



The Mission



Rocket: Delta 2-Heavy

Payload: Dawn

Date: July 7, 2007

Time: 4:09-4:36 p.m. EDT (2009-2036 GMT)

Site: Pad 17B, Cape Canaveral, Florida

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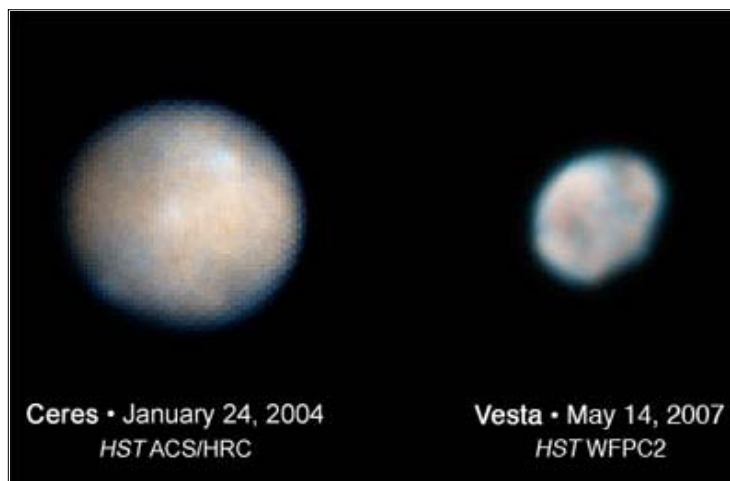
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Dawn's two cosmic targets: Vesta and Ceres

FROM NASA PRESS KIT

Ceres and Vesta are the two most massive residents of the asteroid belt. Vesta is a rocky body, while Ceres is believed to contain large quantities of ice. The profound differences in geology between these two protoplanets that formed and evolved so close to each other form a bridge from the rocky bodies of the inner solar system to the icy bodies, all of which lay beyond in the outer solar system.

At present, most of what we now know about Vesta and Ceres comes from ground-based and Earth-orbiting telescopes like NASA's Hubble Space Telescope. The telescopes pick up sunlight reflected from the surface in the ultraviolet, visible and near-infrared, and by emitted radiation in the far-infrared and microwave regions.



Hubble Space Telescope images of Vesta and Ceres.

Credits for Vesta: NASA; ESA; L. McFadden and J.Y. Li (University of Maryland, College Park); M. Mutchler and Z. Levay (Space Telescope Science Institute, Baltimore); P. Thomas (Cornell University); J. Parker and E.F. Young (Southwest Research Institute); and C.T. Russell and B. Schmidt (University of California, Los Angeles)

Credits for Ceres: NASA; ESA; J. Parker (Southwest Research Institute); P. Thomas (Cornell University); L. McFadden (University of Maryland, College Park); and M. Mutchler and Z. Levay (Space Telescope Science Institute)

Vesta

Discovered: March 29, 1807 by Heinrich Wilhelm Olbers of Germany (fourth asteroid discovered)

Apollo 1 DVD

This tribute DVD features over 4.5 hours of material about the Apollo 1 tragedy and the crewmembers lost in the pad accident.

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STS-118 patch

This is the official astronaut patch of space shuttle Endeavour's STS-118 mission to the International Space Station. The crew features Barbara Morgan, the former Idaho teacher and now NASA's first Educator Mission Specialist.

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Project Orion

The Orion crew exploration vehicle is



Dimensions: About 578 by 560 by 458 kilometers (359 by 348 by 285 miles)

Shape: Nearly spheroid, with a massive chunk out of the south pole

Rotation: Once every 5 hours, 20 minutes

The asteroid's official name is "4 Vesta" because it was the fourth asteroid discovered. About the length of Arizona, it appears to have a surface of basaltic rock -- frozen lava -- which oozed out of the asteroid's presumably hot interior shortly after its formation 4.5 billion years ago, and has remained largely intact ever since. Telescopic observations reveal mineralogical variations across its surface.

Vesta has a unique surface feature which scientists look forward to peering into. At the asteroid's south pole is a giant crater - 460 kilometers (285 miles) across and 13 kilometers (8 miles) deep. The massive collision that created this crater gouged out one percent of the asteroid's volume, blasting over one-half million cubic miles of rock into space.

What happened to the one percent that was propelled from its Vesta home? The debris, ranging in size from sand and gravel to boulder and mountain, was ejected into space where it began its own journey through the solar system. Scientists believe that about 5 percent of all meteorites we find on Earth are a result of this single ancient crash in deep space.

To get an idea of the size of the crater on Vesta's south pole, the longest dimension of the main-belt asteroid Eros (which the Near Earth Asteroid Rendezvous Shoemaker spacecraft studied in 2000) is 30 kilometers long. That entire asteroid would quite easily be lost in the awesome maw of the crater near Vesta's south pole. Or, as another analogy, if Earth had a crater that was proportionately as large as the one on Vesta, it would fill the Pacific Ocean.

Ceres

Discovered: January 1, 1801 by Giuseppe Piazzi of Italy (first asteroid/dwarf planet discovered)

Size: 975 by 909 kilometers (606 by 565 miles)

Shape: Spheroid

Rotation: Once every 9 hours, 4.5 minutes

The object is known by astronomers as "1 Ceres" because it was the very first minor planet discovered. As big across as Texas, Ceres' nearly spherical body has a differentiated interior - meaning that, like Earth, it has denser material at the core and lighter minerals near the surface. Astronomers believe that water ice may be buried under Ceres' crust because its density is less than that of the Earth's crust, and because the dust-covered surface bears spectral evidence of water-bearing minerals. Ceres could even boast frost-covered polar caps.

NASA's first new human spacecraft developed since the space shuttle a quarter-century earlier. The capsule is one of the key elements of returning astronauts to the Moon.

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This special 12-inch embroidered patch commemorates the U.S. astronauts who made the ultimate sacrifice, honoring the crews of Apollo 1, Challenger and Columbia.

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STS-117 patch

The official crew patch for the June space shuttle mission. The Atlantis crew installed new solar wings on the space station.

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Astronomers estimate that if Ceres were composed of 25 percent water, it may have more water than all the fresh water on Earth. Ceres' water, unlike Earth's, is expected to be in the form of water ice located in its mantle.

Asteroids

Large, rocky bodies that orbit the sun are known as asteroids or minor planets. They are smaller than planets or dwarf planets -- both of which are large enough to assume near-spherical shapes -- but are larger than meteoroids, which are usually defined as being 10 meters (about 33 feet) across or smaller. In addition, asteroids are distinguished from comets, which are identified by the fact that they have a visible coma (or atmosphere) and/or a tail. Asteroids can range from the size of a house to objects the size of Vesta -- about 530 kilometers (330 miles) in diameter.

The scientific interest in asteroids is due largely to their status as the remnant debris from the processes that formed the bodies of the inner solar system. Because some asteroids can collide with Earth, they are also important for having significantly modified Earth's biosphere in the past. In addition, asteroids offer a source of volatile compounds and a rich supply of minerals that can be used in human exploration of the solar system.

Main Asteroid Belt

There is a region in the solar system - between Mars and Jupiter - where hundreds of thousands of small bodies orbit the sun. Known as the main asteroid belt, this zone consists of rocky bodies that formed about 4.5 billion years ago, at the same time and in similar environments as the bodies that grew to be the rocky inner planets, Mercury, Venus, Earth and Mars. Scientists believe that when all the mass of the main asteroid belt is added together, there is more than enough to make a healthy-sized planet. So why did these space rocks not work together and ascend the mighty ziggurat of celestial analogues?

Blame it on Jupiter.

Jupiter is more than the top god of the ancient Romans and the fifth planet from the sun. Jupiter is an enormously massive gravity well that tugs at literally everything in the solar system. And the closer you are, the more influence Jupiter's gravity has on your existence.

The space rocks between Mars and Jupiter were closest of all. Thus, even though they had all the celestial ingredients to form another planet, the gravitational tug of Jupiter denied them the chance of becoming more than the vast rubble field we call the asteroid belt.

Denied the opportunity to fulfill such a destiny, Ceres and

Vesta became the two most massive remnants of this epoch of the planet-forming phase of the solar system. Ceres alone accounts for about one-third of the estimated mass of all of the solar system's asteroids, while Vesta's mass is almost one-third that of Ceres.

But all conditions are not benign in the main asteroid belt. Each asteroid is on its own orbital path around the sun and, every once in a while, two asteroids try to be in the same place at the same time. This celestial pinball, and the resulting collisions, can hurl small fragments far beyond the belt and even beyond Jupiter's influence. In some cases, these small fragments make their way into the inner solar system where some become meteors hurtling across our sky -- and even fewer survive as meteorites which make it to Earth's surface.

Dwarf Planets

In August 2006 the International Astronomical Union created a new category of celestial body, "dwarf planets." The objects in this category are smaller than planets but larger than asteroids. In order to qualify as a dwarf planet, an object must meet four criteria. First, it has to be in orbit around the sun. Second, the body has to have sufficient mass so its own gravity causes it to assume a near-spherical shape, just like the larger planets. But, third, the body must not have swept clean the neighborhood around its orbit -- which is the feature that distinguishes these minor planets from their bigger siblings. And, fourth, the body must not be a satellite (or moon) or a planet.

The first objects to be designed dwarf planets in 2006 are Ceres, Pluto and Eris. Discovered in 1801, Ceres was at first considered a planet, later classified as an asteroid, and more recently as a dwarf planet. Pluto was discovered in 1930 and was considered a planet for more than 75 years until its reclassification in 2006. Eris was discovered in 2005 from images taken in 2003, and was known as 2003 UB313 until its final name was assigned in 2006.

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