

# Meteor Activity Outlook for November 06-12, 2021

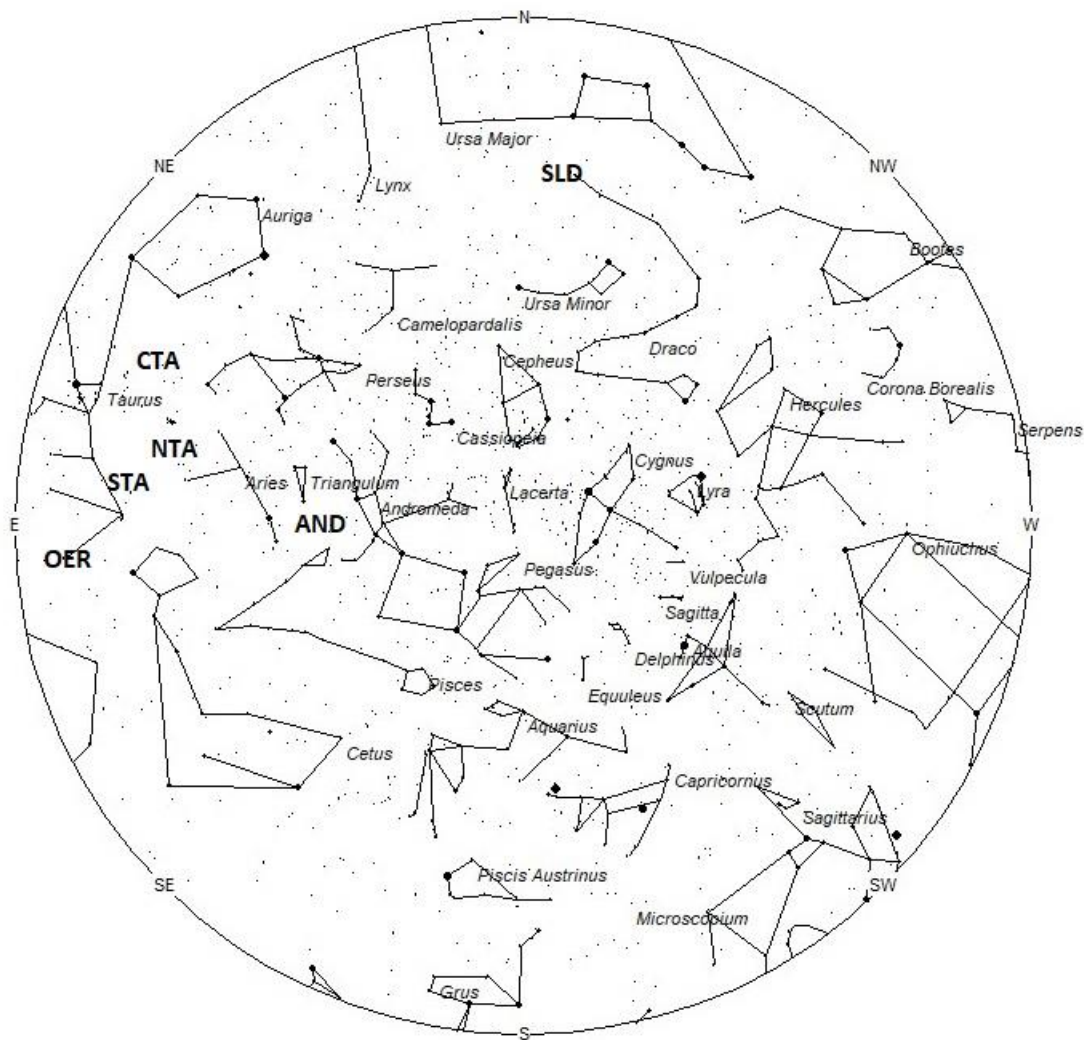


Daniel Bush captured this fireball that occurred at 22:43 CDT on 24 August 2021 (03:43UT 25 Aug.), from Albany, Missouri, USA. ©Daniel Bush

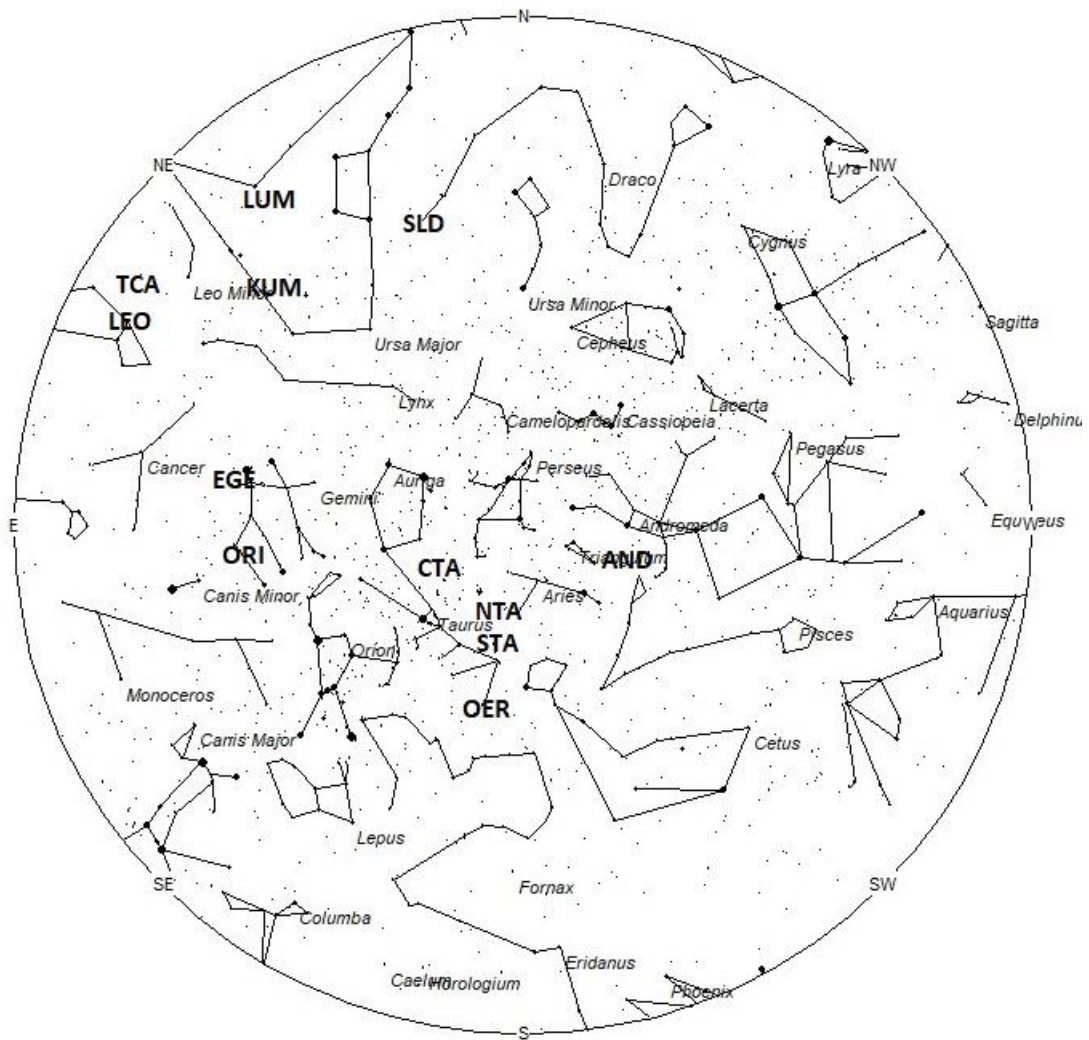
During this period, the moon reaches its first quarter phase on Friday November 11th. At that time the moon lies 90 degrees east of the sun and sets near 22:00 local standard time (LST) on November 10<sup>th</sup>. This weekend the waxing crescent moon will set during the early evening hours but will not spoil meteor observations as it sets long before the more active hours arrive. The estimated total hourly meteor rates for evening observers this week is near 5 as seen from mid-northern latitudes (45N) and 4 as seen from tropical southern locations (25S). For morning observers, the estimated total hourly rates should be near 20 as seen from mid-northern latitudes (45N) and 15 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. 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 6/7. 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. 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. 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

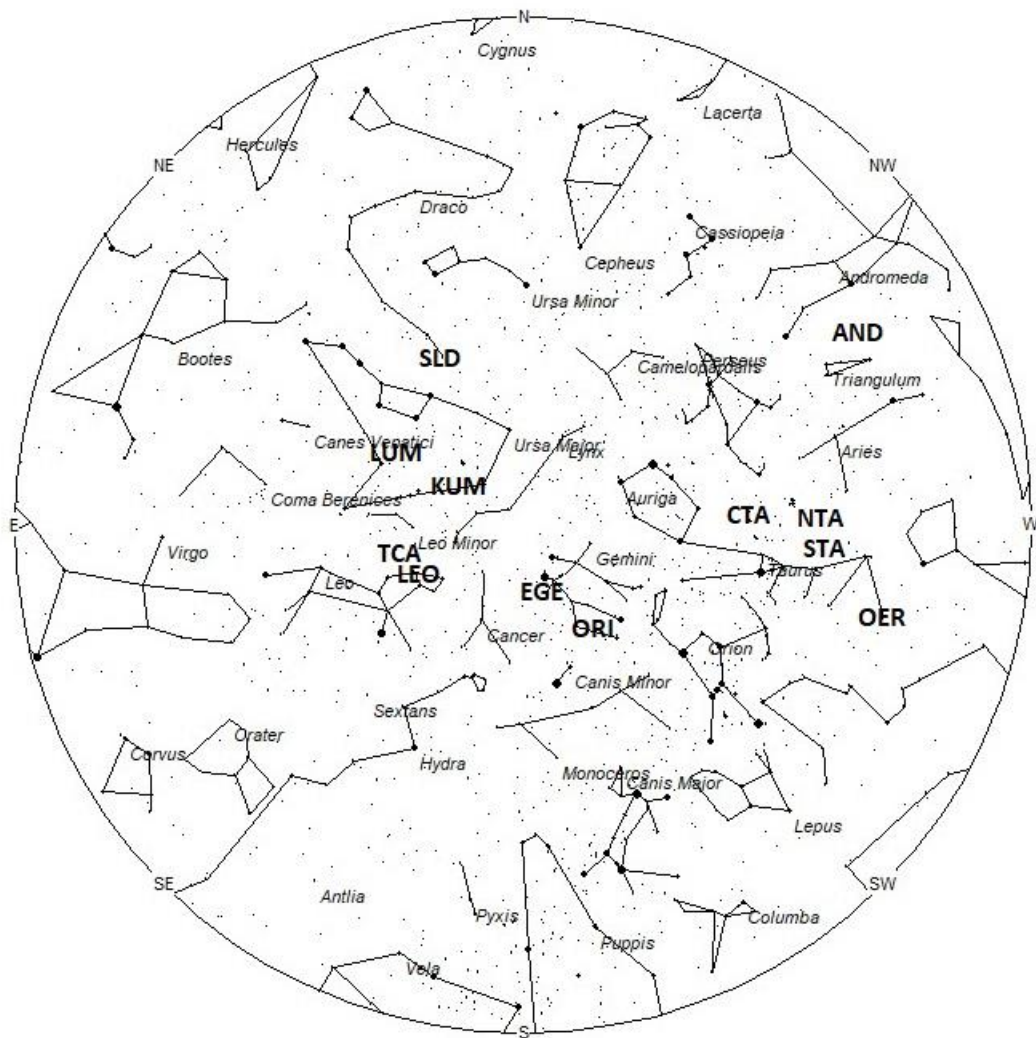
center. Viewing there will allow you to easily trace the path of each meteor back to the radiant (if it is a shower member) or in another direction if it is sporadic. Meteor activity is not seen from radiants that are located far below the horizon. The positions below are listed in a west to east manner 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 19<sup>th</sup> 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 01:23 (021) +28. This position lies in northern Pisces, 5 degrees west of the 3rd magnitude star known as Mothallah (alpha Trianguli). This part of the sky is best placed near 2200 LST, when the radiant lies highest above the horizon. Current rates would most likely be less than 1 per hour no matter your location. With an entry velocity of 18 km/sec., the average Andromedid meteor would be of very slow velocity.

The **Southern Taurids (STA)** are active from a large radiant is located at 03:34 (54) +14. This area of the sky is located in southwestern Taurus, 2 degrees northeast of the 4th magnitude star known as 5 Tauri. This radiant is best placed near 0100 LST, when it lies on the meridian and is located highest in the sky. Current rates should be near 4 per hour no matter your location. With an entry velocity of 27 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 2<sup>nd</sup>. Maximum activity is ill-defined and may occur anytime from November 3-27. 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 03:35 (54) -00, which is located in extreme southwestern Taurus, near the spot occupied by the faint star known as 10 Tauri. This radiant is best placed near 0100 local standard time (LST), when it lies on the meridian and is located highest in the sky. Rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 29 km/sec., the average OER meteor would be of medium-slow velocity.

The **Northern Taurids (NTA)** are active from a large radiant is located at 03:36 (54) +22. This area of the sky is located in western Taurus, 3 degrees southwest of the naked eye star cluster known as the Pleiades. This radiant is best placed near 0100 LST, when it lies on the meridian and is located highest in the sky. Maximum activity is not until November 12<sup>th</sup> so rates at this time should be 3 per hour as seen from the Northern Hemisphere and 2 per as seen from south of the equator. With an entry velocity of 29 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 4th. The radiant is currently located at 04:23 (066) +28, which places it in northern Taurus, 10 degrees northeast of the naked eye open cluster known as the Pleiades. These meteors may be seen all night long but the radiant is best placed near 0100 LST when it lies on the meridian and is located highest in the sky. Current rates should be less than 1 per hour no matter your location. With an entry velocity of 40 km/sec., the average chi Taurid meteor would be of medium velocity.

The **Orionids (ORI)** are active from September 26 through November 22, with maximum activity occurring on October 21st. The radiant is currently located at 07:09 (107) +16, which places it in southern Gemini, 2 degrees west of the 4th magnitude star known as lambda Geminorum. This area of the sky is best placed near 04:00. Current rates are expected to be near 2 per hour, no matter your location. With an entry velocity of 65 km/sec., the average ORI meteor would be of swift velocity.

The last of the **epsilon Geminids (EGE)** are expected this weekend from a radiant located at 07:47 (117) +27. This area of the sky lies in eastern Gemini, 1 degree south of the 1st magnitude star known as Pollux (beta Geminorum). This area of the sky is best placed during the last dark hour prior to dawn. These meteors are active from September 27 through November 8, with maximum activity occurring on October 18. Rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 67 km/sec., the average EGE meteor would be of swift velocity.

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 5th. The radiant is currently located at 09:41 (145) +45. This position lies in southwestern Ursa Majoris, directly between the 3<sup>rd</sup> magnitude stars known as lambda and iota Ursae Majoris. Rates are expected to be less than 1 regardless of your location. These meteors are best seen during the last hour before dawn when the radiant lies highest above the horizon in a dark sky. With an entry velocity of 64 km/sec., the average Kappa Ursae Majorid meteor would be of swift velocity.

The **Leonids (LEO)** are active from November 03-December 02 with maximum activity occurring on November 18<sup>th</sup>. The radiant is currently located at 09:48 (147) +26. This position lies in northwestern Leo near the position occupied by the 4th magnitude star known as Rasalas (mu Leonis). The Leonid radiant is best placed 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 less than 1 per hour no matter your location. With an entry velocity of 69 km/sec., most activity from this radiant would be of swift speed with numerous persistent trains on the brighter meteors.

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 22. The radiant currently lies at 10:10 (153) +29, which places it in southwestern Leo Minor, 1 degree west of the faint star known as 23 Leonis Minoris. Expected hourly rates are less than 1 per hour no matter your location. With an entry velocity of 67 km/sec., the average TCA meteor would be of swift velocity.

The **Southern lambda Draconids (SLD)** 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 29-November 8 with maximum activity occurring on November 4<sup>th</sup>. The radiant is currently located at: 11:02 (166) +67. This area of the sky is currently located in northwestern Ursa Major, 5 degrees north of the 2<sup>nd</sup> magnitude star known as Dubhe (alpha Ursae Majoris). This area of the sky is best placed in the sky during the

last hour before dawn, when it lies highest above the horizon in a dark sky. Current rates should be less than 1 per hour no matter your location. With an entry velocity of 48km/sec., most activity from this radiant would be of medium-swift speed.

The last of the **lambda Ursa Majorids (LUM)** are expected this weekend from a radiant located near 11:10 (168) +46. This area of the sky lies in southern Ursa Major, 1 degree north of the 3<sup>rd</sup> magnitude star known as psi Ursae Majoris. This area of the sky is best placed in the sky during the last hour before dawn, when it lies highest above the horizon in a dark sky. Current rates should be less than 1 per hour no matter your location. With an entry velocity of 61km/sec., most activity from this radiant would be of swift speed.

As seen from the mid-northern hemisphere (45N) one would expect to see approximately 11 **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 7 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.

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 available at: <https://meteorshowers.seti.org/> 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.

<b>SHOWER</b>	<b>DATE OF MAXIMUM ACTIVITY</b>	<b>CELESTIAL POSITION</b>	<b>ENTRY VELOCITY</b>	<b>CULMINATION</b>	<b>HOURLY RATE</b>	<b>CLASS</b>
		<b>RA (RA in Deg.) DEC</b>	<b>Km/Sec</b>	<b>Local Standard Time</b>	<b>North- South</b>	
Andromedids (AND)	Nov 06	01:23 (021) +28	18	22:00	<1 - <1	IV
Southern Taurids (STA)	Nov 05	03:34 (54) +14	27	01:00	4 - 4	II
omicron Eridanids (OER)	Nov 13	03:35 (54) -00	29	01:00	<1 - <1	IV
Northern Taurids (NTA)	Nov 12	03:36 (54) +22	29	01:00	3 - 2	II
chi Taurids (CTA)	Nov 04	04:23 (66) +28	40	02:00	<1 - <1	IV
Orionids (ORI)	Oct 21	07:09 (107) +16	65	04:00	2 - 2	I
epsilon Geminids (EGE)	Oct 18	07:47 (117) +27	67	05:00	<1 - <1	II
kappa Ursae Majorids (KUM)	Nov 05	09:41 (145) +45	64	07:00	<1 - <1	IV
Leonids (LEO)	Nov 18	09:48 (147) +26	69	07:00	<1 - <1	I
tau Cancrids (TCA)	Oct 22	10:10 (153) +29	67	07:00	<1 - <1	IV
Southern lambda Draconids (SLD)	Nov 04	11:02 (166) +67	48	08:00	<1 - <1	IV
lambda Ursa Majorids (LUM)	Oct 28	11:10 (168) +46	61	08:00	<1 - <1	IV