

Ground-based observations of visible spectroscopic properties of 1999 JU3

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Asteroid 1999 JU3 is among the few C-type asteroids that can be reached with small delta-V from the Earth. This makes this asteroid a very attractive target for a near future sample-return mission. In fact, 1999 JU3 is currently chosen for the primary exploration target of JAXA's Hayabusa 2 and the secondary target for both OSIRIS-REx mission by NASA and Marco-Polo mission by ESA. Thus, detailed investigation of this NEA is very important for near future planetary mission projects.

In particular, both spatial inhomogeneity and temporal variation in the spectral properties of the mission target NEA would give a large impact on remote sensing strategy and sampling site selection processes. In this study, we observe visible spectrum of 1999 JU3 over multiple spin phases to examine how much spatial inhomogeneity is present and analyze newly obtained and literature spectrum of 1999 JU3 closely to infer material properties.

A series of visible spectroscopic observations of 1999 JU3 were conducted with the 8.1-m-aperture Gemini-South telescope in Chili using GMOS instrument on June 24, 26, and July 5. The apparent visible magnitude of 1999 JU3 was between 19.13 and 19.66 during our observations. The phase angle was relatively small between 22.7 and 30.3 deg. Two standard stars (HD142801, SA107-998) were used for calibration. Although the three observations cover a wide rotational phases, the observation on July 5th suffered from background star contamination.

The comparison between meteorites and the great variety of 1999 JU3 spectra reveal that the spectrum observed by Binzel et al. (2001) in May 1999, that by Vilas (2008) in Sept. 2007, and those in this study in June to July 2012 can be fit well by Murchison chondrite samples heated at different temperatures ranging from 650 to 900 deg.

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