

IAAS Monthly Astronomy Newsletter November 2016



The International Association for Astronomical Studies provides this newsletter as a service for interested persons worldwide.



This newsletter is published on the World Wide Web at <http://www.ki0ar.com/astro.html> - The Home of KI0AR - and is received nationally and internationally. A PDF formatted downloadable version of the newsletter is at http://www.ki0ar.com/current_nl.pdf.

An Open Invitation - For amateur radio operators and scanner enthusiasts, when in the Denver metro area, please join the Colorado Astronomy Net on the [Rocky Mountain Radio League's](#) **146.94 MHz** and **449.825 MHz** repeaters. The RMRL **146.94** repeater is also linked with the WB0WDF Cripple Creek **447.400 MHz** repeater and [Allstar](#) nodes **28298, 28299, 29436**. We are also linked via Echolink, links are **k0jsc-r** and **canoncty**. More information on the WB0WDF repeater links, Allstar nodes and Echolinks can be found at k0jsc.com. The net meets on Tuesday nights at 7 P.M. Mountain Time (US).

Interested in obtaining your Amateur Radio (Ham) License or your General radio Operator's License (GROL)? Visit the [South Metro VE Team](#) website for more information.

The [Colorado Astronomy Net](#) now has a Facebook page. Be sure to "Like" us.



Excerpts from JPL mission updates are provided as a public service as part of the [JPL Solar System Ambassador / NASA Outreach](#) program.

In This Newsletter...

The Month At-A-Glance	4
The Moon	4
Phases:	4
Moon/Planet Pairs:	4
The Planets & Dwarf Planets	4
Planetary Highlights for November	5
Venus	5
Earth	5
Mars	5
Jupiter	5
Saturn	6
Uranus	6
Neptune	6
Dwarf Planets	6
Ceres	6
Pluto	6
Astronomical Events	7
Meteor Showers	7
Comets	7
Eclipses	8
Observational Opportunities	8
Asteroids	8
Occultations	9
Member Meteor Sightings	9
Subscriber Gallery	10
Planetary/Lunar Exploration Missions	11
Juno	11
Cassini	11
New Horizons	12
Dawn	12
MESSENGER	13
Pack Your Backpack	13
Mars Missions	14
JMARS	14
Laboratory for Atmospheric and Space Physics	15
MAVEN	15
Mars Science Laboratory - Curiosity	16
Mars Exploration Rover Mission (Spirit and Opportunity)	16
Mars Reconnaissance Orbiter Mission	18
Journey to Mars	19
Mars Missions Status	19
Astronomy Links and Other Space News	20
Colorado Astronomy Links	20
Radio Astronomy Links	20
Other Astronomy Links	20

Acknowledgments and References	20
Subscription Information	20
Keep looking UP!	20

The [Month At-A-Glance](#)

The current month's calendar displaying the daily astronomical events.

The Moon

Phases:

- First Quarter Moon occurs on the 7th.
 - Full Moon occurs on the 14th.
 - Last Quarter Moon occurs on the 21st.
 - New Moon occurs on the 29th.
-
- The Moon is at Perigee on the 14th, 221,524 miles from Earth.
 - The Moon is at Apogee on the 27th, 252,621 miles from Earth.



Moon/Planet Pairs:

- The Moon passes 4° north of Saturn on the 2nd.
- The Moon passes 7° north of Venus on the 2nd.
- The Moon passes 5° north of Mars on the 6th.
- The Moon passes 1.0° north of Neptune on the 9th.
- The Moon passes 3° south of Uranus on the 12th.
- The Moon passes 0.4° north of Aldebaran on the 15th.
- Mercury passes 3° north of Antares on the 18th.
- The Moon passes 1.9° north of Jupiter on the 24th.
- The Moon passes 7° north of Mercury on the 30th.

For reference: The Full Moon subtends an angle of 0.5° .

The Planets & Dwarf Planets

[Planetary Reports](#) are generated by "TheSky" software. These reports provide predicted data for the planets on the first of each month for the current year. The rise and set times for the Sun and the Moon for each day of the month as well as meteor shower radiants are also included in the reports. These reports have been optimized for the Denver, Colorado location, however, the times will be approximate for other locations on Earth.

(All times are local unless otherwise noted.)

Planetary Highlights for November

With the skies getting darker, earlier for those of us in the northern hemisphere, November nights will bring us excellent views of most of the solar system's major planets. Jupiter remains a morning object. The others, Venus, Mars and Saturn, can easily be spotted soon after sunset. Though you will need a small telescope, Neptune and Uranus are also visible in the early evening skies. Look for the Leonids meteor shower peaking around mid-month.

Mercury

Is lost in the evening twilight glow until mid-month. Look for Mercury during the last week of November in the evening sky. Mercury sets at around 5:39 p.m. by month's end. Mercury moves from the constellation of Libra into Sagittarius this month shining at magnitude -0.5 on the 30th.

Venus

Sets at 7:54 p.m. on the 1st and about 7:36 p.m. by month's end. Look for Venus in the early evening towards the south-western horizon this month. On the evening of the 2nd, look for Venus, Saturn, a thin crescent Moon and Antares, just above the southwest horizon about 30 minutes after sunset. Venus moves from the constellation of Ophiuchus into Sagittarius shining at magnitude -4.1.



Earth

[Daylight Saving Time](#) ends at 2:00 a.m. local time on the 6th for most of the United States and several other countries.

Mars

Sets at 10:42 p.m. on the 1st and about 11:38 p.m. by month's end. Look for Mars about an hour or so after sunset to the south. Mars moves from the constellation of Sagittarius into Capricornus shining at magnitude 0.5.

Jupiter

Rises about 5:07 a.m. on the 1st and about 2:37 a.m. by month's end. Look for Jupiter in the early morning to the east-southeast before sunrise. Jupiter is in the constellation of Virgo shining at magnitude -1.7.



Saturn

Sets at 7:55 p.m. on the 1st and about 5:10 p.m. by month's end. Look for Saturn towards the southwest just ahead of Mars in the evening sky. Saturn is rapidly approaching the western horizon as the month progresses, so try to view Saturn earlier in the month before it begins to be lost in the evening twilight glow. Saturn is in the constellation of Ophiuchus shining at magnitude 0.5.

Uranus

Rises at 5:06 p.m. on the 1st and about 2:05 p.m. by month's end. Uranus is visible almost all night long this month. Uranus is in the constellation of Pisces shining at magnitude 5.7.

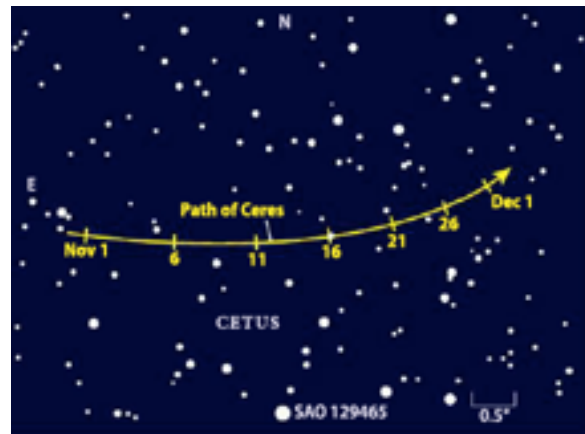
Neptune

Rises at 3:25 p.m. on the 1st and about 12:27 p.m. by month's end. Neptune is visible in the early evening until the very early hours of the morning. Neptune is in the constellation of Aquarius shining at magnitude 7.9.

Dwarf Planets

Ceres

Rises at 6:08 p.m. on the 1st and about 2:49 p.m. by month's end. Ceres, like Neptune, is visible in the early evening until the very early hours of the morning as long as you have nice dark skies. Ceres is in the constellation of Cetus shining at magnitude 7.8.



Pluto

Sets at 10:05 p.m. on the 1st and about 7:10 p.m. by month's end. Look to the southwest, between Mars and Venus, to spot Pluto in the evening skies. Pluto is in the constellation of Sagittarius shining at magnitude 14.2.

As always, good luck at spotting Neptune, Ceres and Pluto, a large telescope and dark skies will be needed.

Astronomical Events

Meteor Showers

The Leonids - The duration of this shower covers the period of Nov. 14-20. Maximum occurs on Nov. 17. The maximum hourly rate typically reaches 10-15, but most notable are periods of enhanced activity that occur every 33 years - events that are directly associated with the periodic return of comet Tempel-Tuttle. During these exceptional returns, the Leonids have produced rates of up to several thousand meteors per hour. The Leonids are swift meteors, which are best known for leaving a high percentage of persistent trains.



Unfortunately, a waning gibbous Moon will wash out many faint meteors, but you may still be able see some of the brighter ones.

For more information about Meteor Showers, visit Gary Kronk's Meteor Showers Online web page at <http://meteorshowersonline.com/>.

Meteor Scatter (or Meteor burst communications) - http://en.wikipedia.org/wiki/Meteor_burst_communications "is a radio propagation mode that exploits the ionized trails of meteors during atmospheric entry to establish brief communications paths between radio stations up to 2,250 kilometres (1,400 mi) apart." Tune your shortwave or your HF amateur radio to 54.310 MHz SSB CW and see if you can hear any pings.

Comets

Comet Johnson (C/2015 V2) is making it's first appearance to the inner solar system this month. Comet Johnson is expected to glow around 12th magnitude as it passes through the constellation of Canes Venatici.

For information, orbital elements and ephemerides on observable comets visit the Observable Comets page from the Harvard-Smithsonian Center for Astrophysics.

<http://cfa-www.harvard.edu/iau/Ephemerides/Comets/index.html>



For more information about Comets, visit Gary Kronk's Cometography.com web page at <http://cometography.com/>.

Eclipses

- Solar Eclipses
 - N/A.
- Lunar Eclipses
 - N/A.

Observational Opportunities

(from evening to morning)

- Observe Venus, Saturn and Mars in the early evening after sunset.
- Try to observe Uranus, Neptune and Ceres after the skies darken to the southwest.
- Look for Jupiter towards the southeast before sunrise.
- Try to spot some of the Leonid meteors streaking through the night sky around mid month.

Asteroids

(From west to east)

- **Melpomene** is in the constellation of Cetus.
- **Eurynome** is at opposition on the 3rd in the constellation of Cetus.
- **Vesta** is in the constellation of Cancer.

Information about the Minor Planets can be found at <http://www.minorplanetobserver.com> the Minor Planet Observer web site.

Occultations



Information on various occultations can be found at <http://lunar-occultations.com/iota/iotandx.htm>, the International Occultation Timing Association's (IOTA) web site.

Member Meteor Sightings

This is a new section where I will post meteor, fireball, etc sightings that have been published on the [American Meteor Society](#)'s web site. I want to make this an active section of the web pages and newsletter and would like to publish the links to member sightings. If you have any published sightings, please provide me with the links and I will post them here for all to enjoy.

<u>Event ID</u>	<u>Date/Time</u>	<u>Location</u>	<u>Observer</u>	<u>Link</u>
3587-2015	2015-11-22 17:38 MST	CO	Kevin S	3587aw
3829-2015	2015-12-05 18:06 MST	CO	Burness A	3829a
3871-2015	2015-11-13 01:55 MST	CO	Charles N	3871a

Subscriber Gallery

I have created a web page containing images taken and submitted by subscribers to the email newsletter, check-ins to the Colorado Astronomy Net and readers of the online newsletter and some of my own images. Any one wishing to submit their images to the gallery, please let me know. The images must be taken by the submitter and be astronomy related. Please include a description and your information so that I can give proper credit to your work. I will post the most recent submissions here.



A satellite is seen reflected in the water: March 11, 2016

Taken by: Kimberly Thornton

Location: Colorado City, CO

Kimberly's images are in the process of getting added to the Gallery. This is just one of her images she has sent me.

Planetary/Lunar Exploration Missions

(Excerpts from recent mission updates)



Juno

October 25, 2016

NASA's Juno Mission Exits Safe Mode, Performs Trim Maneuver - Mission Status Report

[Full Article and Image](#)

"NASA's Juno spacecraft at Jupiter has left safe mode and has successfully completed a minor burn of its thruster engines in preparation for its next close flyby of Jupiter.

Mission controllers commanded Juno to exit safe mode Monday, Oct. 24, with confirmation of safe mode exit received on the ground at 10:05 a.m. PDT (1:05 p.m. EDT). The spacecraft entered safe mode on Oct. 18 when a software performance monitor induced a reboot of the spacecraft's onboard computer. The team is still investigating the cause of the reboot and assessing two main engine check valves."

More information on the Juno mission is available at:

<http://www.nasa.gov/juno>

The public can follow the mission on Facebook and Twitter at:

<http://www.facebook.com/NASAJuno>

<http://www.twitter.com/NASAJuno>



Cassini

October 27, 2016

Spooky Saturn

[Full Article & Images](#)

"Like any extended family, the Cassini mission enjoys holiday traditions - such as transforming our homepage into a spooky landscape for Halloween.

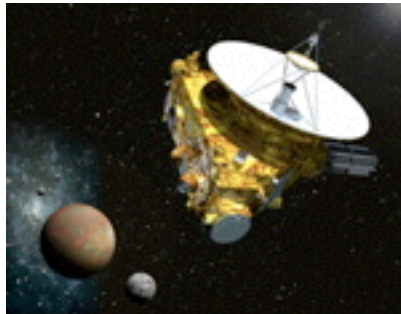
This year ñ the mission's last Halloween ñ we offer a tongue-in-cheek preview of Cassini's Grand Finale, a series of 22 spectacular dives between Saturn's cloud tops and innermost rings ending in September 2017 with a plunge into the planet."



The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of the California Institute of Technology, Pasadena, manages the mission for NASA's Science Mission Directorate in Washington.

Raw images are available at <http://saturn.jpl.nasa.gov/photos/raw/index.cfm>.

More information about Cassini is available at the following sites:
<http://saturn.jpl.nasa.gov> & <http://www.nasa.gov/cassini>.



New Horizons
October 18, 2016
Partly Cloudy on Pluto?

[Full Article and Images](#)

"Pluto's present, hazy atmosphere is almost entirely free of clouds, though scientists from NASA's New Horizons mission have identified some cloud candidates after

examining images taken by the New Horizons Long Range Reconnaissance Imager and Multispectral Visible Imaging Camera, during the spacecraft's July 2015 flight through the Pluto system. All are low-lying, isolated small features-no broad cloud decks or fields - and while none of the features can be confirmed with stereo imaging, scientists say they are suggestive of possible, rare condensation clouds. "

[New Horizons gallery](#)

For more information on the New Horizons mission - the first mission to the ninth planet - visit the New Horizons home page: <http://pluto.jhuapl.edu/>.



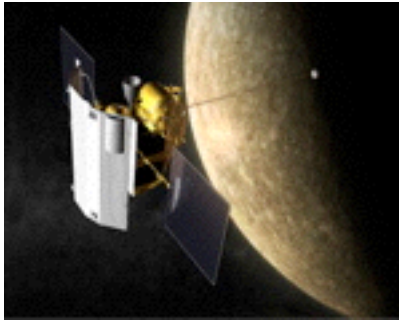
Dawn
September 01, 2016
NASA Discovers "Lonely Mountain" on Ceres Likely a Salty-Mud

[Video](#)

"An isolated mountain near the equator of the dwarf planet Ceres resembles a volcanic dome, according to new observations from NASA's Dawn mission. Like the "Lonely Mountain" Erebor in J.R.R. Tolkien's mythology, Ahuna Mons on Ceres was once occupied by a dragon, but one that "breathed" ice, not fire. The mountain likely formed as a salty-mud volcano.

Instead of molten rock, salty-mud volcanoes, or "cryovolcanoes," release frigid, salty water sometimes mixed with mud."

For more information on the Dawn mission, visit the Dawn home page: http://www.nasa.gov/mission_pages/dawn/main/index.html.



MESSENGER

May 30, 2016

The MESSENGER mission is officially ended but there is a lot to learn about the planet closest to our Sun. Visit the new, updated MESSENGER website:

"UNLOCKING THE MYSTERIES OF PLANET MERCURY"

for resources, to learn, and to explore.

The [MESSENGER app](#) is available for download on iTunes.

For more information on the MESSENGER mission, visit the MESSENGER home page: <http://messenger.jhuapl.edu/>.

Pack Your Backpack

Calling all explorers! Tour JPL with our new Virtual Field Trip site. Stops include Mission Control and the Rover Lab. Your guided tour starts when you select a "face" that will be yours throughout the visit. Cool space images and souvenirs are all included in your visit.

+ <http://virtualfieldtrip.jpl.nasa.gov/>

Past, Present, Future and Proposed JPL Missions - <http://www.jpl.nasa.gov/missions>.

For special JPL programs and presentations in your area visit the JPL Solar System Ambassador web site at <http://www2.jpl.nasa.gov/ambassador/index.html>.

Mars Missions

[Be A Martian](#)



Mars website mobile version is here!

Simply type

<http://mars.jpl.nasa.gov>

into your mobile browser.



Mars on the Go! NASA Be A Martian Mobile App

If you want the latest news as it happens, try our Be A Martian app.

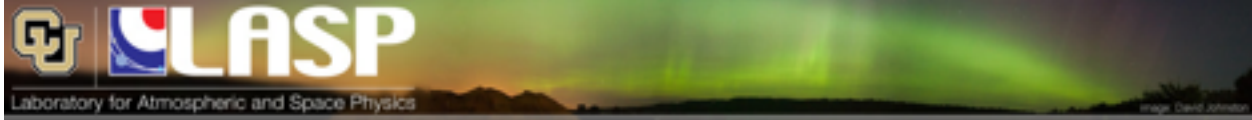
Download on Mobile Devices

Android | iPhone | Windows Phone

JMARS



JMARS is an acronym that stands for Java Mission-planning and Analysis for Remote Sensing. It is a geospatial information system (GIS) developed by ASU's Mars Space Flight Facility to provide mission planning and data-analysis tools to NASA's orbiters, instrument team members, students of all ages, and the general public. <https://jmars.mars.asu.edu/>



Laboratory for Atmospheric and Space Physics

"The Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado Boulder (CU) began in 1948, a decade before NASA. We are the world's only research institute to have sent instruments to all eight planets and Pluto.

LASP combines all aspects of space exploration through our expertise in science, engineering, mission operations, and scientific data analysis. As part of CU, LASP also works to educate and train the next generation of space scientists, engineers and mission operators by integrating undergraduate and graduate students into working teams. Our students take their unique experiences with them into government or industry, or remain in academia to continue the cycle of exploration.

LASP is an affiliate of [CU-Boulder AeroSpace Ventures](#), a collaboration among aerospace-related departments, institutes, centers, government labs, and industry partners."



MAVEN

October 19, 2016

MAVEN Observes Ups and Downs of Water Escape from Mars

[Full Article & Images](#)

"After investigating the upper atmosphere of the Red Planet for a full Martian year, MAVEN has determined that escaping water does not always go gently into space.

Sophisticated measurements made by a suite of instruments on the MAVEN spacecraft revealed the ups and downs of hydrogen escape-and therefore water loss. The escape rate peaked when Mars was at its closest point to the sun and dropped off when the planet was farthest from the sun. The rate of loss varied dramatically overall, with 10 times more hydrogen escaping at the maximum."

Visit [LASP](#) and [MAVEN](#) for more information.

Mars Science Laboratory - Curiosity

October 28, 2016

Curiosity Mission Updates



[Full Article and Images](#)

"Sol 1503: Simple Plan

Everything went well in yesterday's plan, with our drive taking us 25 meters farther along our "Mt. Sharp Ascent Route." We started the day with some challenges caused by connectivity issues with team members outside of the US, particularly the ChemCam team. They were able to get at least one computer connected to JPL, however, so we were able to plan without too much trouble overall."

To follow the Mars Curiosity rover and NASA on Foursquare, visit: <http://www.foursquare.com/MarsCuriosity> and <http://www.foursquare.com/NASA>



For information about NASA's partnership with Foursquare, visit: <http://www.nasa.gov/connect/foursquare.html>.

[Mars Rover Landing](#) - Free for the Xbox (requires Kinect)

Visit the Mars Science Laboratory page at <http://mars.jpl.nasa.gov/msl>.

Mars Exploration Rover Mission (Spirit and Opportunity)

October 18, 2016



SPiRiT UPDATE: Spirit Remains Silent at Troy - sols 2621-2627, May 18-24, 2011:

"More than 1,300 commands were radiated to Spirit as part of the recovery effort in an attempt to elicit a response from the rover. No communication has been received from Spirit since Sol 2210 (March 22, 2010). The project concluded the Spirit recovery efforts on May 25, 2011. The remaining, pre-sequenced ultra-high frequency (UHF) relay passes scheduled for Spirit on board the Odyssey orbiter will complete on June 8, 2011.

Total odometry is unchanged at 7,730.50 meters (4.80 miles)."

OPPORTUNITY UPDATE: Preparations for an Attempt to Image Mars Arrival - sols 4522-4527, October 12, 2016-October 18, 2016:

"Opportunity is located at the feature called 'Spirit Mound' on the rim of Endeavour Crater, the first science waypoint of the 10th extended mission.

The rover is continuing the in-situ (contact) investigation of several targets in this area. The rover is also preparing for the imaging of the ESA Schiaparelli Entry, Descent and Landing Demonstrator Module (EDM).

Several practice images with the Panoramic Camera (Pancam) were tried over several sols. On Sol 4522 (Oct. 12, 2016), in addition to several practice images, Opportunity used the robotic arm to investigate the surface target called 'Jefferson City.' The rover collected a Microscopic Imager (MI) mosaic and then placed the Alpha Particle X-ray Spectrometer (APXS) on the target. Later on Sol 4524 (Oct. 14, 2016), the rover offset the APXS relative to the initial target for further integration. Selective Pancam panoramas and targeted 13-filter images were also collected. On Sol 4527 (Oct. 18, 2016), the rover bumped just over a meter to some new targets.

The rover will stay put for the next few sols as the Schiaparelli EDM entry, decent and landing occurs. Opportunity will attempt the imaging of the landing on Sol 4528 (Oct. 19, 2016). (Update information indicates that the lander did not come into view of the camera, however.)

As of Sol 4527 (Oct. 18, 2016), the solar array energy production is 506 watt-hours with an atmospheric opacity (τ) of 0.909 and an improved solar array dust factor of 0.743.

Total odometry is 26.99 miles (43.44 kilometers)."

Landing sites link - <http://marsoweb.nas.nasa.gov/landingsites/>

Visit the Mars Exploration Rover page at <http://marsrovers.jpl.nasa.gov/home/index.html>.

Mars Reconnaissance Orbiter Mission

October 27, 2016

Further Clues to Fate of Mars Lander, Seen From Orbit



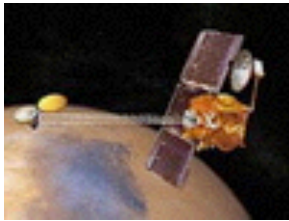
[Full Article and Images](#)

"The most powerful telescope orbiting Mars is providing new details of the scene near the Martian equator where Europe's Schiaparelli test lander hit the surface last week.

An Oct. 25 observation using the High Resolution Imaging Science Experiment (HiRISE) camera on NASA's Mars Reconnaissance Orbiter shows three impact locations within about 0.9 mile (1.5 kilometers) of each other."

MARS RECONNAISSANCE ORBITER HIRISE IMAGES

All of the HiRISE images are archived here: <http://hirise.lpl.arizona.edu/>.
More information about the MRO mission is available online at <http://www.nasa.gov/mro>.



Mars Odyssey Orbiter

August 23, 2016

Test for Damp Ground at Mars' Seasonal Streaks Finds None

[Full Article and Images](#)

"Seasonal dark streaks on Mars that have become one of the hottest topics in interplanetary research don't hold much water, according to the latest findings from a NASA spacecraft orbiting Mars.

The new results from NASA's [Mars Odyssey](#) mission rely on ground temperature, measured by infrared imaging using the spacecraft's Thermal Emission Imaging System ([THEMIS](#)). They do not contradict last year's identification of hydrated salt at these flows, which since their 2011 discovery have been regarded as possible markers for the presence of liquid water on modern Mars. However, the temperature measurements now identify an upper limit on how much water is present at these darkened streaks: about as much as in the driest desert sands on Earth.

When water is present in the spaces between particles of soil or grains of sand, it affects how quickly a patch of ground heats up during the day and cools off at night."

DAILY MARS ODYSSEY THEMIS IMAGES

Thermal Emission Imaging System (THEMIS) web site: (<http://themis.asu.edu/gallery>)

The Odyssey data are available through a new online access system established by the Planetary Data System at: <http://starbrite.jpl.nasa.gov/pds/>

Visit the Mars Odyssey Mission page at <http://mars.jpl.nasa.gov/odyssey/index.html>.



Journey to Mars
InSight - Revealing the Heart of Mars
September 02, 2016
NASA Approves 2018 Launch of Mars InSight Mission

"InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) is a NASA Discovery Program mission that will place a single geophysical lander on Mars to study its deep interior.

NASA is moving forward with a spring 2018 launch of its InSight mission to study the deep interior of Mars, following final approval this week by the agency's Science Mission Directorate."

Learn more about the InSight mission at: <http://www.jpl.nasa.gov/missions/insight/>

Mars Missions Status

New Mars missions are being planned to include several new rover and sample collection missions. Check out the Mars Missions web page: <http://mars.jpl.nasa.gov/missions/> and the Mars Exploration page: <http://marsprogram.jpl.nasa.gov/>.

[Astronomy Links and Other Space News](#)

(If you have a link you would like to recommend to our readers, please feel free to submit it.)

[Colorado Astronomy Links](#)

[Radio Astronomy Links](#)

[Other Astronomy Links](#)

Acknowledgments and References

Much of the information in this newsletter is from "Astronomy Magazine" (Kalmbach Publishing), JPL mission status reports, "Meteor Showers - A Descriptive Catalog" by Gary W. Kronk and other astronomical sources that I have stashed on my book shelves.

The author will accept any suggestions, constructive criticisms, and corrections. Please feel free to send me any new links or articles to share as well. I will try to accommodate any reasonable requests. Please feel free to send questions, comments, criticisms, or donations to the email address listed below. Enjoy!

Subscription Information

- Email Newsletter archives -

http://ki0ar.com/pipermail/astronews_ki0ar.com/

- Full documentation of the online administration system is available at http://ki0ar.com/mailman/listinfo/astronews_ki0ar.com.

- The latest version of the newsletter is accessible from <http://www.ki0ar.com/astro.html>.

Keep looking UP!

73 from KI0AR

Created by Burness F. Ansell, III
ki0ar@ki0ar.com

COO, Director of Aerospace Technologies, IAAS
JPL Solar System Ambassador, Colorado
Last modified: November 01, 2016