

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

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SUMMARY OF HOT SCIENTIFIC ISSUES IN LUNAR SCIENCE RESEARCH

Abstract

In recent years, with the advancement of the U.S. Lunar Orbital Platform- Gateway Program and the Artemis Program, there is a new round of lunar exploration upsurge. In December 2020, the United States released a Artemis III Science Definition Team Report, highlighting the importance of scientific research in the lunar exploration process. As Earth's closest natural satellite, the moon still has a lot of scientific questions to answer. In this paper, hot issues in lunar science research are divided into four aspects: lunar science research, lunar observation and environment research, low gravity experiment research, and lunar surface resource utilization research. Lunar science research includes the formation of the moon, core-mantle crust differentiation of the moon, lunar interior structure, the volcanism of the moon, lunar impact history and inner solar impact flux, tectonic evolution of the moon, chronology of lunar formation and evolution, distribution and source of lunar water and volatiles, the superficial structure of the moon and its surface evolution history, structure/composition and formation mechanism of lunar soil, characteristics and action mechanism of lunar dust and so on. Lunar observation and environment research includes evolution of lunar near space and its effect on lunar surface survival, physical process/mechanism and law of solar wind and moon interaction, the effect of earth winds on the lunar environment, dynamical process of panoramic interaction between the sun and the earth, lunar space environment prediction and support, solid earth problem, the problem of measuring the moon by laser, fine physical processes of solar/stellar magnetic activity, effects of intense stellar magnetic activity on exoplanet atmospheres, detecting the ultra long wave electromagnetic radiation of unknown celestial bodies, intermediate gamma rays explore the unknown physical processes of the universe and so on. Low gravity experiment research includes fluid management and water resource recycling, study on constitutive model of lunar soil and in situ application, study on material preparation and enslavement behavior, high precision synchronization of time-frequency communication, research on fuel combustion problems, spatial ecosystem, gravity biology (botany and zoology), space microbiology, radiation biology, space biomechanics, submagnetobiology, synthetic biology, the search for extraterrestrial life and so on. Lunar surface resource utilization research including distribution and classification of lunar resources, building materials research, separation and extraction of metal minerals, Oxygen preparation, water ice detection and utilization, solar energy resource utilization, extraction and utilization of He-3 and so on. This paper will discuss the aforementioned lunar science issues.