

The density and porosity of binary asteroids

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A consequence of the explosion of observations of binary asteroids over the past 10 years is a much improved view of the bulk density and porosity of small bodies. Binary observations provide system mass and with radiometric estimates of object volume we can tackle bulk density. Shown below are bulk density measurements of 42 asteroids, comets, dwarf planets, and icy satellites. From these data macroporosity is estimated by comparing the small body's bulk density with the grain density of the object's spectroscopically determined meteoritic or mineralogical analogue. The difference between these two values provides the object's bulk porosity. Subtracting the average microporosity of the analogue material gives an estimate of the object's large-scale macroporosity. The objects of the main asteroid belt span the full range of both bulk densities and porosities with objects that are essentially intact over the age of the solar system to objects that are pervasively rubbleized. NEAs tend to have low-bulk densities and relatively high porosities.

