

# Venusian atmospheric general circulation model for the Earth Simulator (AFES-Venus) local ensemble transform Kalman filter (LETKF) data assimilation system (VALEDAS)

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We have developed the Venus AFES (atmospheric GCM (general circulation model) for the Earth Simulator) LETKF (local ensemble transform Kalman filter) data assimilation system (VALEDAS) to make full use of the observation. This system has been tested for Venus AFES simulations excluding the thermal tides [1]. Here, we further proceed to the data assimilation with horizontal winds derived from Venus ultraviolet (UV) images taken by the Venus Monitoring Camera (VMC) onboard the Venus Express (VEX) orbiter using Venus AFES simulations including the thermal tides to investigate the impact of the data assimilation on the thermal tides and the general circulation [2]. Currently, we have conducted observing system simulation experiment on the Venus atmosphere, assuming radio occultation measurement by small satellites. The preliminary results suggest that the system would provide useful information for updating the future missions and improving the Venusian GCMs and produce first analysis datasets from the Venus Climate Orbiter ‘Akatsuki’.

## [References]

- [1] Sugimoto, N., A. Yamazaki, T. Kouyama, H. Kashimura, T. Enomoto, and M. Takagi, **Development of an ensemble Kalman filter data assimilation system for the Venusian atmosphere**, *Scientific Reports*, Vol. 7, (2017), 9321, 9pp.
- [2] Sugimoto, N., M. Takagi, and Y. Matsuda, **Impact of data assimilation on thermal tides in the case of Venus Express wind observation**, *Geophysical Research Letters*, revision submitted.