

Possible Genetic Association between (3200) Phaethon and (155140) 2005 UD and Their Physical Properties

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Ohtsuka et al. (2006) carried out numerical integrations of orbits of (3200) Phaethon and (155140) 2005 UD, and pointed out possible association between these two Apollo type near-Earth asteroids from dynamical study. Jewitt and Hsieh (2006) and Kinoshita et al. (2007) performed visible photometric observations of (155140) 2005 UD, and they confirmed bluish surface colors of (155140) 2005 UD are similar to those of (3200) Phaethon suggesting rare F/B type among near-Earth asteroids, and a possible link between these two objects was also confirmed by observational studies. Furthermore, Kinoshita et al. (2007) pointed out the variation of (R-I) color along the rotation of the body. A part of the surface of (155140) may be originated from the sub-surface of the precursor object. These observational results support the idea that the fragmentation of (3200) Phaethon produced a large amount of dust particles and formed a meteor stream complex. In order to confirm this hypothesis, we carried out observations of (3200) Phaethon and (155140) 2005 UD. Time-resolved low dispersion spectroscopic observation of (3200) Phaethon was performed at Lulin Observatory in Taiwan in Nov./Dec. 2007. Basically, the spectra of (3200) Phaethon exhibit bluish colors with negative spectral gradient for most part of the rotational phase. The change of the spectral gradient was recognized, and a clear trend was seen when we folded the time-series spectral gradient by a possible rotational period estimated by the lightcurve obtained at the same time in Japan. It could be a signature of the split event on (3200) Phaethon. In Oct. 2008, we carried out intensive time-series photometric observation of (155140) 2005 UD at Lulin Observatory for six nights. The purpose of this observation is to search for the complex rotation of (155140) 2005 UD. If the non-principal axis rotation is detected, it is a strong piece of evidence for the fragmentation process for (3200) Phaethon and (155140) 2005 UD system. I also report the status of Pan-STARRS project and the construction of Lulin 2-m telescope, and give a future asteroid study plan using these research facilities.