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[U-06_28AM1]New Progress toward the Understanding of Small Solar System Bodies

Convener:*Masahiko Arakawa(Graduate School of Science, Kobe University), Taishi Nakamoto(Tokyo Institute of Technology), Sei-ichiro WATANABE(Division of Earth and Planetary Sciences, Graduate School of Science, Nagoya University), Masanao Abe(Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency), MASATERU ISHIGURO(Department of Physics and Astronomy, Seoul National University), Chair:Masahiko Arakawa(Graduate School of Science, Kobe University)

Mon. Apr 28, 2014 9:00 AM - 10:45 AM 503 (5F)

This session is aimed at setting up a forum to discuss how we can make progresses in our understanding of the solar system evolution with our hands on data. Presentations related to the science of the small bodies in the solar system (satellites, asteroids, comets, interplanetary dust particles, trans-Neptunian objects, and planetesimals) are invited. In addition to the extensive astronomical/remote-sensing observations and theoretical works, Hayabusa has brought us samples back from Itokawa (S-type asteroid) for unprecedentedly detailed analysis. The results of the Hayabusa sample initial analysis do prove that analysis of returned samples will play a key role in our future study of the solar system evolution. While the mission preparation of Hayabusa2, which is targeted at a more primordial asteroid than Itokawa (1999JU3, C-type), is being matured, expectation of building a new gateway to biology-flavored topics via organic material and aqueous alteration analysis is ramping up. In this session, after summarizing the cutting-edge results obtained by various studies, including the impact physics important for the asteroid evolution, we will discuss the future shape of the study of the solar system evolution.

10:30 AM - 10:45 AM

[U06-P10_PG]Size Dependence of Impact Disruption Threshold of Iron Meteorites

3-min talk in an oral session

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Keywords:Small Bodies, Iron Meteorite, Impact Process

Iron meteorites and some M-class asteroids are generally understood to be fragments that were originally part of cores of differentiated planetesimals or part of local melt pools of primitive bodies. On these primitive bodies and planetesimals, a wide range of collisional events at different mass scales, temperatures, and impact velocities would have occurred between the time when the iron was segregated and the impact that eventually exposed the iron meteorites to interplanetary space. In this study, we performed impact disruption experiments of iron meteorite specimens as projectiles or targets at room temperature to increase our understanding of the disruption process of iron bodies. Our iron specimens (as projectiles or targets) were almost all smaller in size than their counterparts (as targets or projectiles, respectively), with one exceptional shot. Experiments of impacts of steel specimens were also conducted for comparison. The fragment size distribution of iron material is different from that of rocks because in iron fragmentation, a higher percentage of the mass is concentrated in larger fragments, probably due to its ductility. The largest fragment mass fraction is dependent not only on the energy density but also on the size of the specimen. We show the largest fragment mass fraction has

a power-law dependence to initial peak pressure normalized by a dynamic strength, which is defined to be dependent on the size of the iron material.This work was supported by the Space Plasma Laboratory, ISAS, JAXA, Japan and by the Global Center of Excellence Program of Pulsed Power Science, Kumamoto University.