Galileo, the venerable spacecraft launched in 1989 and in orbit about Jupiter and its moons since late 1995, will come to the end of its mission with a controlled dive into the planet on Sunday, Sept. 21.

Among Galileo’s bountiful science return is the discovery of likely subsurface water oceans on Europa, which has fueled speculation about the possibility of life on the icy Jovian moon. Galileo was not designed for such a search, so it was not subjected to the rigorous sterilization procedures such as those mandated for Mars-bound spacecraft. To prevent any possible future biological contamination of Europa, the decision was made to provide a final resting place—Jupiter itself—for Galileo that guarantees it will never collide with any of the Jovian moons.

“It’s sad to see the mission end; it has been fabulous for planetary science,” said Project Manager Dr. Claudia Alexander. “It certainly seemed like we would never arrive and do the mission, and it seemed like, with the high-gain antenna not opening, we wouldn’t do half the things we set out to do, but in the end, with a little ingenuity, the spacecraft proved to be resilient, and the mission has been incredible.”

Rather than an impact, Galileo’s demise will actually be a gradual, but very rapid, immersion in the gas atmosphere where the pressure reaches one bar. For reference, this point is 71,492 kilometers, the equivalent of Earth’s atmospheric pressure at sea level. For reference, this point is 71,492 kilometers, the equivalent of Earth’s atmospheric pressure at sea level.

In addition to discovering strong evidence that Europa has a melted saltwater ocean under an ice shell, measurements of conditions within Jupiter’s atmosphere, returning to its constituent atoms as it makes its unannulable journey in the vast weather systems of Jupiter. Following its arrival at Jupiter in December 1995, Galileo orbited the solar system’s largest planet 35 times. From launch to impact, the spacecraft has traveled 4.6 billion kilometers (about 2.9 billion miles), returning more than 163,000 gigabytes of data, including 14,000 pictures.

Following launch, Galileo flew past Venus (February 1990) and then twice past Earth (December 1990 and December 1992). The highlights of its observations and discoveries would fill volumes.

Also on route to Jupiter, Galileo flew close to two asteroids—the first such visits by any spacecraft—encountering Gaspra in October 1991 and Ida in August 1993. Galileo also discovered Dactyl, the first confirmed moon of an asteroid, orbiting Ida. During the latter part of its interplanetary cruise, Galileo was used to observe the collisions of fragments of Comet Shoemaker-Levy with Jupiter in July 1994. In addition to discovering strong evidence that Europa has a melted saltwater ocean under an ice layer on its surface, Galileo also found indications that two other moons, Ganymede and Callisto, may have layers of liquid saltwater as well. Other major science results from the mission include details of varied and extensive volcanic processes on the moon Io, measurements of conditions within Jupiter’s atmosphere, and discovery of a magnetic field generated by Ganymede.

Following its arrival at Jupiter, Galileo was switched on two of its onboard systems, said Project Scientist Dr. Michael Watkins. “We can’t wait to see the images and spectra we’ll get once the telescope is cooled down and instruments are operating at full capacity.”

The most striking image is a 3-D reconstruction of images. The pole of comet 67P/C-G, based on a 3-D reconstruction of images, is revealed 4.6 billion kilometers from the Earth. The observatory, which observed the comet 67P/C-G on September 5 at the annual meeting of the Division of Planetary Sciences of the American Astronomical Society in Monterey, revealed four such visits by any spacecraft. The images were taken as part of an operational test of the infrared array camera. The spacecraft was launched from Cape Canaveral, Fla., on Aug. 20.

The images were taken as part of an operational test of the infrared array camera. The spacecraft was launched from Cape Canaveral, Fla., on Aug. 20.

The engineering image was derived from 100 seconds of observing time on one of the three science instruments aboard SIRTF.

The Wide Field Planetary Camera 2. to the JPL-built and developed camera onboard NASA’s Hubble Space Telescope, played a major part in identifying a football-shaped comet as the new target for the European Space Agency’s Rosetta mission, the first ever to land on a comet. The observations revealed that comet 67P/C-G is a roughly three times larger than the original Rosetta target. Its elongated shape should make landing on its nucleus feasible. now that measures are in place to adapt the lander package to the new configuration before next year’s launch,” said Dr. Philippe Lamy of France’s Laboratoire d’Astronomie Spatiale in France, who presented the results on Sept. 5 at the annual meeting of the Division of Planetary Sciences of the American Astronomical Society in Monterey. Mission scientists began considering the new target when the Rosetta mission’s launch date was postponed. The delay made the original target comet, 46P/Wirtanen, no longer easily reachable. But scientists did not have enough information on the new comet, comet 67P/C-G, and sought data from the largest telescopes.

The team snapped 618 images of comet 67P/C-G over an interval of 21 hours on March 11-12, 2003. The Wide Field Planetary Camera 2 isolated the comet’s nucleus from the coma—the diffuse cloud of dust and gas surrounding the nucleus—and quickly provided the missing figures. The telescope showed that the nucleus has an elongated shape. Rosetta’s launch is currently planned for February 2004, with a rendezvous with the comet about 10 years later.
The Office Of Safety And Mission Success’ Occupational Safety Program Office has recognized the Solar System Exploration Programs Directorate for its outstanding support of employee safety.

The directorate’s efforts resulted in zero reportable injuries or first-aid cases for fiscal year 2002. This was accomplished in part by conducting periodic “walkthrough” inspections; performing ergonomic evaluations; attending Laboratory safety committee meetings and communications; and health-and-safety-related information during staff meetings.

JPL Deputy Director EugeneS. Fatemin presented a plague to 68 employees (from left) Fik Li, Cary Loevstein and Jeanette Darrett.
An independent voice for help

Ombudsman Lewis Redding is here to listen to JPLers’ concerns

The Ombuds position was established at JPL in fall 1995 as a response to concerns expressed by employees and employee groups such as the Advisory Council for Minority Affairs and the Advisory Council for Women that there was no office to which issues and concerns could be taken that did not display a pro-management bias and where their concerns could be safely and confidentially voiced. Ombudsman Lewis Redding, who joined JPL in August 1996, discusses his role.

WHAT HAS SURPRISED YOU MOST ABOUT JPL?
Aside from its resiliency, I think that what surprised me the most about JPL, and continues to be surprising is the relative “quiet” of the organization. Indirectly, I hear all kinds of things but, broadly speaking, JPL employees seem to me to be reluctant to raise issues and concerns.

I used to think there was less reluctance on the technical side of the house, but I am no longer certain that is the case.

WHY DO YOU THINK EMPLOYEES MAY BE RELUCTANT TO BRING CONCERNS FORWARD IN GENERAL?
There are several possible reasons, undoubtedly including some I haven’t even considered. One, with layoffs in 1997 came a distinct loss of trust between management and employees. For some employees the changes in the classification system exacerbated that loss of trust (not to mention the more recent changes in parking allocation). Two, employees will not bring concerns forward if the institutional culture is one of “shoot the messenger.” Three, employees will not bring issues forward if the institutional culture says that acknowledging or admitting there is a problem means you will be viewed as being incompetent or not very intelligent. Four, employees will not bring concerns forward if they feel that their management does not wish to hear their concerns.

Since his assumption of the leadership of JPL, Dr. Elachi has been proactively encouraging employees to raise concerns to him in group settings throughout the year. I would hope that managers at all levels are mirrored his efforts across the organization. Openness and honesty are particularly critical in an organization such as ours.

Of course, the possibility that JPL employees have no issues or concerns cannot be overlooked either.

WHAT IS THE ROLE OF THE OMBUDS OFFICE IN ALL OF THIS?
From the beginning, the Ombuds Office has been a place to which employees may bring work-related issues and concerns in confidence for advice, counsel or resolution. The number of employees who do utilize the office, however, has been smaller than I might have anticipated.

I have heard there are employees who are afraid the office is too closely linked to JPL management. The fact is that nothing said in my office by any employee goes to management without the employee’s express permission. If, however, I hear similar concerns from several different employees from the same section or division, then I have an obligation to take forward the concerns that have been raised, but only in a generic fashion and without using names.

I have also heard employees feel that nothing ever happens as a result of a visit to my office. First of all, employees need to give permission in order for there to be any fair and balanced exploration of an issue they may bring forward. Even if permission is given, however, and an issue is taken forward, it is possible that the individual most responsible and able to deal with that employee’s issue may not be as responsive as one might like, or may respond appropriately, but still not to the employee’s liking. There is no institutional requirement for anyone to respond to concerns. But that can certainly leave employees with the impression that nothing has happened.

Most employees come to the Ombuds Office either because they want to explore what options they may have in any given situation, or because they want to “vent,” or because they want information. Rarely do JPLers want any intervention. Intervention means that an Ombudsman has to examine all sides of the matter that is of concern and that usually means talking to those involved.

Employees are afraid to give me permission to speak to the other party or parties involved for fear of escalating the situation and for fear of loss of confidentiality. There is also the JPL culture with which to contend. Unfortunately, in an environment in which employees are paid for their acute problem-solving skills, for some, openly acknowledging a problem or concern at JPL comes very close to being an admission of personal incompetence or stupidity.

WHAT KINDS OF ISSUES HAVE COME TO YOUR OFFICE?
They have ranged from “Do you have any suggestions about how I might approach a colleague whose deodorant doesn’t seem to work very well?” to “I am a retiree whose wife died; I’ve remarried and it turns out my new wife cannot be covered under my retiree medical insurance—can anything be done?” Both situations were successfully resolved, the latter very much courtesy of a conversation that Human Resources had with Campus.

WHAT DO YOU WANT EMPLOYEES TO KNOW MOST ABOUT YOUR OFFICE?
There are a couple of things. One is that the Ombuds Office is not a “cop” for the Laboratory. Its purpose is to provide confidential, neutral assistance to help employees resolve misunderstandings and conflicts as quietly as possible and as far down in the organization as is appropriate. The office is most used by employees to help them think through and weigh their options in order to determine what might be best and most comfortable for the employee. What an employee actually does is the employee’s decision.

For instance, if an employee decides she or he wants to resolve a situation by having a conversation with someone with whom they may be in conflict, but they are nervous about doing so, I might help the employee “practice” the conversation. Or, an employee may be more comfortable having that conversation with a third-party present. Provided that the “other” party is willing to have a three-way discussion, I can serve as the third party.

Finally, if there is confusion about the role of the Ombudsman, I remain more than willing to speak at any staff meeting in order to talk about the role. A presentation takes no more than about 15 or 20 minutes and I am pleased to do it.

“A intelligent as JPLers are, we’re still all human beings in the workplace and no one has the answer for everything. Raising a concern in confidence or seeking assistance with an issue in confidence is another reason for the existence of the Ombud function.” — Lewis Redding, JPL ombudsman
The investigation of the Columbia tragedy revealed the need for NASA to improve its safety and risk management. Classified ads will be available the Friday after publication for the follow-up issue of Universe at universe@jpl.nasa.gov. Items may be combined within a single classified ad, but each ad can include no more than 60 words. Advertising is available for JPL employees, employees of partner organizations, and the general public. Classified ads will involve all NASA centers and the top technical experts at NASA and our partners, in a concerted effort, will provide independent technical expertise to evaluate problems and support the safety and reliability as we know how. The NESC enables us to more completely fulfill our commitments for assessing risk and making better risk-acceptance-decision judgments.

The NESC will provide centralized management of independent engineering assessment, as well as oversight of the risk tools and methods used by others. The NESC will have the benefit of adequate funding to perform truly independent assessments and analyses. Because NASA will fund the NESC at the corporate level, an unimpeachable level of independence will exist. The NESC does not exist, however; these program managers from their responsibilities for safety. Instead, NESC initiative will complement the engineering and safety efforts of programs and NASA centers. The NESC’s credibility and its independent chain of command will assure consideration of all points on complex technical issues.

How can you help?

The NESC will be based at the Langley Research Center. Hampton, Va. and will have a management organization consisting of approximately 30 to 40 full-time employees. Another 30 to 50 senior engineering and safety experts will be located at the centers but assigned full-time to the NESC. This workforce will be supplemented through partnerships with external organizations. Finally, “read-experts” at each field center will be available. The NESC has 150 in 200 technical experts in various technical specialities—will be called upon for peer review and critique of NESC analyses, assessments, recommendations to form a robust, independent, scientific technical review team. The NESC implements an NESC initiative as his first priority. It’s a tremendous responsibility but a stimulating opportunity,” said Roe. Another 30 to 50 senior engineering and safety experts will be located at the centers but assigned full-time to the NESC. This workforce will be supplemented through partnerships with external organizations. Finally, “read-experts” at each field center will be available. The NESC has 150 in 200 technical experts in various technical specialities—will be called upon for peer review and critique of NESC analyses, assessments, recommendations to form a robust, independent, scientific technical review team.

The NESC initiative as his first priority.

Wanted

OFFICE WORKHORSE is in need of 2 clerks for seasonal work. Customer service, data entry, computer skills, basic office skills. If you are interested, please contact me at 626-798-9222. www.pool/spa, game rm., sleeps 4. 949/786-6548.


BEAUTIFUL house for sale, 3 bd., 2 ba., + loft, in-ground pool and spa, big yard on cul-de-sac, close to shopping, schools & park, $369,000. 790-0308, Beatrice (agent).

BASKETBALL GOAL, portable regulation sz., $150/obo; leather, blk, 6 mo., from Best Buy at $800. 626/296-8633.

CAR COVER: Covercraft 211” size A, brand new in box, $125; 2 side tables w/tablecloths, $20/each; water heater, 50 gal., $150 & matching dishwasher ($150), tan; all pieces, incl. tea pot, creamer, sugar, platter, small serving bowl, 2 mugs, 2 Japanese tea cups, all pieces, $35/obo. 790-8523, Marc Rayman.

BAKERY & CAFE for sale. 13” GE color, $25. 842-5596.

TIFFANY LIGHT, white, 1’ tall, in box, $45. 626/794-7660.

IN-STORE STRANDS. PAPER, 150/each, $1/each; QUILTING, 1/each, $1/each; SEWING, 1/each, $1/each. 714/796-7641.

WANTED

WANTED

THE NESC will draw on the engineering talents of the best minds across the agency. That’s a big order. It’s also a stimulating “One NASA” opportunity. The NESC is a ‘One NASA’ effort that will involve all NASA facilities and partnerships. The NESC is a ‘One NASA’ effort that will involve all NASA facilities and partnerships.

Dear Colleagues:

I want to express my thanks to all my friends, coworkers and JPL for their support during my illness and in the passing of my mother, Violet Bose.

Thank you,

Robert Powers

The NESC is a ‘One NASA’ effort that will involve all NASA facilities and partnerships. The NESC is a ‘One NASA’ effort that will involve all NASA facilities and partnerships.
Mission ends as spacecraft enters Jupiter's atmosphere

The Galileo mission's 14-year odyssey came to an end on Sunday, Sept. 21, when the spacecraft passed into Jupiter's shadow then disintegrated in the planet's dense atmosphere at 11:57 a.m. Pacific time. The event occurred between 12:43:14 and 12:45:23 Pacific time.

The spacecraft was purposely put on a collision course with Jupiter because the onboard propellant was nearly depleted and to eliminate any chance of an unwanted impact between the spacecraft and Jupiter's moon Europa, which Galileo disintegrated in the vicinity of the moon Amalthea in November 2002.

The delay is due to the time it takes for the signal to travel to Earth. Hundreds of former Galileo project members and their families were present at JPL for a celebration to bid the spacecraft goodbye. There was sadness, to be sure, and more than a few tears were shed. But mostly it was a celebration—of awesome science, ingenious engineering, perseverance in the face of numerous obstacles.

"We learned mind-boggling things," said Galileo Project Manager Dr. Claudia Alexander. "This mission was worth its weight in gold."

Having traveled approximately 4.6 billion kilometers (about 2.8 billion miles), the hardy spacecraft endured more than four times the cumulative dose of harmful solar radiation it was designed to withstand. During a previous flyby of the moon Amalthea in November 2002, flashes of light were seen by the star scanner that indicated the presence of rocky debris circling Jupiter in the vicinity of the small moon. Another measurement of this area was taken Sunday during Galileo's final pass. Further analysis may help confirm or constrain the existence of a ring at Amalthea's orbit.

"I can't believe we collected science data all the way in," said Alexander. "What a machine."

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The spacecraft was purposely put on a collision course with Jupiter because the onboard propellant was nearly depleted and to eliminate any chance of an unwanted impact between the spacecraft and Jupiter's moon Europa, which Galileo discovered is likely to have a subsurface ocean. Without propellant, the spacecraft would not have been able to point its antenna toward Earth or adjust its trajectory, so controlling the spacecraft would not have been possible. The possibility of life existing on Europa is so compelling and has raised so many unanswered questions that it is prompting plans for future spacecraft to return to the icy moon. The on-Lab celebration featured panel discussions with former project managers and science team members, who offered testimonials and memories.

"There were a lot of great people working on this mission, the best on the planet," said Richard Spilhaus, who managed the project at its launch in 1989. "The whole mission has been overcoming one incredible obstacle after another," noted former manager Elsene Thellig. "It’s really built a camaraderie and become one of the most special times of our lives."

Project Scientist Dr. Torrence Johnsson said Galileo studied "a miniature solar system." "We haven't lost a spacecraft, we’ve gained a steppingstone into the future of space exploration," he said. "It’s been a tremendously exciting journey."

Added Dr. Rosaly Lopes, research scientist on the Galileo Near Infrared Mapping Spectrometer science team, "It’s sad to say goodbye to an old friend. But I’ve had the time of my life."

Also, NASA Administrator Sean O’Keefe telephoned the gathering to offer his congratulations. "This mission was a testament to the persistence of NASA even through tremendous challenges," he said. "It was truly a phenomenal mission."

Galileo was launched from the cargo bay of Space Shuttle Atlantis in 1989. The exciting list of discoveries started even before Galileo got a glimpse of Jupiter. As it cruised the asteroid belt in October 1991, Galileo snapped images of Gaspra, returning the first ever close-up image of an asteroid. Less than a year later, the spacecraft got up close to yet another asteroid, Ida, revealing it had its own little "moon," Dactyl, the first known moon of an asteroid. In 1994 the spacecraft made the only direct observation of a comet impacting a planet—comet Shoemaker-Levy 9's collision with Jupiter.

The descent probe made the first in-place studies of the planet's clouds and winds, and it furthered scientists' understanding of how Jupiter evolved. The probe also made compositional measurements designed to assess the degree of evolution of Jupiter compared to the Sun.

Galileo made the first observation of ammonia clouds in another planet's atmosphere. It also observed numerous large thunderstorms on Jupiter many times larger than those on Earth, with lightning strikes up to 1,000 times more powerful than on Earth. It was the first spacecraft to dwell in a giant planet's magnetosphere long enough to identify its global structure and to investigate the dynamics of Jupiter's magnetic field. Galileo determined that Jupiter's ring system is formed by dust kicked up as interplanetary meteors smash into the planet's four small inner moons. Galileo data showed that Jupiter's outermost ring is actually two rings, one embedded within the other.

Galileo extensively investigated the geologic diversity of Jupiter's four largest moons: Ganymede, Callisto, Io and Europa. Galileo found that its extensive volcanic activity is 100 times greater than that found on Earth. Europa, Galileo imaged, could be hiding a salty ocean up to 100 kilometers (62 miles) deep underneath its frozen surface, containing about twice as much water as all the Earth's oceans. Data also showed Ganymede and Callisto may have a liquid-saltwater layer. The biggest discovery surrounding Ganymede was the presence of a magnetic field. No other moon of any planet is known to have one.

The prime mission ended six years ago, after two years of orbiting Jupiter. NASA extended the mission three times to continue taking advantage of Galileo's unique capabilities for accomplishing valuable science. The mission was possible because it drew its power from two long-lasting radioisotope thermoelectric generators provided by the Department of Energy.

Following Galileo's final minutes on Sunday, team members had some fun at their own expense with a song and comic routine featuring "The Not Ready for Realtime Players." Based loosely on the hit television series "Survivor," through song parody they noted "citing off," among others, the bulky high-gain antenna, the probe, the flight team, remote sensing and finally Galileo itself.

To the audience's delight, the Rolling Stones' "You Can't Always Get What You Want" became "You Can’t Always Get the Science You Want." The lyrics to Three Dog Night’s "Joy to the World" were sent up to include "If Europa has fishes in the deep blue sea, there’s fame for you and me."

To view the end-of-mission webcast, go to http://www.jpl.nasa.gov/webcast/galileo.
Due to rising health care costs and the prospect of JPL and campus employ-
ees paying substantially higher rates and having higher out-of-pocket expend-
tures for coverage in 2004, Caltech has decided to replace the Blue Cross
preferred provider organization (PPO) CaliforniaCare and Cigna health main-
tenance organization (HMO) plans with a new health care insurer. Health

In a recent confidential newsletter sent to all benefit-eligible employees, Caltech President Dr. David Baltimore affirmed his commitment to providing a benefits program that meets the needs of employees and their families in a cost-effective manner. He cited studies of benefit plans, carriers and costs that showed current carriers requesting increases ranging from 15% to 25%.

“By consolidating most of our coverage with HealthNet, we were able to
preserve virtually all the same features and access to most of the physicians and
hospitals of our current health care plans, while avoiding sharply higher
premiums that would have resulted if we had elected to stay with our current
choice,” noted Baltimore. Below is a summary of what is and is not changing in 2004:

Caltech’s study showed that among other factors, Health Net offered com-
petitive rates and a comprehensive health care benefits plan with a $500
annual deductible and a 90% payment match in HMO and a significant match of PPO network providers.

Employers will make their 2004 benefit plan selections during the open enroll-
ment period from Oct. 15-31. To assist in a smooth transition, Health Net representatives will be on Lab in October for one-on-one consultations, and seminars will be offered on Transition of Care and the Health Net prescription drug program.

What’s Changing

Health care

• The Health Net PPO will replace the Blue Cross Preferred Provider

• The Health Net HMO will replace the Blue Cross, CaliforniaCare

• Cigna HMO plans

• Rates will increase somewhat, but less than they would have

• The Health Net HMO will replace the Blue Cross, CaliforniaCare

• The Health Net PPO will replace the Blue Cross Prudent Buyer

• New “employee/child(ren)” coverage level will provide

• Additional newsletters will provide details on long-term disability as well as annual enrollment instructions. If you have any questions, call the Health Net dedicated line for Caltech employees at (909) 628-2297, visit the Health Net customized website at www.healthnet.com/caltechor call the JPL Benefits Office at ext. 4760.

What’s Not Changing

Health care

• Kaiser will continue as a plan option

• Most out-of-pocket costs for deductible, co-payment and co-insurance will not increase

• Delta Dental and Safeguard Dental plans will remain

• Life and Personal Accident Insurance

• Flexible Spending Accounts

New DSN contract signed

JPL has awarded ITT Industries of White Plains, N.Y., a five-year $274-
million subcontract for operations and maintenance of Deep Space Net-
work facilities in the United States and for support of overseas facilities.

The contract includes incentives

ITT Industries will provide all necessary maintenance, operations and engineering support to operate and maintain JPL’s Goldstone Deep Space Network Communications Complex, located near Barstow, accomplish Deep Space Network operations and maintenance; support problem anal-

JPL’s MPS Systems Division, located in Colorado Springs, Colo., will perform the contract work. The contract start is Oct. 1, for 10 years. The responsibility for operations will be picked up on the new contract on Jan. 1, 2004.

SRTM team honored; antenna goes to Smithsonian

Jim Rainesmeyer of Section 334 shows the SRTM outboard antenna structure before its departure earlier this month to the Smithsonian’s Udvar-

Jim Rainesmeyer of Section 334 shows the SRTM outboard antenna structure before its departure earlier this month to the Smithsonian’s Udvar-Hazy Center at Dulles International Airport in Virginia, which opens in December. The SRTM display, which includes the mast/antenna subassembly and outboard structure including the C-Band antenna panels and associated C-band electronics, is scheduled to open early in 2004.
**HAT IS THE INVENTION CHALLENGE?**

It's a contest whose purpose is to create a device that performs a specific task, and then operate your device on the day of the contest. The task may be to throw a beanbag onto a target, lift some water into a cup, or a variety of things.

The rules—now available online at [http://www.jpl.nasa.gov/education/team-science-education/index.html](http://www.jpl.nasa.gov/education/team-science-education/index.html)—are different each year, but the task is always rather simple in concept.

**HOW MANY STUDENTS AND JPLERS PARTICIPATE?**

In past years, I have had as many as 40 JPL entries and 25 student team entries. Last year more than 500 students visited JPL on contest day. Each year, between 150 and 300 JPL employees, friends and family watch the contest.

**HOW IS THIS YEAR’S CHALLENGE DIFFERENT?**

This year’s challenge is the “Wright Turn Glider Contest.” The objective is to create a glider that will navigate a right-hand turn and land on an “X” located 50 feet away. This is the first year where flying has been incorporated, as opposed to launching.

Children of JPL employees can show their science or math teacher the website I mentioned earlier and encourage them to form a team and enter the contest, even for this year. The deadline for turning in student team entries is Oct. 1.

We plan to hold regional contests in November. The top 20 entries from the regionals will be invited to participate in the JPL contest on Dec. 5.

**WHO RUNS IT? DO YOU HAVE SPONSORSHIP (CORPORATE, ACADEMIC OR OTHER)?**

Each year my partner, Richard Alvidrez from the JPL Education Office, and I visit local venues to spread the word. This year we went to a Greater Los Angeles Teachers’ Science Association conference; the Los Angeles County Science Fair; the Math, Engineering, Science Achievement (MESA) workshop in August; and the AIA Space Conference held earlier this week (Sept. 23–25).

MESA promotes science and math in middle schools and high schools, and helps underprivileged schools by providing bus transportation and other functions. Last year they helped encourage more than six schools to enter for the contest, and I feel that their influence will spread to more schools every year.

We have neither corporate sponsors nor any budget at JPL, except for some help in putting on the webcast last year and generating some flyers, posters and banners.

**WHAT KINDS OF “CHALLENGES” HAVE YOU HAD IN THE PAST?**

In 1998 Chris Stell and Gene Wester created a car by stretching their balloons and using a cardboard box to travel as far as possible on a restricted area. This was the car of the year, the JPL entry forms can be turned in as late as Nov. 26, as long as there are remaining spots on the JPL contest.

**WHAT KIND OF IMPACT HAS THE CHALLENGE HAD ON THE COMMUNITY?**

The Challenge allows many schools and classrooms to participate in an activity that provides authentic and powerful learning through design and invention. This is a great thinking leap above assembling and manipulating devices.

It’s particularly valuable where teachers may not have a lot of technical expertise, or in cases where the school cannot commit to a large cost or time requirement. The entry bar is low—less than $50—and the Challenge stimulates good old-fashioned imagination that might nurture “the next generation of explorers... as only NASA can.” The Challenge has become a part of the curriculum in some schools, and we expect this to continue and expand.

Last year, a teacher, Melody Yang of First Avenue Middle School in Arcadia, took the Invention Challenge to heart. She required all 120 of her students to design a jellybean-tossing device and talk about it in front of the classroom. One student who had never participated in class discussions instantly became an enthusiastic participant in the Invention Challenge and even volunteered his own house for practice sessions. This was an inspiration for Melody. She had the names of her student competition come to JPL for the contest.

Every year we get some positive media attention, which is an extra bonus for the student teams, and for JPL as well.

**WHAT IS YOUR HOPE FOR THE FUTURE?**

I hope all schools throughout the nation will be able to participate. Because the cost of holding the competition is relatively low, I feel that other venues can be made available. I would like to see other NASA centers and major aerospace companies throughout the United States host the annual contest at their own locations. Also, many universities that receive space grants from NASA could be encouraged to host as well. The MESA organization is nationwide, and their infrastructure could be used to help this vision come true.

On a local scale, I hope that word-of-mouth spreads throughout the middle schools and high schools to encourage more participation. As the contest grows, I hope that more JPL teams will form because this is truly an amazing contest that allows the creativity and imagination of all who enter to shine.
JPL’s Informal Education Office is Partnering with museums, science centers and planetaria all over the country to help spread the JPL story.

Currently, JPL works with more than 100 institutions of various sites on exhibit and artifact loans, professional development, curriculum development, and multimedia material. JPL provides the institutions with a reliable source of information and resources. Through these venues, people across the nation learn about JPL’s work.

Informal education—also known as “lifelong” or “free-choice” learning—happens outside of the formal classroom as people of all ages continue to seek knowledge and enrich their lives.

JPL’s collaborations include the California Science Center, KidSpace (the Children’s Museum of Southern California), the National Air and Space Museum in Washington, D.C., the American Museum of Natural History and Hall of Science in New York. After Plantasm in Chicago, and Caltech Space Station, JPL also has been a re- source for the developers of a national touring exhibit, “SPACE. A Journey to our Future,” which opens at Seattle’s Science Fiction Museum in Nov. 2002. JPL’s partnership with Caltech has been particularly successful. Both institutions are extremely dedicated to the Alliance, JPL has provided supportive educational assistance for the new museum, as well as role models, field trip opportunities and plantation programming. Caltech offers these resources to diverse groups of students and families including underserved populations.

“What makes the collaboration with Caltech truly beneficial,” said Anthony Hahn, JPL informal education lead, “is that the two institutions share the same language, know how and inspire people of all ages about Earth and space.”

JPL also works with the International Plantasm Foundation. The federal grant provides information to more than 200,000 new and returning visitors worldwide, and has increased in education material, posters and multimedia products from the Space Infrared Telescope Facility (SIRTF). Mars Exploration Rovers Mission, Space Interferometry Mission and the Deep Space Network.

“With the support and funding we can take advantage of other science education opportunities such as after-school programs and camps at science centers, planetariums, and such,” said Solis.