

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

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## LUNAR SURFACE MISSION PREPARATION STATUS UPDATE IN KOREA

**Abstract**

Lunar surface mission succeeding KPLO (Korea Pathfinder Lunar Orbiter), which will be the first Korean lunar mission to be scheduled in 2022, is actively under preparation coordinated by KARI in collaboration with national research institutions in a variety of fields: landing technology, surface mobility, space nuclear power, in-situ resource utilization (ISRU), scientific instruments, etc. KARI makes focus on developing critical technologies for landing guidance and navigation techniques associated with deep-learning based terrain-relative network (TRN) landing and lunar mobility mission planning, and delay tolerant network (DTN) based communication, etc. The virtual and on-ground platforms for landing techniques and mobility were also built to validate landing techniques and lunar surface mobility: virtual lunar image testbed at KARI, indoor/outdoor analog test facilities at KIST and KICT premises, lunar environmental test facility at KICT, so on. KARI is trying to combine domestic resources on lunar surface researches into proper lunar surface mission reference architecture. In parallel, ISRU research activities in Korean lunar community have been prominently increased in the area of prospecting, resource acquisition processing, construction, etc. KIGAM is leading lunar ISRU research by developing ISRU payloads with focus on lunar resource prospecting based on spectroscopy and mapping as well as lunar volatiles extraction out of lunar regolith. KICT recently built small and large scale of dust vacuum chambers with the lunar soil bed containing up to 25 metric tons as well as is working on associated ISRU studies focusing on resource acquisition and processing including drilling sampling, sintering of lunar regolith for brick-making on the moon, lunar base building with 3D printing. KAERI is working on surface power development including radioisotope thermoelectric generator (RTG) and radioisotope heater unit (RHU). In line with NASA's Artemis mission, Korean lunar communities led by KASI will provide scientific instruments in 2024-2025 time frame as NASA CLPS (Commercial Lunar Payload Services) payloads in order to meet NASA driven SKG needs as well as to possibly accommodate future domestic lunar surface mission. In this paper, lunar surface mission preparation status in Korea are updated including pre-phase A study for lunar lander and associated core technologies, ISRU research activities, and expected scientific contribution to NASA CLPS program. In addition, collaborative activities on space exploration under discussion with NASA and other space agencies will be also introduced.