

Messier Marathon 2025

Quick Review

& Space News



Tom Heisey
Solar System Ambassador
March 20, 2025

Image attribution as marked

Quick Note:

- For information and links mentioned here, see my article and past presentation at:
- <https://southplainsastronomy.org/2022/02/23/messier-marathon-presentation-2-17-2022/>
- <https://southplainsastronomy.org/2022/03/03/messier-marathons/>

<https://southplainsastronomy.org/2022/02/23/messier-marathon-presentation-2-17-2022/>

<https://southplainsastronomy.org/2022/03/03/messier-marathons/>

Charles Messier

- Charles Messier, 1730-1817
- 1751 - Astronomer, French Navy
- 1753 - 1st observed transit of Mercury

- Honors
 - 1764 - Fellow of the Royal Society
 - 1769 - Royal Swedish Acad. of Sci.
 - 1770 - French Academy of Science

- 1760-1785 - Discovered 13 comets



By Ansiaux (1729—1786) Wikipedia

Charles Messier was a comet hunter who created a list of objects that he confused with comets. Ironically, with better telescopes, these objects turn out to be a very nice list of objects to observe.

By Ansiaux (1729—1786) (??) - Stoyan R. et al. Atlas of the Messier Objects: Highlights of the Deep Sky. — Cambridge: Cambridge University Press, 2008. — P. 15., Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=1386610>
https://en.wikipedia.org/wiki/Charles_Messier

A Brief History of Telescopes

- 14-15th Century - developed eyeglasses
- 17th Century
 - 1609 Galileo's telescope with **convex lenses**
 - 1611-75 Kepler, Hevelius, Huygens refine
 - 1668 Newton - 2" **spherical Newtonian**
- 18th Century
 - 1729 - Hall - **Achromatic lens pairs**
 - 1730 - Short - **Parabolic reflector**
 - 1757 - Dolland - **Achromat triplet**
 - 1789 - Herschel - 40' telescope 4' mirror

<http://www.antiquetelescopes.org/history.html>

In order to understand Messier's catalog, we've to go look at the technology of the telescopes in his era. Many of the objects don't resemble comets in today's telescopes, but the mirrors and lenses of the 17th and 18th did not have the clarity and resolution of even a department store telescope.

Convex lens eyepieces - very narrow FOV

Concave lens eyepieces - wider FOV, could project solar images

Longer focal length - reduces chromatic aberration

Air spaced convex lenses - reduced chromatic aberration

Aerial telescopes - longer focal length without massive tubes

Newtonian - compact reflector, but still using spherical mirrors

<http://www.antiquetelescopes.org/history.html>

18th Century Large Reflectors



astronomy.com

- Speculum Mirrors
 - Mixture of copper/tin
 - Spherical grind
 - Prone to tarnish, needs polishing 2x year
 - Poor reflectivity
- For 200 years, was the only mirror in telescopes
 - The drawbacks fueled the development of refractors

White copper/tin mixtures had been used for household mirrors for approximately 2000 years in China.

In Europe, speculum of variable metals were used by the wealthy only. (Rare metals) Speculum metal was very hard to cast and shape, plus it tarnished easily.

- This meant the telescope mirrors had to be removed, polished, and reshaped twice a year, meaning some mirrors would eventually be unusable in a few years.

- Rapid nighttime cooling caused stress and misshaped the mirrors, causing poor images.

www.antiquetelescopes.org

<https://www.astronomy.com/magazine/2019/08/great-telescopes-of-the--past>

https://en.wikipedia.org/wiki/Speculum_metal

18th Century Large Refractors



Marly Tower, Paris Observatory
wikipedia.org

- 2-3 lens achromat
- Very long focal length
 - reduces aberration
- Aerial telescopes
 - No tube
 - No light pollution
- Tube scopes
 - Long tubes prone to sagging

Lens technology of the time was primitive and lead to poor image quality and large amounts of chromatic aberration. Long tubes caused engineering problems and needed large domes and heavy support structures. Aerial telescopes like the one pictured worked without a tube, with the lens in open air. There was no light pollution like we have today - lights were contained inside houses and extinguished at night.

https://en.wikipedia.org/wiki/Paris_Observatory#/media/File:Paris_Observatory_XVIII_century.png

18th Century Small Scopes



Ramsden 2.5" Reflector



Ramsden 2.75" refractor



Ramsden 4.5" Reflector
~40" focal length

www.antiquetelescopes.org

Small refractors common at the start of scientific telescopic observations.

<http://www.antiquetelescopes.org/ramsden.jpg>

<http://www.antiquetelescopes.org/Miltitz.jpg>

http://www.antiquetelescopes.org/Jramsden_t.jpg

Messier's Telescopes

1765-69, published in the *Connaissance des Temps*

● Reflectors

- 6 feet FL, Mag. 110x
- 30 feet FL, 6 inch aperture, Mag. 104x
- 4.5 foot FL, Mag. 60x
- 1 foot FL, 3-inch aperture Mag. 44x
- 19 foot FL, Mag. 76x
- 32 ft fl, 7.5 obj, 104x

● Refractors

- 25 foot FL, Mag. 138x
- 10.5 foot FL, Mag. 120x
- 3.5 foot FL, Mag. 120x
- 23 foot FL, Mag. 102x
- 30 foot FL, Mag. 117x
- Mag. 64x

Fixed magnification = fixed eyepieces

www.messier.seds.org/

<http://www.messier.seds.org/xtra/history/m-scopes.html>

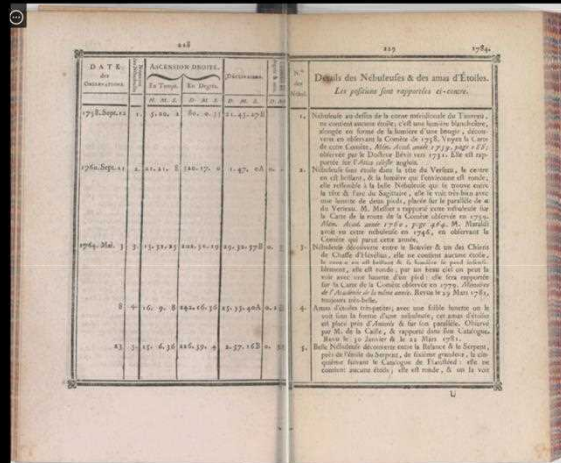
- Messier's telescopes (1765-69) as published in the *Connaissance des Temps* for 1807
- FL means "Focal Length", "Mag." Magnification, unfortunately he normally doesn't give the aperture
- Fixed magnification, so interchangeable eyepieces were not used

In his contribution to *Sky & Telescope* which is reprinted in Mallas' and Kreimer's *Messier Album*, Owen Gingerich points out that Messier's favorite instrument was a 32-foot FL, 7.5-inch aperture Gregorian reflector with mag. 104x, not listed above. Bailly has computed that the effective aperture of this instrument was equivalent to a 3.5-inch refractor.

Later he preferred to use several 3.5-inch (90 mm) achromatic refractors, which were usually about 3.5 feet long and magnifying 120 times. He selected to use these scopes because they were the best accessible instruments for him.

Messier Catalog

- Versions published:
 - 1774, 45 objects
 - 1783, 68 objects
 - 1784, 103 objects
- Messier discovered 17 of the objects
- Covers 90° to -36°
 - Visible from Paris



archive.org

<http://astro.ago.uni-lj.si/mirror/www.seds.org/messier/xtra/history/m-cat.html>

<https://www.messier.seds.org/Messier.html>

PDF of Messier's original catalog (in French):

<https://archive.org/details/messier-catalogue-des-nebuleuses-et-des-amas-detoiles...>

PDF of book - Ronald Stoyan's Atlas of the Messier Objects

<https://archive.org/details/atlas-of-the-messier-objects-highlights-of-the-deep-sky/mode/2up>

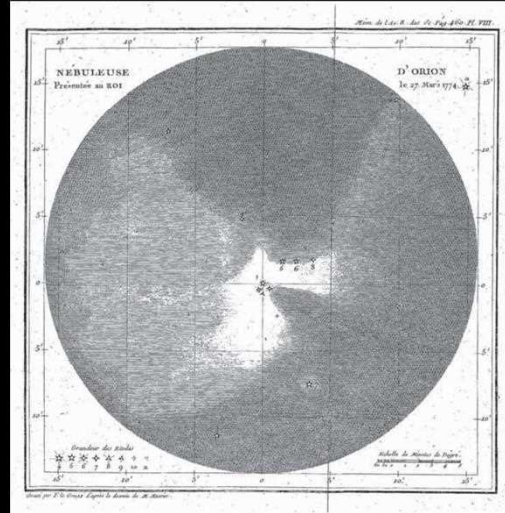
The Messier album book by John Mallas,

images and diagrams of Messier objects. free checkout at

<https://archive.org/details/messieralbum0000mall/page/14/mode/2up>

Messier Catalog

- Objects that could be confused with comets
- Objects include
 - 40 Galaxies
 - 29 globular clusters
 - 27 open clusters
 - 4 planetary nebulae
 - 6 diffuse nebulae
 - 1 supernova remnant
 - 1 asterism
 - 1 double star
 - 1 Milky Way patch



The Orion Nebula as drawn by Messier
Wikipedia.org

https://en.wikipedia.org/wiki/Charles_Messier

<https://starlust.org/messier-catalog/>

Messier Objects Group Photo



https://en.wikipedia.org/wiki/Messier_object#Messier_objects

[https://commons.wikimedia.org/wiki/File:All_messier_objects_\(numbered\).jpg](https://commons.wikimedia.org/wiki/File:All_messier_objects_(numbered).jpg)

Astronomical League

- Messier Observing Program
 - 6" scope recommended
 - Log book required
 - Marathon prohibited
- Messier Marathon informal certificate:



Messier
Observing
Program



www.astroleague.org/content/downloadable-certificates

Messier Observing Program

<https://www.astroleague.org/al/obsclubs/messier/mess.html>

www.astroleague.org/content/downloadable-certificates

Messier Marathon Advice

- **50mm binos can see**
 - AL Messier Program list
 - 7x35-10x50mm binos
 - 42 Easy
 - 18 Tougher
 - 16 Challenging
- **3"/76mm scope can see all MM Objects**
 - Ideal skies
- **6-8" scopes easier**
- f/4-f/7 recommended
- **Have a plan!**
 - Use a log
 - Prepare charts
 - Practice helps
- **Site**
 - Low horizon
 - Dark skies
- **Process**
 - Star Hop to object
 - Observe
 - Log the observation
 - Wash, Rinse, Repeat

Most of this is from experience, but the SEDS site helped bring up some points I forgot:

<https://www.messier.seds.org/xtra/marathon/mm-tips.html>

<https://www.astroleague.org/binocular-messier-program-appendix-a/>

Have Fun While Learning!

- **Comfort & Fun**
 - Dress warmly
 - Comfortable chair
 - Table for charts
 - Power Bank
 - Thermos w/hot drink
- **Fun!**
 - Manage expectations
 - Don't stress out
 - Pair up if needed
- **Equipment Tips:**
 - Binoculars for searching!
 - Telrads 4 star hopping
 - Printed maps
 - Mobile atlas
 - SkySafari
 - Google Sky Map
 - Stellarium
 - Red headlamp/light
 - Sorry, no lasers on the Ranch (astrophotos)

<http://www.messier.seds.org/m-goodie.html>

<https://www.messier.seds.org/xtra/marathon/mm-tips.html>

You'll be outside for a long time, so be prepared. Dress warmly, especially head and feet, which can be overlooked. Hunter's or shooter's gloves or mittens can be warm the hands while you still access your telescope. They also make gloves with hand-warmer pockets, electrically heated gloves, vests, and socks. Felt-lined boots are great for cold nights. They also make rechargeable hand-warmers in a variety of sizes and styles starting at \$10-\$15. (If you can't find them locally, Amazon has them.)

Best tip is not stress out if you don't catch all of them. Above all, this is a learning program, a social gathering, and meant to be fun!!!

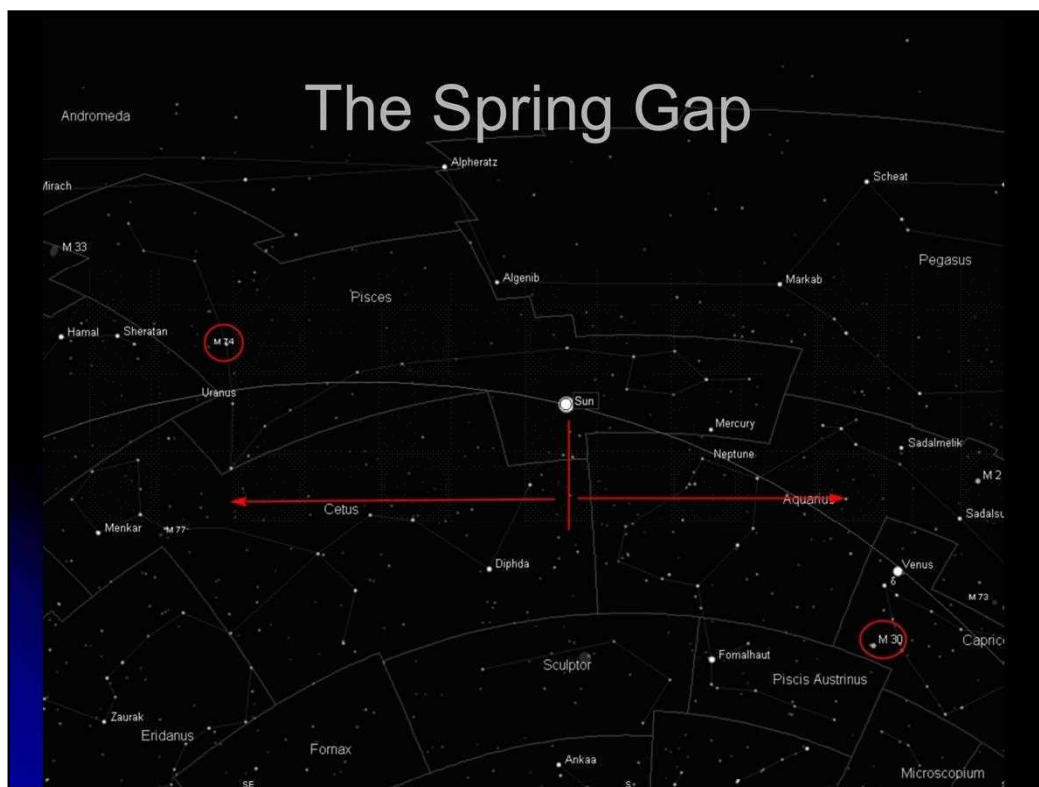
Binoculars will be a big help in finding, verifying, and seeing objects. While the marathon is meant to be a telescopic adventure, binos make star hopping easier thanks to their very wide view. Sometimes, you'll only find your way if you scout it out with the binos and then hop with your scope.

Messier Marathons Types

- **Traditional**
 - Manual scope (tracking OK)
 - Visual only
 - Printed maps only
 - Can receive some help
- **Traditional Options:**
 - **Binocular** (traditional)
 - 20-50mm - 50 objects
 - 55-100mm - 81 objects
 - **Pairs** (Traditional)
 - Two observers alternate objects
 - **Half Marathon**
 - Traditional to midnight
 - Try for maximum objects
- **Non-Traditional:**
 - **Go-To Marathon**
 - Go-To scopes
 - Little-to-no challenge
 - May give views to traditional marathoners in trouble
 - **Camera**
 - Insane difficulty
 - Long exposures required on dim objects means rushing

The marathon has some tradition since it began in the 70's and the traditional one is star hopping with a telescope with only printed atlases and no other electronic help. However, clubs recognize several other types.

- The Go-To Marathon has no challenge, but it gives you much more time to enjoy the objects. You can also use your view to show the traditional marathoners what an object looks like and even help with star hopping.
- Pairs can be a fun experience where two people switch off between running the scope and paperwork. This can really help in the late night as you have a partner to help with star hopping and keeping things on track.
- The Half Marathon can be run until midnight or the morning break and allow you to get home at a somewhat reasonable time. You try for the maximum number of objects within that time frame.
- The Camera Marathon is a bit insane because you simply don't have the time needed to accumulate enough pixels for the dim objects, even with a computerized scope. I tried it once and failed with a cooled DSLR. (Better cameras with higher ISOs would help.)

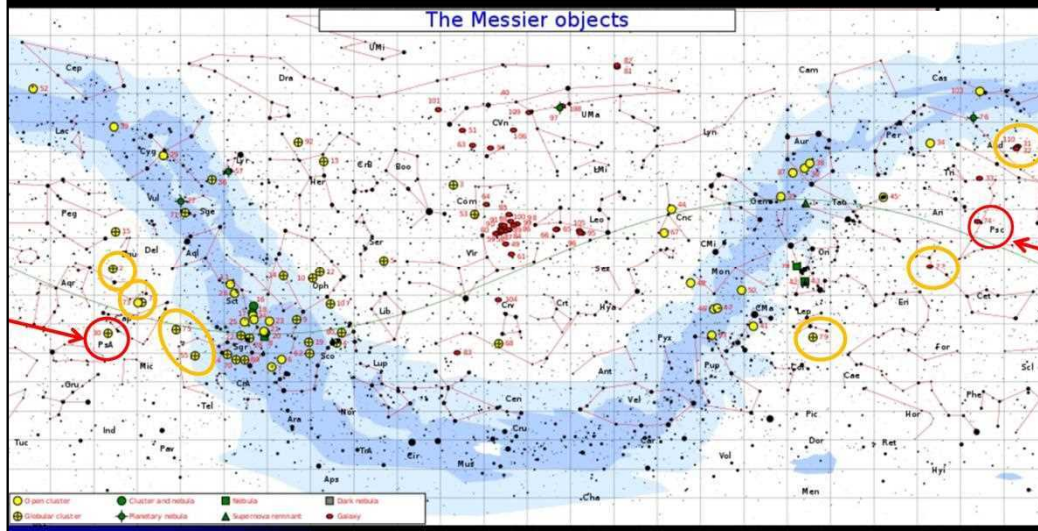


<https://www.messier.seds.org/xtra/marathon/mm-dates.html>

<https://www.peterboroughastronomy.com/LearningCentre/Messier%20Marathon%202019/G.%20The%20Messier%20Gap%20-2.jpg>

The Messier objects are not distributed evenly and in spring, there is just enough space that the sun can set and rise with M30 and M74/77 just above the horizon. This break occurs in March or April every year and the best weekends are at the new moons in these months.

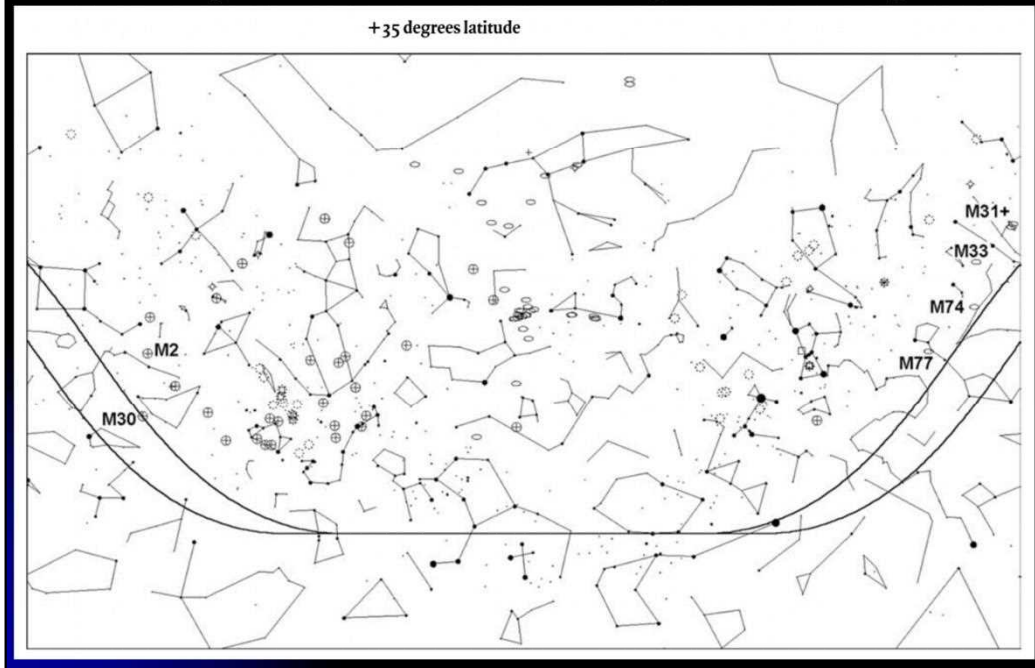
Messier Object Atlas



<https://en.wikipedia.org/wiki/File:MessierStarChart.svg>

Most Messier maps will show this same layout, centered on the Virgo cluster of galaxies and the edges split the M30 to M74/77 gap. There is another gap in Autumn that is not quite a wide and some objects won't be visible. The Virgo cluster really complicates the fall marathon, since it is lower to the ground and closer to the sun. See <https://www.scopereviews.com/fallimm.html> for more info

Objects near the light of day

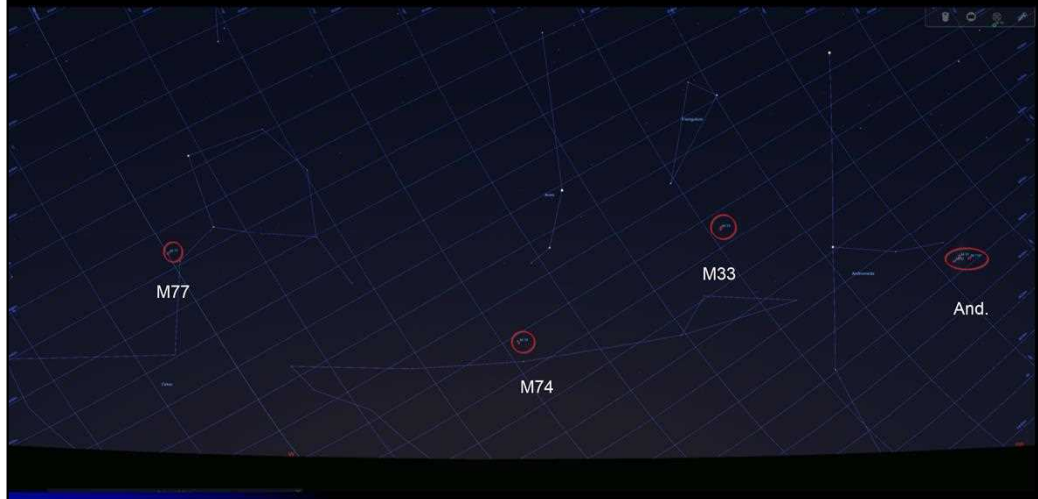


From The Observing Guide To The Messier Marathon, A Handbook and Atlas by Don Machholz

<https://www.cambridge.org/us/academic/subjects/physics/amateur-and-popular-astronomy/observing-guide-messier-marathon-handbook-and-atlas?format=HB&isbn=9780521803861>

In the south, we have more time to find the objects and can wait for nightfall for most of the objects. Lubbock is at about 33 degrees, so it's a little higher for us than this map shows.

21:00 March 29 Busy Evening Twilight



From Stellarium using Lubbock as the location:

M74 - 9.4 mag galaxy, reduced to 10.11 by air mass, surface brightness 14.14 mag/acrmin², 14.85 after extinction 10 degrees alt. sets 21:41

M31 - Mag 3.4 reduced to 3.96, surface brightness 13.31 reduced to 13.87

M32 - Mag 8.1 reduced to 8.66, surface brightness 12.19 reduced to 12.76

M110 - mag 8.1 reduced to 8.65, surface brightness 13.79 reduced to 14.35
13 degrees alt, sets 22:29

Sunset 20:00

Moonset 20:40

Twilight start

Date and time

06:44 March 30
Easier Sunrise



From Stellarium using Lubbock as the location:

March 29, 2025

	Sun	Moon	Civil Twilight	Nautical Twilight	Astro. Twilight
Set	20:06	20:44	20:30	21:00	21:30
Rise	07:38	07:41	07:13	06:44	06:14
Hours:	11:32	10:57	10:43	9:44	8:44

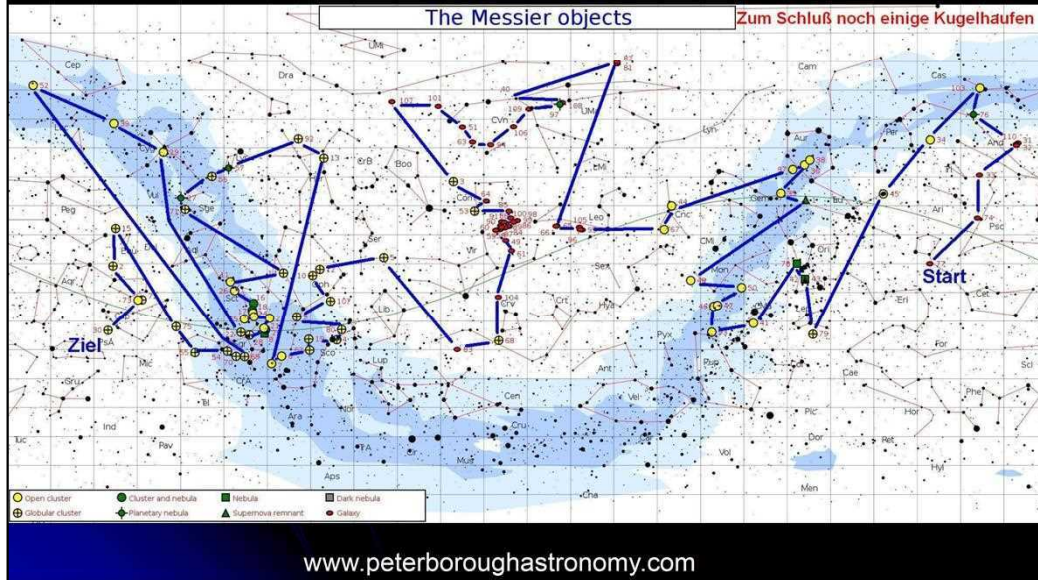
OBJ	Twilight	Altitude	Mag. ^{**A}	Surface Bright. ^{*#}	Rise /set	Type
M74	21:00	7.5°	7.38	15.09 mpsas	21:41	Gal.
M77	21:00	11°	9.54	13.36 mpsas	22:04	Gal.
M31	21:00	11°	4.07	13.94 mpsas	22:29	Gal.
M32	21:00	11°	5.08	12.85 mpsas	22:26	Gal.
M110	21:00	11°	8.75	14.45 mpsas	22:29	Gal.
M30	06:44	7°	7.78	13.84 mpsas	6:04	Glob
M55	06:44	14°	4:30	6.7 mpsas	12.84	Glob

^{*} with atmospheric extinction ^A calc as point source [#] magnitude per arcsec² or light spread across object

* Includes atmospheric extinction

magnitudes per square arcsecond (MPSAS)

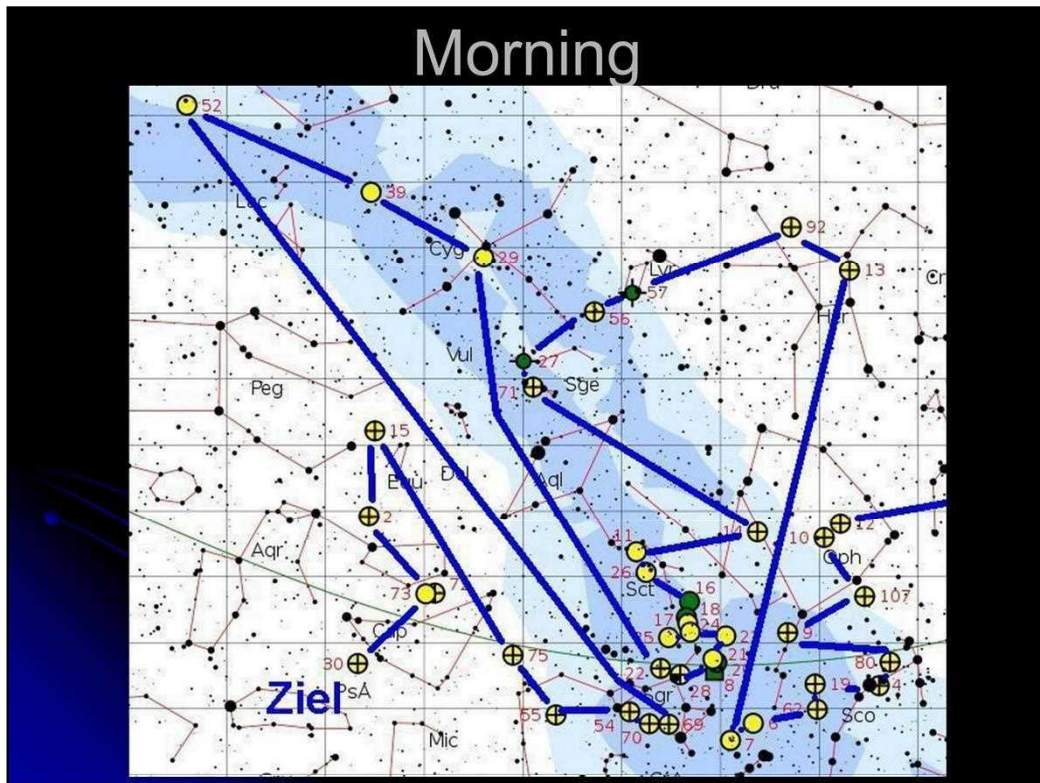
Messier Marathon Map



<https://www.peterboroughastronomy.com/messier.php>

Morning and evening horizons roughly follow the Milky Way diagonals during the marathon. In the evening, the horizon is roughly parallel with M013 to M79 line. At dusk, the line is from M52 to M55. This means that most marathon sequences will agree pretty closely in the early evening and early morning objects. However, as you can imagine, the star hopping in the rest of the night can be up to interpretation. I've seen some sequences where they hop from Leo to Virgo Cluster, then take the loop through the northern constellations. However, I recommend sticking to whatever plan you pick so you get all of the objects in a night. Make a checklist or log book for the objects to be sure.

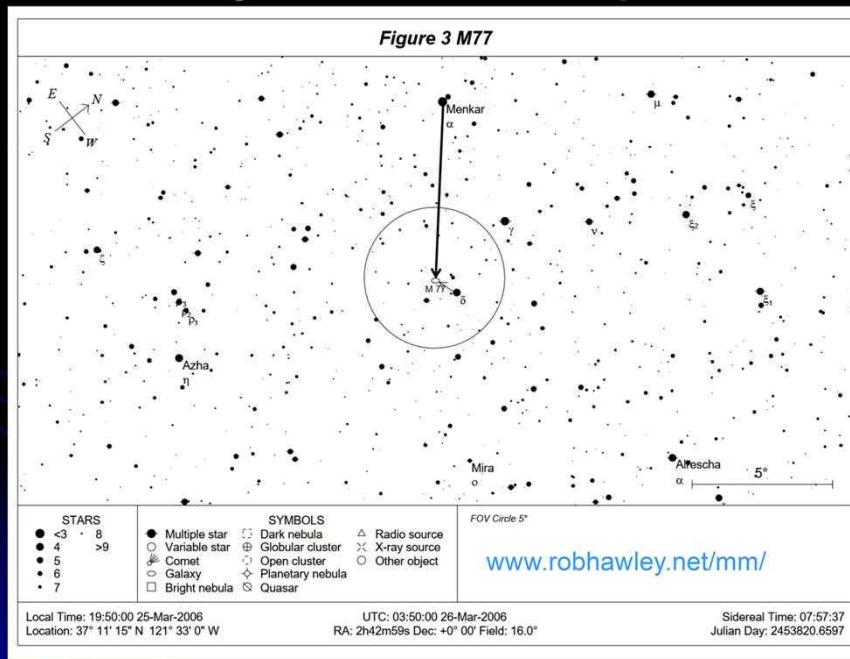
Morning



<https://www.peterboroughastronomy.com/messier.php>

The morning requires some sizeable jumps, but many of the objects are fairly bright and easy to find, which is good for a tired marathoner. This is often a mad race to hop to the last of these objects!

My Favorite Map



For a long time, I used charts similar to http://astro-tom.com/messier/messier_finder_charts/messier_maps.htm.

However, that set lacked details for star hopping. Rob Hawley solved that by making the charts even more user-friendly and even included simulated eyepiece views for some of the galaxies! I highly recommend printing his maps:

www.robhawley.net/mm/

Special Recommendation

- Don Machholz is a comet hunter and one of the founders of the Messier Marathon.
 - His book is often listed as THE reference for the marathon and I agree!
- The Observing Guide To The Messier Marathon
 - <https://www.amazon.com/Observing-Guide-Messier-Marathon-Handbook-ebook/dp/B01DM26PYW>

<https://www.amazon.com/Observing-Guide-Messier-Marathon-Handbook-ebook/dp/B01DM26PYW>

Charles Messier Links

- <https://southplainsastronomy.org/2022/03/03/messier-marathons/>
- <https://www.messier.seds.org/xtra/history/biograph.html>
- <https://www.messier.seds.org/xtra/history/timeline.html>
- Messier's Log Book translated:
<astro.ago.uni-lj.si/mirror/www.seds.org/messier/xtra/history/m-cat.html>

<https://southplainsastronomy.org/2022/03/03/messier-marathons/>

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 - <https://archive.org/details/atlas-of-the-messier-objects-highlights-of-the-deep-sky/mode/2up>
- The Messier album book by John Mallas,
- images and diagrams of Messier objects. free checkout at
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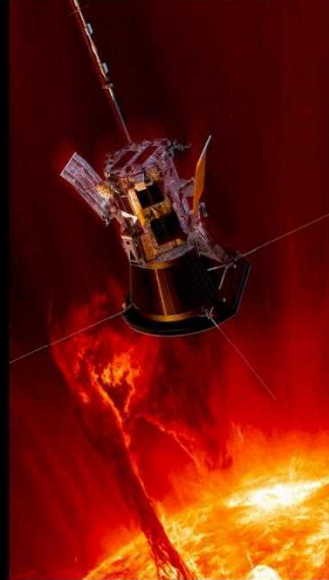
Space Exploration News

- Stranded astronauts Suni Williams and Butch Wilmore finally return to Earth
- Launched June 5 on Boeing Starliner
 - Thrusters failed & helium leaks
 - Safety issues, returned to White Sands safely
- Stranded for 286 days, 4,576 orbits
 - Mission was for 1 week to test Starliner

<https://www.msn.com/en-us/news/technology/nasa-s-stuck-astronauts-are-finally-on-their-way-back-to-earth-after-9-months-in-space/ar-AA1B89KG>

Parker Solar Probe Records

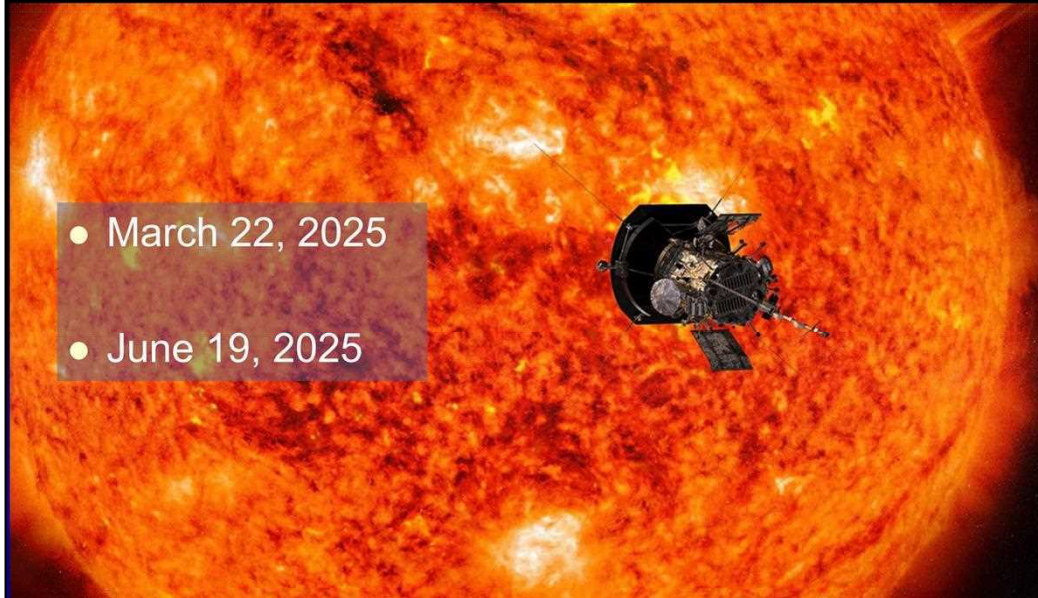
- Dec 24, 2024 close pass
- PSP two new records
 - 3.8 million miles above the surface of the Sun
 - 430,000 mph - fastest human-made object
- The shield withstands the melting point of steel - 2,600 °F!



<https://scitechdaily.com/nasas-parker-solar-probe-the-fastest-human-made-object-just-touched-the-sun-and-shattered-records/>

<https://science.nasa.gov/mission/parker-solar-probe/>

PSP Next Passes



<https://scitechdaily.com/nasas-parker-solar-probe-the-fastest-human-made-object-just-touched-the-sun-and-shattered-records/>

<https://blogs.nasa.gov/parkersolarprobe/2025/03/21/parker-solar-probe-primed-for-next-close-solar-approach/>

<https://science.nasa.gov/mission/parker-solar-probe/>

Blue Ghost

- Firefly Aerospace lunar lander
- 14 day mission - longest for commercial company
- 10 science packages
- 1st of 3 planned trips



<https://fireflyspace.com/blue-ghost/>

<https://fireflyspace.com/news/>

3/14/25 Lunar Eclipse

by Blue Ghost lander
(Solar eclipse by Earth)

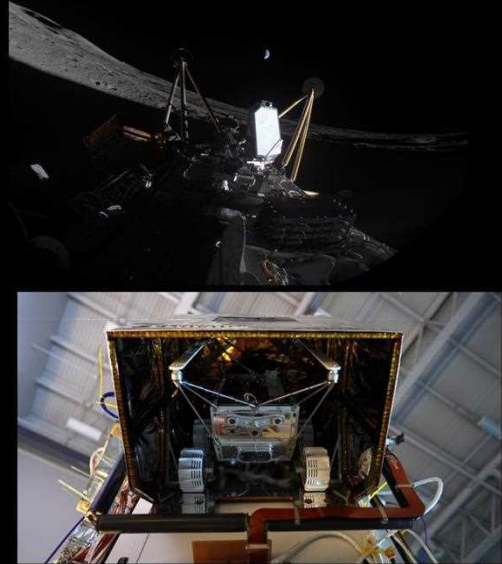


<https://www.scientificamerican.com/article/see-the-total-lunar-eclipse-from-the-moon-in-photos-from-blue-ghost-lander/>

<https://www.scientificamerican.com/article/see-the-total-lunar-eclipse-from-the-moon-in-photos-from-blue-ghost-lander/>

Intuitive Machines Lander

- Athena lander
- Landed 250m from intended spot
 - inside a crater
 - fell solar panel down
- Could not recharge
 - some science done
 - mission mostly failed



<https://www.intuitivemachines.com/>

<https://www.intuitivemachines.com/post/im-2-the-southernmost-step-in-human-exploration>

SpaceX Turnaround Record



- SpaceX Falcon 9
- Launch occurred just 2 days, 8:59:40 after landing
- 18th Launch of that rocket

<https://spaceflightnow.com/2025/03/15/live-coverage-spacex-to-launch-23-starlink-satellites-on-falcon-9-rocket-from-cape-canaveral-8/>

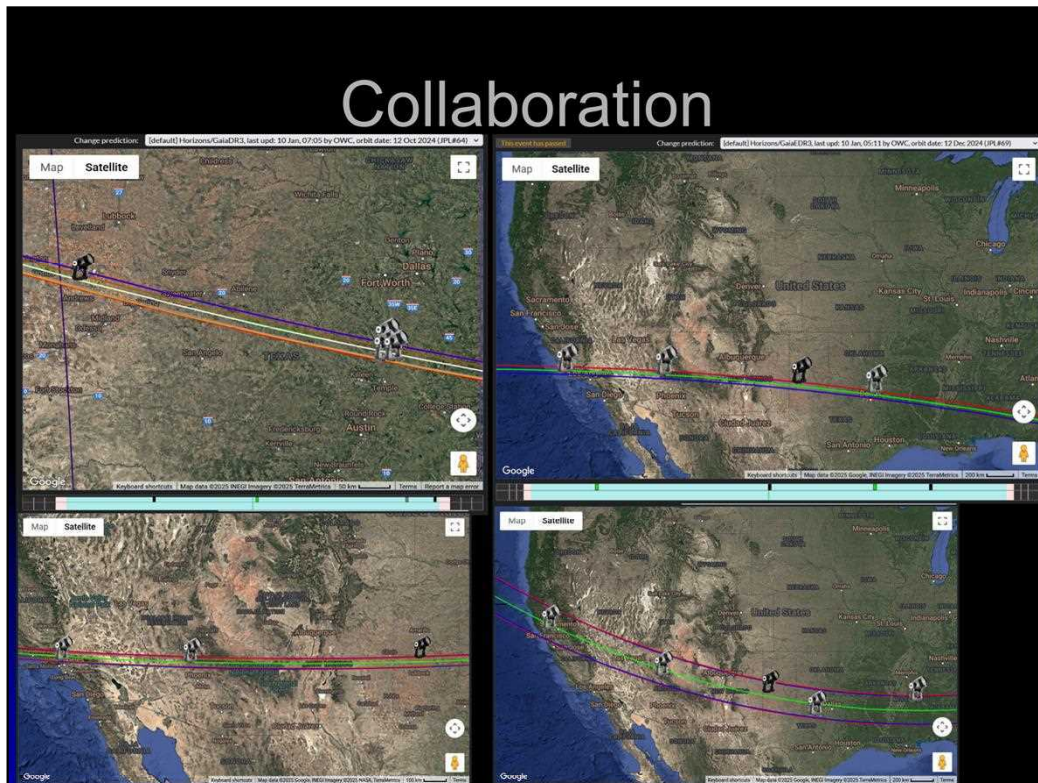
“Convenient” Occultations

- Sat. 22 Mar, 03:26 - (3493) Purple Mtn. 99%
W.Reese
- Sat 5 Apr, 03:16 - (66097) 2002 CC4, Gott, 99%
- Thu 17 Apr, 21:03 - (29943) 1999 JZ78, Gott, 99%
- Fri, 18 Apr, 05:05 & 05:08 **Double Event**
 - Near Gott (if not on?) 3 minutes apart
 - 05:05 (16627) 1991 DH1, 40%
 - 05:08 (1789) Dobrovolsky, 99%

If you're interested in citizen science and occultations (asteroid passing in front of a star) in particular, I have a few interesting events on weekends that you can observe with me. contact me for times and locations

www.occultations.org

Collaboration



Now that I'm observing regularly, I'm starting to collaborate more regularly with other IOTA (www.occultations.org) members in Oklahoma, Texas, California, Arizona, and Mississippi timing events together. You get far more information and confirmation from multiple chords on a rock than you get with a single event, so banding together is common and fun!

- 1 - (1848) Delvaux occults UCAC4 329-172090 on 11 Mar 2025 - success
- 2 - (204) Kallisto occults UCAC4 510-021847 on 18 Jan 2025 - clouds
- 3 - (899) Jokaste occults UCAC4 384-058809 on 06 Feb 2025 - success
- 4- (895) Helio occults UCAC4 330-058849 on 20 Feb 2025 - success