

## Lunar Meteor Schedule and Observing Plan for 2015

This form outlines the plan to monitor the moon on a regular basis both inside and outside normal annual showers. This effort is made to support the ongoing monitoring of the lunar earthshine for meteoroid impact flashes. Each month, for a total of 10 to 14 days per month, we are coordinating observations of the Earthshine portion of the moon for background (including the minor showers when they fall during this time) meteor impact flux. A typical run of observations starts three days after New Moon and continues until a day or two past First Quarter. The run resumes a day or two before Last Quarter and continues until three days prior to New Moon. The actual interval will depend on the lunar elevation and elongation as well as the ability of the observer to control stray light in one's system. In addition to the showers outlined below, there is weak activity from the Antihelion Source (ANT) from Dec. 10 to Sep. 10, with enhancements during March-April, late May, and late June, average meteoroid velocity is 30 km/s,  $r = 3.0$ , and their maximum ZHR = 4.

Shower	Activity	Maximum Date	$\lambda_{\odot}$	Radiant $\alpha$	$\delta$	$V_{\infty}$ km/s	$r$	ZHR
Quadrantids (QUA)	Dec 28 - Jan 12	Jan 03	283.16°	230°	+49°	41	2.1	120
$\alpha$ -Centaurids (ACE)	Jan 28 - Feb 21	Feb 08	319.2°	210°	-59°	56	2.0	6
<b><math>\gamma</math>-Normids (GNO)</b>	<b>Feb 25 - Mar 28</b>	<b>Mar 15</b>	<b>354°</b>	<b>239°</b>	<b>-50°</b>	<b>56</b>	<b>2.4</b>	<b>6</b>
<b>Lyrids (LYR)</b>	<b>Apr 16 - Apr 25</b>	<b>Apr 22</b>	<b>32.32°</b>	<b>271°</b>	<b>+34°</b>	<b>49</b>	<b>2.1</b>	<b>18</b>
$\pi$ -Puppids (PPU)	Apr 15 - Apr 28	Apr 24	33.5°	110°	-45°	18	2.0	Var
$\eta$ -Aquariids (ETA)	Apr 19 - May 28	May 06	45.5°	338°	-01°	66	2.4	40*
$\eta$ -Lyrids (ELY)	May 03 - May 14	May 09	48.0°	287°	+44°	43	3.0	3
June Bootids (JBO)	Jun 22 - Jul 02	Jun 27	95.7°	224°	+48°	18	2.2	Var
Piscis Austrinids (PAU)	Jul 15 - Aug 10	Jul 28	125°	341°	-30°	35	3.2	5
South. $\delta$ -Aqr (SDA)	Jul 12 - Aug 23	Jul 30	127°	340°	-16°	41	3.2	16
$\alpha$ -Capricornids (CAP)	Jul 03 - Aug 15	Jul 30	127°	307°	-10°	23	2.5	5
<b>Perseids (PER)*</b>	<b>Jul 17 - Aug 24</b>	<b>Aug 13</b>	<b>140.0°</b>	<b>48°</b>	<b>+58°</b>	<b>59</b>	<b>2.2</b>	<b>100</b>
<b><math>\kappa</math>-Cygnids (KCG)</b>	<b>Aug 03 - Aug 25</b>	<b>Aug 18</b>	<b>145°</b>	<b>286°</b>	<b>+59°</b>	<b>25</b>	<b>3.0</b>	<b>3</b>
$\alpha$ -Aurigids (AUR)	Aug 28 - Sep 05	Sep 01	158.6°	91°	+39°	66	2.5	6
<b>September <math>\epsilon</math>-Per (SPE)</b>	<b>Sep 05 - Sep 21</b>	<b>Sep 09</b>	<b>166.7°</b>	<b>48°</b>	<b>+40°</b>	<b>64</b>	<b>3.0</b>	<b>5</b>
<b>Draconids (DRA)</b>	<b>Oct 06 - Oct 10</b>	<b>Oct 09</b>	<b>195.4°</b>	<b>262°</b>	<b>+54°</b>	<b>20</b>	<b>2.6</b>	<b>Var</b>
<b>Southern Taurids (STA)</b>	<b>Sep 10 - Nov 20</b>	<b>Oct 10</b>	<b>197°</b>	<b>32°</b>	<b>+09°</b>	<b>27</b>	<b>2.3</b>	<b>5</b>
$\delta$ -Aurigids (DAU)	Oct 10 - Oct 18	Oct 11	198°	84°	+44°	64	3.0	2
<b><math>\epsilon</math>-Geminids (EGE)</b>	<b>Oct 14 - Oct 27</b>	<b>Oct 18</b>	<b>205°</b>	<b>102°</b>	<b>+27°</b>	<b>70</b>	<b>3.0</b>	<b>3</b>
<b>Orionids (ORI)</b>	<b>Oct 02 - Nov 07</b>	<b>Oct 21</b>	<b>208°</b>	<b>95°</b>	<b>+16°</b>	<b>66</b>	<b>2.5</b>	<b>15*</b>
Leo Minorids (LMI)	Oct 19 - Oct 27	Oct 24	211°	162°	+37°	62	3.0	2
<b>Northern Taurids (NTA)</b>	<b>Oct 20 - Dec 10</b>	<b>Nov 12</b>	<b>230°</b>	<b>58°</b>	<b>+22°</b>	<b>29</b>	<b>2.3</b>	<b>5</b>
<b>Leonids (LEO)</b>	<b>Nov 06- Nov 30</b>	<b>Nov 18</b>	<b>235.27°</b>	<b>152°</b>	<b>+22°</b>	<b>71</b>	<b>2.5</b>	<b>15*</b>
$\alpha$ -Monocerotids (AMO)	Nov 15 - Nov 25	Nov 22	239.32°	117°	+01°	65	2.4	Var
<b>Phoenicids (PHO)</b>	<b>Nov 28 - Dec 09</b>	<b>Dec 06</b>	<b>254.25°</b>	<b>18°</b>	<b>-53°</b>	<b>18</b>	<b>2.8</b>	<b>Var</b>
<b>Puppids-Velids (PUP)</b>	<b>Dec 01 - Dec 15</b>	<b>(Dec 07)</b>	<b>(255°)</b>	<b>123°</b>	<b>-45°</b>	<b>40</b>	<b>2.9</b>	<b>10</b>
Monocerotids (MON)	Nov 27 - Dec 17	Dec 09	257°	100°	+08°	42	3.0	2
$\sigma$ -Hydrids (HYD)	Dec 03 - Dec 15	Dec 12	260°	127°	+02°	58	3.0	3
<b>Geminids (GEM)</b>	<b>Dec 04 - Dec 17</b>	<b>Dec 14</b>	<b>262.2°</b>	<b>112°</b>	<b>+33°</b>	<b>35</b>	<b>2.6</b>	<b>120</b>
<b>Comae Berenicids (COM)</b>	<b>Dec 12 - Dec 23</b>	<b>Dec 16</b>	<b>264°</b>	<b>175°</b>	<b>+18°</b>	<b>65</b>	<b>3.0</b>	<b>3</b>
<b>Dec. Leo Minorids (DLM)</b>	<b>Dec 05 - Feb 04</b>	<b>Dec 20</b>	<b>268°</b>	<b>161°</b>	<b>+30°</b>	<b>64</b>	<b>3.0</b>	<b>5</b>
Ursids (URS)	Dec 17 - Dec 26	Dec 23	270.7°	217°	+76°	33	3.0	10

**Table.** Working list of meteor showers, courtesy of the International Meteor Organization.

Observations of the moon during annual showers will occur during routine monthly observations, but observers who are limited in terms of time spent observing are encouraged to plan for annual showers first of all and to observe for a day or two either side of (and including) shower maximum..

The table on the previous page, from the Working list of meteor showers published annually at [www.imo.net](http://www.imo.net) (the International Meteor Organization) shows information about the annual showers. Entries in bold delineate a shower that is favored for lunar activity. The shower name and IMO designation is given in the first column. The interval of activity is presented in the second column with the date of maximum (Earth-based) in the third column. The velocity of the meteoroids at infinity is presented in the next column, which is followed by the population index. The population index,  $r$ , is a measure of the distribution of meteoroid sizes at maximum. A larger value of  $r$  indicates a larger proportion of smaller particles, and is less favorable for lunar meteor studies. Smaller  $r$ -values indicate more large particles, translating into a greater probability of observing lunar impacts. Finally, the Zenithal Hourly Rate, as observed on Earth, is given.

We encourage observers to watch the moon a day or two before and after the predicted peak date. The difference in ZHR peak time from Earth to the moon is up to  $\pm 7$  hours...later for evening phase, earlier for morning phase. Some showers, such as the Orionids, have a broader peak, while others like the Quadrantids have a narrower peak. The dates of monthly observations are given in the next table. Routine monthly observations usually take place from 3-4 days after New Moon to First Quarter, then Last quarter to 3-4 days prior to new moon. The actual cutoff date near New Moon depends on ecliptic angle for a given location.

<b>Last Quarter</b>	<b>Observing Interval</b>	<b>New Moon</b>	<b>Observing Interval</b>	<b>First Quarter</b>
Jan. 13	Jan. 11 – 16	Jan. 20	Jan. 24 - 29	Jan. 27
Feb. 12	Feb. 10 – 14	Feb.18	Feb. 22 – 27	Feb. 25
March 13	Mar. 11 – 17	March 20	Mar. 24 – 29	Mar. 27
April 12	Apr. 10 – 15	April 18	Apr. 21 – 27	Apr. 25
May 11	May 9 – 15	May 18	May 22 – 27	May 25
June 9	June 7 – 12	June 16	June 20 - 26	June 24
July 8	July 6 – 12	July 16	July 20 – July 26	July 24
Aug. 7	Aug. 5 – 11	Aug. 14	Aug.17 – Aug. 24	Aug. 22
Sept. 5	Sep. 3 – 10	Sep. 13	Sep. 16 – Sep. 23	Sept. 21
Oct. 4	Oct. 2 – 10	Oct. 13	Oct. 17 – Oct. 22	Oct. 20
Nov. 3	Nov. 1 – 8	Nov. 11	Nov. 14 – Nov.21	Nov. 19
Dec. 3	Dec. 1 – 8	Dec. 11	Dec. 14 – 20	Dec. 18

Any questions concerning this plan can be directed to the ALPO Lunar Meteoritic Impact Search Coordinator, Mr. Brian Cudnik, at [cudnik@sbcglobal.net](mailto:cudnik@sbcglobal.net).