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Venus' atmospheric waves indicated by ground-based dayside infrared spectroscopic observation

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In the Venus' atmosphere, waves of various scales transport angular momentum and play an important role in the atmosphere. For example, the mechanism of the super rotation may be explained by the equatorial Kelvin wave [Yamamoto & Tanaka, 1997] or by the thermal tides [Takagi & Matsuda, 2007].

Most of studies have focused on the ultraviolet region to observe atmospheric waves at 70 km [Del Genio et al., 1982, 1990]. Several studies have focused on the infrared region and analyzed thermal emission from the nightside to observe atmospheric waves at 50 km [Belton et al., 1991]. In contrast, we observed the dayside by infrared spectroscopy to quantify CO_2 column density above 60 – 65 km. We performed infrared spectroscopic measurements at the NASA Infrared Telescope Facility (IRTF) with CSHELL spectrometer in May and Nov. 2007, Jun. 2009 and Aug. 2010. We derive representative height to study atmospheric waves.

In this presentation, we will show the clouds structure at 60 – 65 km. The clouds structure varied 2007 to 2010. We estimate that CO_2 column density above 60 – 65 km increased 10 – 30 % in this term. The change suggests that the Venus' atmosphere changes gradually year by year. Previous observations assumed a latitudinally uniform atmospheric circulation [Belton et al., 1991; Crisp et al., 1991]. In contrast, we take latitudinal variations into account.

Then, we will compare these results with those of Venus Express.