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## SECURE AND EFFICIENT OPERATIONS FOR MISSION SUCCESS OF MULTIPLE JAXA EXPOSED PAYLOADS

**Abstract**

The Japanese Experiment Module-Exposed Facility (JEM-EF) is one of the unique facilities onboard the International Space Station and that provides users of wide view for the deep space observation as well as of the earth observation. There are 4 JAXA exposed payloads; Monitor of All-sky X-ray Image (MAXI), Space Environment Data Acquisition equipment-Attached Payload (SEDA-AP), Superconducting Submillimeter-wave Limb-emission Sounder (SMILES), and Multi-mission Consolidated Equipment (MCE). One of the most representative research outcomes is MAXI. It has discovered 12 X-ray novae since 2009. The purpose of this manuscript is to introduce how multiple JAXA exposed payloads have been operated securely and efficiently.

The JAXA exposed payloads are operated by Exposed Payload Officer (ExPO) and Operator (OP). The ExPO is an integrator of these payloads and is responsible for timeline and resource coordination. The OP is a dedicated operator for each payload. The main responsibility of the OP is monitoring telemetry and sending commands. The ExPO is staffed for 24hours per day throughout the year. On the other hand, the OP is staffed only when the task is scheduled. When the task is not scheduled, the ExPO has to monitor all these exposed payloads alone.

In order to operate multiple JAXA exposed payloads securely and efficiently, even if an ExPO is on console alone, we have been made all kinds of effort. One of the examples is “Command Script”. It is the pre-registered command list that corresponds to the procedure. Once it is executed by an operator, all pre-registered commands will be sent sequentially. This Command Script is prepared not only for nominal tasks, but also for off-nominal events. It allows us to save the payloads quickly and securely in off-nominal events. For another example, we established a system that an operator can monitor and command multiple payloads.

In consequence, we succeeded to streamline operation of the JAXA exposed payloads. It has already passed 5 years since the beginning of the operation, and we have maintained secure and efficient operation so far. This operation system has made major contribution to research outcomes of the payloads.

Next JAXA exposed payload, CALorimetric Electron Telescope (CALET), will be launched by H-II Transfer Vehicle-5 (HTV-5). We are going to keep trying to operate the payloads for mission success.