Cafe 167 to reopen soon

Open house set for June 16

By Mark Whalen

A large salad bar stands in the center of the remodeled cafeteria’s serving area. Made-to-order items will include sandwiches and fresh pasta (left) and pizza from a wood-burning oven (right).

To celebrate the grand reopening of the Red Planet Cafe in Building 167, JPL staff are invited to see the refurbished entryway during a ribbon-cutting ceremony and open house on Monday, June 16, from 2 to 3:30 p.m.

Complimentary punch, cookies, ice cream and yogurt will be served in honor of the event, a collaboration of JPL Employee Services and Caltech Dining Services personnel. Red Planet Cafe will be formally open for business during its normal operating hours, 6:30 a.m. to 3:30 p.m., beginning June 17.

Upon entering the cafe, employees will immediately notice the new open floor plan and state of the art food service equipment. A new char-broiler is installed and includes a glass case where patrons will select fresh beef, chicken or fish and watch it being prepared. A new and much larger salad bar is placed in the center of the service area and includes freshly prepared homemade soups. Five “grab-and-go” food stations will feature pre-made sandwiches and salads. Customers will now be able to order their own freshly made pizza, as the Cafe features a wood-burning oven similar to one in Cafe 303. Also introduced on an August service will be a new rotisserie-like “combi” ovens that will be used to prepare special beef and chicken dishes. Pasta dishes will be prepared made to order too. And a self-service Dreyers ice cream and yogurt stand will also be available.

Another new change to the Red Planet Cafe will be the placement of the soda fountains. To expedite refills will be available to those who use the same cup.

Suzanne Bradford, manager of Employee Services and Recognition, added, “I believe the Laboratory population, as well as visitors, will enjoy the new updated look of Cafe 167. We appreciate the patience of Laboratory personnel during construction and look forward to serving customers in our beautiful new facility.”
Earth from Globe diagram illustrates process happening on timescales of between quake faults is a complex 3-D space-based techniques. The latter crust deforms in response to movement sands of measurements of how Earth’s help scientists learn more about what modeling system called QuakeSim will soon provide new insights into the now being developed by JPL scientists, Tools provide earthquake insight Advanced computer simulation tools now being developed by JPL scientists, together with those at NASA’s Goddard Space Flight Center and Ames Research Center, and several universities, may soon provide new insights to the complex and mysterious physics of earthquakes and vastly improved earthquake forecasting. When completed in late 2004, simulation tools on an advanced earthquake modeling system called QuakeSim will help scientists learn more about what makes earthquakes happen. The tools are based upon the latest technologies. For QuakeSim, the finite elements are tens to thousands of thousands of measurements of how Earth’s crust deforms in response to movement of the electronic plates. Earth’s land masses ride upon the movements. The measurements are gathered through both ground- and space-based observation systems. These include global positioning system and interferometric synthetic aperture radar, which can measure the “non-earthquake” motions associated with plate tectonics and the quake cycle. QuakeSim Principal Investigator Dr. ANDREA DONNELLAN of JPL calls QuakeSim “the next step toward eventual earthquake forecasting.” “The deforma- tion of Earth’s crust and the interaction between bright quakes and nearly processes happening on timescales of minutes to thousands of years,” she said. “The availability of space-based data and our current limited under- standing of quakes process makes this an ideal time to develop a system for studying deformation processes such as tectonics, quakes and volatans.” “New quake models developed under QuakeSim are expected to yield errorless earthquake forecasts that will be used by a variety of federal and state agen- cies to develop decision support tools that will help mitigate losses from future large earthquakes,” she added. SeaSat team members sought The Public Services Office is seeking members for the SeaSat project for a special event. June 26. Many later Earth- orbiting instruments developed above their owe the SeaSat mission. These include imaging radars flown on NASA’s space shuttle as well as Earth-orbiting satellites and instruments (e.g. Topex/ Poseidon, the NASA Scatteredatterometer, QuikSat and the planned) upon 1. June 26 event will be held from 11 a.m. to 6 p.m. and will include speakers and a general gathering for guests. SeaSat veterans are asked to call Public Services at (818) 354-0122. Symposium set for July in Pasadena The fifth International Symposium on Reducing the Cost of Spacecraft Ground Systems, and operations, by JPL Deep Space Communications and Navigation Systems X7etter of Excellence, will be held July 8-11 at the Westin Hotel in Pasadena. DESCANSO promotes innovative work in many areas for planetary explorations, including opera- tional concepts and methodologies. The entire technical program can be viewed at http://descanso.jpl.nasa.gov/ RCSGSD, where registration is also available. The symposium will include: • Opening session with a keynote speech by Dr. WILLIAM WEBBER, head of JPL’s Interplanetary Network Directorate. His speech will be followed by talks by representatives of the National Space Development Agency, European Space Agency, NASA on their plans, and a panel Discussion • Technical sessions with 92 papers and 18 posters, in two tracks, over two and a half days. • An evening at the Magic Castle. • A banquet with keynote address by PETER THEISSINGER, manager of the Mars Exploration Rovers Project. Contact the organization committee via e-mail at RCSGSD symposium@ jpl.nasa.gov or call ext. 4-0062. Have you ever wondered what you would see if you were on Mars looking at Earth? Many later Earth-orbiting instruments developed above their owe the SeaSat mission. These include imaging radars flown on NASA’s space shuttle as well as Earth-orbiting satellites and instruments (e.g. Topex/ Poseidon, the NASA Scatteredatterometer, QuikSat and the planned) upon 1. 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This first-ever image of its kind not only shows Mother Earth as a tiny alien world in the vast darkness of space, but also includes a view of five family members: planet Jupiter and three of its four Galilean moons: Callisto, Ganymede and Europa. This first-ever image of its kind not only shows Mother Earth as a tiny alien world in the vast darkness of space, but also includes a view of five family members: planet Jupiter and three of its four Galilean moons: Callisto, Ganymede and Europa. Heartbeat feature near the center-right of the Red Planet is currently orbiting Earth. The image has been specially processed to allow both Earth and its moon to be seen in the image. The image is available online at http://photojournal.jpl.nasa.gov/ calendar/2003/05/13. The image of Earth actually shows our home as a planetary disc, in a “half- Earth” phase. The image has been specially processed to also show the moon and Mars. In this view, the earth appears to be at its full phase rather than the crescent seen in photos from Mars. Also visible are Jupiter and its three of four Galilean moons: Callisto, Ganymede and Europa. Have you ever wondered what you would see if you were on Mars looking at Earth through a small telescope? Now you can find out, thanks to a unique view of our world recently captured by JPL Mars Global Surveyor spacecraft currently orbiting the Red Planet. This first-ever image of its kind not only shows Mother Earth as a tiny alien world in the vast darkness of space, but also includes a view of five family members: planet Jupiter and three of its four Galilean moons: Callisto, Ganymede and Europa. This first-ever image of its kind not only shows Mother Earth as a tiny alien world in the vast darkness of space, but also includes a view of five family members: planet Jupiter and three of its four Galilean moons: Callisto, Ganymede and Europa. 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Wheels in the Sky

By Colleen Sharkey

When Chris Voorhees thinks about wheels, he doesn't imagine the rubber hitting the road, but rather aluminum crawling across the surface of Mars. In fact, he has already seen some of his handiwork making its way across the Red Planet.

One of the first jobs Voorhees was handed as an intern was to stamp out more than 1,000 stainless steel cleats for the Sojourner rover on JPL's Mars Pathfinder mission in 1997. Fast-forward six years and tack on a 365-pound weight gain and mobility specialists are dealing with a whole new animal—the large twin "robot geologists" known as the Mars Exploration Rovers, preparing for launch this month.

"We started with the Sojourner wheels as a base to work from," Voorhees said. "Because of many different engineering demands, the wheels for our new rovers didn't mature until late in the game."

Mobility engineers were tasked with making the wheels lightweight, so as not to add any more weight to an already hefty spacecraft; compact, so that when the rover is stowed in the lander they would fit; and capable, so the twin geologists can maneuver off of the lander safely and climb rocks up to 10 inches high. Basic parameters were set—based on the weight of the rover and the contact area on the sur face—and then the challenge began to make the wheels deliver on all requirements.

A Design to Keep on Turnin'
The rocker-bogie suspension that was developed for Sojourner, the first vehicle to rove on another planet, will be used again in a modified design. This flexible mobility system allows the wheels to conform to obstacles like rocks, strengthening their grip and maximizing their ability to clear any "road blocks." At a little more than 10 inches, these aluminum wheels are twice the size of those on Sojourner and are missing the recognizable sharp cleats.

"A big challenge is to be able to get enough traction to get through soil and over rocks but also to be benign—we couldn't use a solid for shock absorp-
tion as we would on Earth," Voorhees said. "We needed to fill the gaps but still be flexible—we couldn't use a solid for shock absorp-
tion. Solimide maintains its flexibility even at very low temperatures so it's ideal for conditions on Mars."

Test Tracks: A Race Against Time
Planning such a complex mission is, as Voorhees said, a race against time. Designs are fluid and subject to intense testing and subsequent change. While nothing can substi-
tute for being on Mars, the next best thing is to run trials in simulated Martian environments at JPL's testbeds. An obstacle course dubbed the "rock gauntlet" challenged test wheels to scale everything from small rocks to concrete blocks. Engineers also con-
ducted airbag interaction tests in which they drove the wheels into the deflated airbags again and again until they had enough information to proceed with wheel design changes. The mobility team and the assembly test and launch operations team gathered to conduct ramp tests with the flight rovers to make sure the rover brains were communicating effectively with its legs and wheels.

Preparing for the Rover's First "Steps"
Preparing a robot to perform to exact specifications on a harsh planet millions of miles away is no easy task. Still, the excitement of sending a spacecraft to another planet has not waned. While engineers are anxious to see Mars through the eyes of a rover again, they know that the deployment process will be slow and precise once the rovers land on Mars in January 2004.

"It's hard to explain the minutiae—everything has to work exactly as you plan," Voorhees said. "After every command sequence we give to the rover, we have to wait to make sure everything is working properly before we proceed. And due to the delay in sending and receiving signals from Earth to Mars and back, it's like taking 20 minutes just to talk to yourself!"

When ground controllers confirm that all systems are working as they should, they will tackle the decision of which direction to go. Nearby obstacles like rocks or deflated airbags will determine the safest route to leave the tetrahe-
dron-shaped lander. As it emerges from the lander, its inter-
planetary cocoon, the rover will not be breaking any speed re-
ords to conduct its research. Top speed for the rovers is 5 centimeters (2 inches) per second. However, as many scientists and engineers are quick to point out, the goal is not to travel as far and fast as possible, but to uncover the most interesting science whenever it presents itself. As long as the wheels do their job, Voorhees and the mobility team can live without wheelies.

During Mars Exploration Rover hardware development, Voorhees was one of two cognizant engineers for the rover's mobility system. In preparation for the launch-
es, he is currently serving as the assembly test and launch operations integration engineer for the MER-2 rover at Kennedy Space Center in Florida.
Classified ads will be available the day before University is published at http://dailyplanet.net

Letters

I wish to thank my friends at the Lab for their kindness and thoughtfulness on the passing of my father Leonard. I wish to thank my friends at the Lab for their kindness and thoughtfulness on the passing of my father Leonard. He was a man of many talents and interests, and he will be sorely missed. In lieu of flowers, memorials may be made to the American Heart Association or the American Cancer Society.

Classifieds

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JPL's ONLINE NEWS SOURCE

Paul Mordy

Three, 4 meditations specialist in classical theme, matching lighthouse design on all pieces, good cond., $200. 148-6122, Elizabeth.

TREK mountain bike, 10-speed, 21 in., black, new condition, $250. 626/379-9200, Kristy.

CROSSCOUNTRY SKIING, 1 pair, 68 cm, used, $200. 626/379-9200, Kristy.

FACIAL LIGHTS & ACCESSORIES (4), $50 set. 909/621-9722, Alex.

TRAVEL UNIT, sleeps 10, with large pull-out slides, $15,000. 626/379-9200, Alex.

YARD SALE: furniture, clothes, electronics, antiques, $25 each or "make an offer." 626/379-9200, Alex.
Following a couple of days’ delay due to weather, a NASA robotic geologist named Spirit began its seven-month journey to Mars on June 10 when its Delta II launch vehicle thundered aloft from Cape Canaveral Air Force Station, Fla. The spacecraft, first of a twin pair in NASA’s Mars Exploration Rovers project, separated successfully from the Delta’s third stage about 36 minutes after launch, while over the Indian Ocean. Flight controllers at JPL received a signal from the spacecraft at 11:48 a.m. Pacific time via the Canberra, Australia, antenna complex of the Deep Space Network. The project announced on Thursday, June 12, that Spirit successfully reduced its spin rate as planned and switched to celestial navigation using a star scanner. All systems on the spacecraft were reported to be in good health. As of 48 hours after the launch, Spirit had traveled 5,630,000 kilometers (3.5 million miles) and was at a distance of 610,000 kilometers (380,000 miles) from Earth. After separation from the third stage of its Delta II launch vehicle on June 10, Spirit was spinning 12.03 rotations per minute. Onboard thrusters were used on June 11 to reduce the spin rate to approximately 2 rotations per minute, the designed rate for the cruise to Mars. After the spinning slowed, Spirit’s star scanner found stars that are being used as reference points for spacecraft attitude.

Naturals and other flight team members at JPL will be deciding soon when to perform the first of several trajectory-correction maneuvers planned during the seven-month trip between Earth and Mars. “We have plenty of challenges ahead, but this launch went so well, we’re delighted,” said JPL’s Pete Theisinger, project manager for the Mars Exploration Rovers. Spirit is due to land on Mars on Jan. 4, 2004, Universal Time (Jan. 3 in the United States), and will roam an area called Gusev Crater, which bears evidence of a watery history. The rover will examine rocks and soil for clues to whether the site may have been a hospitable place for life. Gusev is an attractive landing site because of a 900-kilometer-long (550-mile) meandering valley that enters the crater from the south-east. This valley is believed to have been eroded long ago by flowing water. The water likely cut through the crater’s rim and filled much of the crater, creating a large lake not unlike current crater lakes here on Earth. The lake is gone now, but the floor of Gusev Crater may contain water-laid sediments that still preserve a record of what conditions were like in the lake when the sediments were deposited. Spirit’s twin, Opportunity, is being prepared for launch as early as 12:27 a.m. Eastern time June 26 (9:27 p.m. Pacific time on June 25), and will be targeted to Meridiani Planum, near Mars’ equator and halfway around the planet from Gusev. Opportunity has been hoisted atop the Boeing MBR-Delta II Heavy launch vehicle at Kennedy Space Center. Installation of the fairing around the spacecraft is scheduled for June 21, and fueling of the Delta second stage with its complement of storable propellants is planned for June 23. The rovers’ cruise through space comes at a time when Mars and Earth will be closer together than at any time in many thousands of years. “Mars is closer to the Earth than it has been in approximately 13,000 years. I find that an amazing number,” said JPL’s Nagin Cox, deputy chief of the mission’s spacecraft/rover engineering team.

“We’re close enough and the geometry works out that we have an excellent data return,” she said. “That means we can bring more pictures, more information about Mars back to the people of Earth.” Information about the rovers and the scientific instruments they carry is available online at http://mars.jpl.nasa.gov.

In the control room in Building 230, Henry Stone and Nagin Cox react to the successful liftoff of the Spirit rover.
SPECIAL EVENTS CALENDAR

Wednesday, June 25
Investment Advice—Fridays will provide one-on-one, appointment-only advice. For an appointment, call (800) 642-7311.

JPL Toastmasters Club—Meeting at 5 p.m. in the 2H-1 center. Call Roger Carlson at ext. 4-2395 for information.

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

Thursday, June 26
Caltech Architectural Tour—The Caltech Women’s Club presents this free service, which is open to the public. The tour begins at 11 a.m. and lasts about 1 1/2 hours. Meet at the Athenaeum front hall, 551 S. Hill St. For reservations, call Susan Lee at (626) 395-8320.

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

JPL Stories—Pls. collaborate Robert Nelson and William Smythe will present “Discovery of Sulfur Dioxide on Jupiter’s Satellite Io: A Personal Perspective of Two Scientists” at 4 p.m. in the Library, Building 111-104. If you have questions or requests, contact “Story tours or wish to participate, call Teresa Bailey at ext. 4-9323.

Saturday, June 28
Caltech Folk Music Society—Bluegrass musicians John Wilcox, Danny Wheeler, and David West will perform at Caltech’s Dabney Hall Lounge at 8 p.m. Tickets are $15 adults and $5 for students under 18. For more information, call (626) 395-4652 or visit http://www.folk.music.caltech.edu.

Wednesday, July 2
“X Prize: A Generation of Private Spacecraft”—Dr. Peter Diamandis and chair executive officer, X Prize Foundation, and chief executive officer of Zero Gravity Corp., will lead this Caltech Management Association Leadership Forum at 4:45 p.m. in von Kármán Auditorium. The X Prize is a competition that offers $10 million to the first privately funded team to build and fly a spacecraft on two consecutive flights to 100-kilometer altitude carrying two or more people. Fourteen teams from seven nations are competing, and at least one X Prize will be awarded in the next six to 12 months. In addition to the X Prize, a variety of other space tourism efforts are making space accessible to the public. One such effort is being led by Zero Gravity Corp., which will soon be offering FAA-approved commercial sub-orbital flights. Diamandis will discuss the opportunities the X Prize teams are taking, and their current status.

For additional information, e-mail cmann@caltech.edu.

Monday, June 23
Caltech Ballroom Dance—An eight-week summer session of salsa classes will be held from 7 to 8 p.m. at Caltech’s Baxter Lecture Hall in this Skeptics Society-sponsored event. Donations are $5 for the Caltech/Caltech community. For more information, call (626) 794-3119.

Monday, June 23
Caltech Ballroom Dance Club—A nine-week summer session of salsa classes will be held at Caltech’s McMillan Auditorium from 7 to 8 p.m. All classes are $15 or $10 for nonmembers. The classes will be led by Peter Diamandis and chair executive officer of Zero Gravity Corp., which will soon be offering FAA-approved commercial sub-orbital flights. Diamandis will discuss the opportunities the X Prize teams are taking, and their current status.

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The first overview analysis of a year’s worth of high-resolution infrared data gathered by the Thermal Emission Imaging System (THEMIS) on JPL’s Mars Odyssey spacecraft is opening Mars to a new kind of detailed geological analysis and revealing a dynamic planet that has experienced dramatic environmental change.

**Odyssey thermal data reveal a changing Mars**

The report by THEMIS’ science team will appear in an upcoming issue of Science and was released on June 5 in the magazine’s online preview, Science Express (http://www.sciencemag.org/sciencexpress/recent.shtml). “THEMIS is creating a set of data that is going to revolutionize our mapping of the planet and our idea of the planet’s geology,” said lead author and THEMIS Principal Investigator Philip Christensen of Arizona State University. “It will keep Mars scientists busy for the next 20 years trying to understand the processes that have produced this landscape.”

THEMIS is providing planetary geologists with detailed temperature and infrared radiation images of the Martian surface. The images reveal geological details that were impossible to detect even with the high-resolution Mars Global Camera on JPL’s Mars Global Surveyor and that have 300 times higher resolution than Global Surveyor’s Thermal Emission Spectrometer. Among the significant findings noted in the report is the detection of layers in the Martian surface that indicate major changes in past environmental conditions.

“With a visible-light camera, I can take a picture of a lava flow, but even with the highest resolution cameras that we have today the smallest thing we can see is the size of a bus and in order to do geology I need to have more detail,” said Christensen. “The camera on Mars Global Surveyor takes exquisite images that show layers, but it doesn’t tell me anything about composition— is it a layer of boulders with a layer of sand on top? I have no way of knowing. With the THEMIS temperature data, I can actually get an idea because the layers vary—and each layer has remarkably different physical properties.”

Daytime and nighttime temperature data can also scientists to distinguish between solid rock and a variety of loose materials, from boulders to sand and dust. As any beach-goer knows, fine-grained sand heats up more rapidly at the surface than solid stone (which transmits more heat inward) but it also cools off more rapidly at night, when solid materials retain heat.

“We have seen layers, each with dramatically different physical properties, in places like Terra Meridiani,” Christensen said. “Could the physical properties in the different layers change? They change because the environment in which these rocks were deposited changed.”

“It’s very difficult to say exactly what happened in any particular place, but what we’ve found is that in many places on Mars it hasn’t been the same old thing happening for year after year for billions of years. We know that some places on Mars have water, but here we see that some really don’t.”

Overall, Christensen notes that the emerging diversity and complexity of the planet point to the likelihood of future surprises and keep enlarging the possibilities for discovery on Mars.

“With Odyssey, we are looking at Mars in its entirety, in context,” he said. “It’s remarkable how much this has already changed our view of the complexity and richness of the planet. We discovered that it has a really dynamic geologic history. It has far more ice and water than we thought— we’re seeing snow and gullies, layers—and there are also processes involving volcanoes, impact craters and wind. It’s a fascinating place.”

In addition to Christensen, the authors on the paper include Anton Ivanov and Kenneth Nealson of JPL, along with Joshua Bandfield, James Bell, Noel Godhill, Victoria Hamilton, Bruce Jakosky, Hugh Kieffer, Melissa Lane, Michael Malin, Timothy McConnochie, Alfred McEwen, Harry McSween, Greg Neuhof, Jeffrey Moench, James Rice, Mark Richardson, Steven Ruff, Michael Smith, Timothy Titus and Michael Wyatt.

JPL manages the 2001 Mars Odyssey mission for NASA’s Office of Space Science. Investigators at Arizona State University, the University of Arizona and NASA’s Johnson Space Center, Houston, operate the science instruments. Additional science partners are located at the Russian Aviation and Space Agency and at Los Alamos National Laboratories, New Mexico. Lockheed Martin Astrotechnics, Denver, is the prime contractor for the project, and developed and built the orbiter. Mission operations are conducted jointly from JPL, leads the mission, and the project’s science partners.

Additional information about 2001 Mars Odyssey is available on the Internet at http://www.jpl.nasa.gov/odyssey.

Photos top to bottom: lava-flooded crater; canyon walls of Valles Marineris; shallows on salt flat; lava outpourings; scabland; close-up of cliff; dark alcove; delta; rockehound; high-angle view of Mount Sharp; layered crater; impact crater; boulder; rock sorts; force of nature.
PASSINGS

ALFRED SIGMETH, 92, a former manager at the Deep-Space Network, died May 22. Although born in Hungary, Sigmeth earned masters degrees from the Technical University of Budapest and joined JPL in 1946, and served as a data analyst for the Space Network managing the Deep Space Mission series. Sigmeth earned NASA's Exceptional Service Medal for his contributions to Pioneer, and was also honored as a member of the Voyager launch teams, at the Smithsonian Institute for his contributions to the mission. In recognition of his contributions to the Voyager missions, Evans Liske and Kathy Sigmeth, five grandchildren, and nine great-grandchildren.

GEORGE TENTANN, 85, died April 27. Tentann joined JPL in 1950 and retired in 1981. He worked in the Space Science Operations Division in the 1970s and 1980s, retiring in 1985. He was married to the former Betty Jo Barksdale, and daughters Sharon Vilt, Sharlene Cartier and Shirley Beatty, and 14 great-grandchildren; and brother Ralph.

HERBERT JEFFRIES, 89, retired from Section 365, died May 22. Jeffries joined JPL in 1955 and retired in 1979. He is survived by sons Steven, Keith, and Susan Jeffries; four granddaughters; and five great-grandchildren.

Funeral services were held May 29 at Temple Mount View in Altadena.

LETTERS

Words cannot express how thankful I am to the whole JPL community, for all their support. I am very grateful for the prayers, over the loss of my wife, Marylyn, and my son Jack.

Bob Dubbuk

I wish to thank my friends and co-workers at JPL on their kindness and well wishes for the day of my last stop on my career path. I will be very fortunate to find a group as fine as you to work with and I am very happy I will all continued success.

Eugene DePiroz

We would like to thank our JPL family friends and co-workers for their prayers and the recent illness and passing of our father. Also to Organizations 374 and 512 and all their support. Thank you.

Sincerely, Rigo and Marcos Falcón and families

Jim Kawalski, a senior engineer in Instrument Systems Engineering in Section 850c, ran the Rocket Rockz/Roll Marathon in San Diego on Sunday, June 2, for the American Stroke Association, raising over $2,700 as part of the Training to Eradicate Stroke campaign. This was his 11th marathon and he finished the 26.2 mile distance in 3 hours and 38 minutes. Thank you to all JPL people who helped support this cause of stop strokes.

Jim Kawalski

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