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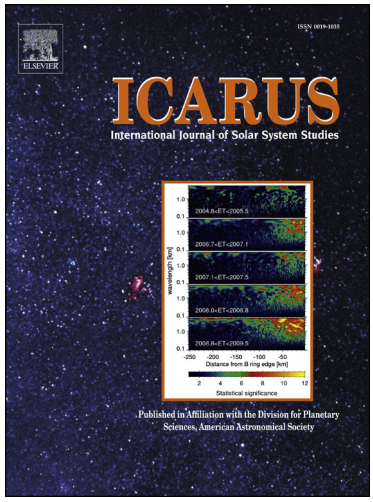

A Search for Subkilometer-sized Ordinary Chondrite Like Asteroids in the Main-Belt

H.W. Lin, Fumi Yoshida, Y.T. Chen, W.H. Ip, C.K. Chang

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A Search for Subkilometer-sized Ordinary Chondrite Like Asteroids in the Main-Belt

H. W. Lin[a], Fumi Yoshida[b], Y. T. Chen[c], W. H. Ip[a,d], C. K. Chang[a]

[a]*Institute of Astronomy, National Central University, Taoyuan 32001, Taiwan*
[b]*National Astronomical Observatory of Japan, 2-21-1 Osawa, Mitaka, Tokyo 181-8588, JAPAN*
[c]*Institute of Astronomy and Astrophysics, Academia Sinica, P. O. Box 23-141, Taipei 106, Taiwan*
[d]*Space Science Institute, Macau University of Science and Technology, Taipa, Macau*

Abstract

The size-dependent effects of asteroids on surface regolith and collisional lifetimes suggest that small asteroids are younger than large asteroids. In this study, we performed multicolor main-belt asteroid (MBA) survey by Subaru telescope/Suprime-Cam to search for subkilometer-sized ordinary chondrite (Q-type) like MBAs. The total survey area was 1.5 deg^2 near ecliptic plane and close to the opposition. We detected 150 MBAs with 4 bands (B, V, R, I) in this survey. The range of absolute magnitude of detected asteroids was between 13 and 22 magnitude, which is equivalent to the size range of kilometer to sub-kilometer diameter in MBAs.

From this observation, 75 of 150 MBAs with color uncertainty less than 0.1 were used in the spectral type analysis, and two possible Q-type asteroids were detected. This mean that the Q-type to S-type ratio in MBAs is < 0.05. Meanwhile, the Q/S ratio in near Earth asteroids (NEAs) has been estimated to be 0.5 to 2 (Binzel et al., 2004; Dandy et al., 2003). Therefore, Q-type NEAs might be delivered from the main belt region with weathered, S-type surface into near Earth region and then obtain their Q-type, non-weathered surface after undergoing re-surfacing process there. The resurfacing mechanisms could be: 1. dispersal of surface material by tidal effect during planetary encounters (Binzel et al., 2010; Nesvorný et al., 2010), 2. the YORP spin-up induced rotational-fission (Polishook et al., 2014) or surface re-arrangement, or 3. thermal degradation (Delbo et al., 2014).

Keywords:

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