Keene Amateur Astronomers

The Newsletter for Keene Amateur Astronomers

Vol. 2024 No. 2 June 2024

Picture of the May Aurora

Photo taken by Christopher Watt at High Five Reservation in Deering, NH with a Sony a5100 camera.

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Editor's Message

What an exciting month. Many individuals had an opportunity to see the Northern Lights on May 10th or 11th. Pictures of this phenomenon have been kindly shared by Christopher Watt.

Let's hope that we will have another opportunity this month to view an aurora. Many of us experienced cloudy skies last month and missed it. The local news has been providing updates and if you haven't been checking the space weather at NOAA, you might want to bookmark NOAA's website and check back often for updates.

You may have heard about the 6 planet alignment. Unfortunately, Mars and Saturn are probably the only planets you will see as they appear with the crescent Moon prior to dawn. Jupiter will most likely be lost in the glow of the morning Sun and the other planets can not be seen without the aid of binoculars or a telescope. Later this month Jupiter will be visible in the sky prior to dawn.

Be sure to check out this month's NSN webinar on Mars and observing this month.

Also included in this month's newsletter is an overview on the solar cycle and auroras as well as an article provided by the Night Sky Network on Circumpolar Constellations.

I hope you enjoy this month's newsletter and have an opportunity to get outside to see the night sky.

- Susan R. Rolke

Reports & Club Happenings

Monthly Business Meeting

Due to the forecast of bad weather, the May meeting which was to take place at the observatory was canceled. The next meeting will be held on June 14th at the Observatory in Sullivan at 7 pm. Observing to follow the monthly meeting.

Annual Spring Dinner

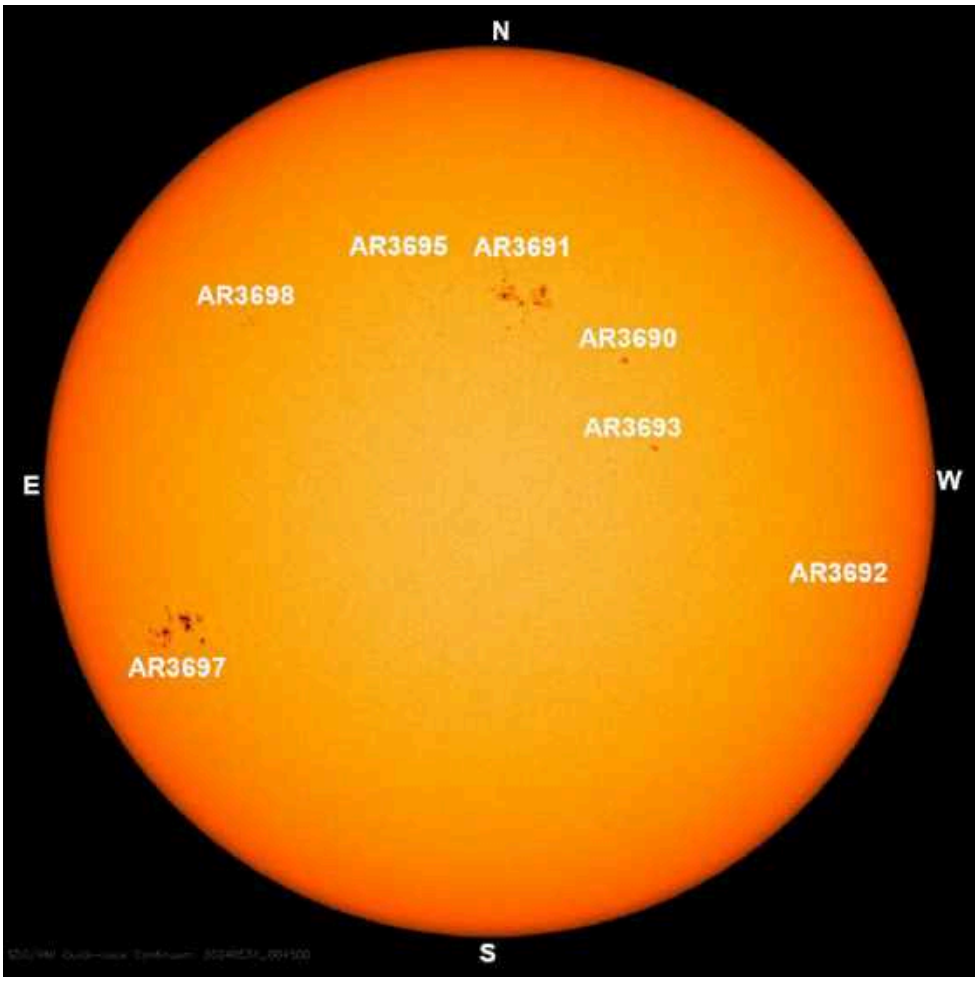
There were 12 people who attended KAA's annual spring dinner at Papagallos in Keene on May 5th, nine of which were members and three guests of honor. Due to COVID the dinner was put on hold a few years so this was a get back to normal celebration.

Aurora Pictures - additional pictures taken/shared by Christopher Watt

Solar Activity and Auroras

It seems appropriate that this year we are celebrating solar science and the Sun's influence on the Earth and our solar system. NASA has been announcing monthly themes since the Annular Eclipse last October for what it is calling the Helio Big Year. The goal is to draw attention to how the Sun touches our lives every day. What a treat to have auroras as part of this solar celebration. If you are interested, check out more information on NASA's Helio Big Year here.

In case you haven't yet read about it, the sunspot responsible for the spectacular auroras on May 10th has rotated back into view. The massive sunspot, designated AR3697, made its presence known before it was visible by the large flares erupting from the surface of the Sun. AR3697 formed last month from the merger of two separate sunspot clusters. It is an extremely active region on the Sun and has already caused issues with shortwave radio transmissions across parts of Europe and Eastern United States.



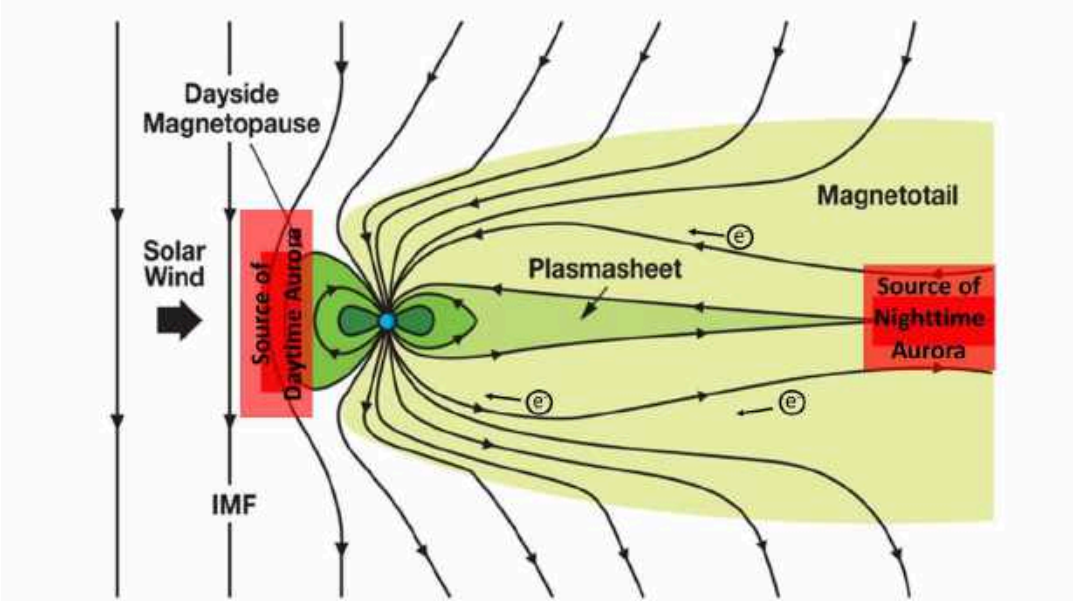
This image shows sun activity – with the most active regions labeled – as of 0 UTC on May 31, 2024. Original image, without labels, via NASA SDO. Courtesy of NASA/SDO and the AIA, EVE, and HMI science teams, with labeling by EarthSky.

If you missed seeing the aurora in May, there might be another opportunity to view one between June 4th and 6th if this region sends another coronal mass ejection (CME), a massive explosion of plasma, hurtling through space towards the Earth. However, due to the decrease in its size from May, any aurora it causes will likely not be as spectacular as the one witnessed last month.

Even if AR3697 does not produce an aurora, we still may have an opportunity to observe another one. Sunspot activity will continue to increase until the Solar Maximum which is predicted to occur in 2025.

Approximately every 11 years, the Sun's magnetic poles flip. The Sun does not rotate like a rigid body but experiences differential rotation with areas near the equator completing one rotation faster than regions closer to the poles. This results in the North-South magnetic field lines to loop and become entangled due to the different amount of time it takes for parts of the Sun to rotate. (It should be noted that this complex process is not completely understood.) The tangled magnetic field produces sunspots. The number of sunspots peaks at solar maximum along with the frequency of prominences, flares, and CMEs.

Auroras occur when charged particles in the solar wind interact with the Earth's magnetic field. As the solar wind carries the particles past the Earth's magnetic field an electric current is created. This is illustrated in the image below. The solar wind compresses the magnetosphere on the side towards the Sun and elongates the field on the night side of the planet. The electric current converges in the magnetotail, shown in red on the right. The electrons are then funneled along the Earth's magnetic field lines toward the north and south poles.



Picture courtesy of NOAA https://www.swpc.noaa.gov/content/aurora-tutorial

The electrons collide with the atoms and molecules in the upper atmosphere and impart some of their energy to the atoms encountered there. These atoms then release the excess energy in the form of photons as they return to their natural or 'ground' state. These photons of light are what we see as the aurora. Each atom and molecule emits photons at different wavelengths which we perceive as colors. Predominantly, the interactions are with oxygen and nitrogen in the upper atmosphere. The colors allow researchers to determine the atmospheric composition based on the colors of the aurora.

Oxygen is responsible for the red and green. The color corresponds to the height these interactions occur with red occurring at extremely high altitudes. However, green emission of light from oxygen is the most common and occurs at lower altitudes. The combination of blue and red emission lights from molecular nitrogen at lower altitudes are responsible for the purple that is seen.

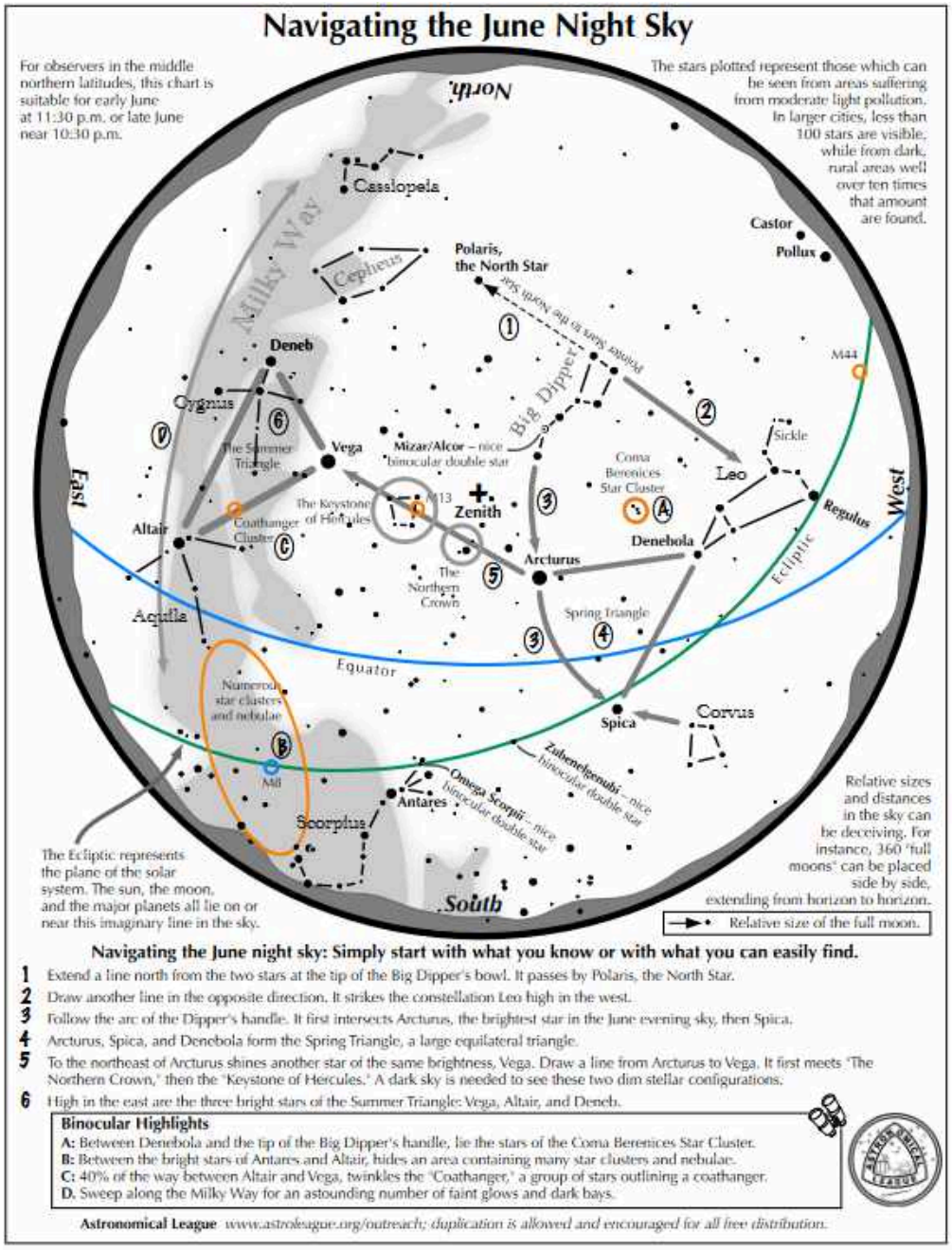
Much of the information has been simplified to provide an overview of auroras and their cause. If you are interested in learning more or want to learn how to best photograph a future aurora, I encourage you to visit the following sites.

- NOAA Aurora Tutorial
- NASA's THEMIS Sees Auroras
- From Space.com
    - Solar Cycle: What is it and Why Does it Matter?
    - Where and How to Photograph the Aurora

Observing

To find out skywatching tips for June, click on the following links (in blue and underlined) to learn more.

- Video: What's Up June 2024 Skywatching Tips from NASA



Click here for a larger image
June 2024

Night Sky Network Online Webinar

The Night Sky Network hosts monthly webinars for members to learn more about space and current research. Keene Amateur Astronomers is part of the Night Sky Network. As a member of KAA you are able to create an account with the Night Sky Network at https://nightsky.jpl.nasa.gov/. After creating an account, our Night Sky Network coordinator will approve your account after verifying your membership and you will be able to virtual attend upcoming webinars.

This month, join the NASA Night Sky Network on Thursday, June 27, at 6:00 PM Pacific Time (9:00 PM Eastern) along with Dr. Kim Steadman where we'll discuss The Perseverance Rover, and its explorations on Mars.

Kim Steadman received both her Bachelor of Science and Master of Science in Aerospace Engineering from Georgia Tech. After graduate school, Kim started her career at NASA's Jet Propulsion Laboratory. While at JPL, she has worked on several missions including the Mars Exploration Rover Mission, Cassini-Huygens Mission to Saturn, the Mars Science Laboratory, and the Mars 2020 Rover.

If you missed the webinar on **Brief History of Everything** presented by Patrick C. Breysse you can go to the Night Sky Network's youtube channel to watch it.

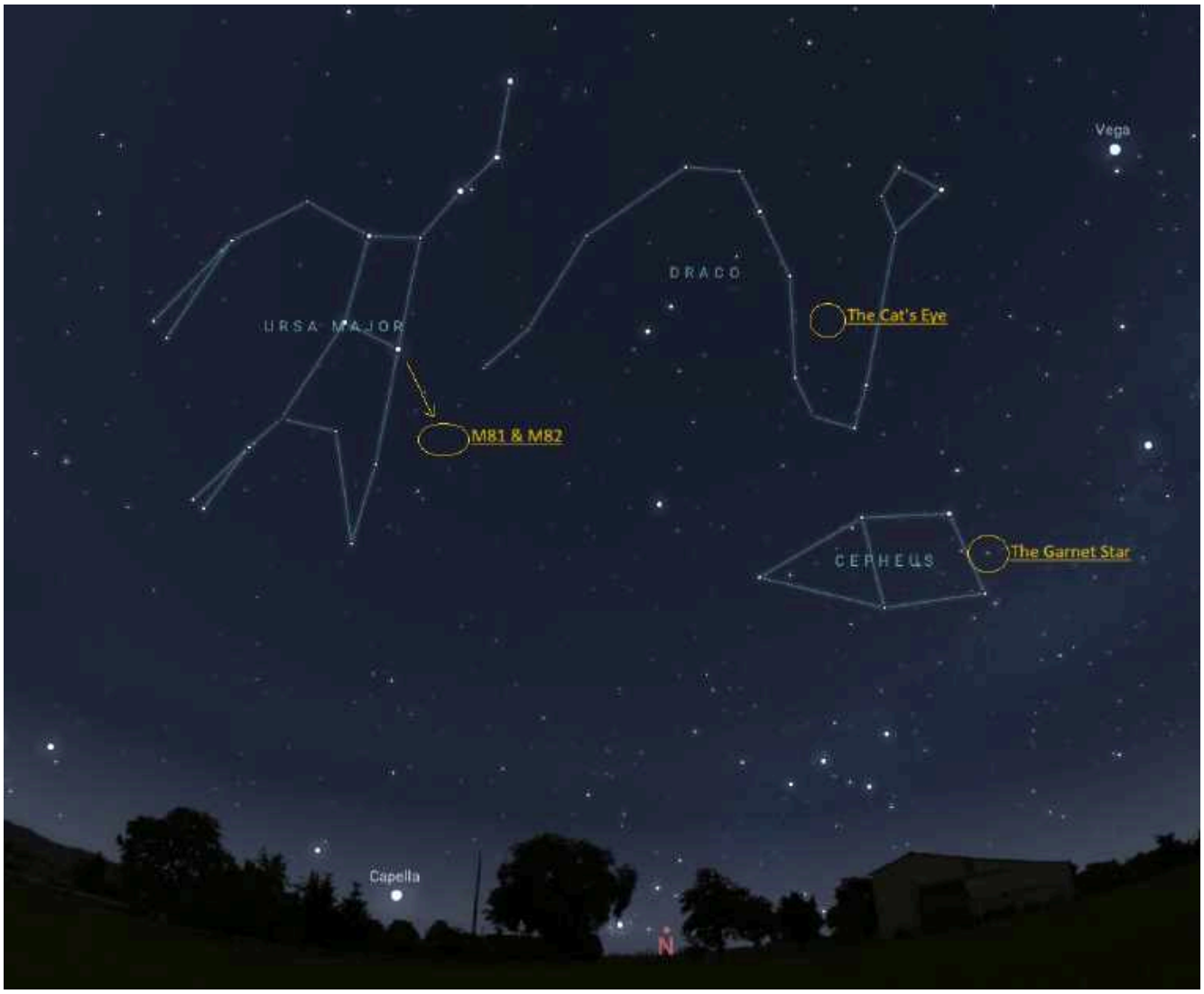
Dr. Patrick Breysse is currently a James Arthur Postdoctoral Fellow at New York University, joining the faculty at Southern Methodist University as an Assistant Professor of Physics this fall. He received his Ph.D. from the Department of Physics and Astronomy at Johns Hopkins University. Patrick's research focuses on a new way of mapping the distant universe which can watch the earliest stars form, study how the universe evolves, and look for new physics beyond standard models. He also plays the euphonium (kind of a small tuba), and enjoys hiking and science fiction novels.

NASA Night Sky Notes, June 2024

Constant Companions: Circumpolar Constellations, Part III

By Kat Troche

In our final installment of the stars around the North Star, we look ahead to the summer months, where depending on your latitude, the items in these circumpolar constellations are nice and high. Today, we'll discuss **Cepheus**, **Draco**, and **Ursa Major**. These objects can all be spotted with a medium to large-sized telescope under dark skies.



From left to right: Ursa Major, Draco, and Cepheus. Credit: Stellarium Web.

- **Herschel's Garnet Star:** Mu Cephei is a deep-red hypergiant known as The Garnet Star, or Erakis. While the star is not part of the constellation pattern, it sits within the constellation boundary of

Cepheus, and is more than 1,000 times the size of our Sun. Like its neighbor Delta Cephei, this star is variable, but is not a reliable Cepheid variable. Rather, its brightness can vary anywhere between 3.4 to 5.1 in visible magnitude, over the course of 2-12 years.

This composite of data from NASA's Chandra X-ray Observatory and Hubble Space Telescope gives astronomers a new look for NGC 6543, better known as the Cat's Eye nebula. This planetary nebula represents a phase of stellar evolution that our sun may well experience several billion years from now. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI

- **The Cat's Eye Nebula:** Labeled a planetary nebula, there are no planets to be found at the center of this object. Observations taken with NASA's Chandra X-ray Observatory and Hubble Space Telescopes give astronomers a better understanding of this complex, potential binary star, and how its core ejected enough mass to produce the rings of dust. When searching for this object, look towards the 'belly' of Draco with a medium-sized telescope.

The Cigar Galaxy. Credit: NASA, ESA, CXC, and JPL-Caltech

- **Bode's Galaxy and the Cigar Galaxy:** Using the arrow on the star map, look diagonal from the star Dubhe in Ursa Major. There you will find Bode's Galaxy (Messier 81) and the Cigar Galaxy (Messier 82). Sometimes referred to as Bode's Nebula, these two galaxies can be spotted with a small to medium-sized telescope. Bode's Galaxy is a classic spiral shape, similar to our own Milky Way galaxy and our neighbor, Andromeda. The Cigar Galaxy, however, is known as a starburst galaxy type, known to have a high star formation rate and incredible shapes. This image composite from 2006 combines the power of three great observatories: the Hubble Space Telescope imaged hydrogen in orange, and visible light in yellow green; Chandra X-Ray Observatory portrayed X-ray in blue; Spitzer Space Telescope captured infrared light in red.

Up next, we celebrate the solstice with our upcoming mid-month article on the Night Sky Network page through NASA's website!