

Current status and instrument development plan for future lunar exploration missions

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Currently JAXA is planning a series of lunar exploration missions as a part of the international space exploration program. The goal of this program is to accomplish a Mars human exploration mission(s) after developing the required technology by doing lunar exploration missions. In the initial stage of the program, JAXA is studying the following two lunar exploration missions.

1) Lunar polar exploration to evaluate the possibility of utilizing lunar polar water ice as a fuel resource for future lunar exploration. This mission will use pinpoint landing technology, which will be developed and demonstrated by the Smart Lander for Investigating the Moon (SLIM), for landing in a very limited and difficult area suitable for polar-ice investigation.

2) A lunar sample return mission (Human Enhanced Robotic Architecture for Lunar Exploration and Science; HERACLES), which will employ a lunar Gateway (Lunar Orbital Platform-Gateway) and will demonstrate the capability to return from the lunar surface that is required for a human landing mission on the Moon. This mission will bring back 15 kg of lunar samples and is capable of exploring tens of kilometers of the lunar surface by rover.

These missions are still before the pre-project phase, and the instruments that will be carried on these missions haven't been selected. Recently, teams for conducting preliminary study of candidate instruments for the lunar polar exploration mission were selected based on proposals. And JAXA is planning to announce a request for information for the HERACLES instruments. Also, study teams for these missions in JAXA identified several key technologies to realize the missions and started to develop them (e.g., a rover system, a surface-drilling system, and night-survival technology). For efficient and optimal development of these technologies, the requirements and engineering limitations are being discussed among scientists and engineers, and iterative development is fundamental. This presentation will discuss the current status of the lunar polar exploration mission and the HERACLES mission including identified key technologies. A development plan for these technologies will also be discussed to accelerate discussion and interaction among people from different fields.

Keywords: Moon, Lunar polar exploration, HERACLES, international space exploration program