



6

PlanIt! for Photographers

ALL-IN-ONE PLANNING APP FOR LANDSCAPE PHOTOGRAPHERS

QUICK USER GUIDES



Night Photography

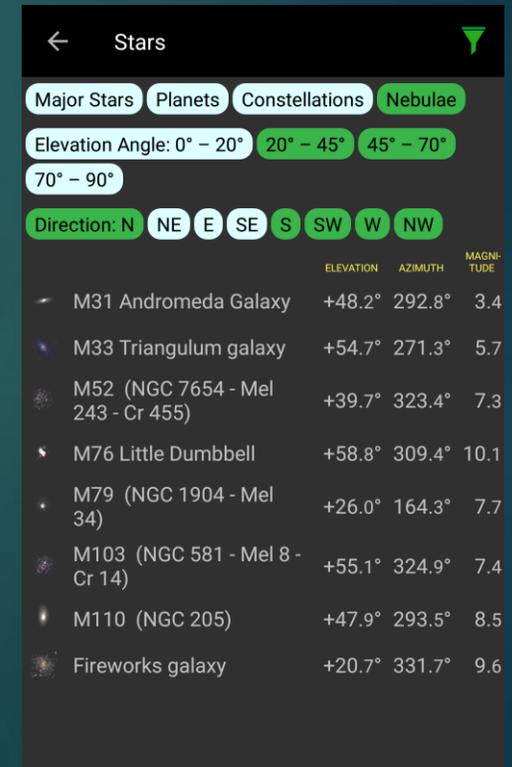
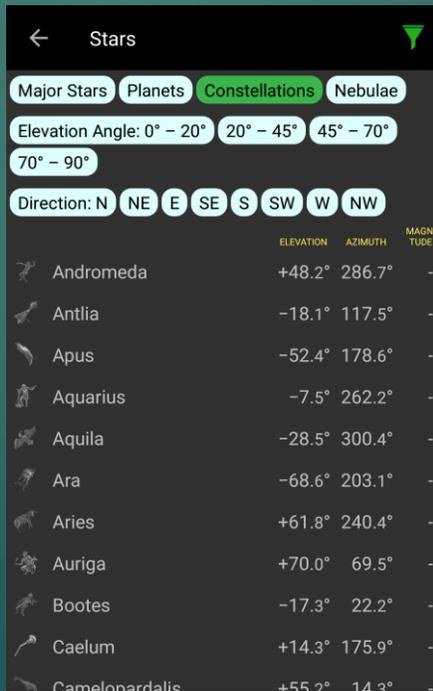
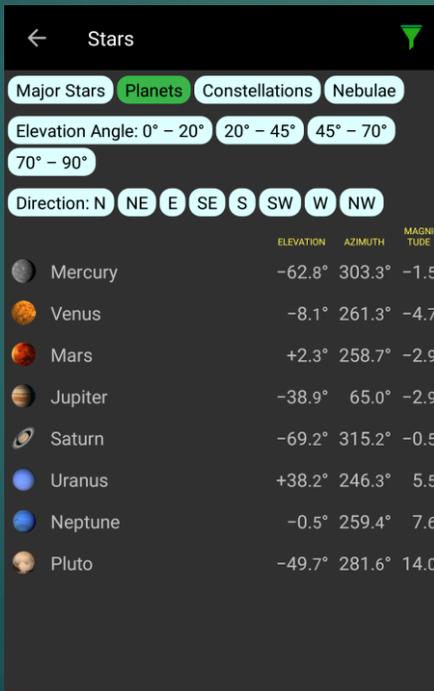
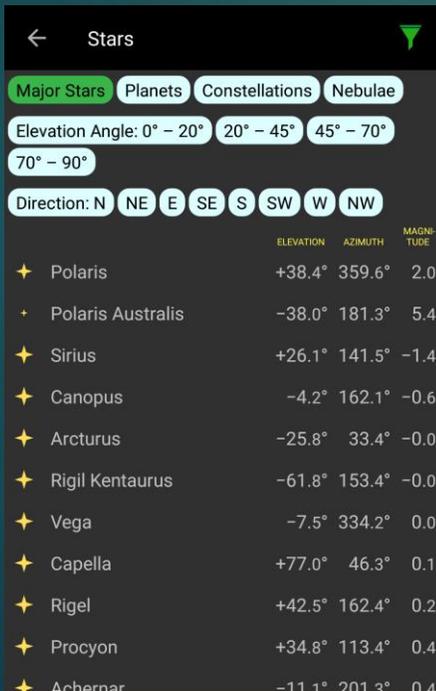
Stars and Star Trails



The Stars and Star Trails page offers many functions. The first function is to find major stars, planets, constellations, and nebula position in the sky at any given time and location. See the red rectangular area below.



Tap on the star name, and you will see the star list, which you can filter by type. You can even filter them by their positions. Suppose you are doing deep sky photography for a nebula. You want it to be high enough but not too high. The east side has a big city so you want to avoid the light pollution from that direction. You can select the elevation angle to be from 20° to 70° and include all directions except east. See the screenshot on the right.

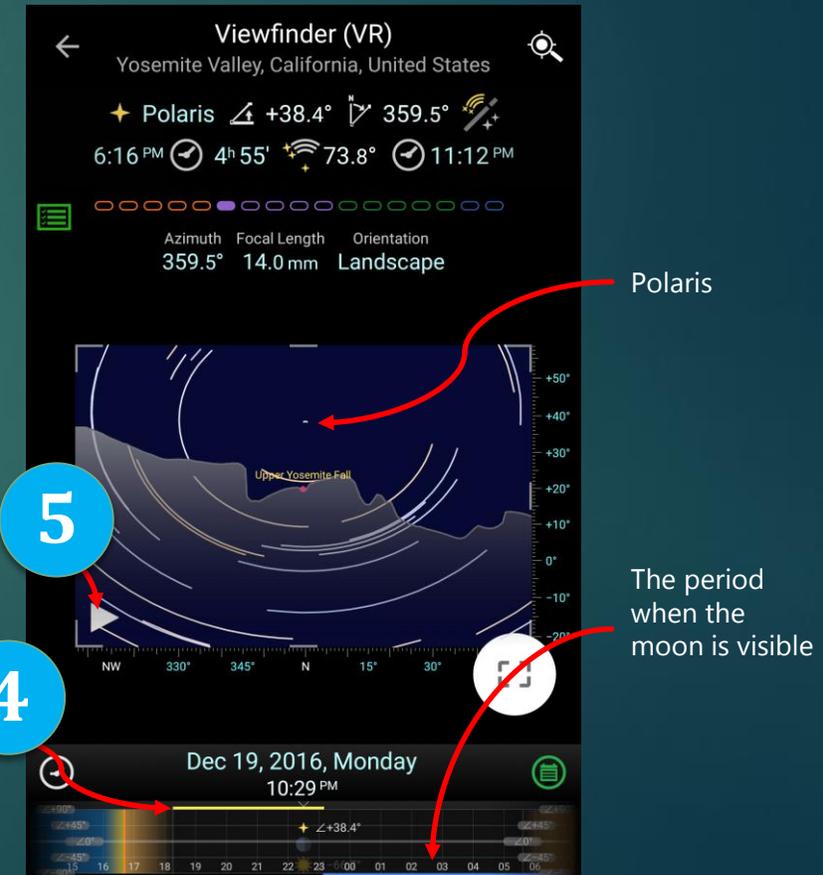
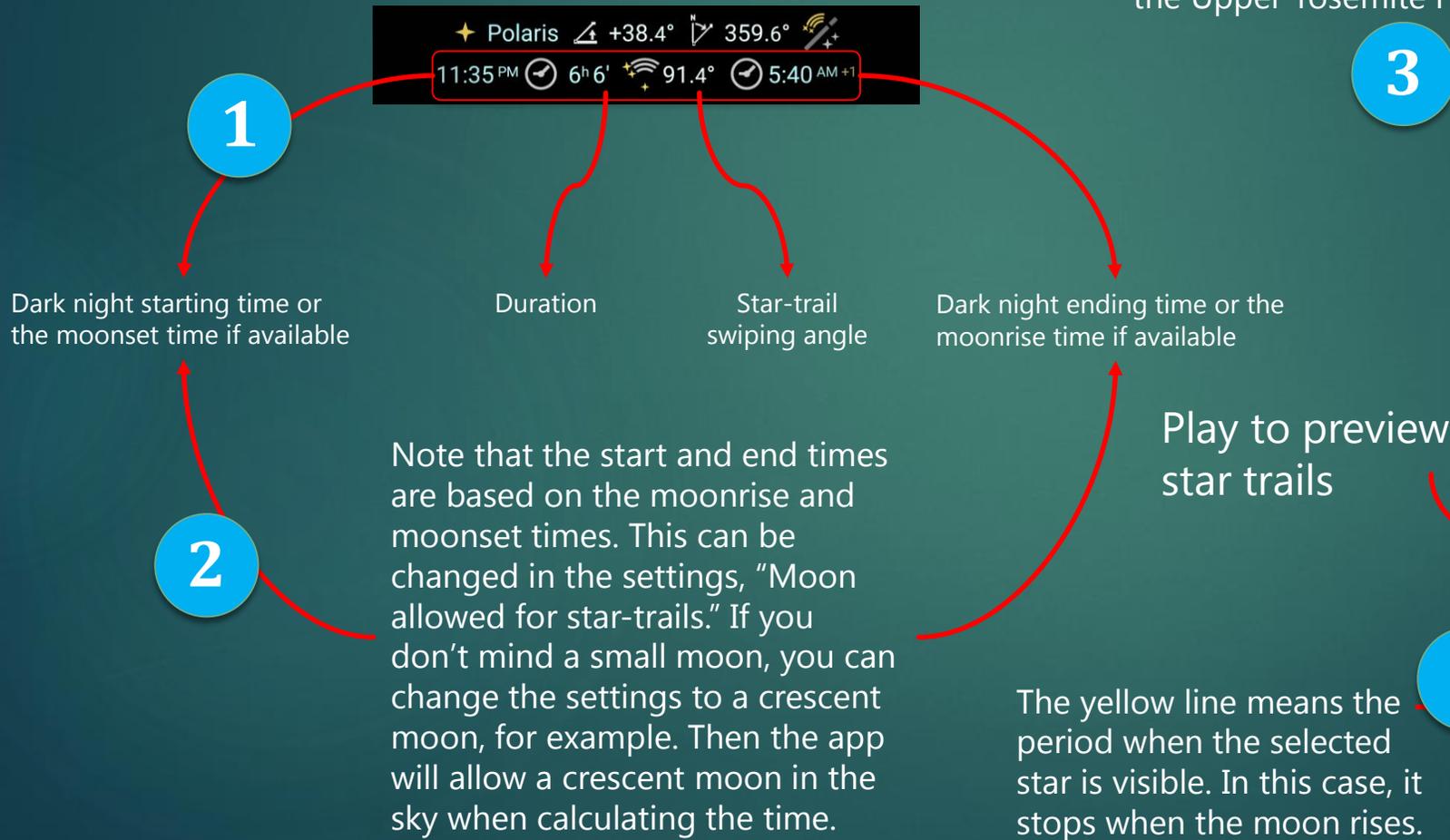


Star Trails and Their Simulation



The second function is to pick a good time to start a star-trail photo. That's when the night is dark enough and (optionally) not affected by the Moon.

If you setup the plan, you can also preview the star-trails length and composition in the viewfinder. This simulation below is the star-trails starting from 18:16 to 22:29. As you can see, I aligned the Polaris with the Upper Yosemite Fall to create a more attractive composition.



Avoid Star Trails– The 500 Rule



Another function of this page is to help you determine the maximum shutter speed you can use without creating star trails without creating star trails. It is the so-called 500 Rules.

🕒 2:55 AM +1

1- 11:34 PM 🕒

4

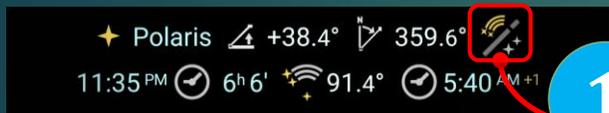
Sometimes you see a superscript "+1" after the time value like the one. It means it is a time of the next day of the current date.

If the superscript "1-" is before the time value, it means the a time of the previous day of the current date.

What does this mean is: in order to avoid star movement in your photo, if you are using 14 mm lens, you need to keep the shutter speed less than 36 seconds.

You can tap on the focal length value to change the focal length.

To get to the 500 Rule, tap this toggle button

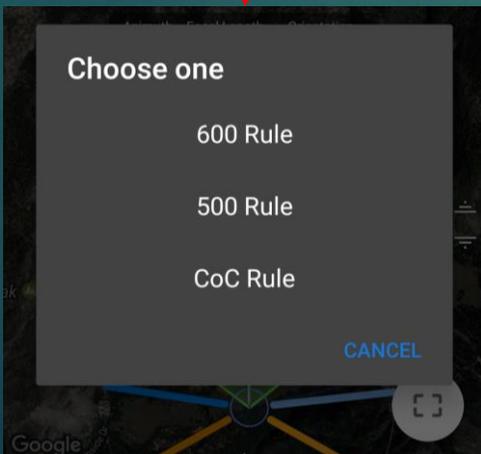


1



3

2



You can also select another rule to avoid creating star trails. The 600 Rule is looser than the 500 Rule. If you have a slow lens (slower than f4 for example), you can consider using this rule. The CoC Rule (CoC means circle of confusion) is a rule we invented. The theory behind this rule is to calculate the movement of stars so they blur on the camera's sensor. The CoC Rule is the strictest of all three rules. If you have a faster lens (faster than f2 for example, and usually a prime lens), you may consider adopting this rule to achieve the maximum sharpness of the stars in your photos.

The Milky Way



Background

The Milky Way is a very interesting subject for night sky photography. For those who have never seen the Milky Way, the first sight of it is breathtaking. The Milky Way looks like a 360° band around the Earth. Because we are on the Earth, we can see only half of the whole band. Some part of the band is dim. What photographers are interested in the most is the brightest part of the band -the Milky Way center, which is also known as the galaxy center or the galaxy core. We call it MWC in short in this app.

Here's some background information of how the Milky Way moves to help you understand the design of the two Milky Way related pages in the app.

The Milky Way, just like the stars, is not moving relative to the Earth center (at least in our times). It is the Earth's self-rotation that makes the Milky Way look as if it was "moving." Although we count 24 hours as a day (the solar day), it takes the Earth 23 hours, 56 minutes and 4.1 seconds to rotate once (also known as the sidereal day). In other words, if you see the Milky Way at a certain position in the sky at 9:00 p.m. tonight, after 23 hours, 56 minutes and 4.1 seconds, which is about 8:56 p.m. tomorrow, you will see it again at the exact same position. Then the day after tomorrow will be at 8:52 p.m., and so on.

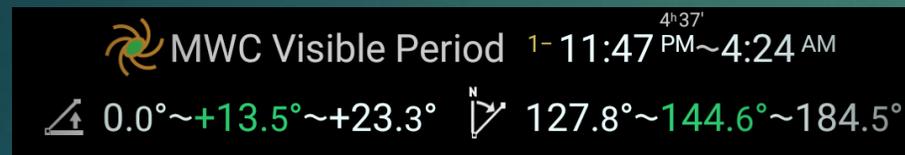
At any location on the Earth, the Milky Way moves and repeats itself every day. However, in some cases, the sky is too bright to see the Milky Way. So finding the Milky Way is not really about finding the position (because the positions are fixed), but finding the time that is dark enough to photograph it .

Two Milky Way Pages



We put all Milky Way related features onto two pages.

The Milky Way Center page: it shows the Milky Way's azimuth range and elevation angle range as well as its center position .

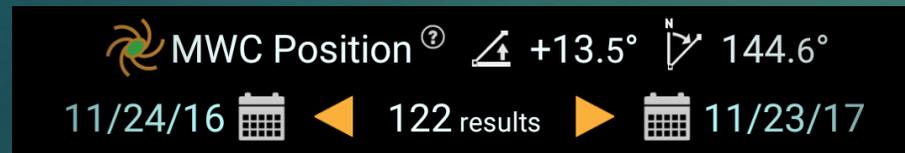
A screenshot of the Milky Way Center page. It displays the "MWC Visible Period" as 1- 11:47^{4h37'} PM ~ 4:24 AM. Below this, it shows the elevation angle range as 0.0° ~ +13.5° ~ +23.3° and the azimuth range as 127.8° ~ 144.6° ~ 184.5°. A red arrow points from the right side of this screenshot towards the text on the right.

MWC Visible Period 1- 11:47^{4h37'} PM ~ 4:24 AM
0.0° ~ +13.5° ~ +23.3° 127.8° ~ 144.6° ~ 184.5°

When to use which page?

If you want to find out whether the Milky Way is visible on a given date, check the Milky Way Center page. You can use it with the Event page, which shows the list of events when the MWC or the MW arch is at a certain position.

The Milky Way Seeker page: this page lists the dates/times when the sky is dark enough to see the Milky Way at a certain position.

A screenshot of the Milky Way Seeker page. It displays the "MWC Position" as +13.5° and 144.6°. Below this, it shows the date range as 11/24/16 to 11/23/17 with a calendar icon, and "122 results" with left and right navigation arrows. A red arrow points from the right side of this screenshot towards the text on the right.

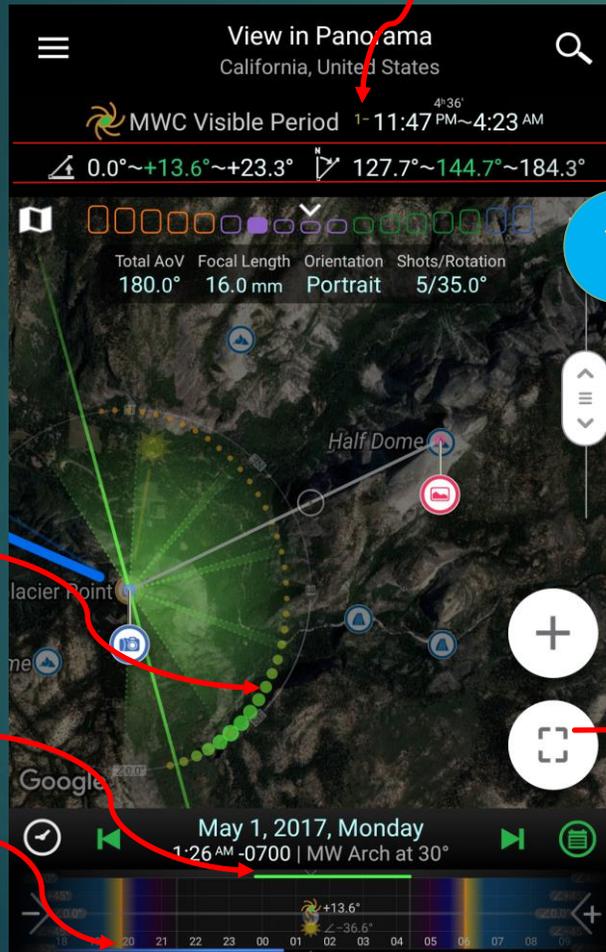
MWC Position[?] +13.5° 144.6°
11/24/16 122 results 11/23/17

If you want to take photos of the Milky Way at a given location for a certain composition, use the Milky Way Seeker page to find out all the possible dark nights at your selected location .

The Milky Way Center



Let's set our camera location at the Glacier Point in Yosemite National Park. With a nice view of the Half Dome on the east, it is a perfect location to take Milky Way arch photos. On May 1, 2017, the Milky Way center is visible from 11:47 p.m. to 4:23 a.m. The superscript "1-" before 11:47 p.m. means the time is in the previous day. 4^h37' is the duration.



MWC

2

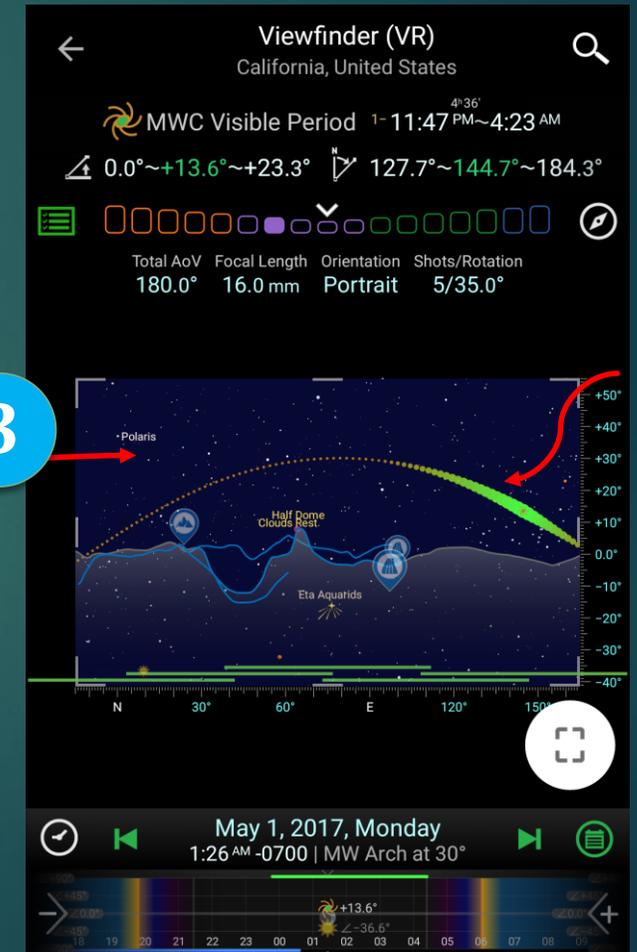
MWC Visible Period

Moon Visible Period

For the whole duration mentioned above, the MWC elevation angle range is 0° to 23.3° , and the azimuth range is 127.8° to 184.5° . At the current time of 1:25 a.m., (see the time on the bottom), the MWC is at the 13.5° elevation angle and 144.6° azimuth.

You can actually see the MW shape on the map (left), but it is very hard to visualize your composition. That's why we created a simulated viewfinder view of it (see the right)

Wow, the viewfinder view is way cooler, but does the map view have any use in this case? Yes. You can see where the Moon is in the map mode but you can't see it in the VF view if the Moon is in the back. Sometimes, you can take foreground pictures when the Moon is up, and then take MW arch pictures when the Moon is down, and blend them together in post processing – a technique many night photographers use.



MWC

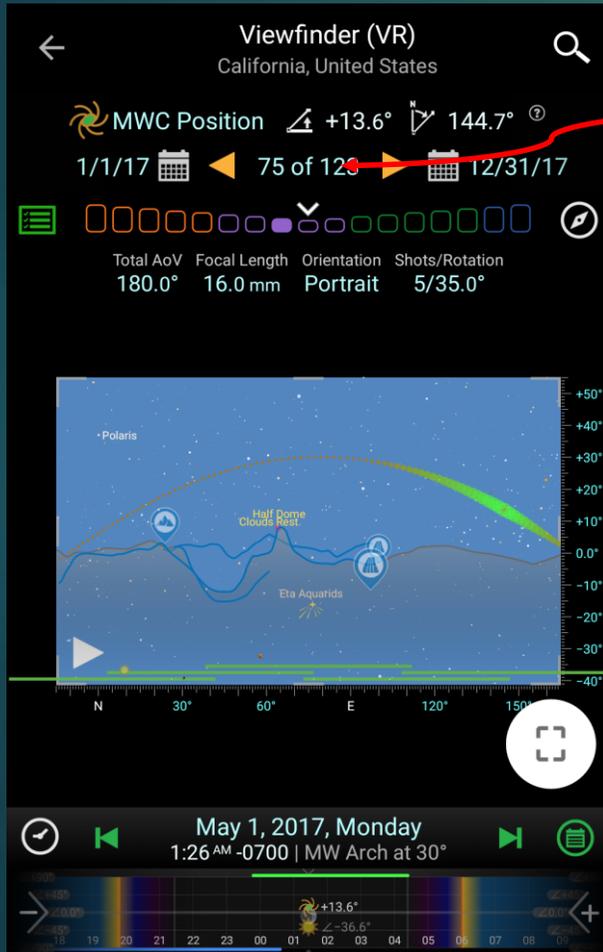
3

May 1, 2017, Monday
1:26 AM - 0700 | MW Arch at 30°



The Milky Way Seeker

From the previous MWC page, we learned that we can photograph the MW arch over the Half Dome on May 1, 2017. However, you may not have time to visit the place. So an obvious question would be what other dates are also possible to take the same photo? Just switch to the Milky Way Seeker page.

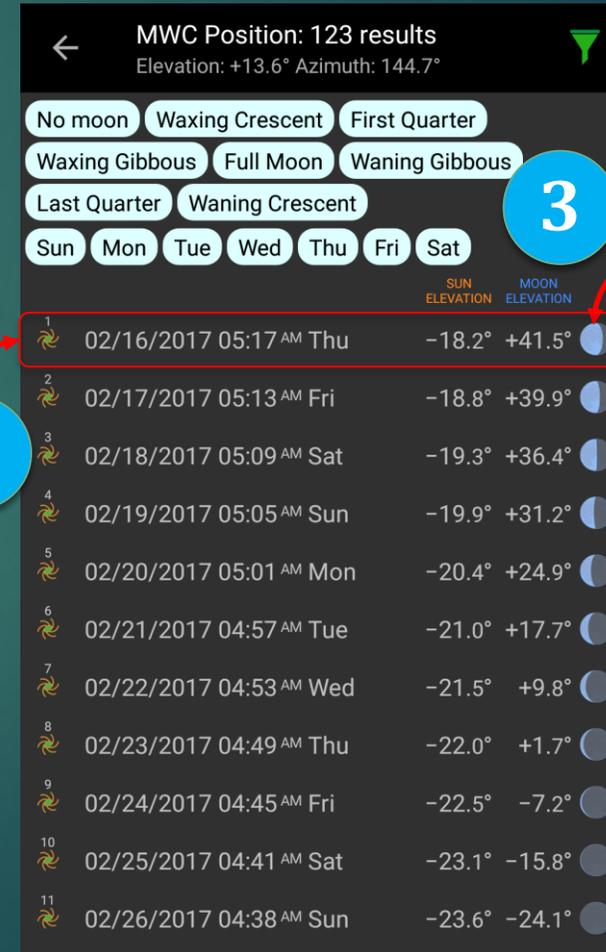


1

Changing the time range to the whole year of 2017, you will see it says 122 results immediately. Just tap on it to see the result list on the right.

You can see from the right, 2/16/2017 is the first date in 2017 when you can see MW arch's top at the 30° elevation angle. However, it is not a good time to go. Why? Just pay attention to the Sun elevation. It was at -18.2° elevation on 5:17 a.m., which means it is about to rise. In addition to the Sun, a gibbous Moon is also high in the sky.

2



3

Moon Elevation. It is very important when you take MW photos.

Filtering the MW Results

Now we get 123 results back, but they don't have the same light condition. We need to analyze them carefully to make the best choices. The first thing we can use is the filter. If you recall the Sun/Moon Finder results, there is also a similar filter area.

← MWC Position: 123 results
Elevation: +13.6° Azimuth: 144.7°

No moon
 Waxing Crescent
 First Quarter
 Waxing Gibbous
 Full Moon
 Waning Gibbous
 Last Quarter
 Waning Crescent
 Sun
 Mon
 Tue
 Wed
 Thu
 Fri
 Sat

		SUN ELEVATION	MOON ELEVATION	
1	02/16/2017 05:17 AM Thu	-18.2°	+41.5°	☾
2	02/17/2017 05:13 AM Fri	-18.8°	+39.9°	☾
3	02/18/2017 05:09 AM Sat	-19.3°	+36.4°	☾
4	02/19/2017 05:05 AM Sun	-19.9°	+31.2°	☾
5	02/20/2017 05:01 AM Mon	-20.4°	+24.9°	☾
6	02/21/2017 04:57 AM Tue	-21.0°	+17.7°	☾
7	02/22/2017 04:53 AM Wed	-21.5°	+9.8°	☾
8	02/23/2017 04:49 AM Thu	-22.0°	+1.7°	☾
9	02/24/2017 04:45 AM Fri	-22.5°	-7.2°	☾
10	02/25/2017 04:41 AM Sat	-23.1°	-15.8°	☾
11	02/26/2017 04:38 AM Sun	-23.6°	-24.1°	☾

1

2

Usually I will select No Moon, Waxing Crescent, and Waning Crescent. It cuts the results down to 68. No Moon is good because the night will be so dark that the MW will be very bright. The crescent Moon is also good as it will light up the foreground while the MW is still visible.

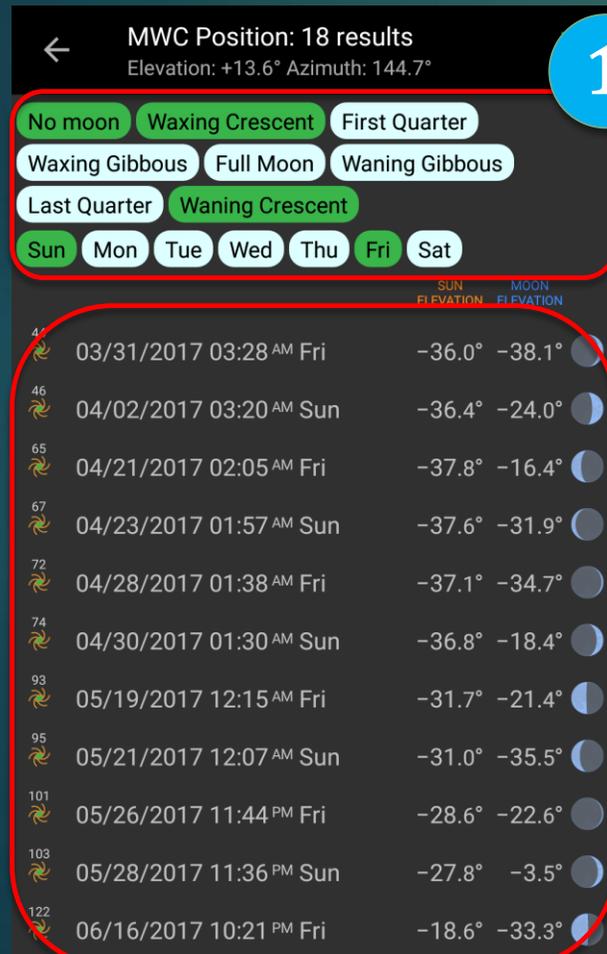
← MWC Position: 68 results
Elevation: +13.6° Azimuth: 144.7°

No moon
 Waxing Crescent
 First Quarter
 Waxing Gibbous
 Full Moon
 Waning Gibbous
 Last Quarter
 Waning Crescent
 Sun
 Mon
 Tue
 Wed
 Thu
 Fri
 Sat

		SUN ELEVATION	MOON ELEVATION	
4	02/19/2017 05:05 AM Sun	-19.9°	+31.2°	☾
5	02/20/2017 05:01 AM Mon	-20.4°	+24.9°	☾
6	02/21/2017 04:57 AM Tue	-21.0°	+17.7°	☾
7	02/22/2017 04:53 AM Wed	-21.5°	+9.8°	☾
8	02/23/2017 04:49 AM Thu	-22.0°	+1.7°	☾
9	02/24/2017 04:45 AM Fri	-22.5°	-7.2°	☾
10	02/25/2017 04:41 AM Sat	-23.1°	-15.8°	☾
11	02/26/2017 04:38 AM Sun	-23.6°	-24.1°	☾
12	02/27/2017 04:34 AM Mon	-24.1°	-31.6°	☾
13	02/28/2017 04:30 AM Tue	-24.6°	-37.8°	☾
14	03/01/2017 04:26 AM Wed	-25.1°	-41.8°	☾

Finding the Perfect Nights

Now I applied one more filter – only the weekends. Here is a list of dates in 2017 when you could possibly take the photos during weekends when there is no Moon or only a crescent Moon. Not many opportunities!



But there is one more thing we haven't considered. The Glacier Point isn't open all year long. It closes in the winter and opens in the spring. From the table on the right, you can see the list of dates when it opens. Even if it opens on March 28, which is the earliest date in the last seven years, only 11 days are possible. If it would open on May 29 as in 2010, there would be only one possible day.

From this example, you can see how important it is to plan ahead, and how easy this app is to plan your shoot with other resources.

2

Year	Glacier Point Opened	Glacier Point Closed
2016	Apr 19	Nov 16
2015	Mar 28	Nov 2
2014	Apr 14	Nov 28
2013	May 3	Nov 18
2012	Apr 20	Nov 8
2011	May 27	Nov 19
2010	May 29	Nov 7

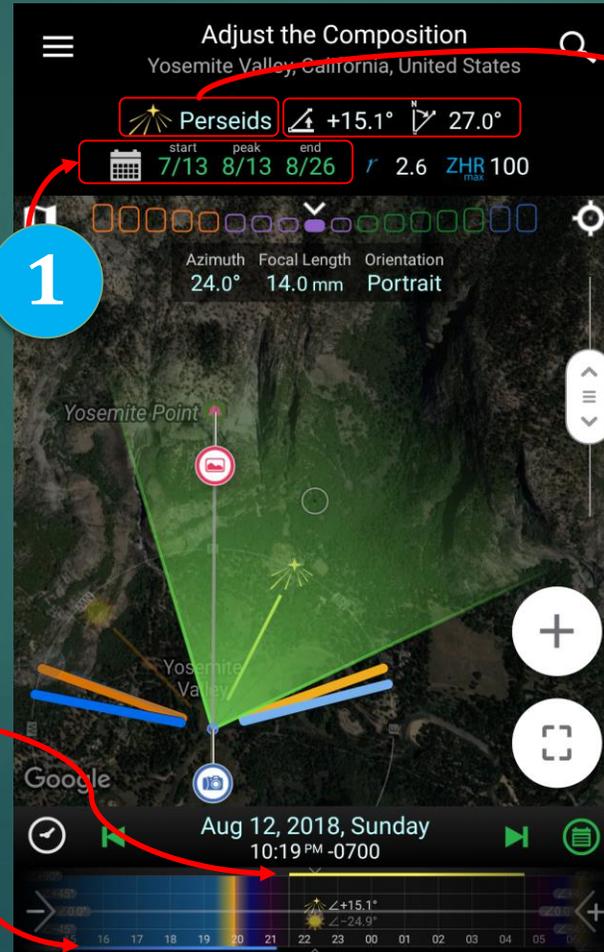
Data from : <https://www.nps.gov/yose/planyourvisit/tiogaopen.htm>

Meteor Showers



During a meteor shower, we might see a meteor anywhere in the sky but the direction of motion, when traced back, will point to the **radiant**. A meteor that does not point back to the known radiant for a given shower is known as a *sporadic* and is not considered part of that shower. When we photograph a meteor shower, our goal is to capture as many meteors as possible, which means we need to point the camera at the right direction in the sky.

The three dates are the starting, peak, and ending dates of the meteor shower. You can press on one of them to set the current date to it. In the viewfinder, we will only show the meteor shower icon at its position when the current day is between the starting and the ending date. The date is usually white. If green, it means the current date is in the range so the meteor shower is active.



Meteor Shower Visible Period

Moon Visible Period

A tap on the meteor shower's name will allow you to choose a meteor shower. The app listed over 20 meteor showers. The big ones are Quadrantids in January, Perseids in August, and Geminids in December.

For any meteor shower, the app lists two important factors for you to determine if the meteor shower is good. ZHR, also known as **Zenithal Hourly Rate**, which is the number of meteors a single observer would see in an hour of peak activity. The second factor is *r-value*, which indicates the magnitude distribution of a meteor shower. It ranges from 2.0 to 3.0, or from the brightest to the dimmest. Anything below 2.5 are considered as bright.

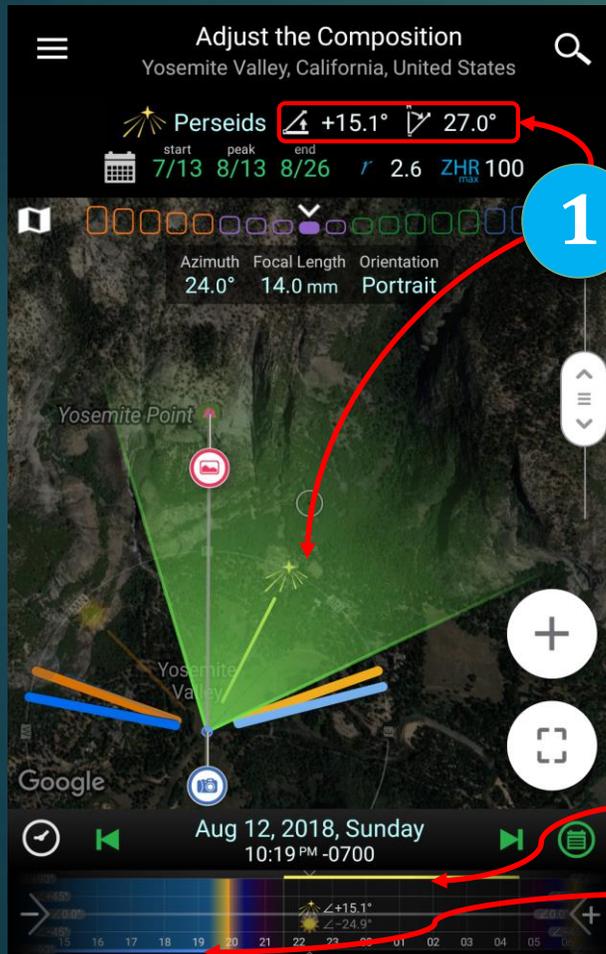
	PEAK	r	ZHR	ELEVATION	AZMUTH
Quadrantids	1/3	2.1	120	+39.6°	306.9°
Lyrids	4/22	2.1	18	+66.7°	264.5°
Eta Aquarids	5/7	2.4	60	+37.7°	126.9°
Delta Aquarids	7/30	3.2	20	+24.0°	136.6°
Perseids	8/13	2.6	100	+22.3°	33.9°
Orionids	10/22	2.5	20	-32.7°	27.5°
Leonids	11/18	2.5	15	-22.9°	325.2°
Geminids	12/13	2.6	120	-20.0°	5.8°
Ursids	12/22	3.0	10	+38.2°	339.8°
Alpha Centaurids	2/8	2.0	6	-31.5°	217.2°
Eta Lyrids	5/10	3.0	3	+81.5°	311.3°
Alpha Capricornids	7/30	2.5	5	+42.0°	173.0°
Kappa Cygnids	8/18	3.0	3	+65.1°	331.6°
Aurigids	9/1	2.6	6	-8.6°	22.6°
September Epsilon	9/9	2.9	5	+11.8°	47.9°
Southern Taurids	10/10	2.3	5	+3.6°	82.5°
Epsilon Geminids	10/22	3.0	3	-23.7°	14.8°
Leonis Minorids	10/22	2.7	2	-6.2°	328.2°
Northern Taurids	11/11	2.3	5	-7.0°	54.9°
November Orionids	11/29	2.3	3	-30.8°	32.4°
Sigma Hydrids	12/6	3.0	3	-50.0°	354.9°
Puppil/Velids	12/7	2.9	10	-82.3°	197.6°
Monocerotids	12/9	3.0	2	-40.7°	26.2°
Dec. Leonis Minorids	12/17	3.0	5	-12.8°	325.6°
Coma Berenicids	12/31	3.0	5	-15.9°	295.2°

Composition in Meteor Showers



To capture as many meteors as possible, you should include the meteor shower radiant in the frame and leave some margin around it so that you can capture the whole meteor trace.

First of all, I choose a date in a meteor shower active period. In this example, I select the night of Aug 13-14, 2018 because it is a crescent Moon that night. Secondly, I choose a 14 mm lens so that it captures a very wide angle of view. Now I will decide my composition in the simulated viewfinder.



1

These two angles indicate the position of the meteor shower radiant.

In the viewfinder, I set the time to the starting time when the sky is dark enough (without the Moon if possible). Then I drag the time slider to see the meteor shower icon move across the viewfinder until the sky gets bright. I will make sure it is visible in the frame for the whole period with enough margin.

Meteor Shower Visible Period

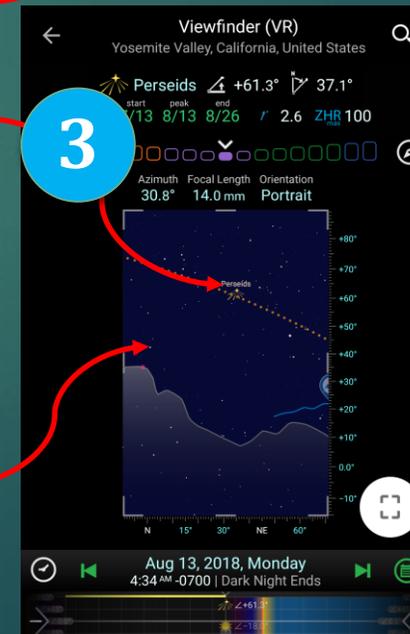
Moon Visible Period



2

Starting Position

Ending Position



3

Polaris, which doesn't move

If you are doing a time lapse, you don't need to worry about this one but if you will post-process all meteors into one picture, there is one more thing you need to pay attention to when you compose the frame. You want to include the **Polaris** in the frame if possible. Why? Because the stars are moving so when we merge all meteors into one, we will rotate the sky portion so that the stars are aligned. Having Polaris will make the rotation easier. Please watch this video by David Kingham to find out more.

<https://youtu.be/u7JVwSX1iAg>

A Dark Sky



For any astrophotography, finding a dark location is the most important step. With the light pollution from the modern urban expansion, we see fewer and fewer stars. That's why we build in a dark sky map into the app.

Dark sky brightness unit

- Bortle Scale
- Surface Brightness
- Factor to Natural Sky
- Naked Eye Limiting Mag.
- Est. Visible Stars

CANCEL

1

Set the Camera/Scene Location
Somerset, California, United States

Bortle Scale: Class 4 (Rural/suburban)

2

3

Latitude: 38.623547° Longitude: -120.578444° Elevation: 3042.10 ft

Aug 13, 2018, Monday
4:34 AM -0700 | Dark Night Ends

2

The Bortle Scale for this location

You can tap on the dark sky value or the color circle to find out what the value means.

4

Tap a row if you want to change the default dark sky unit

Sky condition at the camera location

Bortle Scale
Class 2 (Typical truly dark)

Surface Brightness
21.93 - 21.89 mag/arcsec²

Factor to Natural Sky
0.06 - 0.11

CLOSE

Choose a different unit to describe the dark sky. We use the Bortle Scale by default because it is a simple number from 1 to 9.

The Bortle Scale

▶ 1: Excellent dark-sky site	●	↑ Good
▶ 2: Typical truly dark site	●	
▶ 3: Rural sky	● ●	
▶ 4: Rural/suburban transition	● ●	
<hr/>		
▶ 5: Suburban sky	● ● ●	Possible
▶ 6: Bright suburban sky	●	
<hr/>		
▶ 7: Suburban/urban transition	●	↓ Bad
▶ 8: City sky	●	
▶ 9: Inner-city sky	●	