Mean Meridional Circulation in the Venus Atmosphere

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In recent years, several numerical studies have been conducted on the Venus atmosphere (Yamamoto and Takahashi 2004; Takagi and Matsuda 2007; Lee et al. 2007; Hollingsworth et al. 2007; Kido and Wakata 2008). The radiative process is simplified by the Newtonian cooling in most models. However, since the optical thickness of the Venus lower atmosphere is quite large, this approximation is obviously inadequate.

In order to investigate dynamics of the Venus lower atmosphere, which is essential for the generation mechanism of the atmospheric superrotation, we are working on a radiative transfer model (RTM) applicable to the Venus atmosphere (Takagi et al. 2010) and an atmospheric general circulation model (AGCM) integrated with this RTM. In preliminary calculations conducted with an axisymmetric two-dimensional model for the grey atmosphere, the structure of the (mean) meridional circulation become shallow and deep due to the pressure dependence of the absorption coefficient.

References

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