

# Southwest Florida Astronomical Society SWFAS



## The Eyepiece December 2018

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### A MESSAGE FROM THE PRESIDENT

Its election time! If you are interested in one of the officer or coordinator positions or are looking to step out of the position, please let me know before the meeting.

We have 2 star party nights this month at Seahawk due to a scheduling issue. We have the 8<sup>th</sup> on the Cape Coral city calendar and I put the 15<sup>th</sup> in our schedule of events. We will be planning on setting up both nights. The 15<sup>th</sup> is just after Geminid peak so we may have some meteors visible.

Our schedule for Star Parties for 2019 is now set. We are looking at also holding an event at SeaHawk Park on Sunday Night Jan 20<sup>th</sup> for the lunar eclipse. As this is a holiday weekend, many people and kids will not have work or school the next day.

Phil Jansen has several items that he will be giving out as door prizes at the meeting.

Dues were increased to \$25.00 per year as of the November meeting. We are starting to collect the 2019 dues. If you had already paid the 2019 dues, you do not have to worry about the difference. If you have any issues, please privately contact an officer.

Brian

## **Program this Month**

The planetarium program entitled "The Sun, Our Living Star" will be featured at the December 6th meeting of the South West Florida Astronomical Society. This program vividly tells the story of our nearest star, our planet's powerhouse and the source of energy that drives the Earth's wind and weather. It is the ball of light that allows for the very existence of life on Earth. The program will begin at 7:30pm on Thursday, December 6th, at the Calusa Nature Center and Planetarium in Fort Myers. The regular monthly business meeting of the SWFAS will be held immediately thereafter which will include the election of officers for 2019. We hope to see you at the planetarium on Thursday, December 6th.

Michael J. McCauley  
Program Coordinator  
SWFAS

## **Star Party Schedule 2019**

**Big Cypress** - Jan 5<sup>th</sup>, Feb 2<sup>nd</sup>, Mar 2<sup>nd</sup>

**SeaHawk Park** – Jan 12<sup>th</sup>, Jan 20<sup>th</sup>, Feb 9<sup>th</sup>, April 13<sup>th</sup>, May 11<sup>th</sup>, June 1<sup>st</sup>, July 6<sup>th</sup>,  
Aug 3<sup>rd</sup>, Aug 31<sup>st</sup>, Sept 28<sup>th</sup>, Nov 30<sup>th</sup>

**Caloosahatchee Regional Park** – Mar 9<sup>th</sup>, Apr 6<sup>th</sup>, May 4<sup>th</sup>, Oct 26<sup>th</sup>, Nov 2<sup>nd</sup>, Nov 30<sup>th</sup>

**Rotary Park** – Cape Coral – March 8<sup>th</sup>

We have scheduled some of the Seahawk Park nights to coincide with the moon being a crescent to 1<sup>st</sup> quarter stage to allow for lunar observing.

## **In the Sky this Month**

### **Moon:**

New – Dec 7; 1<sup>st</sup> Quarter – Dec 16; Full – Dec 22; Last Quarter – Dec 29.

**Mercury** moves quickly this month into morning view after inferior conjunction on 27 November. Its magnitude increases from a dim level to +0 by the 8<sup>th</sup> to close to -0.4 by the end of December. It will move to close conjunction with Jupiter this month. It will reach greatest elongation from the sun by the 15<sup>th</sup> (21°)

**Venus** remains about 32° at about 45 minutes before sunrise for the month, appearing in the Southeast above and to the right of Mercury. During the month the brightness changes from only -4.9 to -4.6, and the angular diameter shrinks from 41" to 26".

**Mars** appears in the evening Southern sky about halfway up through December setting consistently around 11:30 p.m. At midmonth, about an hour after sunset, it is almost directly above the Moon. It quickly moves from Aquarius to Pisces. It is almost conjunction with Neptune on 7 December. During December Mars also continues to shrink, from 9" to 7 1/2".

**Jupiter** follows Mercury up into view about an hour before sunrise about December 12. Its brightness is about -1.7. In early December it moves into Scorpius, into Ophiuchus by the end of the 3<sup>rd</sup> week, passing 5° on the upper left of Antares. The "King" of the planets is then about 1° from Mercury, appearing 31" across vs. 6" for the "Winged Messenger".

**Saturn** begins the month setting about two hours after the Sun. By December 7, it continues to get brighter, reaching magnitude -0.5, about 8 1/2° high looking Southwest, 30 minutes after sunset (a good binocular target).

**Uranus** is still between Aries to Pisces, and is highest in late evening. See <https://is.gd/urnep> for a finder chart or pages 48-49 in September issue of *Sky & Telescope*.

**Neptune**, at such a distance, changes just a little from November, at magnitude 7.9 in Aquarius at 2.3" wide. It will get very close to Mars. In the Western Hemisphere on the evening of the 6<sup>th</sup>, the two planets appear separated by 20' shortly after sunset, and just 15' apart on the evening of the 7<sup>th</sup>. See <https://is.gd/urnep> for a finder chart or pages 48-49 in September issue of *Sky & Telescope*.

**International Space Station**: The ISS is visible in the early evening skies over Ft Myers from December 11<sup>th</sup> through 17<sup>th</sup>, and during early morning from the 21<sup>st</sup> to the 25<sup>th</sup>. Brightness will vary from -0.4 to -4.0. See this link for specific times and routes for the ISS: <http://www.heavens-above.com/>

The **Hubble Space Telescope** will be visible early mornings during the first half of December and early evenings during the second half. See this link for specific times and routes for the HST: <http://www.heavens-above.com/>

## Southwest Florida Astronomical Society, Inc. Event Schedule for 2018/2019

<b>Date</b>	<b>Event</b>	<b>Location</b>	<b>Time/Note</b>
Dec 6 <sup>th</sup> , 2018	Monthly Meeting	Calusa Nature Center Planetarium	7:30pm
Dec 7 <sup>th</sup> , 2018	Public Observing	FSW Moore Observatory Punta Gorda Campus	Dusk
Dec 8 <sup>th</sup> , 2018	Monthly Star Party	Seahawk Park -Cape Coral	Dusk
Dec 15 <sup>th</sup> , 2018	Solar Observing	Harbor Heights Park Punta Gorda	9:00 am - Noon
Dec 15 <sup>th</sup> , 2018	Monthly Star Party 2	Seahawk Park Cape Coral	Dusk
Jan 3 <sup>rd</sup> , 2019	Monthly Meeting	Calusa Nature Center Planetarium	7:30pm
Jan 4 <sup>th</sup> , 2019	Public Observing	FSW Moore Observatory Punta Gorda Campus	Dusk
Jan 5 <sup>th</sup> , 2019	Big Cypress Observing Night	Big Cypress Welcome Center Ochopee	7:00pm
Jan 12 <sup>th</sup> , 2019	Monthly Star Party	Seahawk Park -Cape Coral	Dusk
Jan 19 <sup>th</sup> , 2019	Solar Observing	Gilchrist Park Punta Gorda	9:00 am - Noon
Jan 20 <sup>th</sup> , 2019	Lunar Eclipse	Seahawk Park -Cape Coral	10pm-2am
Feb 1 <sup>st</sup> , 2019	Public Observing	FSW Moore Observatory Punta Gorda Campus	Dusk
Feb 2 <sup>nd</sup> , 2019	Big Cypress Observing Night	Big Cypress Welcome Center Ochopee	7:00pm
Feb 7 <sup>th</sup> , 2019	Monthly Meeting	Calusa Nature Center Planetarium	7:30pm
Feb 9 <sup>th</sup> , 2019	STEMtastic Day of Discovery	Lee County School Board Complex	10am – 3pm
Feb 9 <sup>th</sup> , 2019	Monthly Star Party	Caloosahatchee Regional Park	Dusk
Feb 16 <sup>th</sup> , 2019	Solar Observing	Bayshore Live Oak Park Port Charlotte	9:00 am - Noon
Feb 23 <sup>rd</sup> , 2019	Burrowing Owl Festival	Rotary Park Cape Coral	10:00 am – 4pm
March 1 <sup>st</sup> , 2019	Public Observing	FSW Moore Observatory Punta Gorda Campus	Dusk
March 2 <sup>nd</sup> , 2019	Big Cypress Observing Night	Big Cypress Welcome Center Ochopee	7:30pm
March 7 <sup>th</sup> , 2019	Monthly Meeting	Calusa Nature Center Planetarium	7:30pm
March 8 <sup>th</sup> , 2019	Rotary Park Star Party	Rotary Park Cape Coral	Dusk
March 9 <sup>th</sup> , 2019	Monthly Star Party	Caloosahatchee Regional Park	Dusk
Mar 16 <sup>th</sup> , 2019	Solar Observing	Ponce deLeon Park Punta Gorda	9:00 am - Noon

***All observing events are Weather Permitting.  
If it is cloudy or a chance of rain, we may not setup at all.  
There may be no way to provide advance notice of cancellation.***

**Events may be cancelled several hours before scheduled time based on observed conditions and forecasts at that time and weather may change.**

**Monthly Star Parties:** These are held at either Seahawk Park in Cape Coral or at Caloosahatchee Regional Park (CRP) off SR78 7 miles east of SR31. Other than park fees noted, these are free and open to the public. Those wanting to learn how to use equipment can bring it to the monthly star parties or the monthly meetings. We are always glad to help people learn how to use their telescopes. It is also a great way to learn about different telescopes and try some out before making a purchase.

**Seahawk Park** is in North Cape Coral off Wilmington Blvd. (Nelson Rd or Chiquita Blvd are the nearest cross streets.) There is a brown sign in the center median at the entrance to the park. (GPS may not get you to the park, as some of the local roads have been closed.) You will make a big J hook before getting to the parking area. Seahawk Park is managed by the *Cape Coral R/Seahawks* Club for Radio Controlled Planes and they have priority. They are usually done by sunset but may be there before sunrise. Park in the lot and transport your equipment to the concrete staging area before the runway. This park is handicap capable as there is level concrete leading from parking to the staging area.

**CRP** has a gate that closes at dusk, you can check the county's website for current gate closing times and the status of the park's Northside entrance as that is where we observe from. (They may close the area if there are issues with the trails.) There is a parking fee of \$1/hr or \$5/day at CRP. Park in the main Northside parking lot. We sometimes setup down the dirt road that goes to the east. That area is grassy and may not be level, so one should walk on the dirt road as much as possible and watch their step.

**Big Cypress:** The Big Cypress Visitor Center is located off US41 5 miles east of SR29 about 25 miles east of Naples. Big Cypress has earned a Dark Sky Park designation. They hold observing events down the road that extends south of the Visitor Center during the winter months. This is a real dark sky site. Their observing events are free.

**Solar Events:** We have daytime solar events where one can safely look at the Sun. Things such as sunspots and prominences may be visible. These are free unless tied to another event that may have an entrance fee. There are seasonal monthly events held at different parks around Charlotte County as well as at other major public events in SW FLA.

**Rotary Park Star Party:** This is a free public star party held at Rotary Park at the south end of Pelican Blvd in South Cape Coral. Park to the west of the main building and walk to where we are setup to the east of the main building.

**Moore Observatory, FSW Punta Gorda Campus:** The campus is located off Airport Rd just east of I-75. Go to the right around the lake and park. The observatory is located down the path along the lake. Besides the telescope in the observatory, additional scopes may be setup around the observatory. This is a free event.

**Star Party Etiquette:** Bright white flashlights are not welcome. We use red flashlights to preserve our night vision. At the parks, please use just your parking lights if possible. As there may be cords and tripod legs that are hard to see in the dark, we ask that all children be well behaved and cautious around the telescopes. If you need help in moving around in the dark, just ask. Someone will be happy to guide you with a red light. If you have a telescope and need help with it, just ask. Someone will be glad to show you how to use it.

**Golden Rules to Telescope Observing:** Move your eye to the telescope, don't try to move the telescope to your eye! Ladders/chairs are there for your support, the telescopes do not provide support and should not be touched.

## **Minutes of the Southwest Florida Astronomical Society – November 1, 2018**

The regular monthly business meeting of the Southwest Florida Astronomical Society was called to order at 7:28 pm by president Brian Risley in the Calusa Nature Center Planetarium.

Thirty-two people were present including two visitors.

Program chairman Mike McCauley introduced Scott Flaig, who presented the program on whether intelligent life exists elsewhere in the Universe.

At 8:35pm the business meeting resumed.

Based on the discussion at last month's business meeting, Bill Francis made a motion to increase the annual membership dues from \$20 to \$25. Jean Pilon seconded the motion. It was stipulated that we will accept \$20 for new members who join based on any currently existing printed application forms. After a discussion, the motion passed 23 to 1.

Based on a suggestion from treasurer Tim Barrier, Tony Heiner made a motion, seconded by Mike McCauley, to set up and track a separate fund within the club savings account to use for donations to community organizations. The motion passed on a voice vote.

The past events listed in the printed agenda were reviewed. Upcoming events listed in the printed agenda were discussed.

Election of officers for 2019 will be held during the December meeting.

Bill Hammond reported that Babcock Ranch has a dark sky policy, and would like to do an evening program on December 7.

Two members have equipment for sale. Phil Jansen will give away some equipment at the December meeting.

Brian Risley discussed the possibility of scheduling more than one star party each month, utilizing both of the parks we normally use. This could allow for Moon observing.

John MacLean made a motion, seconded by Tony Heiner, to approve the minutes of the October 4, 2018 meeting as published in the November newsletter. The motion carried on a voice vote.

Treasurer Tim Barrier presented the October treasurer's report, with an ending balance of \$1147.10. Tony Heiner made a motion, seconded by Tom Segur, to approve the report. The motion passed on a voice vote.

Equipment Coordinator Brian Risley reported that equipment is available for checkout.

Skyjinx is providing "swag" that can be handed out at events. Astronomical League coordinator John MacLean reported he completed the quarterly update.

The business meeting was adjourned at 9:26 pm.

Submitted by Don Palmer, secretary

## Stars at Sea Event



Photo by Scott Flaig.

John MacLean, Mike McCauley, Scott Flaig and Brian Risley setup scopes for the Calusa Nature Center fundraiser

# Photos by Chuck Pavlick

<http://www.pbase.com/hobbynaut/image/168298623>



## Wizard Nebula

*Scope: Takahashi FSQ 106*

*Filters: Astrodon 5nm Ha, 5nm O3, 5nm S2*

*Subs, Ha 26@300 sec., O3 20@300, S2 20@300*

*Captured in Nebulosity and Processed in Pixinsight and Photoshop*



<http://www.pbase.com/hobbynaut/image/168209331>



### **Pillars of Creation M16**

*Scope: Celestron Edge 9.25 F/10*

*Camera: ASI 1600*

*Filters: Astrodon 5nm Ha, 5nm O3, 5nm S2*

*Subs, Ha 20@60 sec., O3 15@180, S2 20@180*

*Captured in Nebulosity and Processed in Pixinsight and Photoshop*

# Insight Lander Touches Down on Mars - Sky & Telescope

Sky & Telescope Weekly, 30 November 2018, David Dickinson

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***After a safe landing, NASA's first dedicated geophysical mission to Mars will spend the next two years studying the deep interior of the Red Planet.***



Welcome to Elysium Planitia. An image taken by Insight's Instrument Deployment Camera shortly after landing, showing the lander deck and the horizon beyond.

*NASA / JPL-Caltech*

After “seven minutes of terror,” and a seven-month journey of almost 300 million miles (500 million kilometers), NASA's [Mars Insight](#) (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) lander went from over 12,000 mph to zero, for NASA's eighth successful landing on the Red Planet.

“This accomplishment represents the ingenuity of America and our international partners and it serves as a testament to the dedication and perseverance of our team,” said NASA Administrator Jim Bridenstine in a November 26th [press release](#).

The landing went flawlessly on the Elysium Planitia region of Mars, 370 miles (600 kilometers) north of Gale Crater, the stomping grounds of NASA's Curiosity rover. The landing occurred on Monday, November 26, 2018 at 2:52:59 PM EST (19:52:59 Universal Time). Insight phoned home from just over eight light-minutes distant and relayed its safe touchdown on Mars via the Deep Space Network, much to the elation of scientists and engineers on Earth.

The criterion for the landing site was a flat, featureless and perhaps visually boring region. This was not only an ideal site from a safety and engineering perspective, but also a great location for what Insight is designed to do. Insight needed an equatorial site for optimal solar panel function, low elevation for entry and descent — giving it a slightly thicker cushion of tenuous atmosphere — and a site relatively free of boulders for a safe landing, along with a softer surface for drilling operations.

Landing also occurred during the tail end of the 2018 dust storm season, a potential concern that arose during Insight's transit to Mars, but did not affect landing operations.



The first photo InSight sent back to Earth immediately after touchdown, courtesy of the MarCO relay satellites. The mottled appearance is due to debris covering the yet-to-be-ejected lens cover. *NASA / JPL-Caltech*

Just over two and a half hours after landing, both solar panels on the lander deployed correctly, another essential early mission milestone. The panels will provide the spacecraft with 600 to 700 watts per day, enough to power a kitchen blender. Even coated with dust — a common occurrence for spacecraft on Mars — InSight's panels are expected to generate 200 to 300 watts, enough for science operations.

“The InSight team can rest a little easier tonight now that we know the spacecraft solar arrays are deployed and recharging the batteries,” said Tom Hoffman (JPL). “Tomorrow begins an exciting new chapter for InSight: surface operations and the beginning of the instrument deployment phase.”



A jubilant mission control at NASA Jet Propulsion Laboratory immediately after landing.  
*NASA / Bill Ingalls*

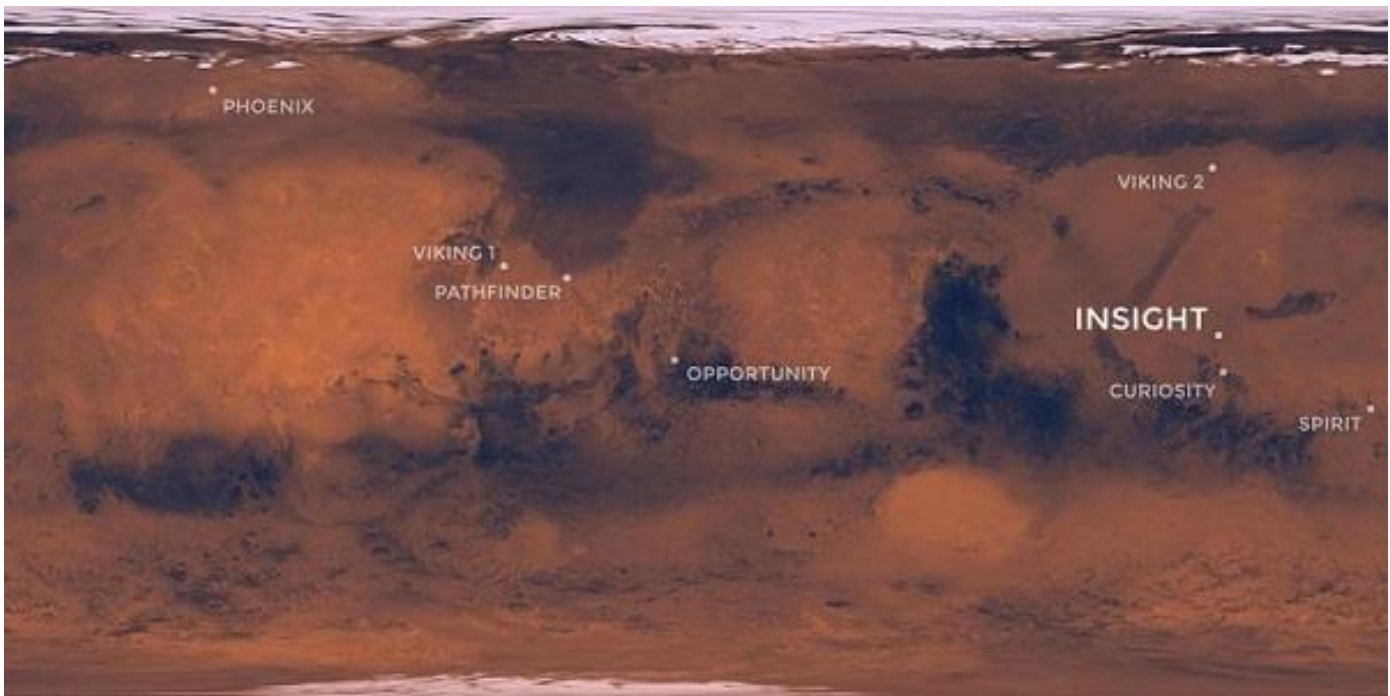
## Insight Science

Insight will chronicle "Mars-quakes" and geologic activity and will also drill into the surface of Mars in an effort to probe its interior.

The primary mission for Insight is set for two years, or one Martian year. Insight will also be able to detect the tug of the Martian moon Phobos as the satellite gently raises the ground about 0.6 inches (1.5 cm) when it passes overhead about once every 11 hours, another natural tool that can be used to probe the planet's interior. Insight will also record the seismic vibrations from meteor strikes, and it's conceivable that imagery from the Mars Reconnaissance Orbiter could match these detections to fresh impact craters.

Insight marks a departure from past missions that were jack-of-all-trades platforms. Instead, Insight specializes in addressing specific questions about Mars: How similar (or different) is the interior of Mars versus other rocky planets? How does the interior of the planet affect what we see on the surface? What is the structural thickness of the crust and the size and density of the core? What is the planet's current rate of heat loss?





The landing site for Mars Insight along with landing sites from other missions.  
*NASA / JPL-Caltech*

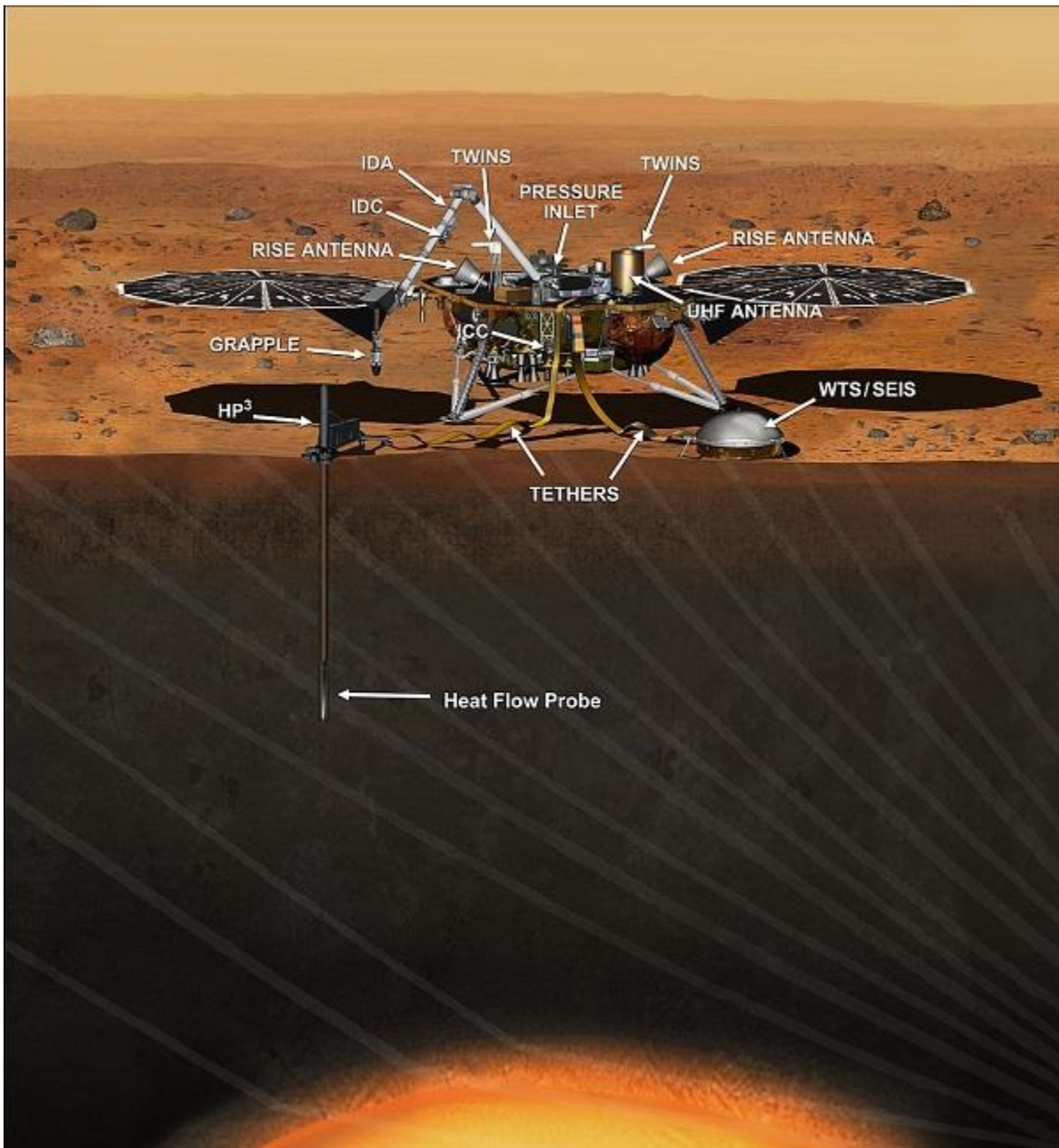
## Meet the Science Instruments

Insight carries three major instrument packages.

**The Seismic Experiment for Interior Structure (SEIS):** A deployable dome-shaped package meant to monitor internal activity on Mars, SEIS was provided by the French Space Agency along with the Swiss Federal Institute of Technology, the Imperial College, the Max Planck Institute for Solar System Research, and JPL. The package sits inside a protective dome, isolating it from wind vibrations that plagued the Viking 2 seismometer.

**The Heat Flow and Physical Properties Package (HP<sup>3</sup>):** Known affectionately as "the mole", this package will work on a tether and drill to 16 feet (4.9 meters) below the surface as it measures the heat dissipation from the core of Mars.

**Rotation and Interior Structure Experiment (RISE):** Built by JPL, RISE will use X-band radio signals to precisely measure the minute wobble in the rotation of Mars, building on data provided by the Pathfinder and Viking missions.



This illustration identifies the various components and instruments on the InSight lander.  
 NASA / JPL-Caltech

The lander also carries several other science instruments.

**Temperature and Winds for InSight (TWINS):** The weather station aboard InSight, TWINS was built by the Center for Astrobiology in Spain. TWINS will also be the first continuous weather monitor on Mars and will eventually provide a daily weather forecast for Elysium Planitia.

**The Laser Retroreflector for Insight (LaRRI):** A corner cube reflector, this will function as a passive geophysical node, allowing future laser altimeter spacecraft missions in orbit to bounce laser signals off of it and precisely measure its location. Built by the Italian Space agency, a copy of the reflector flew on the European Space Agency's [failed Schiaparelli lander](#) in 2016. These reflectors will still be useful after Insight has fallen silent, allowing the lander to continue chronicling movement of the surface of Mars.

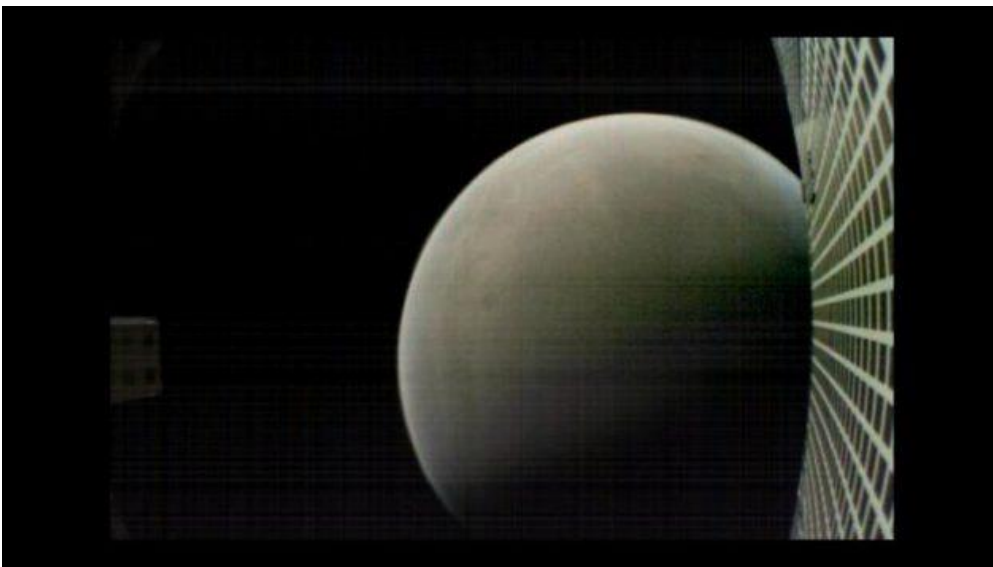
The lander also comes equipped with a robotic deployment arm, a main instrument camera and panoramic context cameras, both of which are duplicates of the same cameras used on Curiosity. Insight also carries two small silicon chips encoded with the names of about [2.4 million people](#).

### Trail-Blazing Mars CubeSats

The [MarCO-A and MarCO-B](#) cubesats, named Eva and Wall-E, also [performed their jobs](#) during Insight's landing, relaying telemetry from the lander as they flew 2,200 miles (3,500 kilometers) past Mars, another first.

"That's one giant leap for our intrepid, briefcase-sized robotic explorers," [said Joel Krajewski](#) (JPL). "I think CubeSats have a big future beyond Earth's orbit, and the MarCO team is happy to trail-blaze the way."

Insight's successful landing was not exclusively dependent on MarCO satellite relays, but they managed to complete the first transmission three hours ahead of the Mars Reconnaissance Orbiter and Mars Odyssey, proving that a mission can bring its own satellite relay along for the ride. This is also a handy proof of concept for planned missions to Europa and Titan, where no orbital relay network exists.



MarCO-B, one of the experimental Mars Cube One (MarCO) CubeSats, took this image of Mars from about 4,700 miles (7,600 km) away during its flyby of the Red Planet on Nov. 26, 2018. *NASA / JPL-Caltech*

## What's Next for Insight

Now that Insight is safely on the Martian surface, the first step is reconnaissance. Scientists will spend three weeks scouting out the landing site using the main camera, while the weather station starts measuring conditions at the site.

First up, Insight will deploy its 5.9-foot-long (1.8-meter) robotic arm over the next two days, and begin to survey the landscape around the lander. Researchers will then select a location to deploy the surface experiments. Insight will use its robotic arm to grab and place the SEIS, its protective cover, and the HP<sup>3</sup> package on the surface. This is a slow process, and should be completed in early 2019, about 10 weeks after landing.

Then, the HP<sup>3</sup> "mole" will begin hammering away, digging into the surface of Mars about 1 millimeter at a time. SEIS should detect this activity, and will use these taps to map the Martian crust directly under the lander. The mole will also stop after every 20 inches (50 cm) of digging to take a measurement of the heat flow from the Martian interior. This will also be a slow process, as the mole will have to pause for about four days between drilling sessions to allow heat from its own activity to dissipate.

The mole will hammer at the Martian soil an estimated 5,000 to 20,000 times en route to its five-meter target depth. The entire digging process is expected to take anywhere from 30 to 40 days, and the mole must achieve a depth of at least 3 meters for good science results.

Then, Insight must sit silent to take delicate seismic measurements. To this end, the lander isn't even equipped with a steerable radio dish or anything that could induce vibrations in the deployed detector. Instead, Insight has fixed opposing horn antennas for communication.

Get set for some fascinating science as NASA's first dedicated geophysical laboratory on another planet gets down to business.

*Editor's Note: This post was updated on November 29th to add an image of Mars taken by the MarCO-B cubesat.*

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For more information about InSight, visit: <https://www.nasa.gov/insight/>  
For more information about MarCO, visit: <https://www.jpl.nasa.gov/cubesat/missions/marco.php>  
For more information about NASA's Mars missions, go to: <https://www.nasa.gov/mars>  
See also December 2018 edition of Sky & Telescope, "Mars: The Inside Story", Emily Lakdawalla, for excellent discussion of InSight's geophysical mission to Mars.  
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**This article is distributed by NASA Night Sky Network**

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit [nightsky.jpl.nasa.org](https://nightsky.jpl.nasa.org) to find local clubs, events, and more!

**NASA Night Sky Notes:  
Observe Apollo 8's Lunar Milestones**

By David Prosper

December marks the 50<sup>th</sup> anniversary of NASA's Apollo 8 mission, when humans first orbited the Moon in a triumph of human engineering. The mission may be most famous for "Earthrise," the iconic photograph of Earth suspended over the rugged lunar surface. "Earthrise" inspired the imaginations of people around the world and remains one of the most famous photos ever taken. This month also brings a great potential display of the Geminids and a close approach by Comet 46P/Wirtanen

You can take note of Apollo 8's mission milestones while observing the Moon this month. Watch the nearly full Moon rise just before sunset on December 21, exactly 50 years after Apollo 8 launched; it will be near the bright orange star Aldebaran in Taurus. The following evenings watch it pass over the top of Orion and on through Gemini; on those days five decades earlier, astronauts Frank Borman, Jim Lovell, and Bill Anders sped towards the Moon in their fully crewed command module. Notice how the Moon rises later each evening, and how its phase wanes from full on Dec 22 to gibbous through the rest of the week. Can you imagine what phase Earth would appear as if you were standing on the Moon, looking back? The three brave astronauts spent 20 sleepless hours in orbit around the Moon, starting on Dec 24, 1968. During those ten orbits they became the first humans to see with their own eyes both the far side of the Moon and an Earthrise! The crew telecast a holiday message on December 25 to a record number of Earthbound viewers as they orbited over the lifeless lunar terrain; "Good night, good luck, a merry Christmas and God bless all of you - all of you on the good Earth." 50 years later, spot the Moon on these holiday evenings as it travels through Cancer and Leo. Just two days later the astronauts splashed down into the Pacific Ocean after achieving all the mission's test objectives, paving the way for another giant leap in space exploration the following year.

The Geminids, an excellent annual meteor shower, peaks the evening of December 13 through the morning of the 14th. They get their chance to truly shine after a waxing crescent Moon sets around 10:30 pm on the 13<sup>th</sup>. Expert Geminid observers can spot around 100 meteors per hour under ideal conditions. You'll spot quite a few meteors by avoiding bad weather and light pollution if you can, and of course make sure to bundle up and take frequent warming breaks. The Geminids have an unusual origin compared

to most meteor showers, which generally spring from icy comets. The tiny particles Earth passes through these evenings come from a strange “rock comet” named asteroid 3200 Phaethon. This dusty asteroid experiences faint outbursts of fine particles of rock instead of ice.

You can also look for comet 46P/Wirtanen while you’re out meteor watching. Its closest approach to Earth brings it within 7.1 million miles of us on December 16. That’s 30 times the average Earth-Moon distance! While passing near enough to rank as the 10<sup>th</sup> closest cometary approach in modern times, there is no danger of this object striking our planet. Cometary brightness is hard to predict, and while there is a chance comet 46P/Wirtanen may flare up to naked eye visibility, it will likely remain visible only via binoculars or telescopes. You’ll be able to see for yourself how much 46P/Wirtanen actually brightens. Some of the best nights to hunt for it will be December 15 and 16 as it passes between two prominent star clusters in Taurus: the Pleiades and the V-shaped Hyades. Happy hunting!

Catch up on all of NASA’s past, current, and future missions at [nasa.gov](https://www.nasa.gov)



*Caption: Earthrise, 1968. Note the phase of Earth as seen from the Moon. Nearside lunar observers see Earth go through a complete set of phases. However, only orbiting astronauts witness Earthrises; for stationary lunar observers, Earth barely moves at all. Why is that? Credit: Bill Anders/NASA*

## Club Officers & Positions:

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