Small Body Mission Targets: 13 Objects in 12 Years

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Within the next 12 years, seven international space missions will either flyby or rendezvous with 7 comets and 6 asteroids. It would be difficult to imagine a more interesting and diverse collection of target bodies. The target body of NASA's Stardust mission (comet Wild 2) is likely to be relatively fresh because it has only recently come into the inner solar system and the second flyby target of NASA's CONTOUR (comet Schwassmann-Wachmann 3) recently split so that fresh interior surfaces may be observable. On the other hand, the first target of the CONTOUR mission (comet Encke) is one of the most aged short period comets. It is thought to have less than one percent of its surface active while comet Wirtanen, the rendezvous target body for ESA's Rosetta's mission is thought to have nearly its entire surface active. Comets Borrelly and d'Arrest, mission target bodies for NASA's Deep Space 1 and CONTOUR, are middle-aged comets that still have a few percent of their surfaces active. The target body for NASA's Deep Impact mission is fortunately one of the larger cometary target bodies. However, so little is known about cometary materials that its not altogether clear whether Deep Impact's "smart" impacting copper cylinder will cause an extensive ejecta cloud or simply be swallowed in a compression crater. The 6 asteroid targets are similarly diverse. Asteroid Wilson-Harrington, the next target body for the Deep Space 1 mission, was discovered as a comet in 1949, lost, then rediscovered as an asteroid in 1979. The joint Japanese/NASA MUSES-C mission to retrieve a sample from the one-kilometer sized asteroid 1989 ML asteroid is contrasted with the largest asteroid in the target body collection, the 140 km sized Rosetta flyby target 140 Siwa. NASA's NEAR spacecraft will go into orbit and intensively study asteroid 433 Eros beginning in Feb. 2000 while flyby analyses of asteroids 5535 Annefrank and 4979 Otawara will be carried out by the Stardust and Rosetta missions. The six asteroid target bodies have at least 4 different spectral classifications. Within a dozen years, our very limited current knowledge of the solar systems most primitive and enigmatic objects will be increased by orders of magnitude.