Contents

In the News

Story 1:
InSight Mars lander escapes cancellation, aims for 2018 launch

Story 2:
Close Comet Flyby Threw Mars' Magnetic Field Into Chaos

Story 3:
Sharpest View Ever of Dusty Disc Around Aging Star

Departments

The Night Sky
ISS Sighting Opportunities
Space Calendar
NASA-TV Highlights
Food for Thought
Space Image of the Week
1. InSight Mars lander escapes cancellation, aims for 2018 launch

The InSight Mars lander has won a reprieve from NASA's top managers after persistent problems with one of the probe's science instruments caused the mission to miss a narrow launch window planned for this month.

The space agency announced Wednesday the InSight mission's launch has been rescheduled for May 5, 2018, the next time Earth and Mars are properly positioned to permit a direct route to the red planet.

The two-year delay is expected to increase the cost of the mission, but the agency said the amount of cost growth is still being assessed.

NASA may owe a penalty payment to United Launch Alliance, the InSight's mission's launch provider, after missing the contracted launch window that opened March 4.

Officials in December decided to suspend preparations for launching InSight this year after engineers repeatedly had trouble sealing an airtight vacuum enclosure containing sensors to detect and study seismic tremors on Mars.

InSight's mission focuses on investigating the interior of Mars by measuring quakes and the flow of heat from the red planet's warm interior reaching the surface.

The seismometer instrument aboard InSight is managed by CNES, the French space agency, under an agreement with NASA and the InSight science team.

"The science goals of InSight are compelling, and the NASA and CNES plans to overcome the technical challenges are sound," said John Grunsfeld, associate administrator for NASA's science mission directorate in Washington. "The quest to understand the interior of Mars has been a longstanding goal of planetary scientists for decades. We're excited to be back on the path for a launch, now in 2018."

Bruce Banerdt, InSight's principal investigator at NASA's Jet Propulsion Laboratory in California, said the mission's flight plan will likely remain unchanged for the 2018 launch opportunity.

InSight will blast off aboard ULA's Atlas 5 launcher from Vandenberg Air Force Base in California, making it the first Mars mission to depart Earth from the West Coast. Previous U.S. probes to the red planet have all launched from Cape Canaveral.

The positions of the planets in May 2018 will be more favorable than this year, reducing the energy boost needed to propel InSight toward Mars. The 2018 launch opportunity is the best to reach Mars since 2003.

"Although we haven't gotten final confirmation from our launch services people, we know of no reason right now that would cause this to change," Banerdt wrote in an email to Spaceflight Now. "2018 is actually a lower energy Mars opportunity, which will likely give us more launch margin (which was already ample in 2016)."
Landing is targeted in Elysium Planitia, a broad equatorial plain on Mars. The mission needs a relatively flat, boulder-free landing zone to safely touch down and conduct its experiments.

JPL will assume responsibility for fixing the component that gave French engineers headaches last year, NASA said in a statement.

Engineers at JPL “will redesign, build and conduct qualifications of the new vacuum enclosure for the Seismic Experiment for Interior Structure (SEIS), the component that failed in December,” the NASA press release said. “CNES will lead instrument level integration and test activities, allowing the InSight project to take advantage of each organization’s proven strengths.”

Banerdt told a meeting of Mars scientists last week that the delay is expected to cost around $150 million, and the costs are likely to be shared by NASA and CNES.

InSight managers pitched NASA leaders March 1 on a plan to fix the seismometer issue in time for the May 2018 launch opportunity, and the agency officials agreed with the proposal.

The Mars lander is part of NASA’s Discovery program, a line of cost-capped missions selected through competitions held every few years. InSight won a competition in 2012, besting proposals to send a floating scientific station to a hydrocarbon ocean on Saturn’s moon Titan and land on a comet’s nucleus.

InSight’s cost limit before the delay was $675 million, including the launch. As of December, NASA had spent approximately $525 million on the project.

The InSight spacecraft was already at its launch base in California when NASA decided to postpone the mission in December.

A spokesperson with Lockheed Martin, InSight’s prime contractor, said the spacecraft returned to the company’s satellite manufacturing plant near Denver on Feb. 6 to be put into storage awaiting the next launch window.

The InSight lander, its Atlas 5 rocket, and the mission’s other main instrument — a German-built underground heat probe — were all ready for liftoff this year, only to be grounded by the seismometer problem.

Source: Spaceflight Now

ExoMars: Prepare for launch! (posted by Emily Lakdawalla @ The Planetary Society)

ESA’s ExoMars Trace Gas Orbiter and Schiaparelli lander are in the final preparations for a launch as early as Monday, toward an October 2016 Mars orbit insertion and landing in Meridiani planum. These two spacecraft represent the first half of the ExoMars program, which is a cooperative effort between ESA and Roscosmos. The second half is a rover and lander currently planned for a 2018 launch, with a January 2019 landing in Oxia planum. In addition to its scientific mission to search for methane and related gases in Mars’ atmosphere and to understand where they come from, the Trace Gas Orbiter will serve as a communications relay for Schiaparelli and the future rover and lander.

ESA will begin livestreamed launch coverage at 08:30 UT or 01:30 PDT on Monday, March 14.

Source: Planetary Society
An in more Mars news. Just weeks before the historic encounter of comet C/2013 A1 (Siding Spring) with Mars in October 2014, NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft entered orbit around the Red Planet. To protect sensitive equipment aboard MAVEN from possible harm, some instruments were turned off during the flyby; the same was done for other Mars orbiters. But a few instruments, including MAVEN's magnetometer, remained on, conducting observations from a front-row seat during the comet's remarkably close flyby.

The one-of-a-kind opportunity gave scientists an intimate view of the havoc that the comet's passing wreaked on the magnetic environment, or magnetosphere, around Mars. The effect was temporary but profound. "Comet Siding Spring plunged the magnetic field around Mars into chaos," said Jared Espley, a MAVEN science team member at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "We think the encounter blew away part of Mars' upper atmosphere, much like a strong solar storm would."

Unlike Earth, Mars isn't shielded by a strong magnetosphere generated within the planet. The atmosphere of Mars offers some protection, however, by redirecting the solar wind around the planet, like a rock diverting the flow of water in a creek. This happens because at very high altitudes Mars' atmosphere is made up of plasma -- a layer of electrically charged particles and gas molecules. Charged particles in the solar wind interact with this plasma, and the mingling and moving around of all these charges produces currents. Just like currents in simple electrical circuits, these moving charges induce a magnetic field, which, in Mars' case, is quite weak.

Comet Siding Spring is also surrounded by a magnetic field. This results from the solar wind interacting with the plasma generated in the coma - the envelope of gas flowing from a comet's nucleus as it is heated by the sun. Comet Siding Spring's nucleus -- a nugget of ice and rock measuring no more than about one-third mile (half a kilometer) -- is small, but the coma is expansive, stretching out more than 600,000 miles (a million kilometers) in every direction. The densest part of the coma -- the inner region near the nucleus -- is the part of a comet that's visible to telescopes and cameras as a big fuzzy ball.
When comet Siding Spring passed Mars, the two bodies came within about 87,000 miles (roughly 140,000 kilometers) of each other. The comet's coma washed over the planet for several hours, with the dense inner coma reaching, or nearly reaching, the surface. Mars was flooded with an invisible tide of charged particles from the coma, and the powerful magnetic field around the comet temporarily merged with -- and overwhelmed -- the planet's own weak one.

"The main action took place during the comet's closest approach," said Espley, "but the planet's magnetosphere began to feel some effects as soon as it entered the outer edge of the comet's coma."

At first, the changes were subtle. As Mars' magnetosphere, which is normally draped neatly over the planet, started to react to the comet's approach, some regions began to realign to point in different directions. With the comet's advance, these effects built in intensity, almost making the planet's magnetic field flap like a curtain in the wind. By the time of closest approach -- when the plasma from the comet was densest -- Mars' magnetic field was in complete chaos. Even hours after the comet's departure, some disruption continued to be measured.

Espley and colleagues think the effects of the plasma tide were similar to those of a strong but short-lived solar storm. And like a solar storm, the comet's close passage likely fueled a temporary surge in the amount of gas escaping from Mars' upper atmosphere. Over time, those storms took their toll on the atmosphere.

"With MAVEN, we're trying to understand how the sun and solar wind interact with Mars," said Bruce Jakosky, MAVEN's principal investigator from the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder. "By looking at how the magnetospheres of the comet and of Mars interact with each other, we're getting a better understanding of the detailed processes that control each one."

Source: JPL
As they approach the ends of their lives many stars develop stable discs of gas and dust around them.

This material was ejected by stellar winds, whilst the star was passing through the red giant stage of its evolution. These discs resemble those that form planets around young stars. But up to now astronomers have not been able to compare the two types, formed at the beginning and the end of the stellar life cycle.

Although there are many discs associated with young stars that are sufficiently near to us to be studied in depth, there are no corresponding old stars with discs that are close enough for us to obtain detailed images.

But this has now changed. A team of astronomers led by Michel Hillen and Hans Van Winckel from the Instituut voor Sterrenkunde in Leuven, Belgium, has used the full power of the Very Large Telescope Interferometer (VLTI) at ESO's Paranal Observatory in Chile, armed with the PIONIER instrument, and the newly upgraded RAPID detector.

Their target was the old double star IRAS 08544-4431 [1], lying about 4000 light-years from Earth in the southern constellation of Vela (constellation) (The Sails). This double star consists of a red giant star, which expelled the material in the surrounding dusty disc, and a less-evolved more normal star orbiting close to it.

Jacques Kluska, team member from Exeter University, United Kingdom, explains: "By combining light from several telescopes of the Very Large Telescope Interferometer, we obtained an image of stunning sharpness -- equivalent to what a telescope with a diameter of 150 metres would see. The resolution is so high that, for
comparison, we could determine the size and shape of a one euro coin seen from a distance of two thousand kilometres."

Thanks to the unprecedented sharpness of the images [2] from the Very Large Telescope Interferometer, and a new imaging technique that can remove the central stars from the image to reveal what lies around them, the team could dissect all the building blocks of the IRAS 08544-4431 system for the first time.

The most prominent feature of the image is the clearly resolved ring. The inner edge of the dust ring, seen for the first time in these observations, corresponds very well with the expected start of the dusty disc: closer to the stars, the dust would evaporate in the fierce radiation from the stars.

"We were also surprised to find a fainter glow that is probably coming from a small accretion disc around the companion star. We knew the star was double, but weren't expecting to see the companion directly. It is really thanks to the jump in performance now provided by the new detector in PIONIER, that we are able to view the very inner regions of this distant system," adds lead author Michel Hillen.

The team finds that discs around old stars are indeed very similar to the planet-forming ones around young stars. Whether a second crop of planets can really form around these old stars is yet to be determined, but it is an intriguing possibility.

"Our observations and modelling open a new window to study the physics of these discs, as well as stellar evolution in double stars. For the first time the complex interactions between close binary systems and their dusty environments can now be resolved in space and time," concludes Hans Van Winckel.

Source: SpaceRef
The Night Sky

Friday, March 11

• Just after dark, look for the waxing crescent Moon low in the west. Upper right of the Moon by about 14° are the leading stars of Aries. The brightest is 2nd-magnitude Hamal.

Upper left of the Moon by about the same distance (depending where you are) is 2.5-magnitude Menkar, Alpha Ceti.

Saturday, March 12

• The crescent Moon in the west shines below the Pleiades and Aldebaran.

• Catch Algol at its minimum light, magnitude 3.4 instead of its usual 2.1, for a couple hours centered on about 9:25 p.m. EST.

• Daylight-saving time begins at 2 a.m. Sunday morning for most of North America. Clocks spring ahead.

Sunday, March 13

• As dusk turns to night, look upper right of the Moon for the Pleiades and upper left of the Moon for orange Aldebaran.

Monday, March 14

• Aldebaran now shines to the lower right of the Moon. Every day, the Moon moves eastward along its orbit by about 15°.

• Double shadow on Jupiter tonight. Io and Europa are both casting their tiny black shadows onto Jupiter from 10:22 p.m. to 12:34 a.m. EDT; 7:22 to 9:34 p.m. PDT. Jupiter's Great Red Spot rotates into view during this time; it reaches the planet's central meridian around 12:49 a.m. EDT.

Tuesday, March 15

• First-quarter Moon (exactly so at 1:03 p.m. EDT). This evening the Moon shines in the dim Club of Orion, above the bright stars of Orion's body.

• Before dawn brightens on Wednesday morning, look south for Scorpius. Mars will seem (at first glance) to have replaced Beta Scorpii, as shown at right. It's as if the top star of the Scorpius's familiar head has flared up to be ten times brighter!

Source:  Sky & Telescope
ISS Sighting Opportunities

For Denver:

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Sighting information for other cities can be found at NASA’s Satellite Sighting Information

NASA-TV Highlights
(all times Eastern Daylight Time)

10 p.m., Friday, March 11 - Space Station Live (Replay from 3/10) (all channels)
12 p.m., Saturday, March 12 - Video File of the ISS Expedition 47-48 Crew's Soyuz TMA-20M Mating and Rollout to the Launch Pad at the Baikonur Cosmodrome in Kazakhstan (NTV-2 (Education), NTV-3 (Media))
3 p.m., Monday, March 14 - Video File of the ISS Expedition 47-48 Crew Activities (March 3-14) in Baikonur, Kazakhstan (Ovchinin, Skripochka and J. Williams) (all channels)
8:30 a.m., Tuesday, March 15 - ISS Expedition 47 In-Flight Interview with WAAY-TV, Huntsville, Alabama and the CBS Radio Network with Commander Tim Kopra of NASA (starts at 8:45 a.m.) (all channels)

Watch NASA TV on the Net by going to the NASA website.
Space Calendar

- Mar 11 - Moon Occults Asteroid 21 Lutetia
- Mar 11 - Comet 16P/Brooks At Opposition (3.540 AU)
- Mar 11 - Curt Brown’s 60th Birthday (1956)
- Mar 11 - Urbain Le Verrier’s 205th Birthday (1811)
- Mar 12 - Resurs-P N3 Soyuz-2.1b Launch
- Mar 12 - Comet P/2003 T12 (SOHO) Perihelion (0.577 AU)
- Mar 12 - Comet 67P/Churyumov-Gerasimenko At Opposition (1.573 AU)
- Mar 12 - Comet 65P/Gunn At Opposition (2.898 AU)
- Mar 12 - Apollo Asteroid 2016 EU28 Near-Earth Flyby (0.016 AU)
- Mar 12 - Aten Asteroid 2016 Ej27 Near-Earth Flyby (0.025 AU)
- Mar 12 - Asteroid 3895 Earhart Closest Approach To Earth (0.986 AU)
- Mar 12 - Asteroid 7392 Kowalski Closest Approach To Earth (1.427 AU)
- Mar 12 - Asteroid 2875 Lagerkvist Closest Approach To Earth (1.527 AU)
- Mar 12 - Asteroid 7507 Israel Closest Approach To Earth (1.711 AU)
- Mar 12 - Asteroid 231307 Peterfalk Closest Approach To Earth (2.075 AU)
- Mar 12 - Frederick Leonard’s 120th Birthday (1896)
- Mar 13 - Daylight Saving - Set Clock Ahead 1 Hour (United States)
- Mar 13 - International Day of Planetaria
- Mar 13 - Comet 321P/SOHO Closest Approach To Earth (0.160 AU)
- Mar 13 - Comet 73P-BM/Schwassmann-Wachmann Closest Approach To Earth (1.607 AU)
- Mar 13 - Comet 73P-BH/Schwassmann-Wachmann Closest Approach To Earth (1.608 AU)
- Mar 13 - Comet 73P-BA/Schwassmann-Wachmann Closest Approach To Earth (1.621 AU)
- Mar 13 - Comet 267P/LONEOS At Opposition (4.097 AU)
- Mar 13 - Asteroid 757 Portlandia Closest Approach To Earth (1.437 AU)
- Mar 13 - 10th Anniversary (2006), Google Mars Goes Live
- Mar 13 - 30th Anniversary (1986), Giotto, Comet Halley Flyby
- Mar 13 - Albert Stevens’ 130th Birthday (1886)
- Mar 13 - 235th Anniversary (1781), William Herschel’s Discovery of Uranus
- Mar 14 - ExoMars 2016 Proton Launch (Russia/ESA Mars Orbiter/Lander)
- Mar 14 - Pi Day
- Mar 14 - Moon Occults Aldebaran
- Mar 14 - Comet 73P-BE/Schwassmann-Wachmann Closest Approach To Earth (1.587 AU)
- Mar 14 - Comet 73P-BP/Schwassmann-Wachmann Closest Approach To Earth (1.605 AU)
- Mar 14 - Comet 73P-BJ/Schwassmann-Wachmann Closest Approach To Earth (1.606 AU)
- Mar 14 - Comet 336P/McNaught At Opposition (2.558 AU)
- Mar 14 - Comet 269P/Jedicke At Opposition (3.891 AU)
- Mar 14 - Asteroid 582 Olympia Closest Approach To Earth (1.450 AU)
- Mar 14 - Asteroid 6546 Kaye Closest Approach To Earth (1.944 AU)
- Mar 14 - Boulder Solar Day, Boulder, Colorado
- Mar 14 - 80th Anniversary (1936), Red Bank Meteorite Fall in New Jersey (Hit Shed)
- Mar 14 - 85th Anniversary (1931), 1st Liquid Rocket Launch in Europe by Johannes Winkler
- Mar 15 - Comet 73P-AF/Schwassmann-Wachmann At Opposition (0.813 AU)
- Mar 15 - Comet 252P/LINEAR Perihelion (0.996 AU)
- Mar 15 - Comet P/2016 BA14 (PANSTARRS) Perihelion (1.009 AU)
- Mar 15 - Comet 9P/Temple At Opposition (1.062 AU)
- Mar 15 - Apollo Asteroid 2010 FR Near-Earth Flyby (0.089 AU)
- Mar 15 - Asteroid 6 Hebe Closest Approach To Earth (1.893 AU)
- Mar 15 - Asteroid 1756 Giacobini Closest Approach To Earth (1.999 AU)
- Mar 15 - Asteroid 4513 Louvre Closest Approach To Earth (2.145 AU)

Source: JPL Space Calendar
When a fireball whizzed over Florida on Jan. 24, more than a hundred witnesses reported spotting the flare on the American Meteor Society’s website. Within a week, Mike Hankey, an amateur meteorite hunter based nearly a thousand miles away near Baltimore, was holding a muddy chunk of the space rock he found near a swamp.

“With A.M.S. we are connecting the sky to the ground,” Mr. Hankey, 43, said, referring to the fireball tracker he manages for the American Meteor Society, a nonprofit organization that monitors fireballs and meteor showers, when he’s not running a software development business. “People are seeing this object in the sky and then a few weeks later they are holding it in their hands.”

Since last October, citizen scientists like Mr. Hankey have uncovered fragments from at least three different fireball sightings using data collected and analyzed by the society. For his Florida hunt Mr. Hankey reconstructed the trajectory of the fireball from the eyewitness reports and then compared it with Doppler radar readings he received from a colleague at NASA. Doppler radar are normally used to measure rain clouds and weather patterns but on occasion they catch a meteor’s path through the sky. Using both tools, Mr. Hankey pinpointed where the fireball’s fragments could have fallen.
A fireball, if you don’t know, is a bright meteor that streaks through Earth’s atmosphere, usually breaking apart and scattering into small pieces. Most chunks that land on Earth are small, weighing a few pounds at the most. But on occasion they can be large and destructive, like the one that exploded over Chelyabinsk, Russia, in 2013, and was captured on multiple dashcam videos. The fireball that flew over Florida did not cause any damage, but it too was caught on a dashcam.

With the newly drawn treasure map, Mr. Hankey embarked on a 13-hour drive to Jacksonville, Fla., in search of a bounty billions of years old.

Once there he met with a few other amateur meteorite hunters and they began searching a large ranch near the map’s metaphorical “X,” but found nothing. On the second day they set their sights on some swamps near Osceola National Forest.

The team walked through muddy trails, but again found nothing. Then, as Mr. Hankey paused for a stretch, he spotted a glistening black rock, about the size of a thumbnail, amid the dried out grass. The team scored its first meteorite.

“It’s a neat rush,” Mr. Hankey said. He had been on five hunts previously, but had not found one himself. “It’s been traveling for hundreds of millions of miles for billions of years and came down in this giant explosion, and I’m the first person to look at it and find it.”

Two hours later the hunters made their second find about a half a mile away, and the next day they found a few more.

They had hit the jackpot he recalled thinking. “There are meteorites everywhere around here.”

After several days he drove back home. Some of his colleagues stayed behind another week and unearthed their biggest treasure: an 840-gram fragment about the size of a tennis ball. In total the team found six meteorites.

The team mailed samples from the hunt to Alan Rubin, a geophysicist at U.C.L.A. who later confirmed their finds. Dr. Rubin said in an email that he suspected the meteorite they recovered experienced several intense collisions before breaking from its parent asteroid and plummeting to Earth. The team’s finds were only the sixth time that meteorite chunks were found in Florida, according to Mr. Hankey. It was also the first time that a team of meteorite hunters had recovered fragments in the state from a fireball that people had witnessed. Most of the previous meteorites found in the state had been dug up years after they fell.

Reached by phone in Pittsburgh last month, where he was conducting yet another hunt, Mr. Hankey said: “For me to find a meteorite from a fireball I tracked, and find it meters away from where I said it would be it’s supreme validation, to be like, ‘Wow, I connected all these dots.’”

Source: New York Times
NASA's EPIC camera, aboard NOAA's DSCOVR satellite, captured a unique view of this week's solar eclipse. While residents of the Western Pacific looked up in the early morning hours to observe a total eclipse of the sun, DSCOVR looked on from a million miles away and captured the shadow of the moon crossing the planet.

The Earth Polychromatic Imaging Camera (EPIC), a four megapixel CCD camera and telescope, captured the entire event in a series of images.

A million miles away, NOAA's DSCOVR satellite is the Nation's first operational satellite in deep space. DSCOVR hovers between the sun and Earth at all times, maintaining a constant view of the sun and sun-lit side of Earth. From here, the satellite can provide advanced solar measurements and early warnings of potentially dangerous space weather events, acting as a solar storm buoy in deep space.

To view the animated sequence and learn more about this EPIC eclipse, visit: [http://earthobservatory.nasa.gov/OTD/view.php?id=87675&eoan=home&oei=iotd_image](http://earthobservatory.nasa.gov/OTD/view.php?id=87675&eoan=home&oei=iotd_image)

Source: [NOAA](http://earthobservatory.nasa.gov/OTD/view.php?id=87675&eoan=home&oei=iotd_image)