Trials toward first Venus analysis product by data assimilation of Akatsuki observation

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Observations of the Venus Orbiter "Akatsuki" provide us horizontal distributions of the horizontal wind derived from cloud tracking of the UVI camera images and of temperature observed by the LIR camera. However, these observations are very limited with respect to altitude, local time (day or night side), and frequency. It is difficult to elucidate general circulation including with various temporal and spatial scales only from observations. In this study, we aim to produce a Venus objective analysis that has high temporal and spatial resolutions by assimilating the Akatsuki observations into a general circulation model.

The model used in this study is a Venusian GCM (AFES-Venus) and the Venus AFES LETKF Data Assimilation System (ALEDAS-V) based on the Local Ensemble Transform Kalman Filter (LETKF) that has been developed for the first time[1]. Using ALEDAS-V, we have examined impact of data assimilation on thermal tides for the Venus Express wind observations[2]. In addition, we have examined the reproducibility of a unique atmospheric structure so-called "cold collar", a cold latitudinal band encircling the warm polar vortex at about 60–70 km altitudes, in order to elucidate the effects of fixed temperature observations by multiple small satellites[3].

In this presentation, we will introduce results obtained for idealized data assimilation. One is for vertical profiles of temperature assuming radio occultation observation with realistic trajectory (Related to Hosono et al.[4]). The other is for distributions of horizontal wind assuming camera observation (Related to Fujisawa et al.[5]). These are necessary attempts before assimilating actual observation data. Furthermore, we will also introduce the results of assimilating actual Akatsuki observation data.

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Keywords: Akatsuki, Venus atmosphere, Data assimilation