

universe

Jet Propulsion Laboratory

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Weiler gives outlook on space science

By Mark Whalen

Dr. Ed Weiler's talk is available from the Daily Planet's video archive (<http://dailyplanet>).

DR. ED WEILER, NASA'S ASSOCIATE ADMINISTRATOR FOR SPACE SCIENCE, ADDRESSED JPL STAFF MARCH 3, COMMENTING ON THE STATE OF THE ENTERPRISE FOLLOWING THE RECENTLY APPROVED FISCAL YEAR 2003 BUDGET.

Noting the quick pace at which JPL will track current missions and prepare new ones for launch over the next few years, Weiler asked whether the "faster, better, cheaper" mantra of the 1990s was worth it. In the '80s, he said, the average number of launches in the Office of Space Science was "a couple in a good year. It was never this many (as today). This is what 'faster, better, cheaper' gave us."

Weiler then discussed Project Prometheus, a new NASA program to develop nuclear power reactors that would be used for spacecraft power and for electric propulsion. The agency is not abandoning the "faster,



Bob Brown / JPL Photolab

better, cheaper" approach, said Weiler, but is recognizing the value of an occasional flagship mission. He was referring to the first mission of Project Prometheus, the Jupiter Icy Moons Orbiter, proposed for launch in 2011. JPL will be the center in charge of the proposed mission, with the Department of Energy, a number NASA centers, and industry heavily involved.

With the ability to closely orbit each of the Jovian

moons for hundreds of days, the proposed project would represent a huge leap in space science, he said. "That's why I use the word 'revolution' vs. 'evolution' in terms of science capability," he said. "You cannot do this mission with chemical power—there would be so much fuel, you'd have no payload.

"Some of us believe that if we're going to have a future of 10, 20, 30 years of planetary exploration—and eventually even humans—we're not going to do it without nuclear fission," he noted, adding that NASA has launched 17 or more nuclear payloads over the years. "We know how to do it, we know what agencies we have to work with, we know how to be safe."

Weiler also expressed his excitement about the potential of optical communications. Radio frequency for the 2005 Mars Reconnaissance Orbiter, for instance, will peak at about 2.2 megabits at closest range, about 300K at maximum range. He said the optical communications system for the 2009 Mars orbiter will be about 10 megabits at closest range and 1 megabit of continuous coverage at the maximum distance.

Now is "the perfect time" to develop optical communications missions, he said, because much of the technology has been developed for defense and commercial use. "Our job is now to figure a way to get laser light from Mars or Jupiter to the vicinity of the Earth."

Weiler urged the audience to speak with pride about what they do for a living, but advised not to talk in jargon. "Think about what might excite the guy or gal who's paying (your) salary. If you can say to your neighbor, 'I work on a program that's going to search for life in the universe or look for the beginning of time,' you might strike up a conversation. Talk about the questions you're trying to answer. They don't deserve acronyms; they deserve better."

The associate administrator had praise for those who have made their careers at the Lab. "You might feel accomplishment and get a higher salary for going to work in outside industry, or you could stay at JPL. Let's say you might work on Mars 2013, the first real in-depth astrobiology mission. You might play a small part. But let's say that mission detects life on Mars—previous or even current-day life. You will have worked on the biggest discovery in the history of the human race."

Galex, SIRTf prepare at Cape for April launches



The launch of the Galaxy Evolution Explorer (Galex), a JPL-managed satellite that

will observe 1 million galaxies across 10 billion years of cosmic history to help astronomers determine when the stars and elements we see today had their origins, has been delayed to March 28 at the earliest.

Tests performed on the spacecraft at Kennedy Space Center before mating with its Pegasus launch vehicle discovered a disconnected cable from the star tracker to the spacecraft bus. The cause of this is being investigated.

JPL developed Galex's science instrument with optics contributions from the French Space Agency. Science operations and data analysis will be performed at Caltech with support from Japan's Yonsei University.

The mission is crucial to understanding how galaxies, the basic structures of our universe, form and function. From its orbit high above Earth, the spacecraft will sweep the skies for 28 months using state-of-the-art ultraviolet detectors.

For more information about the mission, visit <http://www.galex.caltech.edu>.

Meanwhile, the Space Infrared Telescope Facility arrived at the Kennedy Space Center March 6 to begin final preparations for its launch next month aboard a Boeing Delta II rocket. The observatory was shipped to Florida from the Lockheed Martin plant in Sunnyvale, Calif.

The telescope will spend a few more weeks in a clean room preparing for its April 15 launch.

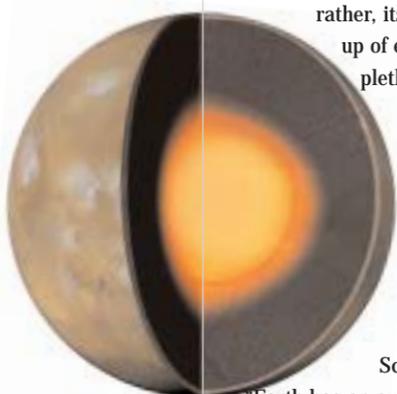
The Space Infrared Telescope Facility marks the finale of NASA's Great Observatories program, which includes the Hubble Space Telescope, the Chandra X-ray Observatory and the Compton Gamma Ray Observatory. Its unprecedented infrared sensitivity will allow astronomers to capture what they affectionately call "the Old, the Cold, and the Dirty," referring to the coldest, oldest, and most dust-obscured objects and processes in the universe.

For more information, visit <http://sirtf.caltech.edu>.



Scientists say Mars has a liquid iron core

By Mary Hardin



This artist's concept of the interior of Mars shows a hot liquid core that is about one-half the radius of the planet.



New information about what is inside Mars shows the Red Planet has a molten liquid iron core, confirming the interior of the planet has some similarity to Earth and Venus.

JPL researchers, analyzing three years of radio tracking data from the Mars Global Surveyor spacecraft, concluded that Mars has not cooled to a completely solid iron core;

rather, its interior is made up of either a completely liquid iron core

or a liquid outer core with a solid inner core. Their results are published in the March 7 online issue of the journal Science.

"Earth has an outer liquid iron core and solid inner core. This may be the case for Mars as well," said JPL planetary scientist Dr. Charles Yoder, lead author on the paper.

"Mars is influenced by the gravita-

tional pull of the Sun. This causes a solid body tide with a bulge toward and away from the Sun (similar in concept to the tides on Earth). However, for Mars this bulge is much smaller, less than 1 centimeter (0.4 inch). By measuring this bulge in the Mars gravity field we can determine how flexible Mars is. The size of the measured tide is large enough to indicate the core of Mars cannot be solid iron but must be at least partially liquid."

The team used Doppler tracking of a Global Surveyor radio signal to determine the precise orbit of the spacecraft around Mars. "The tidal bulge is a very small but detectable force on the spacecraft," said JPL planetary scientist Dr. Alex Konopliv, co-author on the paper. "It causes a drift in the tilt of the spacecraft's orbit around Mars of one-thousandth of a degree over a month."

The researchers combined information from Mars Pathfinder on the Mars precession with the Global Surveyor tidal detection to draw

conclusions about the Mars core, according to JPL's Dr. Bill Folkner, another co-author of the paper.

The precession is the slow motion of the spin pole of Mars as it moves along a cone in space (similar to a spinning top). For Mars, it takes 170,000 years to complete one revolution. The precession rate indicates how much the mass of Mars is concentrated toward the center. A faster precession rate indicates a larger dense core, compared to a slower precession rate.

In addition to detection of a liquid core for Mars, the results indicate the size of the core is about one-half the size of the planet, as is the case for Earth and Venus, and that the core has a significant fraction of a lighter element such as sulfur.

In addition to measuring the Mars tide, Global Surveyor has been able to estimate the amount of ice sublimated, changed directly into a gaseous state, from one pole into the atmosphere and then accreted onto the opposite pole.

News Briefs



Dr. Hwang Lee

Lee wins Korean physicists award
DR. HWANG LEE, a senior member of the Quantum Computing Technologies Group, Section 367, has won the prestigious Association of Korean Physicists in America's Outstanding Young Researcher Award for 2003.

The award was for his work in the Quantum Computing Technologies Group in theoretical quantum optics and quantum information processing.

The work for which Lee was recognized was supported primarily during his tenure at JPL as a National Research Council fellow, with Code Y funding provided by NASA Headquarters. He was also partially supported with NASA Intelligent Systems, Revolutionary Computing Technologies funding.

Deep Space 1 team honored by AIAA
The American Institute of Aeronautics and Astronautics announced that the Deep Space 1 team is the 2002 recipient of the Space Systems Award. The award will be presented April 2 during the Responsive Space Conference in Redondo Beach.

The award is presented to recognize outstanding achievements in the architecture, analysis, design and implementation of space systems. The Deep Space 1 team is being honored "For the outstanding performance of the team during design, implementation, test, operations, and extended mission including spaceflight test of 12 important, high-risk technologies."

The organization said Deep Space 1 mission success is due largely to the structure and the management of the Deep Space 1 team. "Deep Space 1 represents true industry-laboratory collaboration," it said. "The Team devised innovative architectures for accomplishing the objectives set forth by the project and proved that the mission was feasible."

SRTM shows Chicxulub

JPL's Shuttle Radar Topography Mission has provided the most telling visible evidence to date of a 180-kilometer (112-mile) wide, 900-meter (3,000-foot) deep impact crater, the result of a collision with a giant comet or asteroid.

"This new, complete North American data set greatly expands our topographic knowledge of Canada, southern Alaska and its Aleutian Islands, Mexico and Central America," said Project Scientist DR. MICHAEL KOBRIK. "There are spectacular features that pop out at you in these maps as never before, and more subtle features, like Chicxulub, become apparent for the first time."

The North America and Yucatan Peninsula images created from the map are available online at <http://photojournal.jpl.nasa.gov>.

Cost/price analysis class April 3

"Cost/Price Analysis," the seventh course of the JPL/UCLA Extension certificate program, begins Thursday, April 3 and will continue every Thursday through June 19. Classes will be held in the 190 Cafe from 5 to 8 p.m.

This course covers the financial analysis of vendor proposals to verify the reasonableness of the quoted prices. Emphasis is on the steps involved in the process, sources of information and application of good analysis methods. Students will receive a certificate of completion for "Government Contract and Proposal Management" after successful completion of all eight classes in the program.

The enrollment fee is \$380, which can be paid by check or credit card on the first night of the class. Tuition reimbursement may be available; contact JPL tuition reimbursement at <http://hr/et>. You may also apply for a loan through the Caltech Credit Union.

Class material will come from the Internet, so no textbook is required. For more information, call DANA EDLER (4-5825) or AILEEN BATIN (4-4281).

Educator astronaut deadline in April

Nominations and applications for NASA's Educator Astronaut Program are due April 30. The program has already attracted thousands of teacher nominations and Earth Crew participants. To find out how you can be involved or to nominate a teacher you know to become a permanent member of the Astronaut Corps, visit <http://edspace.nasa.gov>.

Lab to host July symposium

The fifth International Symposium on Reducing the Cost of Spacecraft Ground Systems and Operations will be held in Pasadena July 8-12. Early registration deadline is May 31.

The event will be hosted at the Westin Hotel (formerly the DoubleTree) by JPL's Deep Space Communications and Navigation Systems Center of Excellence. The symposium will focus on ground telemetry, tracking and command systems used to support spacecraft, on the operational aspects of the support and on methodologies such as automation, re-use, and interoperability that reduce the cost of the systems and operations.

See the symposium website at <http://descanso.jpl.nasa.gov/rcsgso/index.html> for registration and more information.

Four receive Lew Allen Award

Four JPL scientists have received the 2002 Lew Allen Award for Excellence.

The annual awards recognize and encourage significant individual accomplishments or leadership in scientific research or technological innovation by JPL employees during the early years of their professional careers.

The recipients are Dr. Serge Dubovitsky and Dr. Andrew E. Johnson both of Division 34, Dr. Dmitry Strelakov of Division 36 and Dr. Daniel Wilson of Division 38.

Dubovitsky received his award for extensive technical contributions to interferometric and formation flying technologies and space missions, developing highly innovative optoelectronic concepts including dual target metrology and the Modulation Sideband Technology for Absolute Range (MSTAR) sensor.

Johnson was recognized for his groundbreaking contributions in the area of machine vision algorithms for safe and precise landing.

Strelakov was recognized for his groundbreaking work in quantum lithography, and for creating the quantum

Internet tested and the single-photon quantum optics technology capabilities at JPL, which form the keystone for the larger JPL Quantum Technologies, thrust area.

Wilson received his award for his technical leadership in bringing to fruition the fabrication of diffractive optics by electron beam lithography, particularly as applied to convex gratings for imaging spectrometers

Each winner received a wall plaque and a research award of \$25,000 from the Research and Technology Development Fund, which is used at JPL to enhance the professional efforts of the awardees.

The award was established in 1990 in honor of Allen, who served as JPL's Director from 1982-90.



From left: JPL Chief Scientist Dr. Thomas Prince, Dr. Dmitry Strelakov, Dr. Andrew E. Johnson, Dr. Daniel Wilson, Dr. Serge Dubovitsky, JPL Director Dr. Charles Elachi.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111.

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Friday, March 14

Caltech Women's Club—A "Welcoming Coffee" will be held from 9 to 10:30 a.m. in von Kármán Auditorium. For more information, call Carol Anderson at (818) 790-8175.

Fri.-Sat., March 14-15

Aquila Theatre Company—This award-winning group will present *The Importance of Being Earnest* Friday and *A Midsummer Night's Dream* on Saturday in Caltech's Beckman Auditorium. Both shows begin at 8 p.m. Tickets are \$15 for adults, \$10 for youth high school age and under. For more information, call (626) 395-4652.

Tues.-Wed., March 18-19

E-Copy Demonstration—Xerox Business Services will host this open house from 8 to 11:30 a.m. in conference room 167 on this capability to send documents electronically for duplication and distribution. Speakers, refreshments, a raffle and giveaways will be offered.

Wednesday, March 19

"Grandmothers and Human Evolution"—Anthropologist and evolutionary ecologist Kristen Hawkes will speak at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$10. For more information, call (626) 395-4652.

Women's History Month—From noon to 1 p.m. in von Kármán Auditorium, the guest speaker will be Lisa Gaeta, founder of IMPACT Personal Safety Inc., a nationally recognized program that teaches individuals how to instinctively recognize and realistically react to potential violence. Gaeta will discuss personal self-defense, give a demo of scenario-based, adrenaline-state teaching techniques, and answer questions. The presentation is sponsored by the Director's Advisory Council for Women.

Thursday, March 20

"Planning Ahead for Retirement"—This TIAA/CREF program, held from 10 a.m. to noon in Building 180-101, looks at retirement planning for those 10 years or more away by identifying retirement savings gaps that could potentially prevent participants from reaching their goals. Recommendations for how to fill gaps are provided, including investing in Supplemental Retirement Accounts, Individual Retirement Accounts and personal annuities.

TIAA/CREF Enrollment Meeting—This workshop, held at noon in Building

180-101, is designed to assist employees newly eligible for the Caltech/JPL TIAA/CREF retirement plan with selection of investment options and the completion of their enrollment forms.

Thu.-Fri., March 20-21

Von Kármán Lecture Series—Cassini Program Manager Bob Mitchell will discuss the Saturn mission at 7 p.m. Thursday in von Kármán Auditorium and Friday in Pasadena City College's Vosloh Forum, 1570 E. Colorado Blvd. Thursday's lecture will be webcast at <http://www.jpl.nasa.gov/events/lectures/mar03.html>. For more information, call Public Services at ext. 4-0112.

Saturday, March 22

Summer Camp Signups—Registration for the JPL/Caltech Child Educational Center's summer camp, "Exploring Our Natural World," will be held from 9 a.m. to 1 p.m. at the CEC, 140 Foothill Blvd. in La Cañada, adjacent to La Cañada High School. Camp is for children completing kindergarten through 6th grade and is held June 23-Aug. 27 at the Oak Grove site; Paradise Canyon Elementary School in La Cañada; and the CEC site in Pasadena, near Caltech. The camp will feature arts and crafts, drama, music, creative writing, swimming, field trips, outdoor sports and games, gardening, water play and science exploration. Full summer or weekly sessions are available; however, enrollment is limited at each location. For information, call the CEC at ext. 4-3418. Brochures are also available in the JPL Store. Tuition assistance is available for qualified JPL families.

Tuesday, March 25

Women's History Month—Guest speaker Jordana Tiger, founder of Awesome Life Coaching, a company specializing in personal development and success, will present "Avenues to Awesome Living" at 11:30 a.m. in von Kármán Auditorium. Tiger, a psychotherapist, works with addiction, abuse, couples, HIV/AIDS, women, diversity issues, special needs children and their families. The talk is sponsored by the Director's Advisory Council for Women.

Wednesday, March 26

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Roger Carlson at ext. 4-2295.

"Quantitative Software Management and Software Cost Risk Analysis"—JPL's Software Quality Improvement Project will present this class with Dr. Jairus Hihn and guest instructor Ron Morillo from 8 a.m. to 4:45 p.m. in Trailer 1707. Call Brian Vickers at ext. 3-0877 to register.

Volunteer Professionals for Medical Advancement—Meeting at 10:30 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Thursday, March 27

JPL Golf Club—Meeting at noon in Building 306-302.

Monday, March 31

Santa Anita Deadline—Today is the last day to buy tickets at the JPL Store for the Lab's day at the races on Saturday, April 12. Tickets are \$5 for adults and \$3 for kids under 18, and include parking, admission, BBQ lunch and entertainment. Cash or check will be accepted. For more information, call Suzanne Bradfield, ext. 3-4067.

Ongoing

The Social Security representative will no longer be doing one-on-one counseling appointments on Lab. Call the Benefits Office at ext. 4-3760 to arrange for a telephone counseling appointment.

studies reorganization

JPL'S ENGINEERING AND SCIENCE DIRECTORATE, WHICH EMPLOYS ABOUT 3,600 PEOPLE—MORE THAN TWO-THIRDS OF THE LAB POPULATION—IS IN THE PROCESS OF STUDYING IF IT IS ORGANIZED IN THE BEST WAY TO SUCCEED IN THE FUTURE. UNIVERSE SPOKE WITH ESD DIRECTOR JOHN BECKMAN AND REORGANIZATION TEAM CHAIR DR. PAULETT LIEWER, MANAGER OF THE ASTROPHYSICS AND SPACE SCIENCES SECTION (326), ABOUT THEIR PLANS AND GOALS.

3X considers changes to sections, divisions

BY MARK WHALEN



Why is the Engineering and Science Directorate considering a reorganization? What do you hope to accomplish?

BECKMAN • The nature of JPL's work has changed dramatically in the last 10 years or so. Ten years ago we had a few projects, compared to many tens of projects today. Also, 10 years ago NASA assigned all our missions to us. Today many of our missions are won through competition and we expect this fraction to increase.

The types of space systems we develop are changing from the traditional spacecraft like Cassini, to a



larger number of specialized systems such as the Mars Exploration Rovers and Space Interferometry Mission. We expect this trend to continue.

So we want to see if there are more effective ways to organize to meet the Lab's changing needs. We haven't decided on any specific course of action yet; that will depend on the output of our study group. If we do decide to reorganize, the objective will be to become more effective at acquiring and successfully carrying out projects.

Given the increased capability of the aerospace industry, will you consider getting out of the in-house mode?

BECKMAN • Absolutely not! Dr. Elachi has been emphatic about JPL not only retaining an in-house build capability, but also increasing our capability. I want the JPL leadership to put the highest priority on having a strong in-house capacity. We believe it is important to have such a competence in order to meet our missions' needs. Our challenge is to define the systems for which we want to focus our in-house work. These systems should be of strategic interest to JPL and not be readily available from industry and/or academia. Also, industry is becoming more capable and we want to use this capability, as opposed to competing with it.

What is the process and schedule for the reorganization?



LIEWER • The reorganization process has several phases. Last year, two teams made preliminary six-week studies of the issues with the current ESD organization and recommended changes not only to the structure but to other facets of the directorate as well. The new ESD Reorganization Team began work in February and will spend about two months gathering input from around ESD and the Lab as a whole on the strengths and weaknesses of the current ESD organization.

BECKMAN • With the involvement of the Executive Council, we expect to decide on a course of action in the July/August time frame. The exact first steps will depend on the decision, but I expect we will know that and make it public by September.

Do the people involved in the assessment and planning of the reorganization provide a balanced representation of ESD? How can non-management employees participate in the process?

LIEWER • The team itself consists of Section Managers and Deputy Section Managers representing all ESD divisions. But input on ESD will be gathered from all levels of staff in the directorate and from project and program managers. Some JPL staff will be interviewed by team members directly, and all Lab personnel will be able to give input via a Web site; information on this will be available soon on the Daily Planet (<http://dailyplanet>).

After we receive input from throughout the Lab, the team will then come up with options for the structure of ESD and other facets of the organization. ESD and JPL management will then decide what to do with the team's products.

You can follow the team's progress on the Daily Planet. We envision updates every three weeks or so.

What are some of the hurdles to overcome in reorganizing?

LIEWER • One thing is to make sure that we retain the good things about the current ESD in any reorganization. JPL is already an extremely successful organization. Look at how many missions we're launching this year!

Another hurdle in designing an effective ESD organization is the unique nature of JPL's "products" compared to other organizations. Here, we "produce" everything from basic research to flight hardware that can last in space for tens of years. A management structure for a high-tech organization like ours is inherently complex. Every year and every project is different. We need to try to build into ESD a flexibility that allows us to accommodate these changes. We also need to recognize that changes to the structure of ESD must complement changes to other policies of the ESD organization.



Is the cost of implementing a reorganization being taken into consideration?

BECKMAN • Yes. Once the specific output of the reorganization team is known, we will look at cost impacts. These will be a factor in the final decision.

Is part of the reorganization goal to trim staff? Ultimately, will anyone in the directorate lose their job because of this?

BECKMAN • No. This is not about reducing staff. The only goal is to explore options that might better serve our customers. It is conceivable that the consequence of deviating from our current organization could produce a change in our management team, but again this is not an objective.

What will a reorganization mean to people working at the section and group levels?

LIEWER • The intent is to keep groups intact, but some groups may change sections or divisions. Also, some sections could be moved to new divisions. We are hoping to achieve a more efficient organization at the section and group levels.

The hope, of course, is that it will lead to a better ESD, where the organization structure, personnel policies and cross-divisional processes are all in tune with a common vision for JPL's future.

Three new data channels on 'Inside JPL'

Inside JPL (a.k.a. the JPL Portal) announces three new data channels for the JPL community. Office of the Director, JPL Master Calendar and Proposal Center data channels add to the information-at-your-fingertips for JPLers.

The Office of the Director data channel is really a sneak preview of what the Director's new website will look like, once it is completed. Although the new site is scheduled to debut sometime in the spring, the new data channel offers quick access to some of the latest statements and presentations from the Director and the Executive Council.

What's going on at JPL today? How about later this week, or through the end of the month? Now, all Lab events are easy to find with the JPL Master

Calendar channel. Click on an event to go directly to the Calendar and view events for the entire week or month, or sort on events by category. It's also easy for anyone to submit an event for the calendar—just click "Submit for publication" at the top of the page.

The new Proposal Center data channel will provide JPL employees with announcements on funding opportunities available to them from NASA. Since this information is time-sensitive, the channel will help proposal authors become aware of submission deadlines to ensure that their proposals receive the consideration they deserve. Additional resources are also available online at the Proposal Center website.

Take a look for yourself, and see what's new at <http://insidejpl>.

Passings

ERIC LAUE, a retired member of the technical staff in Section 351, died Jan. 3.

Laue joined the Lab as a full-time employee in 1950 after working at JPL as a Caltech graduate student in the 1940s. He is survived by his wife, Betty, sons Doug and Tom, and three granddaughters.

WALLACE POWELL, 78, a retired JPL logistics consultant and expeditor, died Jan. 19 from injuries suffered in a car accident in his hometown of Daytona Beach Shores, Fla.

Powell worked in materiel procurement and specialized instrument development for Division 38. He contributed to Mariner 2 and 4, the Infrared Astronomy Satellite and the New Millennium Program, among others. He retired in 1989.

He is survived by his wife, Alicca; sons Raymond and Randall, stepson Rev. Harry Wood, stepdaughters Audrey Starkey and Charmaine Wida, 18 grandchildren and 17 great-grandchildren.

ARLINE FORDYCE, retired executive secretary of the Flight Projects Office, died Jan. 24 in Pasadena of pulmonary failure.

She began her career at JPL in the Telecommunications Division (33) in October 1963 and retired in July 1986. She is survived by her husband of 40 years Charles "Red" Fordyce, who wishes to thank all those who gave him support during her illness. She is also survived by her son Wade, his wife Kim, and grandchildren Erin, Wade Jr. and Geraldine. She will also be deeply missed by her JPL "Lunch Bunch."

Letters

My family and I would like to thank everyone for their kindness and thoughtfulness after the passing of my father. We would like to extend our sincere and deep appreciation for all the flowers and plants. We also would like to thank ERC for the lovely plant.

Tony Wen and family

Heartfelt thanks for the prayers, cards, calls and support received upon the sudden death of my husband, Wallace Powell, on Jan. 19. We are blessed by your thoughtfulness. Love and gratitude,

Alicca Powell and family

To the JPL family: We all truly appreciate the lovely plant you sent on behalf of my mother, Irene Campbell, who recently passed away. She lived a full life to age 89! Thank you for caring and embracing us with your thoughtfulness during this most difficult time. We were touched by this wonderful gesture.

Glen, Trudy, Genelle and Garrett Campbell

Retirees

The following JPL employees retired in March: Barbara Sherrod, 26 years, Section 214; Bruce Bon, 24 years, Section 348; Anthony Taylor, 24 years, Section 312; Karen Boyle, 23 years, Section 313; Ronald Morgan, 15 years, Section 349; Paul Baca, 14 years, Section 349.

Classifieds

For Sale

BED, twin size rollaway with spring mattress, exc. cond., \$50. 626/286-1883.

BEDROOM SET, vintage 1970-80s, queen size bed, new mattress, with 6 drawers beneath, 2 three-drawer dressers, stackable with cabinets, 2 two-door cabinets, stackable with dressers, good cond., \$800; PERSIAN RUG, red, 7.5 ft. x 11 ft., \$150; SIDE TABLE, French garden, \$75; COFFEE TABLE, large Sloan mahogany, with glass top, \$500. 626/379-5749 or mcwebster@att.net.

BICYCLES, 2, Schwinn Marada 10 speed, cond. good, \$75/each. 626/355-0123.

CAMERA, digital, Sony Cybershot, DSC-P1, 3.3M pixels, tiny, hi res., movie capability, never used, \$399/obo. 687-8627, Alberto.

COFFEE MAKER, Braun 10-cups, white/black, like new, \$30/obo. 626/791-6101.

COMPUTER, new Gateway laptop, model 1450, never used, complete with warranty, connection to AOL and 2 training courses in Pasadena. 766-5354.

COMPUTER, Powerbook G3, Wallstreet version, exc. cond., rarely used, extra batteries/peripherals available, best offer. 626/355-0828 or masri888@hotmail.com.

COUCH, with matching pillows, Earth tones, very comfortable, good cond., 87" w x 40" d x 31" h, \$175/obo. 626/351-1335.

DESK, antique mahogany desk and chair, \$500; 2 TABLES, indoor/outdoor, glass top, rod iron, \$1,500; COMPUTER DESK, \$100; OFFICE CHAIR, \$35/obo. 248-1102.

DINING CHAIRS, 6 total, 4 side, 2 arm, wood w/cane seat, exc. cond., barely used, \$1,000. 661/298-2647, Dave.

DODGER TICKETS, to be sold in twos, 1/2 season would be approximately 40 games, at \$35 x 2 = \$2,800; 1/4 season would be approximately 20 games at \$35 x 2 = \$1,400, individual tickets also available on a first come basis, \$70 for two tickets. 662-0966.

DODGER TICKETS, 4 season ticket seats, Loge level, behind 3rd base, section 141, row K, sell at face value, \$23/seat, many games still available, prefer to sell 5 games or more. 790-5902 or nsl1020@yahoo.com.

DODGER TICKETS, selected games from season ticket package, Loge level (orange), Aisle 132 (just inside first base), two tickets per game at face value of \$29/per ticket. www.delunac.net/tickets or 626/296-1253.

DVD SET (5), Speed Racer, all 52 classic episodes, signature collectible edition, unopened cond., \$500/obo. 626/287-7440, eves.

DVD PLAYER, Philips, \$80; CALCULATOR, graphing scientific Texas Instruments, TI-83 plus, \$50; MOUSE, Apple, USB, \$10; INTERNAL DRIVE, Zip VST for Mac Powerbook G3 series, \$50; SURFBOARD, Rusty, 7' 1" minigun, \$100. 626/844-9228.

EXERCISE BIKE, Tunturi Egometer W2, adjustable seat, handle bars, pedal resistance, condition good, \$50. 626/355-0123.

EXERCISE CYCLE, Ergometer made by Tunturi, adjust. seat height, handlebars and pedal resistance, workout Timer, calorie meter, mph meter, heavy-duty unit in exc. cond., manual. \$75. 626/963-5727.

FIGURINE, Lennox, porcelain, bride & groom, wedding cake topper, 7", pristine condition, wonderful wedding gift, \$100. 249-4316.

FISHING TACKLE, quality, for long range, deep sea fishing for large tuna & wahoo, used just once, immaculate, includes a large custom made tackle box, 8 rods, 6 reels, many jigs & lures and a treasure trove of terminal tackle, make offer. 323/222 0485, Joe.

GUITAR, Traveler, has 2 electronic pickups and a transducer that can be used with a headset like that of a stethoscope, over all length is 27.75" with a scale length of 24.75," comes with a carry bag and all assures. \$275. 626/301-0765.

GUITAR TUNER, Fender AX-12 chromatic tuner, \$35. 626/301-0765.

KENNEL/DOG CARRIER, made by Veri-Kennel, 40 in. high for large dogs, new, \$125. 249-9445.

MOVING SALE: nearly new furniture in vg cond., all prices are obo, desk, pine 2-drawer, \$200; couch, blue armless, down pillows, \$500; chairs, 2 cafe-style, black metal w/off-white cushions, \$80. 323/664-2672.

MOVING SALE: TV/stereo cabinet, large teak, \$850; armoire, pine painted white, \$500; bookcases, 2 Bonde style from IKEA, cherry color, 14 x 86" and 28 x 86", \$275; end tables, 2 Indonesian teak with iron details, \$130; floor lamp from Restoration Hardware, retro 3-bullet tree style, \$85; tables, small bedside, wood with drawer & shelf, \$225. 323/664-2672.

ORGAN, classic Wurlitzer electric (brass reeds), two 7-octave, 9-stop manuals, 13 pedals, sideman, black, w/bench, \$625. 626/794-1050.

ORGAN, Wurlitzer, with bench, 2 44-key manuals, 1 octave bass pedal, electronic beats, mahogany, \$150. 248-9418.

PATTERN MAKING SYSTEM, Lutterloh, includes tool kit with tailor's curve, instructions, and 280 models and pattern designs manual, used once, \$100/obo. 323/268-6645, Priscilla.

PIANO, Yamaha upright in rosewood finish, barely used, sacrifice, <http://yamaha.com/cgi-win/webcgi.exe/DsplyModel?gYPP00005YDP121> for info, \$1,000. 626/850-4378.

PING-PONG TABLE, always garaged, \$50; TABLE TOP, butcher block hardwood, 60 x 28 x 1 inch, with legs, \$80. 248-9418

PIPE THREADING EQUIPMENT, Armstrong, 3 dies and 1 tap, vg cond., \$35; JACKET, men's formal, nice for cruises, size 40 long, vg cond., \$100 value at \$25. 626/793-1895.

POOL TABLE, 8 foot, 1 yr old, exc. cond, incl. light bar, corner cue rack, all playing accessories, \$1,000/obo. 626/405-9701, leave msg.

MISC: radio/record player, Grundig, \$75; tape recorders, \$5/ea.; shovels, \$5; humidifiers, \$5; small toaster oven, \$10; water purifier, 2 tanks, \$50; toaster, under-cabinet, \$5. 626/357-8210.

REFRIGERATOR, GE, 4 yrs. old, like new, new icemaker, \$400. 626/359-1056.

REFRIGERATOR, Whirlpool 18.2 cu. ft. freezer on the top; white, auto ice maker, EZ-vue crispers, adjustable glass shelves, 2 years old, like new, sacrifice \$350. 790-4028.

SCANNER/flatbed, Umax Astra 2400s w/Vista Scan software, 8.5 x 14 scannable area/max res 9600 x 9600 dpi, interface: built in SCSI II; one 25-pin connector and one 50-pin connector, manual, installation software, cables, SCSI card, \$100/obo. 626/791-8161.

SKIS/BOOTS/POLES, Fischer SC4 skis w/ Salomon 647 bindings (6), w/ canvas carrying bag, Aéro Pro 7020 poles, 53" long, Nordica ski boots, women's size 11 + boot tree + REI canvas carrying bag, good cond., \$200. 626/794-1716.

TELEVISIONS, 20" Toshiba color, \$50; 26" console Sylvania color, \$75. 626/359-7666.

TENT, heavy duty, lifetime quality canvas, rainproof, sleeps 3, no center pole, for campers/ fishermen/hunters, have photo, vg cond., \$45/obo. 626/793-1895.

TREES, red banana plant, 5' tall, \$60/obo; fish tail, 6' tall, \$80/obo; Ficus, braided, in 30" plastic pot >10' tall, \$250/obo; CERAMIC BOWL, gray, 2' diameter with planted geraniums, \$40/obo. 626/791-6101.

TV, Toshiba projection, model TZ55V61, 55" screen, 2 1/2 yrs. old, \$1,200. 661/298-2647, Dave.

VACUUM CLEANER, Kenmore, canister, all attachments included, good cond., \$100/obo. 626/791-7645.

WEIGHT BENCH, Brutus Excel, w/ incline positions and leg workout attachment, includes, 6' bar, 2 dumbbells, 87 lbs. in weights, exc. cond., \$100. 626/794-1716.

Vehicles / Accessories

'98 ACURA CL, 66K mi., exc. cond., gray/silver mist, \$11,499. 395-9606.

'94 DODGE Grand Caravan SE, 6 cyl, dual a/c, a/t, roof rack, good cond., 124,000 mi, \$3,500. 248-4601.

'93 DODGE Grand Caravan SE, white, dual a/c, power steering/doors, cruise, good cond., well maintained, 149K mi., \$3,000. 626/355-1960.

'98 FORD Crown Victoria LX, 4.6L V8, 4 door, white/beige, leather, CD, keyless entry (remote and keypad), cruise, power everything, 100k, split front seats, good cond., \$12,500. 822-6465, Ryan or code3media@crownvic.net.

'01 HONDA Accord LX, leather interior, 25,000 mi., black ext., gray int., \$10,900. 323/582-2109 or 562/650-0536.

'95 HONDA Accord EX, 4 door, 92,000 mi., VTEC, a/c, moon roof, full power, good cond., \$7,500. 353-2103.

'00 JEEP Grand Cherokee Ltd., 38,900 mi., exc. cond., silver, V8, 2 wheel drive, loaded, sunroof, 8 CD chgr., leather int., luggage rack, alloy rims, pics available, \$19,800. 626/291-2185.

'85 KOUNTRY Lite 5th wheel trailer, 30 ft., orig. owner, alum. frame, 13.5K btu a/c, side bath, microwave, new tires & water pump, sleeps 6, exc. cond., \$6,000/obo. 626/963-5727.

'96 MAZDA MPV minivan, 3.0L V6, dark green, dual side doors, dual a/c, well-maintained, good cond., 97K mi., \$6,000. 626/793-8085.

'91 MAZDA Protégé, white, \$3,000. 909/952-1660.

'87 MERCEDES BENZ 560 SL, red, 2 tops, 77K mi., 2nd owner from 1991, exc. cond., must sell. 213/820-2881.

'95 SAAB 9000CS, hatchback, 4-dr, black w/ tan leather interior, 97K mi., 5-sp, AM/FM/cassette/6 CD changer, sunroof, great cond., \$6,200. 323/664-2672.

'94 VOLVO 960 station wagon, loaded, 3rd seat, 10 cd changer, 163,000 mi., very good cond., \$5,900. 949/853-8659.

Wanted

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

VOLLEYBALL PLAYERS, coed, no beginners please, Tuesday nights 8-10:00 at Eagle Rock High School, \$3/nt. 956-1744, Barbara.

Free

BUNK BED, white metal frame and two twin mattresses in good condition, for pick up, or \$20 will deliver to JPL vicinity. 626/793-1619.

CAMERA, Olympus XA2 incl batteries and instruction book, older and works fine. 909/593-4046 or vividavies@earthlink.net

FILL DIRT, clean, 20 cu. yds. avail., you haul as little or as much as you like, near Los Robles/Jackson, Pasa. 626/791-3103.

MISC: leather couch; living room chair; coffee table, PC AT, dot matrix printer. 249-8735.

For Rent

ALTADENA, guest bd. + ba. in 4 bd. home, built in 1998, close to JPL, pool, st. parking, \$975. 653-9613.

HIGHLAND PARK, house to share, private 900 sq. ft., one bd., living room and ba., exc. view, \$850. 213/553-1826 or 323/255-4485.

LA CANADA guesthouse, very secluded, off-st. parking, on separate parcel with separate delivery, includes water, gardener, trash pickup and access to tennis court, \$950. 952-1304.

PASADENA, 3 bd., 1 ba., plus den, front house near Rose Bowl \$1,750. 626/794-8517, Art.

PASADENA, apt to share, unfurn'd bd., + ba., in fully furn. 2 bd. 2 ba. apt. btwn Caltech/Old Town, stair access only to 2nd floor in 8-unit bldg, carpet, central air, carpet, l/p, free laundry, avail 3/17, references req'd, \$700 + deposit. 626/564-9885, eves.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut. inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy l/r w/FP, end unit, frml. d/r, hdwd. flrs., immac. cond., close to schls, \$1,750. 626/396-9024.

PASADENA, fully furn., 2 bd., 1.5 ba., town-home-style apt.; a/c, laundry, patio; nr. Caltech & JPL, \$1275/mo plus utilities; PASADENA, townhome-style apt. to share in the same bldg., fully furn. 3 bd., 3 ba., w/patio, a/c, laundry facilities, \$625 incl. util. 626/351-9641.

SIERRA MADRE apt., 2 bd., 1 ba., 6-unit bldg, short walk to village, new carpet and paint, parking, \$920. 626/355-7318.

SOUTH PASADENA apt., 2 bd., 1.5 ba., living and dining room, fireplace with built-in bookcases, wood floors, kitchen, 1-car garage w/automatic opener, w/d hookups, patio atrium; \$1,700, includes H2O, trash, sewer and gardening service. 323/344-7163.

TUJUNGA, Seven Hills, room in 3 bd., 2 ba., house, in the mountains N. of the Burbank Studios, quiet neighborhood, great views and hiking trails, month-to-month lease for respectful non-smoking professional, some kitchen and laundry privileges, utilities shared, \$600. 544-2119, Amy, days.

Real Estate

GLENDALÉ condo, 2 bd., 2 ba., exc. school dist., hardwood floor remodeled kitchen, pool and Jacz., by owner, \$225,000. 667-5569.

WILLIAMS, AZ area, 127 acres w/1 bd. house, 12 miles from Williams, seasonal creek, wildlife abounds, www.Randall.Mielke.fiji.com for pictures, \$110,000/obo. 505-0172.

Vacation Rentals

BALBOA ISLAND, fully furnished 2 bd., 1 ba., patio, washer/dryer, parking, steps to bay, \$150/night or \$875/week. 626/351-9641.

BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, excellent view. 248-1102.

CHARENTE, FRANCE, pleasant, spacious XVIIth cent. country house, in Aug. 03, slps 7 + a sofa bed in l/r, fireplace, washing mach., 2 ba., phone, in an orchard w/beautiful view, easy driving dist. from markets, 2 1/2 hours train from Paris, in a province famous for many Romanesque churches, castles and by-passed by tourism, \$450/week, plus \$100 returnable cleaning deposit. 310/457-5975, eve.

COPACABANA Beach, Rio de Janeiro, Brazil, 1 bd. furnished apt. overlooking beach, superb view and location, sleeps 3-4, \$80/day. 626/303-1616 or 626/304-0688.

HAWAII, Kona, ocean front on Keauhou Bay, house and guest house comfortably sleep 6, 3 bd., 2 ba.; rustic/relaxing/beautiful, swimming/snorkeling/fishing, spectacular vw., nr restaurants, golf, other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bd. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., Low Season rate \$105/nt/2, High Season rate \$120/nt/2, \$15/nt/2/add'l person. 949/348-8047, jackandrandy@cox.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., + loft, sleeps 6-8, fully equipped kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/view to mtns., Jacuzzi, sauna, streams, fishponds, close to Mammoth Creek, JPL discount. 626/798-9222 or 626/794-0455.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitch., quiet, relaxing, beautiful beachside setting; BBQ/pool/spa/game rm., great ocean vw.; easy walk to pier/restaurants, slps. 8, avail. weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

JPL'S ONLINE NEWS SOURCE

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the JPL Store and the Universe office, Bldg. 111-B29C, or via e-mail to universe@jpl.nasa.gov.

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