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## ASTRONOMY

### NASA mission seeks out dwarf planet, asteroid

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BY TOM STATLER

If all goes well this week, NASA's Dawn spacecraft will launch on its mission to Ceres and Vesta, which are two of the biggest nonplanets in our solar system.

Ceres is the nearest of the sun's dwarf planets. Vesta is one of the largest asteroids. Both orbit the sun in the main asteroid belt between Mars and Jupiter.

Dawn follows the NEAR-Shoemaker spacecraft, which orbited the 20-mile-long Eros and intentionally crash-landed on it in 2001, and the Japanese spacecraft Hayabusa, which did a touch-and-go landing on the much smaller Itokawa in 2005.

Eros and Itokawa are near-Earth asteroids. Dawn will mark the first exploration of the main asteroid belt.

Dawn was built by an international group of scientists and engineers mainly from the United States and Germany. It's propelled by an ion engine, an amazingly fuel-efficient technology pioneered on the Deep Space 1 mission in the late 1990s and on Hayabusa.

The purpose is to understand the formation of Earth and the other planets. Asteroids are leftover chunks from that formation. Some have circled the sun, unchanged, for billions of years. Others have been battered and broken by violent collisions.

One such collision took a big bite out of Vesta's south pole. Debris from that impact is still orbiting the sun and could account for 5 percent of all the meteorites found on Earth.

Dawn is expected to arrive at Vesta in 2011 and spend nine months there before moving on to Ceres.

By then, we hope that the Hayabusa spacecraft will have returned safely to Earth. After a serious engine failure in 2005, Hayabusa engineers coaxed the spacecraft back into operation and started it on a homeward trajectory this spring.

In 2010, Hayabusa will arrive with long-awaited cargo: the first samples of rock from the surface of an asteroid.

For more information on the Dawn and Hayabusa missions, see <http://dawn.jpl.nasa.gov> and <http://www.isas.ac.jp/e/enterp/missions/hayabusa/index.shtml>.

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