

# Odyssey

*Pushing the Edges*

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2006

*Official Newsletter of OASIS: the Los Angeles Chapter of the National Space Society*

## Craft Returns To Earth After "Gathering Stardust" Space Scientist Darren Baird Describes Unmanned Mission to Comet Wild 2

By Steve Bartlett

A NASA mission to collect samples of a comet and return them to Earth came to a stunning climax over the Utah desert in early January when the Stardust craft brought back materials as old as the Solar System itself. Darren Baird, a member of the mission navigation team at the Jet Propulsion Laboratory, told of the mission and its latest findings in the talk "Gathering Stardust" at the Long Beach Public Library on January 21.



JPL scientist Darren Baird

*Photo: Steve Bartlett*

By the third pass, the Stardust spacecraft had enough speed to carry it halfway out to Jupiter and on its way to an encounter with Wild 2. In that encounter, on January 2, 2004, Stardust and the comet raced past one another at over 13,000 miles per hour. Its onboard instruments - a mass spectrometer, optical spectrometer, optical navigation camera, and sample collection materials for cometary

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The seven-year, 2.9-billion mile mission was launched from Earth aboard a Delta II rocket from Florida in 1998 on its way to the comet Wild (pronounced "Vilt") 2. To get there, it took an innovative trajectory that began with it departing from Earth in a wide arcing orbit around the sun. Its orbit then returned it to the vicinity of the Earth, where it used

Earth's gravity in a slingshot maneuver to pick up speed.

Stardust again swung wide and returned to Earth again, picking up more speed. Following its second pass, the spacecraft traveled near the asteroid Anne Frank, where it collected 3D images and spectral data on the space rock.

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**ISDC 2006! May 4-7, Los Angeles, CA. Mark your calendars now!**

# SETI@home Going BOINC

By Craig Ward

Is there somebody out there? That's the main question of the SETI@home project.

Since 1998, the University of California, Berkeley has hosted a distributed computing project that analyzes the signals received by radio telescopes, primarily the Arecibo telescope in Puerto Rico, for signs of a signal of extraterrestrial origin.

Separating natural background noise from an artificial, non-terrestrial, source takes lots of computing power, more power than that of even the most advanced supercomputers. The solution is to slice the data into small parts and let small computers work on them. Thus the SETI@home screen saver was created. People participating in

the search donate unused time on personal machines. More than two million people run the program.

Members and friends of the National Space Society (NSS) have participated in the project on an NSS team. The team has processed more than 396,586 data units, contributing more than 504 years of CPU time.

SETI is not the only problem that can be broken down into smaller pieces, so the SETI@home system is being retired and replaced with the Berkeley Open Infrastructure for Network Computing (BOINC). As of December 15, 2005, the SETI@home database servers stopped delivering new data sets to the SETI@home clients.

The new system will still allow

people to participate in the search. What is being added is the ability to donate computer time to other activities. In addition to SETI@home, CPU time can be given to climate study, gravitational physics, particle physics, and research into human diseases.

While there are currently no plans to maintain the NSS SETI@home team, all current members and anyone else who would like to participate are encouraged to download the software and allocate the extra time from your machines to the project or projects of the most interest.

Clients for many platforms, including Windows XP, MacOS X, Linux, and several Unix varieties, can be found at the BOINC web site: [boinc.berkeley.edu](http://boinc.berkeley.edu).

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## Darren Baird "Gathering Stardust"

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gas - worked at high speed to collect data in the close approach. The spacecraft navigation team flew the craft through the comet's head, or coma, where they expected the greatest amount of material to be released from the icy surface by the sun's heat.

Baird described the innovative material used to collect the comet samples, called aerogel,

which has been likened to solid smoke. The lightweight substance consists mostly of silicon and oxygen and was considered the material least likely to contaminate the cometary material.

During the flyby, Stardust was pelted by a high flux of gas and dust, putting the sensitive parts of the solar-powered spacecraft at risk. The NASA

designers dealt with this threat by incorporating protective barriers called "Whipple shields" into the structure of the probe. These multilayered shields absorbed and dissipated the energy of the incoming dust and gas before they could damage the instruments and critical systems.

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# The Beauty of Cost-Plus-Fixed Fee (CPFF)

By Robert Brodsky

Working in aerospace in the 60's was great fun. There always seemed to be money and sponsors for exploratory programs that pushed the state of the art. Such innovative projects were often a gamble, but the risk was usually knowingly shared by the company and customer alike. Truly forward-looking projects were usually funded using "company money," but here again the government gave tacit approval by partial funding. In this atmosphere, many important breakthroughs were achieved—such as those that led to the success of the Apollo missions.

Then, in the 70's, a new philosophy—foisted on us by the "suits"—came into vogue. The happy times were over, and engineering innovation became much rarer.

In the early days of the space age, NASA, the Air Force, and the various big money "spook" agencies all desired to exploit this new frontier as quickly as they could. They made Requests for Proposals (RFPs) to industry, that often asked for results that certainly would be difficult to achieve, and possibly unachievable without luck or a new invention. Industry, in turn,

was more than happy to make proposals for these challenging quantum leaps because they wanted to be at the cutting edge; moreover their financial risk was limited.

This was because the contracts were Cost-Plus-Fixed-Fee (CPFF): the companies bid on a job quoting a certain price, and asked for an additional fee that was a fixed percentage of the quoted price; usually 2%-3%, negotiable. This fee was certain, even if the job bombed, and represented a clear profit. If additional funds were later requested to continue or add on to the project, and if the customer agreed that such were justified, an additional negotiated—usually smaller—fee came along with the "overrun" money. Under these circumstances, it was generally a win-win proposition unless you fouled up so badly that the customer would not do future business with you, in which case your reputation as an advanced R&D outfit would go down the drain.

The atmosphere created by the CPFF way of doing business was exactly right for the times. It permitted programs heretofore only dreamed of. Even so, the success rate was remarkable, mostly because

so many new ideas, analysis-techniques, and devices were suddenly available. Great strides were taken, even if many problems could only be solved by throwing gobs of money at them.

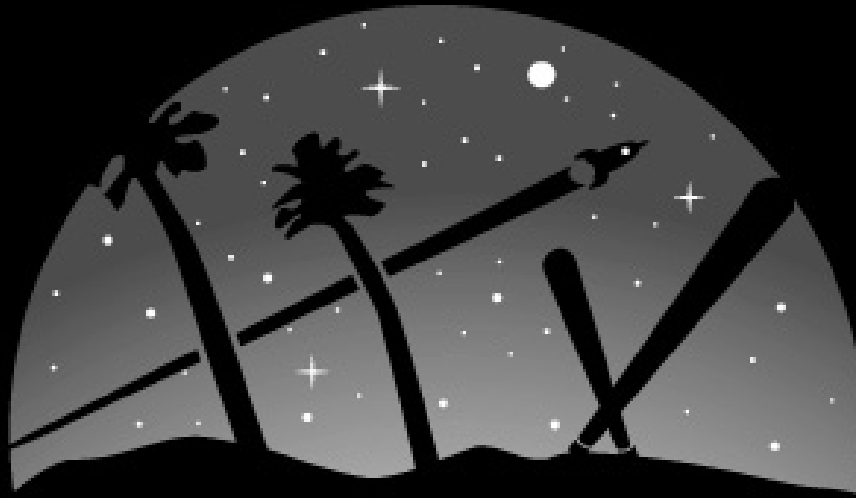
Thus the competitions for new work were cutthroat, calling for vivid prose, big imaginations, and a few Hail Mary's for luck. But it was fun! It was an atmosphere I thrived in. I lived by the sacred words of my late Aerojet/Space General boss, Charlie Roth: "Never say a job is difficult, Never say we can possibly or probably do it. Just say we'll have it done next Tuesday, and be ready to punt!"

This air of engineering euphoria went on for the better part of 10 years. Buoyed up by the ongoing Apollo moon program, it was a happy time in both the airplane and space sectors. But now and then the public glimpsed what was going on in this happy military-industrial complex. Scandals like \$100 screwdrivers and \$500 toilet seats leaked out, until Congress started paying attention. Why not "Fixed Price?" they said. Soon the pendulum started to swing, and of course soon swung too far.

Nowadays, contractors are forced to bid a price they agree not to

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# ISDC06



## EXPLORING NEW WORLDS LOS ANGELES \* MAY 4-7

The National Space Society and The Planetary Society  
invite you to Los Angeles on May 4-7, 2006, for the 25th annual  
**INTERNATIONAL SPACE DEVELOPMENT CONFERENCE (ISDC)**  
Mark your calendars today for the biggest space advocacy event of the year!

**ISDC 2006** will feature dozens of presentations, panel discussions, interactive exhibits and activities spanning the entire spectrum of space-related issues: exploration, tourism, science, technology, policy, and commerce.

**ISDC 2006** is your window to the new world of space, and your chance to participate in the beginning of a spacefaring civilization!

Check back often for the latest updates and please contact us if you have any questions about the conference. We look forward to seeing you in Los Angeles next May!

Sheraton Gateway Los Angeles  
6101 West Century Boulevard, Los Angeles, California 90045  
See <http://isdc.nss.org/2006>, email [katherine@moinc.com](mailto:katherine@moinc.com), or fax to (202) 463-8497

# ISDC 2006: VOLUNTEER OPPORTUNITIES

**Q:** How can I get involved with this historic event????

**A:** There are many opportunities for people who live in the Los Angeles area to help make ISDC 2006 a reality.

These include:

- ◆Operations (obtaining audiovisual equipment, scheduling)
  - ◆Programming (contacting potential speakers, running sessions)
  - ◆Communications (writing press releases, contacting media, publishing a program book)
- ...and much, much more!

No conference experience is required to help out.

If you are interested in volunteering for ISDC 2006, please contact conference volunteer coordinator Pat Montoure at [patmontoure@aol.com](mailto:patmontoure@aol.com).

## The Beauty of Cost-Plus-Fixed Fee (CPFF) *(continued from page 3)*

exceed, even if they have to finish the job using their own money. In return, they are allowed a higher profit margin to help cover their much greater risk, especially in undertakings that normally would be naturals for CPFF agreements.

The mind set in bidding FP is much different than in CPFF - the customer will no longer bail you out if you get in trouble. It is a different ball game, and one that I think is, in many cases, to the detriment of the country. The government, in some key developments, now asks for bids on programs that are clearly of a speculative nature. They know it, and the contractors know it and complain, but both are cowed by a recalcitrant Congress.

When this new regime started to set in, the results for older advanced engineers and engineering was just short of being disastrous. The wind was taken out of their sails. On the face of it, this very logical edict was saying, "Let's only buy what we know we can achieve. Let's no longer bet on 'the come'." The proposals that were then returned were based on "ifs, ands, and buts." They were overly cautious. The newer generation of engineers, who were not active in the CPFF days, never knew what they were missing. For engineers under this new regime, the challenge is to find an approach, based on proven technology, that no one could doubt would work. The soaring flights of innovative minds were suddenly grounded. In

their place are good, but uninspired and expensive, solutions to problems that produce an inch, not a yard, of progress. New organizations called "Risk Management" have sprung up, and are manned by engineers who heretofore were doing advanced design work.

The swashbuckling days are over, except for a few crucial CPFF jobs that slip under the door - usually cloaked in secrecy. The change took the excitement of going to work every day away from many of our best innovators. It certainly made it easier for me to retire when my time came. "Fixed Price" is clearly a mixed blessing. It signifies that we have reached a certain stage of engineering maturity, but methinks we are paying a high price in progress for it.



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Industrialization and Settlement  
(OASIS)

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Contributions may also be mailed as .doc or .txt files on PC-formatted CDs, or as hard copy to:

OASIS, PO Box 1231  
Redondo Beach, CA 90278

## Gathering Stardust

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Stardust then headed back toward Earth. The sample canister was separated from the main spacecraft bus for a landing in the Utah desert. A heat shield protected the samples from the extreme temperatures of reentry as the probe plunged into the atmosphere at high speed. At a preset altitude, a drogue chute deployed, slowing the descent. The onboard electronics were then supposed to command the main parachute to deploy, further slowing the descent.

The mission navigation team suffered some nail-biting moments as telemetry showed the craft falling further and further toward the ground without confirming that the main parachute had deployed. They feared a repeat of the recent Genesis solar probe mission failure, where an incorrectly installed sensor prevented the main parachute from deploying, causing the craft to hit the ground at over 200 miles per hour, severely damaging the samples onboard.

The nail-biting ended when the Stardust crew discovered that they were receiving delayed data and that the parachute had indeed deployed on command. The sample recovery team then found the probe, intact and ready for study, after only 40 minutes' search of the desert.

The scientists in charge of studying the samples had expected the aerogel to collect a few tens of particles during the cometary encounter, each one minute and difficult to detect. Instead, they found that the craft had registered thousands of impacts, with several large enough to be seen with the naked eye. They'd scored a cosmic jackpot!

Baird spoke before a standing-room-only crowd, all anxious to find out the latest on the mission. He commented that initially he'd been reluctant to be on the Stardust program but had grown to appreciate the spacecraft and its unique capabilities.

As an epilogue, the JPL researcher mentioned that the main spacecraft bus for the Stardust mission is still in orbit around the sun and still has substantial reserves of onboard propellant. The equipment is still operating well and is expected to do so for several years. If NASA chooses to do so, the probe can be sent on further voyages to other comets or spacecraft for very little money. This would be a fitting way to continue a very successful mission - to keep it doing what it was designed to do.

Saturday, 11 March 2006. 7:30 pm. Riverside Astronomical Society General Meeting. "The Problem with Pluto." Gary Peterson of San Diego State University. Astronomy students and kids age 1 to 100 are welcome. Admission is free! Pre-meeting dinner at 5:00 pm; for information contact Pam Malcolm, pammalcolm@charter.net. Cossentine Hall, La Sierra University, 4500 Riverwalk Pkwy., Riverside, CA. Visit <http://www.rivastro.org/index.html> or email [information@rivastro.org](mailto:information@rivastro.org).

Thursday and Friday, 16 and 17 March 2006. "Wide in the Middle, Hot at the Top: The Direct Measurement of the Shapes of Stars." Gerard Van Belle, Keck Operations Scientist, California Institute of Technology, Michelson Science Center. Thursday: 7 pm. von Kármán Auditorium, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA. Friday: Vosloh Forum, Pasadena City College, 1570 East Colorado Blvd., Pasadena, CA. Visit <http://www.jpl.nasa.gov/events/lectures/may05.cfm> or phone (818) 354-0112.

Saturday, 18 March 2006, 3:00 pm. OASIS Board Meeting. Home of Bob Gounley and Paula Delfosse, 1738 La Paz Road, Altadena, CA. Visit [www.oasis-nss.org/](http://www.oasis-nss.org/) or phone the OASIS HOTLINE at (310)364-2290.

Tuesday, 21 March 2006, 7:30 pm. Birth of the Personal Spaceflight Industry. Peter Diamandis, Chairman and CEO of the X PRIZE FOUNDATION. San Diego Aerospace Museum, 2001 Pan American Plaza, San Diego, CA. Visit <http://www.aerospacemuseum.org/upcoming/lectureseries.html> or phone (619)234-8291. For directions: visit <http://www.aerospacemuseum.org/visit/directions.html>



Organization for the Advancement of Space Industrialization and Settlement  
A chapter of the National Space Society

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\*Family rates include the children's edition. Please specify names of children.

\*\*Supporter level or higher: you can choose to subscribe to the Moon Miners Manifesto (MMM)

Wednesday, 22 February 2006, 8:00 pm. California Institute of Technology Earnest C. Watson Lecture: "Beyond Pluto: Discovery of the 10th Planet." Michael Brown, Professor of Planetary Astronomy at California Institute of Technology. This event will be digitally recorded and made available for viewing on the Caltech Theater site <http://today.caltech.edu/theater/>. Beckman Auditorium, California Institute of Technology, Pasadena, CA  
Visit <http://events.caltech.edu/events/event-1444.html> or phone (626) 395-4652.

Thursday and Friday, 23 and 24 February 2006, 7:00 pm. "New Views of Hidden Worlds: Revealing the Depths of Venus, Jupiter, Saturn, and Titan with 21st-Century Spacecraft." Kevin Baines, Planetary Scientist, JPL.  
Thursday: von Kármán Auditorium, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA.  
Friday: Vosloh Forum, Pasadena City College, 1570 East Colorado Blvd., Pasadena, CA.  
Visit <http://www.jpl.nasa.gov/events/lectures/may05.cfm> or phone (818) 354-0112.

Friday, 24 February 2006, 8:00 pm. "Unveiling the Secrets of Comets." Guest Lecture, Dr. Paul Chodas, Solar System Dynamics, JPL. Science Lecture Hall 140, Santa Monica College, 1900 Pico Blvd., Santa Monica, CA  
Visit <http://www.smc.edu/planetarium/> or phone (310)434-4003.

Saturday, 4 March 2006. Sunset until 10 pm. Los Angeles Sidewalk Astronomers Star Party.  
Autry Museum of Western Heritage, 4700 Western Heritage Way, Los Angeles, CA.  
Visit <http://www.sidewalkastronomers.com/chapters/laevents.html> or phone (323)664-1191.

Friday, 10 March 2006. 7:30 pm. Santa Monica Amateur Astronomy Club Monthly Meeting  
Nils Turner of Georgia State on "Astronomy with the CHARA Array [on Mount Wilson]: A New View of the Universe." Free admission. New Roads School, 3131 Olympic Blvd., Santa Monica, CA.  
Visit <http://connect.to/smaac> or phone (310)495-7595 or email [reinhardka@aol.com](mailto:reinhardka@aol.com).

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