

Interactive comment on “Quantification of atmospheric visibility with dual digital cameras during daytime and nighttime” by K. Du et al.

Anonymous Referee #1

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General Comments:

A number of methods have been developed to measure visual range (VR) using a single camera. This work presents a new method based on a two-camera system in which both cameras are aimed at the same object but at different distances. Only the distance between the two cameras needs to be known as opposed to the distance from the camera and one or more targets, as in single camera systems. The advantages of this method compared to the others are that precalibration of the cameras using a visibility meter is not required and the method is relatively independent of the positioning of the camera relative to the objects used to measure the VR. These advantages make this system easier to deploy in an ad hoc fashion. The theory upon which the VR measurement is based is sound, and the authors demonstrate its feasibility with a

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small field study. I have a few concerns that should be addressed prior to publication.

Specific Comments:

1) The authors regularly use “visibility” when they mean visual range, light scattering, or light extinction. Throughout the manuscript visibility should be replaced with the proper term.

2) While not clearly stated, it appears that the authors use jpeg images from the cameras as opposed to raw images. The jpegs can be highly processed images, introducing nonlinearities between pixel values and exposure times under various lighting conditions. They attempt to reduce some of this error by adjusting the zoom in both cameras so that they have similar fields of view. However, this may not fully account for all of the error introduced due to the in-camera image processing. These errors need to be further discussed in the manuscript. Ideally, the authors should repeat the field study using a camera with both raw and jpeg images so that they can better assess the errors introduced by in-camera image processing, at least for that one camera.

3) The authors use VR estimates from a Vaisala PWD 20 VR meter against which to evaluate their camera system. The Vaisala PWD 20 is a forward-scattering instrument and therefore does not account for light extinction due to absorbing aerosols. However, their camera system does. The authors need to discuss this error and provide some information as to how important absorbing aerosols are in their field experiment.

4) The authors make the case that their method is more flexible and adaptive for field measurements. This is an important attribute of the method. However, it would be very interesting to know if this method is more or less accurate than the other methods currently in use. This could be assessed by comparing VR measurements from the two-camera system to estimates from one-camera systems and the Vaisala PWD 20. I think such a comparison would be a valuable addition to the manuscript.

5) Page 48, line 18: “overcast sky” should be “uniformly overcast sky”. Also, it says that

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the equilibrium radiance model for uniform illumination assumes negligible absorption. It is not clear as to why absorption needs to be small and the referenced Molenaar et al. (1994) paper does not mention this assumption. This needs to be clarified in the manuscript.

Technical Corrections:

- 1) Page 44, line 12: there is an extra "to".
- 2) Page 47, line 4: "methods" should be "method".
- 3) Page 48, line 4: "such like" should be "such as".
- 4) Page 51, line 25: "actually" should be "actual".

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 43, 2013.