

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)  
Joint Session on Human and Robotic Partnerships to Realise Space Exploration Goals (3-B3.6)

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MISSION RESULTS OF THE REX-J MISSION CONDUCTED ON THE JAPANESE EXPERIMENT  
MODULE TO REALIZE THE ASTRONAUT SUPPORT ROBOTS

**Abstract**

Growing human's space activities need to be supported by robots to reduce risks of incidents which include astronauts or to improve cost performance of each man-tended or manned mission. JAXA is developing an astronaut support robot (named Astrobot) to cope with the above requirements. To realize the Astrobot, some new technologies must be developed beside traditional space robot technology such as robot's location capability to move the robot to where tasks will be conducted. We are proposing a new type of space robot's locomotion methods which use tethers. We have developed and launched an experimental robot system to develop and verify new technology needed to realize the Astrobot. This robot experiments were named "REX-J (Robotics Experiments on the International Space Station Japanese Experiment Module)". REX-J is an unique experimental robot system. It has an extendable / retractable robot arm to manipulate tethers which are used to suspend and move the robot's body. The REX-J experimental robot system was launched by the space station logistic support vehicle named "Konotori" and also "HTV (H-II Transfer Vehicle)" in July 2012. The REX-J robot experiment system was attached to the Japanese Experiment Module's Exposed Facility. Operation and tests of REX-J are being conducted from JAXA Tsukuba Space Center. Since all operations are conducted from the ground, astronauts' assistance is not necessary.

All planned experiments were successfully conducted. Experiments which are already conducted are such as; \* Initial check out of the experiment system \* Un-lock the launch-lock mechanism. \* Functional check of each components and equipment \* Attach a tether to a handrail using the extendable robot arm \* Robot's re-location experiment by controlling tethers In the presentation, Plan, development and mission results will be presented.