

## Ground-based observation campaign of 1999JU3, the target asteroid of sample return mission, Hayabusa-2

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JAXA is planning the sample return mission, Hayabusa-2. It will be launched at early 2010s. 162173 1999JU3 is C-type asteroid which was selected as a mission target.

1999JU3 was observable from 2007 summer to 2008 spring. There won't be any observation chance before 2012, so we must get a lot of information as possible during this chance. We need to know asteroid's rotation period, shape, and direction of rotation axis to draw up the mission.

The following is information about this asteroid before this work.

- The spectral type is Cg by visible spectroscopy. (Binzel et al. 2001)
- Orbital elements are  $a=1.189$ ,  $e=0.190$ ,  $i=5.885$ ,  $\text{Node}=251.7$ ,  $\text{Peri}=211.3$  and  $M=147.3$ .
- Visible absolute magnitude, H is 19.21.
- Geometric albedo, size, rotation period, direction of rotation axis and shape are unknown.

The purpose of this work is to examine unknown factor listed above.

[Observational data]

-Visible photometry & light curve data

Lulin 1m, Kiso 1.05m, Ishigaki 1m, BSGC 1m, UH 2.2m and Steward 1.55m

-Near infrared photometry

CFHT 3.6m

-Thermal infrared photometry

Japanese infrared space telescope, AKARI/IRC and Subaru/COMICS

-Visible spectroscopy

MMT 6.5m

-Near infrared spectroscopy

IRTF 3m

[Result]

We got new information of 162173 1999JU3 from this work.

-We confirmed that it is C-type asteroid from BVRI color indices and visible and near infrared spectroscopy.

Reflectance spectrum was featureless.

-Rotation period is seven hours 37 minutes 38 seconds  $\pm 21$  seconds, so probe vehicle can touch down on the surface.

-Rotation direction is a forward and we get to know direction of the axis.

-Diameter is  $980 \pm 29$ m. This is larger than Itokawa.

-Geometric albedo is  $0.0037 \pm 0.002$  that is typical value of C-type asteroids.

-Absolute magnitude H is  $18.8 \pm 0.027$  and slope parameter, G is  $-0.11 \pm 0.01$ .