

## ***Interactive comment on “Using a holographic imager on a tethered balloon system for microphysical observations of boundary layer clouds” by Fabiola Ramelli et al.***

### **Anonymous Referee #2**

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The paper describes balloon-borne measurements of microphysics inside supercooled boundary layer stratus clouds collected with use of a modern holographic imager HOLIMO.

The paper consists of two very distinct parts. From the beginning to section 4.3 the paper is clear, very well written and there are no major drawbacks in the text. The description of the measurements, calibration is sound. The results are interesting, show unexpected behavior of cloud microphysics, hard to document with different, than HOLIMO, instruments. This, with some additional discussion and maybe selected examples of local samples of droplet spatial and size distributions would be enough to justify the

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publication. However, instead of focusing on microphysics, in the last sections of chapter 4 and in the discussion author speculate on mixing and dynamical effects which are aimed at explanation the unexpected results of microphysical measurements, in particular large variations in droplet number concentration. These speculations should be backed with the data, but are not. As shown in Fig.1 the HoloBallon is, together with the HOLIMO, equipped with a sonic anemometer, which should provide in-situ high-resolution data on turbulence (velocity fluctuations) and virtual temperature. The authors, instead of using data from the device, speculate on turbulence and waves, Kelvin-Helmholz Instabilities, downdrafts. I strongly believe that insight into sonic data could be used to verify which speculations are justified and which are not. In particular virtual temperature fluctuations might help to understand mixing, velocity records should allow to document turbulence, waves and K-H instabilities

In my opinion the paper in the present form is hardly acceptable. I suggest the major revision of the text. Two options is possible: 1) to make the paper shorter, remove the speculative part of the chapters 4 and 5 and to write that the explanation requires additional, highly demanding analysis of turbulence data recorded; 2) to use sonic data and do the analysis in a simplified form, to show some dynamical properties of the flow to support speculations presented in the text.

If the authors chose the second option I suggest more detailed insight into the cited Mellado's paper about stratocumulus top and into references therein. Such insight, in my opinion, could help very much in the analysis.

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