Determining the Thermal Inertia of the UTPS-TB simulant for different grain sizes and densities

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The Martian moons, Phobos and Deimos are exciting new targets for future in-situ, and possibly future human explorations. The mission of JAXA, Martian Moons eXplorer (MMX), is scheduled to launch in 2024 to perform observations of both moons, landing on one of them. How the landing modules should be designed depends greatly on the surface conditions, thus studying the surface of Phobos (the likely candidate for landing) is highly important. The exact composition of the regolith covering the surface of the moon is still under debate; but even with the chemical compositions and size distributions of the grains established, numerous mechanical properties remain problematic to estimate. The thermal inertia of the regolith determines the amount of heat the soil can store, as well as how quickly the heat is reradiated. It is also possible to estimate the particle diameter and porosity of the regolith, if thermal inertia is measured, however, the Hayabusa2 and OSIRIS-REx missions showed that the actual grain sizes can vary greatly. In our study we work with the Tagish Lake-based simulant developed at the University of Tokyo (UTPS-TB). Using a thermostatic chamber and a vacuum chamber at the ISAS/JAXA laboratory in Sagamihara, we measure and calculate the thermal inertia of UTPS-TB samples with different grain sizes and densities. This work was supported by the by Campus Mundi short scientific research programme, and the ÚNKP-19-3 New National Excellence Program of the Ministry for Innovation and Technology.