ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

Vol. 69, No. 01 – January 2020

IN THIS ISSUE

01. SFAA PRESIDENT'S NOTE | NEW YEAR, NEW DIRECTION

With the start of the new year, the board election results from last month came in, and we have a new board to help run SFAA. We were able to fill all of the positions we had open, with a write-in candidate offering to become a member. We are very grateful for those that came forward to run. We look forward to planning a great year of outreach activities.

We have a bit of a problem this year, as we haven't yet chosen dates for the whole year for City Star Parties, and we have some volunteers retiring or becoming less available in 2020. Also, one sentiment expressed by the previous board was that some of our past City Star Party locations were reaching visitors to the city, and not so much of the community. So, it's come to my attention that these things need to be addressed ASAP.

There was one thing that stood out for me at our December meeting, when the board candidates stood up and spoke about what they are interested in achieving through participation in our board. Many expressed an interest in outreach directed at San Francisco youth. And it occurs to me we can kill two birds with one stone by reaching out to science teachers at local schools and getting together to plan star parties and other outreach events, not only for their students, but for their community. This could help in fulfilling our mission and fill our calendar with a variety of activities and locations. If we can find a way to entice students to get involved, it would also help with our low volunteer engagement problem.

It may take a while to get the ball rolling, but I believe this is the new direction SFAA needs to take. Our current calendar of activities will not change and the activities you enjoy will remain. But the City Star Parties will increasingly serve to get more of San Francisco's youth involved in astronomy and space discoveries. And through Telescope Making, we can even add some Art to STEM (I firmly believe the current education emphasis on STEM to the detriment of the arts is a mistake, but that's a subject for another newsletter.)

It is my hope that through our new board and new emphasis on community building and youth outreach, SFAA continues to grow and continues to engage our membership. We have had a great run through the last 68 years, and there is still a lot of room for growth and achievement.

Clear skies,
P.J. Cabrera
President, SFAA

SFAA BOARD OFFICERS AND DIRECTORS		
President	PJ Cabrera	president@sfaa-astronomy.org
Vice President	Jessica Miller	vice-president@sfaa-astronomy.org
Treasurer	Jim Burke	treasurer@sfaa-astronomy.org
Secretary	Bill Kircher	secretary@sfaa-astronomy.org
Directors	Vanessa Anderson, Evan Ryder, Michael Wingerath, Ben Max Rubinstein, Liz Triggs, Douglas Smith, Thomas Perfumo	

02. SFAA & BAY AREA ASTRONOMY EVENTS

JANUARY 2020 – JUNE 2020

Details: http://www.sfaa-astronomy.org/events

Wednesday, January 15, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, January 25, 4:00 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

Wednesday, February 19, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, February 22, 4:30 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

Wednesday, March 18, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, March 21, 5:00 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

Wednesday, April 15, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, April 25, 6:30 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

Wednesday, May 20, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, May 23, 7:00 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

Wednesday, June 17, 7:30 pm – 9:15 pm
Meeting and Lecture, Randall Museum

Saturday, June 20, 7:30 pm – 2:00 am
Mt. Tam Members Night (arrive BEFORE sunset)

GET LIVE HELP WITH YOUR TELESCOPE!

* * * * * * * *

Are you a new telescope owner?

Or perhaps you could use some help with alignment, collimation, or other adjustments?

Like playing guitar or dancing the tango, learning to operate a telescope can, with great effort, be learned on your own.

However, it's much easier and more enjoyable to learn hands-on with experienced individuals.

Bring your telescope to a Star Party – we'll be happy to help!

BAY AREA ASTRONOMY EVENTS

* * * * * * * *

Long-time SFAA member, Kenneth Lum, assembles and reports a list of Bay Area Astronomy events. Check the following link for information and additional events: https://groups.yahoo.com/neo/groups/bayastro/info

03. SFAA VOLUNTEER OPPORTUNITIES

VOLUNTEER OPPORTUNITIES

Contact: Will Silberman (volunteer@sfaa-astronomy.org)

Star Party Volunteers ▪ City Star Parties ▪ Mt. Tam Star Parties	Will Silberman (volunteer@sfaa-astronomy.org)
Snack Volunteers	Linda Mahan (speakerchair@sfaa-astronomy.org)
Marketing Volunteers	PJ Cabrera (president@sfaa-astronomy.org)
Above the Fog Volunteers	PJ Cabrera (president@sfaa-astronomy.org)

Star Party Volunteers

SFAA hosts 2 to 3 star parties every month throughout the year, including City Star Parties in San Francisco and observation nights on Mount Tamalpais. Between April and October, in partnership with Mt. Tam State Park, the Friends of Mt. Tam, and Wonderfest, SFAA provides telescope observing as part of a monthly astronomy program. As a result, we need **experienced SFAA members to serve as volunteers for each of these events**. If you've been to a few star parties, you're familiar with the procedures, and you're able to commit to attending these events, **we can use your help**!

Volunteers are responsible for: checking weather forecasts prior to scheduled events, coordinating with other volunteers, providing cancellation notice due to inclement weather or dangerous conditions (e.g. forest fires). Volunteers are expected to arrive to events early, welcome and orient members, and hold a brief huddle for all telescope operators to review procedures and answer questions.

For Mt. Tam events, volunteers are tasked with:

- members night: ensuring every vehicle belongs to an SFAA member and has a parking pass; at the end of the night, volunteers make sure members understand how to lock the gate on the way out; and
- public astronomy program: coordinating with Friends of Mt. Tam volunteers to manage visitor parking.

Volunteers receive an e-mail once a month to coordinate on upcoming star parties. If you're interested in volunteering, or if you have questions, please contact Will Silberman at volunteer@sfaa-astronomy.org.

Snack Volunteers

SFAA needs volunteers to bring light refreshments to our monthly meetings and lectures at the Presidio Officers Club, on the **third Tuesday of each month**. Refreshments create a welcoming atmosphere for members and guests. Volunteers can donate snacks or provide receipts for expense reimbursement.

If you're interested in bringing refreshments, please send an e-mail to Linda Mahan at speakerchair@sfaa-astronomy.org and indicate which month(s) you can help with and what you'd like to bring.

Marketing Volunteers

SFAA needs volunteers to help post SFAA event updates to groups such as SFGate, SF FunCheap, Eventful, Bay Area Science, etc. If you're interested in marketing opportunities, please send an e-mail to PJ Cabrera at president@sfaa-astronomy.org.

Above the Fog Volunteers

SFAA distributes a monthly newsletter, *Above the Fog*. Volunteers are asked to submit an occasional article, astrophoto, and/or to serve as a member of the editorial team. If you're interested in contributing to these monthly newsletters, please send an e-mail to PJ Cabrera at president@sfaa-astronomy.org.

On behalf of the board of directors and your fellow SFAA members, thank you for your willingness to help out!

04. SFAA LECTURE SERIES | JANUARY 15, 2020

GOING DEEP: THE NGC AND IG PROJECT

STEVE GOTTLIEB, AMATEUR ASTRONOMER COLLABORATOR

This presentation describes the re-examination of source material used to compile the original New General Catalogue of Nebulae and Clusters of Stars (NGC) in 1888. The collaboration of amateur and professional astronomers, known as the NGC/IC Project, ultimately produced a corrected NGC that reflects the original visual discoveries.

The NGC and IC objects were discovered over 100 years ago, but 15% - 20% have identification problems — poor positions, misidentifications, duplicate entries, incorrect classifications, and confusion with single or multiple stars. The NGC/IC sleuths have recovered hundreds of mistaken identities, lost objects, and solved long-standing contradictions in professional and amateur databases. The corrected database derived from the NGC/IC Project is now incorporated into several amateur software programs (SkySafari, StarryNight, TheSky, Voyager, Guide, SkyMap Pro, Cartes du Ciel, and more) and professional online databases such as NASA-IPAC Extragalactic Database, SIMBAD and HyperLeda. In this talk, Steve will discuss the history of the NGC and give several examples of their catalogue sleuthing.

Steve Gottlieb has been an active observer in the Bay Area for over 40 years. He is a contributing editor to Sky & Telescope magazine and has written articles on advanced observing projects for 20 years. He recently completed a project to visually observe the entire NGC (7,840 objects) and his website Adventures in Deep Space (www.astronomy-mall.com/Adventures.In.Deep.Space/) is a source of observing challenges for experienced amateurs.

Randall Museum
199 Museum Way, San Francisco, CA 94114
7:00 pm Doors Open & Light Refreshments | 7:30 pm Club Announcements | 7:45 pm Speaker
SFAA'S GENERAL MEETINGS OCCUR ON THE 3RD WEDNESDAY OF EACH MONTH

05. UPCOMING SFAA LECTURES 2020

FEBRUARY 19TH | JEFFREY MOORE

New Horizons, NASA's Pluto-Kuiper Belt Mission, and the 2014 Arrokoth Encounter

In 2006, NASA dispatched an ambassador to the planetary frontier – the New Horizons spacecraft. After 10 years and more than 3 billion miles, passing by the storms and moons of Jupiter, New Horizons shed light on new kinds of worlds on the outskirts of the solar system. On July 14, 2015, New Horizons flew 12,500 km (7,800 mi) above the surface of Pluto and continued into the cold, classical Kuiper Belt object (KBO) Arrokoth on January 1, 2019. New Horizons is the fifth probe to traverse interplanetary space and the first ever to travel to Pluto and Arrokoth. This was the first time a spacecraft has ever closely observed one of the free-orbiting small denizens of the Kuiper Belt, which was revealed to be a bi-lobate contact binary. New Horizons has, with the encounter of Arrokoth, become a time machine, taking us back to almost the very beginning of the solar system, to a place where we can observe the most primordial still-extant building blocks of our world and the worlds around us.

Dr. Jeffrey M. Moore is a Research Scientist at NASA Ames Research Center. Dr. Moore is Imaging Team Lead for NASA's New Horizons Mission to the Jupiter system, the Pluto system, and the Kuiper Belt, which flew past the Pluto system on 14 July 2015, and provided our first view of the geology of Pluto and Charon and more recently, flew past its second major science target—2014 MU69, the most distant object ever explored up close.

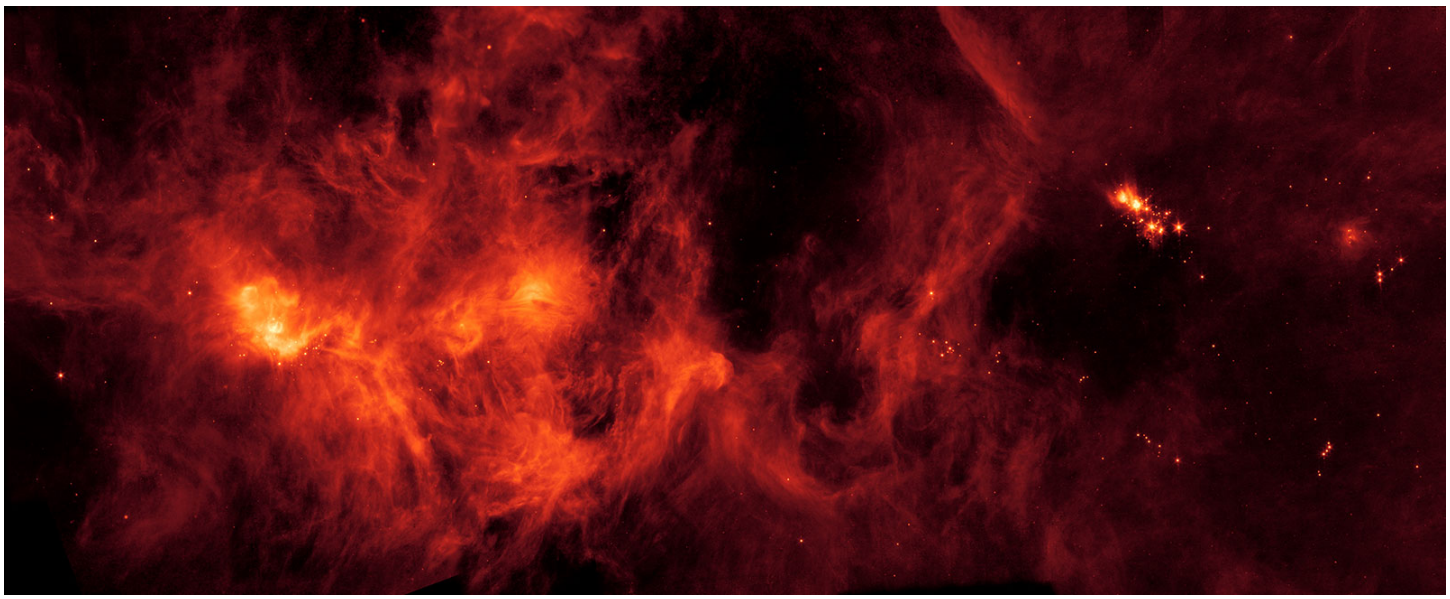
In addition to the New Horizons Mission, Dr. Moore provides leadership and participation on other NASA Planetary Mission Science Teams, including: Co-Investigator for the Europa Clipper Mission ground penetrating radar instrument, REASON, Collaborator on the HiRISE camera aboard Mars Reconnaissance Orbiter, and until recently, Dr. Moore was a Long Term Planning Lead in mission operations for the Mars Exploration Rover (MER). Dr. Moore's research focuses on a range of topics relating to the geologic evolution of planetary landscapes and crustal materials. He has published a number of papers on the geomorphology, stratigraphy, and sedimentology of, as well as explored the roles of impact cratering, volcanology, and tectonism on terrestrial planets and outer planet satellites. He has conducted extensive laboratory simulations of Martian geologic processes, including his dissertation laboratory experiment on the sublimation of ice beneath lags of dust and sand under Mars-like conditions. Dr. Moore has led multiple Mars-related NASA-funded investigations including, the geomorphic and sedimentological evolution of ancient Martian highlands and basins, and a laboratory investigation into the formation of evaporites and brines under Mars-like conditions. In addition, he has headed an investigation into the nature of erosion of the moons of Jupiter, and has conducted research on the implications of impact craters on Europa for a sub-surface ocean, and surface volatile migration and landform degradation on the icy Galilean Satellites as part of his 14-year-long association with the Galileo SSI (imaging) Team.

Dr. Moore is recipient of the 2018 G.K. Gilbert Award for his outstanding contributions to the field of Planetary Geology and was recently awarded the 'NASA Exceptional Scientific Achievement Medal. He is also a Geological Society of America Fellow.

Randall Museum

199 Museum Way, San Francisco, CA 94114
7:00 pm Doors Open & Light Refreshments | 7:30 pm Club Announcements | 7:45 pm Speaker
SFAA'S GENERAL MEETINGS OCCUR ON THE 3RD WEDNESDAY OF EACH MONTH

Spitzer Studies a Stellar Playground With a Long History



A collection of gas and dust over 500 light-years across, the Perseus Molecular Cloud hosts an abundance of young stars. It was imaged here by the NASA's Spitzer Space Telescope.

Credit: NASA/JPL-Caltech

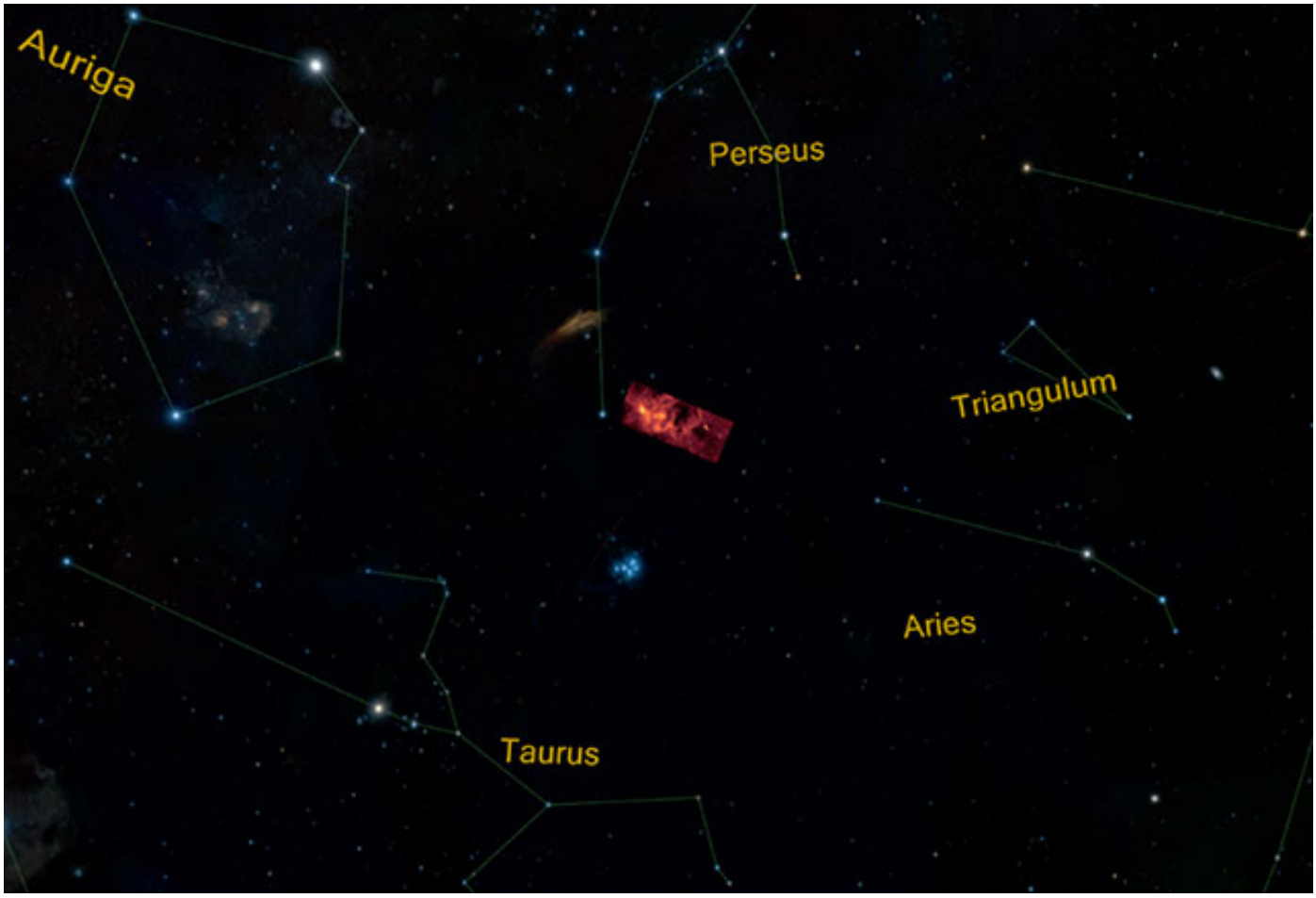
This image from NASA's Spitzer Space Telescope shows the Perseus Molecular Cloud, a massive collection of gas and dust that stretches over 500 light-years across. Home to an abundance of young stars, it has drawn the attention of astronomers for decades.

Spitzer's Multiband Imaging Photometer (MIPS) instrument took this image during Spitzer's "cold mission," which ran from the spacecraft's launch in 2003 until 2009, when the space telescope exhausted its supply of liquid helium coolant. (This marked the beginning of Spitzer's "warm mission.") Infrared light can't be seen by the human eye, but warm objects, from human bodies to interstellar dust clouds, emit infrared light.

Infrared radiation from warm dust generates much of the glow seen here from the Perseus Molecular Cloud. Clusters of stars, such as the bright spot near the left side of the image, generate even more infrared light and illuminate the surrounding clouds like the Sun lighting up a cloudy sky at sunset. Much of the dust seen here emits little to no visible light (in fact, the dust blocks visible light) and is therefore revealed most clearly with infrared observatories like Spitzer.

On the right side of the image is a bright clump of young stars known as NGC 1333, which Spitzer has observed multiple times. It is located about 1,000 light-years from Earth. That sounds far, but it is close compared to the size of our galaxy, which is about 100,000 light-years across. NGC 1333's proximity and strong infrared emissions made it visible to astronomers using some of the earliest infrared instruments.

In fact, some of its stars were first observed in the mid-1980s with the Infrared Astronomical Survey (IRAS), a joint mission between NASA, the United Kingdom and the Netherlands. The first infrared satellite telescope, it observed the sky in infrared wavelengths blocked by Earth's atmosphere, providing the first-ever view of the universe in those wavelengths.



This image from NASA'S Spitzer Space Telescope shows the location and apparent size of the Perseus Molecular Cloud in the night sky. Located on the edge of the Perseus Constellation, the collection of gas and dust is about 1,000 light-years from Earth and about 500 light-years wide.

Credit: NASA/JPL-Caltech

More than 1,200 peer-reviewed research papers have been written about NGC 1333, and it has been studied in other wavelengths of light, including by the Hubble Space Telescope, which detects mostly visible light, and the Chandra X-Ray Observatory.

Many young stars in the cluster are sending massive outflows of material - the same material that forms the star - into space. As the material is ejected, it is heated up and smashes into the surrounding interstellar medium. These factors cause the jets to radiate brightly, and they can be seen in close-up studies of the region. This has provided astronomers with a clear glimpse of how stars go from a sometimes-turbulent adolescence into calmer adulthood.

An Evolving Mystery

Other clusters of stars seen below NGC 1333 in this image have posed a fascinating mystery for astronomers: They appear to contain stellar infants, adolescents and adults. Such a closely packed mixture of ages is extremely odd, according to Luisa Rebull, an astrophysicist at NASA's Infrared Science Archive at Caltech-IPAC who has studied NGC 1333 and some of the clusters below it. Although many stellar siblings may form together in tight clusters, stars are always moving, and as they grow older, they tend to move farther and farther apart.

This annotated image of the Perseus Molecular Cloud, provided by NASA's Spitzer Space Telescope, shows the location of various star clusters, including NGC 1333.

Credit: NASA/JPL-Caltech

Finding such a closely packed mixture of apparent ages doesn't fit with current ideas about how stars evolve. "This region is telling astronomers that there's something we don't understand about star formation," said Rebull. The puzzle presented by this region is one thing that keeps astronomers coming back to it. "It's one of my favorite regions to study," she added.

Since IRAS's early observations, the region has come into clearer focus, a process that is common in astronomy, said Rebull. New instruments bring more sensitivity and new techniques, and the story becomes clearer with each new generation of observatories. On Jan. 30, 2020, NASA will decommission the Spitzer Space Telescope, but its legacy has paved the way for upcoming observatories, including the James Webb Space Telescope, which will also observe infrared light.

The Spitzer-MIPS data used for this image is at the infrared wavelength of 24 microns. Small gaps along the edges of this image not observed by Spitzer were filled in using 22-micron data from NASA's Wide-Field Infrared Survey Explorer (WISE).

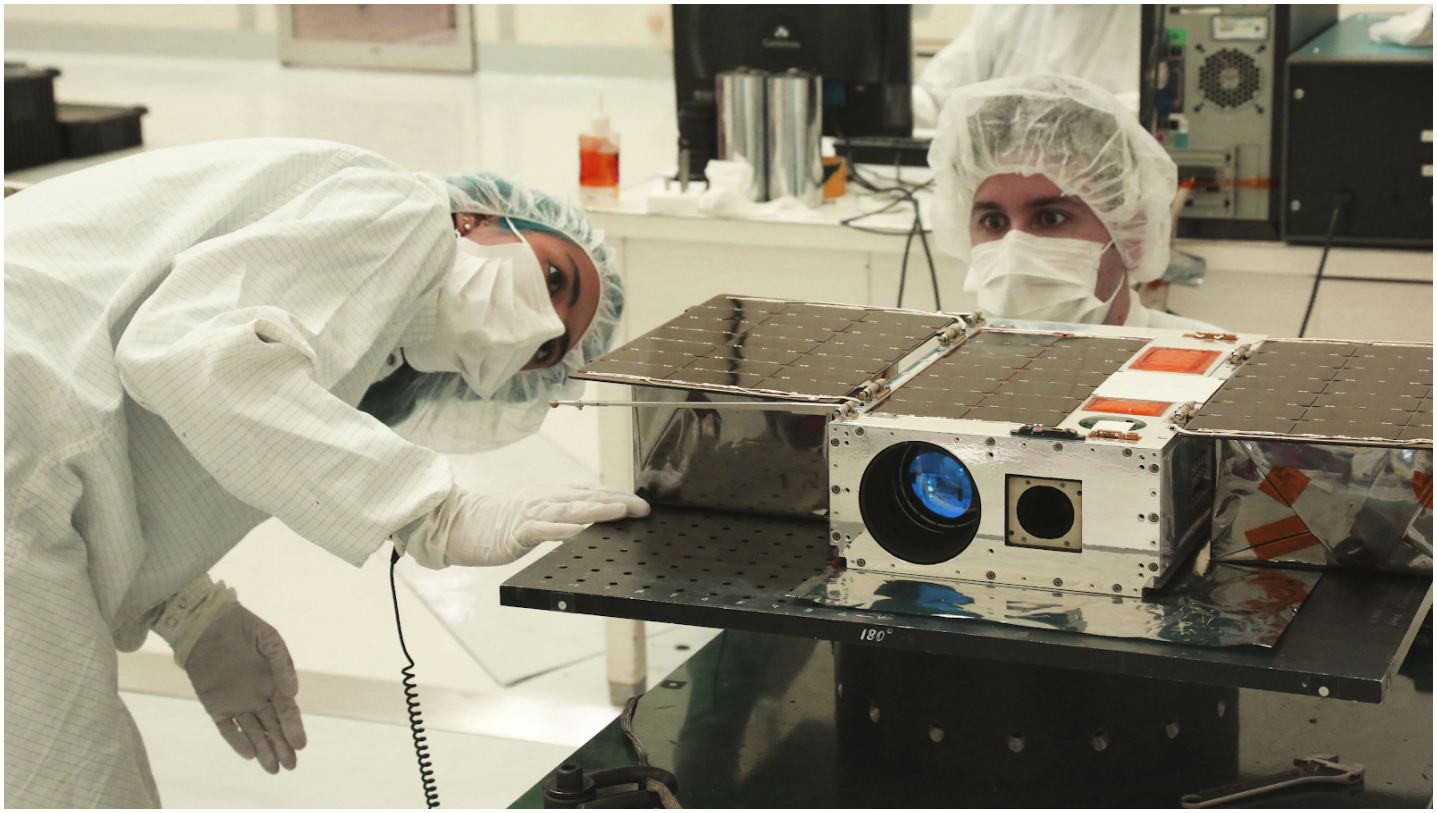
To learn more about Spitzer and how it studies the infrared universe, check out the Spitzer 360 VR experience, now available on the NASA Spitzer channel on YouTube: http://bit.ly/SpitzerVR.

More information about Spitzer is available at the following site(s):
https://www.nasa.gov/mission_pages/spitzer/main

News Media Contact

Calla Cofield
Jet Propulsion Laboratory, Pasadena, Calif.
626-808-2469
calla.e.cofield@jpl.nasa.gov

Tiny Satellite for Studying Distant Planets Goes Quiet



Left to right: Electrical Test Engineer Esha Murty and Integration and Test Lead Cody Colley prepare the ASTERIA spacecraft for mass-properties measurements in April 2017 prior to spacecraft delivery ahead of launch. ASTERIA was deployed from the International Space Station in November 2017.

Credit: NASA/JPL-Caltech

Mission operators at NASA's Jet Propulsion Laboratory in Pasadena, California, have lost contact with the ASTERIA satellite, a briefcase-sized spacecraft designed to study planets outside our solar system. The last successful communication with ASTERIA, short for Arcsecond Space Telescope Enabling Research in Astrophysics, was on Dec. 5; attempts to contact it are expected to continue into March 2020.

ASTERIA belongs to a category of satellites called CubeSats, which vary in size but are typically smaller than a suitcase. Deployed into Earth orbit from the space station on Nov. 20, 2017, the technology demonstration mission showed that many technologies necessary for studying and potentially finding exoplanets (planets orbiting stars other than our Sun) can be shrunk to fit on small satellites. Long-term, the mission aimed to show that small satellites could one day be used to assist larger exoplanet missions, such as NASA's Transiting Exoplanet Satellite Survey (TESS).

ASTERIA observed a handful of nearby stars and successfully demonstrated that it could achieve precision measurements of the stars' brightness. With that data, scientists look for dips in a star's light that would indicate an orbiting planet passing between the satellite and the star. This planet-hunting technique is called the transit method. Mission data is still being analyzed to confirm whether ASTERIA spotted any distant worlds.

Since completing its primary mission objectives in early February 2018, ASTERIA has continued operating through three mission extensions. During that time, it has been used as an in-space platform to test various capabilities to make CubeSats more autonomous, some of which are based on artificial intelligence programs. ASTERIA also made opportunistic observations of the Earth, a comet, other spacecraft in geo-synchronous orbit and stars that might host transiting exoplanets.

Even if contact is not regained with ASTERIA, scientists can still conduct experiments on CubeSat autonomy programs using the mission testbed - a replica of the spacecraft's internal hardware, kept on Earth for testing purposes.

"The ASTERIA project achieved outstanding results during its three-month prime mission and its nearly two-year-long extended mission," said JPL's Lorraine Fesq, current ASTERIA program manager. "Although we are disappointed that we lost contact with the spacecraft, we are thrilled with all that we have accomplished with this impressive CubeSat."

ASTERIA was developed under the Phaeton program at JPL. Phaeton was developed to provide early-career hires, under the guidance of experienced mentors, with the challenges of a flight project. ASTERIA is a collaboration with the Massachusetts Institute of Technology in Cambridge; MIT's Sara Seager is principal investigator on the project. The project's extended missions were partially funded by the Heising-Simons Foundation.

News Media Contact

Calla Cofield
Jet Propulsion Laboratory, Pasadena, Calif.
626-808-2469
calla.e.cofield@jpl.nasa.gov

San Francisco Amateur Astronomers
PO Box 15097
San Francisco, CA 94115

Application for New or Renewing Membership

1. Memberships, with dues payment, are for one year running from the member's join or renewal date.

2. New or renewal memberships sent in via USPS mail will have membership start date based on postmark date.

3. SFAA is a 501(c)(3) nonprofit organization. Membership dues are tax-deductible, as allowed by law.

This application is for:

☐ **New**

☐ **Renewing**

Name: _____

Address: _____

_____

E-mail: _____

Phone (optional): _____

Membership Type: ☐ Individual - $30.00 ☐ Family - $35.00 ☐ Student - $10.00

☐ Supporting - $80.00 ☐ Institutional - $40.00

(All dues tax-deductible as allowed by law)

☐ **Please mail me a Mount Tamalpais Parking Permit (1 per membership)**

To complete the membership process:

A. Print and fill out this form

B. Make check or money order payable to San Francisco Amateur Astronomers

C. Mail this form and payment to:

Treasurer, SFAA
PO Box 15097
San Francisco, CA 94115

Both new and renewing members will receive a verifying email from the SFAA upon completion of the membership process.