

Atmospheric super rotation developed in a GCM (AFES-Venus)

*Norihiro Sugimoto¹, Masahiro Takagi², Yoshihisa Matsuda³

1. Keio University, Department of Physics, 2. Kyoto Sangyo University, Department of Physics, 3. Tokyo Gakugei University, Department of Natural Sciences

The generation mechanism of the atmospheric super rotation on Venus is one of the most important topics in the Earth and planetary sciences. Here we reproduced the fully developed super-rotation for the first time in a Venus general circulation model (GCM) driven by a zonally-averaged component of the *realistic* solar heating only. Our GCM enables us to perform long term simulations with medium resolution higher than those used in previous studies. It is newly found that mean meridional circulation driven by the *realistic* solar heating can generate the fully developed super-rotation of $\sim 100 \text{ m s}^{-1}$ with the vertical eddy viscosity smaller than $0.02 \text{ m}^2 \text{ s}^{-1}$ (see below Figure). Existence of the range of the vertical eddy viscosity in which the fast super-rotation can be generated by the reasonable solar heating has broad implications for the atmospheric sciences in light of optimal parameters for the GCMs.

Fully developed super-rotation driven by the mean meridional circulation in a Venus GCM, Norihiro Sugimoto, Masahiro Takagi, and Yoshihisa Matsuda, *Geophysical Research Letters*, (2019), doi.org/10.1029/2018GL080917.

Keywords: General circulation, Super rotation, Venus

