

Triton Fun Company

Science Newsletter October 2007

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The Dawn Mission: Journey to the Asteroids

J. Wise

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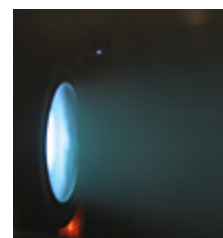
The **Dawn mission** is headed to the asteroid belt. It will study 2 asteroids and give us an unprecedented look at these celestial bodies. The spacecraft launched on September 27, 2007.

There I was, at the Causeway on the grounds of Cape Canaveral in the early morning dawn, waiting for the launch of the spacecraft. Many memories passed through my mind as I went back to my first involvement with the Dawn Mission some ten years earlier. It had been a bumpy ride getting Dawn to the launch pad, but here we were. The count-down was down to four minutes. There was a hold, a ship was in waters that were down range and the Coast Guard had to be dispatched. Certainly the launch would not be put off a day for that. The ship was cleared, and then we had to wait for the International Space Station to fly overhead. Finally the spacecraft lifted up upon launch, and a beautiful launch it was.

Exploring a new frontier, the Dawn mission will journey back in time over 4.5 billion years to the beginning of our Solar System. How is this "time travel" possible?

Many thousands of small bodies orbit the Sun in the asteroid belt - a large region between the orbits of Mars and Jupiter. They formed at the same time and in similar environments as the bodies that grew to be the rocky planets (Mercury, Venus, Earth, and Mars). Scientists theorize that the asteroids were budding planets that were never given the opportunity to grow, due to gravitational stirring by massive Jupiter. Asteroids contain clues that reveal the conditions and processes acting at the Solar System's earliest epoch. Dawn investigates the asteroids *Vesta* and *Ceres* to unlock some of the mysteries of planetary formation, including the building blocks and the processes that made them what they are today.

You may ask "Why Vesta and Ceres?" Vesta and Ceres have survived the collisional environment of the asteroid belt and have remained intact since their formation. Evidence shows that each has distinct characteristics and therefore, must have followed different evolutionary paths. Vesta's physical characteristics reflect those of the inner planets,



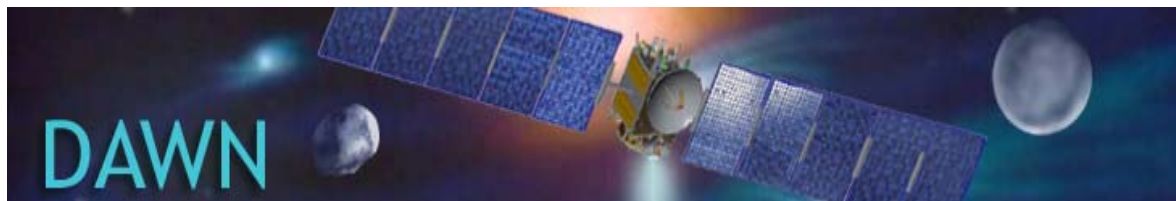
The blue glow of Dawn's ion engine

while Ceres is representative of the icy moons of the outer planets.

Dawn is the first mission in which the same suite of instruments is used to gather comparative data. The spacecraft carries two cameras, a visible and infrared mapping spectrometer, and a gamma ray and neutron spectrometer. These instruments will reveal surface features as well as the surface minerals and the elements that make up the outer parts of the asteroids. Dawn will also be able to measure the gravity fields of the asteroids to reveal the details of these asteroids' interiors.

We are always looking for **contributors** to the Science Newsletter. If you would like to write an article about a science subject you are excited about, or contribute a superfluous question, or if you would like to be on our **mailing list** for future newsletters, please e-mail us at:

science@tritonfun.com



Dawn Mission to Vesta and Ceres, continued

Photos: NASA JPL/UCLA/New Roads

Seeing the spacecraft built from beginning to end was quite a thrill. Memories of the initial meetings and tour of the clean rooms at Orbital Sciences Corporation years ago sifted through my mind, as well as thoughts upon viewing the spacecraft now as it sat on top of the Delta II rocket. Dawn's journey to the asteroid belt, spanning about eight years from launch to completion of data return, is made possible by *ion propulsion*. Initially tested and proven successful on NASA's **Deep Space 1** mission, this innovative technology is now applied for the first time in the design and implementation of a *dedicated* scientific space flight with the Dawn mission. . Ion propulsion allows Dawn to undertake a bold and important mission that would be unaffordable – or perhaps impossible – with more conventional propulsion systems. Two large solar panels, stretching approximately 19.7 meters (65 ft) from tip to tip, help to harness power from the distant Sun to the ion engines.

The power then ionizes the onboard fuel, which is composed of xenon atoms, to form xenon ions and then accelerates the ions, which in turn accelerate the spacecraft .

Getting to know the Dawn Science team was another thought that passed through my mind. So many talented and dedicated people were necessary to make this mission happen. With the successful launch and the current reports of testing of the spacecraft, my thoughts are now full of the excitement and anticipation of the discoveries to come.



Launch of Dawn spacecraft from Cape Canaveral, Sept 27, 2007



Lift-off !



Spacecraft in stowed configuration



Science team at launch site

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** Send us your superfluous questions for a future issue ! They can be on any subject. The funnier, the better. M.D., our editor, appreciates the help and will send you a free Triton Fun coffee mug as compensation for your question. Or write an article for us and be read by professional and amateur astronomers and scientists in the U.S. and Canada ! **

Superfluous Questions:

- The Nobel prize in chemistry was awarded to which group for their discovery of *fullerenes* ? (Fullerenes are fascinating compounds containing only carbon atoms bonded together to make hollow spheres, tubes or bean-shaped structures; they have many valuable uses, including those in medicine, engineering and chemistry.)
 - Curl, Kroto and Smalley
 - Deisenhofer, Huber and Michel
 - Herschbach, Lee and Polanyi
 - Mo, Larry and Curly
- Tympanic membranes are also known as *what* ?
 - eyelids
 - bile ducts
 - liver cysts
 - eardrums
- In the TV show *The Wonder Years*, Kevin finds his mom praying in a church one afternoon. What was she praying for ?
 - to find tax receipts that she lost
 - for Kevin to pass his class
 - for Jack's health
 - for the safety of the astronauts
- Chutney is *what* ?
 - a city in England
 - a kind of automobile
 - a condiment containing spices
 - a tool for polishing brass

—> ANSWERS in next months issue of the Science Newsletter ! <---

** ANSWERS to September's Superfluous Questions: 1. b) \$283,205 2. a) volume 3. d) Univ of Wisconsin 4. d) cheese