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Characterization of the CO2 and haze densities in the thermosphere-mesosphere region of Venus based on SPICAV observations of the nitric oxyde UV nightside airglow

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The Spectroscopy for Investigation of Characteristics of the Atmosphere of Venus (SPICAV) instrument on board the Venus Express spacecraft has collected a large number of ultraviolet spectra of the Venus nitric oxyde δ and γ bands nightside airglow. These emissions are generated by the associative excitation of O and N atoms formed on the dayside and carried to the nightside by the Subsolar to antisolar global circulation. The SPICAV observations of the NO nightglow cover an altitude range from $\sim$70 to $>$130 km and show an emission peak at about 113 km. In this altitude range, absorption of the NO emission by CO_2 can occur between 180 and 200 nm. At longer wavelengths, haze aerosols may also contribute to the opacity.

Stellar and solar occultations classically use the radiation from a distant star or the Sun and the absorbing properties of the atmosphere of the planet to retrieve information about the foreground atmosphere. We present here a new method using the NO δ and γ bands emission as a source and the atmosphere between the tangent point of the line of sight and the spacecraft as an absorbing medium. We describe how changes observed in the spectra collected with the SPICAV spectrograph are used to infer haze and CO_2 characteristics from a selected data set of limb observations.

We analyze CO_2 and haze densities as a function of altitude in the thermosphere-mesosphere region. These values are then compared with those from standard neutral atmosphere models such as VTS3N and haze properties recently derived from Venus Express remote sensing observations.