Astrogolge Gene Shoemaker always said that he wanted to travel to Eros, lasso it, and hit it with a rock hammer. Eros, the size of a small city, is one of the largest of the asteroidal and cometary remnants from the solar system’s birth that can venture near Earth. Shoemaker, co-discoverer of comet Shoemaker-Levy 9 which famously crashed into Jupiter in 1994, thought that Eros might be like a road cut in the heavens: it might reveal rock strata from the interior of the main-belt asteroid from which Eros fragmented long ago. Launched from Cape Canaveral in early 1996, the NEAR Shoemaker spacecraft accomplished Shoemaker’s dream, at least metaphorically, as it orbited the little world and plied its surface with beams from half-a-dozen remote-sensing instruments.

For planetary scientists, like the late Gene Shoemaker, NEAR’s study of Eros opened a window to our distant past, when the Earth and other planets were forming by the gathering together of bodies like Eros. NEAR’s explorations, the first-ever dedicated spacecraft investigations of an asteroid, are helping researchers peer back to those formative epochs of solar system history and learn more about the precursors that formed a habitable world, like our own planet Earth.

Clark R. Chapman
Planetary Scientist

As the first mission launched in the National Aeronautics and Space Administration’s (NASA) Discovery Program, the Near Earth Asteroid Rendezvous (NEAR) mission set the stage for asteroidal exploration and formed a base of knowledge that will be the framework for future missions. The NEAR Shoemaker spacecraft was designed and built by The Johns Hopkins University Applied Physics Laboratory, which managed the mission for NASA.
Science Objectives

The NEAR mission was the first comprehensive study of the physical geology, composition and geophysics of an asteroid. The mission had three main scientific goals:

- Determine the physical and geological properties of a near-Earth asteroid (NEA);
- Clarify relationships between asteroids, comets and meteorites; and
- Further our understanding of how and under what conditions the planets formed and evolved.

Exploring Eros

NEAR's target was 433 Eros, the first NEA discovered and one of only three known NEAs with diameters wider than 6 miles (10 kilometers). Before descending to the surface in February 2001, NEAR Shoemaker traveled at various distances around Eros, passing as close as 2 miles from the surface and orbiting farther than 200 miles from the asteroid's center. Its main scientific orbits ranged from 22 miles (35 kilometers) to 124 miles (200 kilometers).

Touchdown!

The NEAR team devised a spectacular finish to the yearlong orbit at Eros — the first-ever spacecraft landing on an asteroid. On February 12, 2001, NEAR Shoemaker made a gentle, picture-perfect landing on the tips of two solar panels and the bottom edge of its body. Then, to much amazement, the craft continued to operate and send signals back to Earth. For two weeks the team gathered the first scientific readings from an asteroid’s surface, adding to the legacy of a mission that collected 10 times more data than planned.