UPDATED ASTEROID DIAMETERS AND ALBEDOS FROM AKARI/IRC MID-INFRARED DATA

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Introduction: Determining physical properties such as sizes and albedos of large samples of different asteroid populations has provided important knowledge about the nature of these bodies. Thermal models can be used to fit thermal infrared (IR) observations in order to derive asteroid diameters (D). Given their simplifying assumptions, these so-called *radiometric* sizes are typically accurate to within 10-20% when sufficient rotational coverage and thermal data are available. Nonetheless, the statistical information contained in large catalogues is extremely valuable. A first major step forward in terms of database size was enabled by the Infrared Astronomical Satellite (IRAS) in the 1980s, from which ~2000 radiometric sizes were determined [1,2]. More recently, the all-sky survey carried out by the Japanese IR-Astronomy space mission, AKARI [3], doubled this number [4]. Shortly after, NASA's Wide-field Survey Explorer (WISE) [5] dramatically increased it by two order of magnitudes [6].

Motivation: The total number of asteroids detected with diameter and albedo information with IRAS, AKARI, and WISE is nearly 140000, which is largely contributed by WISE (see Fig. 1 in [7]). While WISE offers size and albedo of a large fraction of known asteroids down to bodies of a few km, the IRAS and AKARI catalogs provided diameters of larger asteroids up to several hundred km, especially in the main belt region. In anticipation to the availability of new asteroid masses derived thanks to Gaia [8], it will be possible to increase the catalogue of know asteroid densities significantly, but given that the uncertainties in size dominate the corresponding uncertainties in density [9], it will be important to produce the best-possible asteroid diameters.

Aims: AKARI/IRC sizes and albedos were obtained by assuming fixed values of the so-called beaming parameter (η) for the two thermal IR filters, 9 and 18 μm. These values were derived from an empirical calibration based on 55 main belt asteroids with well known physical properties (sizes, albedos, rotational properties) [4]. One of our aims is to revisit the AKARI/IRC measurements and update diameters and albedos by fitting the beaming parameter for all objects for which it is possible (>2000 objects) and study correlations between the relevant quantities (η, D, p_V, phase angle of the observation, etc.). Secondly, this work will also serve to present to the community the publication of the "AKARI Asteroid Flux Catalog"[1], the exploitation of which will surely grant continuing advancement in the study of asteroid physical properties, e.g. by providing crucial help for more advanced thermophysical modelling. Finally, for a selected group of targets with well determined, shapes and rotational states, we will model the combined data from the different catalogues to improve our estimates of size and physical parameters and reexamine the accuracy and possible limitations of these methods.

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[1]http://www.ir.isas.jaxa.jp/AKARI/Archive/Catalogues/Asteroid_Flux_V1/