Observation of near-earth object (1566) Icarus and the split candidate 2007 MK6

*Seitaro Urakawa[1], Katsutoshi Ohtsuka[2], Shinsuke Abe[3], Daisuke Kinoshita[4], Hidekazu Hanayama[5], Takeshi Miyaji[5], Shin-ichiro Okumura[1], Kazuya Ayani[6], Syouta Maeno[6], Daisuke Kuroda[5], Akihiko Fukui[5], Norio Narita[5,7,8], George HASHIMOTO[9], Yuri SAKURAI[9], Sayuri Nakamura[9], Jun Takahashi[10], Tomoyasu Tanigawa[11], Otabek Burhonov[12], Kamoliddin Ergashev[12], Takashi Ito[5], Fumi Yoshida[5], Makoto Watanabe[13], Masataka Imai[14], Kiyoshi Kuramoto[14], Tomohiko Sekiguchi[15], MASATERU ISHIGURO[16]

1. Japan Spaceguard Association, 2. Tokyo Meteor Network, 3. Nihon University, 4. National Central University, 5. National Astronomical Observatory of Japan, 6. Bisei Observatory, 7. Astrobiology Center, 8. University of Tokyo, 9. Okayama University, 10. University of Hyogo, 11. Sanda Shounkan Highschool, 12. Ulugh Beg Astronomical Institute Uzbekistan Academy of Science , 13. Okayama University of Science, 14. Hokkaido University, 15. Hokkaido University of Education, 16. Seoul National University

Background & Aim: A numerical simulation proposes that the origin of near-Earth object 2007 MK_6 (hereafter, MK6) is a near-Earth object (1566) Icarus (hereafter, Icarus) [1]. In addition to it, the orbital parameters of the daytime Taurid-Perseid meteor swarm are in good agreement with those of Icarus. Thus, it is considered that MK6 is split from the parent object Icarus by a rotational fission and/or an impact event, and the produced dust became to the daytime Taurid-Perseid meteor swarm. To confirm such a hypothesis, we need to obtain the observational evidence that the color indices of Icarus and MK6 are same. Moreover, if MK6 split by the rotational fission due to the YORP effect, the rotation period of Icarus would be shorten compared with the past rotation period. When the MK6 split by an impact event, the rotation period of MK6 would shorter than the spin limit of 2.2 hours. We require the observation for Icarus and MK6 to test these hypotheses.

Observations: We conducted the observations for Icarus in 2015 and MK6 in 2016, respectively. The observation summary is shown as followings: Icarus (June 2015): Nayoro Observatory 1.6 m Pirka telescope of the Hokkaido University (visible photometry), Ishigakijima Astronomical Observatory (IAO) 1.05 m Murikabushi telescope (g', R_C, and I_C band simultaneous photometry), Maidanak Observatory (MO) 0.6 m telescope (R band photometry), Nishi-Harima Astronomical Observatory (NHAO) Nayuta 2.0m telescope (J, H, and K_S band simultaneous photometry), Lulin and Kinmen Observatory 0.4 m telescopes (visible photmetry), Lowell Observatory (LO) 1.1 m, 1.8 m, and 4.3 m telescopes (visible photometry and visible spectroscopy), MK6 (June - July 2016): IAO 1.05 m Murikabushi telescope (g', R_C, and I_C band simultaneous photometry), MO 1.5 m telescope (R band photometry), NHAO Nayuta 2.0 m telescope (J, H, and K_S band simultaneous photometry), Lulin Observatory 1.0 m telescope (visible photometry), LO 1.8 m and 4.3 m telescopes (visible photometry and visible spectroscopy), University of Hawaii 2.24 m telescope (visible photometry), Okayama Astrophyscial Observatory 1.88 m telescope (g', r', and z' band simultaneous photometry).

Results: Previous studies indicated that the taxonomic type of Icarus is an S-type or a Q-type [2][3]. We obtained that the color indices $g' - R_C$ and $R_C - I_C$ are 0.828 ±0.027 mag and 0.397 ±0.025 mag, respectively. These are consistent with the color indices of an S-type asteroid. Moreover, the color indices implied the slight rotational color variation, though the further data analysis is needed. On the other hand, the color indices and the rotation period of MK6 have not been revealed in the previous study. In addition to the color indices of Icarus, we will present the result the color indices of MK6 and the rotation period of both Icarus and MK6.

References: [1] Ohtsuka K. et al. (2007) *ApJ*, *668*, L71-L74. [2]Chapman C. R., Morrison D., and Zellner B. (1975) *Icarus*, *25*, 104-139. [3]Hicks M. D., Fink U., and Grundy W. M. (1998) *Icarus, 133,* 69-78.

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