AKARI/IRC Mid-infrared Asteroid Survey.
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Introduction: The physical properties of asteroids are fundamental to understanding the formation process of our planetary system. The size and albedo are the basic physical properties of the asteroid. These two are, however, coupled by their relationships with the absolute magnitude (e.g., [1]); given the size of an asteroid, the albedo value can be uniquely derived on the basis of absolute magnitude correlations.

Measurement of sizes and albedos of asteroids: One of the most effective methods for measuring the sizes and albedos of asteroids is by radiometry, in which a combination of the thermal infrared flux and the reflected optical flux provide unique solutions for size and albedo. The radiometric technique for determining the sizes and albedos of asteroids was developed in the early 1970s (e.g., [2]). Using radiometric measurements, a large number of objects can be observed in a short period of time, thus providing uniform data for large populations of asteroids. Infrared measurements using space-borne telescopes are suitable for this method. When integrated into an all-sky survey, large number of infrared images can be obtained rapidly; moreover, the data are unbiased and uniform. The first systematic survey of asteroids using a space telescope was made by the *Infrared Astronomical Satellite* (*IRAS*; [3]), which cataloged the sizes and albedos of 2470 asteroids [4].

***AKARI* asteroid catalog:** Recently, the infrared astronomical satellite *AKARI* [5] carried out the second generation infrared all-sky survey after *IRAS*. It surveyed more than 96% of the sky during the cryogenic mission phase at 6 bands in the mid- to far-infrared spectral range. The mid-infrared part of the All-Sky Survey was conducted at two broad bands centered at 9 micron and 18 micron, using an on-board InfraRed Camera (IRC) [6]. Point-source detection events were extracted and processed in the IRC All-Sky Survey observation data, from which the IRC Point Source Catalog (IRC-PSC) [7] was produced after checking the position of sources with multiple detections. About 20% of the extracted events in the All-Sky Survey data were not used for the IRC-PSC, because of a lack of confirmation detection at the same celestial positions. We identified asteroids out of these excluded events from the IRC-PSC. In this process, we searched for events whose positions agree with those of asteroids with known orbits. The asteroid positions were calculated by numerical integration using orbital elements obtained from the Asteroid Orbital Elements Database [8] distributed by Lowell Observatory. For each identified object, we calculated the size and albedo using the Standard Thermal Model of asteroids [9]. Finally, we obtained an unbiased, homogeneous asteroid catalog [10], which contains 5120 objects in total, twice as many as the *IRAS* asteroid catalog. The catalog is named AcuA, which is the acronym for Asteroid Catalog Using *AKARI*, and is publicly available via the Internet
(http://darts.jaxa.jp/ir/akari/catalogue/AcuA.html).

This catalog will be significant for various fields of solar-system science, and contribute to future Rendezvous and/or sample return missions of small objects.

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