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Retrieval of Venus' clouds parameters with polarization using SPICAV-IR onboard Venus Express

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Understanding the structure and dynamics of Venus' clouds is essential as they have a strong impact on the radiative balance and atmospheric chemistry of the planet. Polarimetry has greatly contributed to our knwoledge about the properties of the cloud layers located between 48 and ~ 70 km. Hansen and Hovenier (1974), using ground-based observations, found the cloud particles to be $\sim 1\,\mu\mathrm{m}$ spherical droplets, with a refractive index corresponding to a concentrated sulfuric acid-water solution. Later, Kawabata et al. (1980), using polarimetric data from OCPP onboard *Pioneer Venus* retrieved the properties of the haze: effective radius of $\sim 0.25\,\mu\mathrm{m}$, refractive indices consistent with a sulfuric acid-water solution, variance of the particle size distribution.

We introduce here new measurements obtained with the SPICAV-IR spectrometer onboard ESA's *Venus Express*. Observing Venus in the visible and IR from 650 nm to 1625 nm with a good spatial and temporal converage, SPICAV's sensitivity to the degree of linear polarization gives us an opportunity to put better constraints on haze and cloud particles at Venus cloud top, as well as their spatial and temporal variability.

These observations reveal a particular feature called glory, observed by SPICAV-IR and VMC (Markiewicz et al. 2014). Using a radiative transfer code taking into account polarization (de Haan et al. 1987, de Rooij et al. 1984, Stam et al. 1999), we model the cloud layers and the glory allowing us to retrieve the real part of the refractive index, the effective radius and variance of the particle size distribution from the main cloud layer. Our results confirm that the particles are spherical, with a narrow size distribution and with refractive indices that are compatible with H_2SO_4-H_2O solutions (Rossi et al. 2014). Using the large latitudinal coverage of the data, we can also retrieve the variation of the overlying haze layer optical thickness. We find that τ_h is increasing with increasing latitude, in agreement with previous measurements from Braak et al. (2002) and Knibbe et al. (1997).

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