Comparing block populations across small bodies

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Blocks have been resolved on the surfaces of many small bodies. Rendezvous missions have allowed for thorough global analyses down to sizes of 15 m for Eros [1] and 5–6 m for Itokawa [2,3]. Localized images have allowed measurements of blocks as small as 10 cm on both asteroids [1,4,5]. Several high-resolution images of Phobos [6–8] have allowed for localized block counts. Large blocks have been identified on Ida [9,10], Deimos [8], and Lutetia [11].

Blocks can give insight into the geologic processes that have affected small bodies. On Eros, most large blocks are linked to the Shoemaker crater, and pre-existing blocks were largely covered or eroded by Shoemaker ejecta [1]. Blocks on Phobos [7] and Lutetia [11] have also been linked to craters. On Itokawa, global analyses suggest the blocks are related to the accretion of the asteroid after a catastrophic disruption event [2,3]. Local comparisons of blocks in the smooth lowlands and the rough highlands indicate subsequent mobilization of smaller block sizes [4,5].

Cumulative size-frequency plots are common tools for characterizing block distributions. In log-log space, the plotted distributions typically exhibit linear trends. Best-fit slopes to the size-frequency distribution and the cumulative number of blocks per area may provide clues to the geologic evolution of small bodies. We will compare block size-frequency distributions of Eros, Itokawa, Phobos, Lutetia, and Deimos to determine whether the observed blocks are diagnostic of the processes that formed them and the properties of their host bodies.

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