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IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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DEVELOPMENT STATUS IN 2024 ON LUNAR POLAR EXPLORATION (LUPEX) PROJECT

Abstract

Lunar Polar Exploration (LUPEX) mission is a joint exploration for Japan Aerospace Exploration Agency (JAXA) and Indian Space Research Organisation (ISRO) in the south polar region on the Moon for exploring water resources and demonstrating mobility by a rover.

LUPEX aims to obtain data for the quantity and quality of lunar water to clarify whether it can be used for future sustainable activities and for understanding the principle of the water distribution and concentration to estimate the quantity and quality of water across the Moon.

LUPEX spacecraft consists of a rover system developed by JAXA and a lander system developed by ISRO. Seven kinds of mission instruments that can detect volatiles such as water and minerals will be mounted on the rover, JAXA and ISRO develop some of them, and in addition to that, National Aeronautics and Space Administration (NASA) and European Space Agency (ESA) also provide one, respectively. The integrated spacecraft will be launched by the Japanese H3 rocket from Japan.

JAXA has been developing the rover and conducting kinds of driving tests and drilling tests in the subsystem level. Preliminary design review 1 (PDR1) for the rover was successfully held in September 2023 to finalize design of the thermal test model (TTM) and basic design of the JAXA's ground systems for operation of the rover. JAXA and ISRO are hard-working to coordinate the interface specifications between the lander and the rover, and JAXA is trying to solidify the structural design for the rover and to step up to the critical design phase within this year.

Mission instruments JAXA develops are Resource Investigation Water Analyzer (REIWA) and Advanced Lunar Imaging Spectrometer (ALIS). They are under the critical design phase and has already started a series of engineering model tests. The tests include function and performance tests of each subsystem and some environmental tests for launching and operations on the Moon. Those tests will be finished by the end of this summer.

In this paper, we will report the project status of LUPEX in detail, especially on the design activities and engineering model test results of the rover system and JAXA's mission instruments: REIWA and ALIS.