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Momentum transport and mean zonal flow induced by thermal tides in the Venus atmosphere

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In the Venus atmosphere, the zonal wind velocity increases with height and reaches 100m/s at 65km. This phenomena is called superrotation, which is one of the most important unsolved problems.

There are clouds of sulfuric acid between 45 to 70km, and solar heating excites thermal tides at the top of these clouds.

The momentum transport by thermal tides is thought to play an important role in the generation and maintenance of the superrotation.

Various parameters such as the wind velocity of basic state and the Brunt-Vaisala frequency determine the vertical structure of thermal tides and momentum flux. Changes of the altitude region where thermal tides are excited would also cause changes in the momentum transport and the resultant zonal wind acceleration.

In this study momentum transport is calculated for various atmospheric parameters using a two-dimensional (longitude and height) model. We will discuss the sensitivity of the momentum transport to these parameters.

Keywords: Venus, thermal tides, superrotation