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Galileo's Exploration of Small Bodies

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The Galileo mission to the Jupiter system afforded the opportunity to make the first ever flyby observations of main belt asteroids. The first encounter, with 951 Gaspra, revealed an irregular, cratered surface that shows evidence of regolith optical space weathering processes. The second encounter, with 243 Ida, resulted in the discovery of the first confirmed satellite of an asteroid, Dactyl. Measurements of Dactyl's orbit also allowed a useful determination of mass and density for Ida. In addition to these pioneering asteroid observations, Galileo also made observations of Jupiter's small inner moons and found that they were the major source for material in Jupiter's tenuous ring system. During it's final data taking orbit in 2002, Galileo passed within about 250 km of the irregularly shaped satellite Amalthea. Determination of Amalthea's mass from tracking data yields a bulk density for this small body of less than 1 gm/cc, suggesting a body of relatively high porosity. This is consistent with the growing body of data on small asteroid densities and estimates of their porosity.