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Atmospheric Measurement Techniques Discussions

Interactive comment on "Schneefernerhaus as a mountain research station for clouds and turbulence – Part 2: Cloud microphysics and fine-scale turbulence" *by* H. Siebert et al.

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Dear reviewer, dear editor,

First of all we would like to express our acknowledgement to all of you for your valuable comments on our manuscript. We followed your suggestions and will respond to your comments in detail below.

Our response is in bold & italic below the original comment.

Publication is recommended but the authors may want to consider the points made below. Same general point as for part 1: The authors argue that the the large scales

are similar to laboratory flows. This is apparently to justify using the site as a high Reynolds number laboratory for cloud studies. Possibly they are trying too hard to make the laboratory connection and it and it would be of interest to the readers to find out what they see as significant differences to the laboratory, rather than only pointing out only the similarities.

There may be a misunderstanding here, in that we do not argue that the large scales (which are probably influenced by the mountain) are similar to laboratory flows. The "small-scales“ – let’s say below a few meter or so – are shown to have properties similar to "free atmospheric clouds“ and on even smaller scales the observed flow at UFS also shows similarities to laboratory flows. We hope this is made clear in the slightly revised introduction. The reviewer’s next point regarding reporting of significant differences is a good one, and we have added some discussion of that to the conclusion section. The examples we have included include the apparent periodicity in the intermittency in figure 6, and the select sub-records with slightly varying mean, such as in figure 2. In other words, the atmospheric data is not nicely stationary as in the laboratory, but when adequate efforts are made to identify stationary sub-records, the fine-scale properties are mostly as we would expect to encounter in idealized laboratory flows and as observed in free clouds (e.g., Siebert et al. 2010).

In particular the cloud is always intermittent at the large scale. Some statistics on the intermittency would be of interest since it undoubtedly affects mixing, drop size etc..

Here it is important what is meant by intermittency. We use this word in terms of small-scale intermittency, and this is discussed in terms of lognormal distribution of local energy dissipation, etc. Discussion of large-scale variability/intermittency has not been included because we are mainly interested in the behavior of individual droplets in a turbulent flow which is affected by the local flow characteristics. The topic is treated instead in the companion paper by Risius et al. As discussed in the response to the previous comment, we did include some discussion of the need to select quasi-stationary data samples in order to provide meaningful estimation of turbulence PDFs.

AMTD
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Some specific points:

P578: Para1, third last line: Provide a reference after “or thin stratocumulus clouds”.

This is a good suggestion, and we have cited some of our prior observations in the stated conditions: Lehmann et al. (2009) and Ditas et al. (2012).

P579: Para 2, second line. Provide a reference after “measured in free clouds”.

Again we cite Lehmann et al. (2009) and Ditas et al. (2012).

Fig 5. Explain what the solid straight lines are in the caption.

We have included in the caption the following sentence: "The dashed horizontal line in the lower panel marks the energy dissipation rate derived from the power spectrum.“

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 569, 2015.