

Polarimetry of (155140) 2005 UD: the Dynamical Association with (3200) Phaethon

*Masateru Ishiguro¹, Jooyeon Geem¹, Hiroyuki Naito², Yoonsoo P. Bach¹, Daisuke Kuroda³, Tatsuharu Ono⁴, Seiko Takagi⁴, Mitsuteru Sato⁴, Kiyoshi Kuramoto⁴, Tomohiko Sekiguchi⁵, Masataka Imai⁶, Makoto Watanabe⁷, Katsuhito Ohtsuka⁸, Sunao Hasegawa⁹, Takashi Ito¹⁰, Fumi Yoshida¹¹, Tomoko Arai¹¹

1. Department of Physics and Astronomy, Seoul National University, 2. Nanyo Observatory, 3. Okayama Observatory, Kyoto University, 4. Department of Cosmo Sciences, Graduate School of Science, Hokkaido University, 5. Hokkaido University of Education, 6. National Institute of Advanced Industrial Science and Technology, 7. Department of Applied Physics, Okayama University of Science, 8. Tokyo Meteor Network, 9. Japan Aerospace Exploration Agency, 10. National Astronomical Observatory of Japan, 11. Planetary Exploration Research Center, Chiba Institute of Technology

An Apollo-type near-Earth asteroid, (155140) 2005 UD, is considered as a possible fragment from (3200) Phaethon, suggesting that Phaethon precursor body might undergo a catastrophic disruption in the past. Here we present our new observational evidence for supporting these two are common origin. We thus conducted a polarimetric observation in 2018 September-October and found that 2005 UD exhibited a polarimetric property significantly different from those of major taxonomic classes of NEAs (i.e., S- and C-type) but similar to that of Phaethon at a wide range of the solar phase angles. Using the polarimetric data, we derived the geometric albedo of ~ 0.1 . In addition, we made a photometric observation at the opposition (the zero phase angle), and determined the mean absolute magnitude of 17.2, the synodic rotational period 5.23 hr, and the effective diameter 1.5 km in combination with the derived geometric albedo. From these evidence, we found that the Phaethon precursor body might have lost more than a few percents of the mass via a disruption if 2005 UD was indeed ejected from the Phaethon precursor.

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