

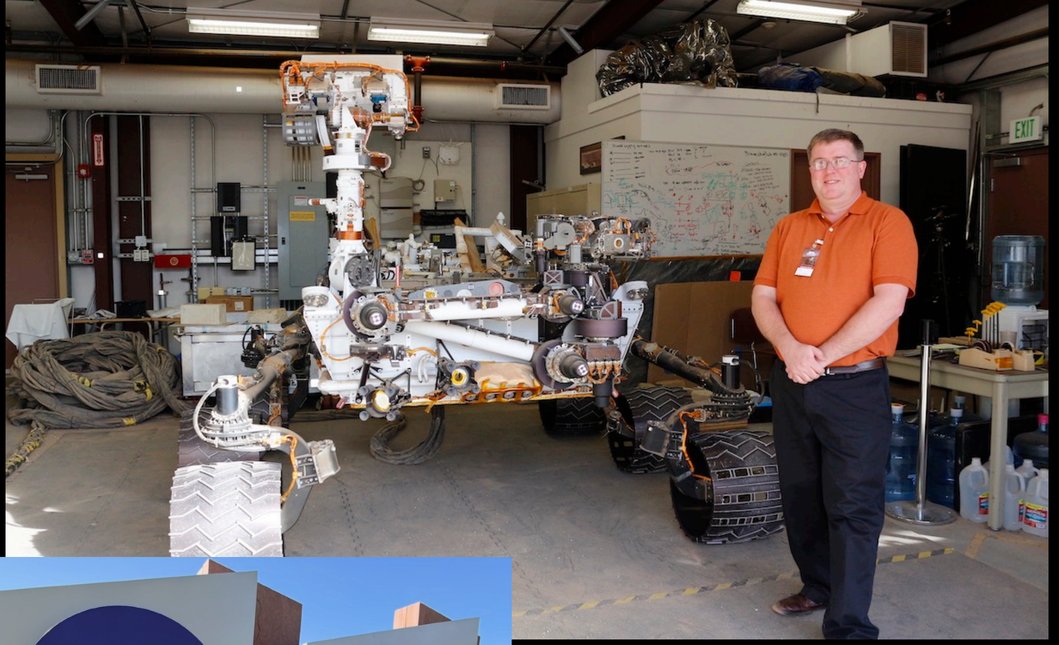
Engaging Audiences with Astronomy

putting the "meteor" in meteorology

Tony Rice, NASA/JPL SSA

@RTPHokie

2025-10-06


EXIT


MISSION CONTROL CENTER


NASA


FOD
CHAOS


NIST
NOAA


Space Weather Prediction Center
NOAA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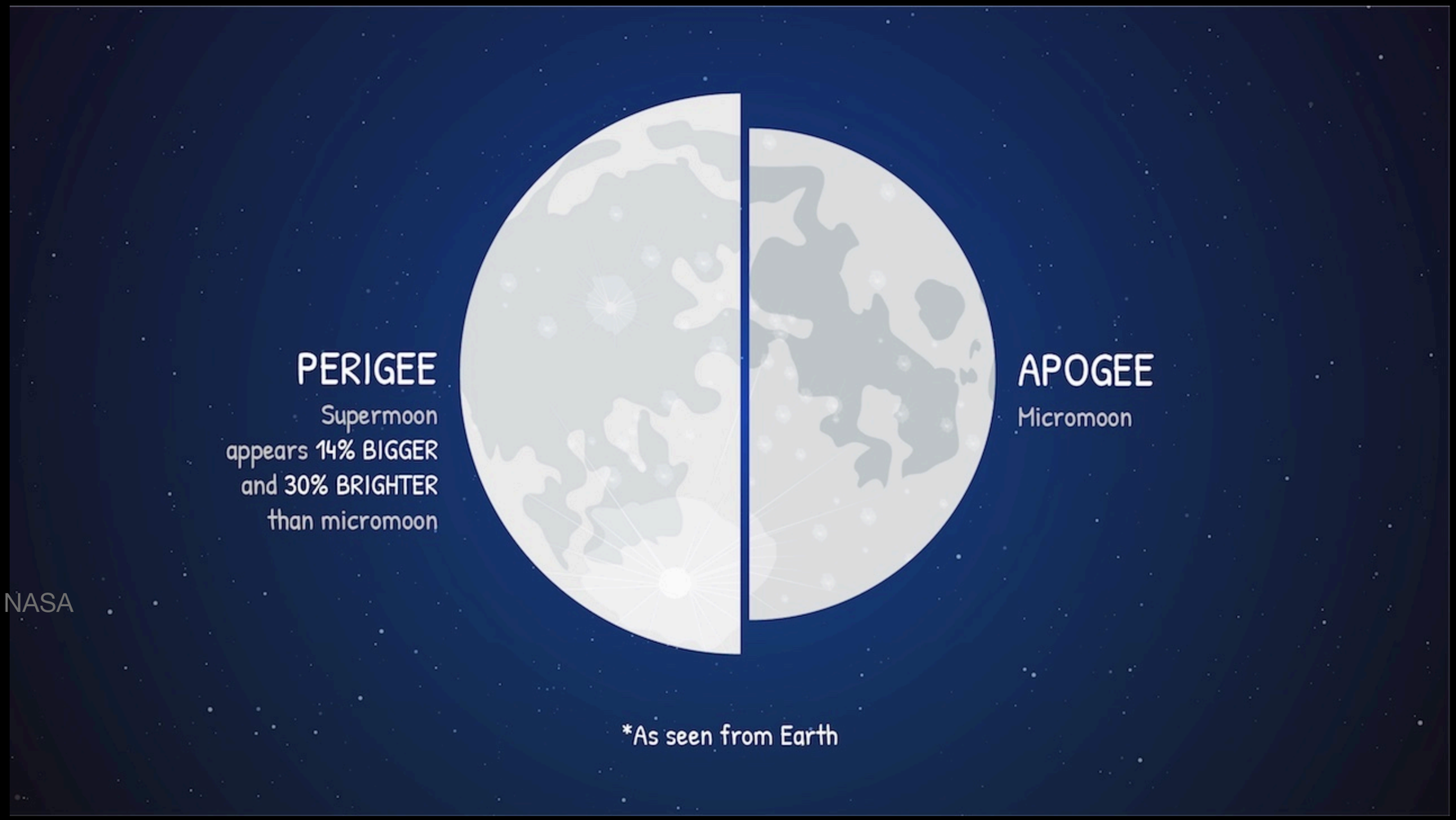
Supermoons



NASA

2026
Sat 01/03/2026 05:02 AM
Tue 11/24/2026 09:53 AM
Wed 12/23/2026 08:28 PM

2025
Mon 10/06/2025 11:47 PM
Wed 11/05/2025 08:19 AM
Thu 12/04/2025 06:14 PM

https://github.com/rtphokie/supermoon

CC

What was that thing in the sky?

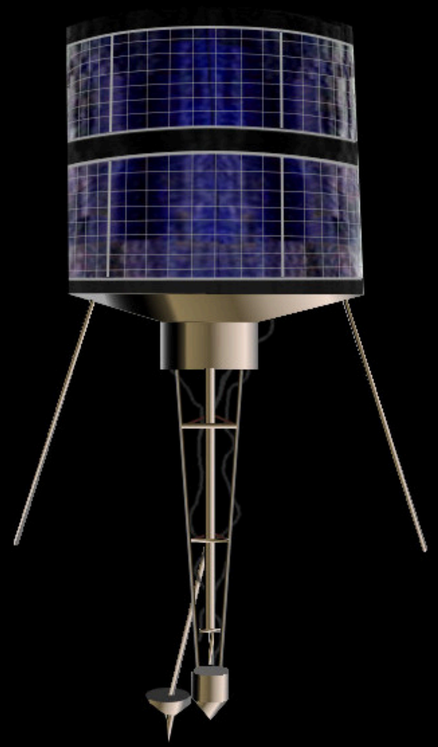


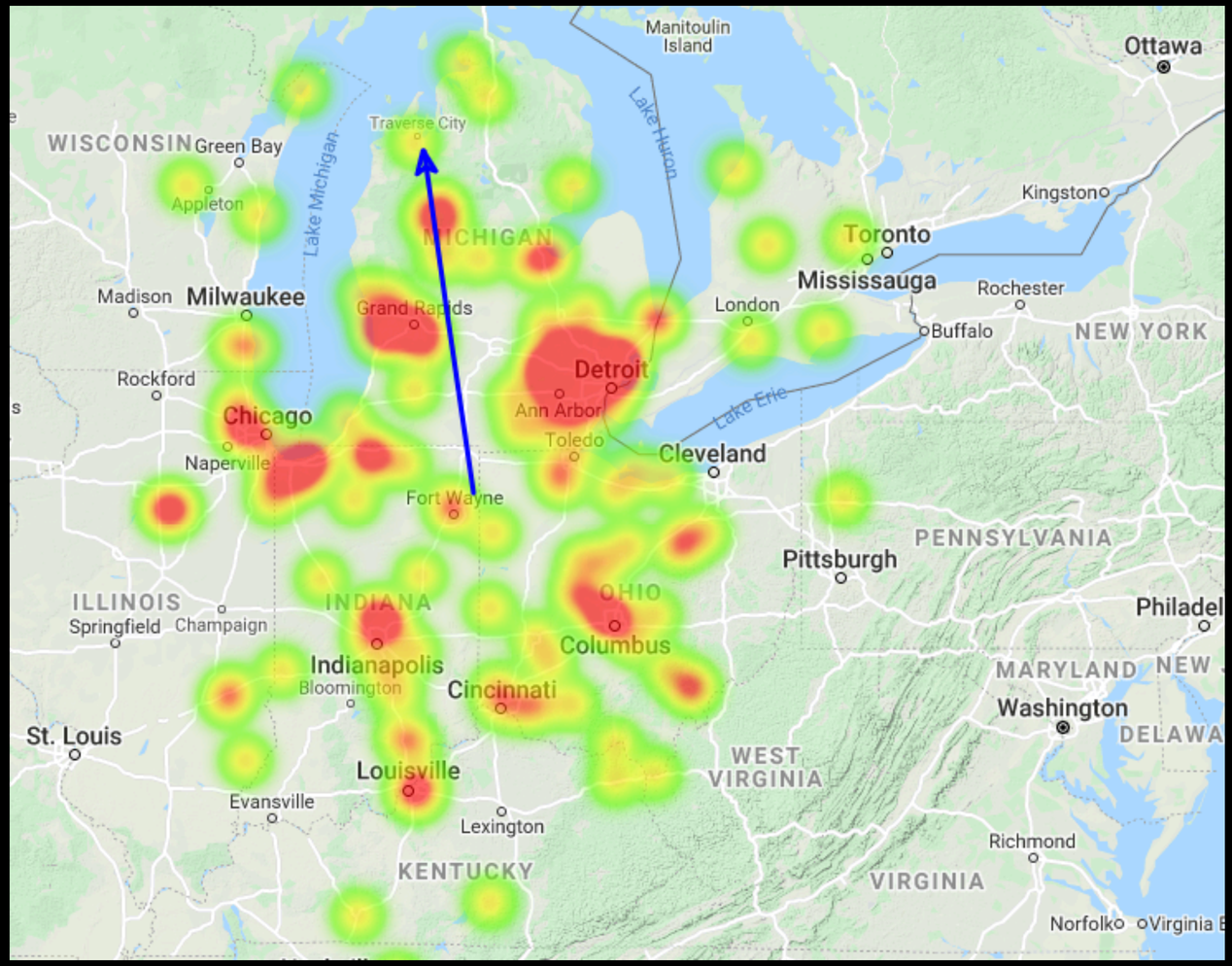
Stanley Waldrup


Melanie Babineau - Cochrane, CA
(pending report #223154)
Nest
American Meteor Society

What was that thing in the sky?

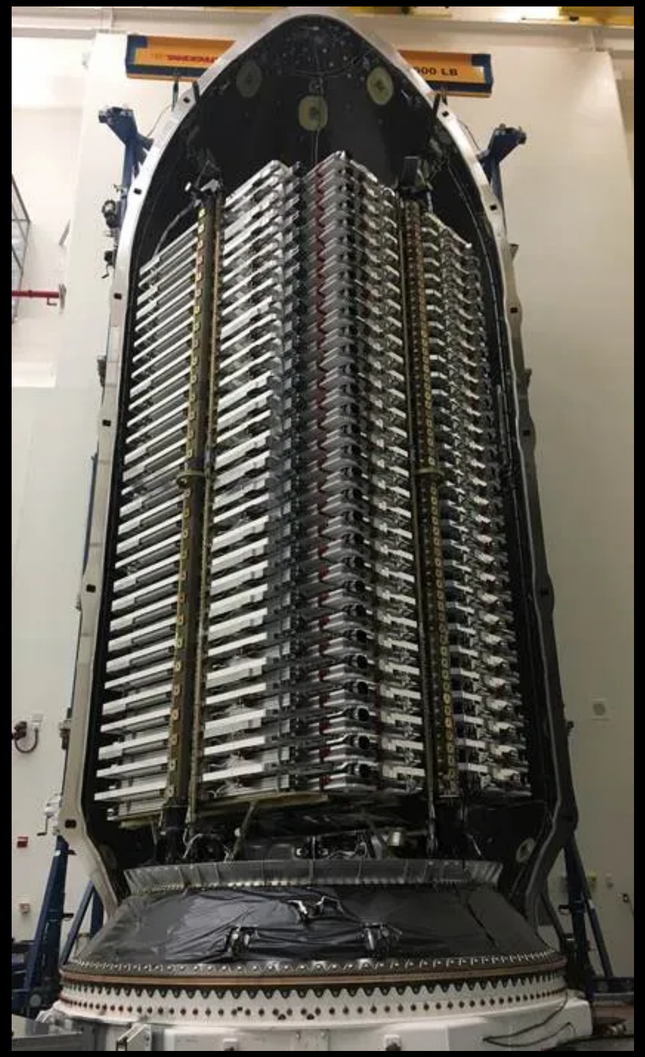
Kosmos-2551

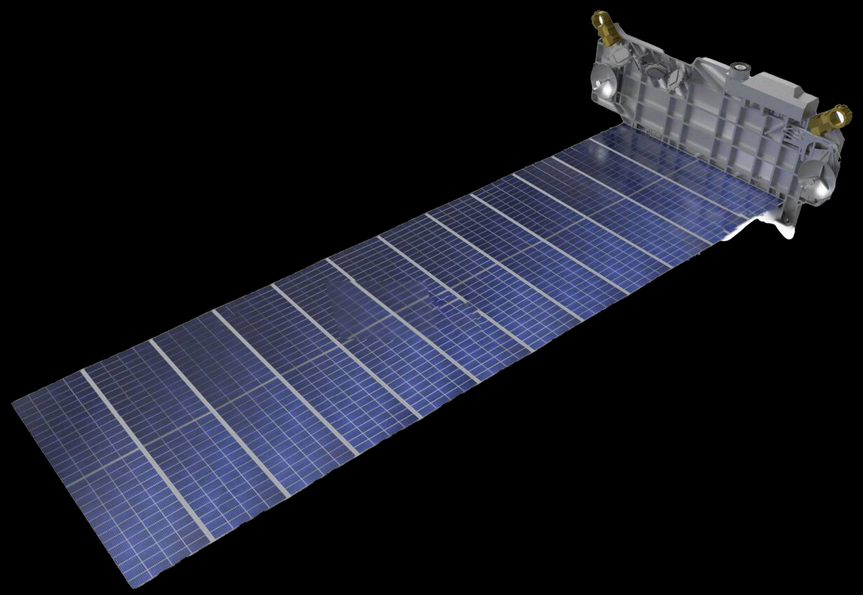




What was that thing in the sky?









Meteor Taxonomy



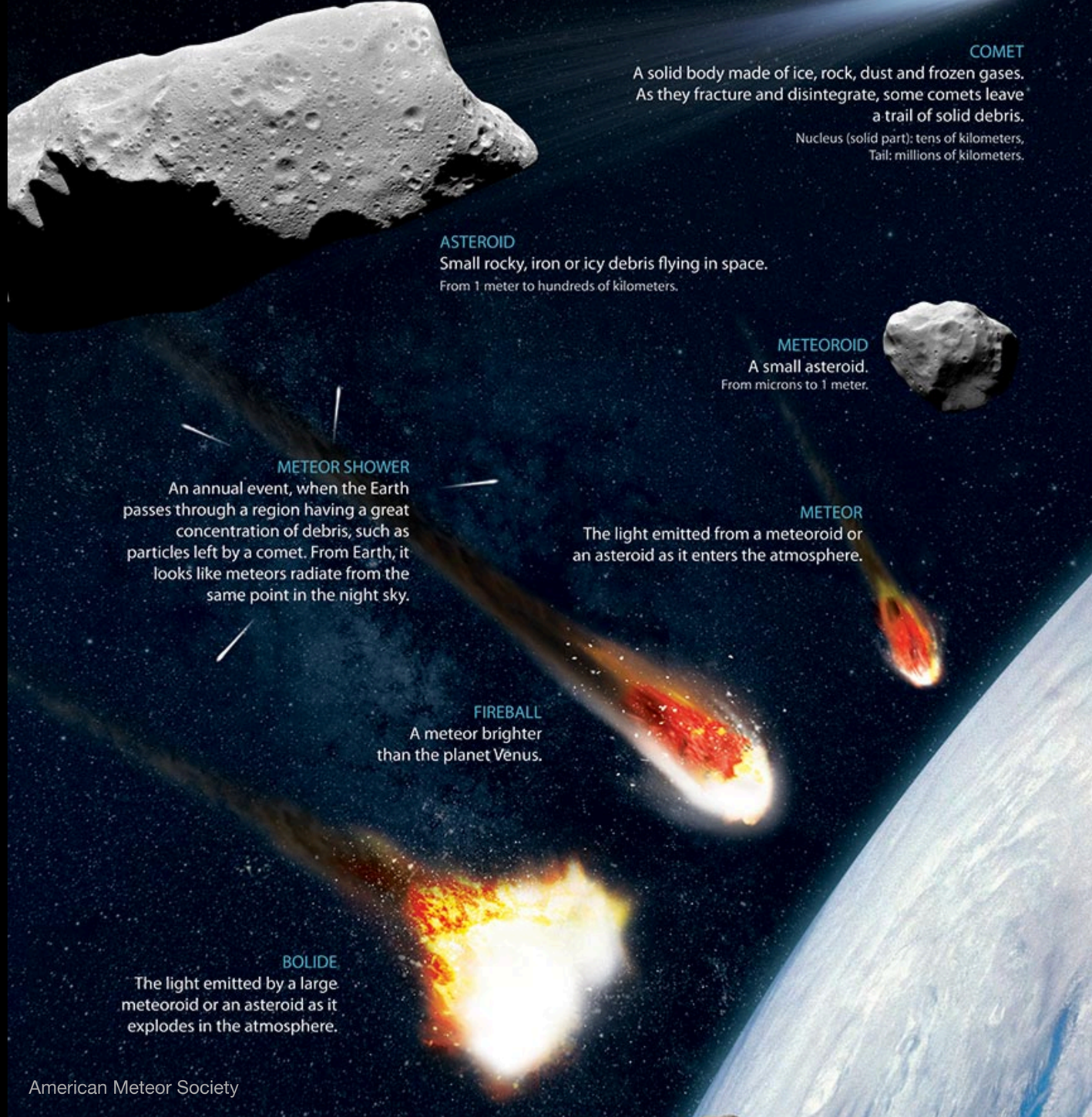
comet / asteroid

meteor shower
meteor

fireball

bolide

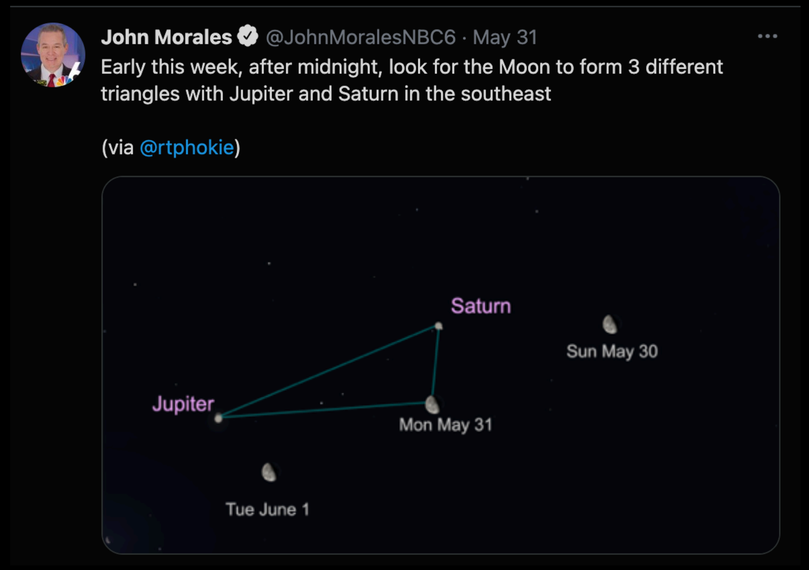
meteorite

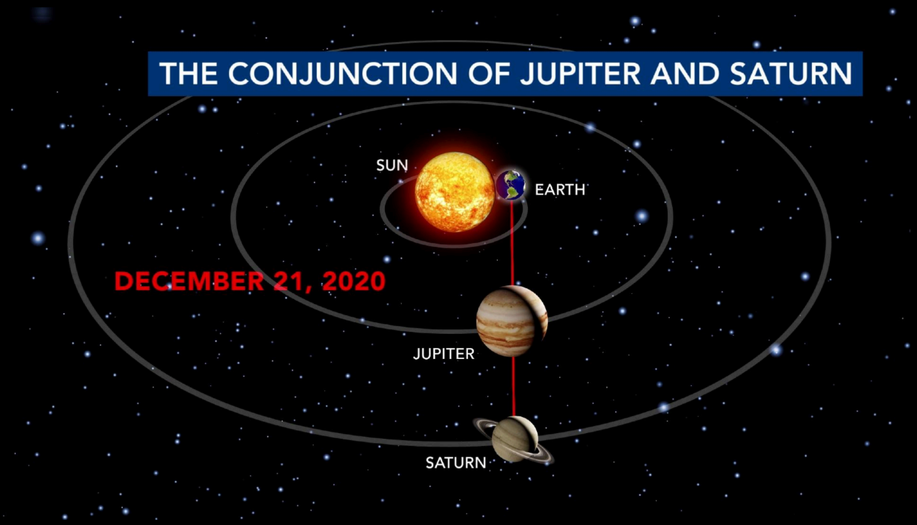


American Meteor Society

Events worth sharing

Weekly







Meteor Showers

Setting expectations

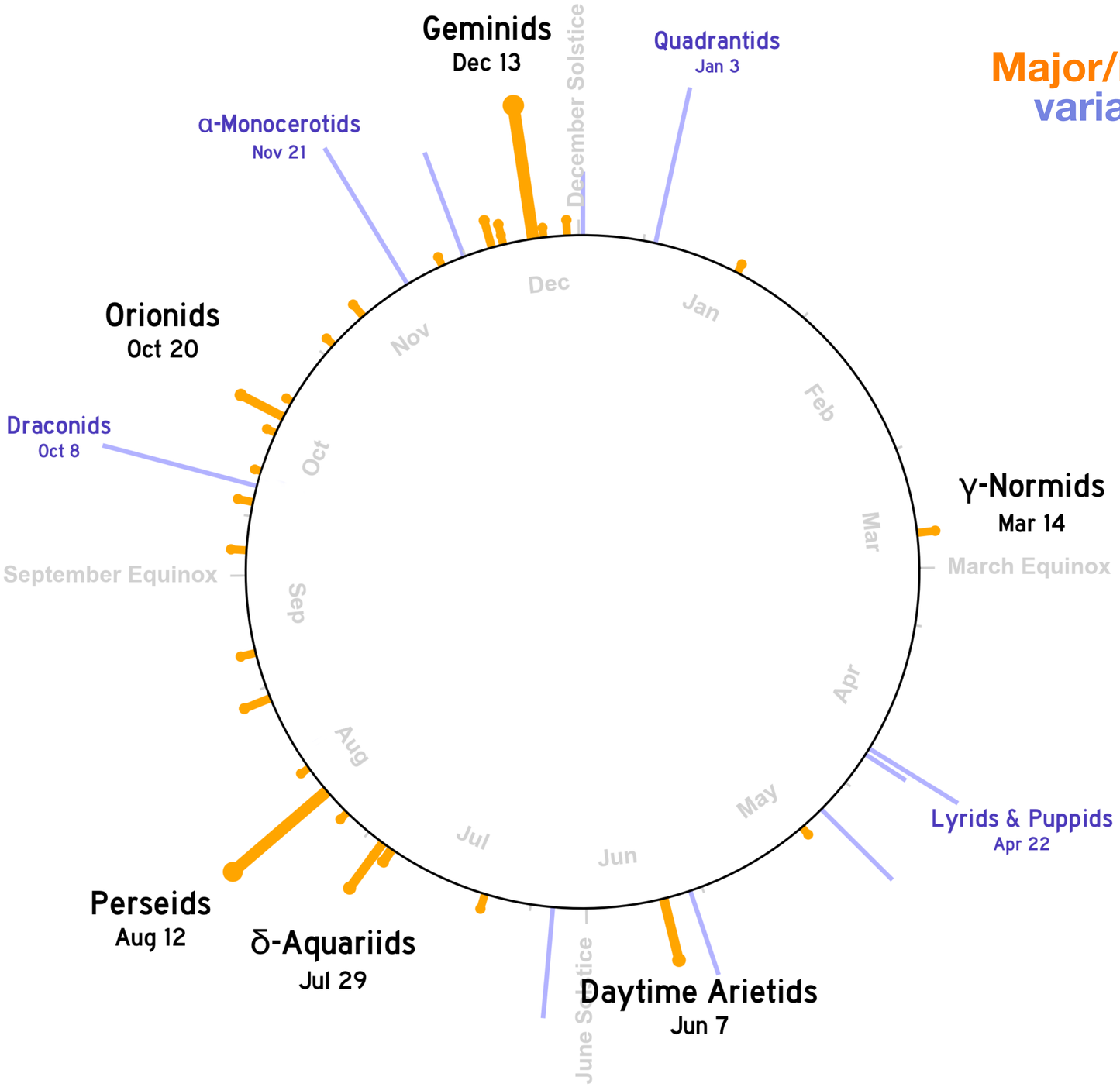


Meteor Shower Advice

- Darker skies = more meteors
- Leave your phone inside
- Give you eyes time to adjust, at least 15 minutes
- Look away from light pollution



Perseid meteor shower, August 12, 2016, Spruce Knob, WV. photo credit: NASA/Bill Ingalls


Major/minor meteor showers
variable meteor showers
Geminids
Dec 13
Quadrantids
Jan 3
α-Monocerotids
Nov 21
December Solstice
Orionids
Oct 20
Draconids
Oct 8
γ-Normids
Mar 14
March Equinox
September Equinox
Lyrids & Puppids
Apr 22
Perseids
Aug 12
δ-Aquariids
Jul 29
Daytime Arietids
Jun 7
June Solstice
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov


Vandenburg
Space Force Base
Wallops
Flight Facility
Kennedy Space Center
Cape Canaveral Space Force Station


Peter Forister

Launches and weather

Launch Mission Execution Forecast

Mission: Falcon 9 CRS-22
Issued: 1 June 2021 / 0900L (1300Z)
Valid: 3 June 2021 / 1324 – 1334L (1724 – 1734Z)

Forecast Discussion: An upper level trough currently located over the Bahamas is expected to slowly fill over the next couple of days, while an Atlantic surface ridge builds westward into the state. The combination of these developments will result in progressively deeper southeasterly flow, favoring late night and morning showers at the coast but focusing afternoon thunderstorms along a rapidly westward moving seabreeze to the west of the Spaceport. Remnant clouds and showers over the ocean and along the coast during the late morning may attempt to persist later, thus the main weather concerns for both Launch Day and Delay Day are the Cumulus Cloud Rule and Flight Through Precipitation.

Launch Day

Probability of Violating Weather Constraints

30% — **Primary Concerns**: Cumulus Cloud Rule, Flight Through Precipitation

Weather Conditions		Clouds				Additional Risk Criteria	
		Type	Coverage	Base (ft)	Tops (ft)		
Weather/Visibility:	Isol showers / 7 mi.	Cumulus	Scattered	3,000	12,000	**Upper-Level Wind Shear**:	Low
Temp/Humidity:	84°F / 70%					**Booster Recovery Weather**:	Low
Liftoff Winds (200'):	140° 15 - 20 mph					**Solar Activity**:	Low

24-Hour Delay

Probability of Violating Weather Constraints

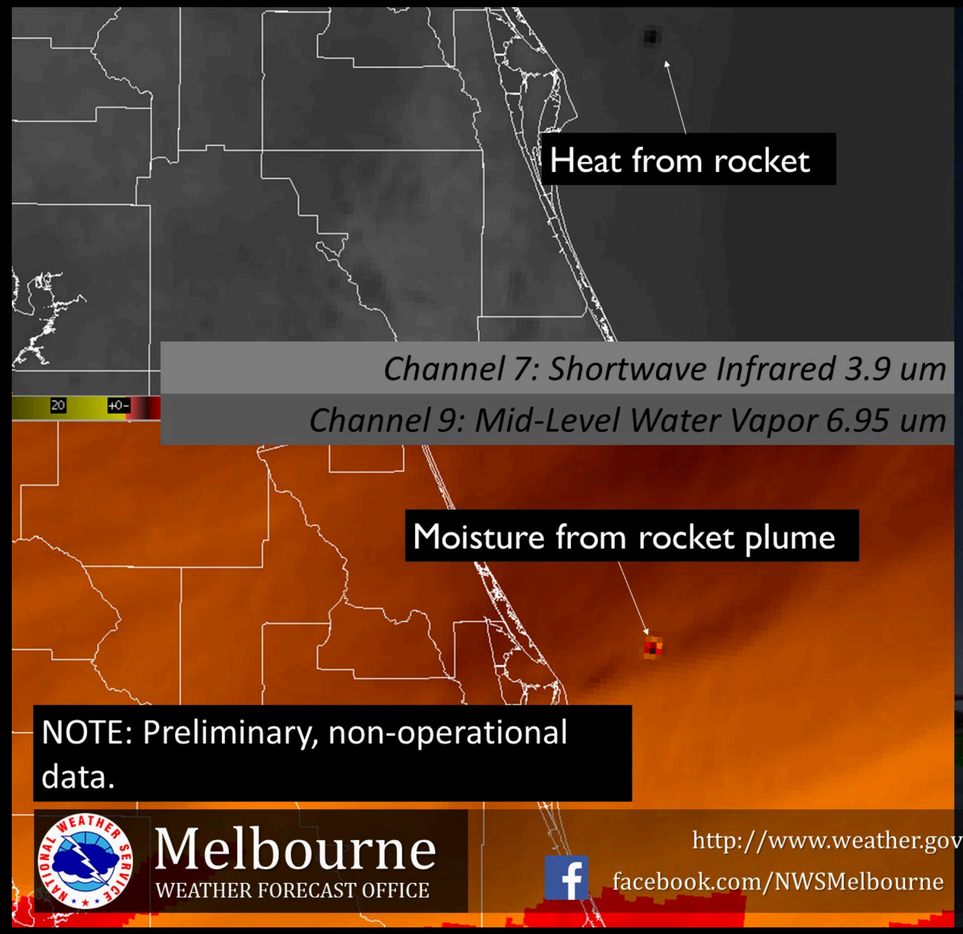
30% — **Primary Concerns**: Cumulus Cloud Rule, Flight Through Precipitation

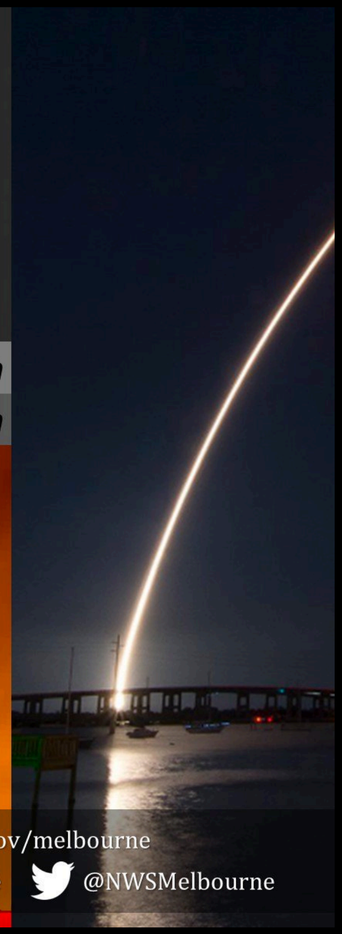
Weather Conditions		Clouds				Additional Risk Criteria	
		Type	Coverage	Base (ft)	Tops (ft)		
Weather/Visibility:	Isol showers / 7 mi.	Cumulus	Scattered	3,000	12,000	**Upper-Level Wind Shear**:	Low
Temp/Humidity:	84°F / 68%					**Booster Recovery Weather**:	Low
Liftoff Winds (200'):	150° 15 - 20 mph					**Solar Activity**:	Low

***Note**: The Probability of Violation (POV) is the chance that a Lightning Launch Commit Criteria (LLCC) or certain user constraints (surface winds, precipitation, and temperatures, etc.) will be violated during the launch window. It does not take into account upper-level wind shear, booster recovery weather, and solar activity.*

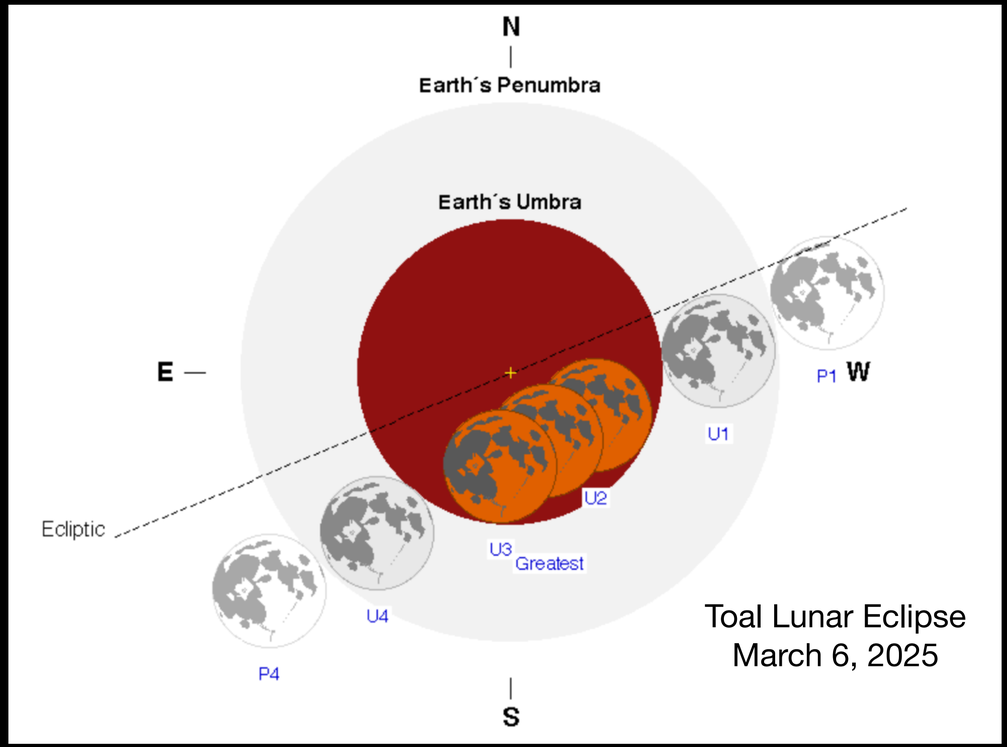
Next Forecast Will Be Issued | 2 JUN 2021

credit: USAF





Events worth sharing
Eclipses



Toal Lunar Eclipse
March 6, 2025

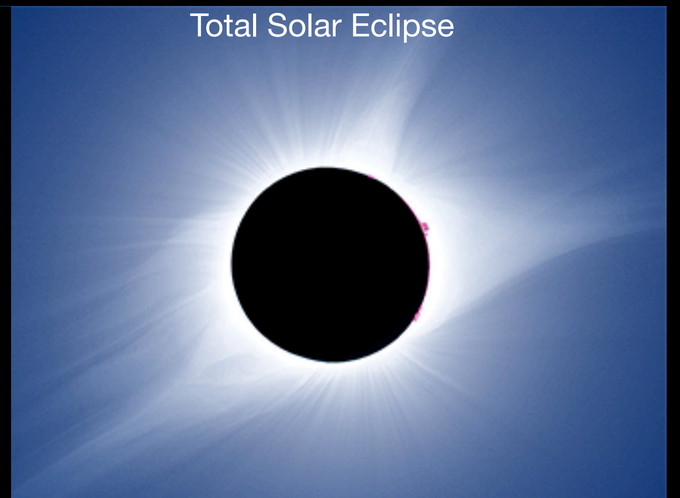
Partial Solar Eclipse



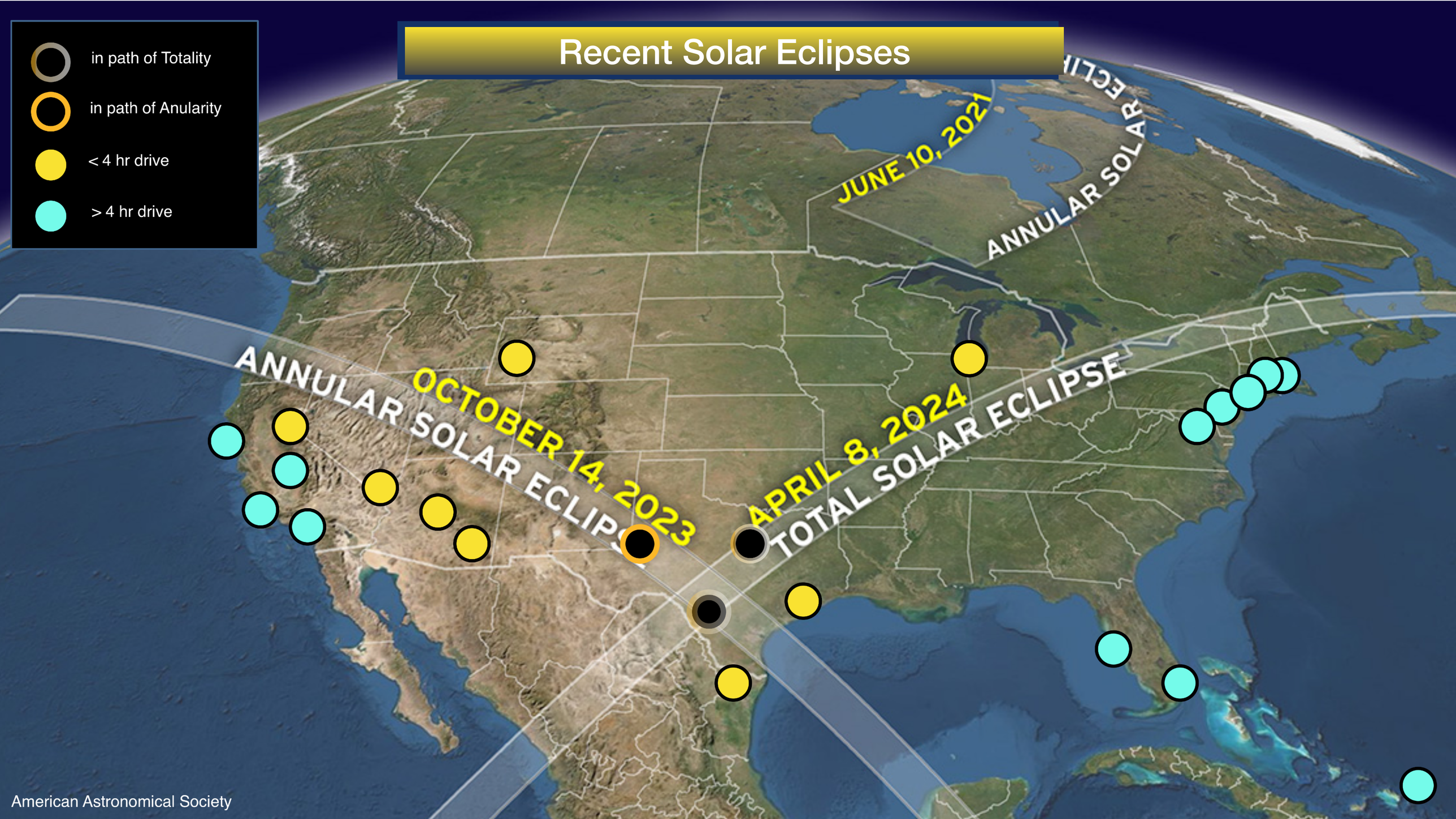
Annular Solar Eclipse



Total Solar Eclipse

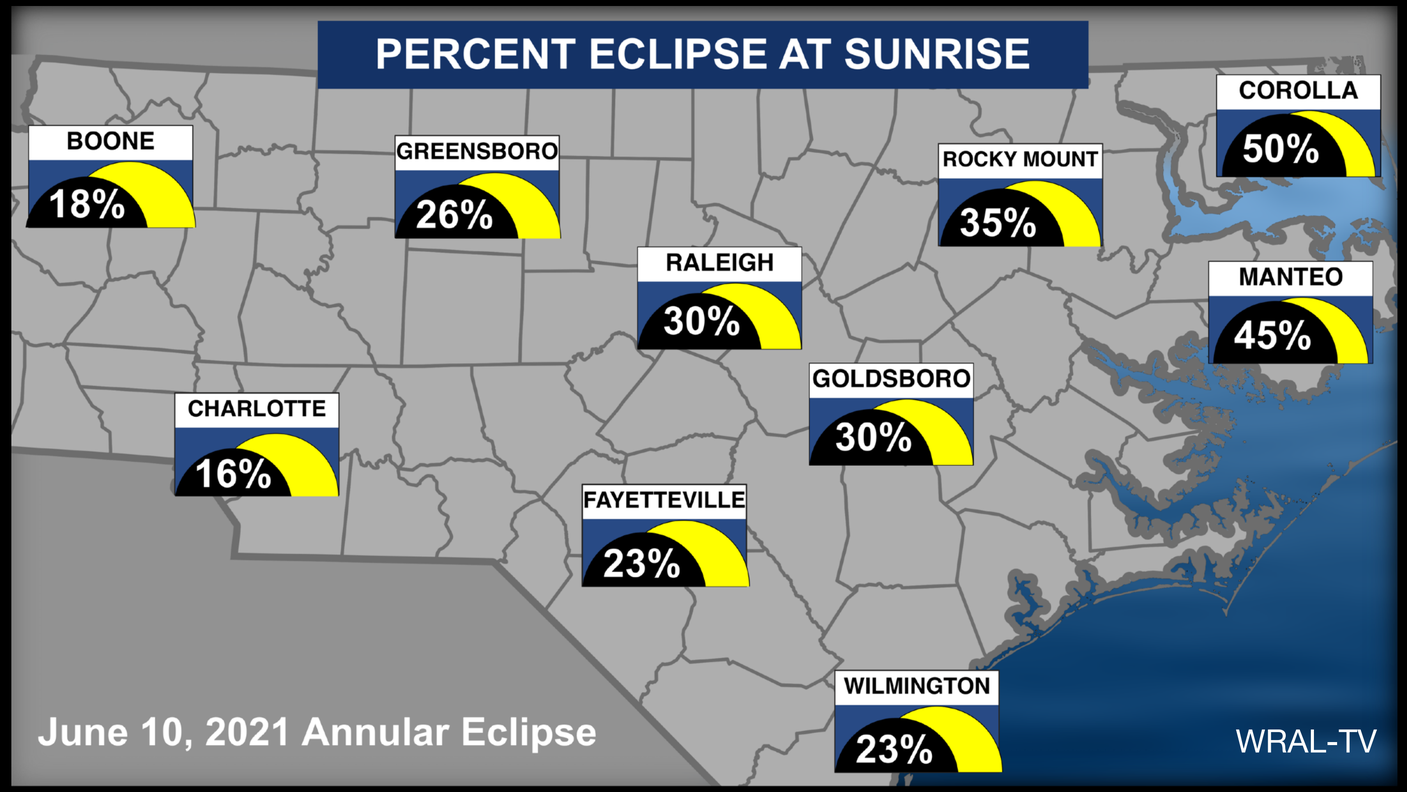


NASA


Recent Solar Eclipses
in path of Totality
in path of Anularity
< 4 hr drive
> 4 hr drive
JUNE 10, 2021
ANNULAR SOLAR
OCTOBER 14, 2023
ANNULAR SOLAR ECLIPS
APRIL 8, 2024
TOTAL SOLAR ECLIPSE
American Astronomical Society

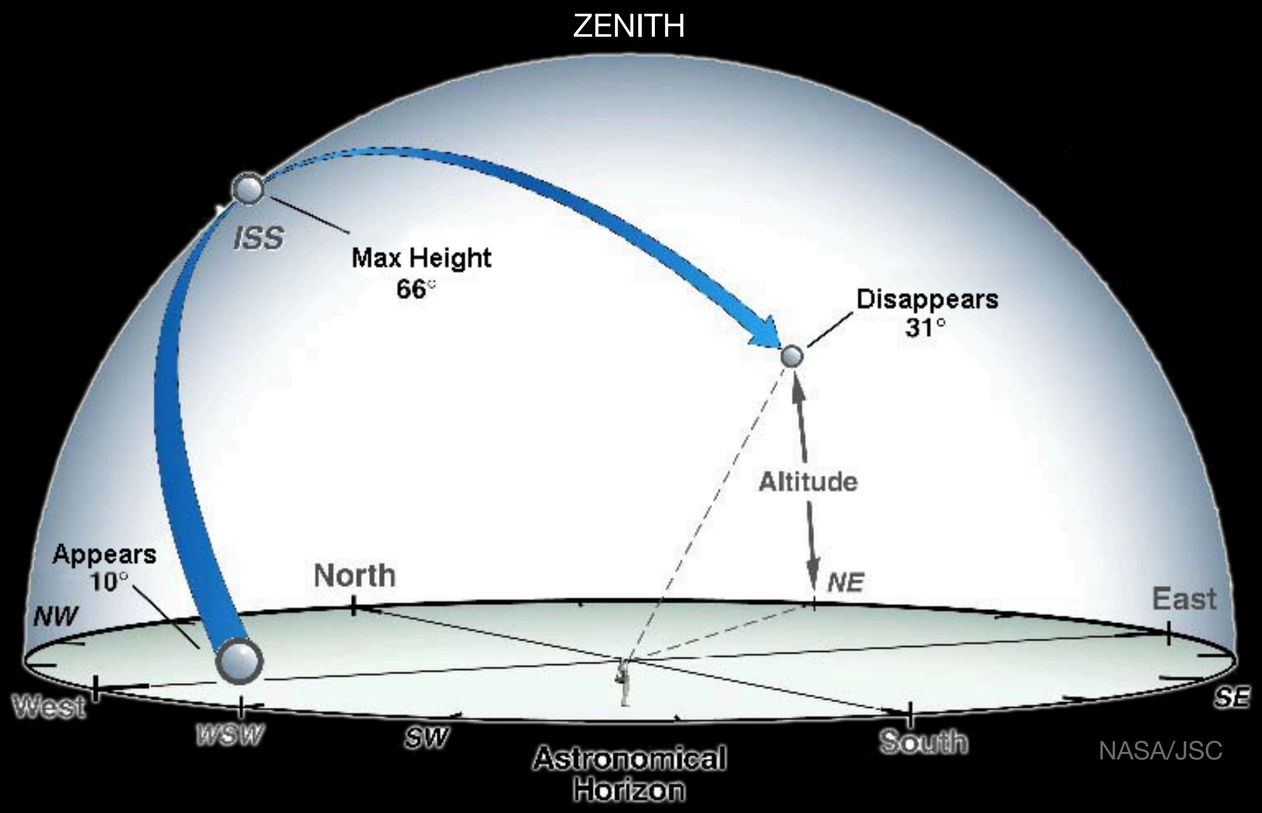
Localizing things happening 93 million miles away.





Where are your horizons?

Know your area

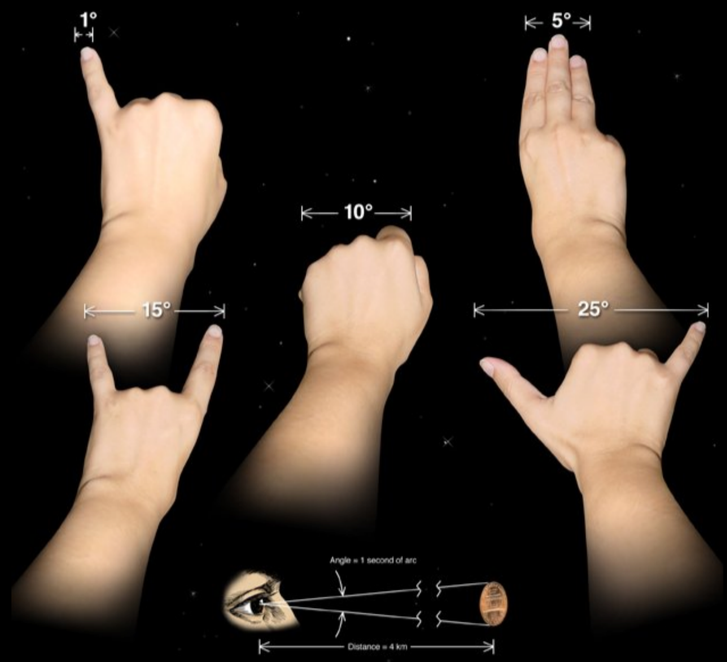


NASA/JSC

Theodolite Smartphone Apps



Hunter Research and Technology



Fort Worth Astronomical Society

Aurora
Space Weather

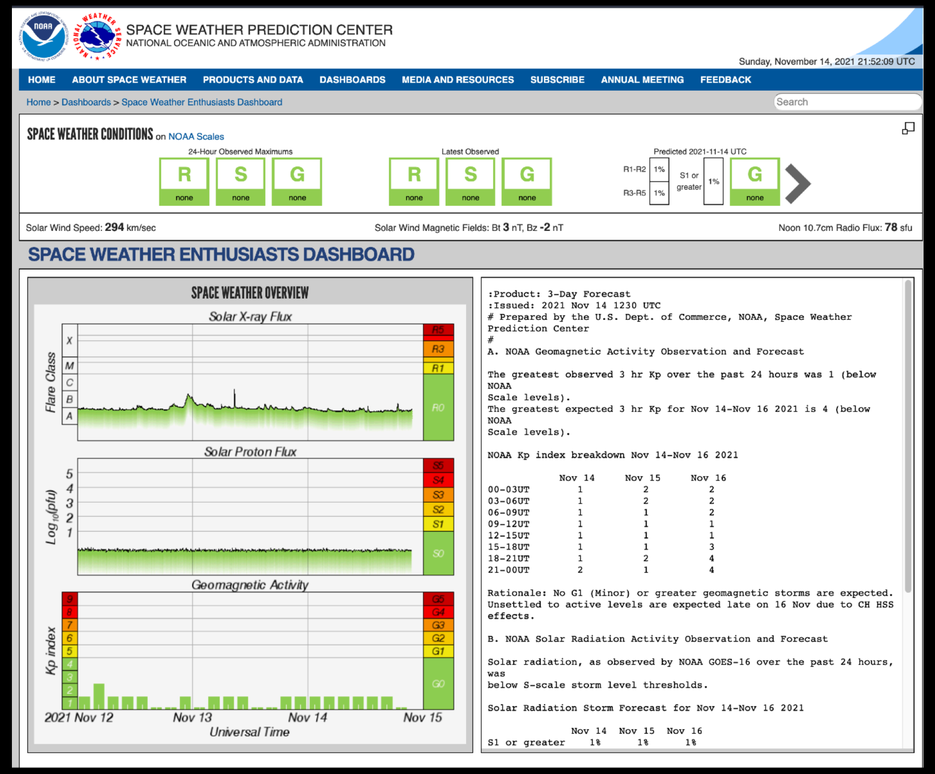
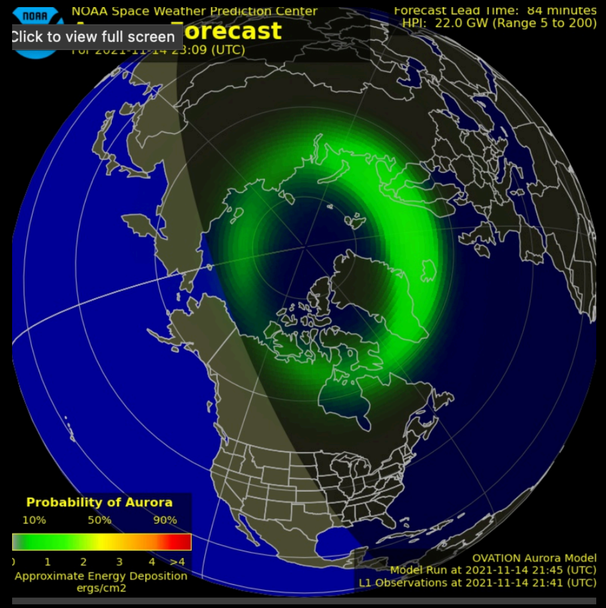
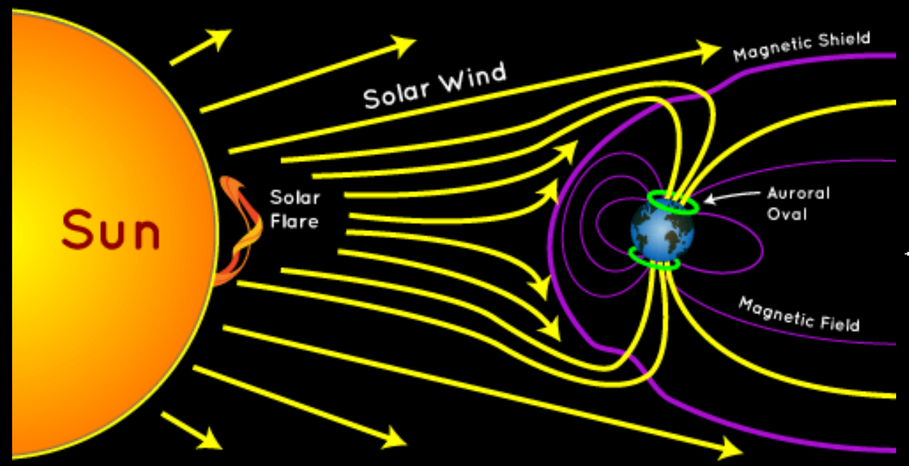


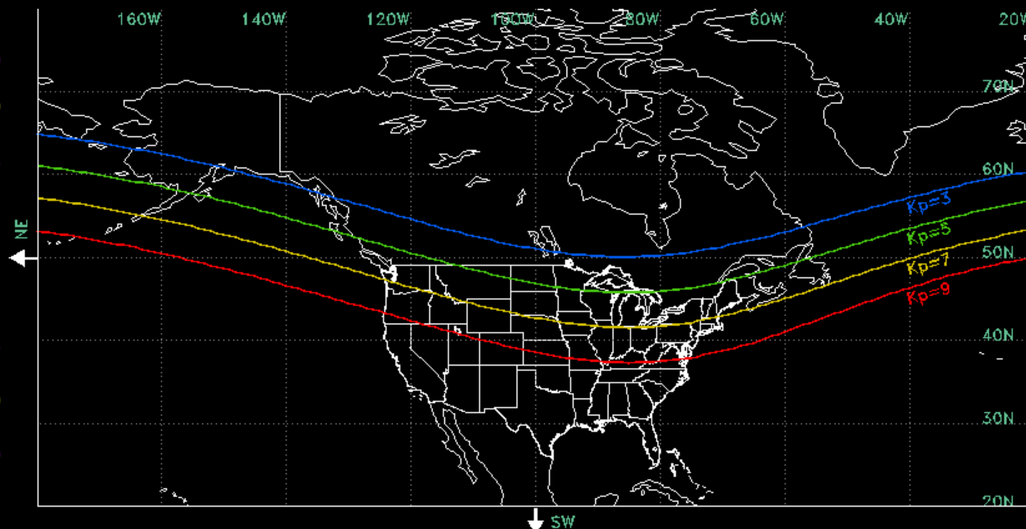


Image: NASA/Sebastian Saarloos

https://www.swpc.noaa.gov







My weekly emails

Email rtphokie@gmail.com with

- email address(es)
- city, state

Highlights

- early this week, after midnight, Jupiter, Saturn and the Moon are putting on a triangular geometry show.
  - Sun May 30, a flattened scalene triangle
  - Mon June 1, the Moon slides beneath Saturn forming a nearly right triangle
  - Tue June 2, the Moon slides beneath Jupiter flipping that right triangle.
  - Wed June 3, another flattened scalene triangle.
- Mon May 31, look for Mars near the bright stars Pollux and Castor in the constellation Gemini
- Tue June 1, Near-Earth Object (2018 LB), between 55 to 123 feet (17 and 38 meters) across, will pass the Earth at between 0.9 and 7.2 lunar distances (nominally 2.9) traveling at 17,200 miles per hour (7.7 kilometers per second).
- Look for a lot more information about next week's annular eclipse in an email this week.

- Thu Jun 10 04:52:35: new moon

Upcoming Launches

- Thu, Jun 3 01:29 PM EDT (17:29 UTC) SpaceX plans the launch of CRS2 SpX-22 from the Kennedy Space Center in Florida
- Wed, Jun 30 05:27 AM +06 (23:27 UTC) Roscosmos plans the launch of Progress MS-17 from the Baikonur Cosmodrome in Kazakhstan
- Fri, Jul 30 02:53 PM EDT (18:53 UTC) United Launch Alliance (ULA) plans the launch of CST-100 Starliner (Boe-OFT2) from the Cape Canaveral SFS in Florida

On This Day

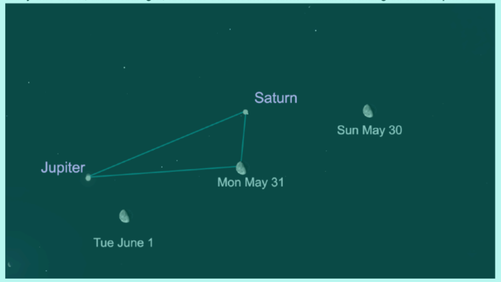
- May 30, 1975: European Space Agency established
- June 3, 1965: Gemini IV launched; Ed White takes America's first space walk
- June 4, 1974: Construction begins on space shuttle Enterprise
- June 6, 1971: Soyuz 11 launched, first crew to occupy Salyut 1 space station

In case you missed it

- NASA's Mars helicopter Ingenuity suffered a glitch during sixth flight last week when flow of images from its navigation cameras were interrupted. It landed safely as the 4lb helicopter ignored anomalous imag data relying instead on inertial measurements. ... read more
- China's rover Zhurong successfully rolled off its Mars lander and began returning images of the massive Utopia Planitia in Mars' northern hemisphere. ... read more
- The National Air and Space Museum in DC announced it will be reopening on July 30, free timed entry passes are required

Here, Tweet This

Early this week, after midnight, look for the Moon to form 3 different triangles with Jupiter and Saturn in the southeast.

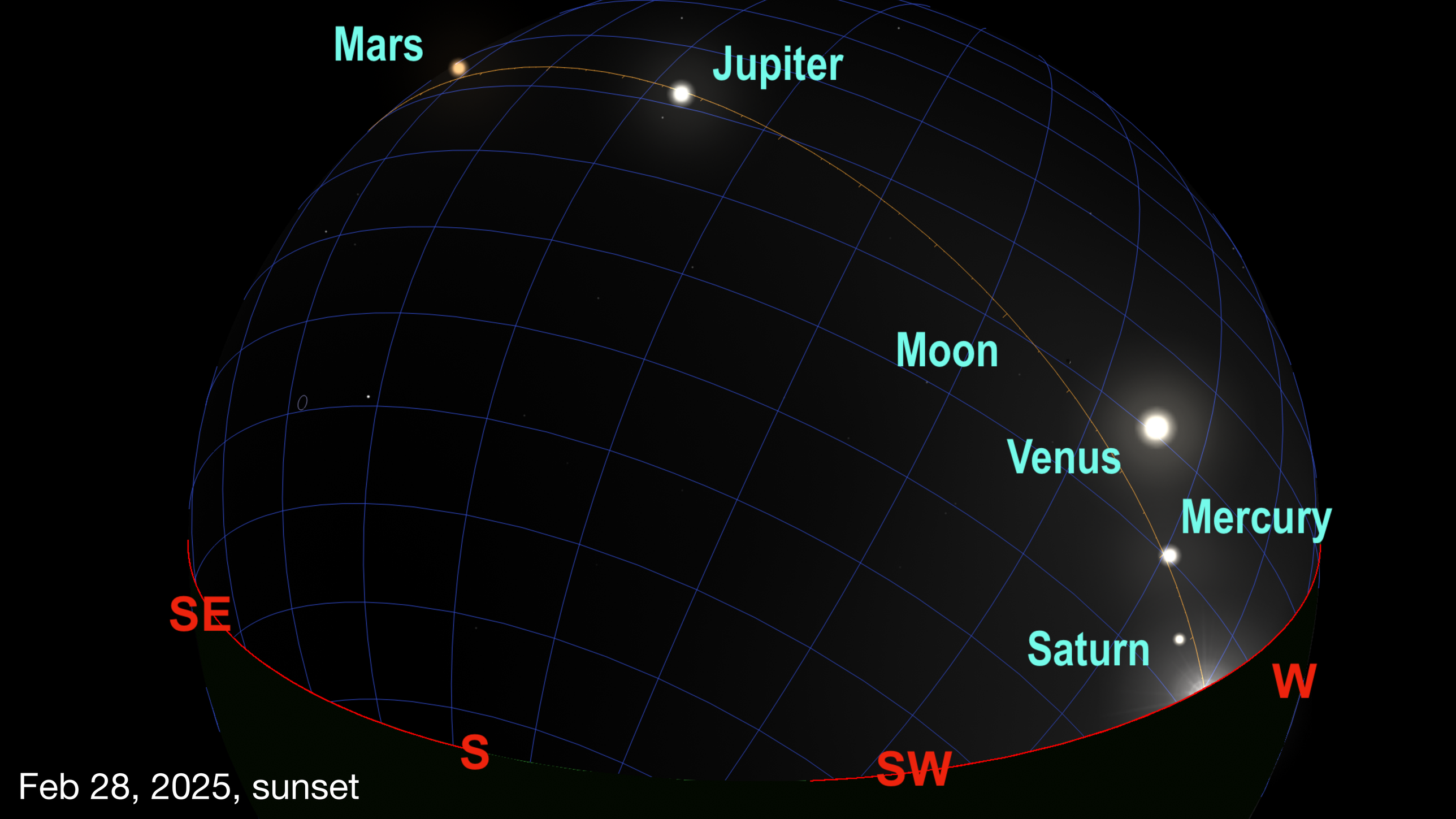


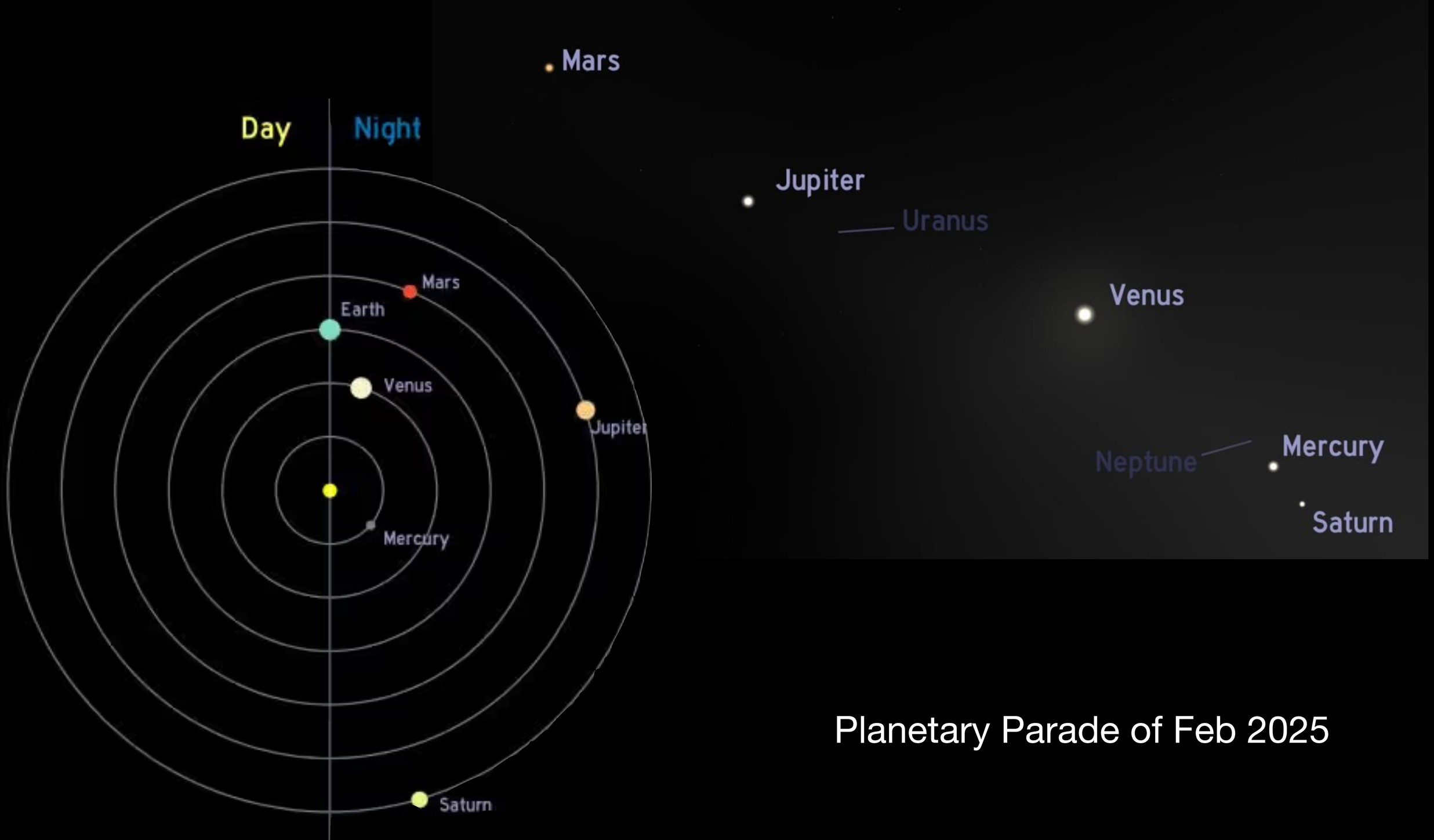
Satellite Passes

This information is best used to identify passes worth sharing or skipping. Those nearest overhead are closest, brightest, and longest. Check dates and times for each pass before sharing.

International Space Station (ISS)

- good pass begins Sun May 30 10:53:16 PM MDT from the ESE (121°) reaches 56°, enters Earth's shadow 9° above the horizon 2.3 minutes
- fair pass begins Mon May 31 10:06:06 PM MDT from the ESE (103°) reaches 31°, enters Earth's shadow 9° above the horizon 3.9 minutes
- below trees pass begins Tue Jun 01 9:19:06 PM MDT from the E (83°) reaches 19°, lasts 5.1 minutes
- fair pass begins Tue Jun 01 10:55:25 PM MDT from the SSE (161°) reaches 36°, enters Earth's shadow 9° above the horizon 2.0 minutes
- outstanding pass begins Wed Jun 02 10:07:52 PM MDT from the SE (141°) reaches 73°, enters Earth's shadow 9° above the horizon 4.0 minutes
- good pass begins Thu Jun 03 9:20:31 PM MDT from the ESE (122°) reaches 57°, enters Earth's shadow 9° above the horizon 5.9 minutes

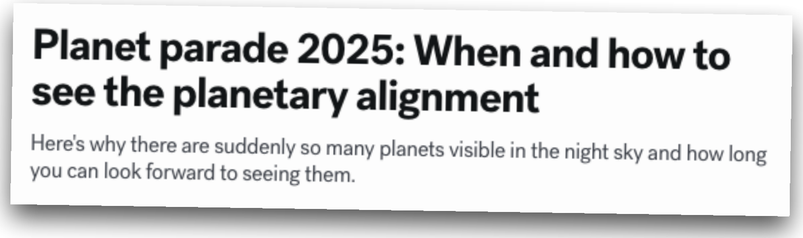

Mars
Jupiter
Moon
Venus
Mercury
Saturn
SE
S
SW
W
Feb 28, 2025, sunset



Planetary Parade of Feb 2025







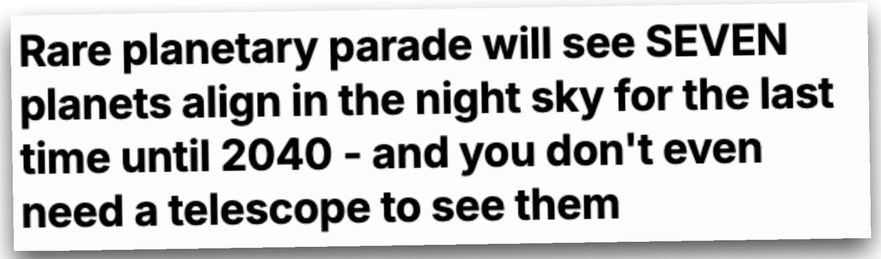












"Friday 28th is the special date, with all seven planets other than the Earth visible in the sky - if the night is clear!"

- [redacted], associate professor of physics at [redacted] University

You Can Witness a Stunning 'Parade of Planets' Tonight—and There Won't Be Another Until 2040

On Feb. 28, seven planets will all grace the early evening sky.

Seven planets to be visible in night sky for last time until 2040

Planet parade 2025: When and how to see the planetary alignment

Here's why there are suddenly so many planets visible in the night sky and how long you can look forward to seeing them.

Seven planets will align on Friday for the last time until 2040. Here's how to see it in Toronto

The planetary parade won't happen again until 2040 — and you don't even need to leave the city to see it.

A rare 'parade' of all 7 planets will move across the night sky this week

Watch 'rare' planetary parade online for free today as 7 planets align across the sky

2 lucky zodiac signs on the day of parade of planets on February 28, 2025

On February 28, 2025, two zodiac signs are poised to welcome abundance and good fortune into their daily horoscope.

Once-in-a-generation planet parade tonight: How to see the rare 7-planet alignment

A rare occurrence, the planet parade is an event any astronomy fan should try to catch.

Rare planetary parade will see SEVEN planets align in the night sky for the last time until 2040 - and you don't even need a telescope to see them







https://speakerdeck.com/tonyrice

Resources

- ISS & other satellite passes (Heavens Above)
- Lunar images: Dial a Moon (NASA LRO)
- Explainers: Scientific Visualization Studio (NASA/GSFC)
- Meteors / Fireballs : AMSMeteors.org
- Event calendars
  - Monthly skywatching tips (NASA/JPL)
  - Sky this week Sky & Telescope & Astronomy Magazine
  - Launch Calendar
- Supermoon list
- KSC/CCSFS Launch Weather Forecasts (45th Weather Squadron)



NASA/GSFC/LRO

Astronomy questions

1.Looking down on the Earth from above the North Pole, which way does it rotate?

2.How long is a lunar cycle?

3.How long is a tropical/solar year?

4.When do full and new moons rise?

5.When is the first day of winter?



tinyurl.com/cnccamsastro

Astronomy questions

1. Looking down on the Earth from above the North Pole, which way does it rotate?
   Counter-Clockwise
2. How long is a lunar cycle?
   average 29 days, 12 hours, 44 minutes and 3 seconds
3. How long is a tropical/solar year?
   365 days 5 hours 51 minus 6 seconds
4. When do full and new moons rise?
   sunset, sunrise
5. When is the first day of winter?
   ~~December 1~~ on the winter solstice: December 21



tinyurl.com/cnccamsastro