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# VMC/VEX photometry at small phase angles: Glory and the properties of particles in the upper cloud layer of Venus

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We present and analyze the images of a full glory on the upper cloud layer of Venus obtained with Venus Monitoring Camera onboard the Venus Express orbiter, Images have been acquired in three wavelengths of 0.365, 0.513, and 0.965 microns. Glory is an optical phenomenon that poses stringent constraints on the cloud properties. The fact of the observed glory itself suggests that the scattering medium at a level where the radiance comes from is rather homogeneous and its particles are spherical with a narrow size distribution. From the angular position of the glory features in specified wavelengths, one may infer the size of scattering particles, which yields the estimate of their effective radius from 1.0 to 1.4 microns for different regions of the cloud deck. This corresponds to the so-called 1-micron mode of the cloud particles of Venus, which, as is inferred from the previous investigations, are droplets of concentrated sulfuric acid. However, in some cases, the details of the glory feature cannot be explained by scattering by purely sulfuric acid droplets and require presence of an additional component with a high value of the real part of the refractive index. We suppose that this material can be ferric chloride or sulfur; substances which are also candidates for the so-called unknown ultraviolet absorber in the upper cloud layer of Venus. We suggest that the carrier of this component are submicron particles that participate in the condensation of sulfuric acid droplets in the clouds and form the complex UV-absorbing particles with an increased real refractive index. For a number of UV-dark and -bright regions observed at small phase angles, it was shown that UV contrasts are caused by variations in the portion of absorbing particles of the submicron mode in the clouds. From changing of the angular position of the glory maximum in the UV phase profiles, the decrease of the sizes of sulfuric acid droplets (Reff changes from 1.05 to 0.8-0.9 micron) in the upper cloud layer with increasing latitude (from 40S to 60S) before the local noon was revealed. The increase in the amount of 0.9-micron particles may also cause the UV-bright feature often observed at about 50S.