

Search for spatial and temporal variability of CO at 30-40 km

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Nightside emission from Venus at wavelengths of 2.3 - 2.4 microns is sensitive to the abundance of carbon monoxide below the clouds at altitudes of 30-40 km. Previous studies have shown that carbon monoxide abundance rises from ~24 ppm at low latitudes to ~35 ppm at 60-70 degrees latitude, using VIRTIS-M data [Tsang et al., JGR, 2008] and VIRTIS-H data [Marcq et al., JGR, 2008] as well as numerous ground-based studies. CO is photochemically generated above the cloud-tops, so CO enhancement below the clouds is interpreted as being indicative of downward transport from above the clouds.

Tsang et al [Icarus, 2009] demonstrated that the ratio of 2.32 to 2.30 um radiances provides a quick way of calculating the CO abundance without requiring a computationally demanding retrieval process. This band ratio technique has now been used to map sub-cloud CO abundance in over 1400 VIRTIS-M-IR observations, spanning the first 600 orbits (May 2006 - Dec 2007).

When all data are averaged over the length of the mission, we find no sign of variation of CO abundance with either longitude or local solar time. Little CO variability is found at low latitudes (<50 degrees). At high latitudes (60-70 degrees) one finds large (>20 degrees in longitude extent), temporally variable regions of CO enhancement.

Measurements of the lifetime of these CO-enhanced regions and their drift velocity will be discussed, as will their implications for meridional circulation.