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Linear analysis of the vertical propagation characteristic of the Venus mountain wave

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In the previous VEGA balloon measurements, the strong vertical fluctuations of the balloon was observed near the altitude of 55 km above the equatorial region. Young et al. (1987) suggested that these fluctuations were influenced by surface topography associated with high mountain ranges. Moreover, Young et al. (1994) suggested that mountain waves could propagate above the Venus cloud layer through the non-linear process. Recently, from the analysis of the ultra violet images taken with the VMC on board the Venus Express, Picciali et al. (2011) argued that mountain waves propagated until the top of the Venus cloud layer.

There are very few observational and theoretical studies about the Venus mountain wave. Then, it is expected that the characteristic of the vertical propagation of the mountain wave is different depending on the latitudes because the depth of the convection layer in the cloud layer and the structures of background zonal wind are different. In particular, the depth of the convection layer in the high latitude region is thicker than in the lower latitude region, thus it is questionable that the mountain wave can really propagate above the convection layer in the high latitude region. Moreover, there is no study that considers the effects of the convection in the cloud layer on the propagation of the mountain wave. Therefore, first of all, we carried out the linear calculation of the mountain wave replacing the effects of the convection with the large diffusion coefficient. In this presentation, we are going to show the result of this linear calculation and the future plan for the study by using a non-linear model.

Keywords: Venus, Mountain wave