L15c Photopolarimetry Analysis of the Venus Atmosphere in Polar Regions

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An analysis of linear polarization in the north and south polar regions of Venus observed by the Pioneer Venus orbiter during the first 2820 days of its mission has been performed to find microphysical properties of the submicron particles and to investigate the temporal variation of the optical thickness of the haze layer.The search for the best values of the physical properties and vertical distribution of the haze particles is based on minimization of the RMS discrepancy between the computed theoretical polarization and observed polarization, under the assumption that the variation of the observed polarization is due to the temporal variation of the optical thickness of the haze layer.The approach allows us to use a simple model which can explain well general features of the angular distribution for a large number of maps at wavelengths 935, 550, and 365nm. The results of this analysis of the observations are as follows:in the north polar region the haze particles have an effective radius $0.25\pm0.05\mu$m, the effective variance 0.25 ± 0.05, and the real part of the refractive index 1.435 ± 0.02 at wavelength 550nm. In the south polar region, the haze particles have an effective radius $0.29\pm0.02\mu$m, the effective variance 0.25 ± 0.03, and the real part of the refractive index 1.45 ± 0.02 at wavelength 550nm.The temporal variations of optical thickness of the haze particles in both polar regions seem to exhibit short period quasi-oscillation features, and our present analysis seems to indicate that some correlation exists between the variation in optical thickness of the haze layer in the north polar and the south polar regions.