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**Next business meeting will be on February 4<sup>th</sup> at 7:00 p.m. – Virtually attended by remote access! (See [Page 19](#) for Zoom link)**

### ***Mars Landing: A Tricky Feat!***

David Prosper

The Perseverance rover and Ingenuity helicopter will land in Mars's Jezero crater on February 18, 2021, NASA's latest mission to explore the red planet. Landing on Mars is an incredibly difficult feat that has challenged engineers for decades: while missions like Curiosity have succeeded, its surface is littered with the wreckage of many failures as well. Why is landing on Mars so difficult?

Mars presents a unique problem to potential landers as it possesses a relatively large mass and a thin, but not insubstantial, atmosphere. The atmosphere is thick enough that spacecraft are stuffed inside a streamlined aeroshell sporting a protective heat shield to prevent burning up upon entry - but that same atmosphere is not thick enough to rely on parachutes alone for a safe landing, since they can't catch sufficient air to slow down quickly enough. This is even worse for larger explorers like Perseverance, weighing in at 2,260 lbs (1,025 kg). Fortunately, engineers have crafted some ingenious landing methods over the decades to allow their spacecraft to survive what is called *Entry, Descent, and Landing (EDL)*.

The Viking landers touched down on Mars in 1976 using heat shields, parachutes, and retrorockets. Despite using large parachutes, the large Viking landers fired retrorockets at the end to land at a safe speed. This complex combination has been followed by almost every mission since, but subsequent missions have innovated in the landing segment. The 1997 Mars Pathfinder mission added airbags in conjunction with parachutes and retrorockets to safely bounce its way to a landing on the Martian surface. Then three sturdy "petals" ensured the lander was pushed into an upright position after landing on an ancient floodplain. The Opportunity and Spirit missions used a very similar method to place their rovers on the Martian surface in 2004. Phoenix (2008) and Insight (2018) actually utilized Viking-style landings. The large and heavy Curiosity rover required extra power at the end to safely land the car-sized rover, and so the daring "Sky Crane" deployment system was successfully used in 2012. After an initial descent using a massive heat shield and parachute, powerful retrorockets finished slowing down the spacecraft to about 2

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miles per hour. The Sky Crane then safely lowered the rover down to the Martian surface using a strong cable. Its job done, the Sky Crane then flew off and crash-landed a safe distance away. Having proved the efficacy of the Sky Crane system, NASA will use this same method to attempt a safe landing for Perseverance this month!

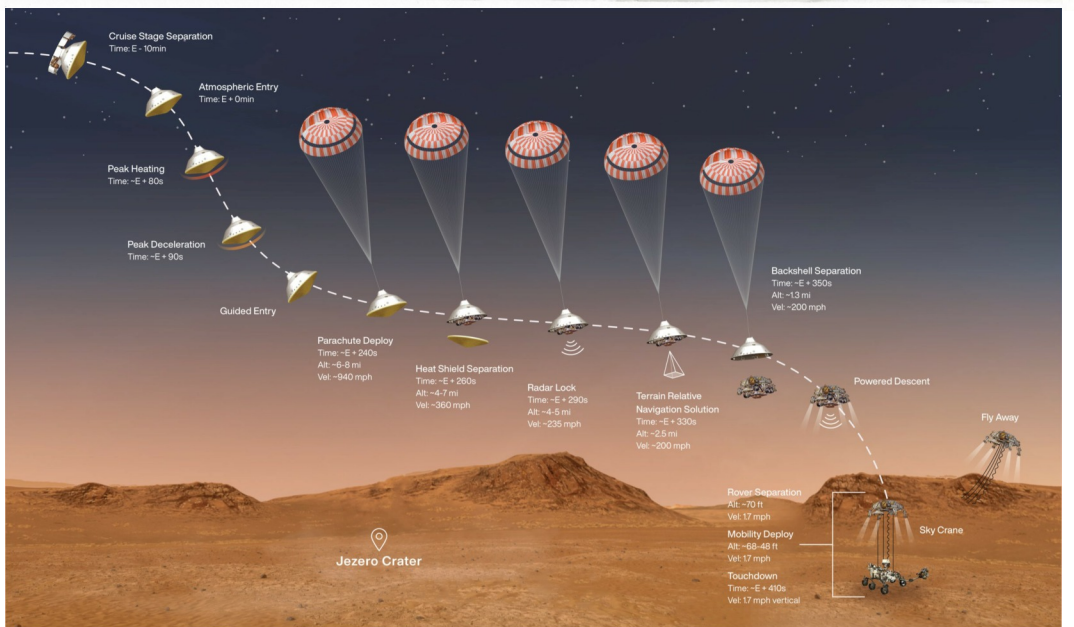
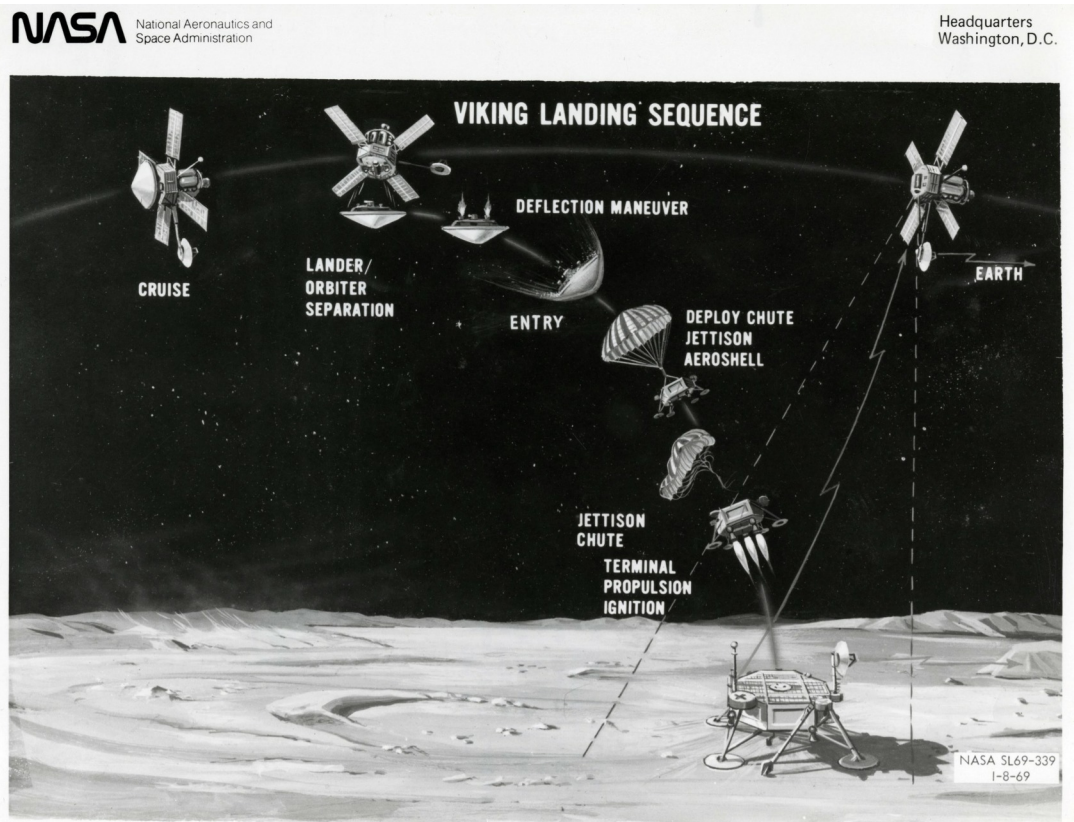
You can watch coverage of the Mars Perseverance landing starting at 1:00 PM CST on February 18 at [nasa.gov/nasalive](https://nasa.gov/nasalive).

Touchdown is expected around 2:55 PM CST. NASA has great resources about the Perseverance Rover and accompanying Ingenuity helicopter on [mars.nasa.gov/mars2020](https://mars.nasa.gov/mars2020).

And of course, find out how we plan to land on many different worlds at [nasa.gov](https://nasa.gov).

*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.gov](https://nightsky.jpl.nasa.gov) to find local clubs, events, and more!*



*Illustrations of the Entry, Descent, and Landing (EDL) sequences for Viking in 1976 (top), and Perseverance in 2021 (bottom). Despite the wide gap between these missions in terms of technology, they both performed their landing maneuvers automatically, since our planets are too far apart to allow Earth-based engineers to control them in real time! (NASA/JPL/Caltech)*



## A Sort of Introduction

By Kevin Railsback

Since I was eight years old and photographed a walrus at Brookfield Zoo, I've been fascinated with documenting the things I've seen, including the night sky.

Back in the eighties, I had a 10" Meade 2120 LX6 SCT telescope that I took some images with hypered Konica 3200 speed film and my trusty Pentax K1000. That 10" SCT was heavy though, and eventually I stopped taking it out and it sits in my basement gathering dust to this day.

I spent the next few decades focusing on photographing wildlife and landscapes but the desire to capture the night sky was always there.

A few years ago, camera manufactures started coming out with digital cameras that were capable of photographing the night sky with a lot less "noise" and I was seeing some amazing images of the Milky Way on social media.

I was hired to film a project for the state of South Dakota and one of the shots I was asked to get was a time-lapse of the Milky Way. It seemed that the stars had aligned for me!

I picked up a Nikon D500 since I had a lot of good Nikon glass back when I was shooting Nikon F5 film cameras and headed off to South Dakota.

You can see the time-lapse of the Milky Way I shot playing continuously at the Good Earth visitor center in Sioux Falls, South Dakota.

That's all it took and my passion for photographing the night sky really took off.

My next project was for an international film challenge. I chose to do a film about light pollution from the Milky Way's point of view. You can watch **Lament of the Milky Way** here: [https://youtu.be/dR48\\_oItBNY](https://youtu.be/dR48_oItBNY)

## Which Brings Us to Today

Last year I purchased a new telescope with the intent on doing a lot more night sky photography. It was a little Meade 70mm Series 6000 Quad refractor. It covered an area of the sky equivalent to about a 350mm telephoto lens. It was amazing but when you get the fever, you want more.

Antoine from Galactic Hunter on YouTube had a Meade 115mm Series 6000 scope he wanted to sell at a good price a few months ago so I jumped at the opportunity and it was love at first sight.

## What is this Leading Up To?

Well, it's simple. I want to share my love of the night sky and how to capture it with you. Not from a scientific point of view but simply a "wow this is so cool check it out" point of view.

I don't know the difference between a quark and a pulsar (is there a difference?) and it doesn't matter to me if the Flame nebula is the same color as the Horsehead nebula in my images. Every time I hit the image review button on my camera, it's like Christmas morning. I photograph the night sky for the simple joy of it and I don't get caught up in the technicalities and details. I don't worry if adding a filter holder messes up my back focus on my system. The Rosette nebula looks just as cool to me.

## Astro Photography 101

Do you have a camera and a couple of lenses and want to put them to use *(Continued on [page 4](#))*



photographing the night sky? I'd like to invite you along on my journey as an astro photographer and learn with me.

There's so much that I want to accomplish as a photographer of the night sky. I've learned a lot but there's still so much more to learn which is exciting to me.

My plan is to start a series of articles for this newsletter on how I capture the night sky, the gear I use and solving the mistakes I make a long the way.

One article I will be sharing with you is how to avoid capturing "sardine stars" in your star trail images. I learned this one from Ansel Adams nephew Kevin Adams while we were filming synchronous fireflies in Tennessee.

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## **Experimenting with the Bushnell Sky Chief I**

John Centala, Observatory Director

If you have attended meetings or programs at Pal Dows you may have noticed a rather forlorn looking 60 mm refractor at the front of the meeting room. This is a Bushnell Sky Chief I, of 700 mm focal length, on an altazimuth mount and wooden tripod. It has been used only to show the audience what a refractor looks like, and does not even have an eyepiece. I borrowed this telescope to test it and see if it was actually usable. It was made in Japan and is very portable, with a 2.5 lb tube assembly and a 3 lb tripod. Two of the three finder adjustment screws were missing. They had an extra coarse 4 mm thread, not available locally, so I re-tapped the holes for 8-32 screws. The finder bracket also uses 4 mm screws, but they have the common coarse pitch so I could replace a missing nut. The finder is a 5x24mm size, with a single element objective internally stopped down to 10 mm. I could barely see 5<sup>th</sup> magnitude stars in it from my backyard.

But using borrowed 12 and 25 mm Huygenian eyepieces, the main telescope performed reasonably well despite its uncoated objective lens.

You may not have known that the CAA has a few broken pairs of 10x25mm binoculars. The achromatic binocular objective has a focal length of about 104 mm, nearly the same as the Bushnell finder lens, but it is about 1 mm larger in diameter, so it cannot be used as a

Of course, maybe I should do an article on shooting star trails first.

Kevin J Railsback

*"Success is peace of mind which is a direct result of self-satisfaction in knowing you did your best to become the best you are capable of becoming." John Wooden*

*[Emmy nominated filmmaker and photographer Kevin J Railsback has traveled as far as Africa to test HD cameras for Panasonic. His stunning nature and wildlife footage has appeared in productions on National Geographic, Animal Planet, Discovery Channel as well as in commercials for such corporate giants as AT&T.*

*<https://naturephotostudios.com/>]*

direct replacement. I cut a short piece of binocular barrel and temporarily installed its objective lens in the finder, after removing the aperture stop. It gave a much brighter view, but the image quality was certainly not improved. I restored the finder to its original condition, but could replace its objective lens if anyone planned to use this telescope for nighttime viewing.

The 10x25 binocular eyepieces are informally called the "reverse Kellner" type, since they have a doublet field lens and a single eye lens, the opposite of the Kellner arrangement. I mounted one in a 0.965 inch diameter tube, expecting good performance. It has a notably wide 55 degree apparent field, but it seemed to have more chromatic aberration than a 12 mm Huygenian. Based on a magnification test by viewing the lap siding on my neighbor's house, the focal length is about 10.5 mm. Another of the binocular eyepieces still had the roof prism attached, so I made another 0.965 inch tube to try it out. It gave an upright but rather dim image. Investigation revealed that the telescope had a plastic baffle in the focuser tube that was stopping down the objective when the focuser was racked in to accommodate the roof prism. The baffle seemed to be glued in, so I took a three-quarter inch drill bit and rotated it by hand to enlarge the hole. It no longer restricts the objective aperture regardless of focus position.

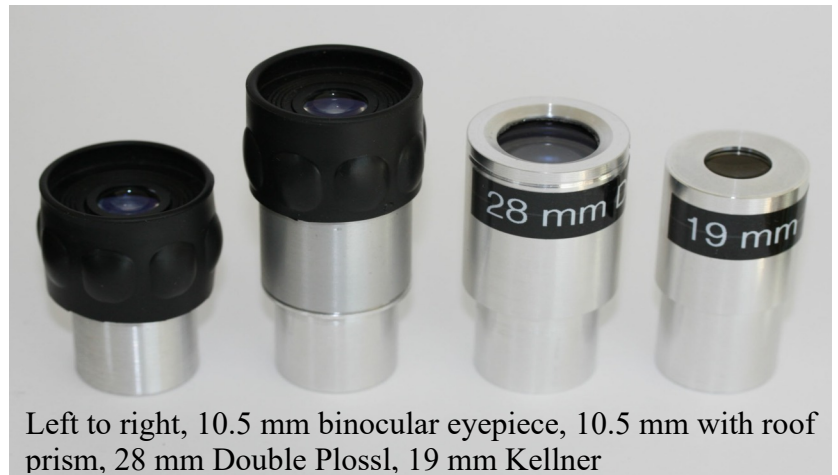
Page 74 of the September 2020 issue of Sky & Telescope shows how to make eyepieces from binocular objectives. A Plossl (Continued on [page 5](#))

eyepiece consists of a closely spaced pair of achromats, but with binocular objectives the focal length will be too long to be useful. Putting two pairs together, making a Double Plossl, results in a practical focal length. I built one of these and measured the focal length at 28 mm, consistent with the calculated value. I was impressed with its performance. Comparing it with the 25 mm Huygenian showed exactly the same magnification, so the marked 25 mm focal length is not accurate. I also measured 12 and 15 mm Huygenians and found their focal lengths were as marked.

While cleaning out my utility room I found a few assorted lenses that have been sitting there for 40 years. They possibly came from the viewfinder of a Zeiss twin lens reflex camera. Only the smallest was a doublet, but there was a slightly bigger singlet that looked like a suitable companion to make a Kellner eyepiece. A check of the focal lengths showed they were both about 24 mm, not a good combination, but with no better choice I machined another 0.965 inch tube. I spaced the lenses at two-thirds of the eye lens focal length as recommended by Sam Brown in *All About Telescopes*. The result is a 19 mm Kellner eyepiece, though I'm not sure Carl Kellner would have approved of this particular example. It seems to work but is not outstanding in its performance. So we now have four more 0.965 inch eyepieces. The 19 and 28 mm ones could be improved a little by enlarging the field lens aperture and adding a field stop. I would like to test these eyepieces in a

Newtonian telescope before putting any more time into them.

A star diagonal is a great convenience for viewing with a refractor. We have a 0.965 inch prism diagonal that came with the Newtonian telescope donated by Mary Hansen. Since this is not needed for a Newtonian, I tested it with the 60 mm Bushnell and found it to be of good quality. It gives a right side up image, but reversed left to right, so may be of some benefit for indoor viewing. We also got a 1.5x erector lens with the Hansen telescope, but it gives a very narrow field of view and obvious chromatic aberration with the 28 mm eyepiece. The Sky Chief I is now ready for viewing the night sky, while also retaining its original purpose as an example of a refractor. The altitude axis of the mount is one remaining item for further improvement.



Left to right, 10.5 mm binocular eyepiece, 10.5 mm with roof prism, 28 mm Double Plossl, 19 mm Kellner

## **Program Note: Cosmic Horizons**

By Noha Reda, program coordinator

Cosmic Horizons will be presented by Charles E. Allen (Chuck). [See more details on the CAA website.](#)

Chuck is currently Vice-President, and also past-President, of the Astronomical League. He founded the League's 30 year-old National Young Astronomer Award in 1991, received the G. R. Wright Award for service in 1998, and holds the League's Master Outreach Award with more than 500 public programs to his credit. He is a League Master Observer with 38 programs completed, three of which he coordinates.

Chuck is Program Director for the Evansville Astronomical Society and past President of the Louisville Astronomical Society (1991-94). From 1995 to 2002, he served as Judge, and once as Lead Judge, in earth and space science for the Intel International Science and Engineering Fair.

Chuck graduated from Duke University in 1970, served as a U.S. Air Force officer from 1970 to 1974, and graduated from the University of Kentucky College of Law in 1977. He was a partner with Kentucky's largest law firm, Frost, Brown Todd LLC, where he practiced for 27 years.



## Library Materials from Bob Haskins

John Centala, CAA Librarian

A few days after the untimely death of Bob Haskins, his sister donated his astronomy-related materials to the CAA. Included were 16 books and a six page laminated *QuickStudy Astronomy* outline. The 3-volume *Burnham's Celestial Handbook* and the 2010 *RASC Observer's Guide* are for sale in the lobby. Twelve of the books and the *Astronomy* outline are new to our library:

- 631 *QuickStudy Astronomy*, by John Roche
- 413 *The Elegant Universe*, by Brian Greene
- 414 *Calculating the Cosmos*, by Ian Stewart
- 415 *In Pursuit of the Unknown*, by Ian Stewart
- 416 *Astronomy: The Evolving Universe*, by Michael Zeilik
- 417 *Night Sky with the Naked Eye*, by Bob King
- 418 *The Sun's Heartbeat*, by Bob Berman
- 419 *Near-Earth Objects*, by Donald Yeomans
- 420 *Stars and Planets*, by Robert Dinwiddie, Will Gater, Giles Sparrow, and Carole Stott
- 421 *Relativity: The Special and the General Theory*, by Albert Einstein
- 422 *A Short History of Nearly Everything*, by Bill Bryson
- 423 *Neil Armstrong: a life of flight*, by Jay Barbree
- 424 *Moonshot*, by Alan Shepard, Deke Slayton, Jay Barbree, and Howard Benedict

Of course I did not have time to read all these, but I quickly got interested in the last two on the list. These cover the early days of the space age, when information was pretty sparse, partly due to the lack of television, and very little revealed by the Russians. Book 416 is a college textbook from 1976. Book 415 is subtitled *17 Equations That Changed the World*, and is not about astronomy. *The Sun's Heartbeat* is a very entertaining account of some strange effects the sun can have on our planet. *Stars and Planets* is a rather complete, heavily illustrated introductory guide to astronomy for amateurs. For additional details, go to the library and take a look at these items.

Eight Great Courses DVD sets were donated. Each course consists of a set of half-hour lectures on DVDs, plus a companion book. Five of these are new to the library:

- V201 *Our Night Sky*, 12 lectures by Edward Murphy
- V202 *A Visual Guide to the Universe*, 18 lectures by David Meyer
- V203 *Experiencing Hubble: Understanding the Greatest Images of the Universe*, 12 lectures by David Meyer
- V204 *New Frontiers: Modern Perspectives on Our Solar System*, 24 lectures by Frank Summers
- V205 *A Field Guide to the Planets*, 24 lectures by Sabine Stanley

I was hoping that *Our Night Sky* might be suitable for youngsters wanting to learn the constellations, but it is actually aimed at the typical amateur astronomer with a telescope. *The Visual Guide to the Universe* has spectacular images, and explains the science that was learned from each image, making it a good choice for viewing on cloudy member nights. V203 is an earlier course by the same lecturer, and in a similar vein, but I thought it was not as good. I was very impressed by *A Field Guide to the Planets*. Dated 2019, it is the newest of these courses, but unfortunately the first disc (6 lectures) is missing. Possibly Bob left it in his DVD player. V204 covers similar topics, but I thought it had less astronomy and more geology.

We already have the other 3 DVD sets, so we now have spare copies:

- V206 *Understanding the Universe: An Introduction to Astronomy*, 2<sup>nd</sup> edition, 96 lectures by Alex Filippenko
- V207 *Dark Matter, Dark Energy: The Dark Side of the Universe*, 24 lectures by Sean Carroll
- V208 *Radio Astronomy: Observing the Invisible Universe*, 24 lectures by Felix Lockman

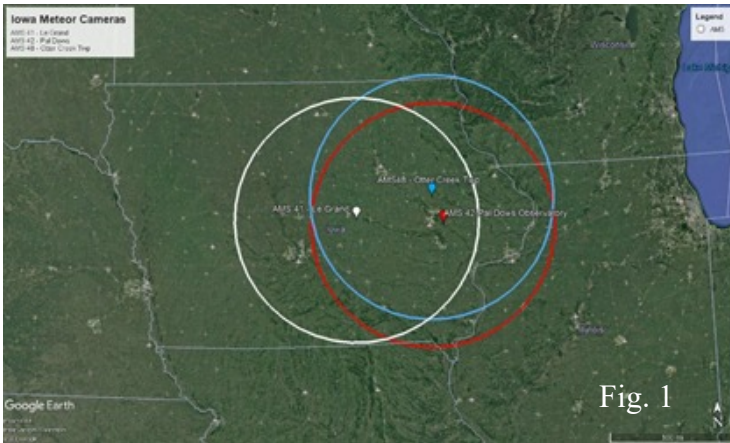
We have already watched many of these DVDs, especially those by Alex Filippenko and Sean Carroll, at meetings and on member nights.

There also were 80 recent issues of magazines, mostly *Astronomy* and *Sky & Telescope*, 44 of which are new to our library. The remaining 36 are on the table in the meeting room with the other magazines for visitors to take, after on-site programming resumes.

# CAA All Sky Meteor Camera System Winter 2021 Project Update

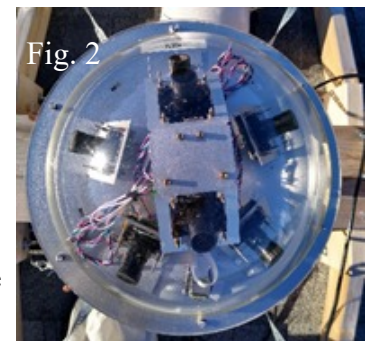
by Carl Bracken

Software updates and camera calibrations are the theme for our project update in this installment.



Considerable effort is being put forward to roll out the latest revisions of the software code running on the three sites in Eastern Iowa. A key area of focus for this roll out is support for multi-site operations, the category into which we fall. Many sites currently operate independently due to physical spacing between stations. The Iowa stations are a high priority for the roll out effort according to developer Mike Hankey since all three of the initial Iowa stations have overlapping coverage areas as shown in Fig. 1. Each circle is approximately 180 miles in diameter.

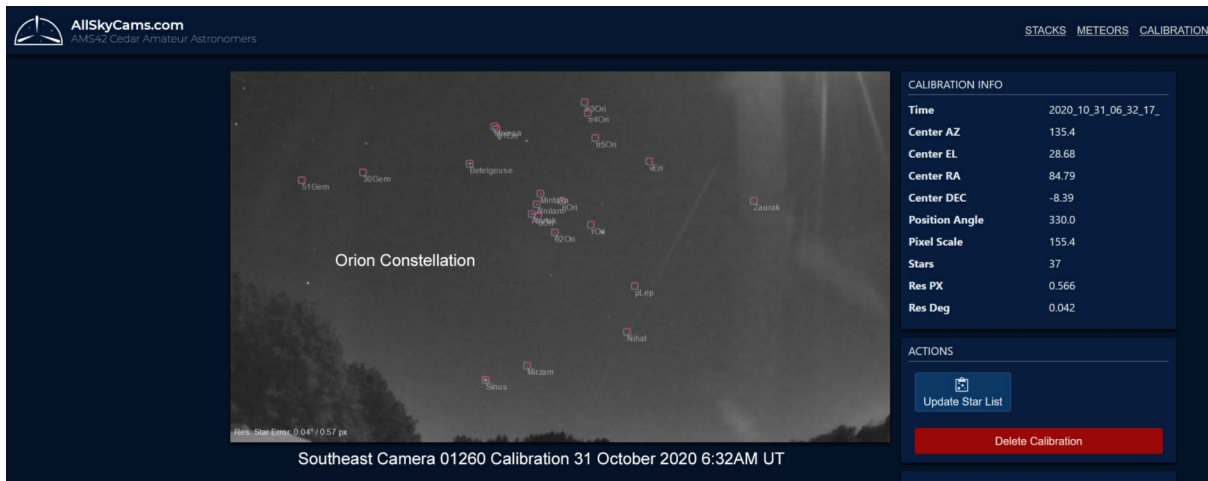
Recall that each camera head unit consists of seven (7) individual sensor modules (Fig. 2); each CMOS sensor includes an effective pixel array of 1945 x 1097 at 2.9 $\mu$  x 2.9 $\mu$  with a 4mm focal length optic. This combo produces a horizontal field of view or HFOV of 72.2° and a vertical (VFOV) of 44.7°. Five (5) of the sensors are installed on the horizontal base of the camera head unit evenly spaced apart generating approximately 360° HFOV coverage with 44.7° VFOV. Two (2) additional cameras are arrayed above on a separate bracket with each camera set at approximately 45° tilt to generate coverage directly overhead.



Camera Field of View calibration tasks are well underway as of January. Mike Hankey is rolling out new code enhancements that significantly improve the analytics performance for each dataset. Starfield calibration is crucial for the overall system operation both in a stand-alone mode as well as the ultimate operational objective to have multi-site orbital solutions developed. The process is highly automated. A library of 'Past Calibrations' are saved locally to build the foundation for the analytics routines to calculate object flight paths.

Clicking on the link presented in the past calibration brings up the calibration detail results page shown below.

(Continued on [page 8](#))



On January 10<sup>th</sup> the first on-line ‘User Interface’ capture session occurred with Mike Hankey operating the principal development site AMS1 at his rural farm site in Maryland. On the local Iowa side, I am using the latest version of Camtasia suite to capture the entire session of working through the user interface as well as the conversation during the capture process. The goal of this phase of the project is to capture the full capability of the software user interface with Mike explaining key details of the newest features and how they fit in the overall workflow. A key example is the color-coded trajectory boxes of a meteor detection which is a newer feature of the software.

The screenshot shows the AllSkyCams.com interface for AMS1 Starlight Farm. The main display is a star chart with a meteor track. The track is color-coded from red at the start to blue at the end. Text labels indicate 'Track Starts red' and 'Track Ends Blue'. The interface includes a navigation menu at the top, a data table for observations, and control buttons for zooming and updating data.

#	Time	RA/DEC	AZ/EL	X/Y	w/h	Max px
50	04:18:20.360	83.74 / -30.25	192.8 / 18.94	750 / 550	7 / 8	431
51	04:18:20.400	83.61 / -30.49	192.9 / 18.68	751 / 556	7 / 8	599
52	04:18:20.440	83.29 / -30.54	193.1 / 18.57	757 / 559	8 / 9	939

In the example above the color boxes are evident: the starting pixel is RED, and the terminal pixel is BLUE. The software attempts to estimate pixel density in this area as well. The key benefit of this feature is to illustrate immediately the direction of the detected object through the color coding.

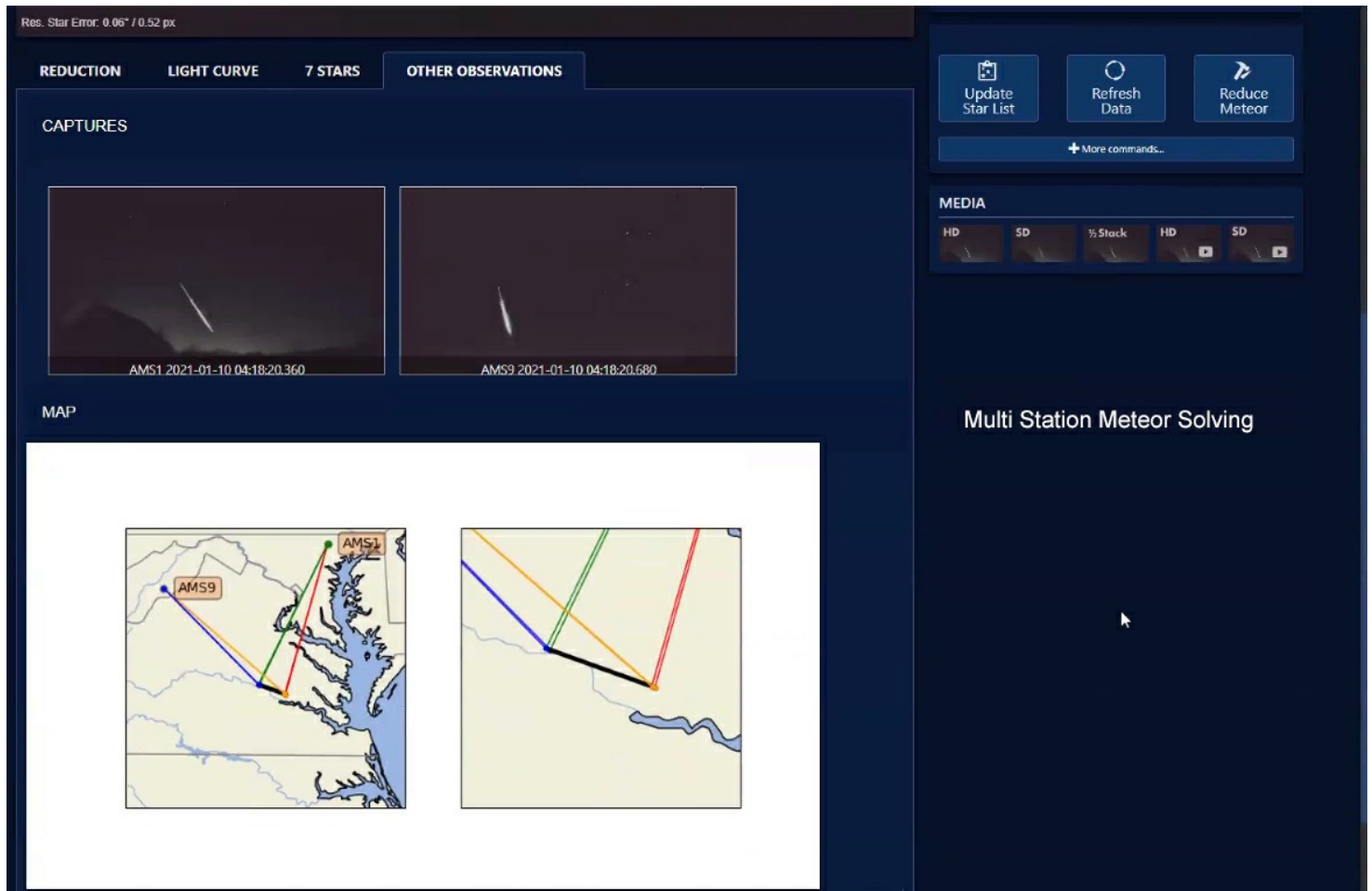
All the features and development are building toward the ultimate goal that leverages multiple sites with overlapping coverage zones in order to calculate detected object flight trajectory and in some cases have sufficient data to estimate possible land fall areas. A quote from a 2012 white paper by Peter S. Gural published by the ‘The Meteoritical Society’ puts a sharper focus on a key goal for this platform “to accurately estimate the meteor’s trajectory through the Earth’s atmosphere and ultimately derive its Keplerian orbital elements in the solar system” (*Meteoritics & Planetary Science* 47, Nr 9, 1405–1418 (2012) doi: 10.1111/j.1945-5100.2012.01402.x). Using data generated in a calibrated system we should be able to make determinations about the parent body of a given detected object whether the origin is a cometary object or asteroid.

(Continued on [page 9](#))



During the first online session with developer Mike Hankey, he was able to showcase the very latest implementation of multi-site analysis. The image below represents the early progress using his primary development site of AMS1 in Maryland and a nearby site AMS9 located in Virginia. A great deal of research in academia has been put into developing the complex modeling required to utilize the raw data our system is now capable of generating.

The screen capture below shows Mike's development site AMS 1 on the left pane and the overlapping site AMS9 on the right pane.



The map overlay graphic below the still images is part of the development currently under way to illustrate the object path and the relative detector site locations. In this example of an object detected on 10 January 2021 the software is looking at the same object from two stations with a known separation between each and calibrated camera fields.

I will continue to provide updates on the documentation development effort with a goal of having a presentation ready for late spring or early summer to give an in-depth review and guided tour for CAA members and possibly a public facing real or virtual program. Until then keep looking up and hope for clear skies in 2021!

## Touring the Skies

By Jim Bonser

I know it's a little hard to tell, but gradually, day by day, the days are getting longer, and the nights are getting shorter. On February 1<sup>st</sup> where I am near LeGrand, Ia., the Sun will rise at 7:27 a.m. and set at 5:30 p.m. By month's end on the 28<sup>th</sup>, it will rise at 6:47 a.m. and set at 6:01 p.m. making the day about 1 hour and 14 minutes longer. This happens because the Earth is spinning like a gyroscope and the poles are not perpendicular to the plane of our orbit around the Sun. If they were, then every day would have the same number of hours of daylight and darkness throughout the year. On December 21<sup>st</sup>, the North pole was tilted away from the Sun giving us the shortest day and longest night. As we continue our journey around the Sun, the pole begins to point back towards the Sun making the days longer and soon, warmer!

Another consequence of our traveling around the Sun is that at night, when we are looking out into space away from the Sun, different constellations come into view. If it happens to be clear on February first around 8:30 p.m. and you bravely put on your warmest coat, stocking cap, scarf and mittens and venture outside, you will be able to see the brilliant blue-white star Rigel due south about 40 degrees up from the horizon. If you are not very good at thinking in degrees, think of the horizon as 0 degrees and straight up (also known as the Zenith) as 90 degrees. So, 40 degrees would be almost but not quite half way between the horizon and the Zenith. Another way of saying it is that Rigel will "transit" at 8:37 p.m. for me in LeGrand. If you are located east of me, say, Cedar Rapids, it will transit about 5 minutes sooner and if you are west, say, Ames, it will transit about 3 minutes later.

Rigel is, of course, the bright star that marks Orion's left knee. We call it Rigel (pronounced Rye'-jell) but it was known to Arabian star gazers as Rigl Jauzah al Yusra which means "the left leg of the Jauzah" or Rai al Jauzah which means "the herdsman of the Jauzah" (*Star Names Their Lore and Meaning* p.312).

Rigel used to be the second brightest star in Orion but Betelgeuse which used to be the brightest, has faded significantly and now it's Rigel's time to shine – at least for a while. I hope you will take a look at Orion this month since the hunter will be moving swiftly to the west over the next couple months. As we move

around the Sun and as the nights get shorter, he will be lost to the sunset twilight before you know it.

Most of the planets are in the morning skies this month. Only Mars is left for those of us who favor stargazing in the evening. If you go out around 8:30 p.m. on the 18<sup>th</sup> and face west southwest the bright, almost first quarter Moon will draw your eyes. Look about 12 degrees above the Moon to see Mars. Continue looking even higher until you come to the tiny dipper shaped open star cluster: Pleiades.

Mercury can be spotted at dawn on the 20<sup>th</sup> rising just before the Sun. Saturn is above and to the right of Mercury. Jupiter joins the party rising at about 6:40 a.m. on the 22<sup>nd</sup>. The three will cheer your heart during the morning commute for the rest of the month with Mercury and Jupiter heading for a fairly close conjunction just before sunrise next month on the 5<sup>th</sup>.

February is cold, but at least it is short and as we travel in our orbit on our tilted planet the temps will get warmer as the days grow longer. Hang in there as the days get longer and the nights get warmer. Clear Skies!



## Live Astronomy Online: Liveskies.org

By Matt Harmston

Conspiring with COVID-19, the cold and snow make it tough to take part in astronomy outreach events. Public viewing groups aren't recommended, frozen fingertips on metal equipment don't qualify as "fun" in most cultures, and frosted eyelashes aren't for the faint of heart. However, we can still take live, free(!) guided tours of the night sky from the comfort of home via live astronomy broadcasts on websites like [Liveskies.org](https://www.liveskies.org).

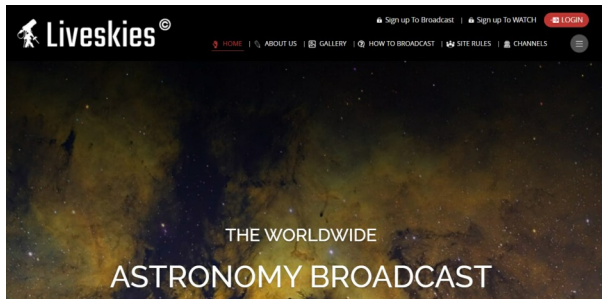


Image 1: The Liveskies.org home page.

Liveskies.org is a venue within which outreach-oriented amateurs from across the globe stream live broadcasts of the skies. Being a diverse, family-friendly outlet, I've enjoyed interaction with broadcasters and viewers from North America, Europe, Australia, and Asia. Like many communities today, the Liveskies community also has a private group on Facebook in which members post snapshots, continue discussions,

etc. (<https://www.facebook.com/groups/293847941701127>).

Equipment with which broadcasters transmit live video feeds to the web ranges from very modest to extraordinary. Similarly, locations from which amateurs broadcast vary just as widely. For instance, I've at times broadcast from a simple folding table in my driveway using a secondhand 80mm refractor and entry-level MallinCam camera. At the other extreme, a friend regularly broadcasts from his 12' dome with top-of-the-line MallinCam cameras using either a 16" Ritchie-Chretien, a 102mm apochromatic refractor, or 152mm Lunt solar telescope, all riding atop his Astrophysics 1600GTO mount.

Similarly, Liveskies broadcasts represent wide ranges of personal interest. For instance, broadcasters often share views of the solar system. The lunar view in Image 2



Image 2

*A rotated, but otherwise unprocessed, view of the lunar Aristarchus region as seen during a live broadcast.*

is an *unprocessed* single frame snagged during one of my recent lunar broadcasts with a SkyWatcher 100

ProED and MallinCam HD-10 II.

At other times, broadcasters will seek out deep sky objects. For instance, Image 3 contains an *unprocessed* live stack of the Horsehead Nebula, Flame Nebula, and a variety of neighbors captured during one of my recent broadcasts using a Celestron Rasa 8 and MallinCam DS10cTEC.

In short, you never know what you might see nor what broadcasters and viewers alike might learn from each other. (Continued on [page 12](#))



Image 3

*An unprocessed view of the Alnitak region, including the Horsehead and Flame Nebulae, as seen during a live broadcast.*



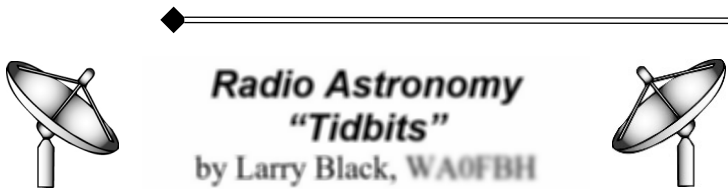
By setting up a free watcher account, you will be able to watch the skies unfold while interacting with broadcasters and other viewers via the chat window. And, you'll do so without frozen toes! At present, there are 300+ registered broadcasters and 18,000+ registered watchers. While broadcasts may be more intimate with only a handful of watchers and there won't always be a broadcaster online, nights with four or five different broadcasters and a larger group of watchers make for quite the virtual star party.

Signing up to watch is straightforward:

- 1) Go to Liveskies.org
- 2) Click on *Sign Up to Watch* at top right
- 3) Fill out the brief registration form and click *Create Account*

- 4) Login
- 5) Click on the *Channels* link at top right, and select a "channel", or broadcast, from the *Currently Live Channels* list. If you see my name on the list and stop by, let me know that you are from the Cedar Amateur Astronomers...I'd like to give you a shoutout.
- 6) When done viewing, click the logout button. Thereafter, each time you want to view, just log in with your viewer account credentials and enjoy the view.

It wasn't long ago that sharing in live views from across the globe would be considered a pipe dream. Sites like Liveskies.org bring this pipe dream into reality. I plan to continue living the Liveskies dream...maybe I'll see you there, too?



Astronomers at the South African Radio Astronomy Observatory near Cape Town South Africa have discovered two new radio galaxies with sizes more than 62 times that of the Milky Way Galaxy. In the past these large radio galaxies were undetectable due to technical limitations of the radio telescope systems, but are now being observed using a new generation of equipment.

The two new galaxies detected are named MGTC J095959.63+024608.6 and MGTC J100016.84+015133.0. They were observed by the MeerKat Radio Telescope [inset] which has unprecedented sensitivity to faint and diffuse radio wavelength emissions.

The term "giant radio galaxy" is used with these particular galaxies. Some classes of active galactic nuclei (AGN) possess relativistic jets which emanate particles that produce radio wave emission. When these jets propagate to extreme distances, the term "giant radio galaxy" applies.

These two galaxies were located in a region of the sky only about 4 times the area of the moon. Based on current knowledge of the density of this type of galaxy, it is estimated that the probability of locating them was

less than .0003 %. It is suspected that many more galaxies of this type may exist.

This discovery was reported in a paper in the *Monthly Notices of the Royal Astronomical Society*.

### Current Solar-Terrestrial Conditions

The new solar cycle 25 has taken a dip since December 23<sup>rd</sup>. The last time a sunspot was observed was on January 2<sup>nd</sup>. The average daily 10.7 cm solar flux has declined from 78.6 to 73.8. The solar flux is predicted to dip slightly and then return to about 78 after February 14<sup>th</sup>.

The current solar wind velocity was measured at 304.6 Km/sec, with a density of 11.2 protons/cm<sup>3</sup>. The interplanetary magnetic field,  $B_{total}$  was 1.9 nT with z-component  $B_z = .7$  nT, north polarity.



### MeerKAT

The MeerKAT telescope is located in the Karoo region of South Africa and is composed of 64 radio dishes. It was inaugurated in July 2018. MeerKAT is managed by the South African Radio Astronomy Observatory (SARAO), which is a facility of the National Research Foundation. Further details: <https://www.sarao.ac.za/science/meerkat/>

## **Bob Haskins**

By John Leeson, CAA Vice President

Bob died of a heart attack while shoveling snow on January 1, 2021. Memorial services will be postponed until after the COVID pandemic subsides.

Robert Haskins has been a member of the Cedar Amateur Astronomers (CAA) since June of 2014. Since joining, Bob has always been active in volunteering at group visits, whether public night visits or reserved groups, such as boy scouts, cub scouts, girl scouts, university students, or other youth groups. Bob has been very supportive of our groups visiting the observatory and most often can be found operating one of the telescopes and explaining to visitors what they are looking at, the operation of the telescope, and answering questions. Bob also volunteered for related work at the observatory such as clean-up, repair, and periodic maintenance work.

In addition, for the last couple of years, Bob has been an officer of the CAA – the association secretary. Bob takes the minutes at all the meetings and submits the completed minutes typed and ready for publication in our monthly newsletter – always on time and accurate. CAA is incredibly grateful to the support Bob has provided and he will be sorely missed, both as a volunteer and as a friend.

Observatory director John Centala commented as follows about Bob: “I am very sorry to hear about Bob's sudden death. I had always assumed he was in good health since he was slim and trim. I was impressed with Bob's energy and ability to open up the rolloff building and use the C14 despite his physical handicap. He was very easy to get along with.” Fred Young commented: “One night Bob and I were the only people at the observatory. He was in the roll-off using the Celestron [our computer controlled telescope] and I was using the B & C [our huge 24” telescope]. I invited him up to look at something with the B & C. We ended up staying until 3:30 a.m. We had both planned to leave about 11, but time flew when the viewing was good.” Doug Slauson also commented about Bob: “I did enjoy chatting with him late into the night in the roll-off building following public lectures and after the crowd had left. Bob often hung out at the observatory until the last of us night owls quit for the night. I enjoyed his company as we shared views at a telescope.” My own experiences with Bob are much the same as these people. For most events I am one of the last people to leave, and for much of the time I have also been acting volunteer coordinator, so I saw Bob a lot. I especially have appreciated his capabilities in operating the buildings and telescopes very independently, and never letting his handicap be a hindrance to his work. I always trusted him to give the visitors a great experience and to care for our valuable resources. Our sincere condolences to the family on their loss.

Obituary: <https://www.thegazette.com/obituaries/robertbobmichael-haskins-20210124-0000234703-01>

*Additional pictures on [pictures](#) page.*



*Photo by Bob's sister.*

## **Business Meeting Minutes**

Date: January 7, 2021

Location: EIOLC with remote access

By John Leeson, Secretary Pro Tem

Call to order was at 7:03p.m. with President Scott Bounds presiding.

Two new members were introduced. Scott introduced Suman Sherwani who works in the physics department at UI and is interested in astrophotography. Suman was elected for Forbes “Thirty Under Thirty” list for Science and Engineering. Fred Stieglitz is a new member and is receiving a new telescope about early February. Fred is retired.

Due to the remote access of the January business meeting, refreshments and food were BYOB.

The February business meeting drinks and food will be BYOB due to the anticipated remote access.

### **Upcoming Events:**

All Public events are being done virtually.

January 9, 7:00p.m.: Member Night

January 16, 7:30p.m.: Virtual public night

Appointment of 2021 Committee chairmen were made as each committee reported.

Appointment of 2021 section leads are noted in the section reports for each section.

### **Election of new Secretary due to death of Robert Haskins.**

Secretary: New – Deb Bonser

### **Section Reports:**

Solar System (Carl Bracken): Carl will stay as coordinator.

- Carl shared an image of a sunspot from an article on 4 January 2021 showing ripples caused by the sun-quake that was caused by a sunspot flare up. Info from Goddard Media Center news.

- Carl shared an image from Jan 7-8 2020 of Neptune’s dark storm in a video by the HST.

- John Centala reported seeing 8 Geminid and no sporadic meteors in 30 minutes.

- December 21<sup>st</sup> conjunction observed by several members. Carl reported 15-20 people stopped by the observatory and observed the conjunction in binoculars and the 6” refractor.

- Jim Bonser got a picture of a nice filament on the edge of the sun with a new camera on his 60mm Coronado. Jim also showed a fireball meteor captured on the all sky meteor camera system at his house.

Deep Sky (Greg Frohner): Lynn Reihman will be the new Deep Sky section lead.

- Steve Spangler commented about M36-M37-M38 being well placed for viewing and interesting targets for binocular viewing.

- Stellar (Doug Slauson): Doug was not present. Doug will remain as Stellar section lead unless he opts out for 2021.

- John Centala observed some double stars while testing new telescopes at the observatory. He will have a report in the next newsletter.

- Steve Spangler commented that the “lost sibling of the sun” (HD162826) is observable and can be found using binoculars. Steve’s program in January was about this star possibly being originally in our sun’s nursery nebula.

Satellite (Scott Bounds): Scott will stay as coordinator.

- Elon Musk will be launching new groups of satellites for the communications constellation in January and February.

Equipment (Carl Bracken/ Jim Bonser): Carl and Jim will stay as coordinator.

- Jim Bonser got a new camera, an ASI-174 monochrome. He used it to observe the filament that is in his report in the Solar System section. Jim is looking for an active USB-3 repeater that will work with a cable up to 20-25’.

- Jim Hannon has a new preamp to work with a VLF antenna in the 16-30KHz range to monitor solar activity. There is a network of these receivers around the world.

Imaging (Jim Bonser/Carl Bracken): Jim and Carl will stay as coordinators.

- Jim Bonser showed an image he took using an 80mm refractor to illustrate that imaging with a small refractor can be done.

Radio Astronomy (Larry Black): Larry was not present. Larry will remain as Radio Astronomy section lead unless he opts out for 2021.

- Jim Hannon reported on a radio astronomy setup referred to as a “scope in a box”, a \$300 set with

*(Continued on [page 15](#))*



receiver and dish antenna that works well on ‘seeing’ the sun.

- John Centala remarked that he was waiting for warm weather to build the antenna system at Pal-Dows to be used with the Radio Jove receiver kit that CAA purchased.

**There was no refreshment break.**

### **Committee and Posts:**

Minutes (Bob Haskins, Secretary): Due to Bob’s recent death a new Secretary was elected as reported above. The minutes for the December meeting were accepted as published in the Prime Focus on a motion by Carl Bracken, seconded by Vern Jackson.

Treasurer (Carl Bracken, Treasurer): Treasurer’s report accepted as presented on a motion by John Centala, seconded by Lynn Reihman.

Rigel Telescope Committee (Fred Young, Chairman): Fred will stay as the committee chairman.

- Jim has received parts for the dome controllers. Dome will have two small controllers connected by WiFi, one to operate the shutters and one for dome rotation. Goal is to have them be ASCOM compliant for their interface to the astronomy control software.

Observatory Committee (John Centala): John Centala is continuing as Observatory Director for the second year of his two-year term of office.

- John reported that two new members got a tour of the observatory and borrowed a loaner 6” DOB to try out.

- John has set the price target for sale of the Keith Sippy 16” Newtonian as \$600.

- There was no objection, either at the meeting or by emails since the publication in the January issue of The Prime Focus, against the sale of the club’s 12.5” f/6 reflector that is stored in the basement. John set the price target for its sale as \$400.

EIOLC Committee (Greg Frohner, Chairman): Greg will stay as the chair of this committee.

The committee continues to meet every Tuesday night at 7:00p.m. on Zoom.

Outreach Committee (Greg Frohner, Chairman): Greg will stay as the chair of this committee.

No report.

Membership (Fred Young): 108 active members. A new membership chairman was appointed. Dena Rauch

will be taking over the membership and circulation duties. Emails sent to [circulation@Cedar-Astronomers.org](mailto:circulation@Cedar-Astronomers.org) will forward to Dena and the membership application form has been updated to include her mailing address.

ALCOR (Wendell Clifton): Wendell will stay as Astronomical League CoORDinator.

- Wendell sent the association roster to the Astronomical League. He also distributed the Northern Lights newsletter to all CAA members.

- Wendell reported that the CAA Facebook Group now has 845 members.

Librarian (John Centala): John will stay as librarian.

- John had an article in the last Prime Focus reviewing four books.

- We just received four boxes of donated books, magazines, and DVDs from Mr. Robert Haskins’ family following his sudden death. John will write up the new additions to the library for the Prime Focus.

Program Coordinator/University of Iowa Liaison (Scott Bounds): These two positions are being separated. Scott will continue as UI Liaison. Noha Reda has been appointed to Program Coordinator.

- The January 16 public program has been scheduled and will be advertised prior to the event. John Leeson provided the Linn County contact information to Noha to get the information to them about up-coming programs. Noha has been and will continue to publish meeting notices on our Facebook page.

- A February public virtual program has been scheduled and Noha has a person to present the program. Information will be posted to our web site Public Events page when details are firm.

Linn County Liaison (Greg Frohner): Greg will stay as the liaison.

LCC got the upper parking lot plowed ahead of the January member night, January 9.

Publicity (Vern Jackson): The What’s Up in January flyer was sent out to the email distribution.

Scout Coordinator (Scott Bounds): No activity.

- Scott would like to have a new group visit coordinator for the Cub Scouts and Boy Scouts. For Boy Scout groups it is necessary that the person conducting the program is registered with the Boy Scouts as a Merit Badge counselor.

*(Continued on [page 16](#))*

Girl Scout Coordinator (Diane McAfee): No activity. Diane was not present, but we believe that she would continue as the GS coordinator.

Prime Focus Newsletter (Greg Frohner and John Leeson): No report

Night Sky Network (Doug Slauson): No report. Doug was not present, but we believe that he would continue as NSN coordinator.

**Old Business:** None

**New Business:**

Carl is close to capturing training information from Mike Henke on processing the meteor camera data and hopes to produce a training video soon.

There was discussion about sharing the membership list with all members. Currently the membership list is only shared with officers and those with specific needs for the information. Following a lengthy discussion of member privacy concerns it was decided that Fred

Young would circulate an email to all members with the proposal to publish a member list for CAA members only with contact information and allow each member the option to OPT OUT of being included on the list.

The meeting adjourned at 10:08p.m.

**Attendance:**

Deb Bonser	John Leeson
Jim Bonser	Noha Reda
Scott Bounds	Lynn Reihman
Carl Bracken	Steve Spangler
John Centala	Bunnie Tomes
Wendell Clifton	John Varn
Alan Erickson	Fred Young
Greg Frohner	Tom Weber
James Hannon	Suman Sherwani
Vern Jackson	Fred Stieglitz
Lloyd Holecek	

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## ***USPS to issue NASA Sun Service Forever Stamps!***

NASA's images of the Sun's dynamic and dazzling beauty have captivated the attention of millions. In 2021, the US Postal Service is showcasing the Sun's many faces with a series of Sun Science forever stamps that show images of solar activity captured by NASA's Solar Dynamics Observatory, or SDO.

"I have been a stamp collector all my life and I can't wait to see

NASA science highlighted in this way," said Thomas Zurbuchen, associate administrator for NASA's Science Mission Directorate (SMD) in Washington. "I feel that the natural world around us is as beautiful as art, and it's inspiring to be able to share the import and excitement of studying the Sun with people around the country."

The 20-stamp set features ten images that celebrate the science behind NASA's ongoing exploration of our nearest star. The images display common events on the Sun, such as solar flares, sunspots and coronal loops. SDO has kept a constant eye on the Sun for over a decade. Outfitted with equipment to capture images of the Sun in multiple wavelengths of visible, ultraviolet, and extreme ultraviolet light, SDO has gathered hundreds of millions of images during its tenure to help scientists learn about how our star works and how its constantly churning magnetic fields create the solar activity we see.

<https://www.nasa.gov/feature/goddard/2021/the-us-postal-service-to-issue-nasa-sun-science-forever-stamps>

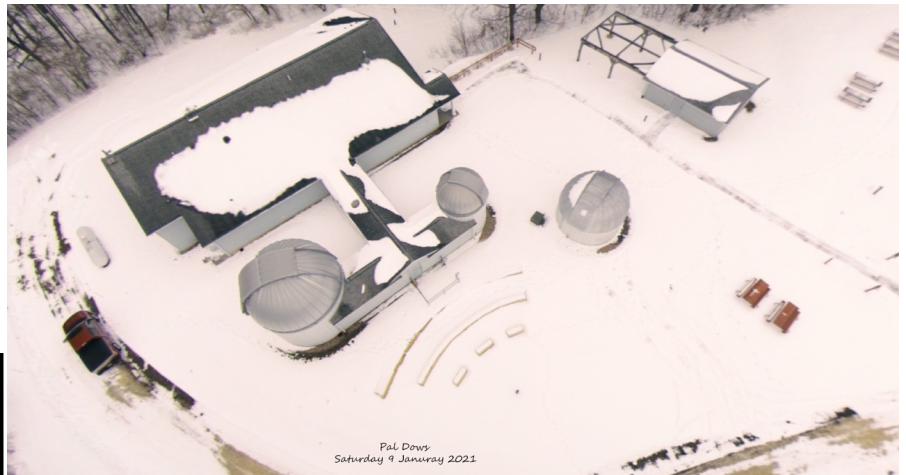




# Pictures



*Bob Haskins at Pal-Dows. Top left: Bob is at center of picture. During summer Star-b-cue party. Top right: President Greg Frohner awarding Bob the Night Sky Network outreach award pin. Left: Bob helping out with the Stellarium exhibit with a daytime group of visiting kids. Below left: Bob assisting at the Apollo 11 50<sup>th</sup> anniversary event July 20<sup>th</sup>, 2019.*



*Pal-Dows in January 2021 from a drone. Picture by Carl Bracken.*



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## **Junior Astronomers!**

By Noha Reda

If you have ever watched the movie “**The Lion King**” you probably noticed a scene where SIMBA, PUMBA and TIMON, after a day full of Hakuna Matata\* lay under the night sky and...

PUMBA asks: TIMON, ever wonder **what those sparkly dots are up there?**

TIMON answers: PUMBA, I don't wonder; I know.

PUMBA: Oh. What are they?

TIMON: They're fireflies. Fireflies that, uh... got stuck up in that big bluish-black thing.

PUMBA: Oh, gee. I always thought they were **balls of gas burning billions of miles away.**

Well, it turns out **PUMBA was right**, by looking carefully at the light that comes from our Sun and different stars, scientists were able to discover that **stars are made mostly of the gases Hydrogen and Helium.**

If you are interested in **learning more** about what they did and how they discovered that, visit the “**Lessons in Light**” exhibit at our Observatory!

\* [“no worries”](#)



**For Sale:** Celestron Omni 120 XLT w/CG4 (manual) mount and tripod. Asking \$750. Includes extras: Orion carrying case, Luminos 10mm eyepiece, Celestron Heavy Duty tripod with Alt/Az mount, various filters and accessories. Detailed inventory on request. CAA member Charles Kuester, contact information on request to Prime Focus Team or Inquiries.

**The CAA would like to sell the following telescopes:**

1. 12.5 inch F/6 Dobsonian, Meade optics; no finder, no eyepieces. \$400.
2. 16 inch F/4.5 Meade Newtonian on a homemade equatorial fork mount, no drive; no finder, no eyepieces. \$600.

Both telescopes have a 4-vane diagonal holder and a 2 inch rack and pinion focuser with a 1.25 inch adapter. These telescopes can be used as is, but are better suited to be modified or rebuilt for the intended use.

Contact Observatory-Director@Cedar-Astronomers.org

Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time.

Thomas A. Edison

**CAA Treasurer's Report: Statement of Accounts**

Funds	12/1/2020	12/31/2020	net gain(loss)
Endowment	\$11,784.48	\$11,784.48	\$-
General	\$4,006.33	\$3,747.93	\$(258.40)
GCRF ODP	\$2,299.97	\$2,299.97	\$-
CRVI Grant	\$23.06	\$23.06	\$-
E.I.O.L.C Facility	\$2,270.76	\$2,270.76	\$-
Lady Astronomers	\$230.03	\$230.03	\$-
AEGON Transportation Fund	\$3989.87	\$3989.87	\$-
Totals	\$24604.50	\$24346.10	\$(258.40)

Carl commented that we received \$36.93 in interest on our CD, which is included in the General Fund. He also commented that next month he would roll the balance of the "CRVI Grant" up into the General Fund and stop reporting on this completed line item.

**Abbreviated agenda for the February meeting**

The business meeting will be held virtually using Zoom at 7:00 p.m.

- Program - None planned
- REPORTS: Section reports
- Review Published Minutes
- Treasurer's Report
- Committee Reports

- OLD BUSINESS
- NEW BUSINESS

[\(Meeting past - address omitted\)](#)

*Note to contributors, readers, and subjects of photographs: Items in The Prime Focus are for private, non-commercial use only. Contact the Prime Focus Team for information on subscriptions.*

## CAA Events

- February 4, 7:00 PM: Virtual Business Meeting
- February 6, 7:00 PM: Member Night
- February 13, 7:30 PM: Virtual Public Night - Chuck Allen, Vice President of the Astronomical League: "Cosmic Horizons". See [Program Note](#) on page 5.

**March 2021  
Prime Focus Deadline  
February 19, 2021**

## February 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31 Sunrise: 7:20 Sunset: 5:20	1 Asteroid 18 Melpomene at opposition, mag 9.4	2 -----	3 -----	4 -- Last Quarter -- Business Meeting	5 -----	6 ----- Member Night
7 -----	8 -----	9 ----- Algol at minimum, 8:35 PM	10 -----	11 -- New Moon --	12 -----	13 ----- Public Night
14	15	16	17	18 Mars Perseverance landing on Mars	19 First Quarter Prime Focus deadline	20
21 Asteroid 29 Amphitrite at opposition, mag 9.2	22	23	24 R Virginis at maximum, mag 6	25 Jupiter, Mercury, and Saturn in ESE, 30 min before sunrise	26	27 Full Moon
28	1	2	3	4	5	6 Sunrise: 6:33 Sunset: 6:03

Note: Dashed days, February 2-13, are days when the moon rises late or sets before full dark so are best for prime time dark sky viewing (and scheduling events for the observatory.)

*Orion, Taurus, Auriga and Gemini are prominent. Pleiades, the great Orion nebulae, and open clusters along the Milky Way, like M35-36-37 are great for viewing.*

<u>CONTACT</u>	<u>NAME</u>	<u>E-MAIL ADDRESS (at Cedar-Astronomers.org)</u>
President	Scott Bounds	President
Vice President	John Leeson	Vice-President
Secretary	Deb Bonser *	Secretary
Treasurer	Carl Bracken	Treasurer
Observatory Director	John Centala	Observatory-Director
Circulation Manager	Dena Rauch	Circulation
Prime Focus Editors	Greg Frohner John Leeson	PrimeFocusTeam

\* Newly elected at the January meeting, Deb Bonser replaces Bob Haskins as CAA secretary.

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**Founded 1979**

[HTTPS://www.cedar-astronomers.org](https://www.cedar-astronomers.org)