CNY Outdoors

June stargazing in Upstate NY: What to look for in the night skies this month

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By Special to nyup.com

star 1.jpg

Different as night and day, except for their apparent size. The partial solar eclipse on 21 February 2012 from the Solar Dynamics Observatory.

(NASA/SDO/AIA)

By Damian Allis, Contributing Writer

For solar eclipse enthusiasts, the next 600 million years are a great time to be alive.

Solar eclipses from Earth are stunning due to the magic of geometry. The Sun's diameter is about 400 times that of the Moon - meaning you could line up about 400 Moons, or 107 Earths, from solar pole-to-pole. That said, the Sun is also about 400 times farther away from the Earth than the Moon is. To the observer on the ground, the Sun and Moon then appear to take up the same exact amount of celestial real estate. This is easy to test for yourself with the help of some solar eye protection - both the Moon and the Sun are about 1/2 the width of your pinky when your arm is fully extended.

This has not always been the case! Among all of the scientific data handed to astronomers by the Apollo Missions, two stand out. First, the rocks they brought back for analysis ended up being remarkably similar in composition to those you might find on the Earth's surface. This and a wealth of other data helped establish the current model for how the Earth-Moon system formed - a violent collision of a Mars-sized object with the early Earth kicked up enough of early Earth's surface to form the Moon.

Second, astronauts on the Apollo 11, 14, and 15 missions placed reflectors on the lunar surface in order to measure the Earth-Moon distance with, literally, laser accuracy. What we know from nearly 50 years of the Lunar Laser Ranging Experiment is that the Moon is slipping away from Earth at a rate of 3.8 cm per year. The available scientific data tells us that the Moon, when it first formed, was much closer to the Earth than it is now - and it has been moving away ever since.

When the Moon was much closer, the Sun would have disappeared behind it and taken some time to go from one edge of the Moon to the other in the process. Such events in astronomy are called occultations, and most commonly occur now when the Moon

passes between ourselves and a star or planet. As our Moon moves much farther out, it will only cover a fraction of the Sun's surface - a phenomenon we call a transit. It is very roughly estimated that that last perfect total eclipse from the Earth's surface will occur in less than 600 millions years - if work or cloud cover keep you from the August 21st eclipse this year, there's still time to catch a few others.

For more information on the Aug. 21 eclipse, check out this NASA website.

Lectures and things to see

New York has a number of astronomers, astronomy clubs, and observatories that host public sessions throughout the year. Announced sessions from several respondent NY astronomy organizations are provided below for June. As wind and cloud cover are always factors when observing, please check the provided contact information and/or email the groups a day-or-so before an announced session, as some groups will also schedule weather-alternate dates. Also use the contact info for directions and to check on any applicable event or parking fees.

Astronomy Events Calendar

Organizer	Location	Event	Date	Time	Contact Info
Adirondack Public Observatory	Tupper Lake	Eclipse Lecture	June 2	7:00 - 9:00 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	Senior Science Day	June 5	3:00 - 4:00 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	AAAA Meetings	June 15	7:30 - 9:00 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	Octagon Barn Star Party & Lecture	June 16	8:00 - 10:00 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	Night Sky Adventure	June 20	8:00 - 9:30 PM	email, website
Albany Area Amateur Astronomers & Dudley Observatory	Schenectady	National Asteroid Day	June 30	9:00 - 10:00 AM	email, website
Astronomy Section, Rochester Academy of Science	Rochester	ASRAS Meeting & Lecture	June 2	7:30 - 9:30 PM	email, website
Astronomy Section, Rochester Academy of Science	Rochester	Observing At The Strasenburgh	June 3	8:30 - 10:30 PM	Jim S., 585-703-9876
Astronomy Section, Rochester Academy of Science	Rochester	Observing At The Strasenburgh	June 10	8:30 - 10:30 PM	Jim S., 585-703-9876
Astronomy Section, Rochester Academy of Science	Rochester	Observing At The Strasenburgh	June 17	8:30 - 10:30 PM	Jim S., 585-703-9876
Astronomy Section, Rochester Academy of Science	Rochester	Observing At The Strasenburgh	June 24	8:30 - 10:30 PM	Jim S., 585-703-9876

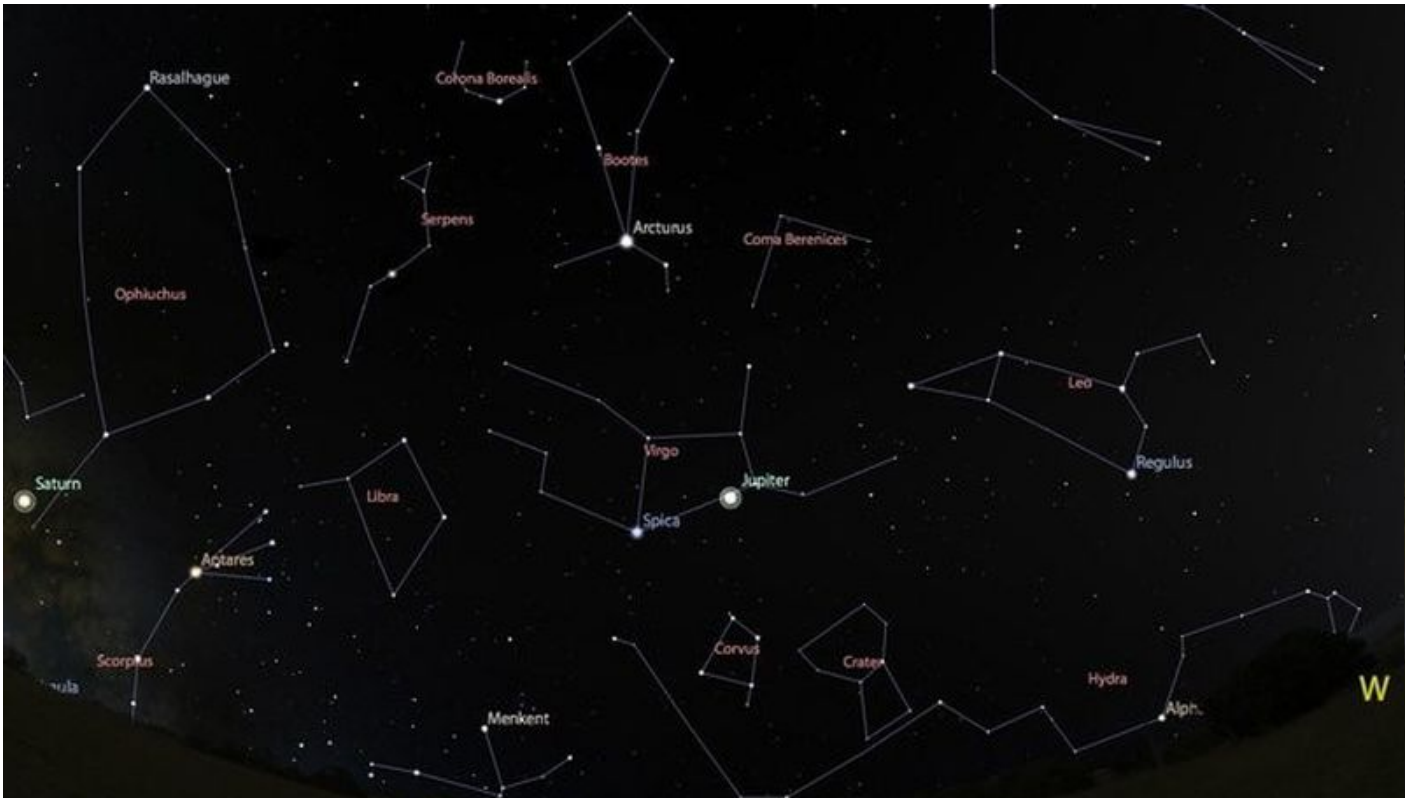
Baltimore Woods	Marcellus	Spring Constellations	June 16	9:00 - 11:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	KAS Monthly Meeting	June 7	7:00 - 9:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Friday Night Lecture & Observing	June 2	8:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Friday Night Lecture & Observing	June 9	8:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Friday Night Lecture & Observing	June 16	8:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Friday Night Lecture & Observing	June 23	8:00 PM	email, website
Kopernik Observatory & Science Center	Vestal	Friday Night Lecture & Observing	June 30	8:00 PM	email, website
Mohawk Valley Astronomical Society	Waterville	Public Stargazing @ Waterville Library	June 17	9:00 PM	email, website

Lunar Phases

New:	First Quarter:	Full:	Third Quarter:	New:	First Quarter:
May 25, 3:44 PM	Jun. 1, 8:42 AM	Jun. 9, 9:09 AM	Jun. 17, 7:32 AM	Jun 23., 10:30 PM	Jun. 30, 8:51 PM

The Moon's increasing brightness as Full Moon approaches washes out fainter stars, random meteors, and other celestial objects - this is bad for most observing, but excellent for new observers, as only the brightest stars (those that mark the major constellations) and planets remain visible for your easy identification. If you've never tried it, the Moon is a wonderful binocular object.

Evening and nighttime guide



The view looking south-southwest at 10 p.m. on June 15 (except for the changing Moon position, this mid-month view is accurate for all of June).

Items and events listed below assume you're outside and observing most anywhere in New York state. The longer you're outside and away from indoor or bright lights, the better your dark adaption will be. If you have to use your smartphone, find a red light app or piece of red acetate, else set your brightness as low as possible.

Southern Sights: The two gas giants of the Solar System - Jupiter and Saturn - are at prime locations for observing in binoculars this month. Exceptionally bright Jupiter is perfectly placed to help you find Spica to the West, Regulus and Leo the Lion to the east, Arcturus to the North, and the small constellation Corvus to the South. Saturn rises after the bright red-orange star Antares in Scorpius - one of our early markers for the edge of the bright band of the Milky Way and the wealth of intra-galactic Messier Objects.

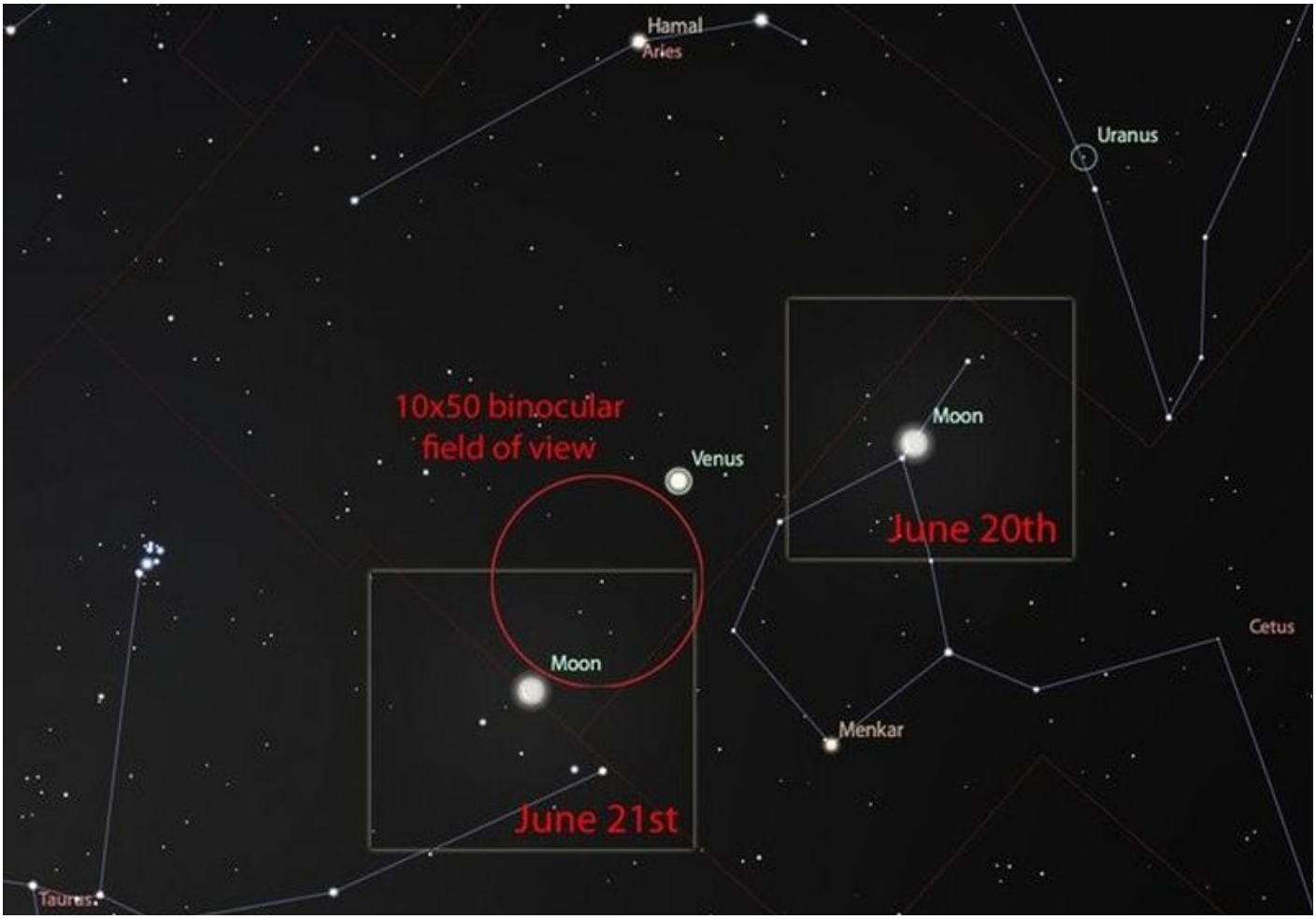
The view looking northeast at 10:00 p.m. on June 15th.

Northern Sights: The Big Dipper is high in the northern sky during pre-midnight observing hours this month. Those prone to stiff necks can take in the brightest objects in the Summer Triangle now while it is low on the eastern horizon. If your search for M13 in Hercules becomes a strain, consider starting your summer stretching exercises soon.

Planetary viewing

Mercury: The fleet-footed Mercury will be a tough catch even in the first week of June, after which it rises close enough to sunrise to be washed out by sunlight. You should not attempt to observe it in binoculars unless you have a steady hand or a good tripod - magnified sunlight, even in low-power binoculars, can instantly AND permanently damage your eyes. Mercury will return to sunset skies in July, then become a morning target again in August.

Venus: Venus remains an unmissable morning observing target in Aries, rising after 3:30 a.m. on the 1st and by 3:00 a.m. on the 30th. It does continue to slip away from us visually, but we see more of its illuminated surface in the process. The result is an only slight dimming of the planet over the entire month as it goes from 40% to 60% illumination.

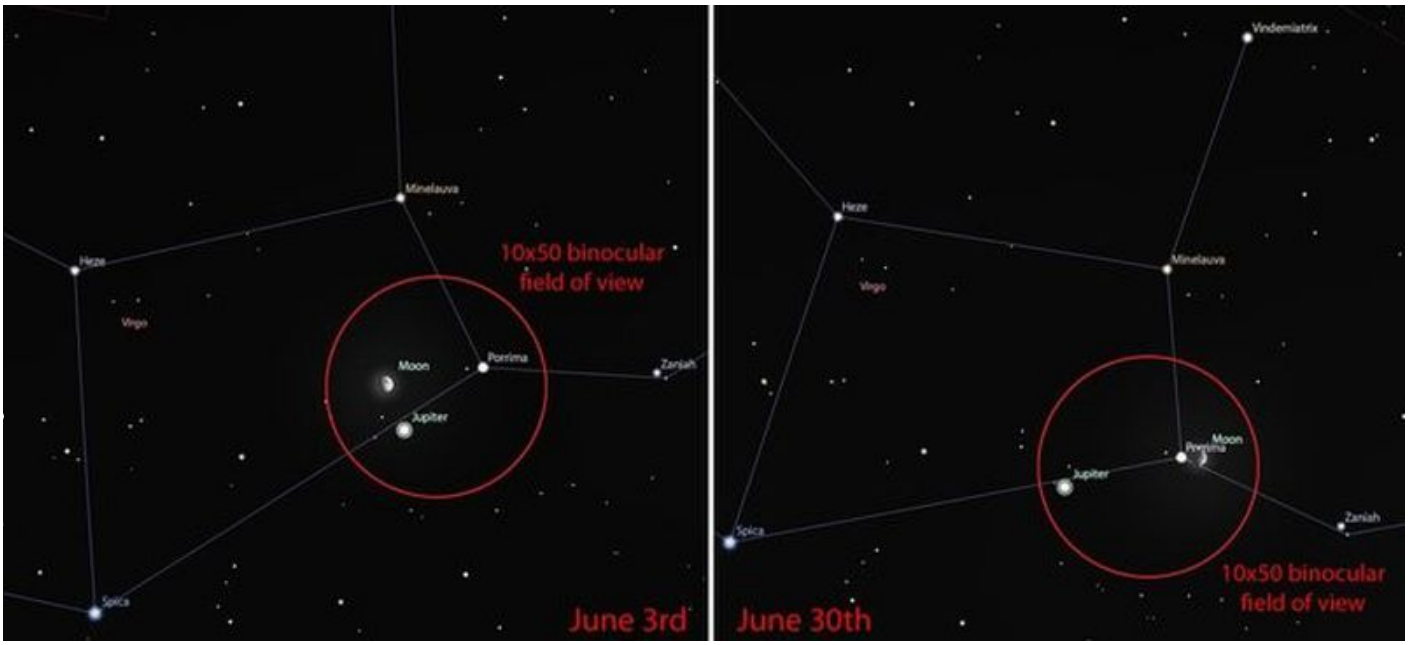


Venus has two closes approaches with the Moon on June 20th and 21st.

Mars: You hopefully had your fill of Mars these past few months. June marks the end of our easy Mars viewing, as it's low enough on the horizon to be nearly washed out by sunlight. Consider a binocular scan low along the horizon for a final glimpse before 9:00 p.m. this month, but ONLY do so AFTER sunset to protect your vision.

Jupiter: As of the writing of this article, the first presentation of data back from the Juno Mission has just changed some of our understanding of the planet Jupiter in fundamental ways, and astronomers eagerly await new data and theories to explain these recent observations. In the meantime, the basics haven't changed since Galileo first followed the four brightest moon - give Jupiter a good look in a telescope or binoculars to see what he saw.

Low power binoculars are excellent for spying the four bright Galilean moons - Io, Europa, Ganymede, and Callisto - and several online guides will even map their orbits for you so you can identify their motions nightly or, for the patient observer, even hourly.

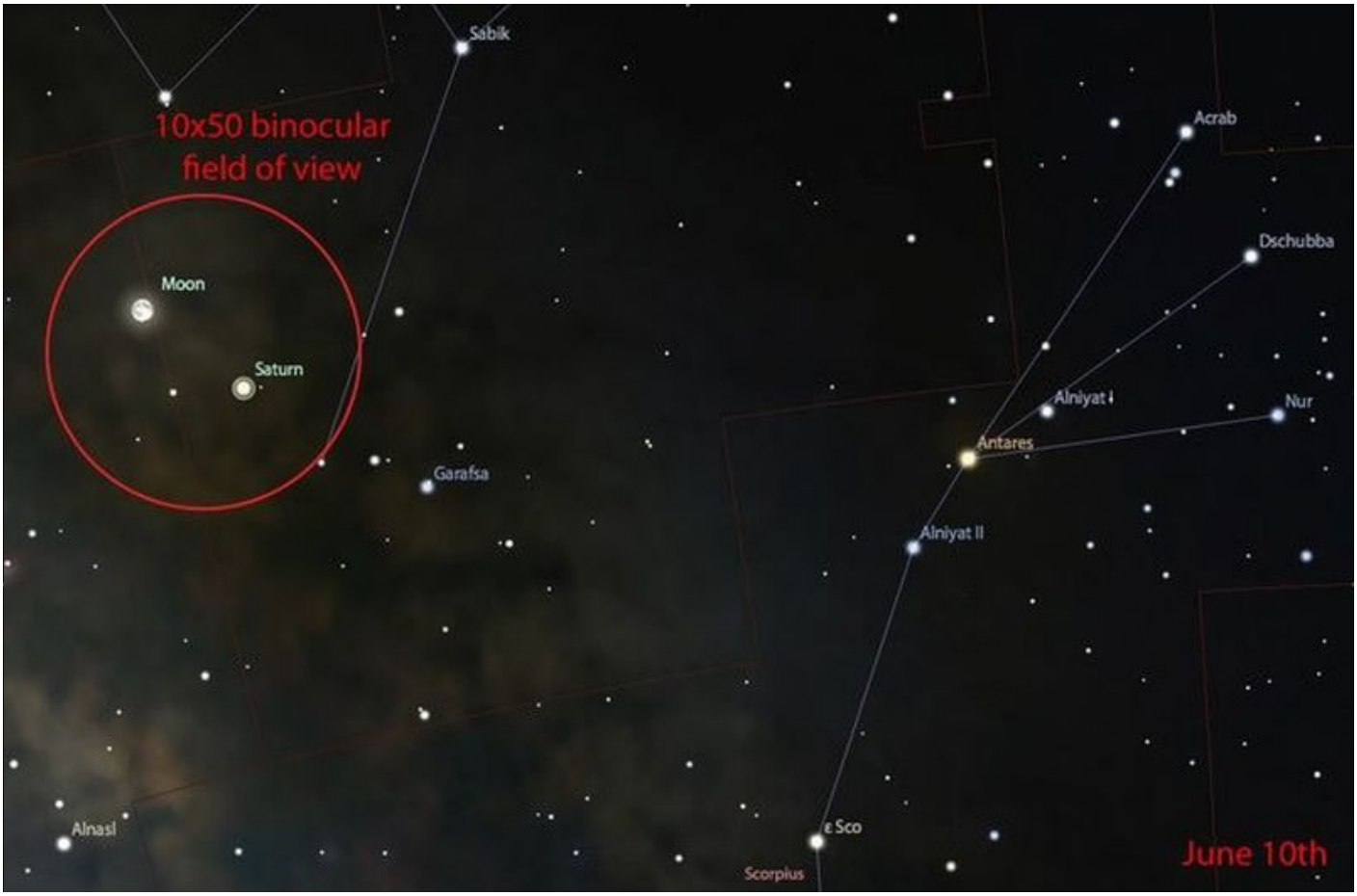


Jupiter and the Moon on June 3rd and June 30th in Virgo.

Saturn: We remain in countdown mode for the end of the Cassini Mission by way of a very rapid decent into Saturn's upper atmosphere on September 15th. Saturn rises

just after 9:30 p.m. at the beginning of the month and by 7:30 p.m. at month's end, making it an excellent nighttime target throughout. Still on the western edge of the brightest part of the Milky Way, Saturn is going to spend the next 18 months making its way to the eastern edge, all the while giving us an excellent observing target from late Spring to mid-Autumn.

While markedly closer to us, Saturn is not the brightest object in this part of the sky. Your eyes may be drawn to the orange star Antares in Scorpius first - simply look to the east for another bright pinpoint. Saturn and the Moon have a close approach inside the borders of Ophiuchus on June 10th.



Saturn and the Moon on June 10th, with Antares bright and to the west.

ISS And Other Bright Flyovers

Satellite flyovers are commonplace, with several bright passes easily visible per hour in the nighttime sky, yet a thrill to new observers of all ages. Few flyovers compare in brightness or interest to the International Space Station. The flyovers of the football field-sized craft with its massive solar panel arrays can be predicted to within several seconds and take several minutes to complete.

The ISS is an excellent late-night target for the first 12 days of June, after which it will disappear from our nighttime skies completely until early July. You even have two

chances to catch it three times in a single day - although you'll have to start just after midnight on the 1st and 4th and wait patiently until that evening to see all three flyovers. Simply go out a few minutes before the start time, orient yourself, and look for what will at first seem like a distant plane.

ISS Flyovers

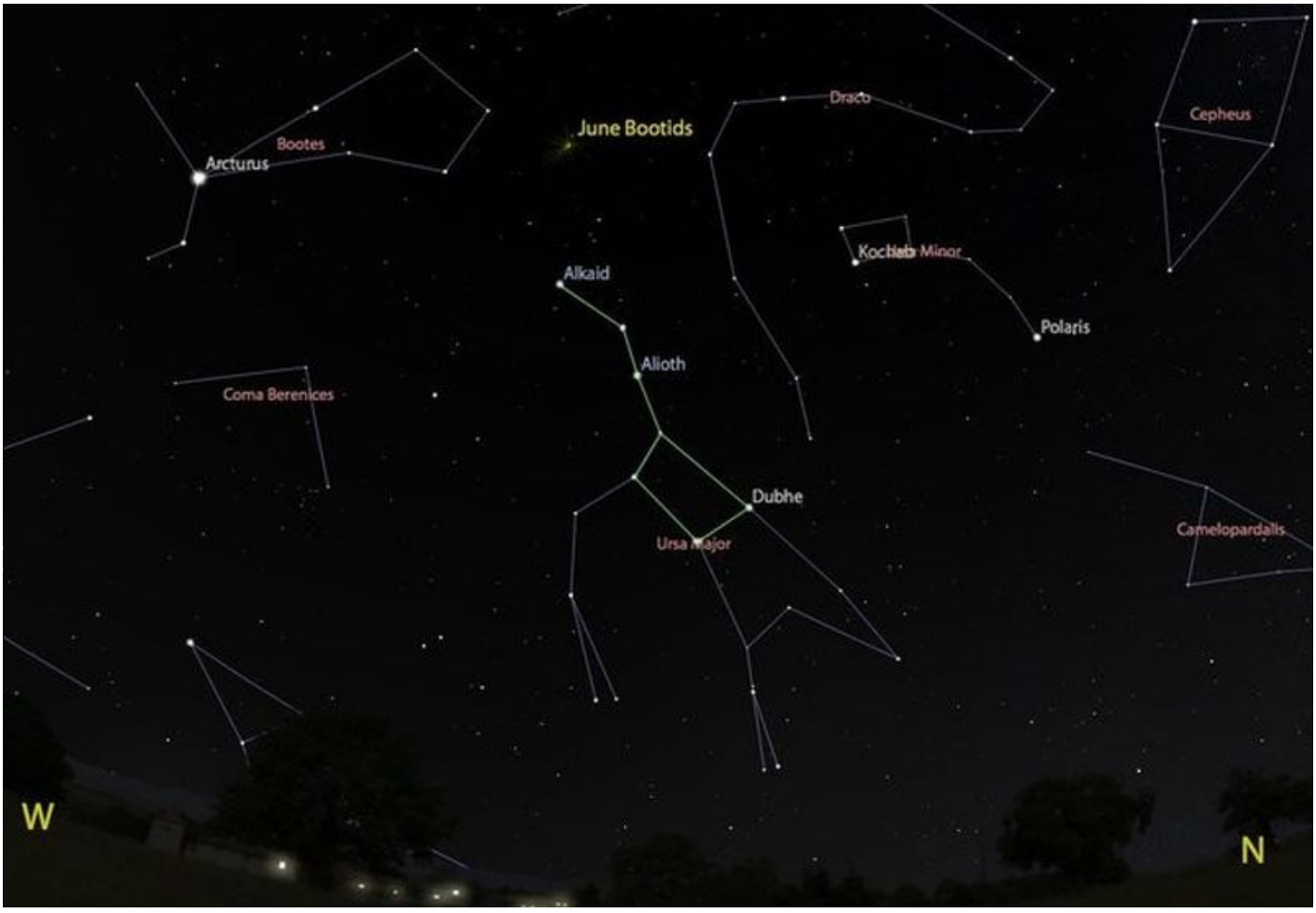
Date	Brightness	Approx. Start	Start Direction	Approx. End	End Direction
1-Jun	very	12:03 AM	NW	12:06 AM	N/NE
1-Jun	somewhat	9:34 PM	NW	9:39 PM	NE
1-Jun	moderately	11:11 PM	NW	11:16 PM	E/NE
2-Jun	moderately	12:48 AM	W/NW	12:48 AM	W/NW
2-Jun	moderately	10:19 PM	NW	10:24 PM	E/NE
3-Jun	moderately	9:27 PM	NW	9:32 PM	NE
3-Jun	very	11:03 PM	NW	11:08 PM	E/NE
4-Jun	somewhat	12:40 AM	W/NW	12:40 AM	W/NW
4-Jun	very	10:11 PM	NW	10:17 PM	E
4-Jun	very	11:48 PM	W/NW	11:50 PM	W/NW
5-Jun	moderately	9:19 PM	NW	9:24 PM	E/NE
5-Jun	extremely	10:55 PM	NW	10:59 PM	E
6-Jun	very	10:03 PM	NW	10:09 PM	E
6-Jun	moderately	11:40 PM	W/NW	11:42 PM	W
7-Jun	extremely	10:48 PM	W/NW	10:51 PM	S/SW
8-Jun	extremely	9:55 PM	W/NW	10:01 PM	E/SE
8-Jun	somewhat	11:33 PM	W/SW	11:33 PM	W/SW
9-Jun	very	10:40 PM	W	10:43 PM	S/SW
10-Jun	very	9:47 PM	W/NW	9:53 PM	S/SE
12-Jun	moderately	9:40 PM	W	9:45 PM	S

Predictions courtesy of heavens-above.com. Times later in the month are subject to shifts - for accurate daily predictions, visit spotthestation.nasa.gov.

Meteor Showers: June Bootids, active June 26 to July 2, peaking June 28

Meteor showers occur when the Earth passes through the debris field of a comet or asteroid. As these objects approach the warming sun in their long orbits, they leave tiny bits behind - imagine pebbles popping out the back of a large gravel truck on an increasingly bumpy road. In the case of meteor showers, the brilliant streaks you see are due to particles usually no larger than grains of sand. The Earth plows through the swarm of these tiny particles at up-to 12 miles-per-second. High in the upper atmosphere, these particles burn up due to friction and ionize the air around them, producing the long light trails we see. We can predict the peak observing nights for a

producing the long light trails we see. We can predict the peak observing nights for a meteor shower because we know when and where in Earth's orbit we'll pass through the same part of the Solar System - this yearly periodicity in meteor activity is what let us identify and name meteor showers well before we ever knew what caused them.



The June Bootids radiant.

The June Bootids are generally not even worth mentioning as a meteor shower to stay awake for, with only one or perhaps two associated meteors expected per hour. On rare occasions, however, persistent observers are treated to quite a show, including a notable outburst in 1916 and one in 1998 that produced 100 bright streaks per hour at peak.

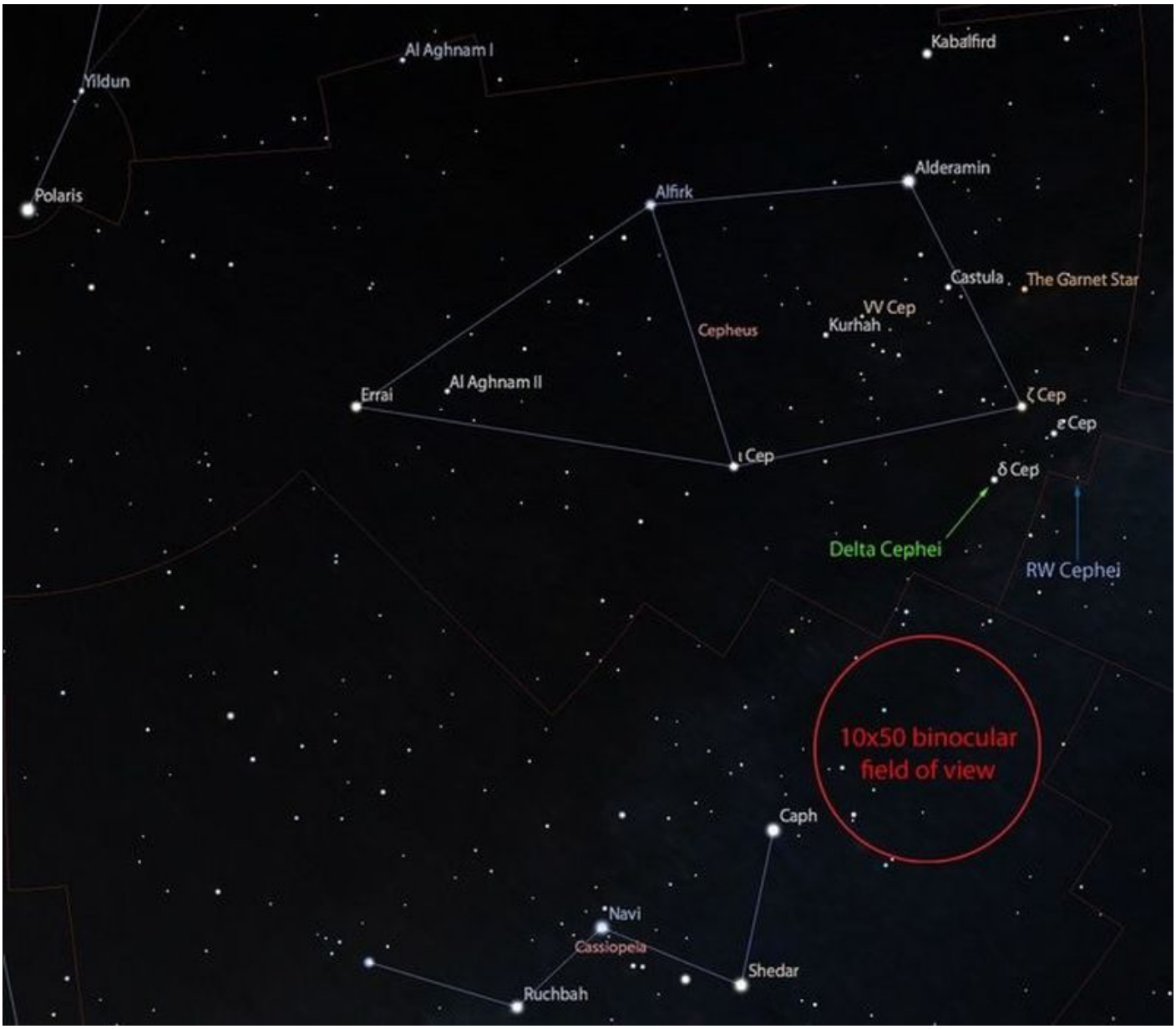
The name of each meteor shower is based on the constellation from which the shooting stars appear to radiate - a position in the sky we call the *radiant*. The June Bootids appear to radiate from the very tip of the kite - the modern object that Bootes the Herdsman most resembles. One object Bootes will not be keeping much watch over is the first-quarter moon, which will set early enough to not impact your viewing of this, very-likely, unimpressive shower. The end of the handle of the Big Dipper is also an easy marker for this shower.

How to observe: To optimize your experience, lie flat on the ground with your feet

pointed to the northwest and your head elevated - meteors will then appear to fly right over and around you.

Those interested in seeing a full list should check out the American Meteor Society meteor shower calendar.

Learn a constellation: Cepheus



Cepheus, a broken barn hovering over the throne of Cassiopeia this month.

King Cepheus - Cassiopeia's husband, Andromeda's father, and eventual father-in-law to Perseus - is arguably less prominent both in terms of mythology and amateur astronomy than the other three. A greater appreciation comes from filling in the details - just as there may be a more interesting backstory to the king, the stars and few known celestial objects within the boundaries of the constellation Cepheus are made much more interesting when you know more about what you're looking at.

During pre-midnight hours in June, Cassiopeia appears as a large "W" just east of due north. Cepheus, which looks more like a dilapidated barn than any other object, can be found by looking straight up above the "W" - the roof will be pointing west.

Within the barn lie some of the largest stars yet discovered. The variable star RW Cephei lies just at the border between Cepheus and Lacerta and would, if sent to replace our Sun, extend out towards the orbit of Saturn. It varies in brightness but, even at its dimmest, is still a reasonable binocular object. VV Cephei is another monster star that is circled by an observable binary companion. Mu Cephei is reason enough to go buy a pair of binoculars. Commonly known as Herschel's "Garnet Star," and less commonly known as Erakis (not to be confused with Arrakis of Dune lore, although it does have the sand-like color to it), Mu Cephei is perhaps the most strongly colored star you can see with or without magnification.

A final notable star is Delta Cephei, the star that gave us the term "cepheid variable." The star varies in brightness every 5 days and 9 hours - you can even reproduce the observations of John Goodricke in 1784 by doing your own comparison of its brightness against the backdrop of neighboring stars. There turns out to be a relationship between the brightness of a cepheid variable and the time it takes to go from minimum to maximum brightness - a discovery made by Harvard "computer" and pioneering female astronomer Henrietta Swan Leavitt. This early study eventually provided a way of using cepheid variables as cosmic measuring sticks to, among other things, determine distances in the Milky Way, determine distances to galaxies in our Local Group, and even help establish the Hubble Constant - the rate at which the universe appears to be expanding.

Dr. Damian Allis is the director of CNY Observers and a NASA Solar System Ambassador.

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