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Interactive comment on "Physical interpretation of the spectral radiative signature in the transition zone between cloud-free and cloudy regions" *by* J. C. Chiu et al.

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We thank the reviewer for his/her very important point and helpful comments. We admit that we have overlooked the studies of cloud halos. To account for these studies in the revised version, we made the following changes:

a) The last sentence in our abstract "In addition, the width of transition zones from SWS data is in the range of 50-150 m, which differs from the width in satellite observations (a few kilometres) and in airborne lidar data (1-2 km)." might mislead readers to think that transition zones here are based on the same definitions. Therefore, we deleted it.

b) As pointed out by the reviewer, there are variations in definition of the transition zones. We added one paragraph (Paragraph 3) in Introduction to summarize types

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and horizontal extents of transition zones reported in literatures, and also discussed them in Summary.

c) In Summary we stated that the transition zone in our paper is defined strictly by radiative signatures of downwelling radiances measured by SWS, namely a linear relationship between the sum and difference at two selected wavelengths. The horizontal extent of the transition zone in this paper is much smaller than those reported in Platt and Gambling (1971), Su et al. (2008) and Koren et al. (2007).

Here are a few more comments with respect to cloud halos and the transition zone:

Cloud halos defined by Perry and Hobbs (1996) and Lu et al. (2003) were characterized by humidity properties. In other words, a cloud halo presents a region with a sharp change in humidity. Note that these two papers used the same equation for calculating the halo width, but different criteria for a cloud boundary. Unlike cloud halos, the transition zone in our paper presents a region with a sharp change in radiative signatures rather than in humidity. Because we used wavelengths of 870 and 1640 nm in which water vapor is not a mandatory factor, our transition zone is not necessarily the cloud halo.

We plan to carefully analyze radiance at other wavelengths, including water vapor absorption wavelengths. One might define a transition zone based on sharp changes of radiance at these wavelengths. In this case, the radiation-defined transition zone will be more comparable to cloud halos.

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