

Regolith Sampling in Martian Moons eXploration (MMX) Mission

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Martian Moons eXploration (MMX) is a mission under study in ISAS/JAXA to be launched in 2020s. This paper introduces the concept of MMX mission and the vehicle.

The goal of MMX is to reveal the origin of the Martian moons, and then to make a progress in our understanding of planetary system formation and of primordial material transport around the border between the inner- and the outer-part of the early solar system. “How was water delivered to rocky planets and enabled the habitability of the solar system?” This is the key question to which MMX is going to answer. Mars was at the gateway position to witness the process, which naturally leads us to explore two Martian moons, Phobos and Deimos, to answer to the key question.

On the origin of Martian moons, there are two leading hypotheses, “Captured primordial asteroid” and “Giant Impact”. We decide to collect samples from a Martian moon to conclude this discussion, and on the conclusion, to investigate further to improve our understanding of material distributions and transports at the edge of the inner part of the early solar system as well as of planetary formations. Moreover, circum-Martian environment will be measured and Martian atmosphere will be observed to improve our views of evolutions of Martian moons as well as Mars surface environmental transition.

MMX landing spacecraft will equip a newly developed and quite different sampling system from the system used in Hayabusa and Hayabusa 2 mission to meet with high level sample retrieval requirements. It has a manipulator which allows to get sample from selected point after landing on Martian moon. A coring system on the end of the manipulator has a unique function to correct and keep regolith until the recovery on the Earth after one year trip from Mars and atmospheric re-entry in a capsule. MMX mission and these technical features of sampling system will be shown in the paper.

キーワード：フォボス、ダイモス、サンプルリターン

Keywords: Phobos, Deimos, Sample Return