

Ground based observations of the target bodies of Japanese future asteroid sample return mission

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One of the important goals in the study of compositional characterization of asteroids is to understand the relationship between asteroids and meteorites. The asteroids are classified into some groups with similar spectral characteristics. The Japanese sample return mission, HAYABUSA, the spacecraft arrived at its exploration target, near Earth asteroid (25143) Itokawa this fall.

The purpose of our observation is to obtain the information about taxonomic type and rotational status of the candidate target of the next asteroid sample return mission (post-HAYABUSA mission). This information is useful for mission targets selection and helpful for raising the technical feasibility of the exploration. Our goal is to find some primordial type asteroid, C-type and D-type, in our candidate objects. Considering several mission plans, we chose 287 asteroids from about 3700 NEAs as the candidate objects of the post-HAYABUSA mission. As the taxonomic types of 238 candidates are unknown, we have performed the colorimetric observations in order to obtain its taxonomic type information.

We have observed 23 near-Earth asteroids (NEAs) during 2003- 2005, using the 1.05-m Kiso Schmidt telescope with 2kCCD in Japan, and the Lulin One-meter Telescope with PI1300B or AP8 in Taiwan.

We made multicolor photometry at clear-stable nights, using broadband filter, B, V, R, and I. As the filter systems of each observatory are slightly different, we have to convert our result from each instrumental system into the standard system, in order to compare them with those obtained at other instrumental system.

The observed objects were classified by comparing with ECAS dataset and SMASS dataset. We classified the objects in broad groups, C-group, S-group, D-group, and X-group. We obtained BVRI photometry data for 16 mission candidates, and classified 14 objects in broad groups. Out of 14 candidates, 4 had previous classification, and 2 of them had also spectrum data.

4 S-type objects, 4 C-type objects, 2 X-type objects, 2 D-type objects, 1 V-type objects were observed. The following 10 mission candidates were newly classified into the taxonomical types.

2003SD220 : D-type

2005TF : S-type

11284 Belenus : S-type, 6 hr, 0.5 mag

2004EW : C-type

68278 2001FC7 : C-type

85585 Mjolnir : D-type

2003UC20 : C-type

2003RB : S-type

2002RX211 : S-type, 5 hr, 0.65 mag

2000QK25 : X-type

As the results of this study, another 5 primordial type asteroids were discovered, and they will be the possible candidates for next asteroidal sample return mission.