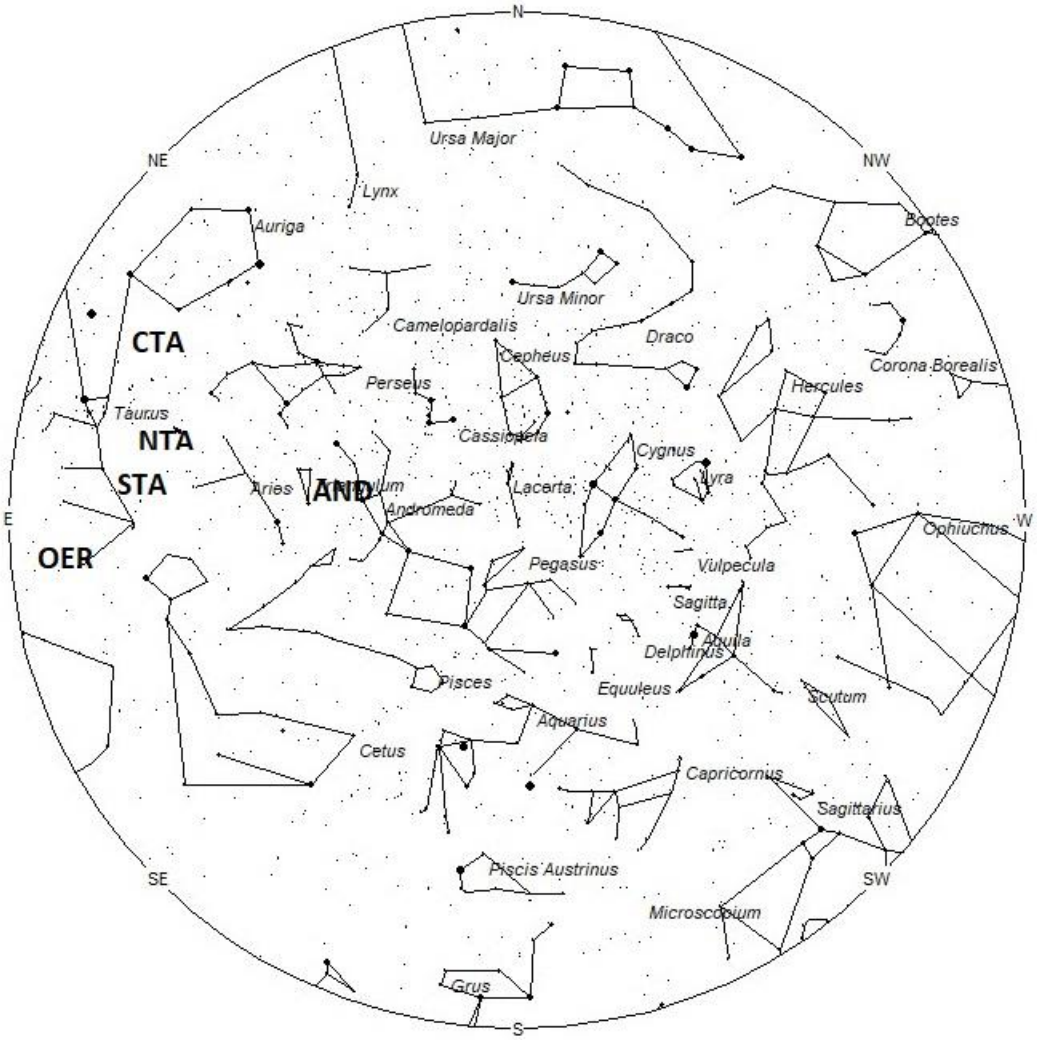
Meteor Activity Outlook for November 9-15, 2024

Bertalan Kecskés captured this colorful fireball on June 7, 2024, at 23:21 CEST (21:21 UT) from Helvécia, Hungary. ©Bertalan Kecskés

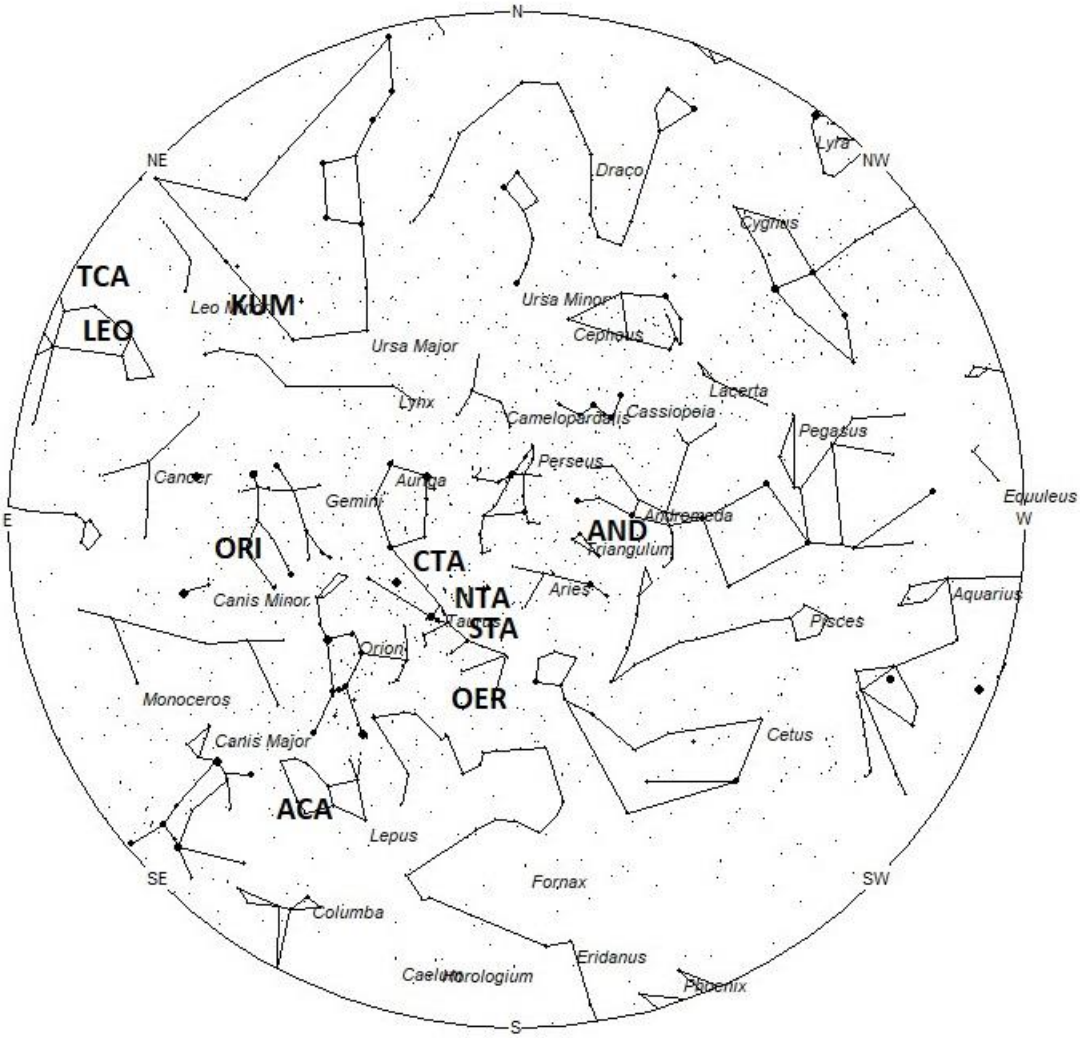
During this period, the moon reaches its full phase on Friday November 15th. At that time the moon will lie above the horizon all night long and will make observing meteor activity difficult. This weekend, the waxing gibbous moon will set during the early morning hours allowing a few hours of total darkness in which to view meteor activity.The estimated total hourly rates for evening observers this weekend should be near 3 as seen from mid-northern latitudes (45N) and 2 as seen from tropical southern locations (25S) For morning observers, the estimated total hourly rates should be near 18 as seen from mid-northern latitudes (45N) and 12 as seen from tropical southern locations (25S). Rates are reduced during evening hours due to moonlight. The actual rates seen will also depend on factors such as personal light and motion perception, local weather conditions, alertness, and experience in watching meteor activity. 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 brighter 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 November 9/10. These positions do not change greatly day to day so the listed coordinates may be used during this entire period. Most star atlases (available online and at bookstores 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. I have also included charts of the sky that display the radiant positions for evening, midnight, and morning. The center of each chart is the sky directly overhead at the appropriate hour. These charts are oriented for facing south but can be used for any direction by rotating the charts to the desired direction. 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. Radiants that rise after midnight will not reach their highest point in the sky until daylight. For these

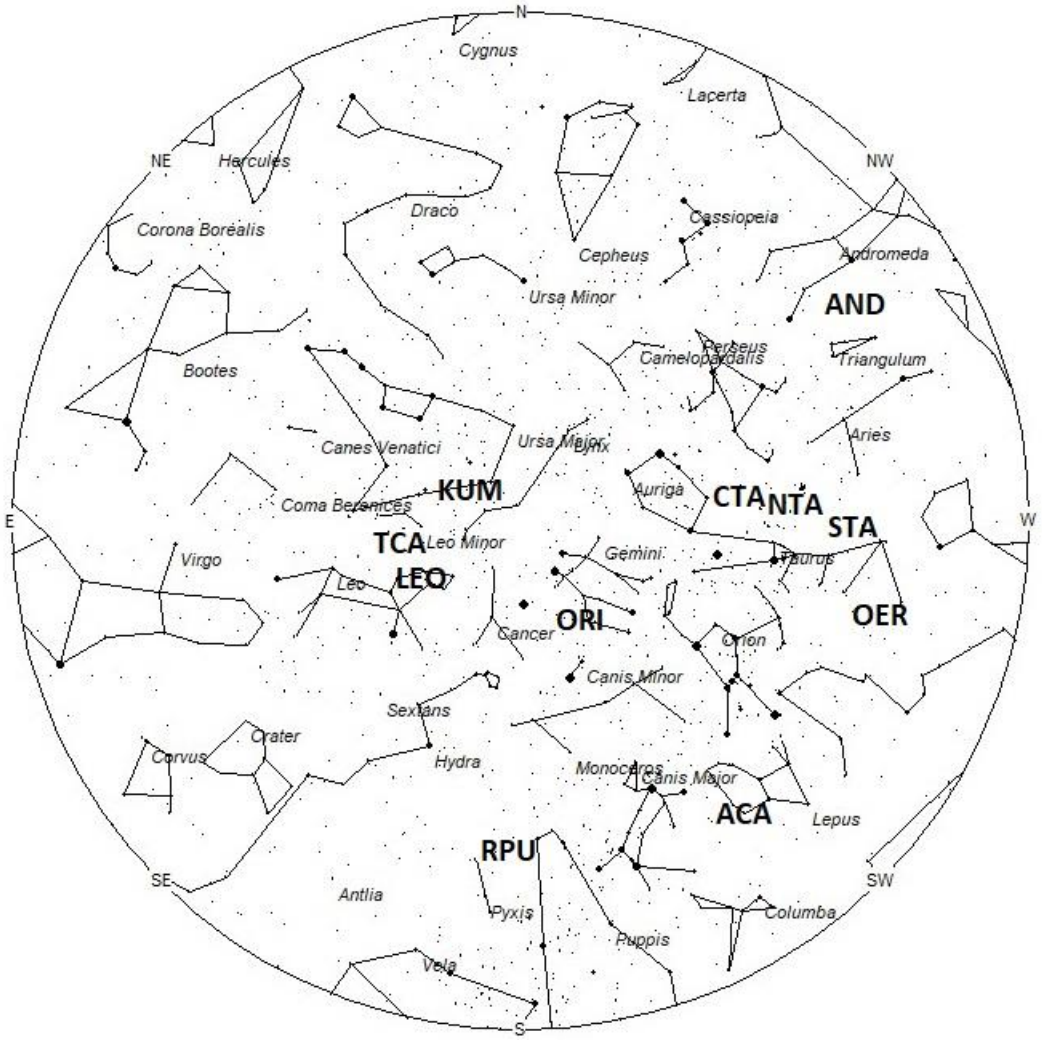
radiants, it is best to view them during the last few hours before dawn. It must be remembered that meteor activity is rarely seen at its radiant position. Rather they shoot outwards from the radiant, so it is best to center your field of view so that the radiant lies toward the edge and not the center. 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 sporadic. Meteor activity is not seen from radiants that are located far 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



Radiant Positions at 5am Local Standard Time

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

The **Andromedids (AND)** are the annual debris encountered from the remains of comet 3D/Biela. These meteors should not be mistaken for the great meteor storms of the 19th century as those meteors are in a slightly different orbit and irregularly encountered in early December. They are known as the December phi Cassiopeiids (DPC). It is interesting that during November, this radiant moves northward toward the area of the DPC's but ends before reaching the DPC radiant. The radiant currently is located near 01:28 (022) +31. This position lies in northeastern Pisces, 5 degrees southeast of the 2nd magnitude star known as Mirach (beta Andromedae). This part of the sky is best placed near 23:00 local standard time (LST), when the radiant lies highest above the horizon. Face toward the north near this time to best see these meteors. Current rates would most likely be less than 1 per hour no matter your location. With an entry velocity of 17 km/sec., the average Andromedid meteor would be of very slow velocity.

The **Southern Taurids (STA)** are active from a wide radiant centered near 03:46 (057) +15. This position lies in western Taurus, 9 degrees south of the naked eye open star cluster known as the Pleiades. These meteors are best seen near 01:00 LST when the radiant lies highest in the northern sky. Rates are expected to be near 2 per hour no matter your location. With an entry velocity of 26 km/sec., the average STA meteor would be of medium-slow velocity.

The **omicron Eridanids (OER)** was discovered by the Japanese video meteor network SonotaCo from video data obtained during 2007-2008. These meteors are active from October 23 through December 2nd. Maximum activity is ill-defined and may occur anytime from October 28 to November 17. The date listed in the table represents the midpoint of the activity curve and not the actual date of maximum activity. The radiant is currently located at 03:48 (057) -01, which is located in northern Eridanus, 2 degrees southeast of the faint star known as 10 Tauri. This radiant is best placed near 0100 LST, when it lies on the meridian and is located highest in the southern sky. Face toward the south at this time to best see these meteors. Rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 28 km/sec., the average OER meteor would be of medium-slow velocity.

The **Northern Taurids (NTA)** are active from a radiant located at 03:46 (057) +23. This area of the sky is located in western Taurus, 1 degree south of the naked eye star cluster known as the Pleiades. To best see these meteors, one should face northward near 01:00 LST. Note that this radiant is only 8 degrees north of the STA radiant so care must be taken to separate these two showers. Maximum activity is not until November 8th so rates at this time should be near 2 per hour no matter your location. With an entry velocity of 28 km/sec., the average NTA meteor would be of medium-slow velocity.

The **chi Taurids (CTA)** were discovered by Dr. Peter Brown during his 7-year survey using the Canadian Meteor Orbit Radar (CMOR). This source is active from October 24 through November 13 with a maximum occurring near November 5th. The radiant is currently located at 04:38 (070) +28 which places it in northern Taurus, 4 degrees north of the 4th magnitude star known as tau Tauri. These meteors may be seen all night long but the radiant is best placed near 0200 LST when it lies on the meridian and is located highest in the northern sky. Current rates should be less than

1 per hour no matter your location. With an entry velocity of 39 km/sec., the average chi Taurid meteor would be of medium velocity.

The **alpha Canis Majorids (ACA)** were also discovered by Dr. Peter Brown during his 7-year survey using the Canadian Meteor Orbit Radar (CMOR2). This source is active from November 2 through December 11 with a 0maximum occurring near November 21st. The radiant is currently located at 05:47 (087) -22 which places it in western Lepus, 1 degree northeast of the 4th magnitude star known as gamma Leporis. These meteors may be seen all night long but the radiant is best placed near 0200 LST when it lies on the meridian and is located highest in the northern sky. Current rates should be less than 1 per hour no matter your location. With an entry velocity of 44 km/sec., the average ACA meteor would be of medium velocity.

The **Orionids (ORI)** are active from September 26 through November 22, with maximum activity occurring on October 22nd. The radiant is currently located at 07:18 (110) +16, which places it in southern Gemini near the spot occupied by the 4th magnitude star known as lambda Geminorum. This area of the sky is best placed for observing during the last dark hour prior to dawn, when it lies highest in the northern sky. Current rates are expected to be near 1 per hour as seen from the northern hemisphere and less than 1 as seen from south of the equator. With an entry velocity of 65 km/sec., the average ORI meteor would be of swift velocity.

The **rho Puppids (RPU)** were discovered by Željko Andreić and the Croatian Meteor Network team based on studying SonotaCo and CMN observations (SonotaCo 2007-2011, CMN 2007-2010). These meteors are active from October 28 through November 22 with maximum activity occurring on November 8th. The radiant is currently located at 08:30 (127) -26. This area of the sky lies in central Puppis, 1 degree east of the 2nd magnitude star known as Azmidi (xi Puppis). To best see these meteors face ay direction during the last dark hour prior to dawn. Rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 57 km/sec., the average RPU meteor would be of medium-swift velocity.

The **Leonids (LEO)** are active from October 27 to December 7 with maximum activity occurring on November 17th. The radiant is currently located at 09:57 (149) +25. This position lies in northwestern Leo, 1 degree south of the 4th magnitude star known as Rasalas (mu Leonis). The Leonid radiant is best placed in the eastern sky during the last hour before morning twilight when the radiant lies highest in a dark sky. Leonids may be seen from the southern hemisphere, but the viewing conditions are not quite as favorable as those north of the equator. Current rates are expected to be near than 2 per hour as seen from the northern hemisphere and 1 per hours as seen from the southern hemisphere. With an entry velocity of 70 km/sec., most activity from this radiant would be of swift speed with numerous persistent trains on the brighter meteors.

The **kappa Ursae Majorids (KUM)** were discovered by cameras of the SonotaCo network in Japan during an outburst of activity on November 5, 2009. This radiant is active from October 28-November 17, with maximum activity occurring on the 6th. The radiant is currently located at 09:58 (150) +44. This position lies in southern Ursa Majoris, 3 degrees west of the 3rd magnitude star known as Tania Borealis (lambda Ursae Majoris). Rates are expected to less than 1 no matter your location. These meteors are best seen during the last hour before dawn when the radiant lies highest above the northern horizon in a dark sky. With an entry velocity of 64 km/sec., the average

Kappa Ursae Majorid meteor would be of swift velocity. Due to the high northern location of this radiant, these meteors are not well seen from the southern hemisphere.

The **tau Cancrids (TCA)** are a weak shower with a long activity period of seven weeks. They are active from September 23 through November 12 with maximum activity occurring on October 21st. The radiant currently lies at 10:24 (156) +29, which places it in southern Leo Minor, 1 degree west of the faint star known as 10 Leonis Minoris. To best see these meteors face eastward during the last two hours of the morning prior to dawn. Expected hourly rates are less than 1 no matter your location. With an entry velocity of 67 km/sec., the average TCA meteor would be of swift velocity.

Sporadic meteors are those meteors that cannot be associated with any known meteor shower. All meteor showers are evolving and disperse over time to the point where they are no longer recognizable. Away from the peaks of the major annual showers, these sporadic meteors make up the bulk of the activity seen each night. As seen from the mid-northern hemisphere (45N) one would expect to see during this period approximately 11 sporadic meteors per hour during the last hour before dawn as seen from rural observing sites. Evening rates should be near 2 per hour. As seen from the tropical southern latitudes (25S), morning rates would be near 7 per hour as seen from rural observing sites and 1 per hour during the evening hours. Locations between these two extremes would see activity between these listed figures. Evening rates are reduced due to moonlight.

The list below offers the information in tabular form of the showers that I feel are within reach of the visual observer to discern. Hourly rates are often less than one, so these sources are rarely listed as visual targets in most meteor shower lists. If you are like me and wish to associate as many meteors as possible with known sources, then you will appreciate these listings. Before listing meteors from these obscure sources, you should attempt to prove these meteors belong to them and are not chance alignments of sporadic meteors. You can note parameters such as duration, length, radiant distance and the elevation of each meteor to help compute the probability of shower association. It should be remembered that slow meteors can be seen from fast showers, but fast meteors cannot be produced from slow showers. Slower showers are those with velocities less than 35/km per second. Slow meteors can appear from fast showers when they appear close to the radiant or low in the sky. The table located on page 22 of the IMO's 2024 Meteor Shower Calendar is a big help in aiding in the identification of meteors. If you record the length and duration of each meteor, you can use this chart to check the probability of the meteor belonging to a shower of known velocity. If the angular velocity is similar to the figure in the table, then your meteor probably belongs to that shower. Rates and positions are exact for Saturday night/Sunday morning.

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	
Andromedids (AND)	Nov 06	01:28 (022) +31	17	23:00	<1 - <1	III
Southern Taurids (STA)	Nov 05	03:46 (057) +15	28	01:00	2- 2	II
omicron Eridanids (OER)	Nov 05	03:48 (057) -01	28	01:00	<1 - <1	IV
Northern Taurids (NTA)	Nov 08	03:49 (057) +23	29	01:00	2 - 2	II
chi Taurids (CTA)	Nov 04	04:38 (070) +28	39	02:00	<1 - <1	IV
alpha Canis Majorids (ACA)	Nov 21	05:47 (087) -22	44	02:00	<1 - <1	IV
Orionids (ORI)	Oct 22	07:18 (110) +16	65	04:00	1 - <1	I
rho Puppids (RPU)	Nov 08	08:30 (127) -26	57	04:00	<1 - <1	IV
Leonids (LEO)	Nov 17	09:57 (149) +25	70	07:00	2 - 1	I
kappa Ursae Majorids (KUM)	Nov 06	09:58 (150) +44	64	07:00	<1 - <1	IV
tau Cancrids (TCA)	Oct 22	10:24 (156) +29	67	07:00	<1 - <1	IV

You can keep track of the activity of these meteor showers as well as those beyond the limits of visual observing by visiting the NASA Meteor Shower Portal. You can move the sky globe to see different areas of the sky. Colored dots indicate shower meteors while white dots indicate sporadic (random) activity. The large orange disk indicates the position of the sun so little activity will be seen in that area of the sky.

Class Explanation: A scale to group meteor showers by their intensity:

- **Class I**: the strongest annual showers with Zenith Hourly Rates normally ten or better.
- **Class II**: reliable minor showers with ZHR's normally two to ten.
- **Class III**: showers that do not provide annual activity. These showers are rarely active yet have the potential to produce a major display on occasion.
- **Class IV**: weak minor showers with ZHR's rarely exceeding two. The study of these showers is best left to experienced observers who use plotting and angular velocity estimates to determine shower association. These weak showers are also good targets for video and photographic work. Observers with less experience are urged to limit their shower associations to showers with a rating of I to III.