



Further strategy for lightning hunt in Venus with Akatsuki/LAC

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LAC, lightning and airglow camera, on board Akatsuki spacecraft, a Japanese 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. It is expected that LAC 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 20 kHz with 32 pixels of Avalanche Photo Diode (APD) matrix, enabling us to distinguish the optical lightning flash from other pulsing noises, including cosmic ray. 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.

The regular operation of LAC for lightning hunt was started on December 1, 2016. Due to the elongated orbit than that planned originally, we have an umbra for approximately 30 min to observe the lightning flash in the night side of Venus every 10 days, which is almost 1/20 rate of the original plan. The triggering parameter was set so as to optimize for the light curve similar to the normal lightning in the Earth and data obtained totally for about 4 hours were examined. However, we couldn't find any lightning signals so far. Adding to this triggering parameter set, we added two more sets, optimized for sprite type emission with duration of up to 10s ms and for blue jets or meteor type emission with duration of about 100s ms. These three sets are in rotation at every 20 sec. Furthermore, in order to investigate fainter emissions, we are conducting successive force triggering recordings without any threshold. Here we report the detailed strategy and the latest status of the LAC observation after the winter campaign in 2018.