

## ***Interactive comment on “Ice Crystal Characterization in Cirrus Clouds II: Radiometric Characterization of HaloCam for the Quantitative Analysis of Halo Displays” by Linda Forster et al.***

### **Anonymous Referee #2**

Received and published: 22 April 2020

#### General Comments:

The submitted manuscript deals with the geometric and radiometric calibration of a camera system HaloCamRAW designed for halo tracking. The long-term objective is to perform a quantitative analysis of ice crystal properties in cirrus clouds from the halo database provided by this camera combined to a radiative transfer model. The article explores prerequisite steps to achieve this goal through one halo case.

The article is well written and easy to follow through the different sections and figures. It is mainly dedicated to the radiometric calibration procedure. Indeed, the methodology for geometric calibration with chessboard checkers (Zhang 2000) is widely used and

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referenced. The radiometric calibration consists in 2 steps: a signal correction following the same steps as used in (Ewald et al. 2016) for the specMACS imager, and a cross calibration step using specMACS imager to estimate the radiance measurement from the camera signal. The paper includes a theoretical uncertainty analysis and gives in details the assumptions that are made in the calibration process. In the last part, one application is performed on a 22° halo case. The authors perform several simulations of LibRadtran model with various ice crystals/cirrus cloud parameters inputs. The results show that one combination of parameters gives a good agreement with the HaloCamRAW estimated radiance. Under certain assumptions this methodology allows to characterize some parameters of ice crystals in the cirrus cloud.

#### Specific Comments:

1) More context would help the reader to appreciate the value of this work. Indeed, the global scope of this work should be given in introduction. Advantages (and eventually drawbacks) of ice crystal characterization in cirrus clouds by the HaloCam system compared to others instruments could also be given.

2) Line 2 p.19, the authors write "a method could be developed to retrieve ice crystal properties". Is that method supposed to be automated to make a "long-term database" (line 22 p.20) ? In that case, what are the difficulties to overcome for this purpose ? It would be interesting to discuss about that point. For instance, halo cases with quite different sets of parameters might lead to the same radiance response using the libRadtran model, hence the inversion of the operator will not be possible if no additional information or constraint is added.

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Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-475, 2020.

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