Observation Plans for Hydrated Minerals and Carbonaceous Materials on Phobos and Deimos by Near-Infrared Hyperspectral Imager MacrOmega

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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.
NIRS4/MacrOmega is an imaging spectrometer in the wavelength range of 0.9 to 3.6 micrometers which is one of the candidate instruments 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. NIRS4/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.
NIRS4/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 at 100 to 200 km in altitude. Precise mapping for candidate landing sites will be followed at about 20 km in altitude. We will also examine the high-resolution observation for selected areas at the orbit lower than 10 km, and precise observations toward blue and red region at the Mars-Phobos Lagrangian points 1 and 2. In the touch down phase, we will observe toward sampling site at full wavelength in the altitude of 20 km to 1 m.
Observations for Deimos will be basically executed from the fly-by orbit, and they are examined to be made at the near circular orbit.

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