A photometric study of the Enormous Cloud Cover seen in the Venus' night-side disk

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The 2-um infrared camera (IR2) onboard Akatsuki observed a remarkable cloud feature in the Venus' night-side disk, a sharp discontinuity of cloud opacity which subtends latitudinally to some thousands of km (Peralta et al., 2020). Though obvious and seemingly common in the Venus' atmosphere as similar features can be identified in imagery since the beginning of the night-side observations (Allen and Crawford,
1984), the mechanism of this emormous cloud cover (ECC) has not yet been explained.

To characterize this ECC (aerosol size parameters and column numbers), we have analyzed the Akatsuki/IR2 data, as well as the Venus Express/VIRTIS data. Six sets of the Akatsuki/IR2 data (MM-DD = 03-27, 07-22, 08-09, 08-18, 08-27, and 09-06) are measurable with varying photometric uncertainties, due to contaminations from the intense day crescent. Seven VEx/VIRTIS data, as tabulated in Peralta et al. (2020), are also
measured by the consistent method with that for IR2 data. A reference region, which is just west of the discontinuity and is seemingly not affected by the ECC, is defined as the background cloud (BC) region. Radiances at the BC and the ECC regions are measured for
two IR2 filter passbands (1.735 and 2.26 um). They are plotted in the correlation plot (radiance at 2.26 um in horizontal axis and radiance at 1.735 um in vertical axis). The BC-to-ECC slope can be used to infer the aerosol size and abundance that changes the BC region to the ECC region.

Comparison of obtained characteristics of the ECC for different observing times will be presented and implication to the possible mechanism of this large-scale phenomenon will be discussed.

Keywords: Venus cloud, discontinuity, night-side observation

