Study of Venus' cloud layers by polarimetry using SPICAV/VEx

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The study of Venus's cloud layers is important in order to understand the structure and dynamics of its atmosphere. The main cloud layers between 50 and 70 km are thought to consist in 1 um radius droplets of a H2SO4-H2O solution. Nevertheless, the composition and the size distribution of the droplets are difficult to constrain more precisely. In the early 1980s, Kawabata et al.(1980) used the polarization data from Pioneer Venus' OCPP instrument to constrain the properties of the haze.

We introduce here the model we developed, based on the BH-MIE scattering model. Taking into account the same size distribution of droplets as Kawabata et al., we obtained the polarization degree after a single Mie scattering given the effective radius and variance of the distribution and the refractive index of the droplets. We also present the first application of our model to the so-far unexploited SPICAV-IR polarization data. We put a particular focus on the polarization feature called the glory, which appears at low phase angles and can provide constraints on the cloud parameters even under the single scattering assumption.

We then plan to integrate our model into a polarized radiative transfer model. With polarization and phase function observations in wavelengths ranging from 650 to 1625 nm, we will be able to put better constraints on the properties of cloud and haze particles, with a primary focus on the cloud droplets characterization.