JPL

Jet Propulsion Laboratory

Universe

NOVEMBER 2014
VOLUME 44
NUMBER 11

30 minutes of concern

MARS ROVERS AND ORBITERS WINK AT PASSING COMET

By Mark Whalen

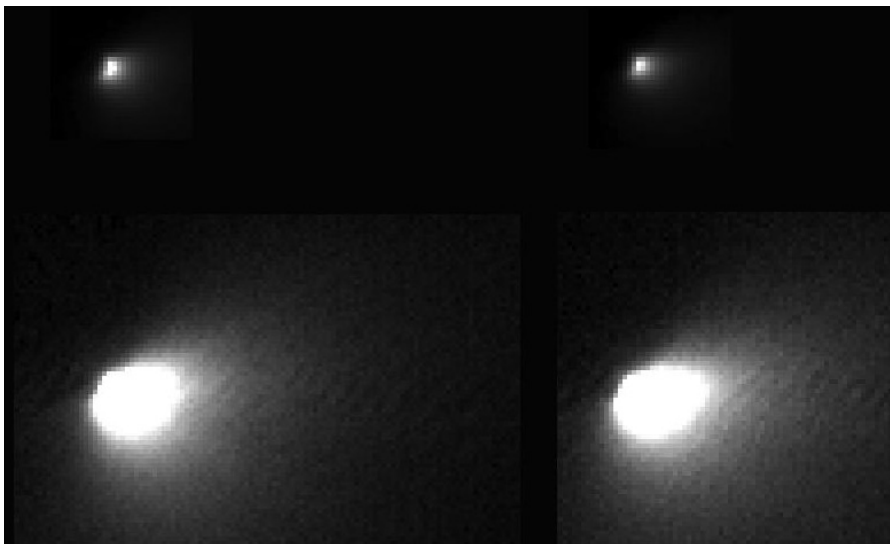
The January 2013 discovery of Comet C/2013 A1 Siding Spring revealed that the comet would fly dangerously close to Mars this October.

The discovery mobilized JPL's Mars program into a risk-mitigation plan of action to protect its assets at the Red Planet from any potential damage. So when the comet sped past Mars Oct. 19, JPL's orbiters were moved to the planet's opposite side.

As the comet approached, analysis showed that probabilities were remote—less than one in a million—for a catastrophic high-speed collision with sizeable dust particles, said Mars Program Chief Scientist Richard Zurek, but it seemed prudent not to take a chance.

Interestingly, Zurek noted, the meteors from the comet thought likely to hit Mars were ejected from the comet more than a year ago, when the comet was beyond Jupiter's orbit.

"Such meteors were predicted to arrive only during the approximate 30-minute period that Mars was closest to the path of the comet," said Zurek. "It was not quite Curiosity's 'Seven minutes of terror' but rather '30 minutes of concern.'" The prime mitigation taken, he added, was to phase the NASA spacecraft in their orbits such that Mars was between them and possible meteors during the predicted period of concern.



Mars Reconnaissance Orbiter's High Resolution Imaging Science Experiment acquired these images of Siding Spring Oct. 19 from a minimum distance of about 86,000 miles.

The concern was short lived. The comet arrived about 100 minutes after its nucleus had already passed by at its minimum distance to Mars, coming within about 87,000 miles of the planet, Zurek added.

Initial observations of the comet were underwhelming, showing a very small nucleus, less than 500 meters in diameter, said Zurek. "We were only able to get a very few pixels on it," he said. "Still, I am glad that the comet did not come any closer to Mars—there is still much to be done in exploring the Red Planet and it is good that no comet was poking holes in our spacecraft!"

The rare encounter proved to be a prime opportunity for observation as well. JPL's flotilla of orbiters and rovers—as well as other NASA and

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Record crowds pack Open House

More than 45,000 visitors for the weekend

By Mark Whalen

JPL's annual Open House, held Oct. 11–12, set an all-time attendance record of 45,716 visitors. It was the largest crowd JPL has hosted over a two-day weekend.

Hundreds of photos submitted by attendees are available at https://tagboard.com/JPLOpen/193438.

"What a fun time. My 'Curiosity' was satisfied. Thanks for the 'Opportunity'!"

An Open House guest

NASA photos by Brad Graverson

Siding Spring *Continued from page 1*

international missions—turned their cameras and other instruments to the skies for a unique opportunity to investigate the comet from close range.

Mars Reconnaissance Orbiter executed a major observing campaign, utilizing its full science suite of instruments, said Project Manager Dan Johnston. All told, during a three-day period around closest approach, the orbiter performed more than 60 off-planet slews to allow its targeting instruments to observe the comet.

The High Resolution Imaging Science Experiment (HiRISE) camera, the Compact Reconnaissance Imaging Spectrometer and the Context Imager camera performed targeted imaging of the nucleus and coma. Meanwhile, Mars Climate Sounder, Mars Color Imager and Shallow Radar took Mars atmospheric measurements during nadir portions of the comet-observing plan, looking for atmospheric change.

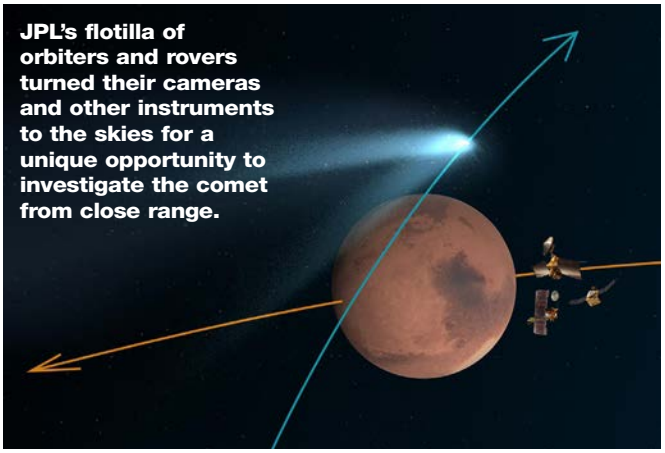
The HiRISE images are the highest-resolution views ever acquired of a comet coming from the Oort Cloud at the fringes of the solar system.

"The spacecraft performed flawlessly throughout the comet flyby," said Johnston. "It maneuvered for the planned observations of the comet and emerged unscathed."

The Odyssey orbiter conducted its planned observations of Siding Spring within hours of the comet's closest approach to Mars, said Mission Manager Chris Potts.

Among the observations: the Thermal Emission Imaging System captured two separate mosaics of visible and infrared images of the coma and tail. Two days later, an image of the entire coma and tail above the Martian limb was acquired, said Potts. Also, the Neutron Spectrometer and High Energy Neutron Detector continuously monitored effects on neutral and charged particle fluxes.

"Spacecraft safety remained first and foremost at all times," said Potts. "After favorably positioning the spacecraft within its orbit, Odyssey executed an ambitious imaging campaign in response to the science objectives of this extremely rare opportunity."



JPL's flotilla of orbiters and rovers turned their cameras and other instruments to the skies for a unique opportunity to investigate the comet from close range.

NASA's other Mars orbiter—the Mars Atmosphere and Volatile Evolution, managed by NASA's Goddard Space Flight Center—also gathered information before, during and after the flyby about the size, rotation and activity of the comet's nucleus, the variability and gas composition of the coma around the nucleus, and the size and distribution of dust particles in the comet's tail.

JPL's two active rovers also pitched in. Researchers used the panoramic camera (Pancam) on the Mars Exploration Rover Opportunity to capture a 10-second-exposure view of the comet C/2013 A1 Siding Spring as it passed near Mars on Oct. 19. The Mars Exploration Rover Curiosity also pointed its cameras to the comet; images are pending.

Overall, the Comet Siding Spring close encounter took nearly a year of planning by individual flight projects, special working groups addressing comet debris issues and unique Deep Space Network coordination issues. The missions' science teams also operated their instruments in nontraditional modes to get the job done. And the efforts of the Lockheed Martin spacecraft teams were critical to the success, implementing frequent slews of the spacecraft to observe a fast-moving target that required looking away from their normal target, Mars.

JPL's performance certainly lived up to expectations. Teams worked long hours assessing risks, implementing mitigation and conducting an extraordinary observing program for this historic encounter of a long-period comet and Mars.

Mars Program Chief Scientist Richard Zurek

For more about comet Siding Spring, including other images of the comet, visit http://mars.jpl.nasa.gov/comets/sidingspring/.

JPL will lead 'Icy Worlds' team

By Mark Whalen

NASA's Astrobiology Institute has awarded five-year grants averaging $8 million each to seven U.S. research teams, including one led by JPL.


Isik Kanik

Isik Kanik, a senior research scientist in the Planetary Science Section, will lead the "Icy Worlds" team, whose key JPL co-investigators include Michael Russell, Laura Barge, Steven Vance and Paul Johnson.

Laboratory experiments and field research will be conducted in environments such as the Cedars in Sonoma County, Calif., to understand the habitability of extraterrestrial icy worlds such as Europa, Ganymede and Enceladus.

The team has a large number of outside partners, both domestic and international. Collectively, they will conduct an interdisciplinary and highly synergistic combination of experimental, theoretical and field-based lines of inquiry focused on astrobiology at water-rock interfaces found on icy bodies in our solar system and beyond. Several of the icy moons in our solar system have subsurface oceans that, combined, contain many times the volume of liquid water on Earth. All of these icy worlds may host or may have once hosted water-rock interfaces generating energy from geochemical gradients.

The Icy Worlds team will examine bio-geochemical/-geophysical interactions taking place between rock/water/ice interfaces in these environments to better understand and constrain the many ways in which icy worlds may provide habitable niches and ultimately generate observable signatures on their surfaces.

The majority of laboratory research will be carried out at JPL, said Kanik, who added that the focus of the team's research is critical to support missions to the satellites of the outer planets, and important for missions to other solar system bodies.

"New results from our investigation," he said, "will help in interpreting results from current missions to the satellites of Saturn (Cassini), the large asteroids Ceres and Vesta (Dawn), and to the Pluto-Charon system and other icy dwarf planets in the Kuiper Belt (New Horizons). Findings from this work will also help the definition and development of future exploration missions to icy satellites (e.g., Europa, Enceladus, Ganymede and Callisto) such as the planned Europa Clipper Flagship mission, which will investigate Europa's habitability."

News Briefs

Murray Award for public engagement, NASA Honor Awards bestowed

JPL oceanographer Bill Patzert, second from left, receives the new Bruce Murray Award for outstanding public engagement. At left is JPL Deputy Director Larry James; next to Patzert are Communications and Education Director Blaine Baggett and JPL Director Charles Elachi. Also receiving the Murray Award were Donald Yeomans and Nagin Cox.

At a recent NASA Honor Awards ceremony, 217 awards in 14 different categories were presented to a number of individuals and groups of individuals who have distinguished themselves by making outstanding contributions to NASA's mission over the past year.

Honorees were nominated by their management or by their peers, and recognized by the NASA Administrator for their extraordinary achievements. Honorees included JPL employees and contractors, colleagues from other NASA centers, and partners from universities and industry.

The full ceremony is available on JPL Tube (https://jpltube.jpl.nasa.gov/details.aspx?ID=1921)

A separate ceremony honored 65 JPL employees who have gone above and beyond over the past year for their outstanding contributions to the Laboratory. Awards presented include:

BRUCE MURRAY AWARD: For outstanding contributions in public engagement on behalf of the Lab by engaging, informing, and inspiring the public about JPL's missions and their discoveries. ***Nagin Cox, Bill Patzert, Donald Yeomans.***

EDWARD STONE AWARD FOR OUTSTANDING RESEARCH PUBLICATION: For publications of particularly outstanding merit and significant research results in science and in technology or engineering. ***Carmen Boening, Ioannis Mikellides, Jorge Luis Pineda Galvez, Xiaoqing Wu.***

EXPLORER AWARD: For significant, individual technical or business accomplishments or outstanding performance with a Labwide impact. ***Amy Mainzer, John Ziemer, James Benardini, Ian Clark, Ronald Indradjaja, Bogdan Oaida, Noah Warner, Robert Witoff, Yvonne Petaja, Adrian Ponce, Teresa Bailey, Alice Wessen, Michael Young, Abigail Allwood, Luther Beegle, Simon Hook, James Lux, Kentaro Suzuki, Anthony Turner, Simon Yueh, Charles Buril, Daniel Chang, Andrew Johnson.***

MAGELLAN AWARD: For accomplishments that demonstrate leadership and/or excellence in a field of knowledge by senior JPL personnel. ***Mark Adler, Clyde Bankston, Ralph Basilio, Josette Bellan, Alaudin Bhanji, Gajanana Birur, Thierry Caillat, Gordon Campbell Jr., Todd Cetti, Willis Chapman, Katrina Christian, Karla Clark, Saverio D'Agostino, Ann Devereaux, Thomas Fraschetti, Randall Friedl, Jaime Gonzales, Jason Hyon, Annette Larson, Thomas Luchik, Jean Milbrandt, Glenn Reeves, Gail Robinson, Christopher Salvo, Georg Siebes, Tomas Soderstrom, Christophe Sotin, Linda Spilker, John Trauger, Jeffrey Umland, Michael Watkins, Charles Whetsel, Reed Wilcox, Janet Zadeh, Cinzia Zuffada.***

Letters

To my colleagues at JPL, I would like to thank you all for the condolences that I received on the passing of my father. My JPL family has been a great support to me, so please accept my thanks for your sympathy as well as the beautiful plant. **Randy Dodge**

Many thanks for all the kind thoughts and condolences on the recent passing of my father back in Chicago. Sometimes it is through the eyes of others that we can best appreciate the bounty of working at JPL and for the past 29 years this was a source of pride and true inspiration for my beloved dad. **Stephen Licata**

To my entire JPL family, both in PO.DAAC and at large: I cannot express how much my mother,

Continued on page 6

siblings, and my immediate family and I appreciated your sympathy and understanding during the swift illness and ultimate loss of my father. He was so very proud of JPL, followed our work very closely (from technology to Earth to deep space), and he held all of you in such high esteem. He would have been incredibly honored by your thoughtfulness and kind words, and he would have appreciated your well-wishes and prayers sent to me and to my family. How lucky we are to work in a place with so many caring people! On behalf of my family and my father, thank you all. **Eric Tauer**

Retirees

The following employees retired in October: **Richard Benson**, 39 years, Section 9021; **Vincent Perun**, 31 years, Section 382F; **Joe Springer**, 30 years, Section 393M; **Anthony Guarnera**, 29 years, Section 382F; **Cynthia Moseley**, 29 years, Section 2144; **Sherry Casson**, 26 years, Section 252D; **Gary Beaner**, 22 years, Section 1732; **Raymond Welch**, 12 years, Section 850; **Glenn Knosp**, 11 years, Section 250.

Classifieds

Ads submitted Oct. 25–31. To submit an ad, e-mail universe@jpl.nasa.gov.

For Sale

CRAFT/RUMMAGE SALE to benefit Angiosarcoma research, Saturday, Nov. 8, 8 a.m. to 2 p.m., Center for Spiritual Living, 4845 Dunsmore Ave, La Crescenta (corner Santa Carlotta and Dunsmore); unique holiday gifts from local artisans, rummage sale of new and vintage items, bake sale and live music. mcfoote@charter.net.

MISC: heated neck massager, $25; mini steam iron, bloody Mary set, decanter set, $20/ea.; coffee table, $125; Roller Blades (sz. 8) w/accessories, $45; pedometer, $10; all obo; call for pictures. 818-272-3262.

Vehicles / Accessories

'71 LINCOLN Continental Mark III Classic, antique, olive exterior/interior leather, white vinyl top, good tires, in good running condition, all original equipment, in Altadena, $12,000/obo. 626-296-0239.

Lost & Found

LOST: activity notes, April 2006–March 2007. SOSNotez@riseup.net.

Wanted

PROPERTY, looking to buy 3-bedroom, 2-bath house/townhouse/condominium close to Caltech and downtown Pasadena. 248-470-7006, velibor@hotmail.com, cell 248-470-7006, Velibor.

ROOMMATE for 3-bedroom/2-bath house in north Pasadena, just west of Lake Ave.; all appliances included, large yard, garage and gated off-street parking; close to Old Town, Rose Bowl and JPL; prefer early career hire, male, someone who will keep common areas clean; preference to those looking to lease ASAP and/or for more than one year; ~$1,000/month, with 1 month security deposit. Jeff: 765-620-4342, jrstuart1986@gmail.com.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use (see http://www.youtube.com/watch?v=S7PvjGp7mCU). mrayman@alumni.princeton.edu, 818-790-8523, Marc Rayman.

For Rent

ALTADENA, one room in a lovely 3-bd./2-bath house, big backyard, hardwood floor, big closet, furnished or unfurnished, shared bathroom, kitchen and laundry privileges; 5-minute drive to JPL, close to public transportation; short- or long-term lease available; must like dogs and be very clean; $750 furnished, $700 not furnished, including utilities + $650 deposit. 626-712-3451.

Vacation Rentals

BIG BEAR lakefront, luxury townhome, 2 decks, tennis, pool/spa, beautiful master bdrm. suite, sleeps 6. 949-786-6548.

BIG BEAR LAKE, newer cabin, 3 bedrooms, 3 baths, sleeps 9, knotty pine on quiet cul-de-sac, 50" HDTV w/HBO, spa tub in master, central heat/AC, BBQ, WiFi, 2-car garage, no pets. 818-952-2045.

BIG BEAR LAKE, huge mountain chalet, 8 bdrms., 7.5 baths (2 spa tubs), sleeps 18, cable TV in each room, pool table, deluxe kitchen w/prof appliances, <1 mi. to slopes, no pets. 818-952-2045.

JACKSON HOLE, WY: Luxurious bed and breakfast nestled on 3 acres of solitude on the Snake River and down the road from the Jackson Hole Mountain Resort and the south entrance to Grand Teton National Park; see http://www.bentwoodinn.com/; mention JPL for employee discount. info@bentwoodinn.com, 307-739-1411.

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-794-0455 or valeriee@caltech.edu.

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond and meadow, new appliances, TVs, DVD players, free wireless Internet access and washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@gmail.com.

OCEANSIDE beachfront condo, watch the beautiful sunsets, a few weeks available this summer, sleeps 4 max, all amenities. 949-786-6548.

READ AND SUBMIT CLASSIFIED ADS AT JPL'S ONLINE NEWS SOURCE
http://jplspace

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universe@jpl.nasa.gov

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Editor
Mark Whalen

Design
Carolyn Stolze

Photography
JPL Photo Lab

Universe is published by the Communications and Education Directorate of the Jet Propulsion Laboratory,
4800 Oak Grove Drive,
Pasadena, CA 91109.