

あかつき搭載LACによる金星雷放電搜索の現状

高橋 幸弘 [1]; 今井 正堯 [1]; 佐藤 光輝 [2]
[1] 北大・理・宇宙; [2] 北大・理

Update of lightning hunt in Venus with LAC onboard Akatsuki

Yukihiro Takahashi[1]; Masataka Imai[1]; Mitsuteru SATO[2]
[1] CosmoSciences, Hokkaido Univ.; [2] Hokkaido Univ.

LAC on board Akatsuki, Venus climate orbiter, is the first sensor optimized for the lightning flash detection in planets other than the Earth so that it can identify the optical flash caused by electrical discharge in the atmosphere of Venus and could conclude the 30-year discussion on the existence of lightning in Venus. Unique performance of LAC compared to other equipments used in the previous studies of Venus is the high-speed sampling rate at 30 kHz for all 32 pixels of APD matrix, enabling us to distinguish the optical lightning flash from other pulsing noises. We selected OI 777 nm line for lightning detection, which is expected to be the most prominent emission in CO₂-dominant atmosphere based on the laboratory experiments.

After checking the sound condition of high-voltage system for the APD detector after the second attempt of the insertion of Akatsuki into the orbit around Venus on December 7, 2015, the regular operation of LAC at nominal high-voltage of 300 V for lightning hunt was started on December 1, 2016. Due to the elongated orbit than that planned originally, we have an umbra for about 30 min to observe the lightning flash in the night side of Venus every 10 days.

Up to now, July 9, 2017, we have examined 13 times observations with total observation time about 4 hours, but could not find any lightning signals. If the spacecraft is located at a distance of 5,500 km from Venus surface, the threshold of triggering is 1/20 of the average of the Earth lightning flash and the instant field-of-view is 1/500 of the whole

globe. Here we discuss the upper limit of the lightning occurrence rate in Venus, assuming homogeneous occurrence over whole globe, which might be compared with the estimations by previous studies. However, in order to confirm the occurrence ratio reported by Hansell et al. (1995), one of the representative estimation, we need to accumulate total observation period by 3 times than we did.