

Japan's Lunar Exploration Strategy and Its Role in International Coordination

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Abstract.

JAXA's Space Exploration Directorate:

JAXA built its Lunar and Planetary Exploration Center (JSPEC) this April. JSPEC is doing not only the moon but planetary exploration encompassing from science to so-called exploration.

JSPEC elaborates strategies of science and technology, program planning and promotion of Space Exploration activities through domestic and international collaborations. And at the same time, the Specific R&D activities for engineering and science development, operation and other related activities for spacecraft are also performed there, including the research and analysis of scientific and technical aspects for future missions. Simply speaking, the JSPEC of JAXA looks at both Exploration together with Science Missions. The activity includes the Moon, Mars and NEOs plus Primitive Bodies, and Atmospheric, Plasma and Surface environmental missions.

Japan's governmental Lunar Exploration study status

The science WG under the SAC (Space Activity Commission, J. gov) concluded this January, and made a recommendation that the Japan's Lunar and Planetary Exploration shall be performed in a programmatic manner at a certain interval. Along with this, the Solar Exploration Road Map study was completed this March, and the Lunar Architecture Study was preliminary done at JAXA this summer.

This September, the Lunar Exploration WG was established under the SAC, and started the strategic discussion at the government level on how to go about the lunar exploration in Japan. The program strategy will have a report in November.

JAXA will start its next 5-year plan from 2008, and any of the projects starting this period needs to commence the phase-A study now and relevant teams were established. JAXA completed the MDR (Mission Definition Review) for the SELENE-2 this July, and established the Phase-A study team for it, aiming at the launch in 2012-14 time frame.

Lunar Exploration Program at JAXA:

JAXA believes it leads to International Cooperation, Discovery and Innovation and shall consist of two types of missions. The first one is the Robotic Lunar Missions, in which JAXA will make an in-depth scientific measurements and utilization, until the middle of 2010s. The other one is the Human Lunar Missions, in which the missions anyhow shall be autonomous with its own objectives, making use of humans related technologies, while pursuing the Japanese astronaut on the moon as early as possible in international activity to commensurate with its international status. As to its Independent Lunar Surface activity by Japan's own space systems assets still await for the governmental decision possibly in the middle of 2010s.

SELENE-2 outline:

The launch will be in 2012-14 by either H2A or H2B vehicle, and the total spacecraft mass expected weighs 4000 to 2000 kg (Wet) leaving the Lander that weighs 500 -1,000 kg (Dry), including a rover (ca 100 kg). It also consists of an Orbiter for communication relay (TBC) weighing approximately 100kg. The landing area anticipated is at such as Quasi- eternal sun-lit area either in polar region or some other locations, and the mission life for the Lander shall last one month at least.

SELENE-X Under Study (Examples)

It will appear in late 2010s, in view of the Japan's participation in Humans Lunar Activity foreseen. The SELENE-X may perform either of the following demonstrations.

Option-1: Technology Demonstration for Building Outpost such as the Excavation to Construction of Infrastructure,
Option-2: Logistics Capability Demonstration for Building Common Landers for both Transportation and JAXA's own robotic missions.

Option-3: Highly sophisticated In-situ Robotic Lander or Returning Sample of the Surface Soil to the Earth, including the Development of High Speed Reentry Capsule.

There are other options under study and will be determined after the international exploration strategy have been clarified.

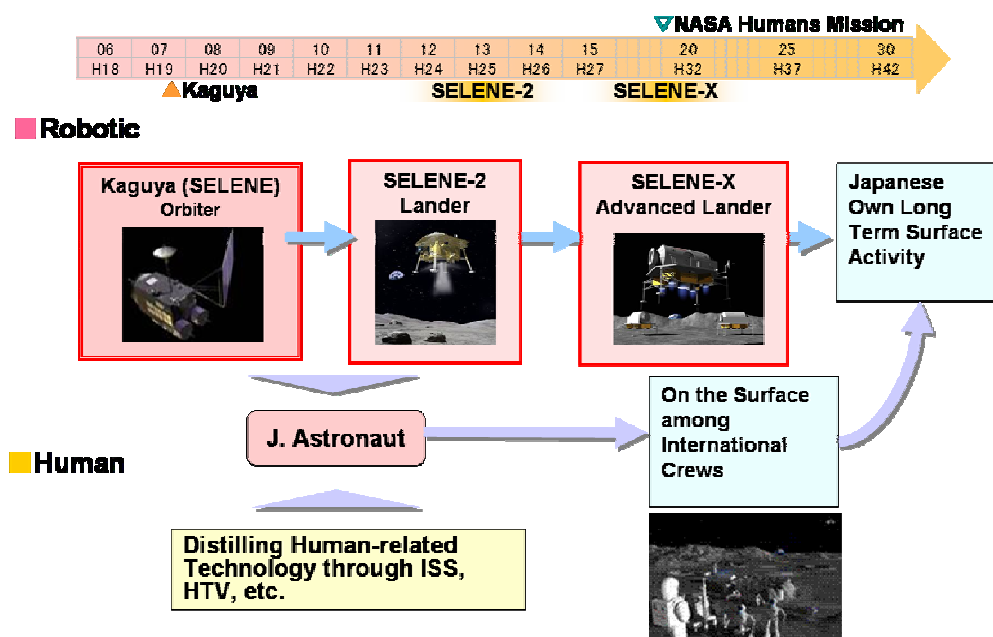


Fig. 1 Japan's Lunar Exploration Road Map

Summary of Strategy

JAXA thinks the Principle of Lunar Exploration to possess the Strategic Objectives including international contribution, attributing Japan's sustainable evolution, and education of next generation, and the Technology development and innovation, Science and knowledge expansion.

JAXA will start the SELENE-follow-on Program up to the middle of 2010 decade, putting the technology demonstration, science observation, investigation for utilization will be thoroughly done by robotic exploration program, the SELENE-2 and -X missions.

JAXA will foster Human Exploration related Technologies through SELENE series, ISS/HTV, etc.

And Japan will make a Japanese astronaut to participate in the international human lunar exploration, as a leading country in the space exploration.

PRINCIPAL AUTHOR'S BIO (~50 WORDS)

Dr. Jun'ichiro Kawaguchi finished the aero-space engineering course, the graduate school of engineering, University of Tokyo, and received the doctor of engineering in 1983. Since then, he has been in charge of lunar and planetary missions analysis from the former ISAS (Institute of Space and Astronautical Science) through the current JSPEC of JAXA for almost 25 years. He contributed to the Sakigake, Suisei, Hiten, GEOTAIL, Nozomi and he has been the project manager of Hayabusa mission since it started in 1996. He is currently the program director at the JSPEC/JAXA.