STAR FIELDS

Newsletter of the
Amateur Telescope Makers of Boston
Including the Bond Astronomical Club
Established in 1934
In the Interest of Telescope Making & Using

Vol. 32, No. 9 November 2020

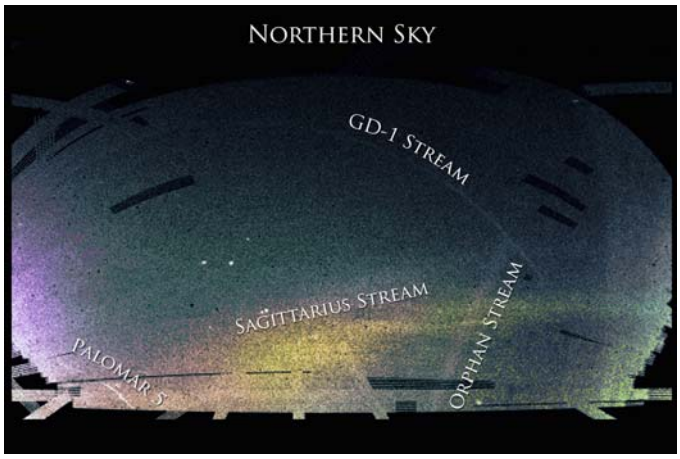
This Month's Meeting . . .

Thursday, November 12th, 2020 at 8:00 PM
Zoom On-line Meeting

All ATMoB meetings scheduled for the Harvard-Smithsonian Center for Astrophysics in Cambridge, MA have been **canceled indefinitely** due to concerns over the coronavirus outbreak.

We are holding virtual on-line meetings using the Zoom application. Please refer to the ATMoB website for future meetings. Members should check their email on the ATMOB-ANNOUNCE list for additional information. Please select this Zoom link to attend the 935th Meeting of the Amateur Telescope Makers of Boston.

Star Streams in the Milky Way Galaxy



Northern Sky by the Sloan Digital Sky Survey. Credit: Dr. Ana Bonaca

Our speaker this month is Dr. Ana Bonaca. Dr. Bonaca's presentation will outline her work on Star Streams in the Milky Way Galaxy. She writes, "Globular clusters are large congregations of stars, which gradually lose their members to form thin and long stellar streams. In pristine conditions, these streams have a nearly uniform density, however, new observations of one such structure in the Milky Way halo have revealed a likely site of perturbation. The on-sky morphology suggests a recent, close encounter with a massive and dense perturber. Known baryonic objects are unlikely perturbers based on their orbital properties, but observations permit a low-mass clump of dark matter as a plausible candidate. This discovery opens up the exciting possibility that detailed observations of streams could measure the abundance of dark-matter substructure and thus shed light on the nature of dark matter."

Dr. Bonaca is a Fellow at the Institute for Theory and Computation, hosted by the Harvard - Smithsonian Center for Astrophysics. Her specialty is stellar dynamics and her research aims to uncover the structure and evolution of our galaxy, the Milky Way, especially the dark matter halo that surrounds it. In her research, she uses space and ground based telescopes to measure the motions of stars and constructs numerical experiments to discover how dark matter affected them. Dr. Bonaca obtained an Astronomy PhD from Yale University and was awarded the Brouwer prize for a distinguished thesis.

I'll open the meeting at 7:45 p.m. and close it around 11:00 p.m. to allow folks to socialize a bit after the presentation. I hope to see everyone there!

~ Rich Nugent – President ~

Clubhouse Observing Suspension

With Governor Baker's mandate for a 10:00 p.m. curfew beginning on 6 November, we are suspending our observing sessions at the Clubhouse, for the time being.

~ Rich Nugent – President ~

President's Message . . .

I hope this note finds you well and staying safely ahead of the pandemic. As infection rates in Massachusetts continue to climb, what you're about to read may change. But, as of late October, this is where we stand.

We recently began to re-open the Clubhouse's Observing Field as MIT's restrictions were relaxed, just a bit. We are still restricted to outdoor observing with only the Clubhouse restroom open. The site has a capacity of 18 observers - 14 pads and 4 telescopes in the observatories. Masks need to be worn except when viewing through a telescope (due to fogging of the eyepiece) and the Massachusetts guidelines for outdoor gatherings and safe social distancing rules must be followed. Members of the same household can share a pad/telescope, but we are not allowing observers to wander around the field to observe through other telescopes.

One Clubhouse "A" member will be on duty to unlock and lock the back door leading to the restroom and to maintain an accurate list of attendees. This will be essential if contact tracing becomes necessary. The outside telephone will be available if you need to call 911 for an emergency.

When an observing session is scheduled, a notification will go out through the ATMoB-Announce email list and the event will be added to the Event Calendar on the ATMoB website. To attend the session, you'll need to sign up on the Event Calendar where you'll be able to choose a pad or telescope on a first come, first served basis. This will avoid double-booking telescopes and overpopulating the observing pads.

There were three observing sessions in October that were run by Clubhouse Chairman Steve Clougherty. Steve reports that things went very well. Members signed up and followed the guidelines and each evening was a success. Going forward, we'll be contacting the "A" members in search of volunteers but no one will be required to run observing sessions. And, as the cold weather approaches, we'll need to update the guidelines. It's been suggested that the machine shop be made available to change in and out of cold weather gear. That room cannot be used by a group of observers as a warming room because It is simply too small and does not have adequate ventilation. Your car, parked to the north of the clubhouse or across the street, will have to suffice as your warming room. Also, I am planning to mark each observing pad's north-west corner with a fiberglass rod. If the observing field is snow-covered the markers will help you to know where to shovel. Please try not to run over the markers if you're backing in.

I want to thank Chris Elledge and Maria Baptista for putting together the signup page for our event calendar. Also, thanks go out to Steve Clougherty for getting the ball rolling and hosting the observing sessions.

As always, each and every one of us needs to evaluate our own risk tolerance when considering the threat of this Coronavirus. Many of us are in a high-risk group simply because of our age and older folks may have underlying issues which might exacerbate COVID-19. We hear about the number of cases and the number of deaths, but we rarely hear about the survivors. Unfortunately, at this time, no one can predict if there will be long-term consequences after surviving an infection. There will come a day when things will feel normal again but, for now, please be careful.

In the meantime, many of our members have been imaging and sharing their results! While I may not comment on every email, know that I am hugely impressed with the results our members are getting! The Veil Nebula has gotten a lot of attention this fall. The Veil, the Observer's Challenge object For September, continues to be well-placed for early evening observing. When I observe this object, I always start by locating the star 52 Cygni. The western portion of this supernova remnant (NGC 6960) is seen easily at and extending to either side of this star. Visible to the naked eye, 52 Cygni can be found near the Swan's eastern wing. The Veil is a large object with the eastern portion (NGC 6995) some 2-1/2 degrees away from 52 Cygni. In between, there are small, wisps and knots of nebulosity to be enjoyed. In light-polluted areas, UHC filters are essential. Use an OIII filter if your telescope's aperture permits it. Whether you are imaging this object or simply observing it visually, the Veil certainly deserves your attention!

Of course, Mars is center stage right now! This is a perihelic apparition. Mars and Earth come close to each other about every 26 months but, due largely to Mars' elliptical orbit, these closest approaches happen in groups of two or three every 15-17 years. There was a nice opposition in the summer of 2018 but Mars was low in our southern skies and the planet was engulfed in a global dust storm. This time the Martian air is clear and the planet rides higher in the sky making it an ideal target. By the time you read this Mars' apparent diameter will have shrunk to 20" and will be around 15" by Thanksgiving. At the next opposition, in December 2022, Mar's disk won't exceed 17". The next perihelic oppositions will occur in 2033 and 2035. The latter will be more favorable for northern observers. Why all the statistics? Because 2035 is a long wait, THIS is the year to observe Mars!

Visually, Mars can be a challenge. If your optics truly needs to be cleaned, then clean them. If your telescope can be collimated make sure it is. If your telescope has a clock drive, use it. Use the highest magnification the sky will allow. I find it better to focus on the polar cap rather than the surface details or limb. Be very patient! The surface features are very subtle. Sometimes I use an orange filter to enhance the detail. Mars is also very bright so a moon filter might help. So will an aperture mask, which can be made to provide an unobstructed path to the telescope's mirror. I like to wait until Mars is near the meridian to minimize atmospheric turbulence.

To check which face is visible, a sky app will likely show you an approximate view. Remember, the Martian winds can blow dust around and change the planet's look. *Sky & Telescope's* web site offers a nice tool to show you what to expect. Mars rotates once every 24h 37m so, at the same time each night, we observe a slightly different part of the planet. By observing at the same time each night, about 40 days must elapse to see the entire planet. Try to observe Mars every clear night! I hope folks continue to observe and image. Please share your results!

As we near the end of 2020 I wish you nothing but health and happiness. Stay strong. Be well.

~ Rich Nugent – President ~

October Meeting Minutes . . .

W. Lowell Putnam on Zoom *

ATMoB 934th Meeting Minutes
October 10, 2020
The meeting came to order at 8:03 pm

The President's welcome included a Covid-19 update: the Harvard Smithsonian Center for Astrophysics (site of our physical meetings) remains closed, but MIT has given us permission, with several requirements, to open the grounds to our Clubhouse. MIT requires that we all wear masks and obey state of Massachusetts social distancing rules. Thus, we plan to open the grounds starting on Friday Oct 9, subject to the following rules:

- Everyone wears masks.
- One observer or family per pad or observatory telescope.
- Total of 18 observing sites available, including the observatories and 2 telescopes in the roll-off roof observatory.
- No telescope or pad sharing (other than by family groups at the same pad).
- Prior signup is required on the ATMoB website.
- The Clubhouse remains closed except for the bathroom.
- A Clubhouse Committee volunteer will unlock the bathroom, make eyepieces available, and track usage.
- Please don't come if you're ill or have been exposed to the virus recently.
- When you sign up to use a telescope or observatory, make sure you're trained to use the telescope. There is no on-site training available.

Guest Lowell Putnam reported that he recently reopened the Lowell Observatory to the public by putting $2 petri dishes over the eyepieces to make them easier to sanitize.

- Alva Couch presented the Secretary's report about the previous (933rd) ATMoB meeting.
- Eileen Myers presented the Treasurer's report, reporting a net inflow in September due to membership renewals, donations, and the lack of meeting expenses.
- Chris Elledge presented the membership report. There are 281 memberships with 356 members. Three new members joined last month. A warm welcome to all of our new members!
- Glen Chaple presented the Observing Committee report, including opportunities to observe Mars at opposition on October 13, the Orionid Meteor Shower on Wednesday October 21, and Uranus at opposition on Saturday October 31. Glen presented the joys of observing the cataclysmic variable SS Cygni, and challenged ATMoB members to be the first to observe a dramatic increase in brightness of this highly variable star.
- Clubhouse Committee chair Steve Clougherty presented the Clubhouse report. The Clubhouse grounds are ready for use after lawn mowing. The clubhouse is in great shape with no leakage or damage. The Clubhouse grounds stand ready for the experiment of reopening tomorrow night. Interested members can sign up for pad or observatory use on our website. Many thanks to Chris Elledge and Maria Batista who created the signup mechanism through the club website. If the clubhouse signup is full, still feel free to call the Clubhouse to determine whether all of those who signed up are present.
- Outreach Committee members Rich Nugent and Kelly Beatty included that a new library telescope has been accepted by the Everett public library, making a total of three telescopes placed in local libraries: Belmont, Tewksbury, and Everett. ATMoB seeks volunteers to approach libraries on the south and north shores about accepting a telescope.
- Bruce Berger and Alan Sliski gave the Mittelman ATMoB Observatory report. Despite some software glitches, the project is going well, and testing continues of the two loaner QHY600 61-megapixel cameras from MIT. Near-future plans include targeting a magnitude 16.7 star, and the team expects to make a final decision on which camera to buy for the observatory soon.
- Old business:
  The club was given a reminder to specify ATMoB as the benefactor of purchases made at https://smile.amazon.com .
- New business:
  After Pierre Fleurant's recent resignation as ATMoB Vice President, former ATMoB president Tom McDonough volunteered to serve as our interim Vice President until our next election next spring.

Our guest speaker for the evening, via Zoom, was Lowell Putnam. As the 5th sole trustee of Lowell Observatory in Flagstaff AZ, Lowell Putnam described the purpose and function of the largest optical interferometer in the world, the Naval Precision Optical Interferometer that was installed at the Lowell Observatory in 1995. An optical interferometer is a specialized device intended to very accurately measure the angular diameter of a star. This angular diameter -- combined with an accurate distance to a star -- allows one to compute the star's physical diameter, while its physical diameter together with its brightness give an estimate of its temperature. Interferometers are also currently in use to measure the effects of exoplanet transits and to thus give some evidence of the composition of an exoplanet's atmosphere. The interferometer has a maximum spread of 437 meters between telescopes, and can make measurements by combining signals from six telescopes via precise electro-optical delay lines.

The meeting ended at approximately 9:20 PM.

~ Alva Couch - Secretary ~

ATMoB Executive Board Special Meeting Highlights . . .

October 22, 2020
For details, refer to the full meeting report on the ATMoB web site.

Meeting Attendees:

Executive Board: Maria Batista, Glenn Chaple, Alva Couch, Chris Elledge, Tom McDonough, Eileen Myers, Rich Nugent, Alan Sliski

Members: Bruce Berger, Peter Bealo, Steve Clougherty, James Chamberlain, Al Takeda

Meeting convened at 8:06 PM.

Agenda Item:

- Discussion and spending request for a scientific camera, filter wheel and filters for the Mittelman - ATMoB Observatory.

Vote:

- The Executive Board unanimously approved spending for a scientific camera, filter wheel and filters for the Mittelman - ATMoB Observatory.

Meeting adjourned at 9:04 PM.

Next meeting:
Tentatively Jan 7, 2021, 8-10 PM.

Membership Report . . .

I am pleased to welcome our newest members: Sagar Bhatt; Cynthia Hillier; David Zelin; Andrew Howard; Daniel Lee; Robert McCarthy; Michael, Trina, Rachel, and Samuel Toups; and Robert Walcott.

As of October 31st, 2020 we have 293 memberships covering 376 members. This is broken down as follows:

- 121 Regular Members
- 116 Senior Members
- 3 Student Members
- 48 Family Memberships covering 131 Members
- 3 Guest Members
- 2 Honorary Members

Membership renewals for the 2020-2021 Year are past due. Expired memberships will be removed on December 1st.

You can check if you need to renew and start your renewal process on the website at https://www.atmob.org/renew

You can also download the membership application from the website at https://www.atmob.org/signup by clicking on the "Download an application" link.

Donations are encouraged during membership renewal to help keep our club running smoothly, our clubhouse maintained, and telescopes in good condition. Donations are tax deductible to the extent allowed by law. If you choose to pay by credit card please consider making at least a small donation since credit card companies take a few percent of your payment to the club.

Please contact me if you need any help with renewing or logging into the website.

~ Chris Elledge – Membership Secretary ~

Meeting Recordings . . .

The recording of ATMoB meeting #934 is available on YouTube: https://youtu.be/PNLCS36nTW8

I would like to thank Lowell Putnam for giving his presentation and allowing us to record it.

This link is to the publicly available cut of the meeting recording. To view the original version of the meetings, please see the Announce Forum on the ATMoB Website https://www.atmob.org

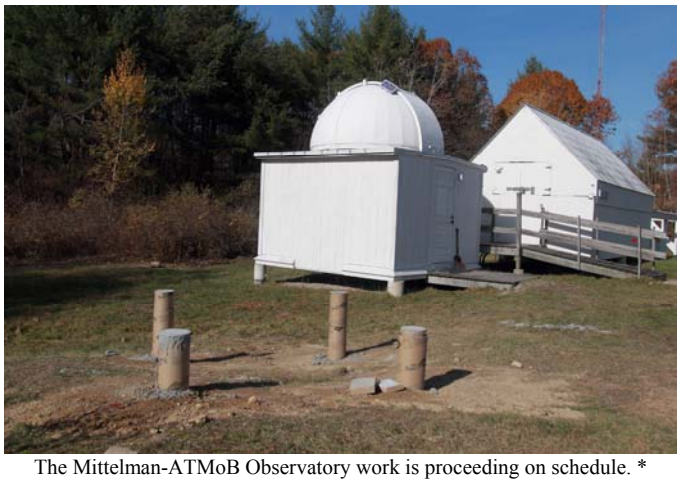
~ Chris Elledge - Membership Secretary ~

2021 RASC Observer's Handbooks and 2021 Astronomy Calendars . . .

2021 RASC (Royal Astronomical Society of Canada) Observer's Handbooks U.S. Edition and *2021 Astronomy Deep Space Mysteries Calendars* were ordered for those who replied to the atmob-announce emails. Members who placed orders will be notified when the materials arrive so they can arrange for pickup. Please mail the payment check using the directions in the atmob-announce emails. All checks must be received before pickup.

~ Eileen Myers - Treasurer ~

Clubhouse Report . . .



The Mittelman-ATMoB Observatory work is proceeding on schedule. *

November 2020 Clubhouse Report

During the month of October we were allowed to use the observing field on a limited basis. Rich Nugent conferred with the assistant director of Haystack and forged an agreement which stipulated that we limit the number of users/observers to no more than 14, corresponding to the number of available observing pads. In addition, we are allowed to have one (qualified) person run each observatory with the exception of the roll off observatory which has two telescopes, and two observers.

I am happy to report that we have held three observing sessions during the month, averaging approximately twelve members for each event. Everyone was compliant with the mandates, including mask wearing and social distancing.

Many thanks to Chris Elledge and Maria Batista for setting up this observing option on our ATMoB website.

Going forward we plan to continue this program with the same mandates. ATMoB announcements will be sent out close to the observing event date. Please be sure to register on the events page of our website if you would like to participate.

Editor's Note: "With Governor Baker's mandate for a 10:00 p.m. curfew beginning on 6 November, we are suspending our observing sessions at the Clubhouse, for the time being." President Rich Nugent

On Saturday, October 31st, a small group of volunteers practicing all coronavirus mandates installed 4 concrete posts for the Mittelman - ATMoB Observatory enclosure. Thanks to Bruce Berger, Steve Clougherty, James Chamberlain, Alan Sliski, Aaron Sliski, John Stodieck and Al Takeda.

~ Clubhouse Committee Chairs ~
~ Steve Clougherty, John Reed and Dave Prowten ~

Wednesday Evening Educational DVD Videos . . .

Member-at-Large Maria Batista is hosting Wednesday evening DVD lectures. These weekly Zoom meetings start at 7 PM. Members can sign up at www.atmob.org.

Observer's Challenge . . .

November, 2020

NGC 278– Galaxy in Cassiopeia
Mag: 11.5
Size: 2.1' X 2.0'

NGC 278, taken with an ASI6200 camera though the 32-inch scope.
1.5 hour integration time. Image by Mario Motta

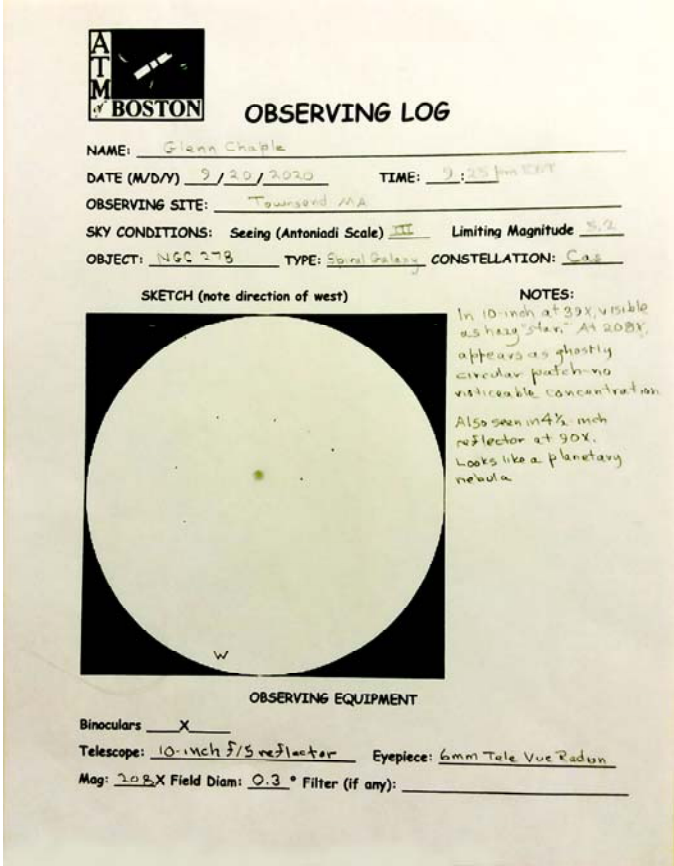
The mere mention of the constellation Cassiopeia to a deep sky enthusiast conjures up visions of open star clusters like M52, M103, and the "ET Cluster" (NGC 457). But if you move southward towards Cassiopeia's border with Andromeda, you'll come across a handful of galaxies that includes NGC 278 - this month's Observer's Challenge.

NGC 278, Stock Canon 80D, 1200mm f/8 lens, ISO 800, 60 x 2-minute subs for a 2 hour total exposure, Enlarged 1.5X, North is up. Image by Doug Paul

This nearly face-on spiral was discovered by William Herschel on the evening of December 11, 1786. It bears the Herschel Catalog designation H1591 (his 159th Class I [Bright Nebulae] object). Its calculated distance of 38 million light years translates to a true diameter of 26,000 light years.

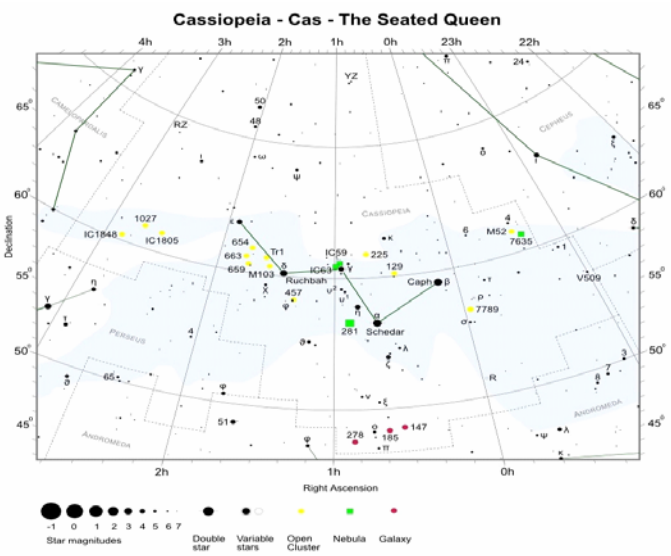
I observed NGC 278 on the evening of September 20, 2020, using a 10-inch f/5 reflector. At 39X, it showed itself as a hazy "star." A boost to 208X revealed a ghostly circular patch with no discernible concentration. NGC 278 was faintly visible in my 4.5-inch f/7.9 reflector. At 90X, it looked more like a planetary nebula than a galaxy.

The coordinates for NGC 278 are RA 0h 52m 04.3s, Dec +47º 33' 02". Star-hoppers can find it by tracing a path from 4th magnitude omicron (o) Cassiopeiae (see finder charts below).



NGC 278, as seen with 10-inch f/5 reflector at 208X.
For an enlarged image, click here. Sketch by Glenn Chaple

Editor's note: *To see an enlarged image of Glenn's drawing click on the following link: NGC 278. A blank copy of Glenn's Observing Log sheet for astro-sketchers can be downloaded from the Documents section in the Observing folder on the ATMoB website.*



Finder Chart for NGC 273, freestarcharts.com

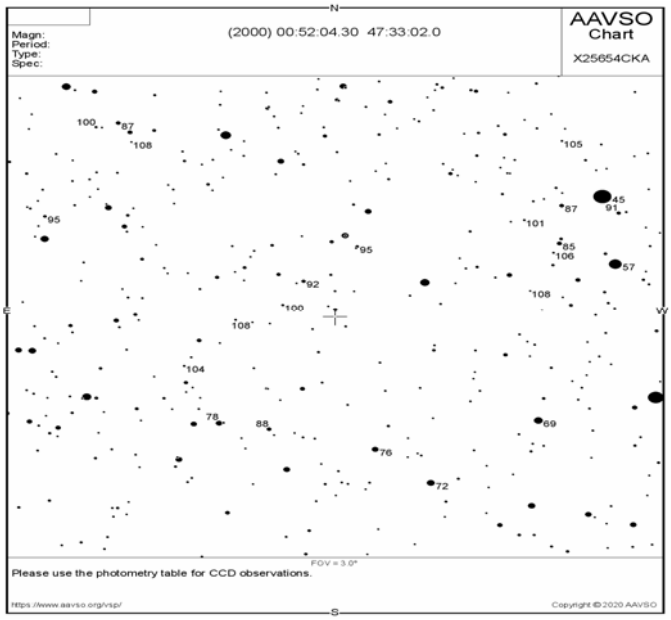


Chart created by the AAVSO's Variable Star Plotter (VSP). Field is 2 degrees on a side, with North up. Numbers indicate star magnitudes (decimals omitted). The magnitude 4.5 star at upper right is omicron (o) Cassiopeiae

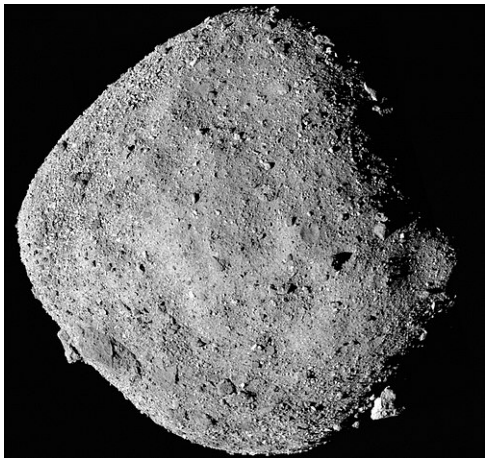
The purpose of the Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone who is interested. If you'd like to contribute notes, drawings, or photographs, we'll be happy to include them in our monthly summary. Submit your observing notes, sketches, and/or images to Roger Ivester (rogerivester@me.com). To find out more about the Observer's Challenge or access past reports, log on to https://rogerivester.com/category/observers-challenge-reports-complete/ .

~ Submitted by Glenn Chaple ~

Skyward . . .

By David Levi
November 2020

Hello, Bennu!



Asteroid Bennu taken from the OSIRIS-REx spacecraft. 12/2/2018, NASA

Not long ago OSIRIS-REx, a spacecraft sponsored by the University of Arizona and flown by NASA, gently touched the surface of an asteroid named Bennu (asteroid No. 101955), tried

to grab some material, and then quickly took off again. It was the first try, but it was a huge success! The craft gathered more than twice what was expected—so much that some small pieces of material started to leak out.

Of course, if all of the samples leaked out, then there would be no samples. But that won't happen. NASA plans to transfer the material to a safe storage container earlier than expected, and then the sample will be safe.

The mission, run jointly by NASA and the University of Arizona, cost the U.S. taxpayers about eight hundred million dollars, plus about 185 million for the launch aboard an Atlas V rocket. The Osiris-Rex is an acronym for Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer. Asteroid Bennu is an interesting choice. Bennu was the name for an Egyptian mythological bird associated with creation, the Sun, and rebirth. But much as the name might inspire us to look back at the early days of our solar system (which it does), that's not the real reason this particular asteroid was chosen. Bennu is a C-type asteroid. It is also a sort of time capsule dating back to the birth and early evolution of the solar system. C is for carbonaceous asteroid, but it is a B sub-type because it is primitive. The reason for this is that it had undergone almost no geological change since it formed.

Especially if you pay taxes to the government of the United States, you may wonder why more than 800 million dollars was sent to this distant spot of light in the sky. I could begin to answer this by saying that Bennu's sample will teach us about what the solar system was made of at its formation. From that, Bennu could give us a healthy idea about what the Earth itself was like at its birth. Sometime after it was formed, its orbit changed so that now, every few dozen years it gets pretty close to Earth. There is a very small chance that it might hit Earth in the distant future. Dolores Hill, a long-time member of the OSIRIS-Rex team adds: "NASA sent this mission to Bennu, a primitive body, to return a pristine, protected sample so we could better understand the beginning and history of the solar system, formation of organic compounds important to life, and understand how Main-belt asteroids migrate to the inner solar system to become Near-earth asteroids."

All this is fine, but couldn't that money be better spent on Earth, to feed the starving, cure those afflicted with coronavirus, house the homeless, and do all the other things we thought we could do when we decided to go to the Moon in the 1960s?

Yes, it could, except for one thing. Going to the Moon seemed pointless until we all were glued to television, watching breathlessly as one human stepped onto the surface of another world. Dear readers, we are explorers. It is in our blood, our DNA, in our hopes and dreams. And in the midst of this horrible pandemic, a small piece of human-built machinery tapped the surface of a distant world and grabbed a sample. Indeed, space journeys like this one help make life worth living. We live here. This is our neighborhood. We reach for the stars.

~ Submitted by Mario Motta at the request of David Levy ~

Dark and Quiet Skies for Science and Society Workshop 2020 . . .

Recently I have been working with the International Astronomical Union (IAU) and the United Nations Office for Outer Space Affairs. In October I gave a Zoom workshop presentation that was seen world wide. It is now available on YouTube. My talk addressed medical issues. Different speakers spoke on other aspects of the problem.

Here is a link to the presentations. I spoke for about 15 minutes. You can load and zip ahead to my part or watch it all, about 1 hour.

Mario Motta's talk (starting at 34:58).
https://www.youtube.com/watch?v=v49IanNCCQc&list=PLaOqa4cng0GFqc1epTy3XTInKqoLjVqlS&index=2

All Workshop presentations.
https://www.youtube.com/playlist?list=PLaOqa4cng0GFqc1epTy3XTInKqoLjVqlS

PowerPoint presentation slides. (Mario's slides were presented on Tuesday, October 6, starting at slide #24).
https://www.unoosa.org/oosa/en/ourwork/psa/schedule/2020/2020_dark_skies.html

I hope for a favorable vote by the UN General Assembly next year. I am hopeful that we have an administration that will also sign on, so we are not an "outlier" nation like we are now.

~ Submitted by Dr. Mario Motta ~

Correction: *October Meeting Minutes: "Meeting convened at 8:04 pm."*

*Editor: * Photos by Al Takeda unless otherwise noted.*

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December *Star Fields* DEADLINE
Sunday, November 22nd

Email articles to Al Takeda at
newsletter@atmob.org

Articles from members are always welcome.
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POSTMASTER NOTE: Not mailed due to the coronavirus pandemic

Amateur Telescope Makers of Boston, Inc.
c/o Chris Elledge, Membership Secretary
99 College Ave
Arlington, MA 02474
FIRST CLASS

EXECUTIVE BOARD 2020-2021

PRESIDENT:	Rich Nugent	(508) 935-8158
VICE PRES:	Tom McDonagh	(617) 966-5221
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	Alan Sliski	
	Bill Toomey	
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2018 - 20	Tom McDonagh	(617) 966-5221
2015 - 18	Glenn Chaple	(978) 597-8465

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	Steve Clougherty	(781) 784-3024
	David Prowten	(978) 369-1596
OBSERVING:	Bruce Berger	(978) 387-4189
NEWSLETTER	Al Takeda	newsletter@atmob.org

PUBLIC OUTREACH

COMMITTEE CHAIR:	Rich Nugent	starparty@atmob.org
STAR PARTIES:	Bernie Kosicki	
	Laura Sailor	
	John Harrington	

How to Find Us...
Web Page www.atmob.org

MEETINGS: Zoom On-Line Meetings until further notice. Meetings held the second Thursday of each month (September to July) at 8:00 PM. For meeting details go to www.atmob.org and check your email on the ATMOB-ANNOUNCE list.

CLUBHOUSE: Latitude 42° 36.5' N Longitude 71° 29.8' W

The Tom Britton Clubhouse is CLOSED. It is the white farmhouse on the grounds of MIT's Haystack Observatory in Westford, MA. Take Rt. 3 North from Rt. 128 or Rt. 495 to Exit 33 and proceed West on Rt. 40 for five miles. Turn right at the MIT Lincoln Lab, Haystack Observatory at the Groton town line. Proceed to the farmhouse on left side of the road. Clubhouse attendance varies with the weather. It is wise to call in advance: (978) 692-8708.

Heads Up For the Month . . .

To calculate Eastern Standard Time (EST) from Universal Time (UT) subtract 5 from UT.

Nov 8 Last Quarter Moon (Moonrise at midnight)
Nov 10 Mercury at greatest western (morning) elongation (19 degrees)
Nov 15 New Moon
Nov 17 Leonid Meteors peak 12:00 UT (07:00 EST)
Nov 21 First Quarter Moon (Moonset at midnight)
Nov 30 Full Moon, Penumbral Lunar Eclipse, 09:43 UT (04:43 EST)
Dec 7 Last Quarter Moon (Moonrise at midnight)
Dec 7 Vesta 0.5 deg. South of Moon 22:00 UT (17:00 EST)
Dec 12 Venus 0.8 deg. South of Moon 21:00 UT (16:00 EST)
Dec 14 New Moon, Geminid Meteors peak 01:00 UT (00:00 EST)