Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

U002-08 Room: IC Time: May 27 14:45-15:15

Modeling of planetary-scale waves using a Venus middle atmosphere GCM

Masaru Yamamoto[1*], Masaaki Takahashi[2]

[1]RIAM, Kyushu Univ., [2]CCSR, Univ. Tokyo

Venus Middle Atmosphere General Circulation Model (VMAGCM, Yamamoto and Takahashi 200 7), which has a model domain of 30-90 km, is developed in order to investigate dynamics of superrotation and planetary-scale waves observed in the cloud layer. The model used is CCSR/ NIES AGCM (Numaguti et al. 1995). In the present study, the planetary-scale equatorial waves with periods of 4-6 days and zonal wavenumber 1 are forced at 30 km in the same way as Yamamoto and Tanaka (1997). In the presence of meridional circulation and thermal tides, the dynamics of the equatorial waves are examined using the VMAGCM simplified by Newtonian cooling.

In the case that the forced equatorial wave is not set in the model, the superrotation is weak in the middle atmosphere. Vertically propagating diurnal and semi-diurnal thermal tides are predominant at the cloud top. In addition, we can see the 6-day wave generated in the atmosphere. In the case of strong equatorial 5.5-day wave forced at the bottom, the superrotation is fully developed at the cloud top and cloud base. The forced 5.5-day wave is seen at the cloud base, while the 4-day wave generated in the atmosphere appears at the cloud top. These equatorial waves may correspond to the equatorial 5.5-day NIR marking (Crisp et al., 1991) and 4-day UV dark band (Rossow et al. 19 80).

By the model development and comparison with observations, we plan to investigate the equatorial and polar dynamics of the Venus middle atmosphere. If possible, the observational data will be assimilated into the model.

Keywords: Venus, superrotation, planetary-scale wave, GCM