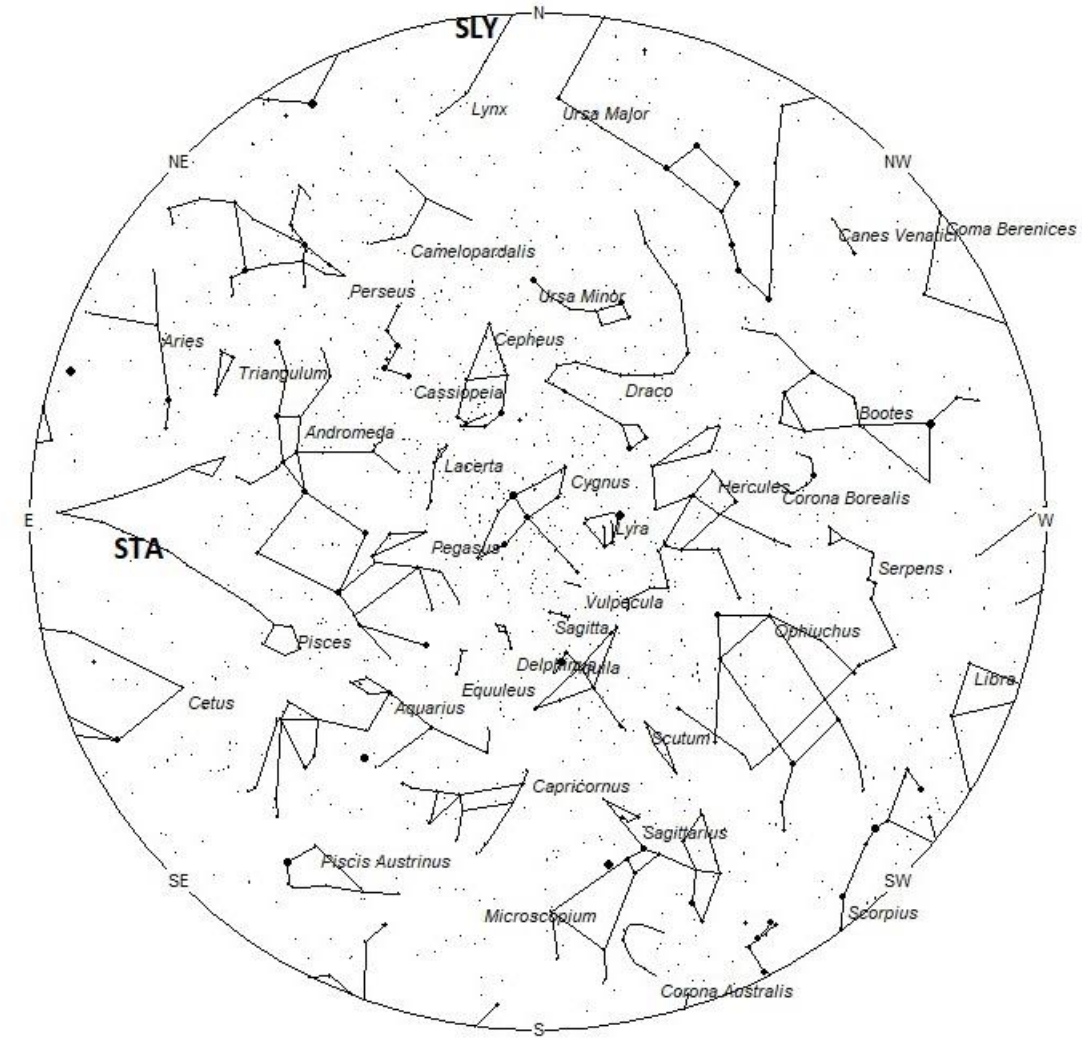
Meteor Activity Outlook for September 23-29, 2023

Rich Davis captured this colorful fireball with a terminal burst at 1:24 MST (8:24 UT) on December 24, 2022, from Cortez, Colorado, USA. Notice how the winds in the upper atmosphere caused a slight bend in the persistent train. ©Rich Davis

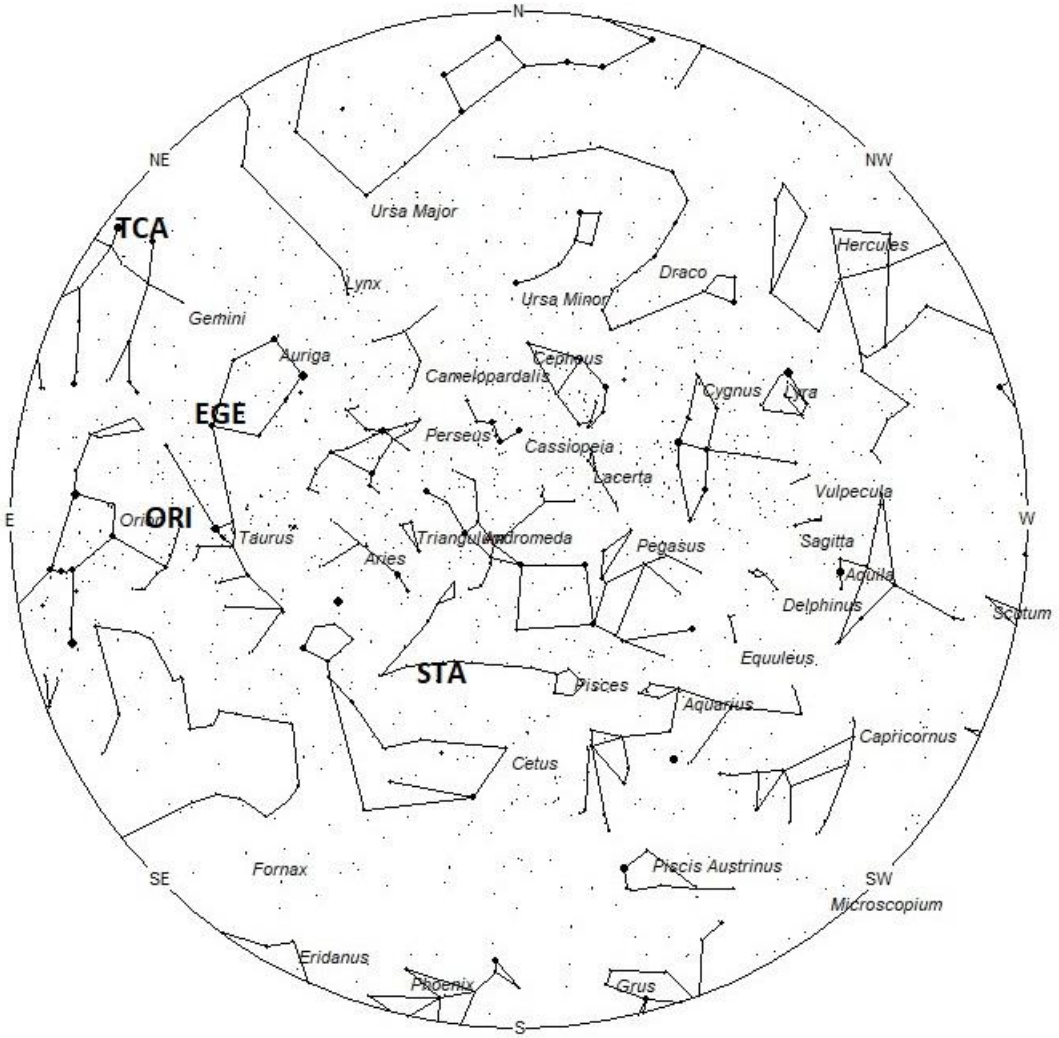
During this period, the moon reaches its full phase on Friday September 29th. On that date the moon will be located opposite the sun and will lie above the horizon all night long. This weekend the waxing gibbous moon will set during the early morning hours, allowing a small window of opportunity to view under dark skies from moon set to dawn. The estimated total hourly rates for evening observers this week 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 12 as seen from mid-northern latitudes (45N) and 9 as seen from tropical southern locations (25S). 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 September 23/24. 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

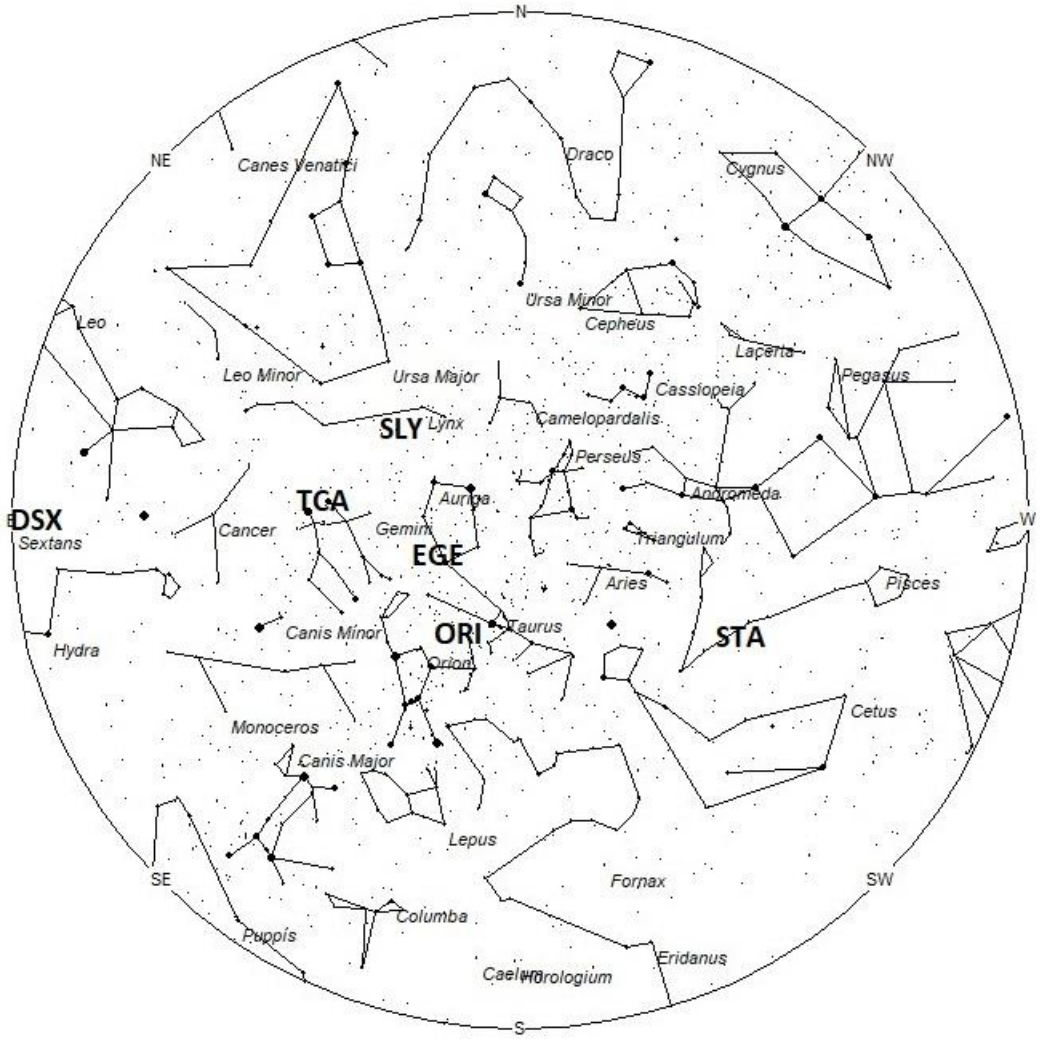
in showing the sky at any time of night on any date of the year. Activity from each radiant is best seen when it is positioned highest in the sky, either due north or south along the meridian, depending on your latitude. Radiants that rise after midnight will not reach their highest point in the sky 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 9pm Local Daylight-Saving Time



Radiant Positions at 1am Local Daylight-Saving Time



Radiant Positions at 5am Local Daylight-Saving Time

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

We are now encountering inbound debris from comet 2P/Encke, which has its source superimposed upon the anthelion radiant. Since the meteors from 2P/Encke are more numerous than the anthelion's, we will recognize this activity as the **Southern Taurids (STA)** from now until early December. Like the anthelion radiant, the source area is large and diffuse so observers can be liberal with the shower association of these meteors. Recent investigations of the Southern Taurids have revealed a complex set of orbits from comet 2P/Encke that the Earth encounters this time of year. Some astronomers have assigned separate shower associations for each orbit encounter, but we feel for simplicity's sake to place them all under the umbrella of the Southern Taurids. When doing so we cannot pinpoint an exact maximum as it could occur anytime from the last week of October through the first week of November. For 2023, the date of November 6-7 would seem to offer the best opportunity to see these meteors. The entire two-week period mentioned above is plagued by moonlight this year. Near the time of maximum activity, the moon is less than fifty percent illuminated only after November 5th.

In 2022, the Earth passed through a swarm of Taurid fireballs. This year we are further from this swarm but will still encounter some fireball activity, especially near November 6-7. As for now, the center of the large STA radiant is currently located at 01:20 (020) +06. Although they are called Taurids, this position lies in central Pisces, 2 degrees north of the faint star known as 89 Piscium. By the time November arrives, the STA radiant will have crossed into the constellation of Taurus. This radiant is best placed near 0200 local daylight-saving time (LDST), when it lies on the meridian and is located highest in the southern sky. Rates at this time should be near 2 per hour no matter your location. With an entry velocity of 31 km/sec., the average STA meteor would be of medium-slow velocity.

The **Orionids (ORI)** become active this week, but rates will remain very low until mid-October. The Orionids are active from September 26 through November 22, with maximum activity occurring on October 21st. The radiant is currently located at 05:01 (075) +13, which places it in northwestern Orion, 1 degree east of the 4th magnitude star known as omicron^2 Orionis. This area of the sky is best placed for observing during the last dark hour prior to dawn, when it lies highest in the southern sky. Current rates are expected to be less than 1 per hour, no matter your location. With an entry velocity of 68 km/sec., the average ORI meteor would be of swift velocity.

The first members of the **epsilon Geminids (EGE)** are expected to be seen this week from a radiant located at 05:19 (081) +30. This area of the sky lies in southern Auriga, 2 degrees northwest of the 2nd magnitude star known as El Nath (beta Tauri). To best see these meteors face toward the northeast during the last dark hour prior to dawn. These meteors are active from September 27 through November 8, with maximum activity occurring on October 19. Since maximum is still four weeks away, rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 70 km/sec., the average EGE meteor would be of swift velocity.

The **September Lyncids (SLY)** are composed of two weak showers active throughout September. The later branch is active from September 16th through October 3rd with maximum activity occurring on September 28th. The radiant is located at 07:06 (107) +49, This position lies in central Lynx, 4 degrees west of the pair of faint stars known as 21 and 22 Lyncis. To best see these

meteors, view toward the northeastern sky during the last hour prior to dawn. Rates are expected to be less than 1 per hour. With an entry velocity of 65 km/sec., the average meteor from this source would be of swift velocity.

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 07:34 (113) +29, which places it in northeastern Gemini, 4 degrees northwest of the 1st magnitude star known as Pollux (beta Geminiorum). 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 per hour no matter your location. With an entry velocity of 67 km/sec., the average TCA meteor would be of swift velocity.

The **Daytime Sextantids (DSX)** are active from September 22-October 13, with maximum activity occurring on October 3. The current position of the radiant is 09:52 (148) -01. This position lies in central Sextans, 3 degrees west of the 4th magnitude star known as alpha Sextantis. Rates at this time should be less than 1 per hour no matter your location. With an entry velocity of 33 km/sec., the average DSX meteor would be of medium-slow velocity. No matter your location, these meteors are difficult to observe as the radiant lies roughly 30 degrees from the sun. Therefore, these meteors may only be seen during the last hour prior to dawn, shooting upward from the eastern horizon.

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 10 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 during this period.

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.

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 1 but noting parameters such as the radiant distance and the elevation of each meteor, one can compute the probability of shower association. Most showers discovered by video means have rates less than 1 meteor per **night** away from maximum, so the showers listed in these articles are not as weak as they seem. 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 Daylight-Saving Time	North-South	
Southern Taurids (STA)	Nov 7	01:20 (020) +06	31	02:00	2 - 2	II
Orionids (ORI)	Oct 21	05:01 (075) +13	68	06:00	<1 - <1	I
epsilon Geminids (EGE)	Oct 19	05:19 (081) +30	70	06:00	<1 - <1	II
September Lyncids (SLY)	Sep 28	07:06 (107) +49	65	08:00	<1 - <1	IV
tau Cancrids (TCA)	Oct 21	07:34 (113) +29	70	09:00	<1 - <1	IV
Daytime Sextantids (DSX)	Oct 03	09:52 (148) -01	33	11:00	<1 - <1	IV

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.