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Temporal variations of UV reflectivity of Venus observed by the Venus Monitoring
Camera (VMC) onboard Venus Express

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The Venus Monitoring Camera (VMC) onboard Venus Express detects dark and bright features in the UV range over the globe. This UV contrast is caused by the absorption of an unknown UV absorber located within the upper cloud layer. The upper haze above the clouds can cover the contrasts below. Therefore, the observed reflectivity is affected by the upper clouds, the unknown UV absorber, and the upper haze (Del Genio and Rossow, 1982). These, in fact, are strongly related with mesospheric solar heating, dynamics, and photochemistry (Del Genio and Rossow, 1982; Crisp, 1986; Mills et al., 2007). We analyze the long term trend of UV reflectivity, in order to examine temporal variations in dynamics and chemistry of the Venus mesosphere.

By analyzing VMC UV images, we found there is a clear decreasing trend of the global mean albedo by 20-30% over 2000 days of VEX operation. This decrease is driven by changes at high latitudes. The typical latitudinal albedo distribution, bright polar hood and dark equatorial region, varies over time. The latitudinal albedo contrast changes from a clear brightness gradient from pole to equator to an almost identical brightness in both regions. Interestingly, this temporal variation is similar to that of the SO₂ abundance above the cloud tops, observed in the same period (Marcq et al., 2013). This suggests a reduction of SO₂ over the equator decreases the amount of upper haze at high latitudes, as less sulfur is supplied by the meridional circulation. We investigate the phase angle dependence of the contrast. The result reveals that the vertical distribution of the UV absorbers and the upper haze varies in time as well.

Our results show a long term variation of the UV reflectivity; the decreasing trend of the albedo and the contrast, and the variations in the phase angle dependence of the contrast. These imply that the amount of upper haze at high latitudes varies, seems to be correlated with sulfur and dynamical transportation processes.