

Near-infrared Hyperspectral Imager MacrOmega on MMX to Observe Martian System: Its Observation Plans and Development

*Takahiro Iwata¹, Hiromu Nakagawa², Tomoki Nakamura², Jean-Pierre Bibring³, Cedric Pilorget³, Vincent Hamm³, Fuminori Tsuchiya², Lucie Riu¹, Moe Matsuoka¹, Hiroyuki Kurokawa⁴

1. Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, 2. Tohoku University, 3. Institut d'Astrophysique Spatiale, Université Paris-Sud, 4. Tokyo Institute of Technology

The Martian Moons Exploration (MMX) is a probe which will be launched by the Japanese launch vehicle H-III and will navigate the quasi satellite orbit of Phobos and will make a fly-by of Deimos. MacrOmega is a hyperspectral imager in the wavelength range of 0.9 to 3.6 micrometers which is under development to be installed on the MMX spacecraft. It is based on MicrOmega on the ExoMars Rover and Hayabusa2 MASCOT and modified as a hyper-spectral imager with spectroscopic function provided by an Acousto-Optic Tunable Filter (AOTF).

MMX aims to elucidate the evolution of our solar system by investigating the migration process of primitive materials in the early stage. NIRS4/MacrOmega will observe hydroxide or hydrated mineral absorptions on Phobos and Deimos in the wavelength of 2.7-3.2 micrometers. By analyzing the shape of the spectra, we will distinguish between water in hydrous silicate minerals, water molecules, and water ice particles. MacrOmega will also try to detect the absorption by organic matter in the wavelength range of 3.3-3.5 micrometers. These results will support efforts to answer the question of the origin of the Martian satellites and identify whether they are satellites formed by a giant impact or asteroids captured by Mars. MacrOmega will observe Phobos to survey the sampling site before sampling, to investigate the sampling site precisely at the touch-down mode, and to make global mapping. Global mapping of Phobos to select prior areas and landing sites will be performed on the quasi satellite orbit. Precise mapping for candidate landing sites will be followed on the lower altitude. In the touch down phase, we will observe toward sampling site at full wavelength in the descending and landing processes. Observations for Deimos will be basically executed from the fly-by orbit, and they are examined to be made at the near circular orbit. It will also monitor the global distributions and dynamics of the Martian atmosphere. We will report and discuss on the observation plans and the development status of the instruments.

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