Meteor Showers for 2022

What You Need to Know - Tips and Terms for Beginners

- **Although you can see shooting stars from almost anywhere, you want to try and find a safe, dark location, far from the lights of a town or city.** Many meteors may be bright, but there are just as many that are too faint to be seen from the light-polluted skies of suburbia.

- **Regardless of where you are, give your eyes time to adapt to the dark.** This can take anything up to about thirty minutes if you're stepping out from a brightly lit interior, but when your eyes are properly adapted you'll see more of the fainter meteors.

- **Once your eyes are properly dark-adapted, you'll want to keep them that way**. Looking at any bright light can instantly ruin your night vision, so make sure to get yourself a red flashlight. Red light doesn't affect your eyes the way white light does, and as long as the flashlight isn't too bright, you should be able to avoid dazzling yourself.

•**One of the best things about meteors is that you don't need any equipment to observe them**. In fact, almost any kind of equipment is a hindrance more than a help. Remember that meteors can appear almost anywhere, but if you use binoculars or a telescope, you're limiting your view to just a small area of the sky. You'll see more of the sky with just your eyes, so even if you're looking in the wrong direction, you might still catch one or two with your peripheral vision.

•**Beware the Moon!** It might look pretty, but when the Moon is between first and last quarter (anywhere from a half Moon in the evening sky, through full Moon to a half Moon in the morning sky) it can considerably brighten the sky. This has the effect of drowning out the fainter meteors. A crescent Moon isn't typically a problem because it's not so bright and is often only visible either before or after the darkest part of the night.

- **A shower's radiant is the area of the sky from which the meteors appear**. A shower is typically named after the constellation from which they seem to originate from (eg, the Leonids have their radiant in Leo) but occasionally a shower is named for the nearest bright star instead (eg, the Alpha Centaurids.

- **The zenith hourly rate (ZHR) is the number of meteors you could expect to see under ideal conditions**. More specifically, this is the number you might see if the radiant were overhead and the skies were completely dark. In most cases, the radiant isn't at its highest until the daylight hours and is rarely overhead. Consequently, the actual number of meteors you can expect to see will greatly depend upon the altitude of the radiant in the sky, the weather, and the phase of the Moon at the time.

January

The Quadrantids are named after a former constellation, Quadrans Muralis, and have become increasingly active over the past few decades. Its zenith hourly rate can vary from year to year, with anything from 60 to 200 meteors potentially being visible. Its current average rate is about 110 per hour, but since that's an ideal number, most of us will probably see around 23 instead.
Most meteors appearing to originate from a point roughly midway between the top of kite-shaped Bootes and the tail of Draco. The best time will be between around 1:00 a.m. and about two hours before sunrise, when the radiant will be rising over the northeastern horizon. Be on the lookout for fireballs as the shower can often produce a number of bright examples.

Quadrantids
Active: Dec 28th - Jan 12th
Maximum: Jan 3rd 15:40 ET / Jan 3rd 12:40 PT
Moon: New Moon
ZHR: 110
Parent Object: 2003 EH (Asteroid)
Radiant: 15:21h +49.5°
Brightness: Bright
Speed: Medium

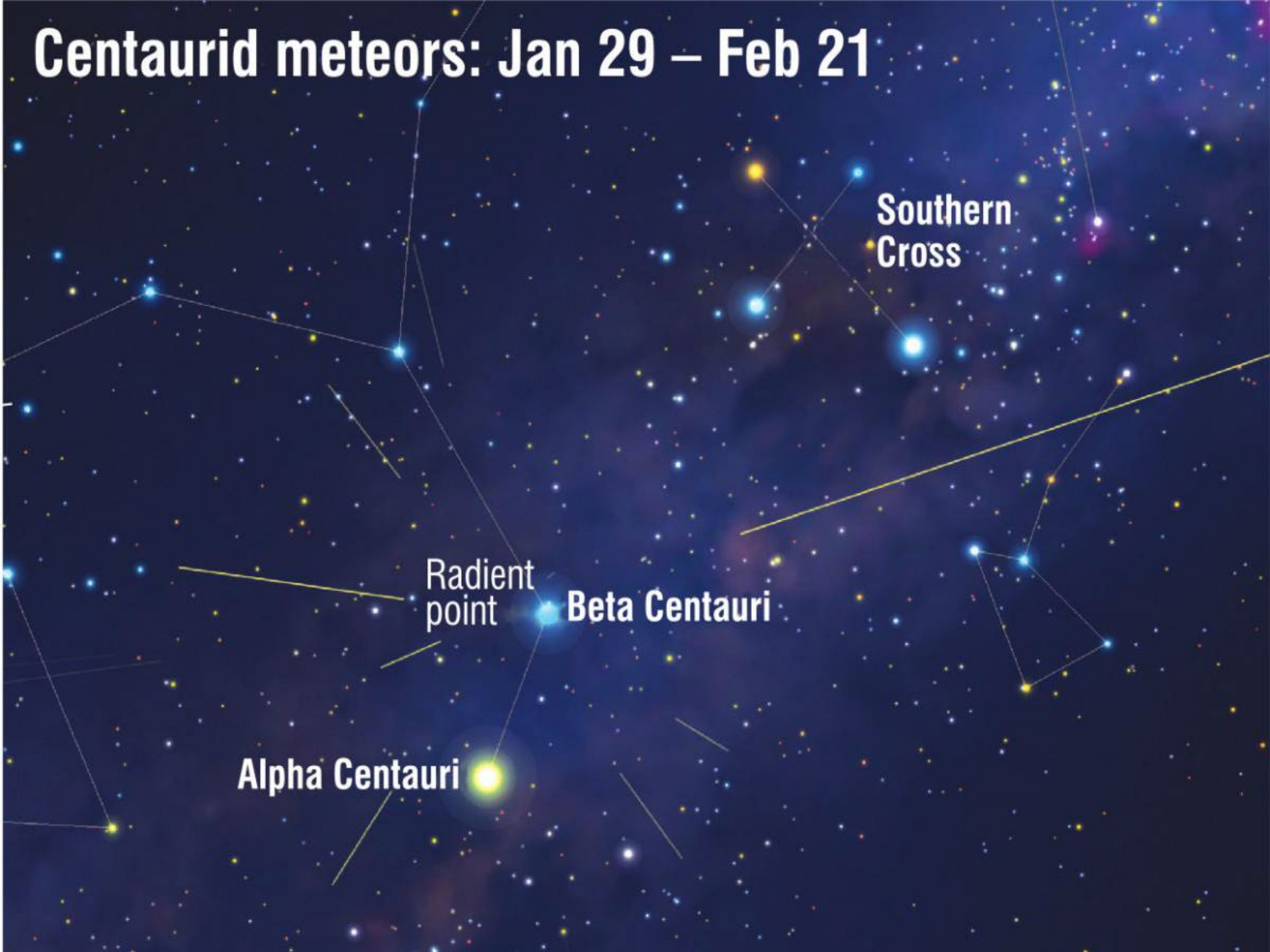

Little Dipper
Big Dipper
DRACO
Radiant
BOÖTES
Arcturus
Looking Northeast, 1 a.m.

February

After the Quadrantids in January, there's something of a drought until April and, as such, there are no major showers in February or March. There is, however, the Alpha Centaurid shower which usually produces around 6 shooting stars an hour, but can produce up to 25.

Unfortunately, since the radiant lies in the southern constellation of Centaurus, it won't rise over the horizon for observers in North America, making this a shower where you'll miss out on seeing a number of meteors. If you want to try your luck, you'll need to go outside a few hours before dawn (after the Moon has set and while the sky is still dark) and keep your eyes on the southeastern and southwestern horizons.

Alpha Centaurids
Active: Jan 31st - Feb 20th
Maximum: Feb 8th 02:00 ET / Feb 7th 23:00 ET
Moon: First Quarter
ZHR: 6
Parent Object: Unknown
Radiant: 14:04h -58.2°
Brightness: Bright
Speed: Fast


Centaurid meteors: Jan 29 – Feb 21
Southern Cross
Radient point
Beta Centauri
Alpha Centauri

March

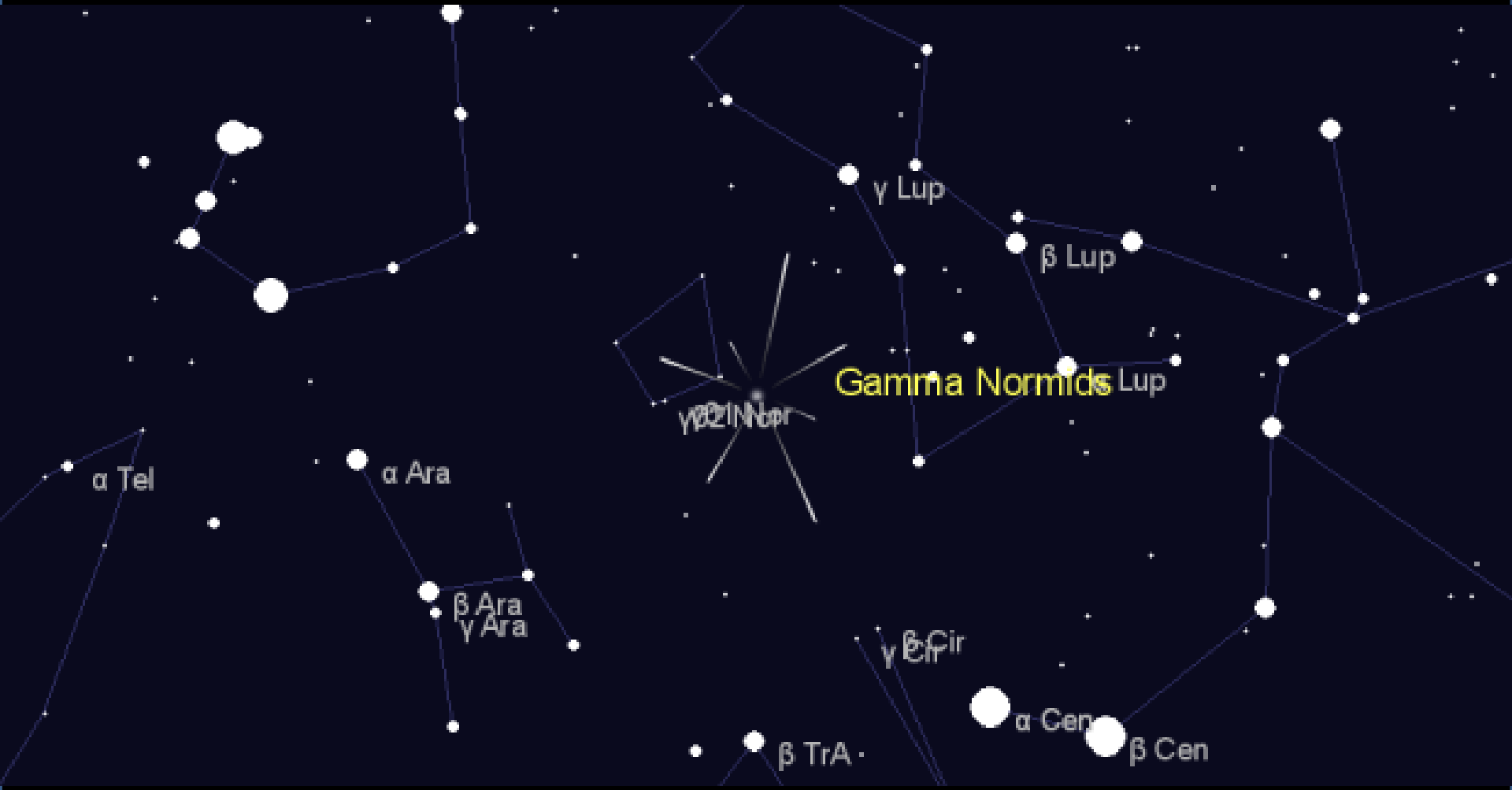
Alpha Centaurids of February only produce about six meteors an hour and **the radiant is in a southern hemisphere constellation**. In fact, although the shower is named for a star in Norma, its radiant actually lies in the constellation of Scorpius, and very close to Zeta Scorpii.

The problem this year is **that the Moon is also a waxing gibbous and will drown out many of those meteors**. To make matters worse, it won't set until about 90 minutes before dawn, which is about the time the radiant will be highest over the southern horizon.

The best chance of seeing a few meteors about two to two and a half hours before dawn, when the Moon is setting and fairly low but the radiant is rising (albeit also fairly low!) Look toward the east-southeast and the south-southwest but be warned - at an average speed of 42.5 miles per second, these meteors are fast!

Gamma Normids

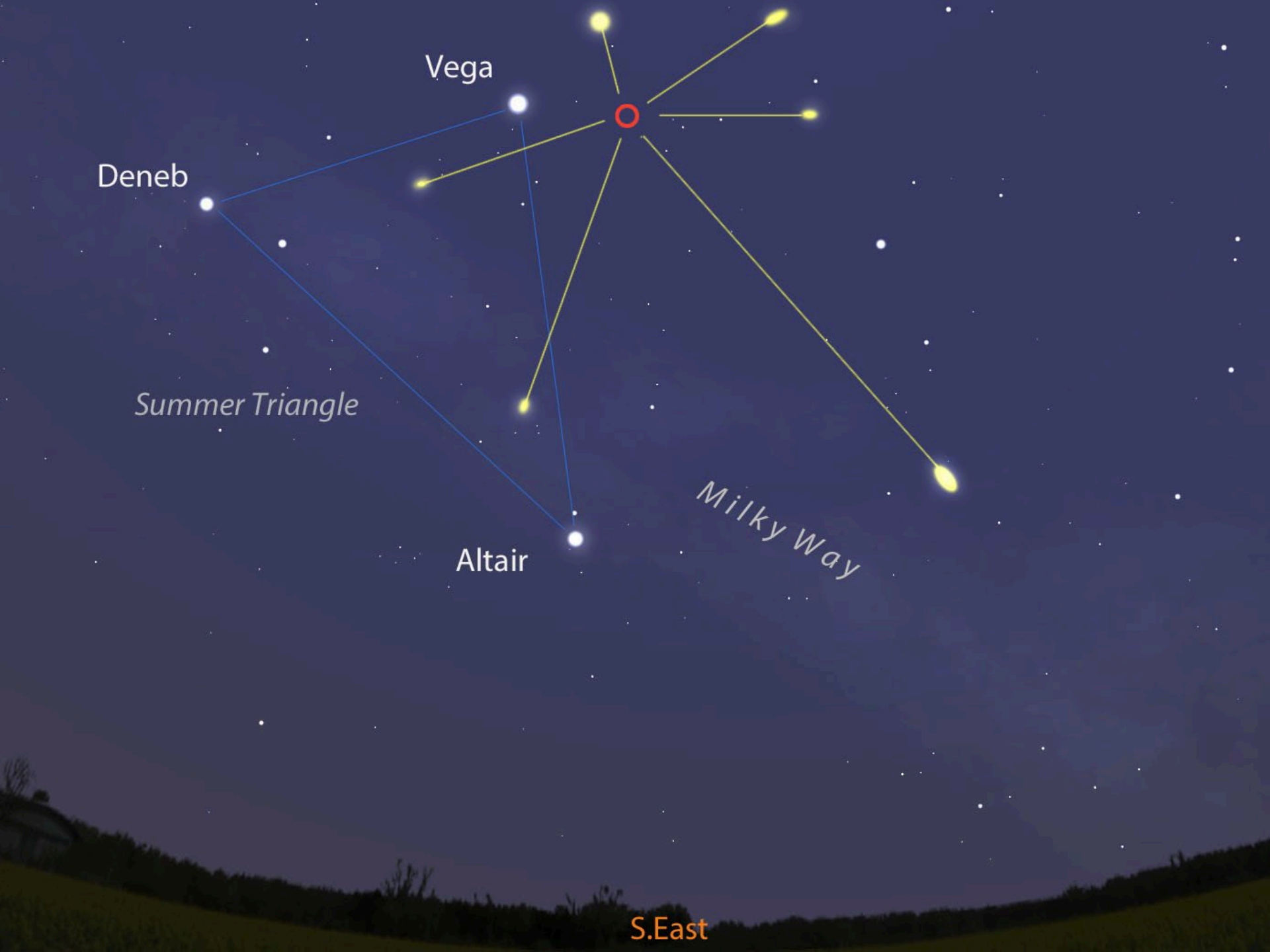
Active: Jan 31st - Feb 20th
Maximum: Mar 14th 18:00 ET / Mar 14th 15:00 PT
Moon: Waxing Gibbous
ZHR: 6
Parent Object: Unknown
Radiant: 16:24h -51.0°
Brightness: Unknown
Speed: Fast


γ Lup
β Lup
Gamma Normids
Lup
α Tel
α Ara
β Ara
γ Ara
β Cir
γ Cir
α Cen
β Cen
β TrA

April

Our **second major shower of the year**, the Lyrids are fairly active and, under ideal conditions**, can produce about 18 shooting stars an hour.** This year the Moon is a waning gibbous, which means it'll still be above the horizon when the radiant is at its highest. Fortunately, the radiant will rise around 11:00 p.m., giving you about four or five hours before the Moon starts to pose a problem.
By that time, the radiant will be high above the eastern horizon, and looking towards the northeast and southeast will give you your best chance of seeing a few shooting stars.

Lyrids
Active: Apr 14th - Apr 30th
Maximum: Apr 22nd 15:00 ET / Apr 22nd 12:00 PT
Moon: Waning Gibbous
ZHR: 18
Parent Object: C/1861 G1 (Comet Thatcher)
Radiant: 18:09h +33.4°
Brightness: Bright
Speed: Medium

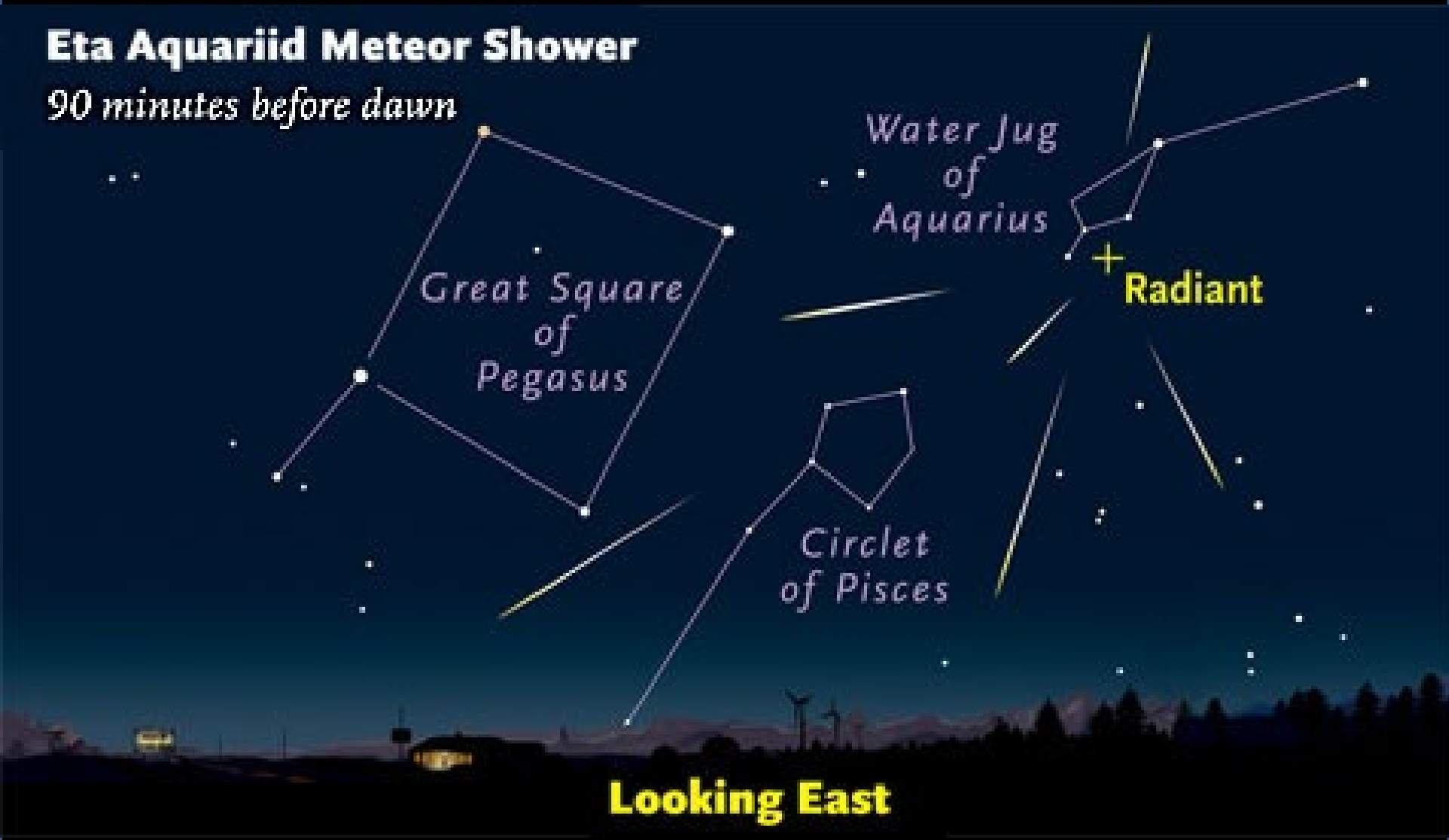

Vega
Deneb
Summer Triangle
Altair
Milky Way
S.East

May

There's good news and bad news for meteor watchers in May. The **good news is that the Moon is a waxing crescent** and will set fairly early in the evening, **but the radiant for the Eta Aquarids won't rise until a few hours before dawn**.

(Incidentally, Saturn appears a little way to the west, in neighboring Capricornus). You could, of course, start looking for meteors during the previous evening or in the hours after midnight, with your best option being to look toward the northeast and southeastern horizons during those times. Under ideal conditions, you could see an average of 50 meteors an hour, but the shower has been known to produce anywhere between 40 and 85.

Eta Aquarids
Active: Apr 19th - May 28th
Maximum: May 6th 04:00 ET / May 6th 01:00 PT
Moon: Waxing Crescent
ZHR: 50
Parent Object: 1P/Halley (Comet)
Radiant: 22:32h -00.8°
Brightness: Bright
Speed: Fast


Eta Aquariid Meteor Shower
90 minutes before dawn
Water Jug of Aquarius
Radiant
Great Square of Pegasus
Circlet of Pisces
Looking East

June

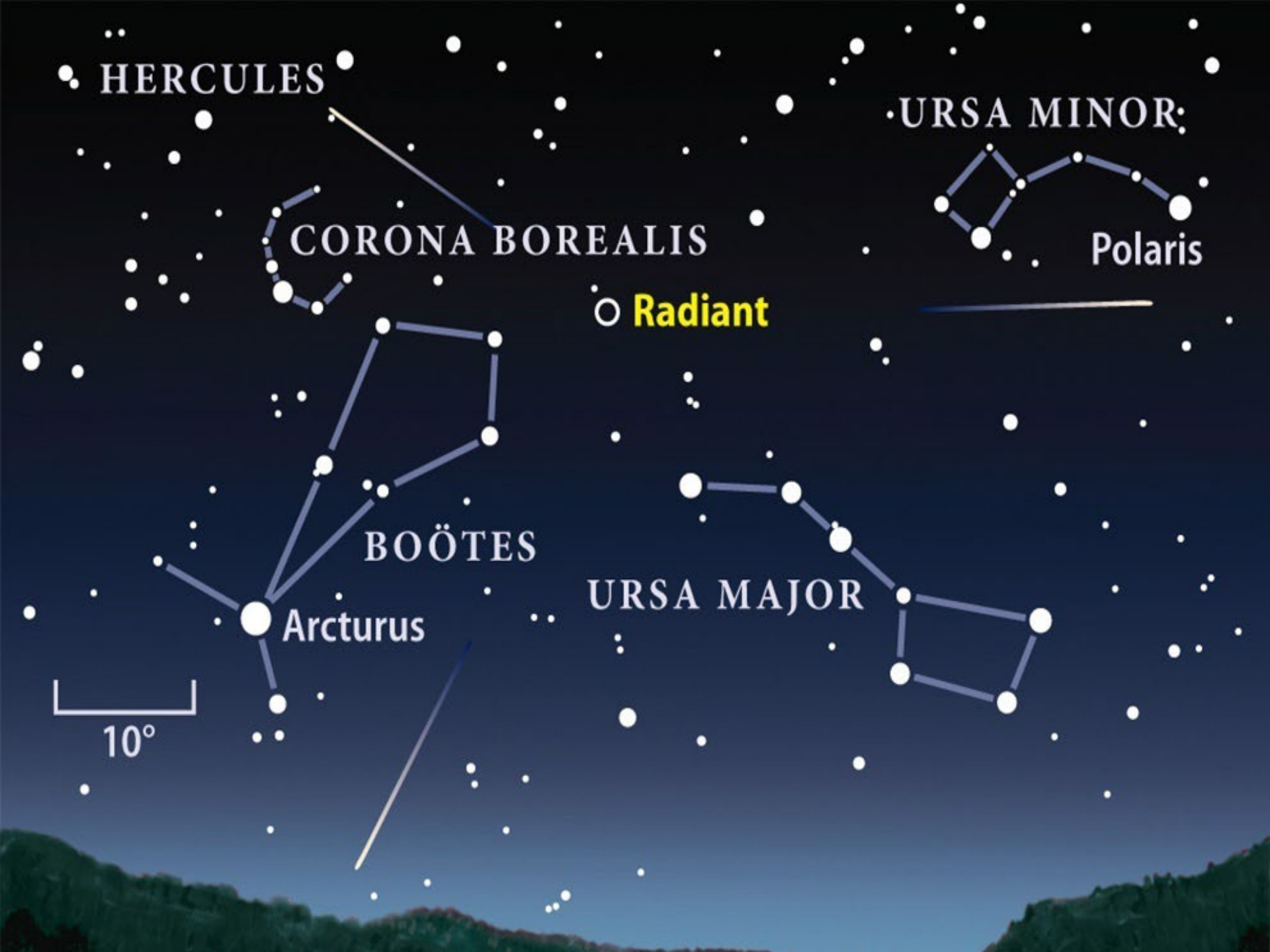
The June Bootids can be unpredictable at best. Historically, the shower has only produced about 5 or 6 meteors an hour, but it's prone to sudden outbursts. For example, in 1916, 1921, 1927, and, most recently, in 1998 about 100 or more an hour were reported at various times during the shower's maximum.

It's anyone's guess as to how many you might see this year; you could see 5 or 6, you could see more or you might not see any at all! On the plus side, these meteors are usually pretty bright and slow, making them easy to spot. There's also a new Moon, so you needn't worry about it brightening the sky.

Lastly, with the radiant located in Bootes (a constellation best seen in the spring and summer) **you won't have to stay up all night to see them. You can start looking a few hours after sunset on the 26th** - at that time, the radiant will be high over the southwestern horizon, so keep your eyes toward the south and west.

June Bootids

Active: Jun 2nd - Jul 2nd
Maximum: Jun 27th 07:00 ET / Jun 27th 04:00 PT
Moon: New Moon
ZHR: Variable
Parent Object: 7P/Pons-Winnecke (Comet)
Radiant: 14:58h +48.0°
Brightness: Bright
Speed: Slow


HERCULES
URSA MINOR
CORONA BOREALIS
Polaris
Radiant
BOÖTES
URSA MAJOR
Arcturus
10°

July

With a zenith hourly rate of 25, the **Southern Delta Aquariids is a fairly active shower, but they're also known to be fairly faint.** However, as the Moon is a waxing crescent during the shower's maximum it will set early in the evening, making this a good year to try your luck.
This is one shower you can observe almost all night. The radiant rises a few hours after sunset and is due south at around 3:30 a.m. If you're meteor watching during the evening of the 29th, then you'll need to look towards the east and south. However, if you're outside during the early hours of the morning on the 30th, then look towards the southeast and southwest.

Southern Delta Aquariids
Active: Jul 12th - Aug 23rd
Maximum: Jul 30th
Moon: Waxing Crescent
ZHR: 25
Parent Object: 96P/Machholz (Comet)
Radiant: 22:42h -16.4°
Brightness: Faint
Speed: Medium


Circlet
AQUARIUS
PISCES
Delta
Aquariid
radiant
δ
CAPRICORNUS
Fomalhaut

August

The Perseid meteor shower is, arguably, the most famous of them all. It's the one that gets all the attention in the media, and not without good reason. It's one of the most reliable and productive showers of the year and is considered a highlight of the annual astronomical calendar.
Unfortunately, this year the Moon turns full on the 11th and will brighten the sky quite considerably during the shower's maximum. It will also be rising a few hours before the shower's radiant with the result that it will brighten the sky throughout almost the entire night. Try your luck a few hours before dawn, when the sky is still dark, the Moon is setting in the southwest and the shower's radiant will be high in the northeast.

Perseids
Active: Jul 17th - Aug 24th
Maximum: Aug 12th 21:00 ET / Aug 12th 18:00 ET
Moon: Waning Gibbous
ZHR: 100
Parent Object: 109P/Swift-Tuttle (Comet)
Radiant: 03:13h +58.1°
Brightness: Medium
Speed: Fast


CASSIOPEIA
Perseid
radiant
ANDROMEDA
PERSEUS
TRIANGULUM
Capella
Looking Northeast at 11 p.m.

September

There's another shower that has its radiant in Perseus, but unlike the primary Perseid meteors of August, the **September Epsilon Perseids are fairly minor**. Unfortunately, this shower does share one characteristic with its more popular cousin: the **phase of the Moon when the shower is at its maximum.**
Just as the Moon was full for the Perseids, so it is also full for the September Epsilon Perseids. In fact, it'll turn full about eight hours after the shower is at maximum, making this a difficult shower to observe. You can either try your luck at about 90 minutes after sunset, when the sky is dark and the Moon is low, (but so is the shower's radiant), or else at around 5:00 a.m., when the radiant is high over the south and the Moon is low in the west-southwest.

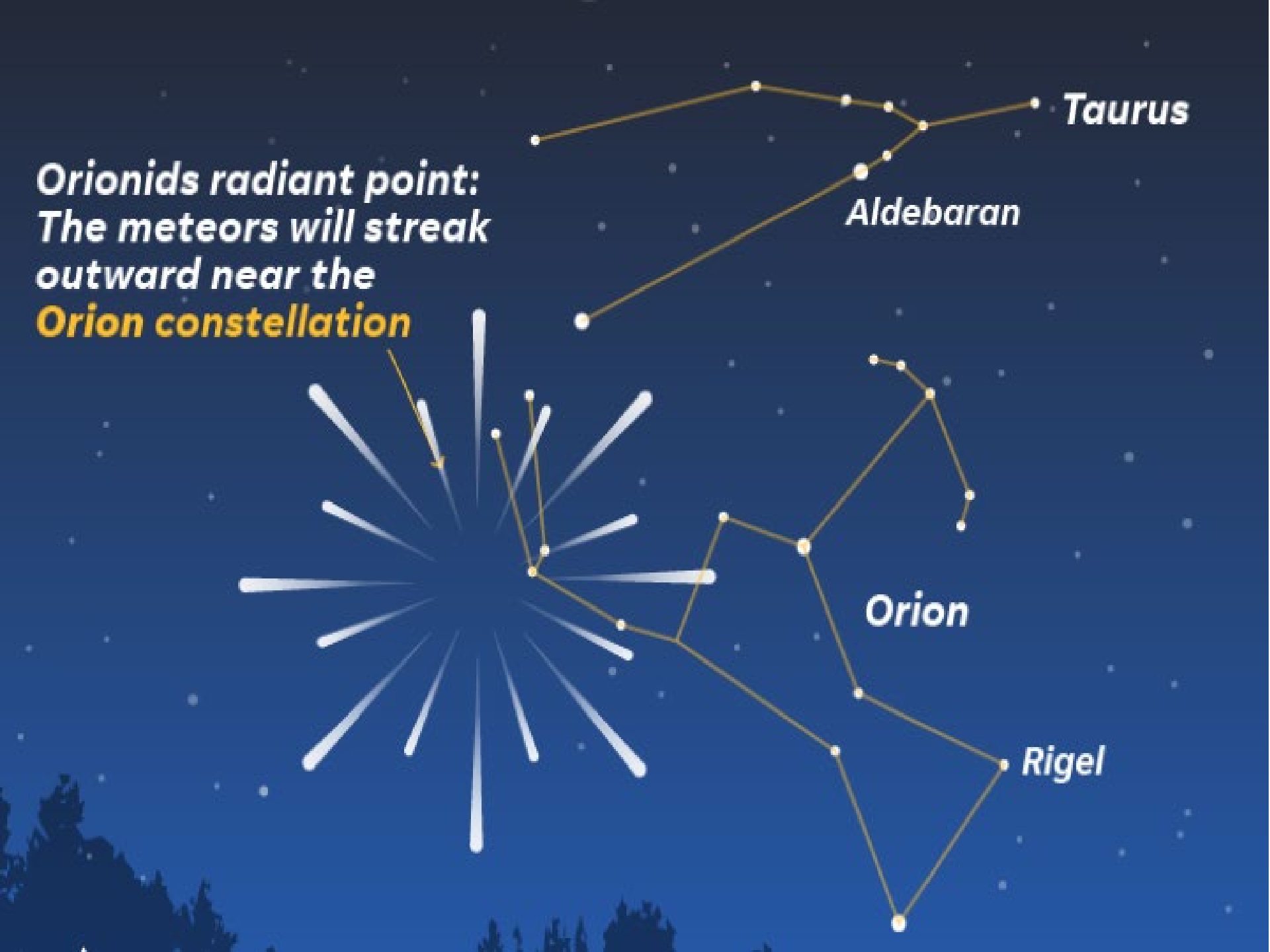
September Epsilon Perseids
Active: Sep 5th - Sep 21st
Maximum: Sep 9th 22:00 ET / Sep 9th 19:00 PT
Moon: Full Moon
ZHR: 5
Parent Object: Unknown
Radiant: 03:15h +39.7°
Brightness: Medium
Speed: Fast

September Epsilon Perseids

October

Our fortunes change a little in October, as the Orionids reach their **maximum on the 21st when the Moon is a waning crescent**. This being the case, you could start looking for meteors from around 90 minutes to 2 hours after sunset or from around midnight, when the radiant is rising over the eastern horizon.
The meteors will appear to originate from a point close to Alhena (Gamma Geminorum) and you'll need to look towards the northeast and southeast for your best chance of seeing a shooting star. Alternatively, rise early (around 4:30 a.m.) to see the shower when the radiant is high over the south-southeastern horizon. At that time, the Moon will be low in the east and the sky won't be brightening for about another 60-90 minutes.

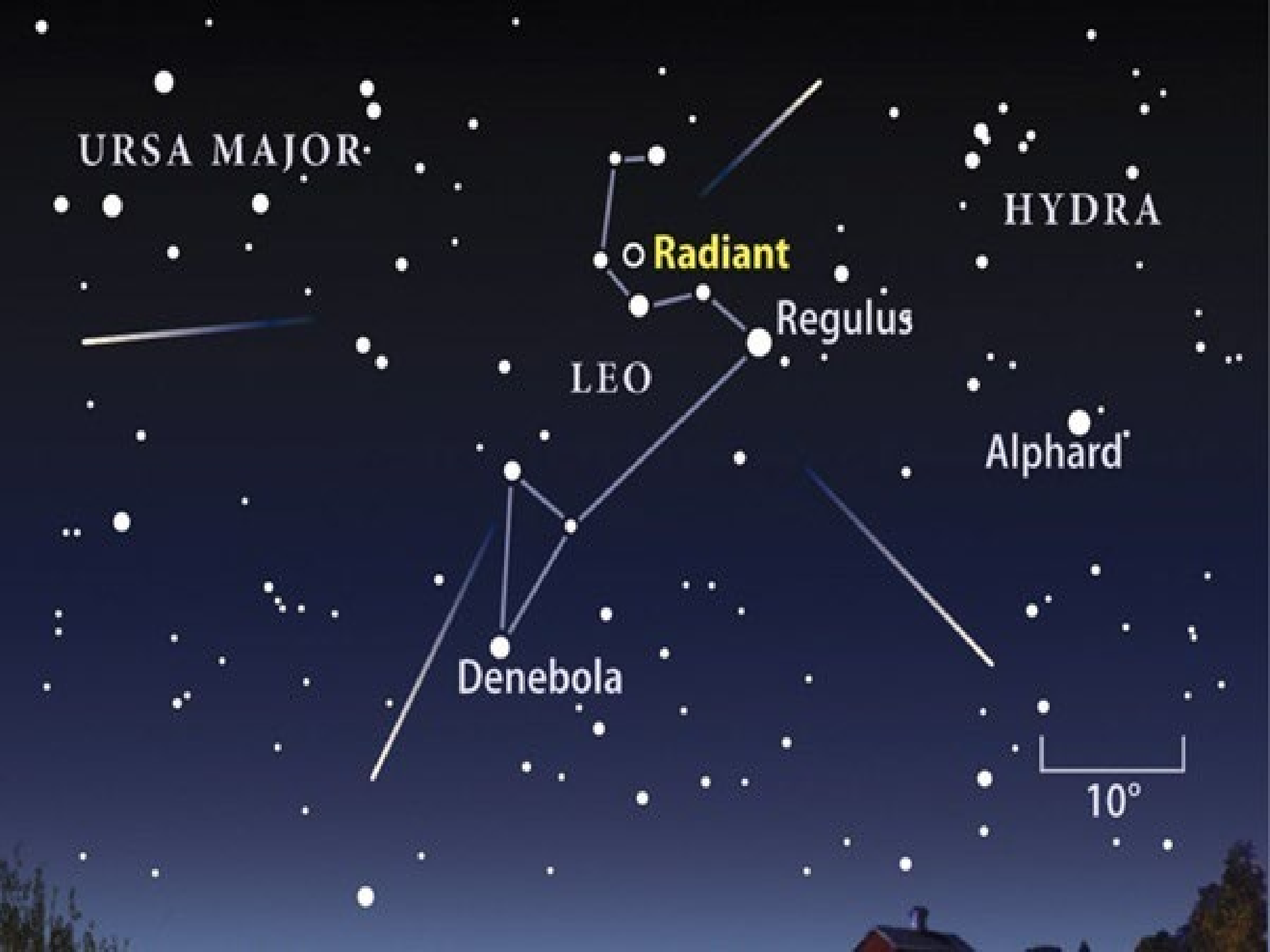
Orionids
Active: Oct 2nd - Nov 7th
Maximum: Oct 21st 14:00 ET / Oct 21st 11:00 PT
Moon: Waning Crescent
ZHR: 20
Parent Object: 1P/Halley (Comet)
Radiant: 06:24h +15.7°
Brightness: Bright
Speed: Fast


Orionids radiant point:
The meteors will streak outward near the
Orion constellation
Taurus
Aldebaran
Orion
Rigel

November

Like the Perseids, the Leonids have become a popular shower with the media, mostly due to **the meteor storm of 1999**. At that time, the shower produced roughly 1,000 meteors an hour, a hundredfold increase over the shower's **typical 10-15 meteors an hour.** Unfortunately, despite the Moon being a waning crescent, we should have no expectations of seeing something similar this year.
Another potential issue is that the waning crescent Moon is in Leo this year, with **both the Moon and the shower's radiant rising in the east at around 1:00 a.m**. All the same, **you can start your observations in the evening hours once the sky turns dark, with the best opportunity coming at around midnight before the Moon makes its appearance.**

Leonids
Active: Nov 6th - Nov 30th
Maximum: Nov 17th 19:00 ET / Nov 17th 16:00 PT
Moon: Waning Crescent
ZHR: 10 - 15
Parent Object: 55P/Tempel-Tuttle (Comet)
Radiant: 10:15h +21.8°
Brightness: Bright
Speed: Fast

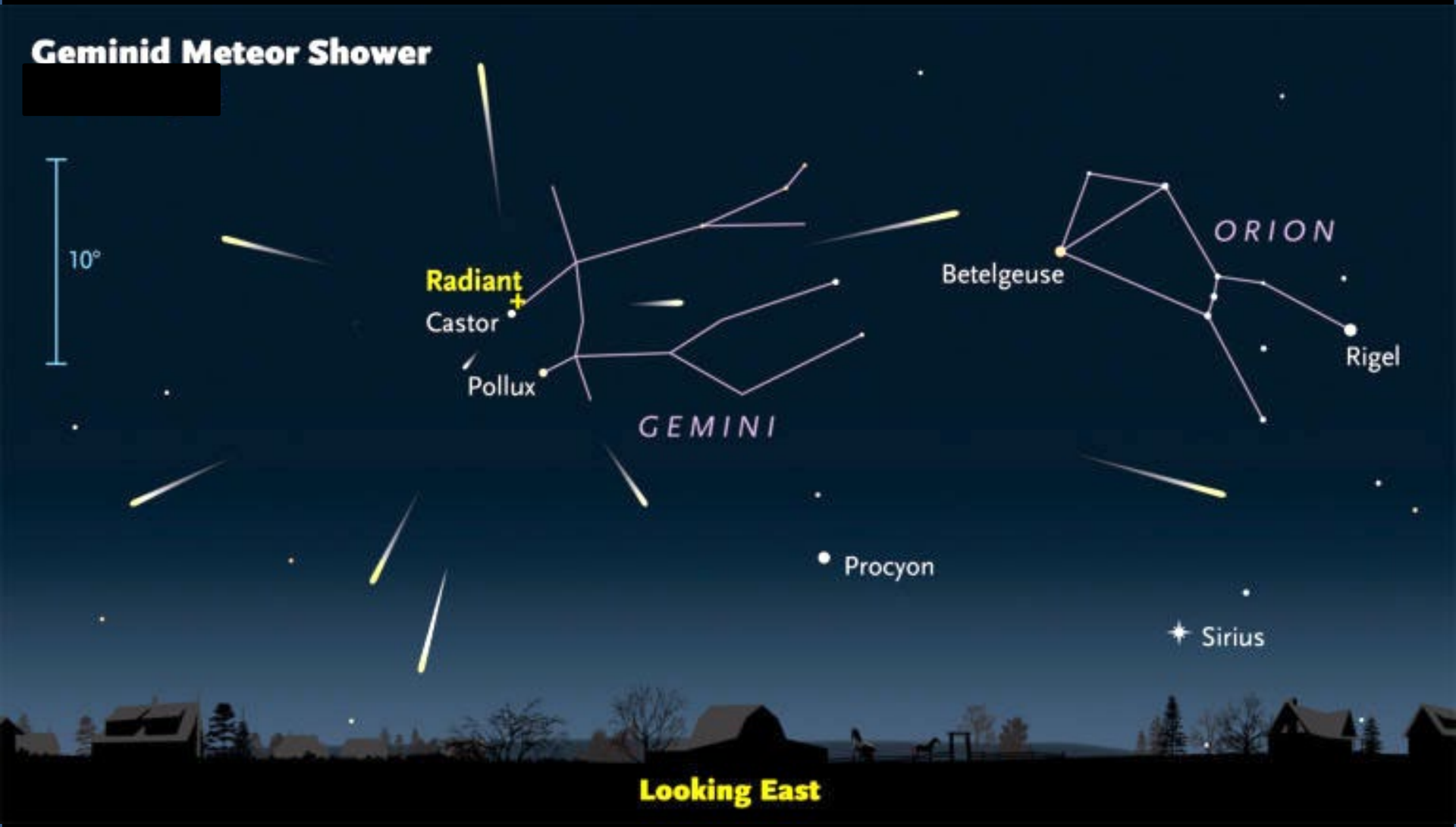

URSA MAJOR
HYDRA
Radiant
Regulus
LEO
Alphard
Denebola
10°

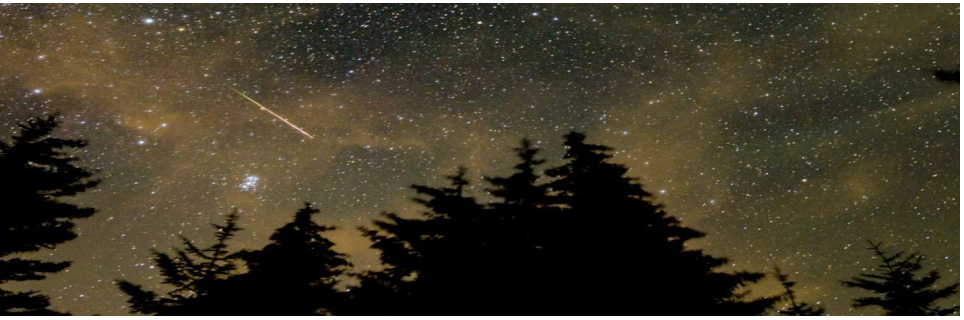
December

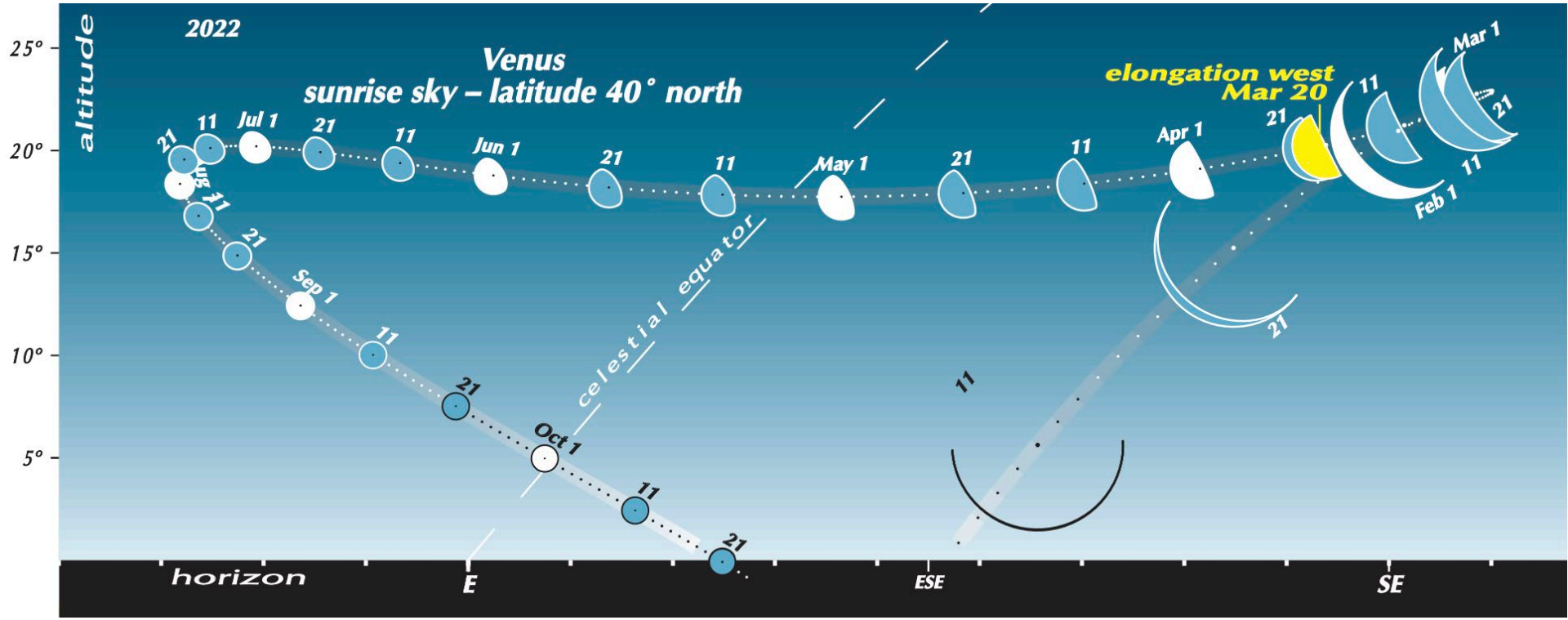
The last major shower of the year is also, arguably, the finest. The media typically doesn't give it as much attention as the summer's Perseids, which is a pity as the Geminids can be more prolific and are also known to be quite colorful. **Another big plus is that Gemini is a winter constellation and the radiant rises just a few hours after sunset.**

This will give you a decent three or four hours to enjoy the shower without any interference from the Moon, which won't rise until around 11:00 p.m. (and won't be much of a hindrance until about an hour later). Keep looking toward the northeast and southeast for the best chance of seeing some shooting stars. The shower's radiant is due south at around 2:00 a.m., but by that time the Moon will also be much higher in the sky.

Geminids
Active: Dec 4th - Dec 20th
Maximum: Dec 14th 08:00 ET / Dec 14th 05:00 PT
Moon: Waning Gibbous
ZHR: 150
Parent Object: 3200 Phaethon (Asteroid)
Radiant: 07:33h +32.4°
Brightness: Medium
Speed: Medium

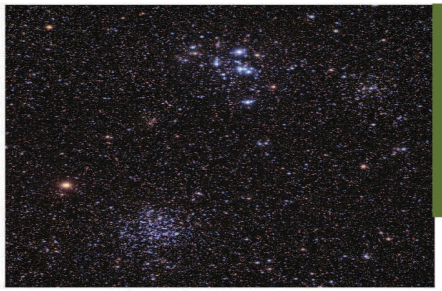

Geminid Meteor Shower
10°
Radiant
Castor
Pollux
GEMINI
ORION
Betelgeuse
Rigel
Procyon
Sirius
Looking East




2022
Venus
sunrise sky – latitude 40° north
altitude
25°
20°
15°
10°
5°
horizon
E
ESE
SE
celestial equator
elongation west
Mar 20
Jan 1
Feb 1
Mar 1
Apr 1
May 1
Jun 1
Jul 1
Aug 1
Sep 1
Oct 1
11
21

HIGH POINT SCIENTIFIC

WHAT'S IN THE SKY THIS MONTH?



Source: Sergio Eguivar

M47

Type:	Open Cluster
Constellation:	Puppis
Distance:	1,600 light-years
Magnitude:	4.4
Apparent Diameter:	25'

The brighter and larger of two Messier open clusters in Puppis (the other being M46), you can pick out M47 with binoculars from most locations. Try scanning about 12.5 degrees due east of Sirius when that star is over the southern horizon. With luck, you should be able to see both M46 and M47 in the same field of view, with M47 being the westernmost, brighter patch.

Binoculars can resolve some of the cluster's individual stars, while a small telescope at 50x will show the cluster as an irregularly shaped smattering of about fifty stars of varying brightness, with a close double at the cluster's center. Larger scopes will also show chains and clumps of stars scattered throughout the cluster, separated by relatively barren areas of fainter stars.

OUR NEAREST NEIGHBORS

Saturn is now lost within the Sun's glare, which means **Jupiter** is now the only bright planet visible in the evening sky. It appears low in the southwest shortly after sunset for most of February, with a crescent Moon to its lower left on the 2nd. **Neptune** doesn't fare much better; it sets a few hours after the Sun but is too low for observation. **Uranus** remains visible all evening and sets at around 11 p.m. by month's end. The nearly first quarter Moon is just under two degrees to its southeast on the 7th. Both **Venus** and **Mars** rise a few hours before the Sun with the two planets appearing within the same 10x50 binocular field of view for the second half of the month. Look for a waning crescent Moon directly below the pair on the 27th. **Mercury** is visible from about 30 minutes before sunrise for almost the entire month and appears to the lower left of Venus and Mars. The **Moon** turns new on the 1st and is then full on the 16th.

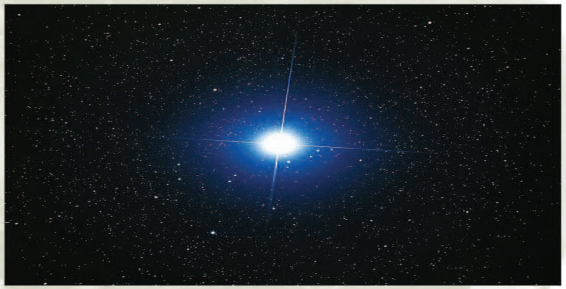
M46: M46 lies just a degree and a quarter to the east of M47 and is smaller and fainter than its neighbor. It can be detected in binoculars but is best seen through a telescope at a magnification of 50x or more.

Alpha Canis Majoris - Sirius: One of the closest stars to the Sun and the brightest in the entire night sky, Sirius is easily found by following the three stars of Orion's belt down and towards the south. It's an unmissable, glittering sight to the naked eye and the perfect complement to any crystalline snow on the ground.

M41: Four degrees below Sirius and within the same binocular field of view is M41. This large, bright, open star cluster is one of the gems of the winter sky and a fine sight when observed through a telescope.

Alpha Geminorum - Castor: A great multiple star for scopes of almost any size, you'll need a magnification of 100x or more to split it. You'll see two stars very close to one another, with both stars appearing white and almost equal in brightness.

Alpha Canis Majoris - Sirius



Source: Akira Fujii

STELLAR CONCEPTS

Celestial Sphere and Declination: Just as the Earth has two hemispheres, north and south, so does the night sky. The celestial sphere can be thought of as a projection of the Earth's sphere out into space, with stars and other objects having coordinates that correspond to their position on the sphere. These coordinates are similar to the latitude and longitude we use for Earthbound landmarks, with the celestial equivalent of latitude known as Declination and the equivalent of longitude called Right Ascension. Polaris is known as the Pole Star because its declination is +89.25° and is therefore very close to the north celestial pole. If you were to stand at our own north pole and look up, it would appear directly overhead. The three bright stars of Orion's belt lie on the celestial equator, but there's no equivalent bright star near the south celestial pole.

HIGH POINT SCIENTIFIC

2022 Astronomical Calendar

January

- 3/4 - Quadrantid Meteor Shower
- 4 - Crescent Moon, Mercury, Saturn, and Jupiter
- 7 - Mercury at Greatest Eastern Elongation
- 17 - Full Moon
- 29 - Crescent Moon, Mars, and Venus

February

- 16 - Mercury at Greatest Western Elongation
- 16 - Full Moon
- 27 - Crescent Moon, Mercury, Venus, and Mars

March

- 2 - Mercury and Saturn
- 6 - Crescent Moon and Uranus
- 12 - Venus and Mars
- 17 - Full Moon
- 20 - Venus at Greatest Western Elongation
- 28 - Crescent Moon, Venus, Mars, and Saturn

April

- 4 - Mars and Saturn
- 16 - Full Moon
- 18 - Venus, Mars, Jupiter, and Saturn
- 21/22 - Lyrid Meteor Shower
- 27 - Crescent Moon, Venus, Mars, Jupiter, and Saturn
- 28 - Mercury at Greatest Eastern Elongation

May

- 2 - Crescent Moon and Mercury
- 4/5 - Eta Aquariid Meteor Shower
- 15/16, Full Moon and Total Lunar Eclipse
- 27 - Crescent Moon, Venus, Mars, and Jupiter
- 29 - Mars and Jupiter

June

- 14 - Full Moon - Super Moon
- 16 - Mercury at Greatest Western Elongation
- 26 - Crescent Moon, Mercury, and Venus

July

- 13 - Full Moon - Super Moon
- 21 - Crescent Moon and Mars
- 22 - Crescent Moon and Uranus
- 24 - Mars and Uranus

August

- 11 - Full Moon
- 11/12 - Perseid Meteor Shower
- 14 - Saturn at Opposition
- 19 - Last Quarter Moon, Mars, and the Pleiades
- 27 - Mercury at Greatest Eastern Elongation

September

- 1 - Mars and Aldebaran
- 10 - Full Moon
- 16 - Neptune at Opposition
- 21 - Crescent Moon and Beehive Cluster
- 26 - Jupiter at Opposition

October

- 8 - Mercury at Greatest Western Elongation
- 8 - Full Moon and Jupiter
- 14/15 - Waning Gibbous Moon and Mars
- 21/22 - Orionid Meteor Shower

November

- 8 - Full Moon and Total Lunar Eclipse
- 9 - Uranus at Opposition
- 17/18 - Leonid Meteor Shower

December

- 7 - Full Moon and Occultation of Mars
- 7/8 - Mars at Opposition
- 13/14 - Geminid Meteor Shower
- 21 - Mercury at Greatest Eastern Elongation

PowerPoint created by Richard Cofer

METEOR SHOWERS FOR 2022