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STRATEGIC KNOWLEDGE GAPS ANALYSIS FOR KOREAN LUNAR EXPLORATION PROGRAM

Abstract

It is widely known that the Moon preserves a record of the early geological evolution of a terrestrial planet including the Earth as well as to retain a unique record of the inner Solar system environment under which life evolved on our planet. For such various reasons, the Moon has been regarded as a fascinating research and exploration object to understand the orgin of where we live as well as the Solar system.

More than 100 robotic missions have been attempted either as the precursors to human exploration missions or as the pioneers to demonstrate new technologies and to discover the unknown scienfic facts since late 1950s. Moreover, leading states such as China, Japan, India, Russia, and the United States have ambitious plans to launch their robotic lunar landers before 2020 for further scientific and technological purposes.

In order to collect the scientific achievements from the previous missions and to prepare for future human exploration missions to the Moon and beyond, the International Space Exploration Coordination Group (ISECG) SKG Assessment Team recently assessed and documented the internationally integrated set of highly relevant gaps, as well as information on how planned robotic mission and ground-based activities fil these gaps.

Motivated by the president's vision and such worldwide exploration activities, Korea has started up a new lunar exploration program to make a lunar lander soft-landed on the moon surface in 2020s. Although the phase A study for Korean pathfinder lunar orbiter is undergoing after completing its strategic planning study, skeptical controvercy still exists inside Korean society regarding why we go to the Moon and what still remains on the Moon to explore.

In this paper, in order to clarify Korea specific mission objectives and provide the strong framework for mission feasibility, the strategic knowledge gaps (SKGs) for Korean lunar robotic mission are newly identified by characterizing the scientific knowledge derived form the previous lunar missions. Those gaps are analyzed with respect to exploration environments, hazards, national and worldwide expertise.

The scientific and technological roadmap and associated guidelines for Korean robotic lunar mission are also proposed to maximize the mutual benefit to both science and exploration objectives.

In conclusion, this study will make contributions not only to properly guide in prioritization of mission payloads, but also to inform the definition of objectives for future robotic lunar missions and ground activities by appending previous ISECG's SKG work.