

Meteor Activity Outlook for December 28, 2019 - January 03, 2020

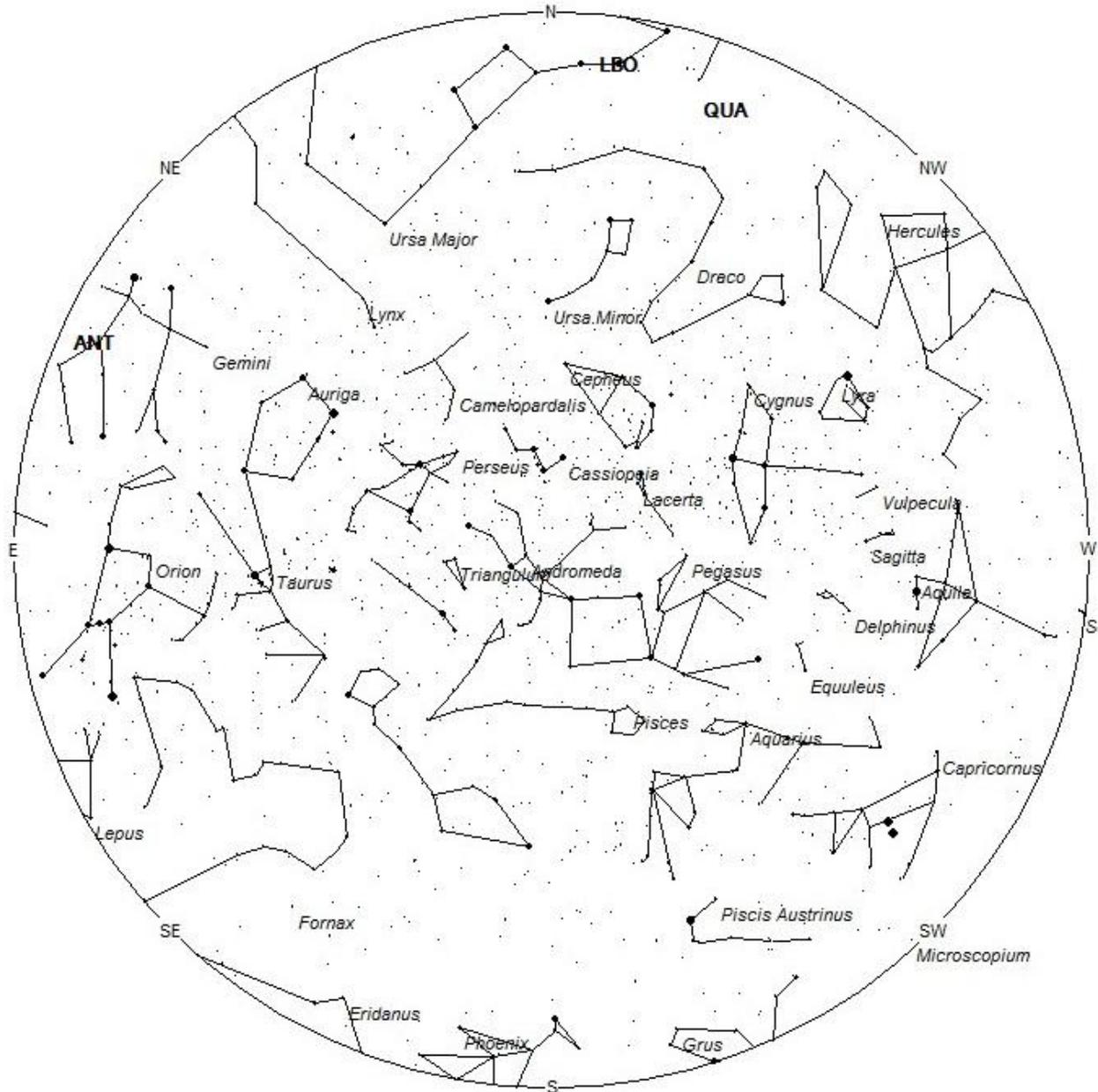


Samer Hariri captured this flaring fireball on December 23, 2019 at 18:58 EST from Northville, Michigan USA. ©Samer Hariri

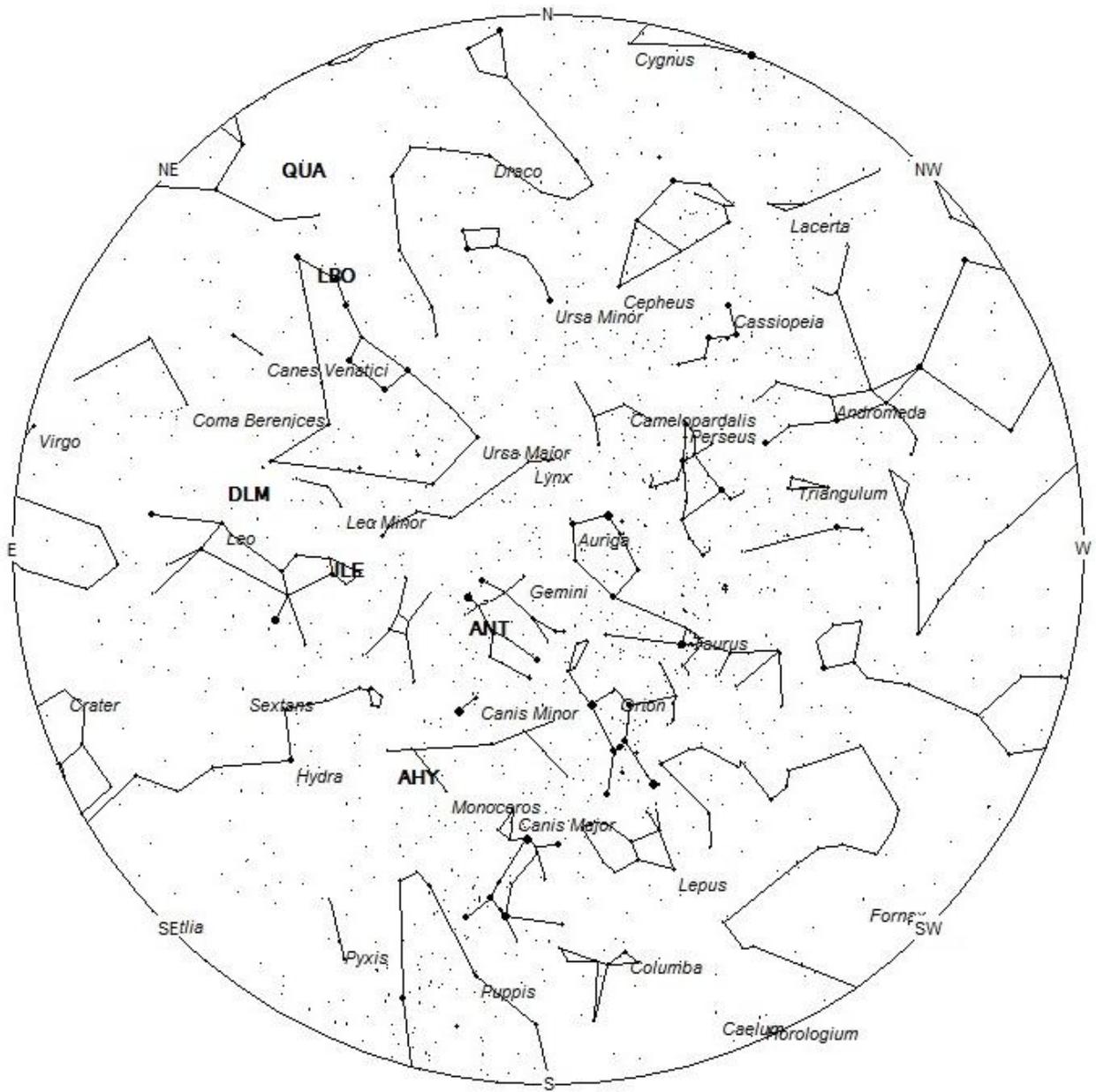
During this period the moon reaches its first quarter phase on Friday January 3rd. At this time the moon will be located 90 degrees east of the sun and will rise shortly after midnight local standard time (LST). This weekend the waxing crescent moon will set during the early evening hours and will not interfere with meteor observing, especially during the more active morning hours. The estimated total hourly meteor rates for evening observers this week is near 4 for those viewing from the northern hemisphere and 3 for those located south of the equator. For morning observers the estimated total hourly rates should be near 14 as seen from mid-northern latitudes (45N) and 11 as seen from tropical southern locations (25S). The actual rates will also depend on factors such as personal light and motion perception, local weather conditions, alertness and experience in watching meteor activity. Evening rates are slightly reduced due to moonlight. Note that the hourly rates listed below are estimates as viewed from dark sky sites away from urban light sources. Observers viewing from urban areas will see less activity as only the brightest meteors will be visible from such locations.

The radiant (the area of the sky where meteors appear to shoot from) positions and rates listed below are exact for Saturday night/Sunday morning December 28/29. These positions do not change greatly day to day so the listed coordinates may be used during this entire period. Most star atlases (available at science stores and planetariums) will provide maps with grid lines of the celestial coordinates so that you may find out exactly where these positions are located in the

sky. A planisphere or computer planetarium program is also useful in showing the sky at any time of night on any date of the year. Activity from each radiant is best seen when it is positioned highest in the sky, either due north or south along the meridian, depending on your latitude. It must be remembered that meteor activity is rarely seen at the radiant position. Rather they shoot outwards from the radiant so it is best to center your field of view so that the radiant lies at the edge and not the center. Viewing there will allow you to easily trace the path of each meteor back to the radiant (if it is a shower member) or in another direction if it is a sporadic. Meteor activity is not seen from radiants that are located below the horizon. The positions below are listed in a west to east manner in order of right ascension (celestial longitude). The positions listed first are located further west therefore are accessible earlier in the night while those listed further down the list rise later in the night.



Radiant Positions at 7pm Local Standard Time



Radiant Positions at Midnight Local Standard Time

These sources of meteoric activity are expected to be active this week..

Now that the activity from particles produced by comet 2P/Encke have ceased encountering the Earth, the Taurid showers for 2019 are over and we resume reporting activity from the **Anthelion (ANT)** radiant. This is not a true radiant but rather activity caused by the Earth's motion through space. As the Earth revolves around the sun it encounters particles orbiting in a pro-grade motion that are approaching their perihelion point. They all appear to be radiating from an area near the opposition point of the sun, hence the name Anthelion. These were once recorded as separate showers throughout the year but it is now suggested to bin them into their category separate from true showers and sporadics. There are several lists that have the Chi Orionids currently active, but we include them with the Anthelions as the celestial positions overlap. This radiant is a very large oval some thirty degrees wide by fifteen degrees high. Activity from this radiant can appear from more than one constellation. The position listed here is for the center of the radiant which is currently located at 07:20 (110) +22. This position lies in central Gemini, near the spot occupied by the 4th magnitude star known as Wasat (delta Geminorum). Since the radiant is so large, Anthelion activity may also appear from western Cancer as well as Gemini. This radiant is best placed near 01:00 local standard time (LST) when it lies on the meridian and is highest in the sky. Rates at this time should be near 3 per hour as seen from the northern hemisphere and 2 per hour as seen from south of the equator. With an entry velocity of 30 km/sec., the average Anthelion meteor would be of slow velocity.

The **alpha Hydrids (AHY)** were discovered by Dr. Peter Brown and are mentioned in his article "A meteoroid stream survey using the Canadian Meteor Orbit Radar". This shower is active from December 17 through January 17 with maximum activity occurring on January 3rd. The radiant is currently located at 08:10 (123) -08. This position lies on the border of Monoceros and Hydra, 8 degrees southeast of the brilliant zero magnitude star known as Procyon (alpha Canis Minoris). These meteors are best seen near 0300 LST when the radiant lies highest above the horizon. At 43 km/sec. the alpha Hydrids produce meteors of medium velocity. Expected rates this week are less than 1 per hour no matter your location.

The **C Velids (CVE)** is a continuation of the Puppis/Velid activity this time of year. Unlike the two week activity during the first half of December, the C Velids are only active on 6 nights centered on December 29th. This segment of the Puppis/Velids is not as strong as the previous one and rates are low, even at maximum activity. At maximum, the radiant is located at 09:20 (140) -54. This area of the sky lies in southern Vela, 2 degrees north of the 2nd magnitude star known as Markeb (kappa Velorum). These meteors are best seen near 0400 LST when the radiant lies highest above the horizon. At 39 km/sec. the C Velids produce meteors of medium velocity. Like all sources of the Puppis/Velid complex, these meteors are not well seen from the northern hemisphere. They are best seen from the deep southern hemisphere where the sources are found high in the sky during the southern summer mornings. Activity from this complex is weak in January with barely discernible radiants in Carina and Crux. Activity increases in February with several radiants spread across Centaurus. This complex weakens again in March with the last traces appearing in the Lupus/Norma region of the sky.

The **January Leonids (JLE)** were also discovered by Dr. Peter Brown and are mentioned in the same source as the Alpha Hydrids. This shower is active from December 30 through January 7

with maximum activity occurring on January 4th. The radiant is currently located at 09:39 (144) +26. This position lies in northwestern Leo, 2 degrees east of the 4th magnitude star known as Al Min'har al A'sad (kappa Leonis). These meteors are best seen near 0400 LST when the radiant lies highest above the horizon. At 59 km/sec. the January Leonids produce meteors of swift velocity. Expected rates this week are less than 1 per hour no matter your location.

The **December Leonis Minorids (DLM)** are a shower of long duration active from December 6th through January 18th. Maximum occurs near December 21st when rates may reach 3 an hour. The radiant is currently located at 11:09 (167) +27. This position lies in northeastern Leo, 8 degrees north of the 3rd magnitude star known as Zosma (delta Leonis). These meteors are best seen near 0600 LST when the radiant lies highest above the horizon. At 63 km/sec. the December Leonis Minorids produce mostly swift meteors.

The **lambda Bootids (LBO)** are another discovery by Dr. Peter Brown and his team at the University of Western Ontario, London, Ontario, Canada. They were using radio means to discover new streams. These meteors are active from December 31 through January 17 with maximum activity occurring on the 16th. The radiant currently lies at 13:31 (203) +55. This position lies near the position of the famous 2nd magnitude double star known as Mizar (zeta Ursae Majoris). These meteors are best seen during the last dark hour before dawn. Current rates are expected to be less than 1 per hour no matter your location. At 41 km/sec. these meteors are of medium velocity.

The **December Sigma Virginids (DSV)** was discovered by John Greaves using the data of SonotaCo. IMO video cameras confirmed that this source is active during the month of December. Peak rates occur near December 14th. The current radiant location is at 14:17 (214) +00 which places it in northern Virgo, 3 degrees southwest of the 4th magnitude star known as tau Virginis. Current hourly rates would be less than 1 shower members no matter your location. These meteors are best seen during the last dark hour before dawn, when the radiant lies highest above the horizon in a dark sky. At 68 km/sec. the December Sigma Virginids would produce mostly swift meteors.

The **Quadrantids (QUA)** are active from December 22nd through January 17th. Maximum occurs on January 4 when rates may reach 100 an hour from dark sky sites over the Atlantic area and eastern North America. The radiant is currently located at 15:10 (227) +51. This position lies in northern Bootes, roughly between 3rd magnitude Edasich (iota Draconis) and Nekkar (beta Boötis). 2nd magnitude Alkaid (eta Ursae Majoris), the bright star at the end of the Big Dipper's handle, lies 10 degrees to the east. These meteors are best seen during the last hour before dawn when the radiant lies highest above the horizon in a dark sky. At 41 km/sec. the Quadrantids produce meteors of moderate velocity. These meteors are visible from the southern tropics but not seen from the deep southern hemisphere.

As seen from the mid-northern hemisphere (45N) one would expect to see approximately 10 **sporadic** meteors per hour during the last hour before dawn as seen from rural observing sites. Evening rates would be near 3 per hour. As seen from the tropical southern latitudes (25S), morning rates would be near 8 per hour as seen from rural observing sites and 2 per hour during

the evening hours. Locations between these two extremes would see activity between the listed figures. Evening rates are reduced by moonlight during this period.

The list below offers the information from above in tabular form. Rates and positions are exact for Saturday night/Sunday morning except where noted in the shower descriptions.

SHOWER	DATE OF MAXIMUM ACTIVITY	CELESTIAL POSITION	ENTRY VELOCITY	CULMINATION	HOURLY RATE	CLASS
		RA (RA in Deg.) DEC	Km/Sec	Local Standard Time	North- South	
Anthelion (ANT)	-	07:20 (110) +22	30	01:00	3 - 2	II
alpha Hydrids (AHY)	Jan 03	08:10 (123) -08	43	02:00	<1 - <1	IV
C Velids (CVE)	Dec 29	09:20 (140) -54	39	03:00	<1 - <1	IV
January Leonids (JLE)	Jan 04	09:39 (144) +26	59	03:00	2- 1	II
December Leonis Minorids (DLM)	Dec 21	11:09 (167) +27	63	05:00	1- <1	II
lambda Bootids (LBO)	Jan 16	13:31 (203) +55	41	07:00	<1 - <1	IV
December Sigma Virginids (DSV)	Dec 14	14:17 (214) +00	68	08:00	<1 - <1	IV
Quadrantids (QUA)	Jan 04	15:10 (227) +51	41	09:00	<1 - <1	I