Organizational framework for scientific studies and instruments in Martian Moons Exploration (MMX) mission

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The Martian Moons Exploration (MMX) mission has been planned to launch a Martian moons probe in 2024 as one of next planetary exploration missions in Japan. In this mission, the spacecraft reaches on quasi-satellite orbits around Phobos and makes remote-sensing observations. The spacecraft then carries out two times of landing and samples material of the Phobos surface. The spacecraft finally comes back to the Earth to bring the collected samples back. The MMX program shifted to the Phase-B in the beginning of February 2020 and basic design of the spacecraft and instruments have been started. In this presentation, we introduce the science-side organizational framework of MMX including science teams and scientific instrument teams we have constructed so far in the entire organization of MMX.

MMX has a new concept of organized science teams and this concept is a new attempt in the Japanese planetary exploration missions to enhance scientific results. As the largest science team Science Working Team (SWT) is defined to have all scientific researchers in MMX and achieve the science objectives of MMX. The SWT consists of Science Board (SB), Sub-Science Teams (SSTs), and a part of Instrument Teams (ITs) and Working Teams (WTs). SB is in charge of making decisions as recommendation to the project from scientific point of view, and manages and controls all teams in SWT. The SSTs are organized to fulfill the MMX's science objectives by using all available observation and analysis data taken from remote sensing observation, rover observation, and return sample analysis. For this purpose, the SSTs are responsible to making science and data analysis strategy, consider requirements for the instruments, check instrument performances, and actually analyze observation data to make science results. MMX has currently the following five SSTs: Origin of Phobos and Deimos, Early Solar System Evolution, Surface Science and Geology, Mars Science, and Geodesy. Most science objectives of MMX require multi-instrument data analyses and they will be effectively conducted in these SSTs.

MMX has a large number of instruments for observations and sampling, including non-scientific instruments which are possibly used also for science studies. These are: Circum-Martian Dust Monitor (CMDM), Light Detection and Ranging (LIDAR), Macroscopique Observatoire pour la Minéralogie, l'Eau, le Glaces et l'Activité (Near-Infrared Spectrometer, MacrOmega), Mars-Moon Exploration with Gamma-Rays and Neutrons (MEGANE), Mass Spectrum Analyzer (MSA), Rover developed by CNES-DLR, Telescopic Nadir Imager for Geomorphology (TENGOO), Optical Radiometer Composed of Chromatic Imagers (OROCHI), Interplanetary Radiation Environment Monitor (IREM), Super High Vision Camera (SHV), Coring Sampler (CSMP), Pneumatic Sampler (PSMP), Sample Return Capsule (SRC), etc. The ITs develop these

instruments and will conduct single-instrument data analysis mainly.

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