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Atmospheric Measurement Techniques Discussions

Interactive comment on "A method for cloud detection and opacity classification based on ground based sky imagery" *by* M. S. Ghonima et al.

M. S. Ghonima et al.

mghonima@ucsd.edu

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We would like to thank the referee for taking the time to read the paper and provide helpful suggestions to improve the paper.

Regarding the dependence of the performance of the algorithm on solar zenith angle: Our method has been recently applied to a TSI stationed at Copper Mountain, Nevada (35.785 N, 115.0012 W). The table below shows how the algorithm compares to a set of 60 manually annotated images encompassing a wide variety of cloud conditions, ranging from broken altostratus clouds to scattered fair-weather cumulus clouds. The

images were taken at 5 minute intervals at different Solar Zenith angles (39°- 65°), with 12 images annotated for each of the 5 days chosen over a period of 6 months.

The values in the table are essentially identical to the results in the manuscript. Thus, solar zenith angle does not seem to affect the accuracy of the algorithm, except in the case of very large solar zenith angles (i.e. near sunrise or sunset), when a considerable proportion of the pixels around the sun are saturated. The following two sentences on page 4547 of the discussion paper, discuss this point:

"Reviewing the algorithm's classification accuracies at different SZAs (39°- 65°) in the training set at a different site (not shown), there was no considerable change in accuracy with SZA. Thus, images captured around solar noon were chosen for the validation set."

The reliability of manual classification is discussed on page 4547:

"The low accuracy for thin clouds is at least partly related to the biases in the manual classification due to human error by the observer; visually it is hard to delineate the 'cloud edges' of thin clouds. Moreover, thin clouds usually have gaps of clear skies and do not have uniform textures."

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Table 1. Confusion matrix for CDOC based on the $Diff^{HCF}$ metric for images collected at Copper Mountain, Nevada (35.785 N, 115.0012 W). All values are in [%].

Manual	**Algorithm**		
	Classification		
Classification	**Clear (1)**	**Thin (2)**	**Thick (3)**
Clear (1)	**80.5**	19.2	0.3
Thin (2)	18.7	**57.8**	23.5
Thick (3)	1.0	17.8	**81.2**

Fig. 1.