Retrieval of Cloud-Base Height and Fractional Sky Cover from Ground-Based Sky Imager

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Abstract

The importance of cloud has received substantial attention from recent climate researches due to its influences on the Earth's radiation budget and climate. Moreover, its accurate parameterization in numerical model is closely related with the improvement of model performances and predictions. The microphysical observations of clouds have been performed by human observers who recorded cloud cover, height, and cloud type and by a satellite. However, the observation methods of clouds by human observers and a satellite have their own limitations due to its difficulties of the punctuality and weaknesses in quantifying small or low cloud features, respectively. For this reason, the automatic observation of clouds based on sky images has been developed to obtain continuous information of sky conditions and calculate the cover and height of clouds from the sky image data. The Automatic Cloud Observation System (ACOS) has been developed and installed at the observational site of National Institute of Meteorological Research. The basic design of the system includes a pair of stereo camera systems with fisheye lens to obtain a whole sky images. The algorithm for the cloud height and cover retrieval calculates the cloud information from all-sky images and this system is controlled by an eternal computer via an internet network. In this study, the cloud observational data from ACOS have been analyzed and compared with the cloud cover and height data from ceilometers, micro wave radiometer, and satellite data for the improvement and evaluation of ACOS data.

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