あかつき/UVIが捉えた金星の惑星規模紫外模様の時間変化
Temporal variation of the Venusian planetary-scale UV features observed by UVI/AKATSUKI

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UV images of Venus obtained by past explorations such as Pioneer Venus and Venus Express showed bright and dark planetary-scale cloud features. These features often called as the Y-feature and rotate around the planet in the westward direction with a period of ~4 days. It has known that the Y-shaped feature is a not fixed pattern and the pattern sometimes drastically changes. After the success of the orbit re-insertion of Japanese Venus Climate Orbiter "AKATSUKI" on Dec 7, 2015, the ultraviolet imager (UVI) onboard Akatsuki provides clear images of the planetary-scale features and also reveals the detail of the Y-feature and its variability.

The formation mechanism of the Y-feature is not still clear, however, several numerical models can reproduce the similar cloud pattern, and these results suggest that the planetary-scale waves have an important role to form and maintain this remarkable feature. For example, Yamamoto and Takahashi (2012) simulated the horizontal distribution of the geopotential hight with supplied appropriate wave forcing, and they showed a possible mechanism that the combination of the Kelvin wave and the Rossby wave could generate the Y-shaped cloud pattern. Peralta et al. (2015) also discussed an association between the Y-feature and Kelvin-like wave depicting the model reconstructed wave pattern, which was distorted by the background winds, and UV images obtained by Pioneer Venus.

The author's previous long-term ground-based Venus imaging observations from mid-August 2013 to the end of June 2015 revealed that the two significant wave modes with ~5.2-day and ~3.5-day periods exist and the relative intensity of two significant components exhibited cyclical temporal variations (Imai et al., 2016). These two wave modes can be interpreted as the Kelvin and Rossby wave with wave number 1, and the time scale of the cycle takes more than 5 months and the dynamic state of the cloud top (such as the intensity of convective activities) changes over shorter timescales than those previously suggested (e.g. 5–10 years, proposed by Pioneer Venus observation). Therefore, the variation of the planetary-scale cloud pattern could occur in several months, and we will show the dynamical time evolution of the prominent Y-feature using latest UVI images.

キーワード：金星、雲、あかつき、UVI
Keywords: Venus, Cloud, AKATSUKI, UVI

