Dynamical Evolution of the Dark Asteroids with Tisserand parameter $T_j < 3$. Y. Kim[1], M. Ishiguro[2], F. Usui[3], T. Kasuga[4] [1]Department of Physics, Ewha Womans University, Korea, [2]Department of Physics and Astronomy, Seoul National University, Korea, [3]Institute of Space and Astronautical Science, Japan, [4]National Astronomical Observatory, Japan.

Introduction: It has been speculated that there could be dormant or extinct comets in the list of known asteroids, which appear asteroidal but are icy bodies originating from outer solar system. However, little is known about the existence of such objects not only because of their complicated chaotic orbits but also because of the limited physical and chemical information. Observationally, asteroid albedos are usually determined through flux measurements at thermal infrared (5–20 μm) wavelengths (DeMeo et al. 2008 [1]). AKARI infrared space mission gave us brand-new albedo catalog of Near Earth Objects, which clues in a better understanding of dark asteroids using both albedo data and dynamical models could be possible (Usui et al. 2011 [2]). Dark Asteroids with low (< 0.1) albedos are thought to be dormant or extinct comet candidates due to its similar albedo values with comet nucleus. In addition to this, dynamical models indicate that candidate cometary objects have Tisserand parameter $T_j < 3$.

In this presentation, we will discuss about the existence of dormant or extinct comets in the near Earth orbit using two methods: study of albedo and study of dynamical evolution.

Study of Albedo: Typical near-Earth and main-belt asteroids have $\rho_v > 0.1$ (Tedesco et al. 1989 [3]; Delbo et al. 2003 [4]). For this reason, we use a visible geometric albedo, $\rho_v < 0.1$, as the criteria of low albedo objects. From AKARI catalog for asteroid's albedo and size (AcuA), we extract 196 asteroids with Tisserand parameter $T_j < 3$, which can be dormant comets. It is found that about 95% of the asteroids in AcuA with $T_j < 3$ show low albedo $\rho_v < 0.1$.

Study of Dynamical evolution: We numerically integrated backward the orbits of 196 dark asteroids using the N-body code Mercury6 (Chambers 1999 [4]) during 10 million years to track the past orbits of bodies. We picked out 14 comet candidates that show abnormal orbits in the past by analyzing orbital elements among 196 candidates.

Extracted 14 comet candidates are followings; *2000 GM126, 2000 SB1, 2000 UE110, 2001 RH, 2001 VE, 2001 XP1, 2002 AJ153, 2002 YA26, 2006 QH169, 2006 QL39, 2006 UD185, 1920 HZ (944 Hidalgo), 1995 QY2 (7604 Kridsadaporn), 2006 HR30 (P/Siding Spring).*

Results and Conclusions: From the studies of albedo and dynamical evolution simulations, we finally obtained three most-likely dormant comet candidates; *1920 HZ, 2006 QL39, and 2006 HR30.*

Two of them are consistent with past research; *2006 HR30 (P/Siding Spring)* is known as a comet and *1920 HZ (944 Hidalgo)* is a most-likely comet candidate in asteroid populations.

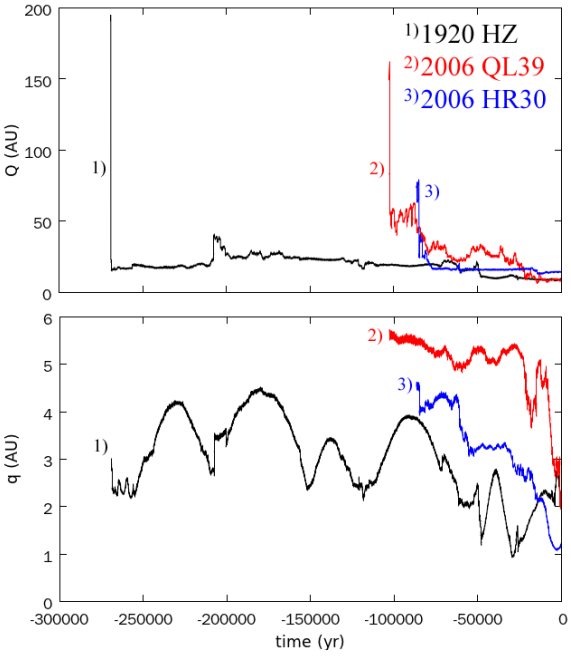

Figure 1: The perihelion distance(q) and aphelion distance(Q) history of three most-likely dormant comet candidates from our integrations.

References: [1] DeMeo, F. et al. (2008) *Icarus, 194,* 436–449. [2] Usui, F. et al. (2011) *PASJ 63, 5,* 1117-1138. [3] Tedesco, E.F. et al. (1989) *Astron. J. 97,* 580–606. [4] Delbo, M. et al. (2003) *Icarus, 166,* 116–130. [5] Chambers, J.E. (1999) *Monthly Notices of the Royal Astronomical Society, 304,* 793-799.