Hundred lightcurves of sub-km main-belt asteroids

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We observed a single sky field near opposition and near the ecliptic plane using the Subaru telescope equipped with the Suprime-Cam. Taking advantage of the wide field of view (FOV) for the Suprime-Cam, the plan was to obtain 100 lightcurves of asteroids at the same time. The total observing time interval was about 8 hours on September 2, 2002, with 2-min exposures.

We detected 147 moving objects in the single FOV (34'×27') on the Suprime-Cam (see Figure). Of those, 112 detections corresponded to different objects. We used the R filter during almost the entire observing run, but we took a few images with the B filter at the beginning, the middle, and the end of the run. We classified main-belt asteroids into S- and C-complexes with the B-R color of the object (Yoshida & Nakamura 2007). Although we carefully avoided regions of bright stars, the sky in the images taken by Suprime-Cam were actually crowded with faint objects. Therefore, the asteroids overlapped with background stars very often. Thus, it was very difficult to get lightcurves with high accuracy.

We modified the GAIA-GBOT (Ground Based Optical Tracking) PIPELINE to measure the position and brightness of each object (Bouquillon et al. 2012). Once the objects were identified and their positions measured in pixel coordinates, the pipeline proceeded to the astrometric calibration and then to the photometric calibrations with the Guide Star Catalog II (Lasker et al. 2008). The pipeline produced time series of photometry for each object. The average brightness of each lightcurve ranged between 19–24 mag. We then estimated the rotational period from the lightcurve of each object.

In our presentation, we will show the spin-period distribution of sub- km main-belt asteroids and compare it with that of large main-belt asteroids obtained from the lightcurve catalogue.

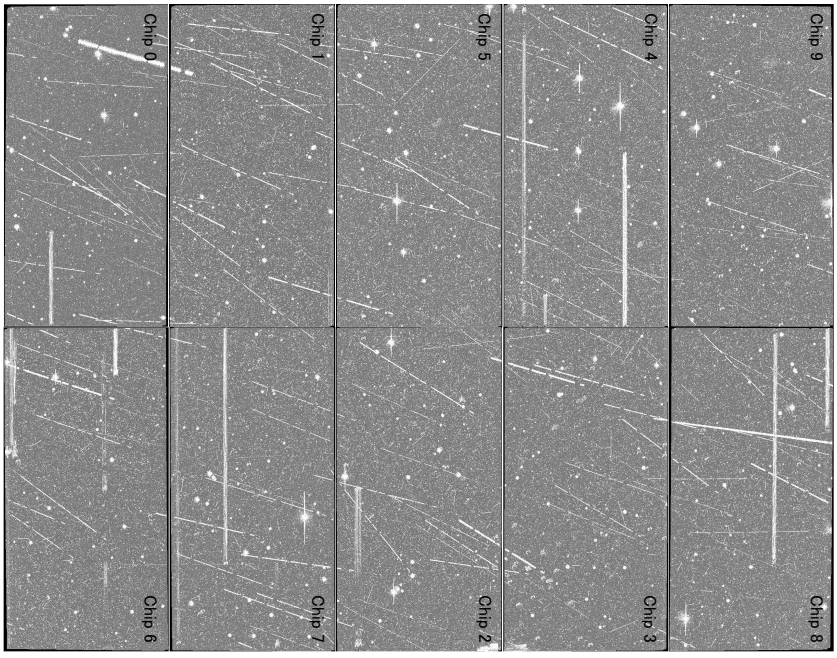

Figure: Each white line shows the detected moving objects in the single sky field (RA=22:41:38.179, DEC=-07:37:35.32 J2000.0, on September 2, 2002). Vertical white lines are dead columns in the CCD chips.

References: [1] Bouquillon S. et al., 2012, LPICo, 1667, 6100. [2] Lasker, B.M. et al. 2008, AJ, 136, 735. [3] Yoshida F., Nakamura T., 2007, P&SS, 55, 1113.