CHARACTERIZING VOLATILES AND ORGANICS ON ASTEROID (162173) RYUGU.

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Following the visit of the spacecraft Hayabusa to (25143) Itokawa in 2005, the Japanese Space Agency (JAXA) launched a second spacecraft, Hayabusa2, in 2014 to the near-Earth Apollo asteroid (162173) Ryugu, a C-complex asteroid. Hayabusa2 will arrive at Ryugu in summer 2018. Near-Earth asteroids (NEAs) are important objects to study because of their possible role in the delivery of water and complex organic molecules to early Earth, and their threats to impact the Earth at irregular and unpredictable periods in the future. Hayabusa2 mission will provide exceptional science with a primary objective to illuminate the origin, evolution, and distribution of volatiles and organics on the surface of Ryugu and in the Solar System. Here we present our Near Infrared Spectrometer(NIRS3)-related plan to help the science team to characterize and select sampling and landing sites to collect carbonaceous samples from Ryugu and bring them back to Earth in 2020. Our plan mainly include, (1) measuring spectra of various carbonaceous chondrites and end-member hydrated silicates under asteroid-like conditions (vacuum and elevated temperatures) to develop spectral parameters of minerals and chemical compounds that we expect to detect on Ryugu, particularly around 2.8 to 3.2 μm, and (2) thermally and photometrically correcting Ryugu's spectra to create site-specific and global maps of the mineralogical and chemical relative abundances across Ryugu's surface, in addition to creating various albedo maps, including the geometric and bolometric Bond albedo. Previous 3-μm spectroscopic studies were conducted in ambient terrestrial environments, and hence were contaminated by atmospheric water. In our work, however, chondrite reflectance and hydrated mineral spectra are measured under asteroid-like conditions (i.e., vacuum and elevated temperatures) to remove adsorbed water and accurately compute the spectral parameters that will be used for Ryugu's mineralogical and chemical mapping.

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