

Martian Moon eXploration MMX: science objectives and their promotion

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Martian Moons eXploration, the next Japanese sample return mission following Hayabusa 2, is under extensive study for the upshift to phase B with a schedule to be launched in 2024 and return to Earth in 2029. MMX will make close-up observations of Phobos and Deimos over ~3 years and sample return from a moon, from which the origin of the Martian moons will be conclusively revealed. Simultaneously, the formation and evolution of a habitable planet having liquid water and atmosphere will be elucidated from the deep search for both moons and parallel Mars atmosphere observations, by making the best use of the inherent nature of the moons that have long history since the formation stage of Mars and orbits near the parent planet. Particularly, MMX will shed light on the formation and early evolution of Mars and the volatile transport from the outer planet region to inner one in early solar system, which are hardly assessed from the survey of Martian surface geology alone. Mission instruments to be on board are telescope camera (TENGOO), multiband visible camera (OROCHI), infrared spectroscopic imager (MacrOmega), gamma-ray and neutron spectrometer (MEGANE), light detection and ranging (LIDAR), dust monitor (CMDM), ion mass spectrum analyzer (MSA) and sampler. A rover is also under study as an additional science instrument to probe the moon's surface microscopic structure and composition. To achieve the mission science objectives, it is essentially important to conduct close interplay among analyses of data from multi-instruments, sample analyses, and theoretical studies. To traverse the instrument development teams and data analysis, sample analysis and theoretical scientists, the MMX science board is going to be organized the sub-science teams, which will produce the best initial scientific results fully answering the mission objectives and conduct preparations for observations, data analyses, sample analyses in parallel with theoretical studies.

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