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Data collection and analysis on Halo displays using an all-sky camera STEPHEN SORENSON, JAMES FROBERG, SYLKE BOYD, University of Minnesota Morris — Observations of atmospheric optical phenomena can reveal much about the physical properties of the troposphere. The goal is to set up a facility for long-term observation and data collection on frequency and type of optical displays at the University of Minnesota-Morris.We aim to utilize these optical phenomena for remote observation of atmospheric conditions that influence the ice crystal shapes, sizes, orientations and particle densities in cirrus altitude. They affect the color, angular intensity distribution, brightness and type of optical displays. An all-sky camera is sampling the sky at regular intervals. We present our work on image analysis software for the automatic detection of the presence of common halo-related optical phenomena. This will allow systematic cataloguing as well as data on frequency and seasonal distribution of the various types of displays for our area. We also present a Matlab simulation correlating the observed angular intensity distribution with the types, sizes and orientations of ice crystals present in the generating layer. Based on sequences of refraction and reflection processes on the various surfaces of the ice crystal, the exit angle distributions for large numbers of incident rays are compiled.

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