

Meteor Activity Outlook for November 23-29, 2024

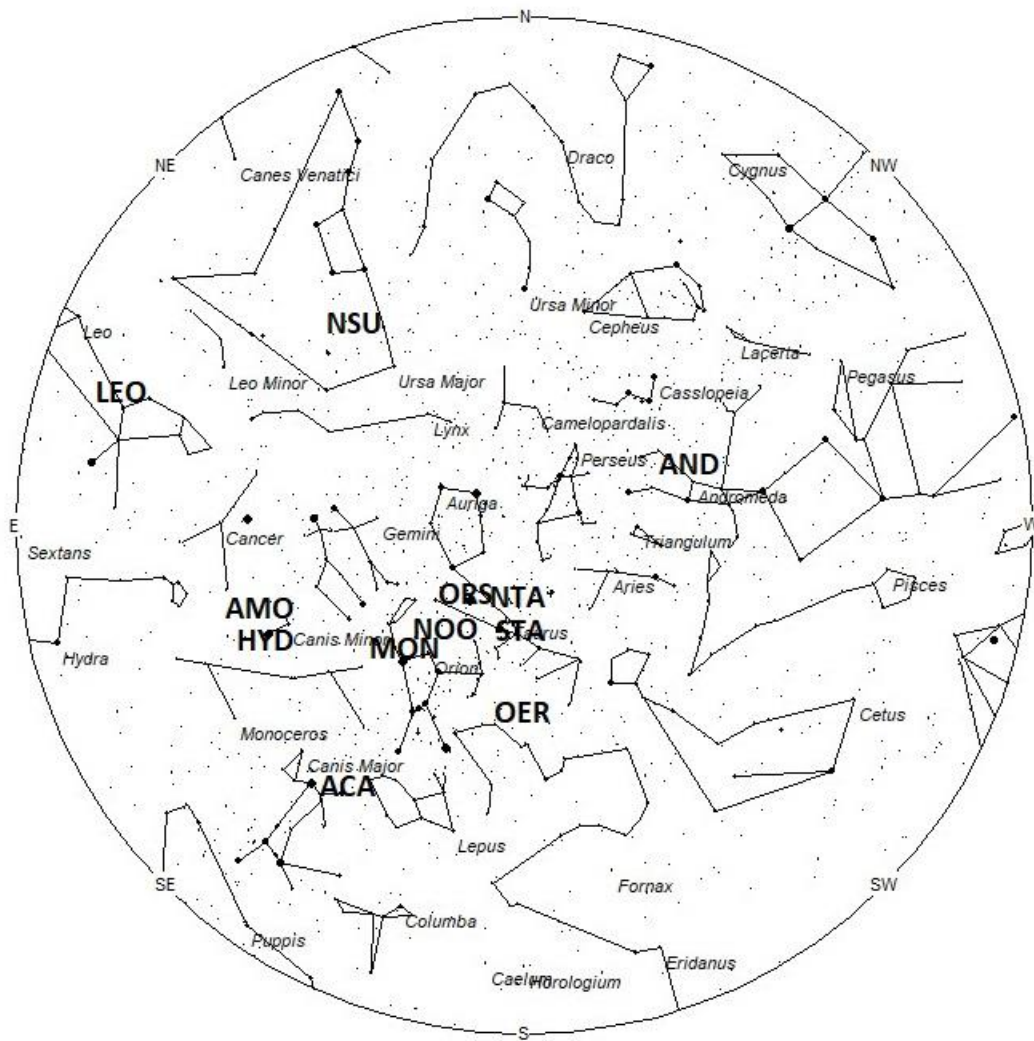


Garner Dewey captured this multi-bursting fireball on July 9, 2024, at 23:23 EDT (03:23 UT on July 10) from Buxton North Carolina, USA. ©Garner Dewey

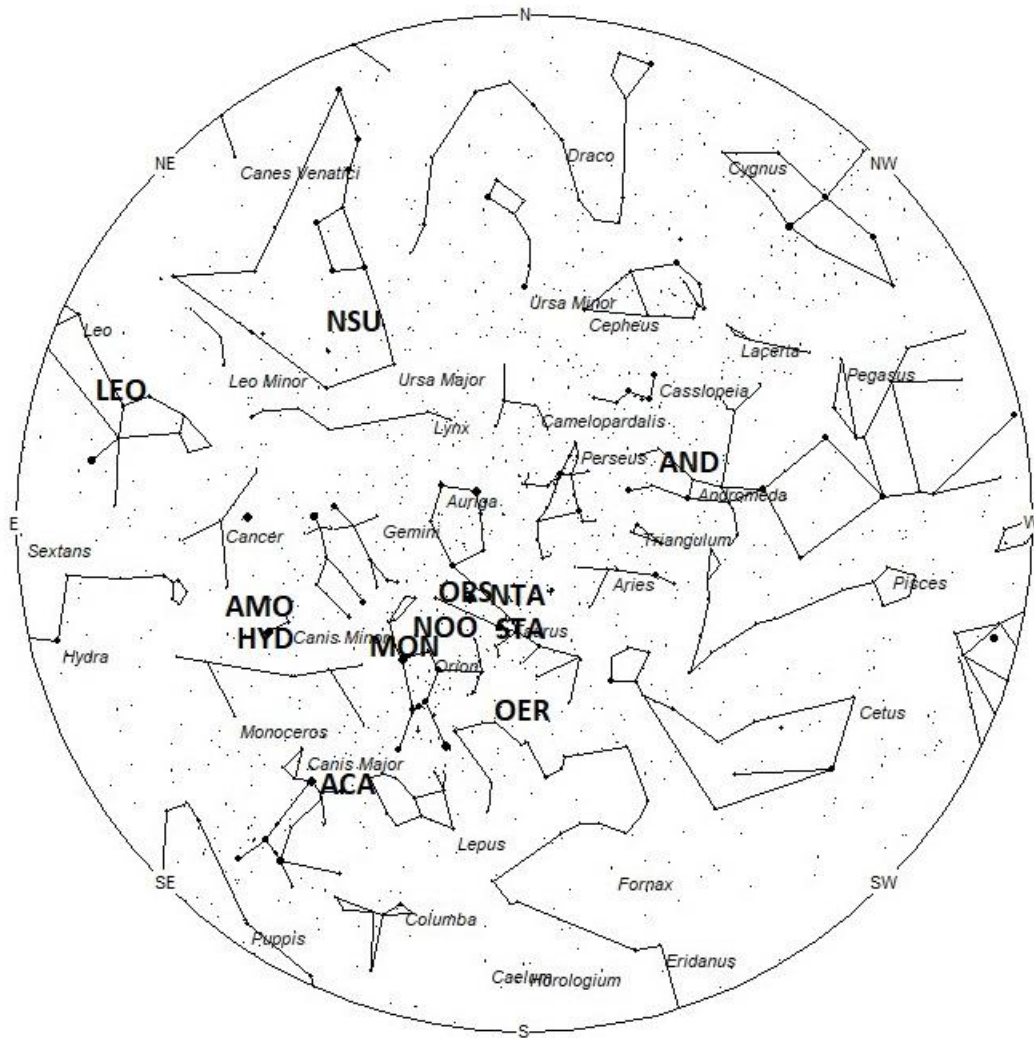
During this period, the moon reaches its last quarter phase on Saturday November 23rd. At that time the half-illuminated moon will rise near 23:00 Local Standard Time (on the previous evening) and will remain above the horizon the remainder of the night. Successful meteor observations are possible this weekend if you keep the moon out of your field of view. Viewing conditions improve with each passing night as the moon wanes and rises closer to dawn. The estimated total hourly rates for evening observers this weekend should be near 4 as seen from mid-northern latitudes (45N) and 3 as seen from tropical southern locations (25S). For morning observers, the estimated total hourly rates should be near 16 as seen from mid-northern latitudes (45N) and 10 as seen from tropical southern locations (25S). Morning rates are reduced during this period 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 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 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

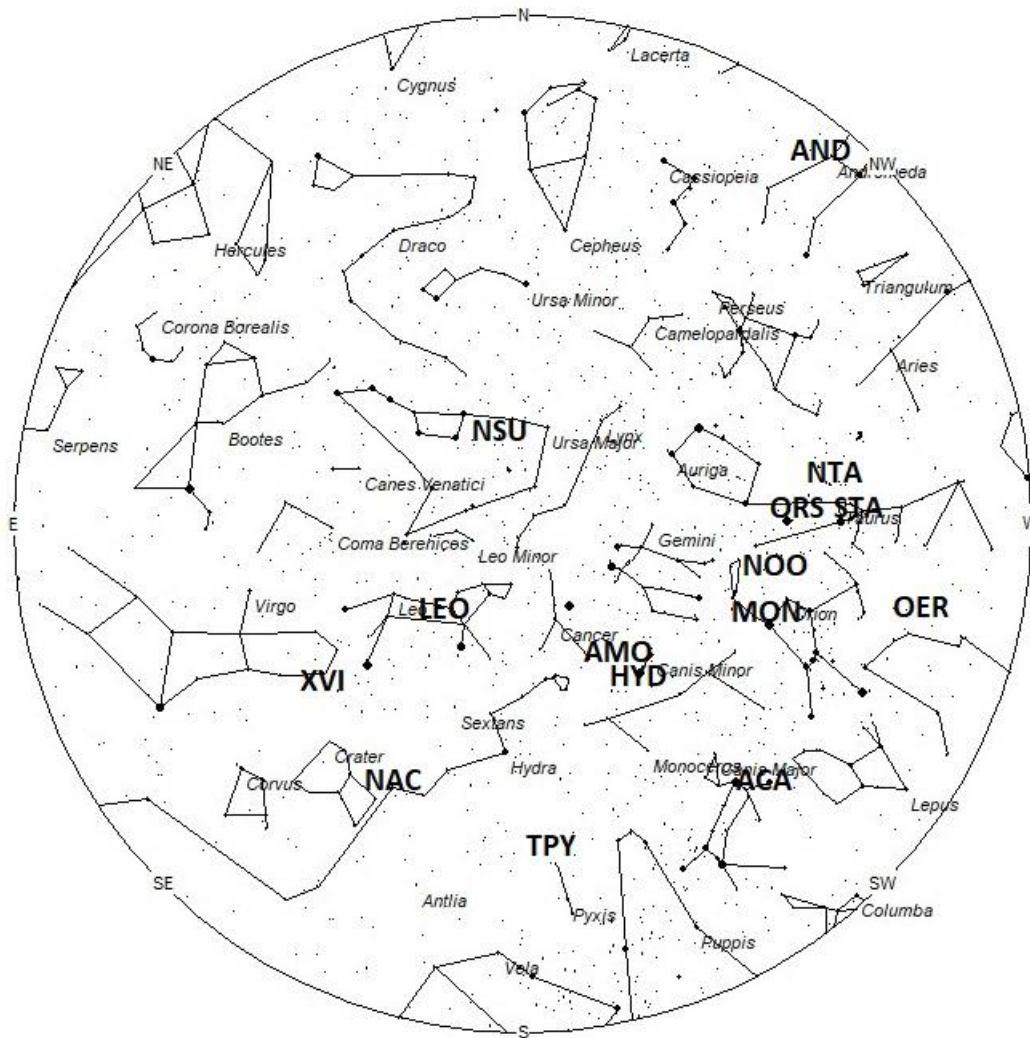
year. Activity from each radiant is best seen when it is positioned highest in the sky, either due north or south along the meridian, depending on your latitude. Radiants that rise after midnight will not reach their highest point in the sky until daylight. For these radiants, it is best to view them 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: 04 (025) +40. This position lies in central Andromeda, 2 degrees northeast of the 4th magnitude star known as mu 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 south 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 14 km/sec., the average Andromedid meteor would be of very slow velocity.

The **Southern Taurids (STA)** are still active from a wide radiant centered near 04:17 (064) +15. This position lies in central Taurus, near the spot occupied by the 4th magnitude star known as Prima Hyadum (gamma Tauri A). These meteors are best seen near 01:00 LST when the radiant lies highest in the southern sky. Rates are expected to be near 1 per hour no matter your location. With an entry velocity of 23 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 04:24 (066) -02, which is located in eastern Eridanus, 2 degrees north of the faint star known as xi Eridani. 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 26 km/sec., the average OER meteor would be of medium-slow velocity.

The **Northern Taurids (NTA)** are active from a radiant located at 04:36 (69) +24. This area of the sky is located in central Taurus, 1 degree northwest of the 4th magnitude star known as the tau Tauri. To best see these meteors, one should face southward near 01:00 LST. Current hourly rates are expected to be near 2 for those in the northern hemisphere and 1 for those viewing from south of the equator. With an entry velocity of 29 km/sec., the average NTA meteor would be of medium-slow velocity.

The **November Orionids (NOO)** are active from November 13 through December 12, with maximum activity occurring on November 28th. The radiant is currently located at 05:48 (087) +16. This area of the sky lies in the eastern Taurus, 3 degrees south of the 4th magnitude star known as chi¹ Orionis. This radiant is best placed in the southern sky near 0300 LST, when it lies highest above the horizon. Hourly rates should be near 2 per hour as seen from the northern hemisphere and 1 per hour as seen from south of the equator. With an entry velocity of 43 km/sec., most activity from this radiant would be of medium speed.

The **Monocerotids (MON)** become active this week from a radiant located at 05:58 (090) +10. This area of the sky is located in northeastern Orion, 3 degrees northeast of the 1st magnitude orange star known as Betelgeuse (alpha Orionis). This position is less than 10 degrees away from the NOO radiant so care must be taken to differentiate between these two showers. This radiant best placed near 0300 LST, when it lies highest in the southern sky. Hourly rates should be less than 1 per hour no matter your location. With an entry velocity of 44 km/sec., most activity from this radiant would be of medium speed. This shower is active from November 23rd through December 24th, with maximum activity occurring on December 10th.

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 maximum occurring near November 21st. The radiant is currently located at 06:29 (097) -18 which places it in western Canis Major, 1 degree southeast of the 2nd magnitude star known as Mirzam (beta Canis Majoris). These meteors are best seen near 0400 LST when it lies on the meridian and is located highest in the southern 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 **sigma Hydrids (HYD)** are active from a radiant located at 07:34 (113) +05. This area of the sky is located in central Canis Minor, 1 degree southwest of the zero-magnitude star known as Procyon (alpha Canis Minoris). These meteors are active from November 22nd through December 31st, with maximum activity occurring on December 7th. To best see these meteors, face toward the south during the last couple of hours prior to dawn. Rates should be less than 1 per hour no matter your location. With an entry velocity of 60km/sec, most of these meteors would appear swift.

The **alpha Monocerotids (AMO)** are best known for their occasional outbursts, the last which occurred in 2019. These meteors are active from 13-27 November with maximum occurring on the 22nd. Rates away from the night of maximum are very low, far less than 1 per hour no matter your location. The radiant is currently located at 07:55 (119) +01. This area of the sky is located in southeastern Canis Minor, 4 degrees southeast of the zero-magnitude star known as Procyon (alpha Canis Minoris A). To best see these meteors, face toward the south during the last couple of hours prior to dawn. With an entry velocity of 62km/sec, most of these meteors would appear swift.

The **theta Pyxidids (TPY)** consist of two weak showers that peak two weeks apart. The early version is active from November 27 through December 5 with maximum occurring on December 1st. The radiant is currently located at 08:52 (133) -26. This area of the sky is located in central Pyxis, 2 degrees north of the 4th magnitude star known as gamma Pyxidis. These meteors are best seen during the last couple of hours prior to dawn when the radiant lies highest in the southern sky. At 60 km/sec. the theta Pyxids would produce mostly swift meteors.

The **Nov. sigma Ursae Majorids (NSU)** are a weak shower active from November 17-December 2. Maximum activity occurs on November 23rd. The radiant is currently located at 09:56 (149) +59. This area of the sky lies in western Ursa Major, 1 degree northeast of the 4th magnitude star known as epsilon Ursae Majoris. To best see these meteors, face toward the north during the last

hours prior to dawn. Current rates are expected to be less than near 1 per hour, no matter your location. With an entry velocity of 55 km/sec., the average NSU 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 10:31 (158) +19. This position lies in central Leo, 2 degrees east of the 2nd magnitude double star known as Algieba (gamma 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 1 per hour as seen from the northern hemisphere and less than 1 per hour 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 **November alpha Corvids (NAC)** are a recent discovery by Peter Jenniskens's system of worldwide cameras. This weak shower is active from November 17th through December 6th with maximum activity occurring on November 28th. The current position is 10:48 (162) -14, which places the radiant in central Hydra, 2 degrees north of the 3rd magnitude star known as nu Hydrae. This area of the sky is best placed for viewing during the last couple of hour prior to dawn when the radiant lie highest in a dark sky above the southeastern horizon. Hourly rates at this time are expected to be less than 1 no matter your location. With an entry velocity of 67 km/sec., most activity from this radiant would be of swift speed.

The **December chi Virginids (XVI)** were discovered in Japan by observers using data from SonotaCo. This source is active from November 26 through December 30 with maximum occurring on December 14th. The radiant is currently located at 11:51 (178) -03, which places it in western Virgo, 4 degrees south of the 4th magnitude star known as Zavijva (beta Virginis). Hourly rates should be less than 1 no matter your location. These meteors are best seen during the last dark hour before dawn, when the radiant lies highest above the eastern horizon in a dark sky. At 68 km/sec. the December chi Virginids would produce mostly swift meteors.

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 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 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	01:34 (023) +35	16	23:00	<1 - <1	III
Southern Taurids (STA)	Nov 05	04:01 (060) +15	24	01:00	1- 1	II
omicron Eridanids (OER)	Nov 05	04:05 (061) -02	27	01:00	<1 - <1	IV
Northern Taurids (NTA)	Nov 08	04:10 (063) +24	27	01:00	2 - 1	II
Southern chi Orionids (ORS)	Nov 28	04:27 (069) +17	28	02:00	<1 - <1	IV
November Orionids (NOO)	Nov 28	05:48 (087) +16	43	03:00	2 - 1	II
Monocerotids (MON)	Dec 10	05:58 (090) +10	44	03:00	2 - 1	II
alpha Canis Majorids (ACA)	Nov 21	06:29 (097) -18	44	04:00	<1 - <1	IV
sigma Hydrids (HYD)	Dec 07	07:34 (113) +05	60	05:00	<1 - <1	IV

alpha Monocerotids (AMO)	Nov 21	07:55 (119) +08	62	05:00	<1 - <1	III
theta Pyxidids (TPY)	Dec 01	08:52 (133) -26	60	06:00	<1 - <1	IV
November sigma Ursae Majorids (NSU)	Nov 23	09:56 (149) +59	55	07:00	<1 - <1	IV
Leonids (LEO)	Nov 17	10:31 (158) +19	70	08:00	1 - <1	I
November alpha Corvids (NAC)	Nov 28	10:48 (162) -14	67	08:00	<1 - <1	IV
December chi Virginids (XVI)	Dec 14	11:51 (178) -03	68	09:00	<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.