Variability of UV albedo and its relation to the wind field revealed by Akatsuki UVI

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Venus is entirely covered by optically thick clouds that play essential roles in the Venus' climate system. The cloud consists of H_2SO_4 aerosols, and H_2SO_4 is produced from SO_2 photochemically. SO_2 is abundant in the lower part of the cloud layer and in the subcloud region (Bertaux, 1996), and is thought to be transported to the cloud top in the sulfur cycle (Mills et al., 2007), although the dynamical processes responsible for the transport are not well understood. The purpose of our study is to confirm that SO_2 is supplied from the lower atmosphere to the cloud top where it is lost via photochemical reactions and to analyze how the stationary planetary-scale circulation and time-varying disturbances contribute to the SO_2 transport. The horizontal divergence calculated from the cloud-tracked wind (Ikegawa & Horinouchi, 2016, Horinouchi et al., 2017 and Horinouchi et al., 2018) is considered as an index of vertical flow. The 283-nm radiance, which is subject to SO_2 absorption, measured by Akatsuki UVI (Yamazaki et al., 2018) was converted to UV albedo following the method of Lee et al. (2015) and Lee et al. (2017), and the albedo is considered to be anti-correlated with the amount of SO_2. By comparing the Lagrangian derivative of UV albedo with the horizontal divergence, the relation between the changes of cloud-top SO_2 and the vertical flow was obtained for independent air parcels and the mean field. The results suggest that the supply of SO_2 by the solar-fixed mean flow is attributed to thermal tides and that the amount of SO_2 also responses to transient, localized ascending flows.

