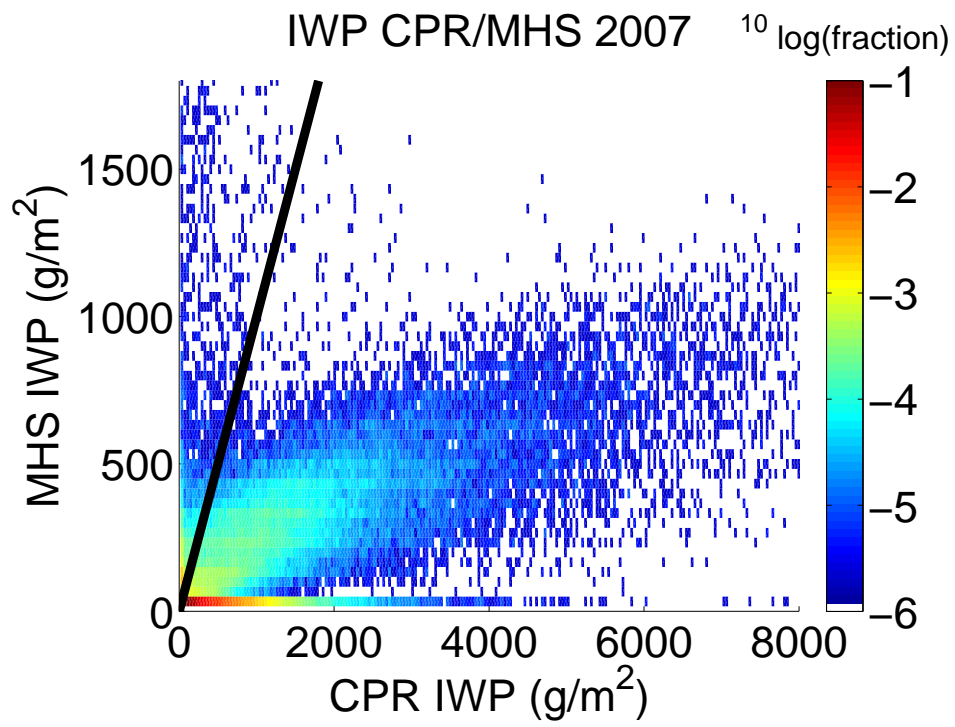


Fig. 2. something2

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