AUSTIN ASTRONOMICAL SOCIETY

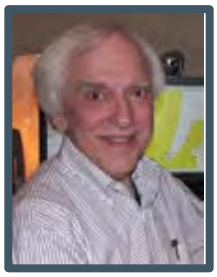
KEEPING ASTRONOMY WEIRD SINCE 1969

# SIDEREAL TIMES

VOLUME 50, NUMBER 2

## PRESIDENT'S NOTES

### By Tim Brown, President



This note presents and explains the status of our agreement with Calibre - operator of Canyon of the Eagles (COTE) and the decisions we now face regarding that agreement. Please email your comments to president@austinastro.com or even better come to the meeting this Friday and share your opinions with your fellow members.

The agreement between AAS and COTE will either be modified or terminated by us or COTE (Calibre Management) in the next few weeks.

**MONTHLY MEETING**
**Friday, February 9, 2018**

ETC 2.136
UT Campus Engineering Teaching Center
Dean Keeton and Speedway

6:30PM PRACTICAL ASTRONOMY
AAS Member, Brian Lippincott "Stellar Transmissions: Decoding Spectral Messages"

7:30 PM GENERAL ASSEMBLY AAS
Robert Reeves "365 Days of the Moon"

**Our Options**

1. Accept new rules proposed by Calibre that further limits our access to the observatory. Essentially, we give up exclusive access to the observatory on a "members only" night. To use the observatory "exclusively", we must wait until the public viewing program completes. Otherwise we would be able to use the field tables as we always have, with members wishing to avoid the public segregating to the saucer field. Additional light trespass from the public could be mitigated by installing a light fence. Calibre has offered to work with us to streamline the gated access to the site.
2. Decide that members only nights are too important to give up, so we would refuse alterations to the current contract and give Calibre 90 days' notice of our intent to terminate our agreement. AAS would leave COTE and look for alternative site arrangements.

The EC have had several conversations trying to come up with other options, but they have all just boiled down to variations on the two options listed above.

Virtually everyone agrees that long term, our degraded ability to use the site is untenable and that we need to find a better site. The two options really define two approaches based on how quickly we want to leave.

The 2nd option takes a get out as soon as possible approach, in which we would kick into high gear, plans for relocating. The most discussed plans are for partnering with state parks, Ink's Lake and Pedernales Falls being the most likely, to establish new observing programs. Longer term plans include acquiring land and building a new observatory.

THE SIDEREAL TIMES IS THE OFFICIAL MONTHLY PUBLICATION OF THE AUSTIN ASTRONOMICAL SOCIETY

BANNER CREDIT: DANIEL MALONEY, THE WILLIAM J. MALONEY OBSERVATORY (STELLAR SKIES, PONTOTOC, TEXAS)
M45, THE PLEIADES, ES 127 ED APO, CANON T6I, MOUNTAIN INSTRUMENTS MI-250, 26.2 HOURS INTEGRATION

## PRESIDENT'S NOTES (CONT)

The second option is really a slower exodus meant to be less disruptive to our current observing programs while we look for and implement alternatives. The concern here is that it may take more than 90 days to establish working programs with potential partners. This path also gives us more time for removal of our scopes and equipment.

In my opinion, even if we reach agreement on a modified contract at this time our future at COTE is limited. We must begin a serious search for alternative sites and partnerships now.

**Every member should express his/her opinion on this urgent matter. The future of the AAS depends on us taking intelligent and effective action - now.**

Read on for a fuller discussion of the current situation. A summary of the negotiations, including a rough timeline, are posted on the members' section of our website. SUMMARY LINK

I hope to see you Friday night at the monthly meeting and Saturday night at EEO for our Public Star Party.

**Tim**

*"For my part I know nothing with certainty, but the sight of stars makes me dream". (Vincent Van Gogh)*

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**Canyon of the Eagles, the Eagle Eye Observatory and the AAS**

For years many of us have enjoyed the pleasure of having a dark sky site that we could call our own. It's been a place to meet friends, make new friends and see some spectacular skies. I and others have spent many happy nights away from city lights at Canyon of the Eagles.

The Eagle Eye Observatory and viewing fields have seen a parade of AAS events: Central Texas Star Party, Messier Marathons, Members-Only nights and outreach on Public Star Party evenings. Many members have earned their Astronomical League awards at COTE. Recently members have been offered a range of workshops on subjects from astrophotography to mythology.

**Who Owns What?**

Unfortunately, we DON'T own the land or the observatory although club members have maintained and improved the site since the observatory was completed and the club has supplied and owns the telescopes and accompanying equipment.

Canyon of the Eagles is owned by the LCRA and operated by Calibre. Calibre operates the lodge and the surrounding preserve including the Eagle Eye Observatory building. For the past few years, they have adopted policies that seem calculated to discourage our use of the both the observatory and the viewing field.

**The Agreement between AAS and Calibre**

This September Calibre proposed changes to our agreement that would greatly restrict our access to the observatory and observing field and reduce our role in public outreach.

**Under the current agreement we have:**

1. One night a month for our members-only star party - held on the Saturday closest to the new Moon
2. Two nights for CTSP
3. Access at any time to the observatory and the viewing field - with minor conditions
4. Sponsorship and operation of the monthly Public Star Party

# PRESIDENT'S NOTES (CONT)

Under Calibre's initial proposal in November we lose these rights - despite our ownership of the telescopes and equipment. In January we met with Calibre representatives and attempted to reach a compromise. We did reach preliminary agreement on a way forward, but a new agreement will require additional negotiation.

**Calibre's Demands**

Calibre insists on having the observatory available for their guests every Saturday night. Instead of completely giving up our members-only nights, or changing them to another night of the week, we proposed that we, possibly with financial help from Calibre, build a light fence separating the observatory from the observing field.

**Under the modified agreement:**

1. A light fence would be built between the observatory and the lower observing field (see below) to allow us to observe undisturbed by the public's lights. The observatory and upper field would be dedicated to Calibre's guests.
2. Free access as now, but by combination lock with notification to Calibre. We're working on a solution to provide easy access via combination lock. Calibre needs to know who is on the field on non-star party nights. Still working on a method that isn't a pain.
3. Public parties continue as before.

This is a bare-bones discussion of a complex situation. You can refer to a more detailed summary and timeline of our ongoing negotiations on the AAS website. SUMMARY LINK (You must login.)

Whatever we decide we need to act soon.

IMAGE CREDIT: SEAN LEARY (EAGLE EYE OBSERVATORY)

**INSIDE THIS ISSUE**



# EXECUTIVE COMMITTEE MEETING MINUTES

## By Sean Leary, Communications Chair and Interim Secretary

**Dec 6, 2017 Executive Committee Minutes**

Call to Order 6:50 p.m.
In attendance: Frank, Jim, Greg, Mark, David, Terry, Sean, Joyce, Joi.
Acting de facto president Mark per request by Tim.
Quorum is met.
Nov 2017 EC minutes are moved, seconded, and approved to accept.

**Reports**

- Outreach (Jim): Next public star party is coming this Saturday. Several outreach events coming up. UT Girl Day commitment needed by Dec 12.
- Equipment (Terry): Actions on hold until COE contract issue is resolved. Terry, Domingo, and Brian L. are working on some more telescopes.
- Member Services (Joi): Party this Friday, Astrophotography on the 16th. Sean will post tonight. Putting together a list of potential dark sky sites to visit.

Other reports deferred for this meeting

**Old Business**

**By-laws discussion:** Email sent on what to do if we dissolve, Central Texas preferred (not just Austin). GA only needs to approve if the GA meetings are changed permanently. Changes in dues are not controlled by the by-laws. Should that continue? Yes. Joyce will work with Tim to come up with a voting date, preferably in January.

**COE:** Discussion of accepting what we must, keep looking for an alternate site. Discussion of the need to negotiate access to the site for equipment. Discussion of options like buying land, finding a land donor. Right now we have a list, but that is all. Nothing is organized yet. We went through this process last year, and standing up a committee was difficult. We need to be more organized. Recommended that Tim set up a committee of 5-7, meet twice a month. Also need a program committee to keep the members engaged in going to these potential sites. Perhaps a long term strategic planning committee. Discussion of replacement of the 25 with a 16. What we need to negotiate:

- Does COE have a draft contract for us to review?
- Can we continue to do member programming (fast track, not including the public and not requiring building use)?
- Can we have access to the observatory during the day for equipment maintenance, scouting programs, etc.?
- Can Members only access to the field (or observatory when not in use) continue on an as-requested basis?
- Can night time telescope training times be reserved?
- Can car access be restricted on the former members only nights for the sake of astrophotographers (either completely, or after a set time)?
- Can we continue to get an approved list of AAS public nights?
- Can we do public and private star parties in Jan, Feb 2018?
- Will COE insure damage to equipment ($324 per year)?
- Will COE pay for at least half of the internet?
- We need to say we are actively looking for another site.

**Notes:** We spend about $200/mo. on the observatory now. In exchange, we get on average 40 x $7 land use fee write off. AAS member COE observatory admin, and guests, use the internet now. AAS could underwrite admission fees for any site (including COE) General agreement that we not let the 25 get locked into any new contract, if necessary removing the scope before March 2018.

## EXECUTIVE COMMITTEE MEETING MINUTES (CONT)

Moved, seconded and approved asking Tim to authorize Dawn to actively investigate another dark sky site.

**NEW BUSINESS**

Membership purge is coming up, expected to go from 600+ to 460 or so. Some discussion about the implications, possible mitigating actions. Discussion of funding.

Meeting adjourned at 9pm.

## TREASURER'S REPORT

### By Mark Lyon, Treasurer

| | | |
|---|---|---|
| **Deposits:** | | |
| Dues payments | $0.00 | |
| Checks | $0.00 | |
| Paypal | $1,300.00 | |
| Dues payments totals | | $1,300.00 |
| Interest earned-checking | $1.09 | |
| Interest earned-CD | $0.21 | |
| Interest earned-CD | $0.25 | |
| Total interest earned | | $1.55 |
| Total Other Income | | $0.00 |
| Deposit Totals January 1 through January 31, 2018 | | $1,301.55 |
| **Expenses**: | | |
| COE Internet Expense | $69.35 | |
| COE Telephone | $76.86 | |
| Post Office Box Rental | $90.00 | |
| Liability Insurance | $548.00 | |
| Amplify Austin Expense | $155.00 | |
| Outreach | $19.46 | |
| Expense Totals January 1 through January 31, 2018 | | $958.67 |
| **Bank Balances:** | | |
| University Federal Credit Union Donations Savings | $557.41 | |
| Paypal Account | $734.75 | |
| University Federal Credit Union Checking | $25,335.84 | |
| University Federal Credit Union C.D. | $5,813.77 | |
| University Federal Credit Union C.D. | $5,794.84 | |
| University Federal Credit Union Scholarship | $465.32 | |
| Total Cash | | $38,701.93 |

AAS members on 1/31/2018: 492

Total AAS Memberships as of 1/31/2018: 344

**CALENDAR OF EVENTS**

**9 February 2018**
**Practical Astronomy**
6:30 PM
**General Assembly Meeting**
7:30 PM
ETC 2.136 - UT Campus
Engineering Teaching Center
Dean Keeton and Speedway

**10 February 2018**
**Public Star Party**
5:30 PM - 9:30 PM
Canyon of the Eagles
Burnet, TX

**20 February 2018**
**Astronomy on Tap**
7:30 PM (doors at 7:00 PM)
The North Door
501 Brushy Street
Austin, Texas

**24 February 2018**
**"UT Austin Girl Day"**
12:00 PM - 5:00 PM
UT Austin Campus
Robert Lee Moore Plaza
2515 Speedway
Austin, Texas

## AAS AFFILIATIONS

http://darksky.org

http://nightsky.jpl.nasa.gov

http://astroleague.org

http://tsgc.utexas.edu

## OUTREACH OPPORTUNITIES, FEBRUARY 2018

**By Dawn Davies, Vice President and Interim Outreach Chair**

Join your AAS Outreach Team for our regular star parties at Canyon of the Eagles and help out at public events.

**Saturday, February 10**
**Public Star Party**
**Eagle Eye Observatory**
**5:30 p.m. – 9:30 p.m.**

**Saturday, February 24**
**UT Austin Girl Day**
**Robert Lee Moore Plaza**
**12:00 – 5:00 p.m.**

**Thursday, March 1**
**Starry Night – Mayan Skies**
**Girl Start**
**5:30 p.m. – 7:00 p.m.**

**Saturday, March 10**
**Public Star Party**
**Eagle Eye Observatory**
**5:30 p.m. – 9:30 p.m.**

To volunteer for these events or any other future outreach opportunities please contact us at outreach@austinastro.org.

## AAS FRIENDS

http://canyonoftheeagles.com

http://parts-people.com

# COMMUNICATIONS REPORT, FEBRUARY 2018

**By Sean Leary, Communications Chair**

1. Website:
    a. December Sidereal Times
        i. Banner with link
        ii. Static page update with link, image, slider entry
    b. 2017 Image of the Year
        i. Banner for Leo Triplet
        ii. Gallery page update
    c. Pages
        i. Rewrote **Your First Star Party** page to viewable to all. Some content is restricted to members only
    d. Events
        i. Removed recurring Girlstart events, which were inaccurate. Replaced with individual events for 2018
        ii. Public and private star party events for Jan, Feb 2018
        iii. Jan EC meeting updated, also added post
    e. Banners
        i. Took down Holiday Party banner
        ii. Added SkyGlow banner and link
    f. Fast Track
        i. FT301 rescheduled for Jan 13. Added post, updated event and signup, updated banner
        ii. FT204 banner and event set up, then removed for rescheduling
2. Email blasts:
    a. FT301 Jan 13
    b. News and notes for Dec 2017/Jan 2018
3. Facebook
    a. FT301 post
4. Communications
    a. Update outreach@austinastro.org for Dawn

## AAS NEEDS YOU!

Volunteers are needed to serve on the Nominating Committee. The Nominating Committee is composed of three current members, not presently occupying a seat on the Executive Committee (EC), who will work together to seek out interested individuals to run for EC offices in the next officer year, June 1 – May 31.

There are currently two positions, one on the EC and on appointed, that are in need of filling. The Outreach Chair is responsible for overseeing all of the public star parties presently held at Eagle Eye Observatory and at all requested locations. The Outreach Chair manages relations, maintains the outreach supplies, updates the website and social media platforms, and ensures adequate staffing of volunteers with equipment at all public functions.

The Editor of the Sidereal Times is responsible for publishing the monthly newsletter for the society. The ideal individual has past experience in documentation editing, graphic design and familiarity with Adobe Creative Suite.

Please share your questions about these positions and your expression of interest to contactaas@austinastro.org.

## MEMBER SERVICE REPORT, FEBRUARY 2018
### By Joi Chevalier, Member Services Chair

**Fast Track 307: Intro to Spectroscopy– Led by Jim Lynch @ Eagle Eye Observatory**
**February 24 from 6:00 p.m. – 9:00 p.m.**
The class will start off with a slide show explaining what is spectroscopy and why we see what we do. Then move to a practical session of observing various light sources with low-res spectroscopes to show that "white" light is not necessarily white. Finish up with instructions on building a DIY spectroscope using a CD and a showbox. For More information and to sign up, please go to: FAST TRACK 307

**Messier Marathon @ Location TBD**
**March 24**
Join your fellow members on the field for a night of dark skies and the stellar scavenger hunt that is the Messier Marathon.

**Fast Track 101: Myth and Sky – Led by Joi Chevalier and Dawn Davies @ Location TBD**
**April 14**
This class will focus on navigation of the night sky by way of the constellations, a discussion about the myths behind the collections of stars and the similarities and differences of the stories across cultures.

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## REVISED BYLAWS VOTE – FEBRUARY 9
### By Joyce Lynch, Bylaws Committee

The vote on revised bylaws will take place at this Friday's GA meeting. The bylaws are posted on our website at **BYLAWS**

Below is a list of major changes that are being proposed.

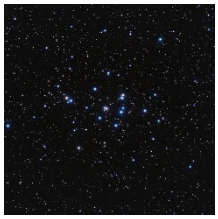
- Instead of Honorary Members, there will be Honored Lifetime Members who will have all the same privileges of membership as other members. As part of being honored for their contributions to AAS, they will no longer be required to pay dues.
- A household with at least one person eligible for a Senior membership will have dues reduced by 30%.
- There will no longer be a set membership year. Instead, when dues are paid, the membership year for that person (or household) will begin, and renewal will come due in a year.
- The Historian position has been eliminated.
- If an EC position is not filled at the April election meeting, the vacancy will be filled by appointment by the President with the approval of the EC.
- A specific meeting night for the GA is no longer included in the bylaws.
- Absentee voting for officers and bylaws amendments will now take place electronically rather than by U. S. mail.

Special thanks to the Bylaws Committee and those that contributed to these recent revisions.
Phil Schmidt, Sean Leary, David Mathias, Joi Chevalier, Mark Lyon, Kelly Knight, Tim Brown,
Ron Carman, Jim Lynch and Chairperson Joyce Lynch

# FEBRUARY OBSERVING TARGETS

## By Brian Cuthbertson, Member

As the winter Milky Way drifts east to west across February skies, it leaves in its wake the beginnings of spring's deeper space. This month's objects, all just east of the winter Milky Way, are of the same region. Open cluster M44 is an outlier of the winter Milky Way's cluster retinue. Galaxy NGC 2403, on the other hand, is in the vanguard of galaxies that will dominate later spring skies. These galaxies are all fodder for your optics. Get out and enjoy them.



**M44=NGC 2632 rating: EASY**
**Open cluster in Cancer**
**RA 8h 40.1m Dec +19d 59.0' (2000)**
**Magnitude 4.5, distance about 550LY**

CREDIT: STUART HEGGIE

M44, the Beehive Cluster, is the nearest, largest and brightest galactic open cluster to the Sun. It lies roughly 600 light-years away, with a diameter of 10 light-years. That translates into about 1.5°, or three full-moons in diameter. The cluster contains no trace of nebulosity, although present theory says there must have been some material there 650 million years ago when the cluster of stars were born.

Since ancient times M44 has been known by the Latin name Praesepe ("the manger"). It was thought to be a nebula until resolved into stars by one of Galileo's early telescopes. The cluster is also known as the Beehive.

M44 appears to the naked eye as a dim, cloudy patch, slightly elongated north to south. It can be seen even through the light of a quarter moon in a slightly hazy sky. Binoculars resolve the cluster into scores of faint stars swarming Beelike around a dozen or so brighter stars that roughly suggest the form of an old-fashioned, dome-shaped beehive. Among these bright stars are four wide doubles of similar brightness. Of M44's roughly 1000 stars, about 200 are magnitude 14 or brighter, 80 are brighter than 10th magnitude, and 13 are brighter than 7.5.

In late 2012 two planets - both hot Jupiter-like gas giants - were found in M44, the first planets discovered orbiting sun-like stars in an open cluster. Beyond the cluster itself, at least 60 NGC galaxies lie in a 3° window roughly centered on the Beehive, and about five of these can be reached with a 12" reflector telescope.

**NGC 2403 rating: MEDIUM**
**Bright spiral galaxy in Camelopardalis**
**RA 7h 36.9m Dec +65d 36.0' (2000)**
**Magnitude 8.4**

CREDIT: SUPRIME-CAM, SUBARU TELESCOPE, NAOJ

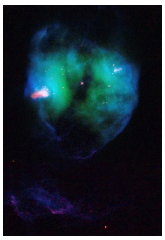
Welcome to the most impressive deep-sky object in the constellation of Camelopardalis. NGC 2403 is the brightest galaxy, north of the celestial equator, that isn't a Messier object. It can be seen in large binoculars if you know where to look, and finding it isn't that hard, even if you aren't familiar with Camelopardalis's location. Start in Ursa Major at 3.4-magnitude Muscida, which means "the Muzzle", and which marks the nose of the Great Bear. From there shift your binoculars 8° to the NW to reach the galaxy, you'll find if framed by two 11th-magnitude stars.

Smaller telescopes show a large 15x5' cigar-shaped disk tilted NW to SE, highlighted by a bright central nucleus. A 12" scope will reveal up to five faint stars associated with the galaxy's core, the brightest of which lies just south of center. More faint stars can be seen in the low surface brightness halo. These make the galaxy a minefield for any would-be supernova hunter who haven't been careful to acquaint themselves in advance with the terrain. Despite this, in 2004 a Japanese astronomer found an 11th magnitude supernova, SN 2004dj, in the galaxy.

## FEBRUARY OBSERVING TARGETS (CONT)

At about 50,000 light years across, NGC 2403 looks strikingly similar to much closer and better known galaxy M33, the Triangulum Galaxy. But it lies about three to four times farther away, at 8-12 million light years. NGC 2403 is most likely an outlying member of the nearby galaxy group that also includes M82 and M81 as its brightest members.

Easily found just over 3° SW of Castor, NGC 2371-2 is one of a select group of double-lobed planetaries, each of whose lobes has its own NGC number. Because it appeared as a double in William Herschel's telescopes, it received 2 entries in his catalog. This catalog later evolved into the NGC. Perhaps the most famous double-lobed planetary is M76, the Little Dumbbell Nebula in Perseus (also known as the Barbell Nebula, Cork Nebula, and NGC 650/651).



**NGC 2371-2 rating HARD**
**planetary nebula in Gemini**
**RA 7h 25.6m Dec +29d 29.1' (2000)**
**Magnitude 11.3**

CREDIT: NASA/ESA/HUBBLE HERITAGE TEAM (STSCI/AURA)

NGC 2371-2 is actually fairly easy in a 4-inch refractor. You can see the double nucleus (lobes), but the use of averted vision is necessary for the 14th-magnitude central star. A 10" telescope clearly shows an obviously pale green planetary with two patches connected by a faint haze. Aligned NE-SW, the patches exhibit differing characters: the SW lobe, NGC 2371, is brighter and more concentrated with a stellar center. The two patches are almost in contact. A slight wedge of darkness, seen best with averted vision, separates them. In a 12" scope a faint haze fills a roughly circular 50" area surrounding the two lobes. Both of the parts are about the same size, but NGC 2371 is again much brighter with a stellar nucleus. At 225x the central star is visible, sparkling faintly between the two bright lobes. In a 20" reflector at 260x the two wedge-shaped lobes can be seen plainly connected by a thin waist and surrounded by a large, faint common envelope. The central star is clearly visible without a filter.

Early in the 20th century H.D. Curtis photographed NGC 3271-72 with the 36-inch Crossley reflector at Lick Observatory. His 160-minute exposure on very slow film showed faint sections of an outer ring about 2' in diameter surrounding the planetary. Its brightest sections are at right angles to (rather than in line with) the nebula's two easily seen lobes. This outer ring has since appeared in deep amateur images of the nebula, but hasn't yet been reported visually.

## ADDITIONAL ASTRONOMY RESOURCES FROM OUR MEMBERS

- Amy Jackson's website is http://www.starryskyaustin.com/ . Learn more about her children's book about astronomy at http://www.starryskyaustin.com/childrens-book-project/
- Celestial Teapot's product catalog can be found at http://messierplanisphere.com/
- Dawn Davies' Earthbound Astronomer website at https://www.earthboundastronomer.com/
- Joseph Macry writes a weekly column for Manor Community News: "This Week in Astronomy". You can read the online edition here: http://manorcommunitynews.com/
- Rob Pettengill's site can be found at http://astronomy.robpettengill.org/ . Rob's material shared per CC BY-NC-SA 4.0 license.

# Image of the Month

## Jeffery Ridings

IC1805, The Heart Nebula, part of the Heart & Soul nebula complex, is located approximately 7500 light years away in the Perseus Arm of the Milky Way Galaxy in the constellation Cassiopeia. The nebula is roughly 150' x 150' in size and has an apparent magnitude of 18.3. This 8 panel mosaic was taken by Jeffery Ridings from his backyard in Hutto, Texas using Ha & OIII filters.

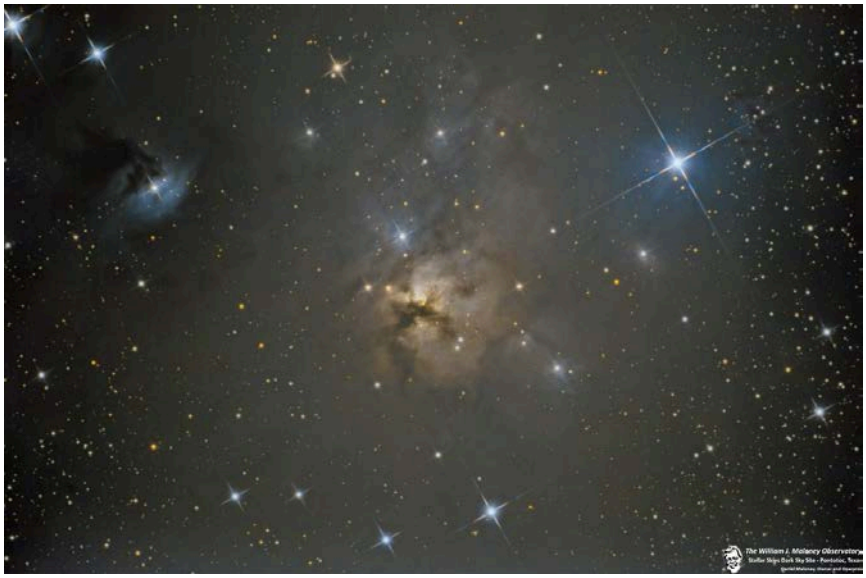
Scope: Celestron EdgeHD 8"
Camera: Moravian G3 w/ OAG
Mount: iOptron CEM60
Filters: Baader Planetarium: Ha 3.5nm, OIII 8nm
Guide Camera: Lodestar X2
Processed in PixInsight and Photoshop
Total exposure time: 48 hours

# MEMBER'S GALLERY

## ROB PETTENGILL

Lunar eclipse as a time-lapse composite
Near the Senterfitt Cemetery in Lometa, TX
2018-01-31 11:47 to 13:12 UT

Camera: Sony RX100 V (25.7mm zoom, 70mm full frame equiv.)
Fixed tripod
Exposures from 1/400 sec at f/4 at ISO 80 to 4 sec at f/2.8; ISO 400
Stacking, exposure adjustment, and final crop in Photoshop.



## DANIEL MALONEY

NGC 1579 The Northern Trifid
William J. Maloney Observatory, Pontotoc, TX
November 2017 to January 2018

Imaging telescope or lens: Vixen VMC260L
Imaging camera: ZWO ASI071MC-Cool
Mount: Mountain Instruments MI-250
Guiding camera: Lodestar
Focal reducer: Astro-Physics CCDT67
Software: MaximDL, ACP Expert, Interactive Astronomy Sky Roof, Interactive Astronomy Sky Alert, PixInsight

## MEMBER'S GALLERY (CONT)

### RATHIJIT BANERJEE

The Horsehead Nebula (Barnard 33)
Austin, Texas
Jan. 14, 2018

Imaging telescope: Stellarvue SVR102T
Imaging camera: ZWO ASI1600MM-P
Mount: Losmandy G-11GFT Gemini 2
Guiding telescope or lens: AstroTech AT60ED
Guiding camera: ZWO ASI174MM
Focal reducer: Stellarvue SFF3-3FT-42
Software: AstroPixel Processor, APT, Adobe Photoshop CC (64 Bit); Filter: Astrodon Ha 36mm 5nm
Integration: 2.8 hours

### YOUR IMAGE/SKETCH COULD BE IN THE NEXT SIDEREAL TIMES

Astronomy related images and sketches can be submitted at any time and are due for publication in the Sidereal Times no later than the 25th of each month. Along with your submission please include your name, location of photography or sketching, equipment used, date and the name of the item. From each month's submission an image or sketch of the month will be chosen. All images/sketches from months January through November will be voted upon by the membership for image/sketch of the year in December.

# NASA Space Place–Sixty Years of Observing Our Earth

## By Teagan Wall

Satellites are a part of our everyday life. We use global positioning system (GPS) satellites to help us find directions. Satellite television and telephones bring us entertainment, and they connect people all over the world. Weather satellites help us create forecasts, and if there's a disaster—such as a hurricane or a large fire—they can help track what's happening. Then, communication satellites can help us warn people in harm's way.

There are many different types of satellites. Some are smaller than a shoebox, while others are bigger than a school bus. In all, there are more than 1,000 satellites orbiting Earth. With that many always around, it can be easy to take them for granted. However, we haven't always had these helpful eyes in the sky.

The United States launched its first satellite on Jan. 31, 1958. It was called Explorer 1, and it weighed in at only about 30 pounds. This little satellite carried America's first scientific instruments into space: temperature sensors, a microphone, radiation detectors and more.

Explorer 1 sent back data for four months, but remained in orbit for more than 10 years. This small, relatively simple satellite kicked off the American space age. Now, just 60 years later, we depend on satellites every day. Through these satellites, scientists have learned all sorts of things about our planet.

For example, we can now use satellites to measure the height of the land and sea with instruments called altimeters. Altimeters bounce a microwave or laser pulse off Earth and measure how long it takes to come back. Since the speed of light is known very accurately, scientists can use that measurement to calculate the height of a mountain, for example, or the changing levels of Earth's seas.

Satellites also help us to study Earth's atmosphere. The atmosphere is made up of layers of gases that surround Earth. Before satellites, we had very little information about these layers. However, with satellites' view from space, NASA scientists can study how the atmosphere's layers interact with light. This tells us which gases are in the air and how much of each gas can be found in the atmosphere. Satellites also help us learn about the clouds and small particles in the atmosphere, too.

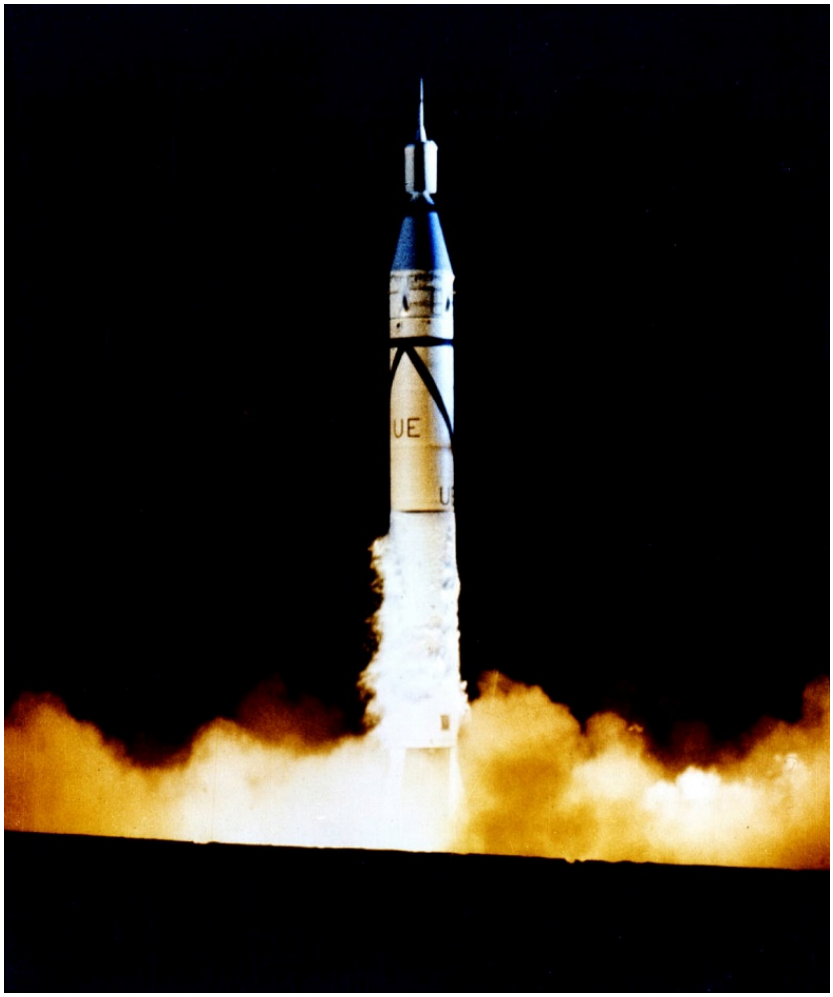
When there's an earthquake, we can use radar in satellites to figure out how much Earth has moved during a quake. In fact, satellites allow NASA scientists to observe all kinds of changes in Earth over months, years or even decades.

Satellites have also allowed us—for the first time in civilization—to have pictures of our home planet from space. Earth is big, so to take a picture of the whole thing, you need to be far away. Apollo 17 astronauts took the first photo of the whole Earth in 1972. Today, we're able to capture new pictures of our planet many times every day.

## NASA SPACE PLACE (CONT)

Today, many satellites are buzzing around Earth, and each one plays an important part in how we understand our planet and live life here. These satellite explorers are possible because of what we learned from our first voyage into space with Explorer 1—and the decades of hard work and scientific advances since then.

To learn more about satellites, including where they go when they die, check out NASA Space Place: https://spaceplace.nasa.gov/spacecraft-graveyard



*This photo shows the launch of Explorer 1 from Cape Canaveral, Fla., on Jan. 31, 1958. Explorer 1 is the small section on top of the large Jupiter-C rocket that blasted it into orbit. With the launch of Explorer 1, the United States officially entered the space age. Image credit: NASA*

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* denotes appointed position