

The Bays Mountain Astronomy Club Newsletter

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Addenda

Dark Sky Wheel Activity

Dark Sky Wheel

Cosmic Reflections

William Troxel - BMAC Chair



Happy New Year fellow BMAcCers! Wow, I cannot believe I just typed that. It seems just yesterday I was getting ready for Christmas. First, I want to thank everyone for sharing your astrophotography with your fellow BMAcCers during the December Zoom meeting. I was very impressed how good each of you are with your cameras. I hope that you will continue to get out and get that shot of the night sky. Like Adam shared with you, take the shot and send a copy to Adam for the newsletter. I was very impressed with how many of you were able to show the many ways you are finding to capture the night sky. They are so inspiring.

I want to take a minute to welcome our new member Matthew Drummonds. Mathew is new to our hobby, however he is very active in learning astrophotography. Welcome Matthew and please reach out to your fellow members for any help with this wonderful hobby.

I want to remind each of you when you reach out to me please be sure and leave your name, contact number and be sure you tell me you are a member of the Bays Mountain Astronomy Club. Of course, leave a message about what you are asking. I promise I will get back to you as soon as I can.

We will not be having a Zoom Bays Mountain Astronomy Club meeting in January 2021. The 1st month of the year is set aside for the Annual Dinner and we would not be meeting for regular meeting. I wanted to let you have a month free to experiment with your new equipment or new-to-you equipment that Santa got for you. I want to ask you to practice and play with the new items and share with the membership in February's Zoom meeting.

I want to let you know that I am getting together a lot of wonderful ideas for our future Zoom meetings going forward in 2021. I will be bringing back the questions running during the meetings along with games and activities that you will be involved with as well. I am also going to have a part of the meeting set aside for show and tell each meeting. This feature will be going into the in person meetings once we can meet at the park. I was very surprised at how well you received the "on-the-spot talk " I still have not figured a good

name to call it. If you have an idea, I would love to hear it. That will be coming back also. I honestly would love for it to be a part of the on-site meetings as well.

I need your help. I am seeking contact information for people who are working in the professional astronomy field to invite to do a Zoom talk. Of course, if you want to do a presentation I would welcome that as well. Please consider being a presenter. These are just a few of the things I have in the works for the 2021 year.

I want to remind each of to get your membership dues paid. Compared to most any other club out there, it is very low in cost. I would like for everyone to stay a member.

I want to say that I am very proud to be your chairperson. We all know that this has not been a typical year in any respect, however you all have stepped up and tried to make the best of what we have to work with, for that is what makes me proud of every member of this club. You are a major part of why I believe so strongly in this club, I applaud you! I thank you! I encourage you to stay strong and stay safe. We are getting through this and it will make us stronger as a club. I believe this with all my heart.

Have a wonderful 2021. I look forward to seeing you on Zoom in February. Until next time, this is your chairman saying...

Clear Skies!

BMAC Notes



New Online Payment Method for BMAC Members!



s part of our efforts to make the Bays Mountain Astronomy Club even better, we have added electronic payment for club dues. The following is what will happen when a club member wants to renew their club membership.

Currently, I, the editor, still have the master club database. Instead of me sending you a reminder e-mail, I will send it to Rob Cole, the Park's Manager and Coordinator for the Park Association. He will check if you are a Park member and will then send you an e-mail that includes an invoice and a unique link for you to pay online. The amount will be correct as it will take into account if you are a Park member. [If you forgot, Park members receive a 50% discount to the BMAC membership!] Those e-mails will be sent when your membership expires the following month, as well as the month you are due and the month after. If you have not renewed after those three notices, you will no longer be part of the club membership nor of our Remind service.

To recap the many ways you can renew your club dues:

- Pay online with the personalized link.
- Pay by mail with a check or card number using the invoice.
- Pay over the phone with card number and invoice number.
- Pay in person at the gift shop with cash, check or card using the invoice.

New Look to Newsletter!



ou should realize by now that the newsletter look has been completed refreshed. This was done for a number of reasons, the biggest was to be more compliant for accessibility. You'll also notice the great images with each chapter header. They are mostly from you, BMACers! Read the image credits on the last page.

Call for Newsletter Content



ellow BMAcCers. This newsletter is yours. As such, it should reflect what our club members are doing and be an avenue for sharing articles, pictures, drawings, etc. Please send content to the [editor](#). Thanks!

Regional Gathering of Amateur Astronomers



he Regional Gathering of Amateur Astronomers, aka **BoBfest**, 2021 is currently scheduled to be online via Zoom on January 23, 2021.

The format will be a bit different, starting at 9:00 a.m. and wrapping up with door prize drawings at 1:00 p.m.

- Speakers include:
 - **Richard Wright, Jr.**, software developer, author and astrophotographer extraordinaire, will focus on astrophotography. (Get it? "Focus on...")
 - Jonathan Ward and Michael Leinbach - authors of **"Bringing Columbia Home."**
 - **John O'Neal**, member of The Catawba Valley Astronomy Club, Black River Astronomical Society, Charlotte Amateur Astronomers, Piedmont Amateur Astronomers Club, Solar Activity Worldwide Affiliate, Group, The Association of Lunar & Planetary Observers, The American Association of Variable Star Observers, and NASA Solar System Ambassador. John will share live solar images from his home observatory, weather permitting, or present on one of his many areas of expertise.
 - **Nora Coffey**, Park Ranger at **Lake James State Park**. Nora will share the latest in light pollution abatement strategies and techniques.

BoBfest **Registration** is now open. You'll also find updated info about our presentations and door prizes at this site as we approach the big event. This year, ticket sales will be handled online and drawings will be done live on Zoom.

Celestial Happenings

Jason Dorfman





elcome to a brand new year. We've made it through one of the more difficult years that we've had in some time. Everyone around the world has had to figure out new ways of doing things. As a club, we've had several very successful meetings over video chat, something that would not have been feasible ten years ago. 2021 holds new hope for better things to come. A vaccine is currently being distributed, but will take time to reach the billions of people around the world. Hopefully, it won't be too much longer until we can meet again in person.

January brings with it colder weather, but also clearer skies. The winter skies offer some wonderful sights if you're willing to bundle up and brave the cold. Be sure to put your scope out before you plan to observe to give it time to acclimate to the colder temperatures and a warm beverage helps a lot! [Ed.: But not to put *in* the telescope. 😊] Even though we are moving into the peak winter months, the days will actually be getting a bit longer and the nights shorter as we head towards the Autumnal Equinox. The Sun will appear at 7:42 a.m. as the new year begins and will dip below the horizon at 5:25 p.m. As we reach the end of January, the Sun will rise at 7:32 a.m. and set at 5:55 p.m.

Planets

Though we are now past the Great Conjunction of Jupiter and Saturn, the two gas giants remain visible in the southwest just after sunset in the early part of January. A half hour after sunset on the first of the month, look to the southwest and you'll find Jupiter about 10° high shining brightly at magnitude -2.0. Fainter Saturn sits just 1.3° to the lower right of Jupiter and at magnitude +0.6 will be just beginning to emerge from the fading twilight. In the second week, Mercury will join the pair as it passes just south of the giants from the 8th to the 12th. On the 9th, Mercury and Saturn will straddle an altitude of 5° above the horizon a half hour after sunset. Mercury at magnitude -0.9 outshines Saturn and sits 1.6° due south of the ringed world with Jupiter about 2.5° directly above tiny Mercury. On the following evening, the three will form a nearly equilateral triangle that would fit inside a 2.3° circle. As we reach the evening of the 11th, Mercury and Jupiter will sit almost side-by-side separated by just under 1.5° .

Saturn will quickly descend into the fading twilight by mid-month followed closely by Jupiter. Mercury, however, will continue to climb higher above the horizon each night as it approaches its greatest eastern elongation on the 23rd. Beginning on the 9th, Mercury will appear as a gibbous world 92% illuminated spanning a small 5". On the evening of the 14th, Mercury will sit midway between Jupiter and a thin waxing crescent Moon. A half hour after sunset, Mercury will be about 8° high with Jupiter to its lower right sitting at 5° high and the young Moon about 7° to its upper left. The three form a shallow arc pointing towards the setting Sun. When Mercury reaches its greatest elongation on the 23rd, it will stand 11° above the WSW horizon a half hour after sunset. It shines brightly at magnitude -0.67 and should be easy to find despite the evening twilight. On this day, the planet will span 7" and will appear 56% illuminated. On the next evening, it will appear as a half lit world. By month's end, Mercury will have grown to almost 9" in diameter, but with it only appearing 19% illuminated, its magnitude will have decreased to +1.0. Though a bit more challenging, look for it about 7.5° high a half hour after sunset and you should be able to spy the small crescent world.

Next, we turn our gaze eastward for the Red Planet. Mars sits more than 60° high in the SSE an hour after sundown and shines brilliantly with its orangish hue at magnitude -0.2. It will climb to its highest elevation of 65° due south an hour later. The planet now spans just 10" as Earth continues to pull away from the Red Planet. Mars begins the month in the lower part of Pisces and crosses into Aries on the 5th as it moves swiftly eastward over the month. As we reach the end of the month, the magnitude of Mars will have dimmed to +0.45 and its apparent diameter will have shrunk slightly to 7.8".

As the third week of January is reaching its end, Mars will pass close to the distant, icy world of Uranus. On the 20th, Uranus lies just 1.6° nearly due south of Mars. Start by centering Mars in your scope and then look south and slightly eastward for the small, bluish-green orb of Uranus, which shines faintly at magnitude +5.7. There are no other similarly bright stars near Uranus, so it should be fairly easy to locate. However, a first quarter Moon lies about 7° southwest of Mars, so you may have an easier time a day or two before the 20th.

You can still catch Venus in the hour before sunrise this month. About an hour before sunup on the 1st, Venus lies 5° high just east of SE and shines brightly at magnitude -3.8. Venus spans about 10.5" and is 95% illuminated. As the month continues, Venus will descend deeper into the dawning twilight becoming quite a challenge by the 31st.

Luna

January begins with a nearly full waning gibbous Moon resulting in nearly moonless nights for the first weeks of the month. On the morning of the 10th, an extremely thin, waning crescent sits about 16° east of Venus. On the following morning, it will be just 4° from the planet, but at only 3.6% illumination, it will be quite a challenge with the competing morning twilight. New Moon occurs on the 12th. As mentioned above, we'll see a young crescent Moon return to our evening skies on the 14th and a first quarter Moon near Mars and Uranus on the 20th. Full Moon arrives on the 28th.

Good luck observing and thanks for reading!

The Queen Speaks

Robin Byrne



Happy Birthday, Proof of Earth's Rotation



s a kid, my family occasionally made trips to the Museum of Science and Industry in Chicago. A few of the exhibits always stood out, one being the Foucault Pendulum. It was always mesmerizing to watch the pendulum swinging back-and-forth, waiting in anticipation for the pendulum to knock down the next of the pins arranged in a circle around the periphery of the pendulum's swing. But it wasn't until I was in my college physics classes that I understood what the point of the pendulum display actually was.

Of course, the idea that Earth's rotation was the reason why objects rise and set in the sky had been known since the time of Copernicus. But if you are stuck on the surface of the Earth, how do you prove this? Leon Foucault was a French physicist who came up with the idea of using the pendulum, and on January 6, 1851, performed the first successful experiment proving Earth's rotation.

So, what's happening? Foucault made use of one of Newton's Laws - an object in motion remains in motion if no net external force acts upon it. In this case, the pendulum is the object in motion. Not only does Newton's First Law mean that the pendulum will keep moving, but also that the direction of motion won't change either, again, as long as no net force acts on it. So, when you set a pendulum in motion to swing back-and-forth, it will continue swinging (until friction slows it down), and the direction of its swing won't change. Now, you may be thinking, "Wait a minute! If the direction of motion doesn't change, why do those museum displays always show the pendulum slowly rotating around knocking down more and more of the pins?" Aha! Because it isn't the pendulum changing direction, but Earth rotating underneath the pendulum. Proof that Earth rotates! Sorry - not sorry - flat Earthers.



*Foucault Pendulum at the Panthéon in Paris, France. Image captured 4/25/2011.
Used with permission from Rémi.*

The easiest situation to picture is if you are at the North Pole. Set a pendulum in motion, where the center of the swing is directly above Earth's axis. Let's use a star as a reference point and say that the pendulum is swinging directly toward the star Sirius. That direction of the swing won't change, but Earth will spin beneath the pendulum, causing different parts of Earth to point toward Sirius over the course of one day. If you are standing to one side of the North Pole watching the pendulum, you will be carried in a circle over those 24 hours around the swinging pendulum, looking at it from different angles as the day progresses.

As you move farther from the poles, the motion becomes less and less noticeable, and will take longer and longer to complete one circle, until you reach the equator, where the pendulum will appear to move in a fixed, straight line with no rotation.

After Foucault's initial experiment, he performed a public demonstration of the pendulum in February of 1851 at the Paris Observatory. The most famous of his pendulums was set up in the Panthéon in Paris a few weeks later. This pendulum was suspended on a 220 foot long wire with a lead bob weighing 62 pounds. At the latitude of Paris, the pendulum made one complete rotation in 31 hours 50 minutes. An exact replica of the original pendulum has been on display at the Panthéon since 1995.

One of the more unusual locations for a Foucault pendulum was the Amundsen-Scott South Pole Station. A new station was under construction, so while it was still mostly empty, the crew made use of a six-story staircase. Using a 55 pound bob at the end of a 108 foot long wire, they confirmed the Earth's rotation is approximately 24 hours. Isn't it nice to know we've been right all this time?

So, the next time you visit a museum or science center with a Foucault pendulum display, you can now not only enjoy watching the motion, but also be able to impress those around you by explaining that you are watching Earth rotate under the pendulum!

References:

Foucault Pendulum - [Wikipedia](#)

The Space Place - NASA Night Sky Network

David Prosper

Check Your Sky's Quality with Orion!



Have you ever wondered how many stars you can see at night? From a perfect dark sky location, free from any light pollution, a person with excellent vision may observe a few thousand stars in the sky at one time! Sadly, most people don't enjoy pristine dark skies – and knowing your sky's brightness will help you navigate the night sky.

The brightness of planets and stars is measured in terms of apparent magnitude, or how bright they appear from Earth. Most visible stars range in brightness from 1st to 6th magnitude, with the lower number being brighter. A star at magnitude 1 appears 100 times brighter than a star at magnitude 6. A few stars and planets shine even brighter than first magnitude, like brilliant Sirius at -1.46 magnitude, or Venus, which can shine brighter than -4 magnitude! Very bright planets and stars can still be seen from bright cities with lots of light pollution. Given perfect skies, an observer may be able to see stars as dim as 6.5 magnitude, but such fantastic conditions are very rare; in much of the world, human-made light pollution drastically limits what people can see at night.

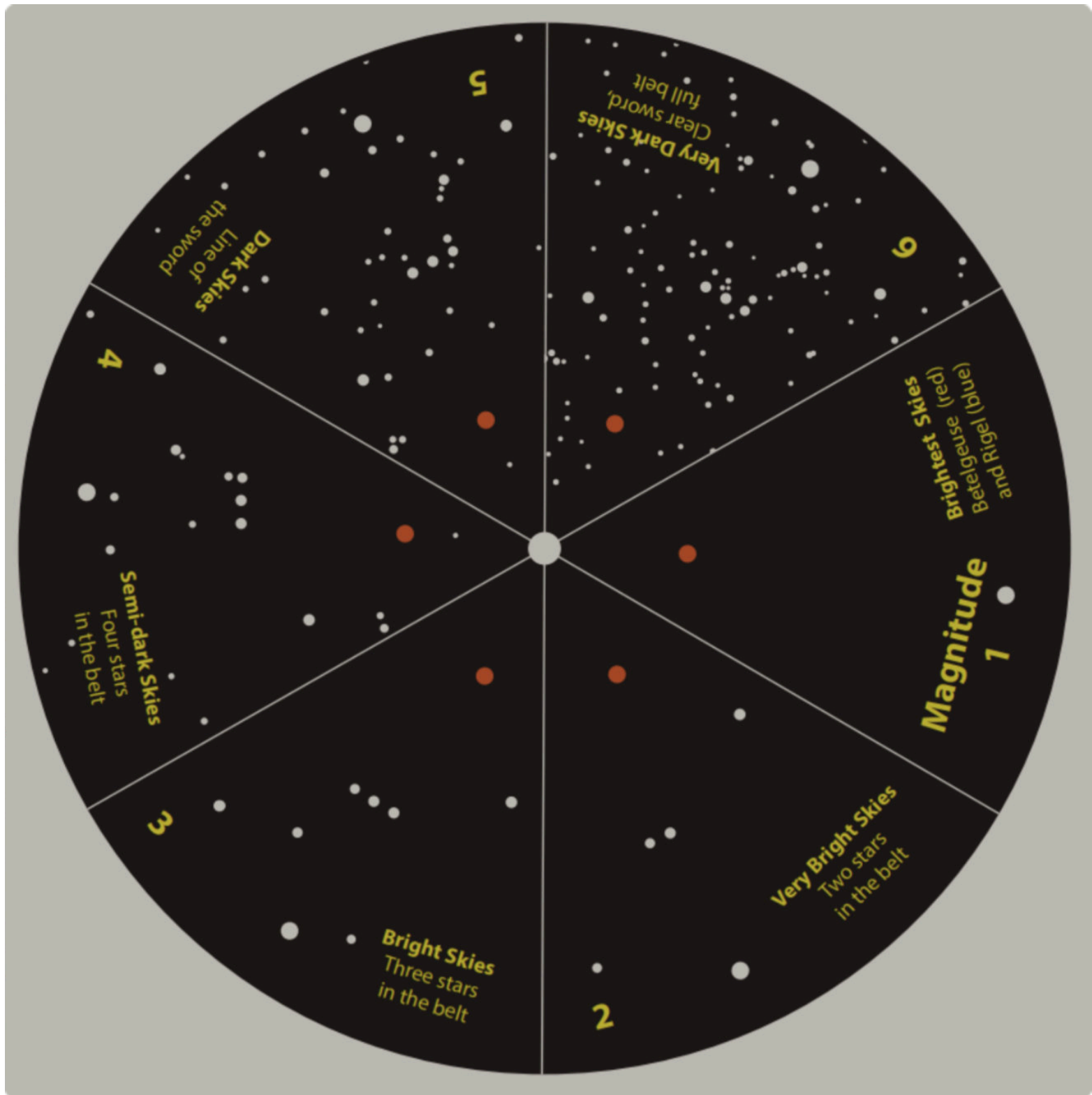
Your sky's limiting magnitude is, simply enough, the measure of the dimmest stars you can see when looking straight up. So, if the dimmest star you can see from your backyard is magnitude 5, then your limiting magnitude is 5. Easy, right? But why would you want to know your limiting magnitude? It can help you plan your observing! For example, if you have a bright sky and your limiting magnitude is at 3, watching a meteor shower or looking for dimmer stars and objects may be a wasted effort. But if your sky is dark and the limit is 5, you should be able to see meteors and the Milky Way. Knowing this figure can help you measure light pollution in your area and determine if it's getting better or worse over time. And regardless of location, be it backyard, balcony, or dark sky park, light pollution is a concern to all stargazers!

How do you figure out the limiting magnitude in your area? While you can use smartphone apps or dedicated devices like a Sky Quality Meter, you can also use your own eyes and

charts of bright constellations! The Night Sky Network offers a free printable Dark Sky Wheel, featuring the stars of Orion on one side and Scorpius on the other, [here](#). [Ed.: The Dark Sky Wheel and activity PDFs have been added to the end of this newsletter.] Each wheel contains six “wedges” showing the stars of the constellation, limited from 1-6 magnitude. Find the wedge containing the faintest stars you can see from your area; you now know your limiting magnitude! For maximum accuracy, use the wheel when the constellation is high in the sky well after sunset. Compare the difference when the Moon is at full phase, versus new. Before you start, let your eyes adjust for twenty minutes to ensure your night vision is at its best. A red light can help preserve your night vision while comparing stars in the printout.



A photo of Orion. What is the limiting magnitude of the photo?



The Dark Sky Wheel, showing the constellation Orion at six different limiting magnitudes. For most observing locations, the Orion side works best on evenings from January-March, and the Scorpius side from June-August.

Did you have fun? Contribute to science with monthly observing programs from Globe at Night's [website](#), and check out the latest [NASA's](#) science on the stars you can - and can't - see.

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](#) to find local clubs, events, and more!

BMAC Calendar & More



Calendar:

MAC Meetings:

- Friday, February 5, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, March 5, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, April 2, 2021 - 7p - Via Zoom - Social time 30m before and after meeting. Topic TBA.
- Friday, May 7, 2021 - 7p - Via Zoom? - Social time 30m before and after meeting. Topic TBA.
- Friday, June 4, 2021 - 7p - Via Zoom? - Social time 30m before and after meeting. Topic TBA.

unWatch:

- **Cancelled until further notice.**
- Every clear Saturday & Sunday - 3p-3:30p - March-October - On the Dam
 - View the Sun safely with a white-light & H α view if clear.; Free.

tarWatch:

- **Cancelled until further notice.**
- March 6 & 13, 2021 - 7p
- March 20 & 27, 2021 - 8p
- April 3, 10, 17 & 24, 2021 - 8:30p

- October 2 & 9, 2021 - 7:30p
- October 16, 23, 30 & November 6, 2021 - 7p
- November 13, 20 & 27 - 6p
 - View the night sky with large telescopes at the observatories. If poor weather, an alternate live tour of the night sky will be held in the planetarium theater.; Free.
 - You must have completed the Park Volunteer Program in order to help with the public program. If you have, please show up at least 30 minutes prior to the official start time.



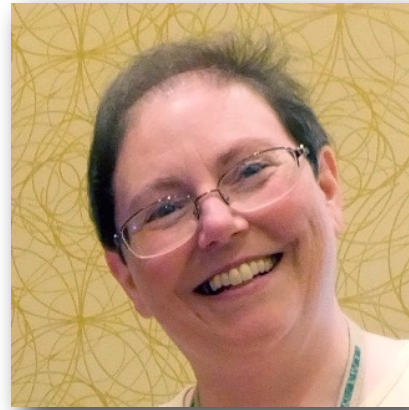
Special Events:

- **All special events are cancelled until further notice.**
- **Astronomy Day - May 15, 2021 - 1p-4p; 8:30p-9:30p**
 - Come help share the fun of astronomy with the public. There will be tables with different themed topics plus solar and night viewing.
- **Annual Club Picnic - July 2021 - Day TBD - 6p**
 - Site location will be sent directly to full BMAC members. BMACers and their families are welcome to enjoy an evening of astronomy-themed games and activities along with a potluck dinner and observing.
 - **Please bring a dish to share and bring your own chair.**
- **StarFest 2021 - October 29, 30 & 31, 2021**
 - Our 37th annual astronomy convention / star gathering for the Southeast United States. Three days of astronomy fun, 5 meals, 4 keynote speakers, unique T-shirt, and more!
 - **Pre-registration by Oct. 8, 2021 with full payment is mandatory for attendance. Sorry, no walk-ins nor "visits."**
 - MeadowView Marriott special 2021 hotel rate.
 - **StarFest Link**

Regular Contributors:



William Troxel



Robin Byrne



Jason Dorfman



Adam Thanz

William is the current chair of the club. He enjoys everything to do with astronomy, including sharing this exciting and interesting hobby with anyone that will listen! He has been a member since 2010.

Robin Byrne has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

Jason Dorfman works as a planetarium creative and technical genius at Bays Mountain Park. He has been a member since 2006.

Adam Thanz has been the BMAC Newsletter Editor for all but a number of issues since 1992. He is the Planetarium Director at Bays Mountain Park and an astronomy adjunct instructor at NSCC since 2000.

Connection:

ays Mountain Astronomy Club:

- 853 Bays Mountain Park Road; Kingsport, TN 37650
- (423) 229-9447 - **Park Site** - **Club Site**
- Newsletter edited by **Adam Thanz**

ues:

- Dues are supplemented by the Bays Mountain Park Association and volunteerism by the club. As such, our dues are kept at an extremely low cost.
- \$16 / person / year
- \$6 / each additional family member
- Note: if you are a Park Association member (which incurs a separate, additional fee), then a 50% reduction in BMAC dues are applied.
- Dues can be paid in many ways. For renewals, you will be sent an e-mail with an invoice and a direct link to pay online. You can also pay by mail, over the phone or in person at the gift shop.

Chapter Background Image Credits:

- **Cover image of Southern Milky Way by Adam Thanz.**
 - Sony A7ii with Zeiss Batis 2.8/18 lens, f/2.8, 8 sec., ISO 6,400, August 9, 2020.
- **Table of Contents image of Comet NEOWISE (C/2020 F3) by Adam Thanz**
 - Sony A7ii with Sony FE 2.8/90 Macro G OSS lens, f/2.8, 8 sec., ISO 4,000, July 15, 2020.
- **Cosmic Reflections image of the Summer Triangle area of the Milky Way by William Troxel.**
 - Image captured July 23, 2016.
- **BMAC Notes painting of the Moon with moon glow by Christa Cartwright.**
 - Painting based on a photograph of the Moon Christa captured July 2020.
- **Celestial Happenings image of sunset at the Bays Mountain Park Lake during a twilight kayak program by Jason Dorfman.**
 - Image captured October 1, 2020.
- **The Queen Speaks image of a solar halo by Robin Byrne.**
 - iPhone 7, June 8, 2020.
- **The Space Place - NASA Night Sky Network image of the Rho Ophiuchi cloud complex by Brandon Stroupe.**
 - Canon 6D with Canon 2.8/70-200mm lens, f/2.8 @200mm, 20 x 120 sec. exposures, ISO 1,000, stacked in Deepsky Stacker, processed in Adobe Photoshop CC, Skywatcher Star Adventure mount, September 19, 2015.
- **BMAC Calendar & More image of the Moon by Greg Penner.**
 - iPhone shooting through a 9mm eyepiece and 12.5" Truss Tube Dobsonian @212x.
- **All background images used with permission by their authors.**

Dark Sky Wheel

How Dark are Your Skies?



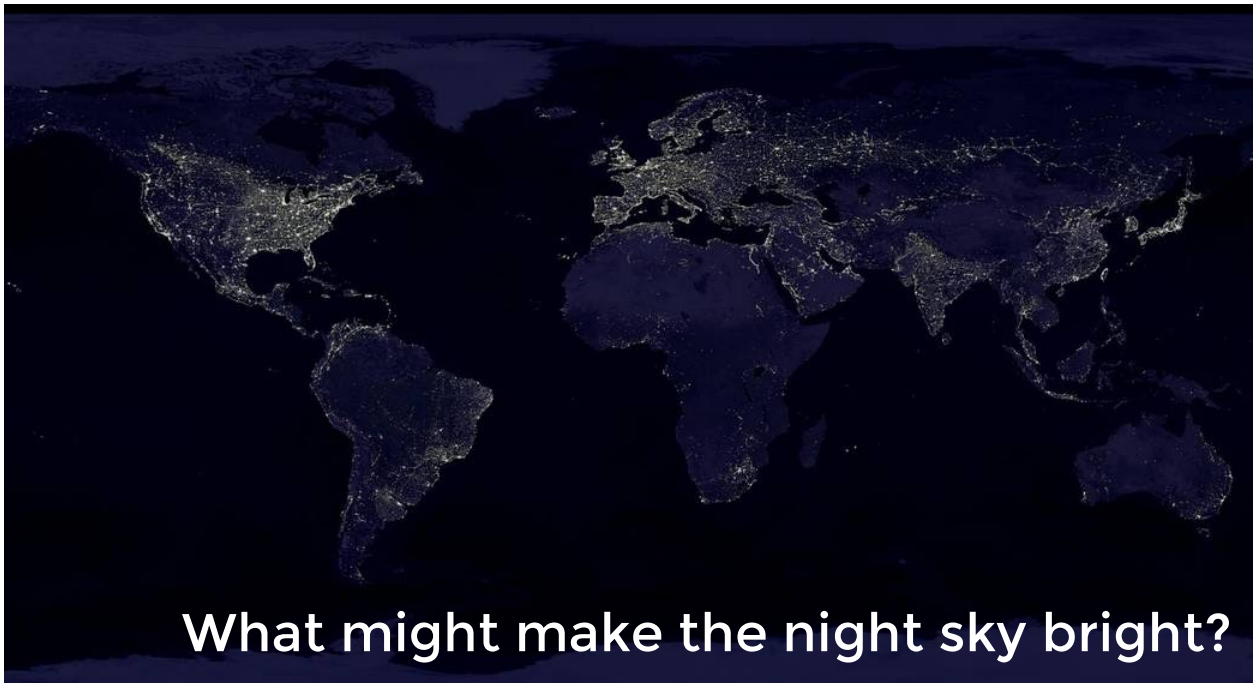
Image above of the Blanco telescope in Chile, with the Milky Way and Magellanic Clouds behind. *Image Credit: R. Smith/NOIRLab/NSF/AURA*

Have you ever
been under a
very dark sky?

How did it feel?

Find your view
tonight on the
Dark Sky Wheel.

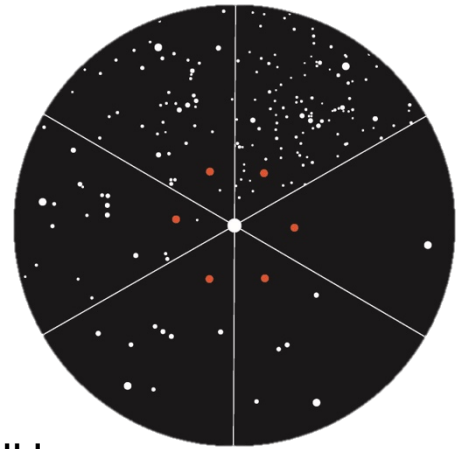
Composite image below shows a global view of the Earth at night. *Image Credit: NASA/NOAA*



Dark skies are a precious natural resource.

The stars in Orion and Scorpius are legendary in cultures around the globe. The skies have held a fascination and a place of reverence for all of human history. We are losing our cultural connection to the night sky.

Try this: Find the constellation version that most closely mirrors what you see in the sky. Then wait 15 minutes without looking at lights. Do you notice any difference once your eyes become *dark adapted*?

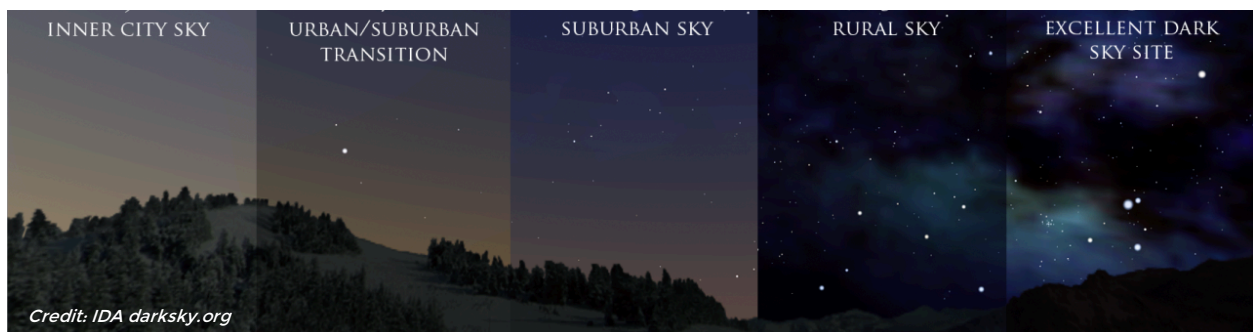


Astronomers, both professional and amateur look for **clear dark skies** for observing the night sky. More than 70% of all large ground-based telescopes in the world are located in the mountains and high deserts of Chile because they have some of the darkest skies in the world.

- High mountaintops above much of the atmosphere
- Still, dry air that does not distort the light
- A commitment to dark skies shared by local communities
- Infrastructure and workforce to support big science projects

How many stars can we see in a very dark night sky?

From the middle of a city, you may only see the brightest stars in the sky. But with good eyes under the darkest skies, we can see around 5,000 stars on a moonless night.



Notes for the Presenter

Dark Sky Wheel

Time: 5-10 minutes
Visitors: General audience, ages 10+
Venue: nighttime, Orion Jan - Mar, or Scorpius Jun-Aug (longer in S. Hemisphere)

Learning Goals

1. Notice how dark or bright our skies are.
2. Understand the impact of lighting on our ability to see the night sky.
3. Understand that stars do not all have the same brightness and color.
4. Notice how our eyes become dark adapted with more time away from light.

Materials (and Sources)

- Set of Dark Sky Wheels for visitors
Print your own from the Night Sky Network [Outreach Resources](#)
- Brads for the center to keep them together and allow them to turn

Advance Preparation

First time setup:

- Use the glow-in-the-dark pen to mark the stars for use in the dark.

Setup:

- Make sure your star wheels are flipped for the correct season. Use the Orion side January through March, and the Scorpius side June-August.
- Insert the brad through the center.

Facilitation Notes

Does anyone recognize any constellations? Constellations are patterns that humans make up in the stars. All over the Earth and for all of recorded history, cultures have created these patterns to remember and understand the order of the stars at night. Have you heard stories about them?

Is that constellation always visible? We see different constellations at different times of year and at different times on the same night. As the Earth orbits the Sun, the night sky looks out at different parts of our galaxy.

How many stars are you usually able to see from your home? Do the number of stars you can see vary from night to night, and when you travel elsewhere? **What do you think is going on?** Lighting from the ground or the Moon can affect our ability to see the stars. Better lighting can mean darker skies!

Why do you think some stars are brighter than others? It could be their distance or how big and bright they are. Some stars are also different colors! See if you notice the red star Betelgeuse (in Orion) or Antares (in Scorpius).

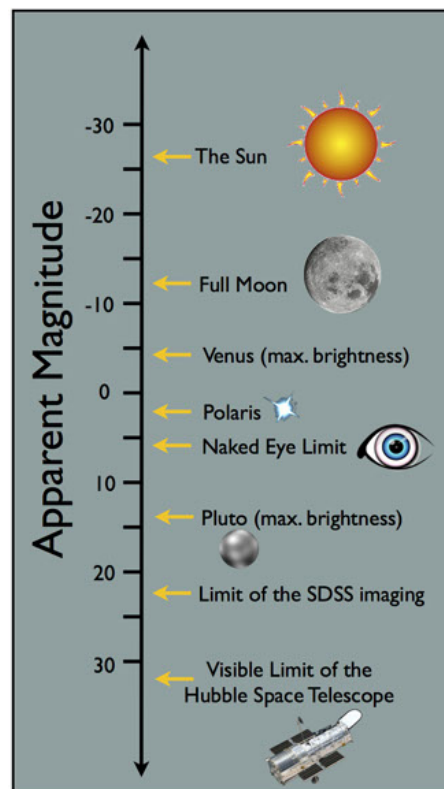
Be a scientist! Record your observations at globeatnight.org and add to a global database of sky brightness.

Background Information

Use a **red light** to help preserve visitors' dark adaptation, allowing them to see the most stars possible when looking up at the sky. Make sure when doing this activity to **NOT** use a white light to help people see the star wheel.

Have visitors note how many stars they can see when they first look up and then again 15 minutes later to demonstrate dark adaptation.

Magnitudes listed here are **apparent magnitudes**, or the brightness of an object *as seen from here on Earth* (as opposed to the absolute magnitude of an object, a measurement of the light it emits). It is an inverse log scale, with higher numbers indicating dimmer stars.



Scale of magnitudes from SDSS Voyages for teachers. Find more information and many exciting activities. voyages.sdss.org

Virtual and Hands-on Presentation Extensions

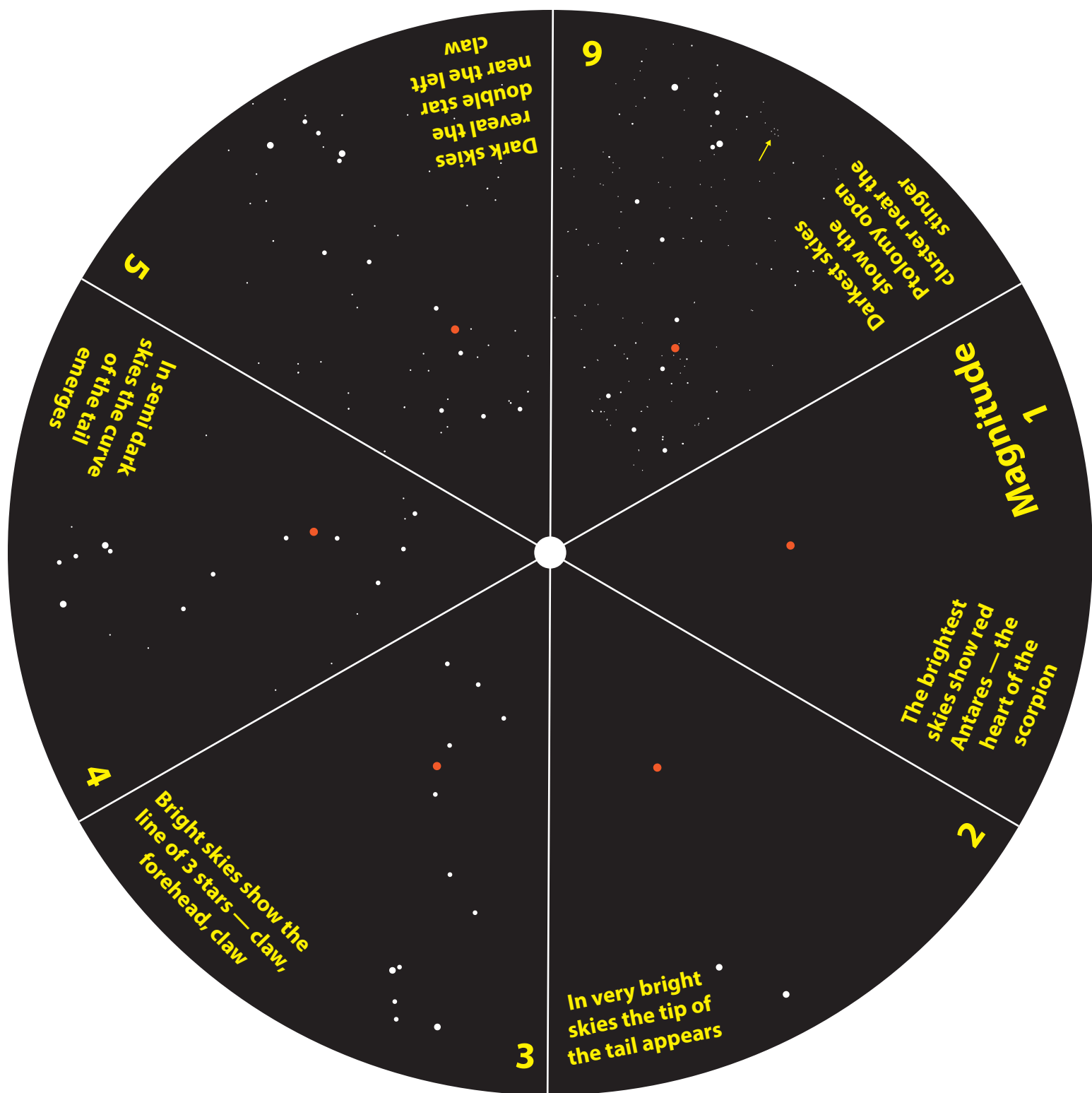
- This activity complements the light shielding activity **Good Light, Good Night** provided in the kit or at bit.ly/bigastro
- Tell constellation legends and have visitors create their own with the **Legends of the Night Sky** activity, also in this Toolkit.
- Explore the effects of light pollution on the night sky with Light Pollution Interactive globeatnight.org/light-pollution.php

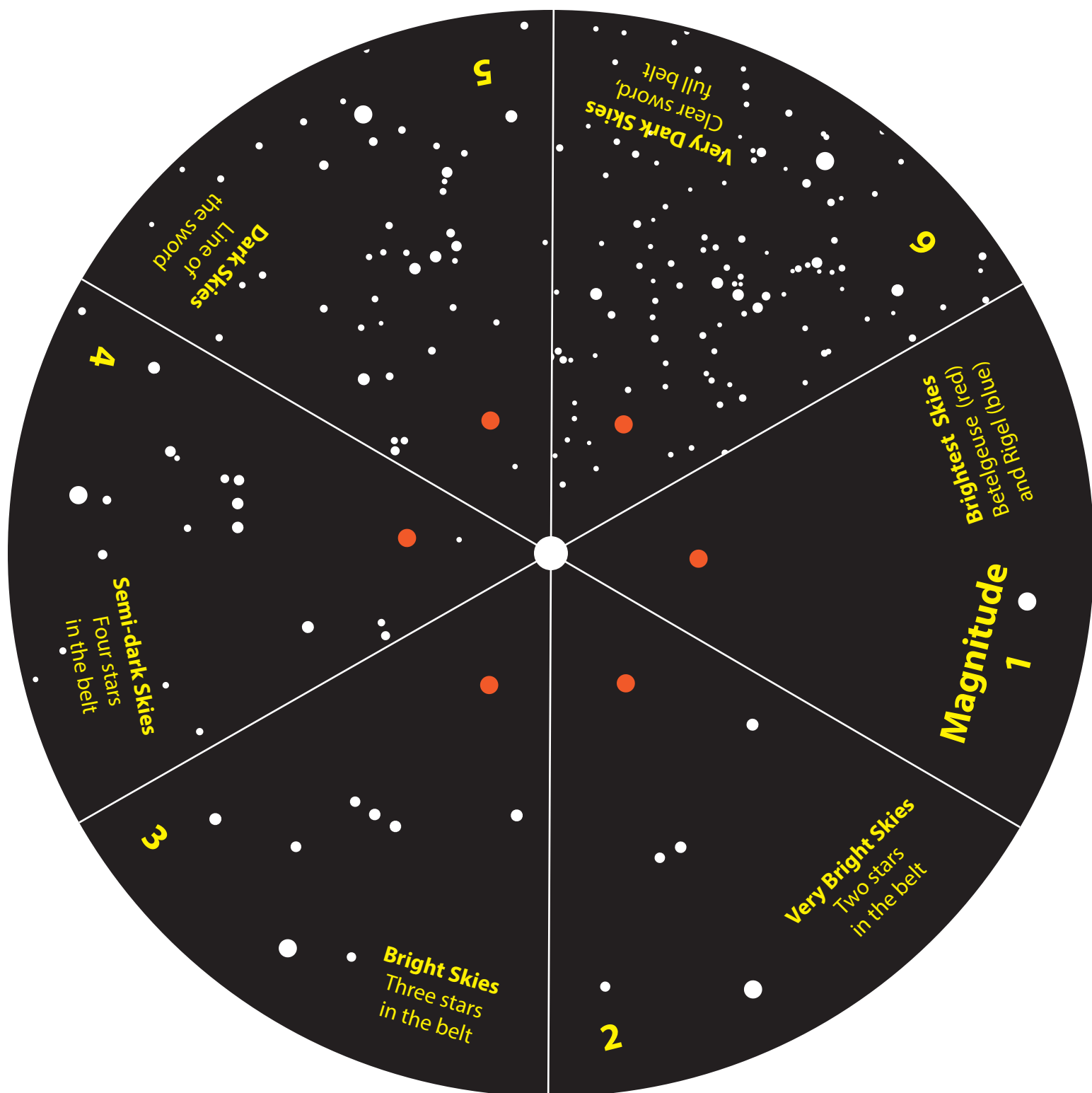
Additional Resources and Credits

This activity was adapted from the magnitude charts of the Globe at Night Activity. globeatnight.org/magcharts



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Scorpius Dark Sky Wheel

Just 100 years ago, everyone all over the world could look up and see a sky full of stars. Now most people live in bright cities, and many have never experienced the awe of the Milky Way.

Find out how dark your skies are with this wheel.

How dark are your skies? Turn the wheel and compare what you see in the sky with the images

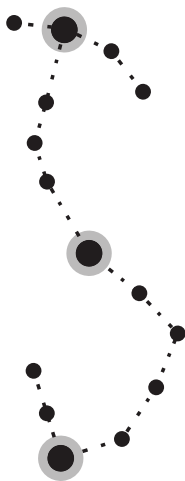
Discover:
In the evening July sky, find the red star Antares near the center of the constellation Scorpius. The entire constellation will only be visible below 40° North.

Share:
Record your observation on GlobeAtNight.org and contribute to community science. Compare your sky brightness with measurements from around the world and find out how we are all affected by the loss of darkness!

Legends:
In many versions of the Greek myth, Gaia sent a scorpion that killed the great hunter and they are placed on opposite sides of the sky, so that when Orion sets, the constellation Scorpius rises. Other cultures tell different legends about the stars. Some Pacific Islanders see a great fish hook and the ancient Javanese saw a leaning coconut tree.

Get Dark:
Where can you find dark skies near you? Find your local amateur astronomy club and get connected with the wonders of the night sky: nightsky.jpl.nasa.gov

Limiting Magnitude
(the larger the number, the fainter the stars we can see)



Orion Dark Sky Wheel

Just 100 years ago, everyone all over the world could look up and see a sky full of stars. Now most people live in bright cities, and many have never experienced the awe of the Milky Way.

Find out how dark your skies are with this wheel.

How dark are your skies? Turn the wheel and compare what you see in the sky with the images here to find out.

Discover:

In the evening sky from January through March, find the red star Betelgeuse in one corner of the constellation Orion and the blue star Rigel in the other corner. Between the two, you may be able to see 3 stars in a line.

Get Dark:

Where can you find dark skies near you? Find your local amateur astronomy club and get connected with the wonders of the night sky:
nightsky.jpl.nasa.gov

Limiting Magnitude

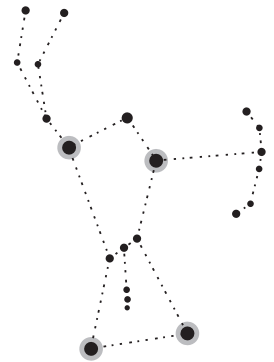
(the larger the number, the fainter the stars we can see)

Share:

Record your observation on GlobeAtNight.org and contribute to community science. Compare your sky brightness with measurements from around the world and find out how we are all affected by the loss of darkness!

Legends:

In many versions of the Greek myth, Gaia sent a scorpion to kill the great hunter Orion and they are placed on opposite sides of the sky, so that when Orion sets, the constellation Scorpius rises. Other cultures tell different legends about the stars. In Latin America, many see the "Tres Marias" in the stars of the belt, while further north, the Lakota see the spine of a bison.



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