Cloud cover retrieved from ground-base observation using Skyviewer : A validation with human observations

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Cloud cover is used in various fields of research in addition to weather forecasts; however, the ground observation of cloud cover is conducted by human observers, a method with low objectivity, temporal and spatial resolutions. Therefore, to address these problems, we have developed an improved algorithm to calculate cloud cover using sky image data obtained with Skyviewer equipment. The algorithm uses a variable threshold of the Red Blue Ratio (RBR) determined from the frequency distributions of the Green Blue Ratio (GBR) to calculate cloud cover more accurately than existing algorithms. To verify the accuracy of the algorithm, we conducted daily, monthly, seasonal and yearly statistical analysis on human observations of cloud cover obtained every hour from 0800 to 1700 LST for the entire year of 2012 at Gangwon Regional Meteorological Administration (GRMA), Korea.

A daily case study compared the images of 1200 LST cases by season and pixel images of cloud cover calculated by the algorithm. The selected weekly cases yielded a high correlation of 0.93 with GRMA data. A monthly case study showed low RMSEs and high correlations for December (RMSE=1.64 tenths and r=0.92) and August (RMSE=1.43 tenths and r=0.91). In addition, seasonal cases yielded a high correlation of 0.9 and 87% consistency within ± 2 tenths for winter and a correlation of 0.83 and 82% consistency for summer, when cases of cloud-free or overcast conditions are frequent. Annual analysis showed that the bias of GRMA and Skyviewer for the year of 2012 was -0.36 tenth, with cloud cover of the GRMA data being greater, whilst RMSE was 2.12 tenths. Considering the spatial inconsistency of the data used in the analysis, GRMA and Skyviewer showed a high correlation (0.87) and 80% consistency for cases with a difference in cloud cover of within ± 2 tenths.