



# So You Want to Photograph the Milky Way? (and meteors)

Don Nelson

September 1, 2016

No star trails here ...that's a separate set of issues.

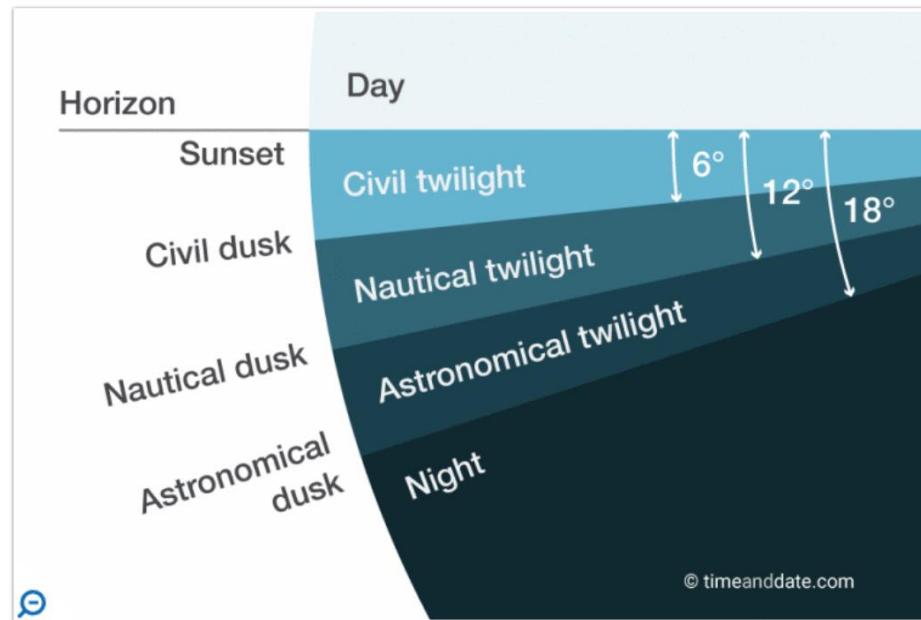
What do you need to know?

- When
- Where
- How
- Post Processing opportunities
- It is SO EASY with digital. Not so with film.
- Give it a try. There is still time now in early September.

# Astronomical Twilight - go to timeanddate.com

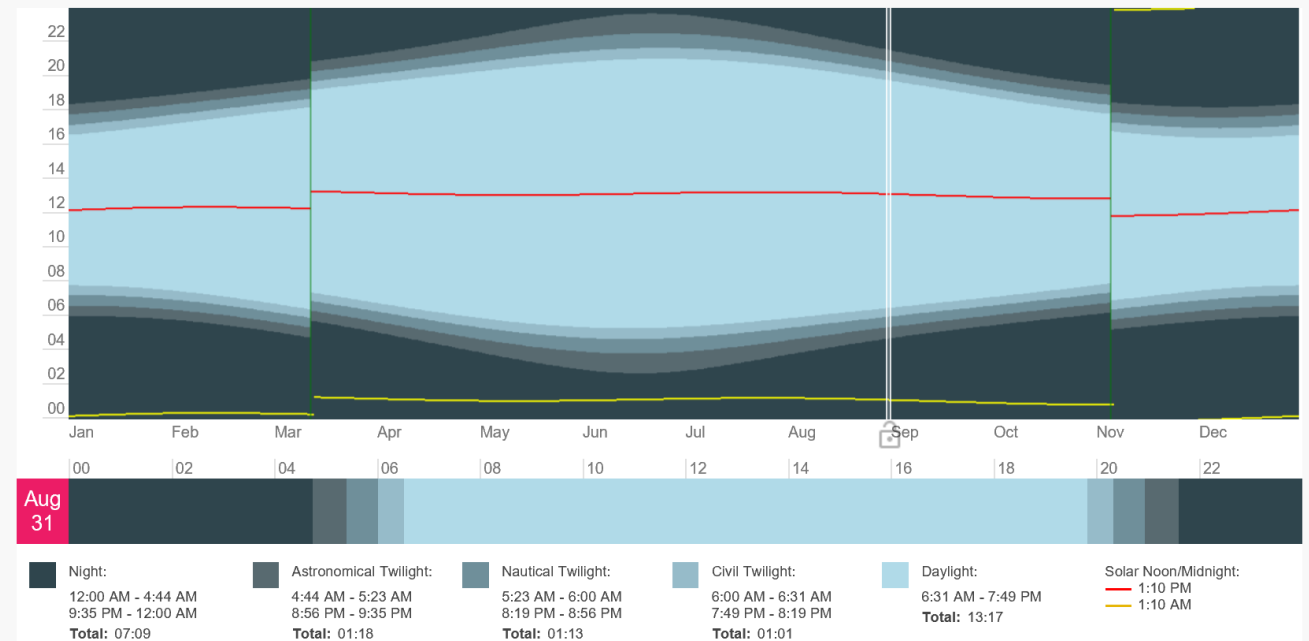
- In the morning, the sky is completely dark before the onset of astronomical twilight
- In the evening, the sky becomes completely dark at the end of astronomical twilight.
- Any celestial bodies that can be viewed by the naked eye can be observed in the sky after the end of this phase in the evening and before this in the morning.

## Civil Twilight, Dawn, and Dusk



Different degrees of twilight

## Yearly Sun Graph for Portland

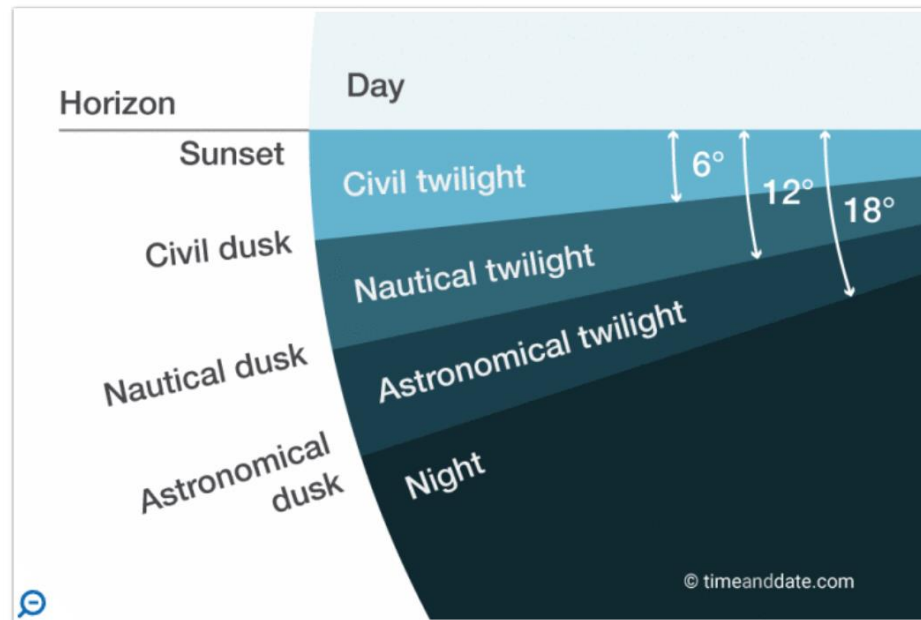


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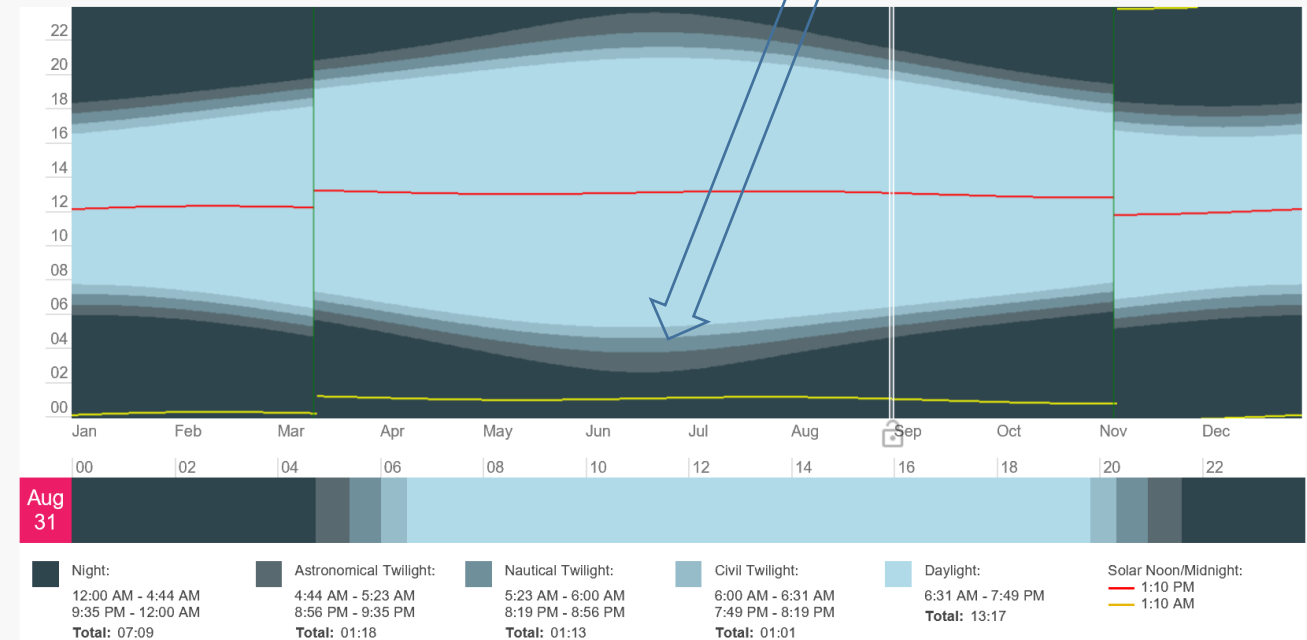
Not much dark time  
In mid summer

## Civil Twilight, Dawn, and Dusk



Different degrees of twilight

## Yearly Sun Graph for Portland



Obvious...

- Don't plan on photographing on cloudy nights
  - Coastal fog can be a problem
  - Smoke from forest fires is a real issue in late summer (eastern OR-WA)
- 
- Your eyes get blinded by bright white flashlight
  - It will take ten minutes to fully recover
  - Cover your flashlight with red rubylith
  - Or get a red headlamp --- just don't shine it on everyone around you

# Time of month set by the Moon

Moon Rise/Set/Phase --- [www.timeanddate.com](http://www.timeanddate.com)

2016	Moonrise/Moonset			Meridian Passing		
Sep	Moonrise	Moonset	Moonrise	Time	Distance (mi)	Illumination
● 1	6:51 AM ↗(80°)	8:03 PM ↖(277°)	-	1:31 PM (49.9°)	245,159	0.2%
2	7:53 AM ↗(86°)	8:31 PM ↖(271°)	-	2:16 PM (45.9°)	247,271	2.3%
3	8:54 AM ↗(91°)	8:58 PM ↖(266°)	-	3:00 PM (41.9°)	249,125	6.3%
4	9:54 AM ↗(97°)	9:26 PM ↖(260°)	-	3:43 PM (38.0°)	250,572	12.0%
5	10:53 AM ↗(102°)	9:54 PM ↖(255°)	-	4:27 PM (34.4°)	251,463	19.1%
6	11:51 AM ↗(107°)	10:25 PM ↖(251°)	-	5:11 PM (31.3°)	251,671	27.3%
7	12:48 PM ↗(111°)	10:59 PM ↖(247°)	-	5:56 PM (28.7°)	251,100	36.4%
8	1:44 PM ↗(114°)	11:37 PM ↖(245°)	-	6:42 PM (26.7°)	249,708	46.1%
☾ 9	2:38 PM ↗(116°)	-	-	7:30 PM (25.5°)	247,516	56.1%
10	-	12:20 AM ↖(243°)	3:30 PM ↗(117°)	8:20 PM (25.3°)	244,618	66.0%
11	-	1:10 AM ↖(243°)	4:18 PM ↗(116°)	9:11 PM (26.0°)	241,186	75.6%
12	-	2:06 AM ↖(245°)	5:03 PM ↗(114°)	10:03 PM (27.7°)	237,463	84.3%
13	-	3:07 AM ↖(247°)	5:44 PM ↗(110°)	10:56 PM (30.4°)	233,747	91.6%
14	-	4:14 AM ↖(252°)	6:22 PM ↗(105°)	11:49 PM (34.0°)	230,363	96.9%
15	-	5:24 AM ↖(257°)	6:57 PM ↗(99°)	-	-	-
○ 16	-	6:37 AM ↖(264°)	7:31 PM ↗(93°)	12:42 AM (38.4°)	227,619	99.7%
17	-	7:51 AM ↖(271°)	8:05 PM ↗(86°)	1:36 AM (43.2°)	225,757	99.5%
18	-	9:07 AM ↖(278°)	8:41 PM ↗(79°)	2:31 AM (48.1°)	224,918	96.3%
19	-	10:22 AM ↖(284°)	9:18 PM ↗(73°)	3:26 AM (52.7°)	225,116	90.2%
20	-	11:35 AM ↖(290°)	10:00 PM ↗(68°)	4:22 AM (56.7°)	226,247	81.6%
21	-	12:45 PM ↖(294°)	10:46 PM ↗(65°)	5:19 AM (59.8°)	228,119	71.2%
22	-	1:50 PM ↖(296°)	11:38 PM ↗(63°)	6:16 AM (61.8°)	230,498	59.8%
☾ 23	-	2:49 PM ↖(297°)	-	7:13 AM (62.5°)	233,153	48.1%
24	12:34 AM ↗(64°)	3:40 PM ↖(295°)	-	8:08 AM (62.1°)	235,893	36.9%
25	1:34 AM ↗(65°)	4:24 PM ↖(293°)	-	9:02 AM (60.5°)	238,577	26.5%
26	2:36 AM ↗(69°)	5:02 PM ↖(289°)	-	9:53 AM (58.1°)	241,122	17.5%
27	3:39 AM ↗(73°)	5:35 PM ↖(284°)	-	10:41 AM (54.9°)	243,483	10.2%
28	4:41 AM ↗(78°)	6:05 PM ↖(279°)	-	11:28 AM (51.3°)	245,641	4.8%
29	5:43 AM ↗(84°)	6:33 PM ↖(273°)	-	12:13 PM (47.3°)	247,578	1.4%
● 30	6:44 AM ↗(89°)	7:01 PM ↖(268°)	-	12:56 PM (43.3°)	249,268	0.1%

\* All times are local time for Portland. Time is adjusted for DST when applicable. Dates are based on the [Gregorian calendar](#). Illumination is calculated at lunar noon.

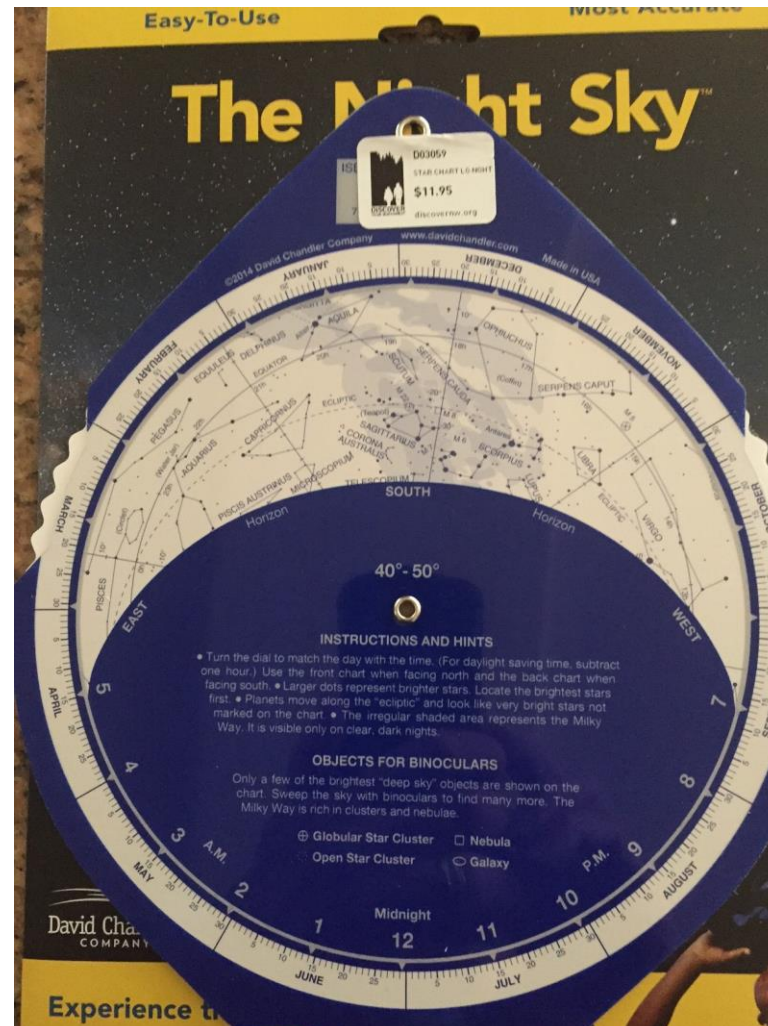
- Look for low Illumination (new moon)
- Watch for moon rising and setting



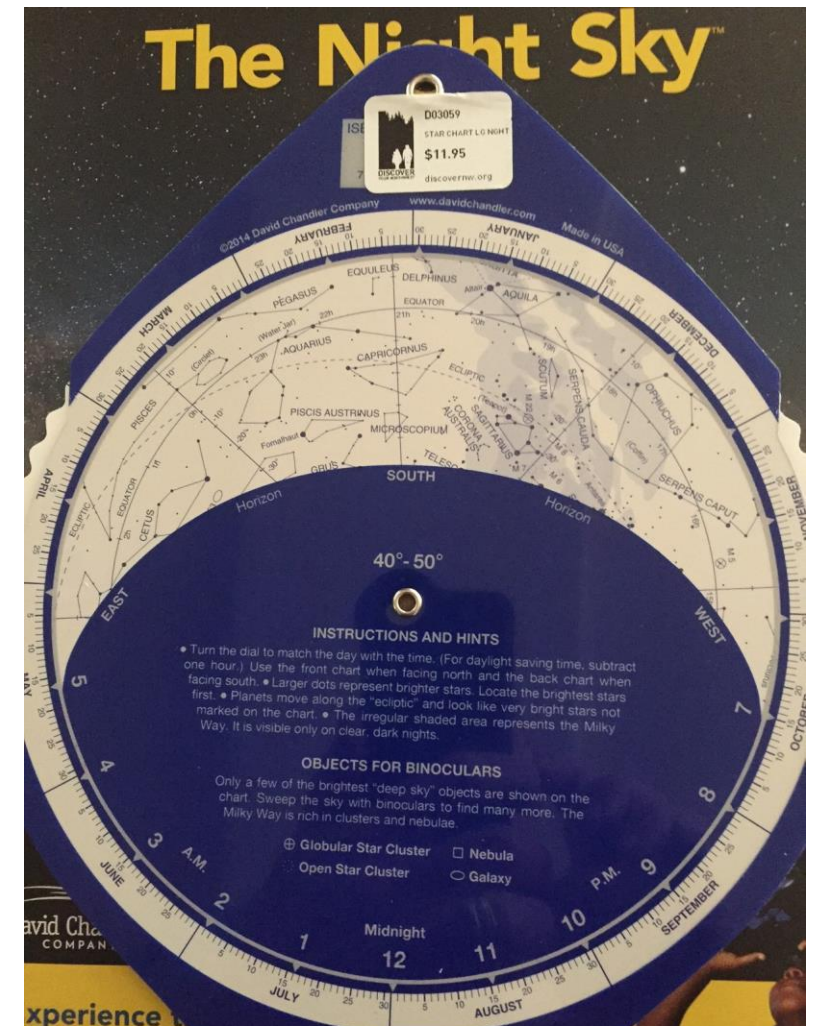
# Early Summer Optimal for Milky Way Core Position in South



Midnight – June 1



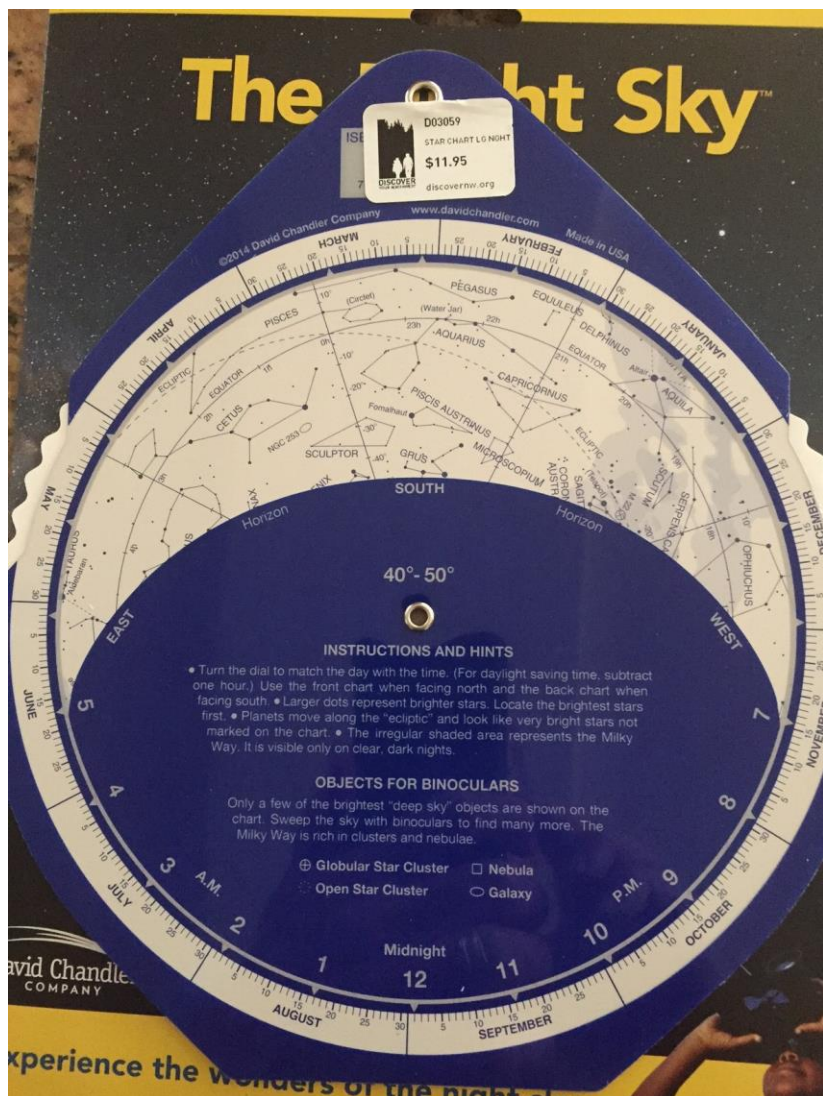
July 1



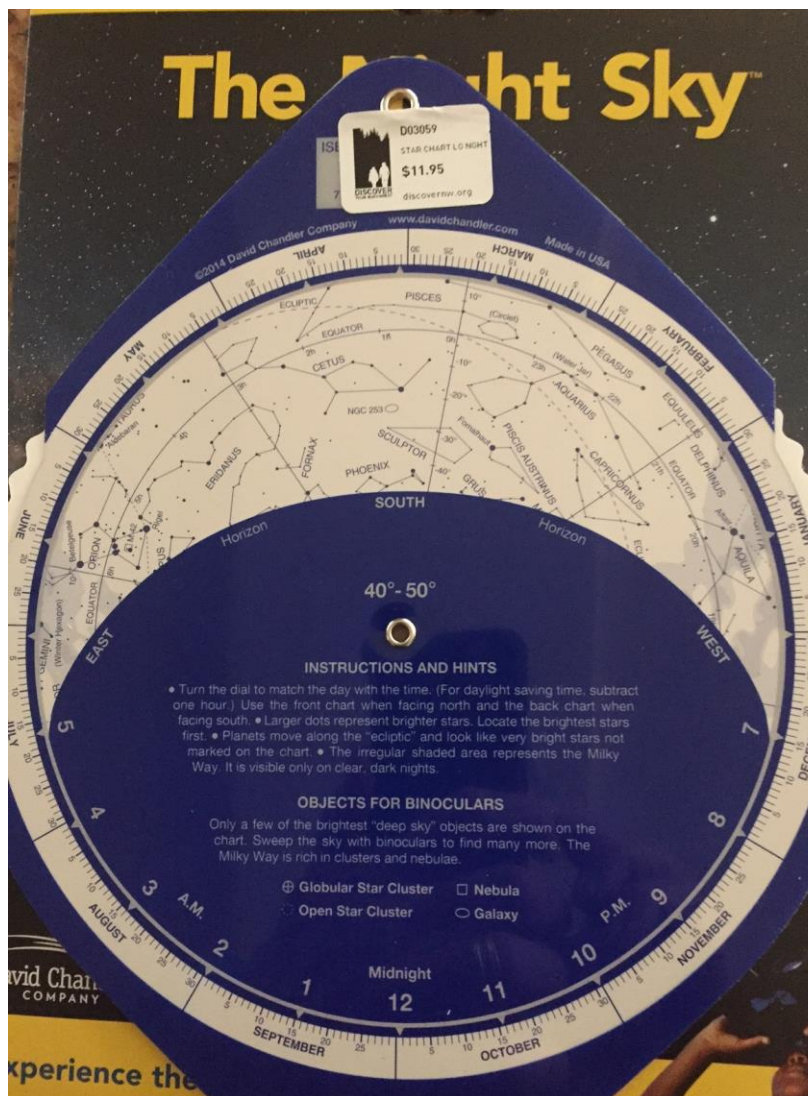
August 1



# Early Summer Optimal for Milky Way Core Position in South



Midnight – September 1



October

Winter – night longer  
...but core of Milky Way  
Is below the horizon

And there is Milky way  
To the North but not as  
Spectacular as the core



# Where?



- Extremely Dark Location
- Avoid forest
- Willamette Valley is difficult due to light pollution.
- Mt St Helens suffers from Vancouver/Portland on the SW horizon
- Mt Hood can be possible (Timberline, White River) but some distance lights.
- East Side of Oregon ideal
- Coastal Oregon can be good, but watch the fog that forms in summer
- Forest fires are smokey

# What Camera/Lens?

- Camera key features needed
  - High ISO (ISO 2400-3200) with low noise
  - Full frame (lower noise and no crop factor on wide angle lens).
  - Bulb Setting. Ideal with possible self timer access
  - View capability off the sensor to exactly focus the stars – the infinity setting isn't adequate
- Key Lens Requirements
  - Want extreme wide angle lens to cover the sky
  - Need 2.8 to 1.4 f-stop
  - Smaller fstop possible but with less light gathering capability
  - Fortunately there are many available lenses including lower priced non-OEM lenses

# Potentially good current lens choices

- Canon
  - 16-35 f2.8 II or III
  - 35mm F1.4
  - 14mm f2.8L
  - 20mm f2.8 ~500.00
  - 24mm f1.4
  - 24mm f2.8 ~550.00
  - 24mm f2.8 STM ~**150.00**
  - 28mm f1.8 ~500.00
  - 28mm f2.8 ~500.00
  - 35mm f1.4
  - 35mm f2.8 ~600.00
- Nikon – check online
- Sigma
  - 15mm ~600.00
  - 24 f1.4 ~850.00
- Zeiss
  - 15 f2.8
  - 21 f2.8
  - 25 f2
  - 25 f2.8
  - 35 f1.4
- Rokinon - generally low priced, check amazon
  - 8mm f2.8 **250.00**
  - 10mm f2.8
  - 12mm f2 and f2.8
  - 14mm f2.8 **300.00**
  - 16mm f2
  - 21mm f1.4
  - 24mm f1.4 550.00
  - 35mm f1.4

***Don't ignore older used manual lenses if they can be attached to your camera!!!***



# Check your lens

- Some lenses are well known for coma at edges
  - Light does not focus at a point
  - More common in cheaper lenses
  - Caused by incorrectly ground lenses, or more commonly == lenses that are out of alignment
  - A friend has a 14 mm Rokinon with obvious comma on only the left hand side.
- Some lenses experience flare around a star

# 500 rule

- Planet rotates quickly
- You will see the star trails even with a short exposure
- Rule of 500: divide the Lens focal length into 500 to give the number of seconds for an image with less noticeable
- Examples:
  - 15mm 33 seconds
  - 18mm 27 seconds
  - 21mm 25 seconds << I use a Zeiss 21mm 2.8. I pushed it at 27 seconds
  - 24mm 20 seconds
  - 35mm 14 seconds
- Yes there is still an arc if you enlarge the image

# Exposure plan

- Lens and camera setup on tripod before nautical twilight ends
  - Or fumble around with a red flashlight....
- Vertical format captures more of the milky way across the sky
- Lens wide open (f2.8 to f1.4)
- Focus using live view (or other) – enlarge and find a star to focus on
  - Insufficient to use infinity on your lense to focus
- Set the ISO to 1600 to 3200
  - What will your camera do – how much noise?
- Enable a dark exposure to remove hot pixels
  - Costs time (its like a second exposure of same time as real exposure)
- Setup with Bulb setting
- Hope you have a self timer that can control, or locking cable release with a stopwatch function (but watch the light)
- Post process to taste

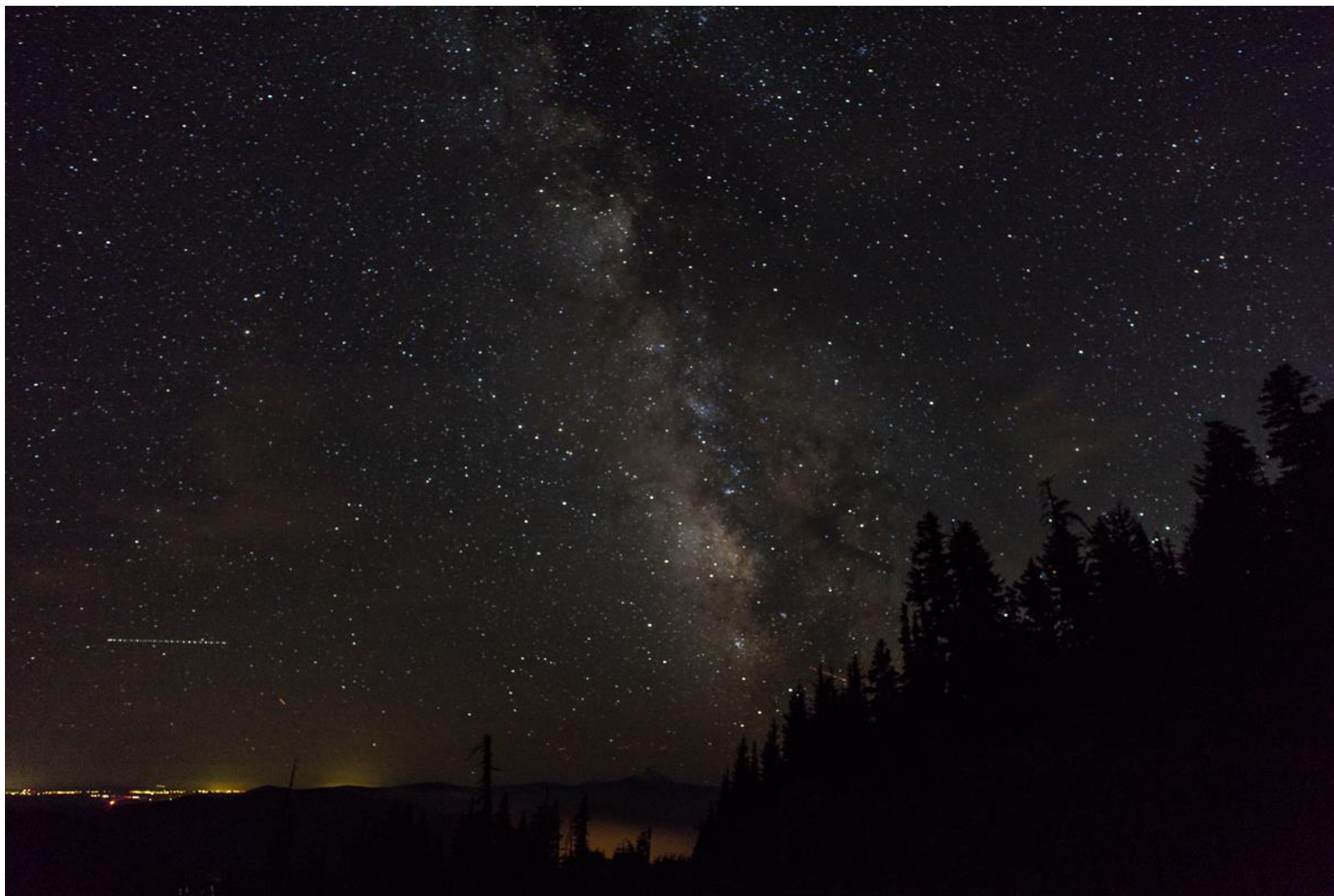


Guess focusing ...no good

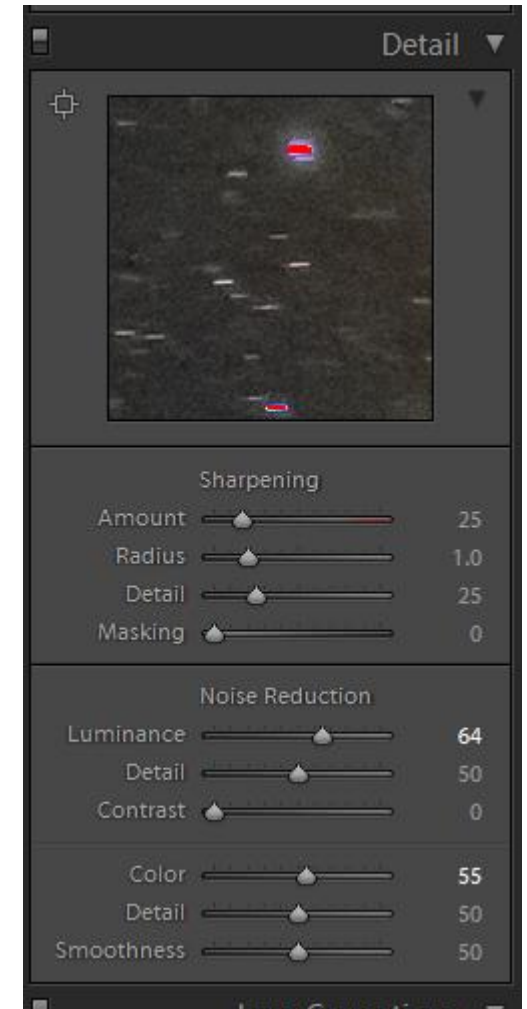
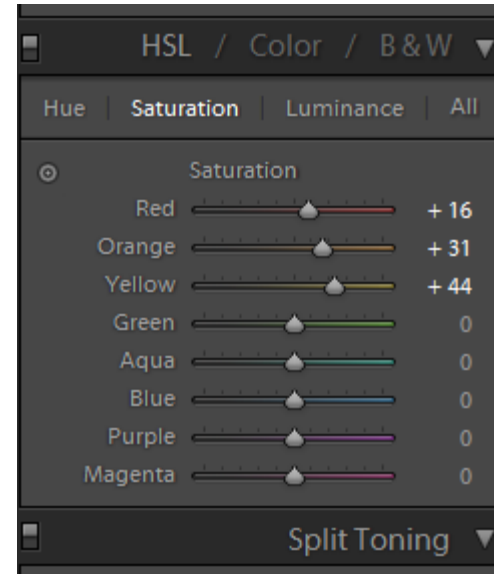
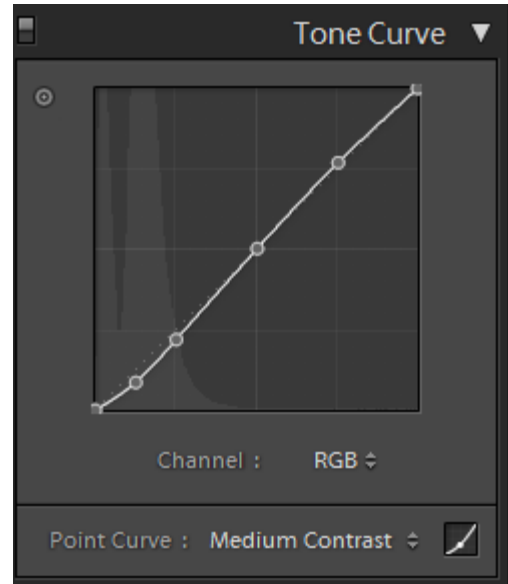
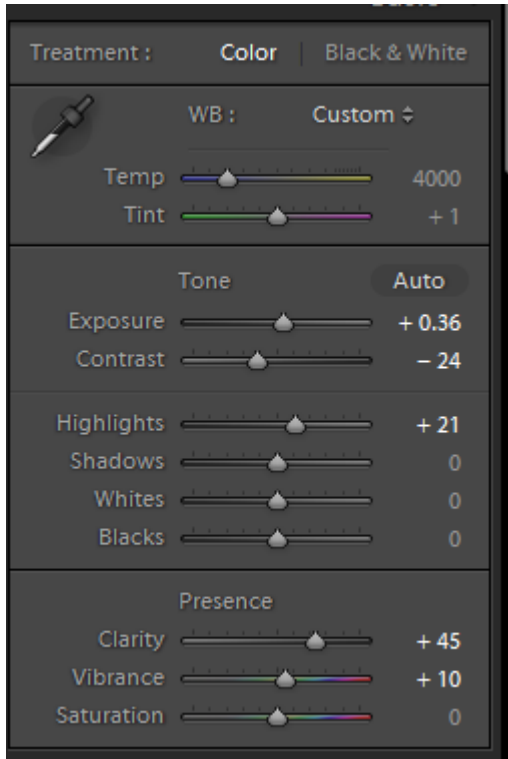


# After focusing with expanded liveview

Note plane..  
The bane of  
photographers



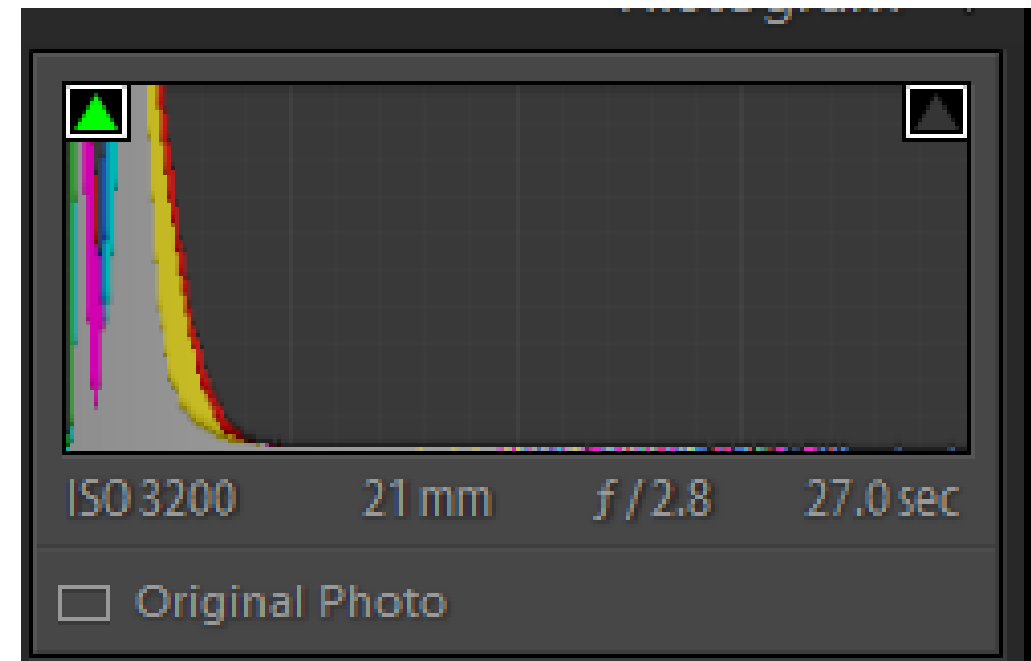
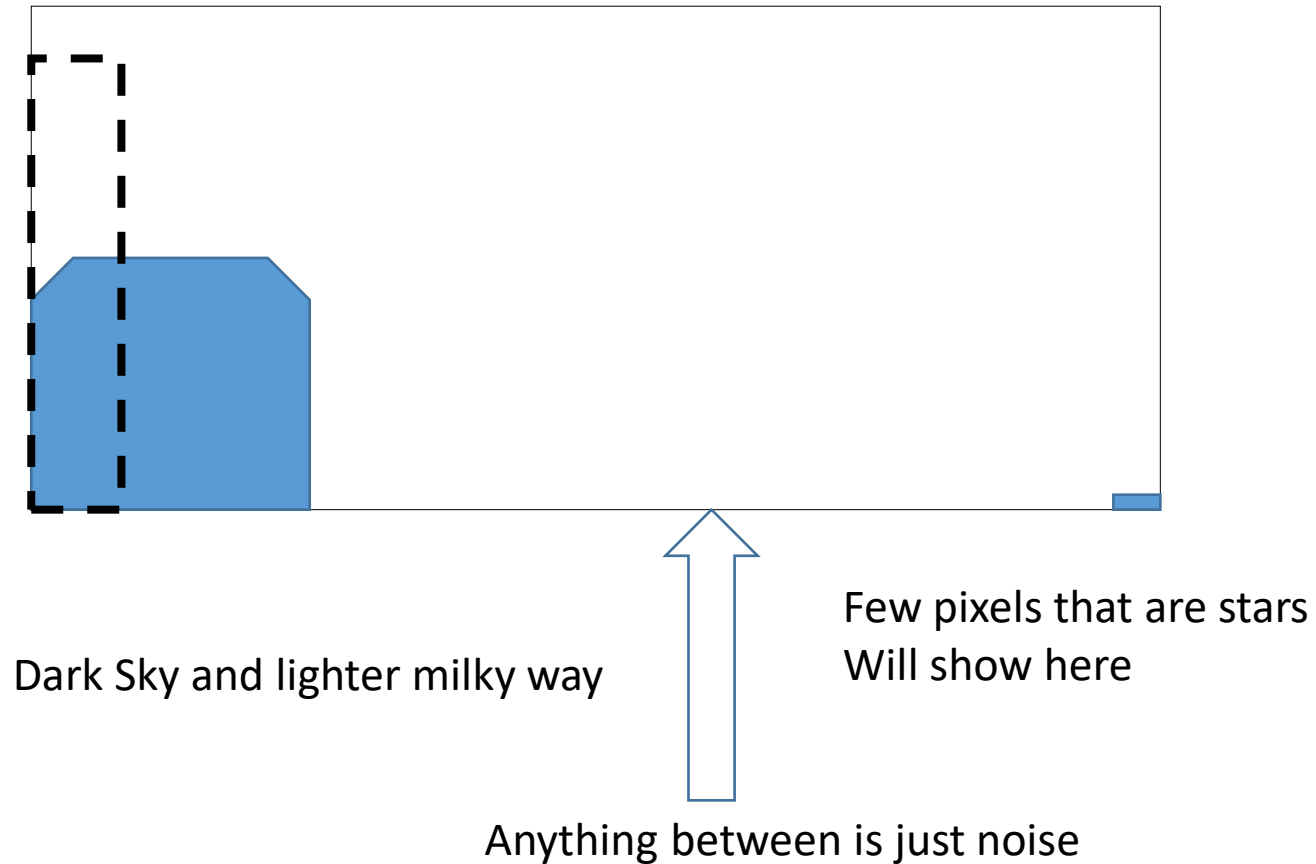
# My settings – do yours to taste





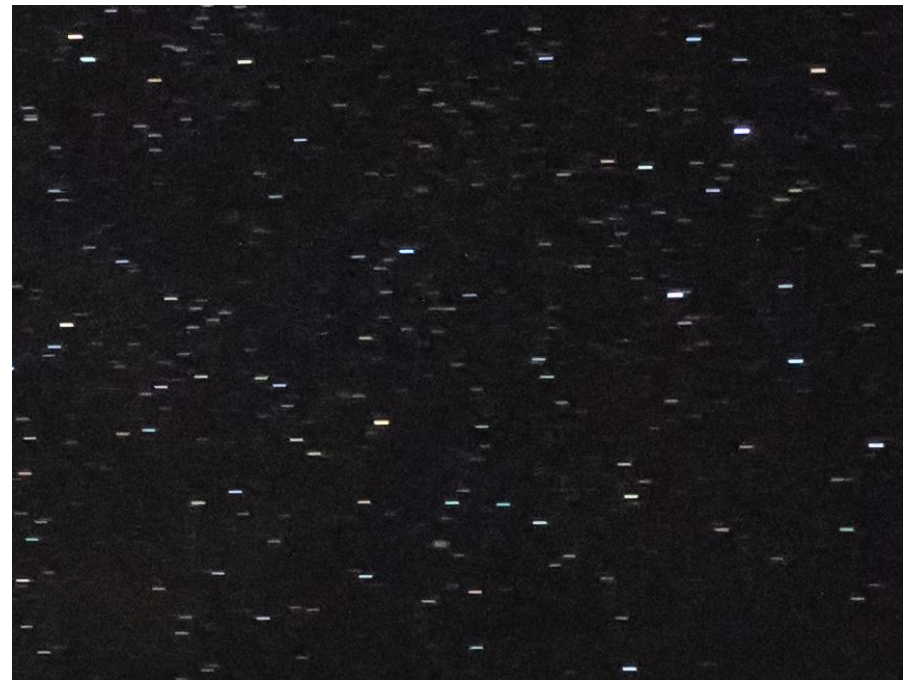
# What will a correct exposure look like on histogram?

- Do NOT push the histogram to the right
- This isn't normal photography.
- Ideal would be outline on left plus stars on right



# Processing in Lightroom or Photoshop

- Noise
  - Enlarge the image
  - Arcs are stars; points are noise from pixels.
  - Reduce noise to taste
- Increase the contrast
  - Contrast
  - Push blacks darker
- Change the saturation of black to make it blacker
- Adjust colors hue and saturation



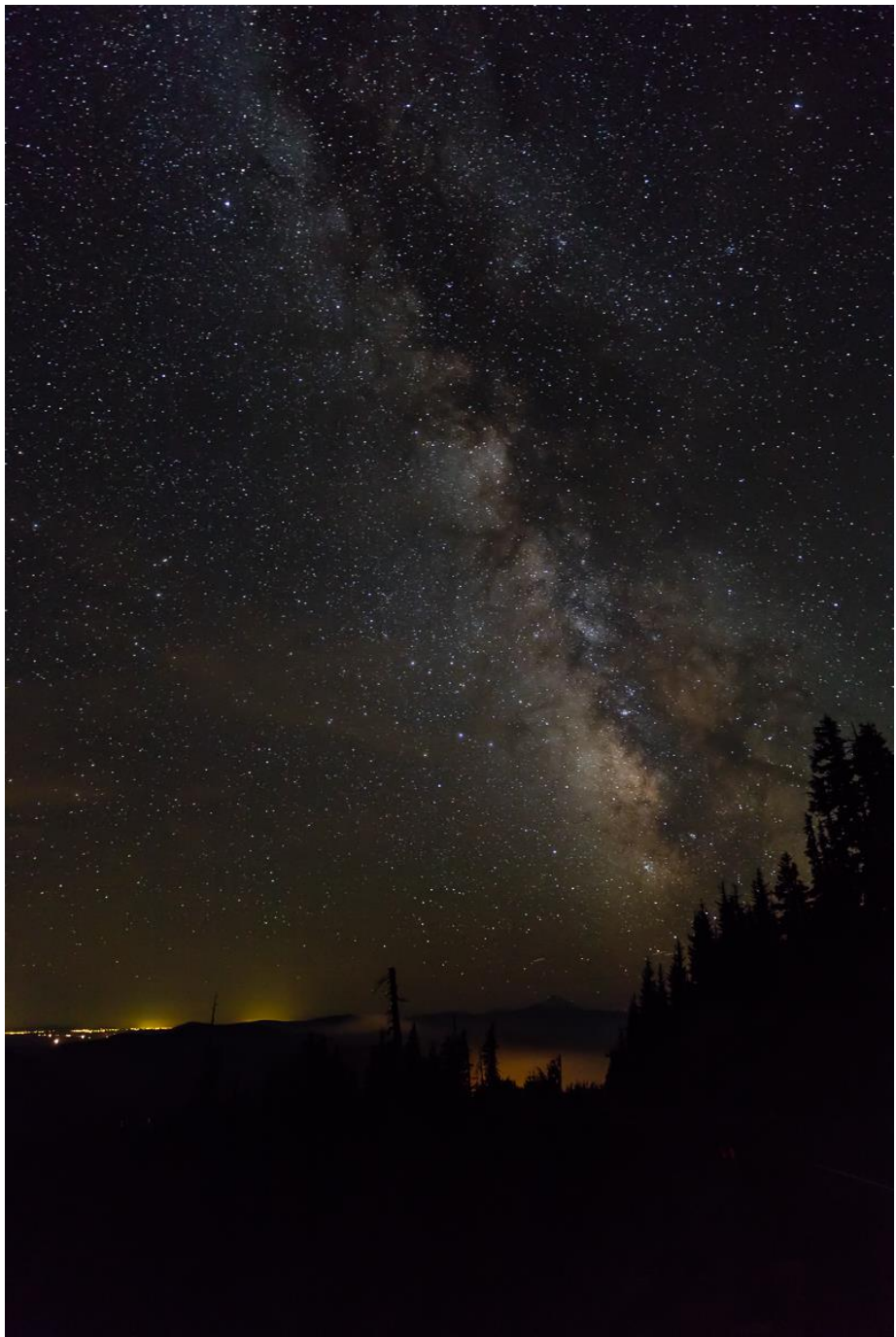
Airplane in distance – note strobes



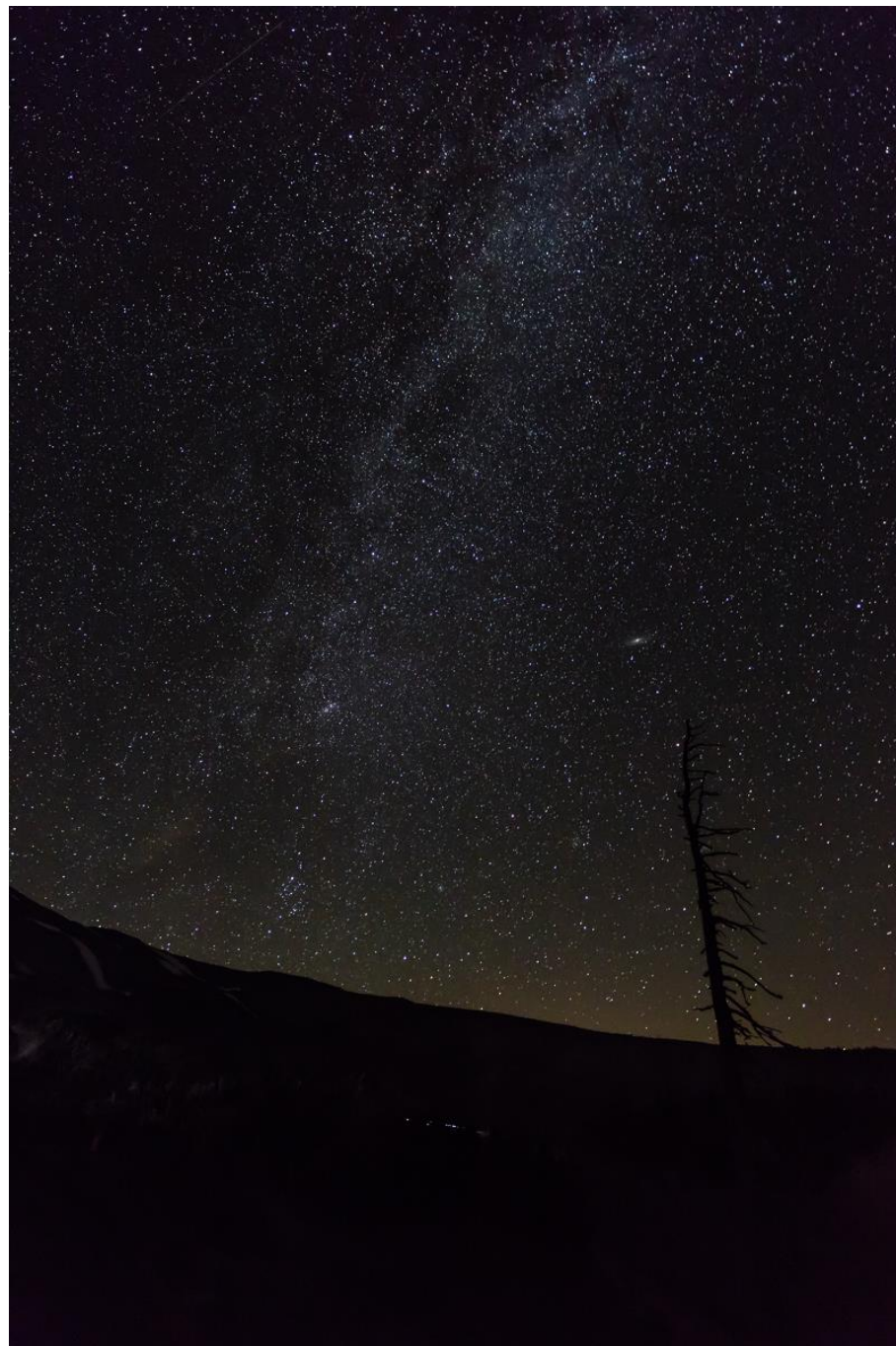


Meteor – note change in intensity









North facing – milky way  
not so spectacular  
compared to the south  
which faces the galaxy  
center

Star fields are interesting



Star fields are interesting

