

Preliminary examination plan for Hayabusa sample

Akira Tsuchiyama^{1*}, Mitsuru Ebihara², Fumio Kitajima³, Keisuke Nagao⁴, Tomoki Nakamura³, Hiroshi Naraoka³, Takaaki Noguchi⁵, Ryuji Okazaki³, Masayuki Uesugi¹, Hisayoshi Yurimoto⁶

¹Dept. Earth & Space Sci., Osaka Univ., ²Grad. Sch. Sci. & Eng., Tokyo Met. Univ.,

³Dept. Earth & Planet. Sci., Kyushu Univ., ⁴Lab. Earthquake Chem., Univ. Tokyo, ⁵Coll. Sci., Ibaraki Univ.,

⁶Dept. Nat. Hist. Sci., Hokkaido Univ.

The Hayabusa spacecraft arrived at the asteroid Itokawa in November 2006 and tried to collect samples on the asteroid surface [1]. Although the sample collection did not made by normal operations, it is considered that a small amount of sample, at least a few particles of approximately 100 micron meters in size, were successfully collected, and the sample will be returned to the earth in June, 2010. The sample will be examined preliminary within one year after the sample recovery before detailed analysis phase. The following scientific achievements will be expected; (a) characterization of the surface material of Itokawa (ordinary LL chondrite or primitive achondrite, formation age, comparison with the density of Itokawa, etc), (b) processes on an ancestor body of Itokawa and accretion into Itokawa (brecciation, degree of impact, etc.), (c) interaction with space environment (proof of space weathering, isotopic composition of solar wind oxygen, age of regolith, gardening rate, etc.), and (d) materials fallen onto the surface (carbonaceous chondrite fragments and cometary dust and included organic materials without contamination on the earth, or differentiated felsic igneous fragments).

We are preparing the preliminary examination of the Hayabusa sample as core members of HASPET (Hayabusa Asteroidal Sample Preliminary Examination Team) with close cooperation with sample curatorial members of the Hayabusa mission at JAXA. Because the amount of the recovered sample will be very limited as mentioned above, we will perform the preliminary examination with the following policies: (1) the sample will be removed from the sample capsule at curatorial facility at JAXA, Sagami-hara, numbering and primitive descriptions, such as size measurement (and mass if possible), will be made, and then a part of the sample will be delivered to HASPET as a series of curatorial operations. However, if the amount of the sample is very limited, such as only a few particles, some parts of the curatorial operation and preliminary examination will be merged. (2) Although the main purpose of the preliminary examination was originally to describe the sample and provide data for the later detailed analysis phase, analyses by HASPET will include some detailed analyses because of the limited amount of the sample. (3) As the sample is not contaminated on the earth, we have to obtain data that cannot be obtained from any meteorites. (4) We have to obtain maximum amount of data effectively from a small amount of the sample by systematic analyses from non-destructive to destructive ways with minimum contamination in an upstream analysis that affects downstream analyses. (5) We have to prepare different analysis flow charts for different cases of sample amounts (from a few particles of about 10 micron meter in size to a multiple particles of about a few hundred micron meter in size). Some specific examples of the preliminary examination plan will be presented.

[1] Fujiwara et al. (2006) *Science*, 312: 1330.

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