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Interactive comment on "Ice Crystal Characterization in Cirrus Clouds: A Sun-tracking Camera System and Automated Detection Algorithm for Halo Displays" *by* Linda Forster et al.

Anonymous Referee #1

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This manuscript reports on the observations of 22-degree halo associated with cirrus clouds by using a sun-tracking system called HaloCam. An automated halo detection algorithm was clearly explained. A brief history of halo observations was reviewed. The HaloCam observations during six weeks were analyzed. The findings were compared with the counterparts revealed by two other datasets, the FARS (Facility for Atmospheric Remote Sensing) and AKM (Arbeitskreis Meteore e.v. Sketion Halobeobachtungen) analyses. Furthermore, theoretical simulations of halo with four combinations of smooth and rough ice crystals were performed.

Overall, the manuscript is well organized and clearly written. No major technical errors were noted. The manuscript in its present form can be essentially accepted for publication as is.

Typographical errors:

Line 3 on page 3: "150.000" should be "150,000".

Line 17 on page 5: "Also AKM state" should be "Also AKM states". Or, should it be better to state "In addition, the AKM observations reveal"

Suggestions for future studies:

1. From the upper panel of Fig.4, the HaloCam system is capable of observing 46-degree halo. As correctly pointed out in the manuscript, the ratio of 22-degree halo to 46-degree halo contains rich information about ice crystal aspect ratio. Thus, it is suggested that the present study based on HaloCam be extended to analyses of 46-degree halo. 2. Ice crystals in the form of individual bullets or bullet rosettes have been extensively assumed (based on some in-situ microphysical property observations). These ice crystals produce a halo at approximately 10 degrees. Did the HaloCam system ever observe this type of halos?