Longmont Astronomical Society

July 2026

Colorful Trifid
by Jim Pollock

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LAS Meeting on July 16: Presentation by Dr. Vicki Hamilton

Beyond Bennu: OSIRIS-APEX and the Exploration of Near-Earth Asteroid Apophis

The OSIRIS-APophis EXplorer mission is the second life of one of NASA's great success stories in planetary science. The spacecraft, launched in 2016 as OSIRIS-REx, spent two years orbiting the carbon-rich asteroid Bennu before collecting a sample and delivering it safely to Earth in September 2023. After dropping off its cargo, the spacecraft and its instruments remained healthy, so NASA extended the mission and gave it a new target and a new name: asteroid Apophis, named after the ancient Egyptian god of chaos, and OSIRIS-APEX. On April 13, 2029, the 340-meter-wide Apophis will fly past Earth at ~32,000 kilometers distance, closer than our highest-altitude satellites, making it the largest object to pass this near to Earth in recorded history. Earth's gravitational pull is expected to alter the asteroid's orbit, change how fast it spins, and possibly trigger quakes or landslides on its surface. OSIRIS-APEX will chase Apophis past the Earth and use Earth's gravity to redirect the spacecraft toward a rendezvous with Apophis, beginning an 18-month science campaign in mid-2029. As part of that campaign, Apophis will be the first S-type asteroid to be characterized from orbit in the extended near infrared region (~2.7 – 4 μm) and by thermal infrared spectroscopy (5.7-100 μm). Near the mission's end, the spacecraft will fire its thrusters to excavate surface material, allowing a look at the asteroid's subsurface.

Dr. Vicky Hamilton is a geoscientist specializing in infrared spectroscopy of minerals, meteorites, and planetary samples. She has extensive experience with science and instrument operations on numerous NASA planetary science flight missions. She is the Deputy Principal Investigator of the Mars Odyssey THEMIS instrument and the L'TES instrument on the Lucy spacecraft. She was a Participating Scientist with the Mars Science Laboratory Curiosity and is a Co-Investigator and Instrument Scientist for OTES on OSIRIS-REx and OSIRIS-APEX. She led the OSIRIS-REx Spectral Analysis Working Groups during operations and sample analysis was the Mission Sample Spectroscopy Scientist. Hamilton chaired the Panel on Mars for the most recent National Academies Decadal Survey in Planetary Science and just concluded a three-year term as the Chair of the Mars Exploration Program Analysis Group, a community-based, interdisciplinary forum representing the interests of the Mars science community.

Location

The meeting will be at 7pm in the First Evangelical Lutheran Church, 803 Third Avenue, Longmont, CO 80501. It will also be available to LAS members on Zoom and on the members .

About LAS

The Longmont Astronomical Society Newsletter ISSN 2641-8886 (web) and ISSN 2641-8908 (print) is published monthly by the Longmont Astronomical Society, P. O. Box 806, Longmont, Colorado. Newsletter Editor is Vern Raben. Our website URL is https://www.longmontastro.org and the webmaster is Mike Hotka. The Longmont Astronomical Society is a 501 c(3), non-profit corporation which was established in 1987.

The Longmont Astronomical Society is affiliated with the Astronomical League (https://www.astroleague.org). The Astronomical League is an umbrella organization of amateur astronomy societies in the United States.

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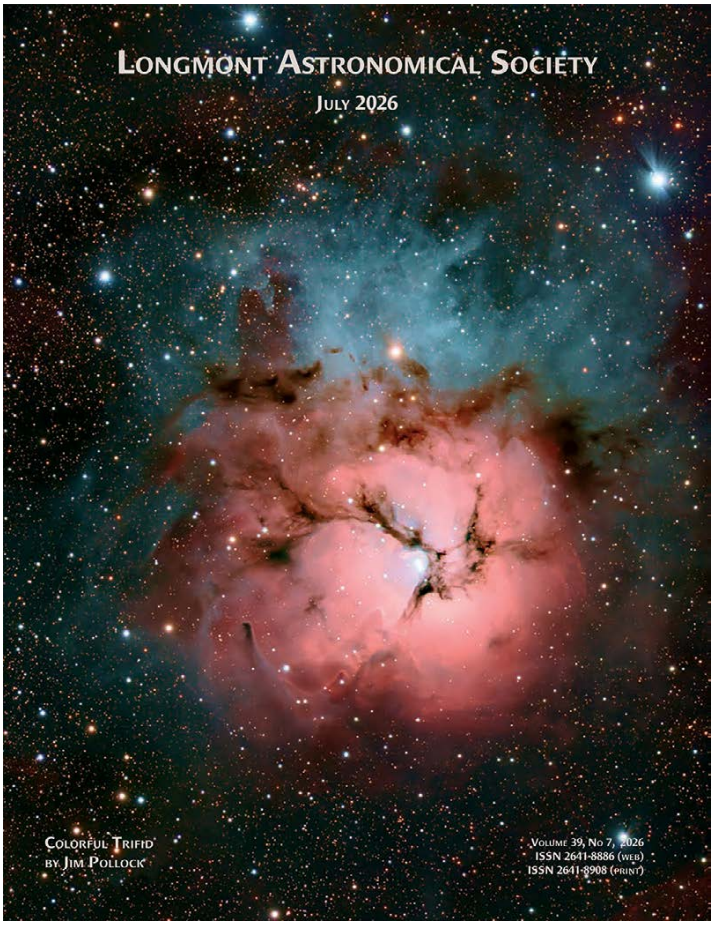


As summer gets closer, the really pretty stuff is starting to come into view. Shot this photo of M20, The Triffid Nebula last night from my scope in Texas.

The Triffid Nebula is a lovely and peculiar object discovered by Charles Messier on June 5, 1764 (262 years ago last week!) and added as the 20th entry in his "not-a-comet" list: M20.

It is a combination of 3 major elements, an open cluster of stars, a reddish-pink hydrogen emission nebula (lit by the cluster) and a large blue/teal reflection nebula.

This image constructed from 77 frames of 180sec (4 hours) at f/7 with a focal reducer on my 9.25" EdgeHD scope at Starfront Observatories in Texas. I used the ZWO 2600mc DUO full-color camera with an L-Quad 4 band filter in front.

Lots to look up at!

Jim

Back Cover: IC 983 + IC 982 = Arp 117 by M. J. Post

IC 983 + IC 982 = Arp 117

According to Russ Croman's StarXterminator routine, there are about 50 galaxies in this image inside the constellation of Bootes. But only two of them just above center are interacting, and Halton Arp cataloged them together as ARP 117. The top one, a barred face-on spiral, is IC 983 while the lower one, IC 982, is classified as lenticular. The large elliptical galaxy below image center is NGC 5490.

DSNM. CDK14, 3 hours on target with ASI 6200MC camera. FOV 33 x 30 arc minutes.

M. J. Post

Planets in July

Mercury

Mercury is not visible naked eye or with small scope this month.

Venus

Venus is visible in the evening sky naked eye or with a small scope all month. It is -4.1 magnitude in brightness and its disk increases from 16 to 21 arc sec across.

Mars

Mars is visible in the morning sky; optimal time to view is just before 5 am. It is +1.3 magnitude in brightness and its disk increases from 4.5 to 4.7 arc sec across this month.

Jupiter

Jupiter is not visible naked eye, with binoculars, or small scopes this month.

Saturn

Try viewing Saturn just before 4 am in the SE Its disk is 18 arc sec across and it +0.5 in brightness.

Uranus

Uranus may be seen very low in the ENE sky around 5 am. It is +5.8 magnitude in brightness and its disk is 3.5 arc sec across.

Neptune

Neptune is in the ESE below Pegasus. Best to view would be about 3 am. It is magnitude 9.1 in brightness and the disk is 2.3 arc sec across.

Lunar Phases in July

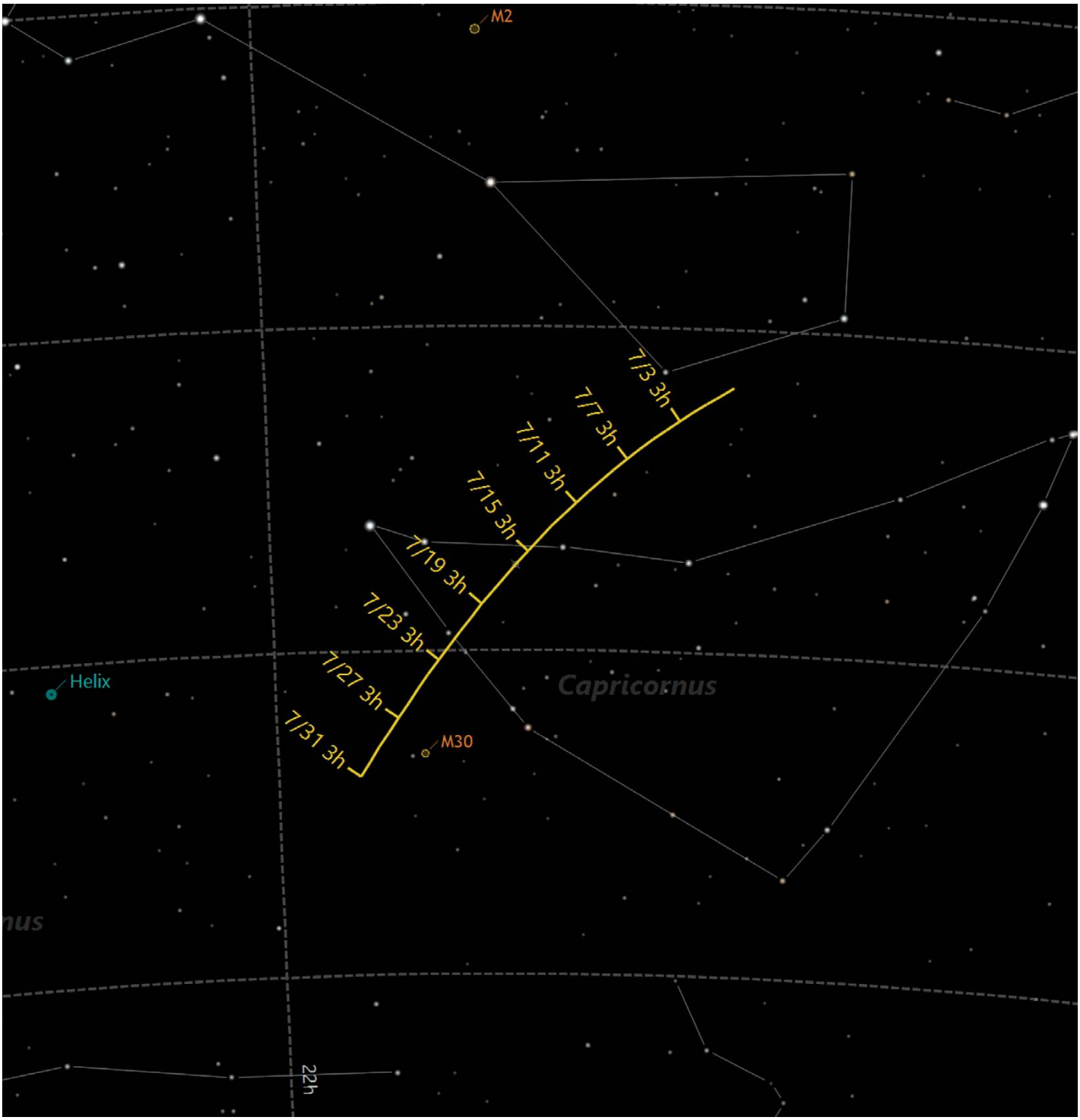
July 7 at 1:30 pm - Third Quarter Moon
July 14 at 3:45 am - New Moon
July 21 at 5:07 am - First Quarter Moon
July 29 at 8:37 am - Full Moon

Meteor Showers in July

There are no major (class I) meteor showers peaking in July. However, the annual Perseid meteor shower begins July 17 and lasts until Aug 24.

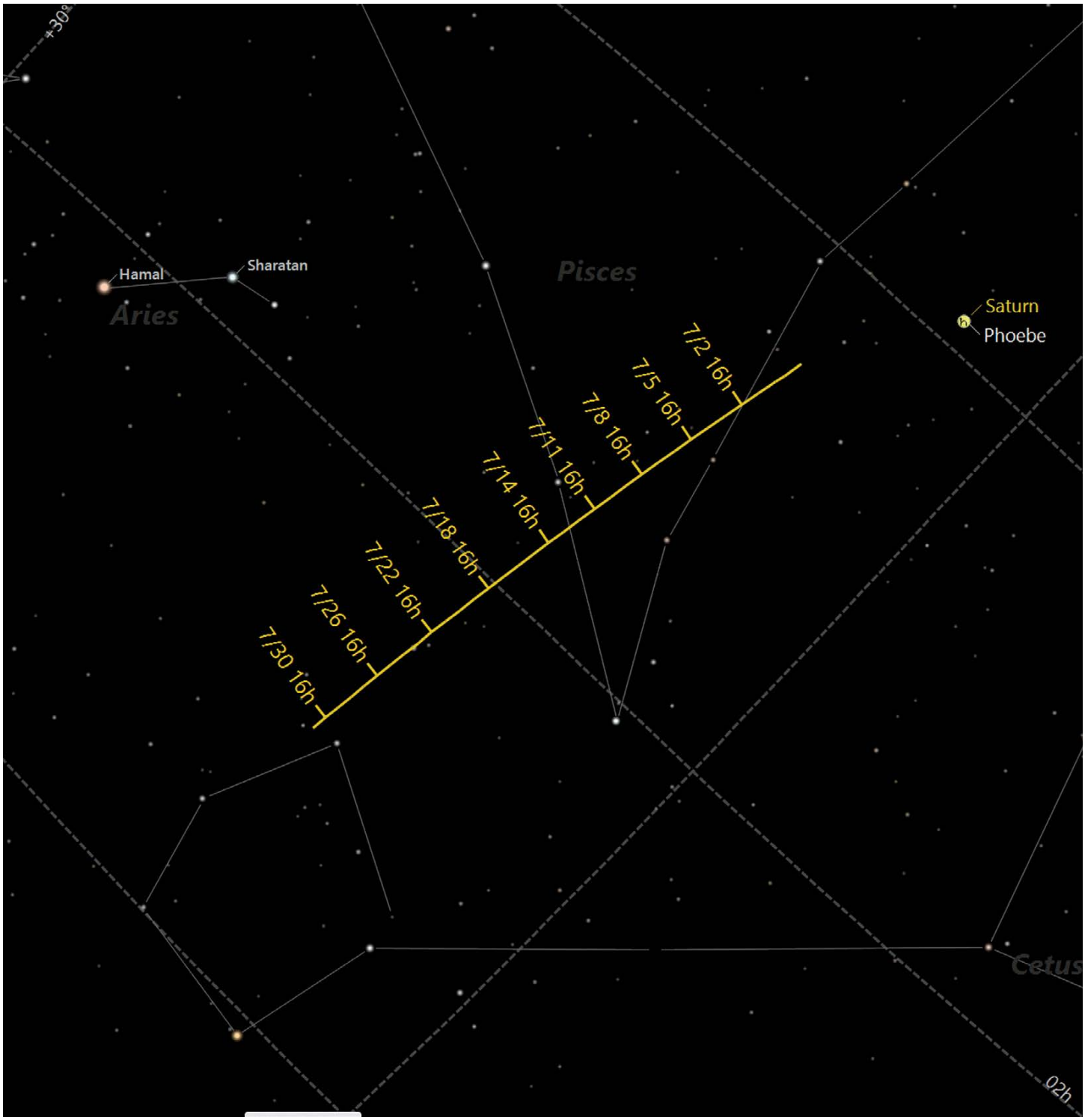
Milky Way at RMSS by Gary Garzone

Comet 10P/Tempel



Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc sec)
July 1	3:30 am	21h07m32.6s	-12°28'31"	Aquarius	9.5	4.6
July 7	3:09 am	21h17m22.5s	-14°17'27"	Aquarius	9.4	4.9
July 13	2:58 am	21h26m47.6s	-16°26'32"	Capricornus	9.1	5.1
July 19	2:43 am	21h35m42.2s	-18°52'30"	Capricornus	8.9	5.3
July 25	2:47 am	21h44m04.9s	-21°30'08"	Capricornus	8.8	5.4
July 31	2:11 am	21h51m49.2s	-24°11'01"	Capricornus	8.8	5.5

Comet 220P/McNaught

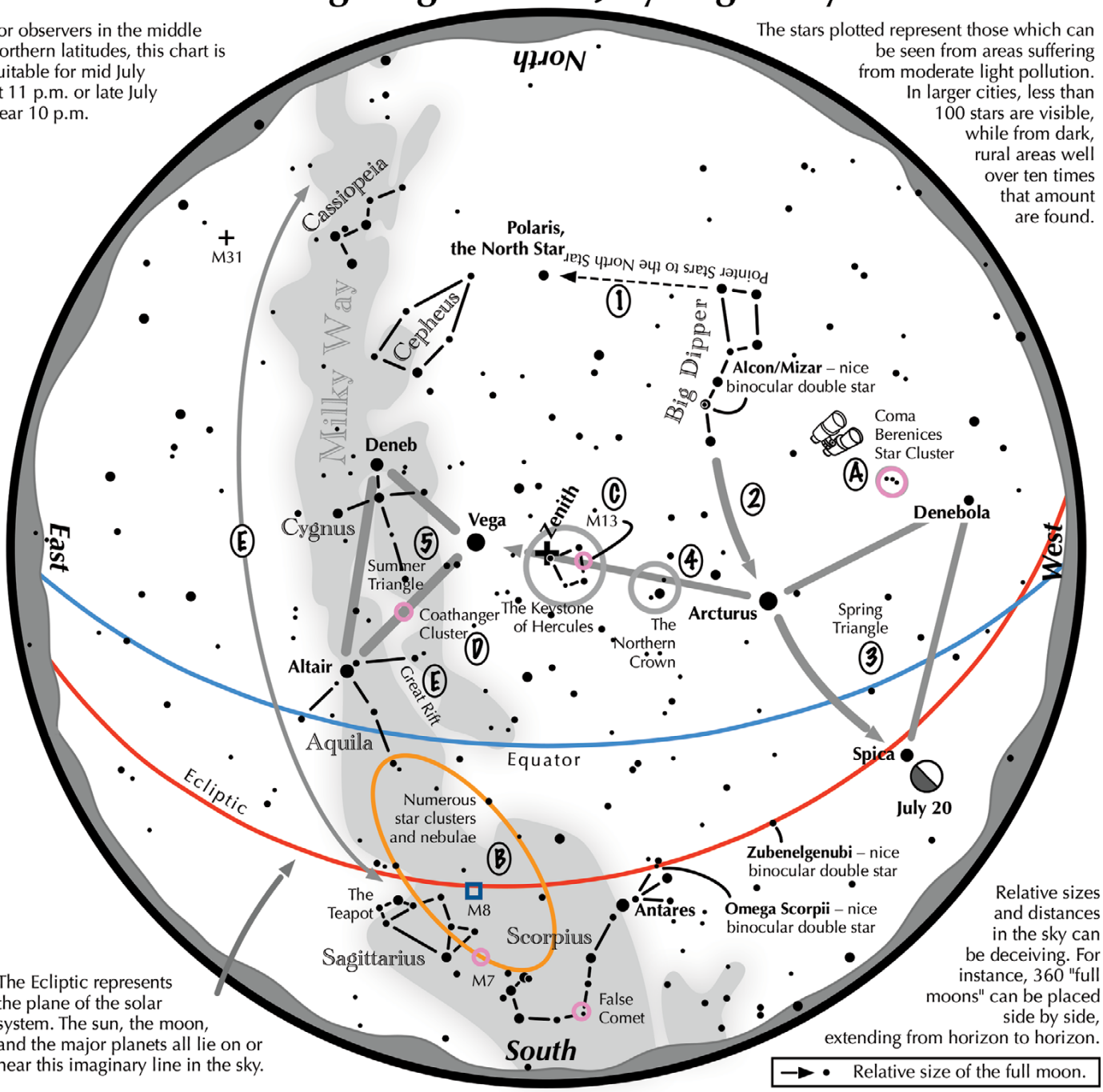


Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc sec)
July 1	3:48 am	01h22m55.3s	+06°43'32"	Pisces	11.6	2.3
July 7	3:50 am	01h37m43.9s	+07°30'18"	Pisces	11.6	2.3
July 13	3:55 am	01h52m04.2s	+08°10'19"	Pisces	11.6	2.4
July 19	4:00 am	02h05m50.7s	+08°43'10"	Pisces	11.5	2.4
July 25	4:07 am	02h18m59.0s	+09°08'38"	Cetus	11.5	2.5
July 31	4:12 am	02h31m23.9s	+09°26'36"	Cetus	11.5	2.6

Navigating the mid July Night Sky 2026

For observers in the middle northern latitudes, this chart is suitable for mid July at 11 p.m. or late July near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

Relative size of the full moon.

Navigating the mid July night sky: Simply start with what you know or with what you can easily find.

1. Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica.
3. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
4. To the northeast of Arcturus shines another star of similar brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
5. High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

Binocular Highlights

A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
D: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.

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The Astronomical League
OC
Open Cluster Program

M6 & M7

When these two big, bright, and beautiful open star clusters appear in the early evening in early July, summer is upon us.

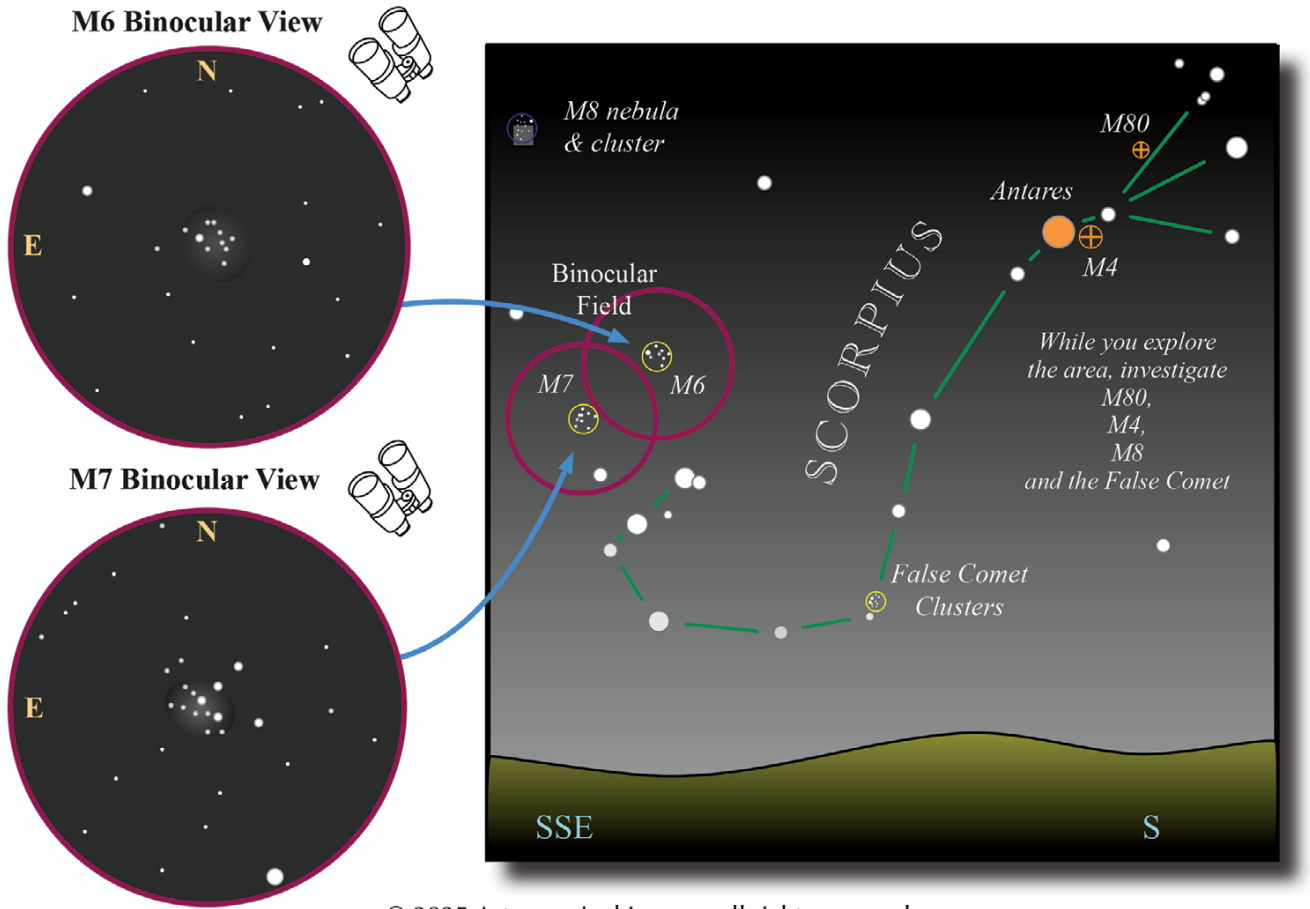
If you have recently begun your journey under the stars, why not whet your appetite by exploring southeastern Scorpius and its two wonderful open star clusters, M6 & M7. You will return to them year after year!

While they are visible to the unaided eye from a dark location, binoculars help greatly.

1. Identify Scorpius standing low in the south-southeast on an early summer evening. As summer progresses, it is ascends low in the south, then swings low in the southwest in the early fall.
2. From red Antares, direct your gaze southward down the scorpion's back, then turn eastward.
3. When its tail hooks northward, continue the length of that hook.
4. M6 and M7 should be plainly visible in the binocular field.

M6:
A faint hazy glow is seen by the unaided eye from a dark, clear site. Two dozen stellar lights can be discerned with 10x50 binoculars.
- Integrated Magnitude: 4.2
- Size: 33 minutes

M7:
A glittery glow is easily spotted off the scorpion's tail by the unaided eye. Binoculars reveal many faint stars.
- Integrated Magnitude: 3.3
- Size: 80 minutes



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LAS June 18th Meeting Notes by Eileen Hall-McKim

I. Introduction

Our LAS June meeting was held in-person and by zoom on June 18th at the Longmont Evangelical Lutheran Church, 803 Third Ave. President, Vern Raben began the meeting with self-introductions of those attending in person. Eighteen attended in person, 5 by zoom.

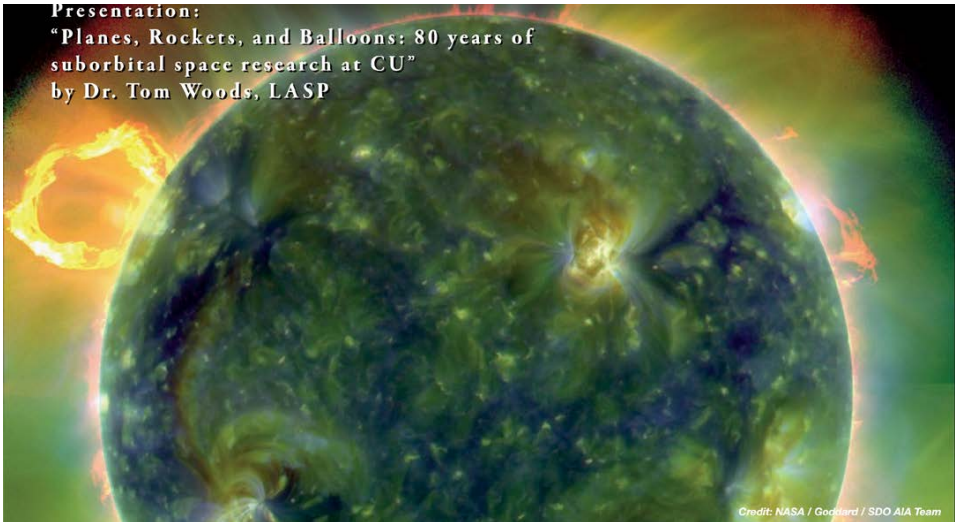
II. Main Presentation

Our speaker this evening is Dr. Tom Woods, Laboratory for Atmosphere and Space Physics (LASP) University of Colorado at Boulder. Tom Woods is a Senior Research Scientist at the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado in Boulder. He earned his B.S. in Physics in 1981 from Southwestern at Memphis (now Rhodes College) and his Ph.D. in Physics in 1985 from Johns Hopkins University. He previously served as LASP's Associate Director of Technical Divisions for 15 years. Dr. Woods is a leading expert in solar ultraviolet irradiance and its effects on Earth's atmosphere and climate. He has served as Principal Investigator for several major NASA missions and instruments, including TIMED SEE, SDO EVE, SORCE, TSIS-1, and the MinXSS CubeSat missions. He has received numerous honors for his contributions, including NASA's Outstanding Public Leadership Medal.

Before NASA and the era of satellites, space research began in the 1930s-1940s as modest experiments to study Earth's upper atmosphere (stratosphere) and solar ultraviolet radiation using planes, rockets, and balloons. None of these early science missions made it into an orbit about Earth and thus are known as suborbital flights.

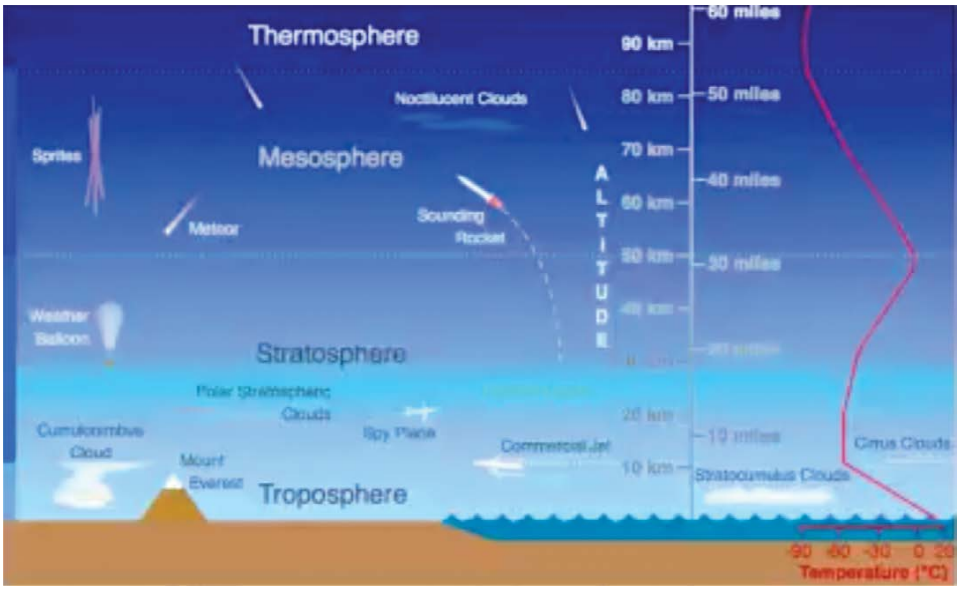
The first University of Colorado suborbital missions were led by Physics Department professors with flights of their solar instruments aboard captured V2 rockets. A research group called the Upper Air Laboratory (UAL) was created in 1948 to develop new rocket technology and science instruments for this field of space physics.

UAL was renamed in 1965 to Laboratory for Atmospheric and Space Physics (LASP) and expanded their research to also include satellites and continuation of suborbital space research. University of Colorado has had more than 240 suborbital rocket flights since 1948 and they still have very active suborbital rocket programs to develop new space hardware technology, study time-critical events like new comets, underflight calibrations for some of their satellite instruments, and train the next generation of space scientists and engineers. This presentation will provide an introduction to some of this rocket and space instrument technology and science topics and will end with a remarkable movie from cameras aboard one of our suborbital rocket flights.



Earth's atmosphere is divided into five main layers: the troposphere, stratosphere, mesosphere, thermosphere and exosphere. These layers

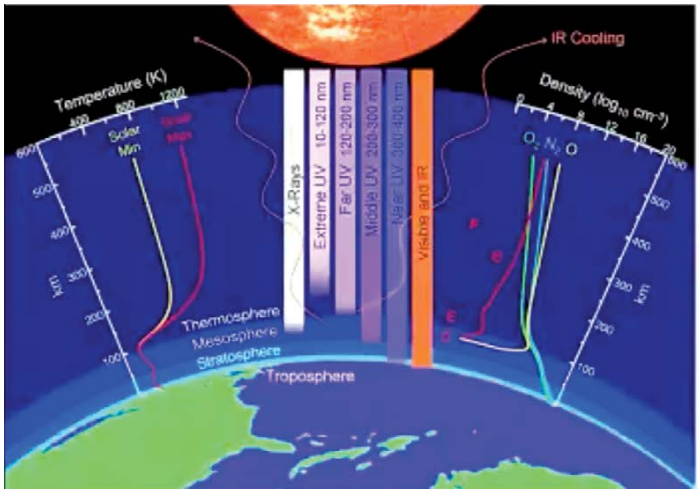
vary in temperature, composition and function and each has distinct and unique characteristics. Back in the early 1900s weather balloon data showed the atmosphere cooled with height, but then started warming at the stratosphere, then cooling again as height increased. We knew from this that something was happening in the atmosphere. Why is this? Big push in early 1900's to study the stratosphere.

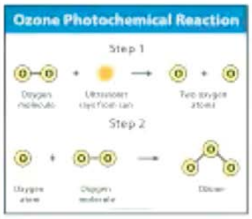


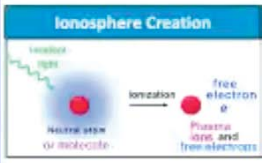
Earth's Atmospheric Layer

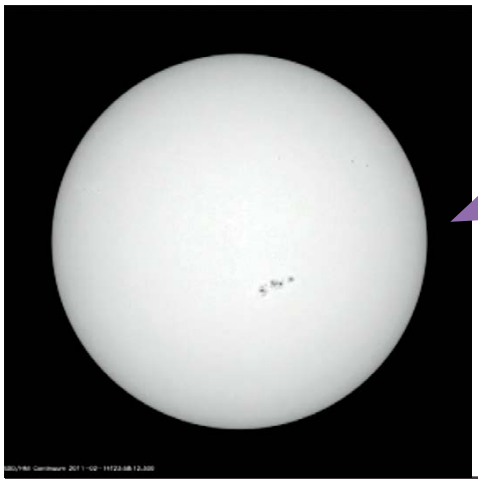
Scientist looked at solar radiation coming through the atmosphere and did many studies to find out what was absorbing this radiation, it stopped at 300 nanometers, what could be absorbing this; after some study found it was ozone.

- Because of solar radiation we have heating in the atmosphere. There is a constant building and destruction of ozone because of solar radiation
- While trying to communicate by radio during World War II discovered electrified ions could disrupt the signals. This lead to study of the Ionosphere developed in the 1950s but we still needed to get up there to understand this



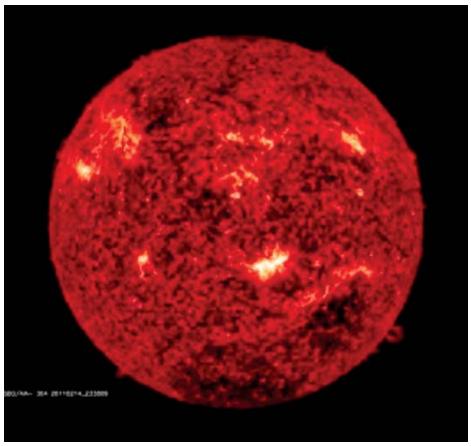






The Sun in Visible Light – Image of the Sun from the ground – dark sunspots due to magnetic fields and activity of the Sun

The Sun in Ultraviolet Light From the Ground - would see nothing; none of the light gets through



The Sun in Ultraviolet Light From Space – going up in the atmosphere, start seeing interesting things, see the sun in ultraviolet is very dynamic and active, sunspots, active network, corona holes, solar flares; layer of the sun we don't see on the ground

Science From Above The Atmosphere –
Today there are many aspect of Space Science
Discovered: solar corona, the Jupiter aurora, can also measure in situ energetic particles – most from the sun but some from outside the solar system called cosmic rays: some are so energetic they get to the ground, may be the cause of some cancers; discovered hot gas in galaxies

Launch Vehicles
First Human Balloon Flight in 1783 at a trade show by some French engineers, went up 100 ft had a cord to pull them back down, use to look around at landscape, used during Civil War to look for other armies and such, mostly for visualizing what is around them.

Check out the Albuquerque Balloon Fiesta sometime is usually in October, great experience to see, this is still just for fun but soon developed balloon flight for research purposes.

First Research Balloon Flight in 1931 by Two German Scientist Auguste Piccard and Paul Kipfer

They knew there was less oxygen in the air at height, so took their own supply, they got up there and got stuck in the temperature inversion and could not go down could only go up, for two days. Left in Germany, landed in Austria, they survived then made a much better balloon.

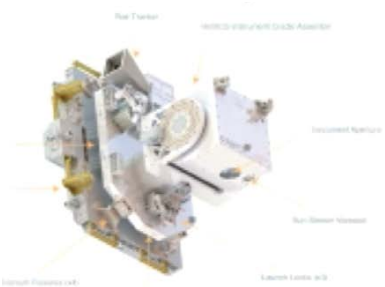
Modern Balloon Launch

NASA launches about 10-20 a year - huge systems, 2-3,000 lbs of instruments, have to operate like a satellite, own solar power, telemetry data, battery supplies; big instrument, use helium

NASA Super Pressure Balloon

Filled with helium and release it; bigger than a football field

Fills then lifts the payload off the ground; once up there will drift with wind, one in Texas, one in Antarctica usually a vortex that circles the continent, balloon follows with the wind flow



HySICS – 2014
Fort Sumner, NM

2006, 2008, 2014, 2016
Antartica

HASP – 16 flights
2006-2025 with student instruments
Fort Sumner, NM

University of Colorado Balloon Flights
University of Colorado didn't start ballooning until recently, some of their projects:
HySICS; 2014; ANITA – Study in Antarctica; HASP – 16 flights Student program Fort Sumner, NM

What vehicles can get us into and above Earth's Atmosphere to do science research?
Balloons can only get into Earth's atmosphere; today's balloons can observe about 20 miles up for 50 hours

Planes As Vehicles To Space
First Human Plane Flight in 1903 – Wright Brothers
Plane research didn't start until the late 50's

First Human Plane Flight in 1903

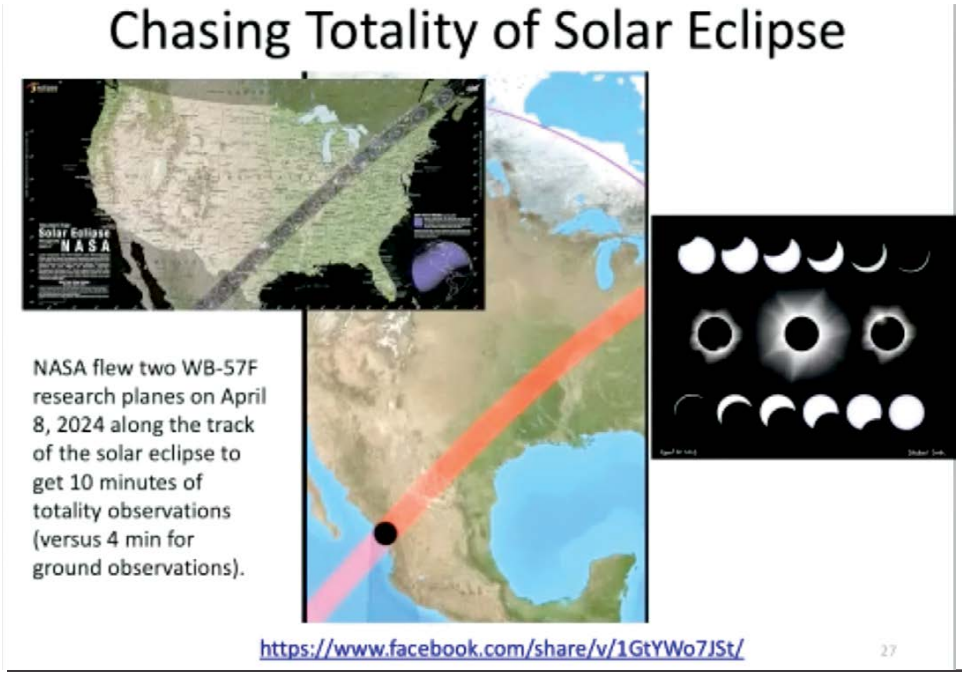
First Research Plane Flight in 1958

NASA ER-2 Experiments –
Example of typical plane research, fly on plane, make measurements, stays up about 10 hours.

More recently switched to drones- can fly higher first drone for NASA – Global Hawk

Flight Paths of NASA Operation Ice Bridge

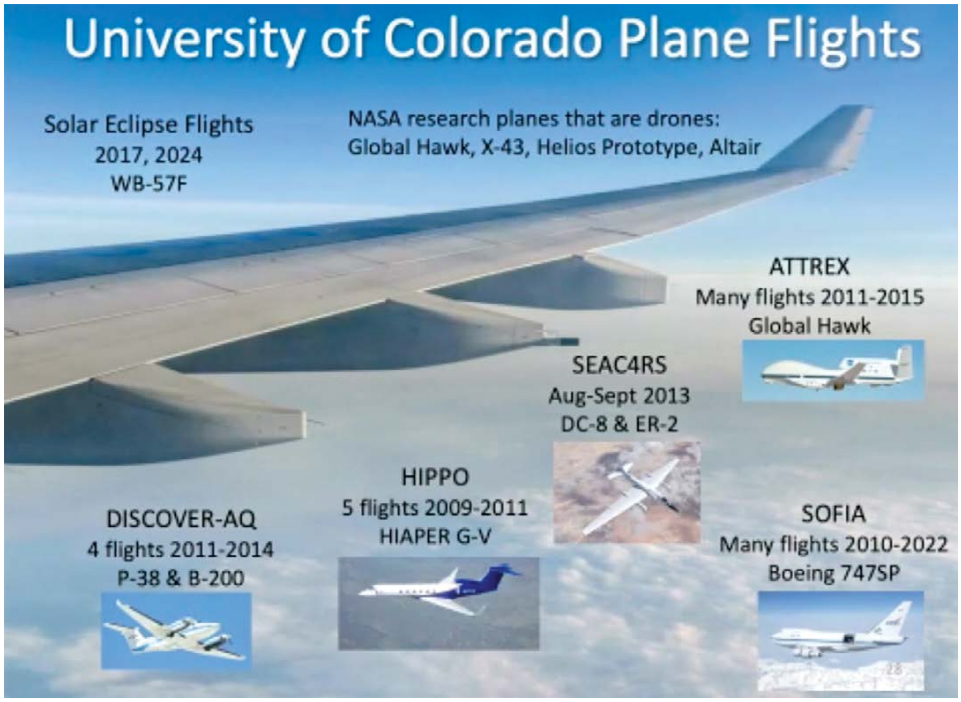
CIRES Group Antarctica 2010 Campaign; Flew 64 flights across Antarctica



Chasing Totality of Solar Eclipse - If you can get in the track and fly very fast can observe solar maximum twice as long - was done in 2017 and 2024 Eclipses

University of Colorado Plane Research Flights

University of Colorado has done a lot of plane research – most from the Aerospace departments – measurements of atmosphere; study of boundary between troposphere and stratosphere, understand clouds, difference looking down between ice and snow; most focused on Earth Science – but does not get us into space

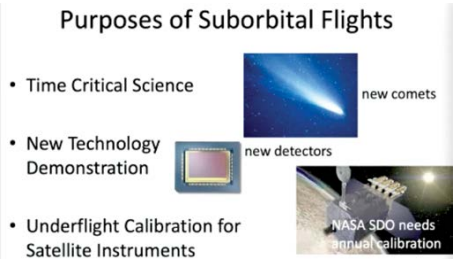


Rockets - Where University of Colorado has the longest history of research

After WWII, the U.S. captured about 200 V2 rockets, instead of using for missiles, decided to release them to the Universities to build science research: what is atmosphere, ultraviolet light, look at the stratosphere

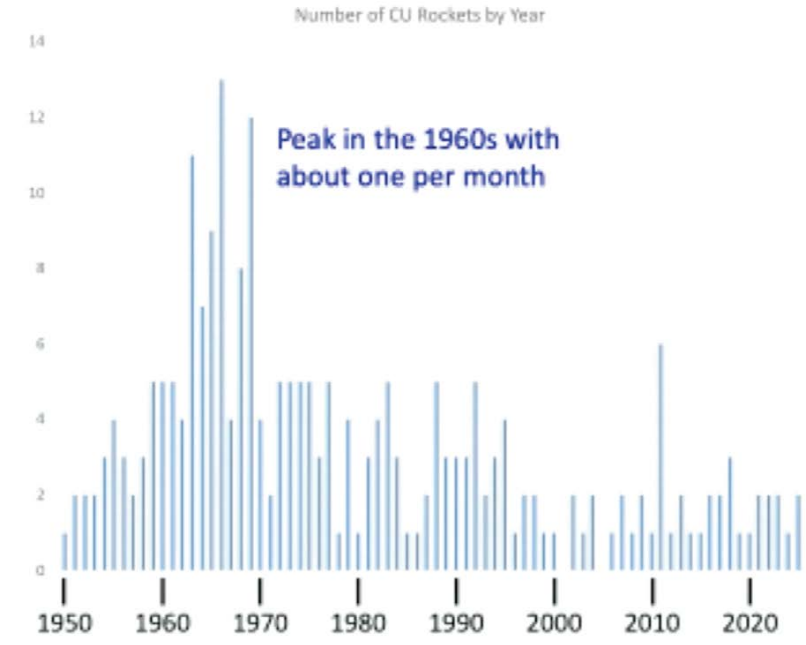
University of Colorado Develops First Rocket Attitude Control System

- Back then all rockets spun so had to build an experiment design to adjust for spin around the sun
- So successful 4 people left and began Ball Brothers Research in Boulder, later became Ball Aerospace and is now BAE
- CU Physics Professors who stayed formed Upper Air Laboratory (UAL) later became LASP- started with 20 people, now about 800



Purposes of Suborbital Flights

- Time critical Science – New Comets - Comet Halley done with sounding rocket
- New Technology Demonstration = new detectors see if it will actually work in space
- Underflight Calibration for Satellite Instruments - Need to know how much degradation of satellite done by sun exposure
- Training of Next Generation – CU rockets students from undergrad to graduate levels



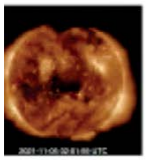
List of 249 Suborbital rocket flights from 1950-2026 (compiled by Rick Kohnert)

- What is now replacing rockets – cube sets, small, stay up years, solar cells
- Have had two missions to study exoplanets with 4" telescopes with Kevin France (LASP)

University of Colorado Rocket Flights

- University of Colorado rocket flight history (compiled by Rick Kohnert) lists **249 suborbital rocket flights from 1950 to 2026** (missing the earlier ones before 1950)
  - Different science objectives:
    - Solar Physics: 79
    - Earth's Upper Atmosphere: 76
    - Astrophysics (mostly stars): 44
    - Solar Irradiance (satellite calibrations): 28
    - Planetary Science (Venus, Jupiter, Moon, Comet): 17
    - Technology Demonstration: 4

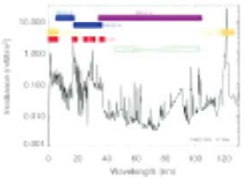
Solar EUV



Earth's Airglow/Aurora

Stars

Solar Irradiance Spectra



Venus

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What Science has CU done with this: University of Colorado Rocket Flights

University of Colorado Rocket Flights

University of Colorado rocket flight history (compiled by Rick Kohnert) lists **249 suborbital rocket flights from 1950 to 2026** (missing the earlier ones before 1950)

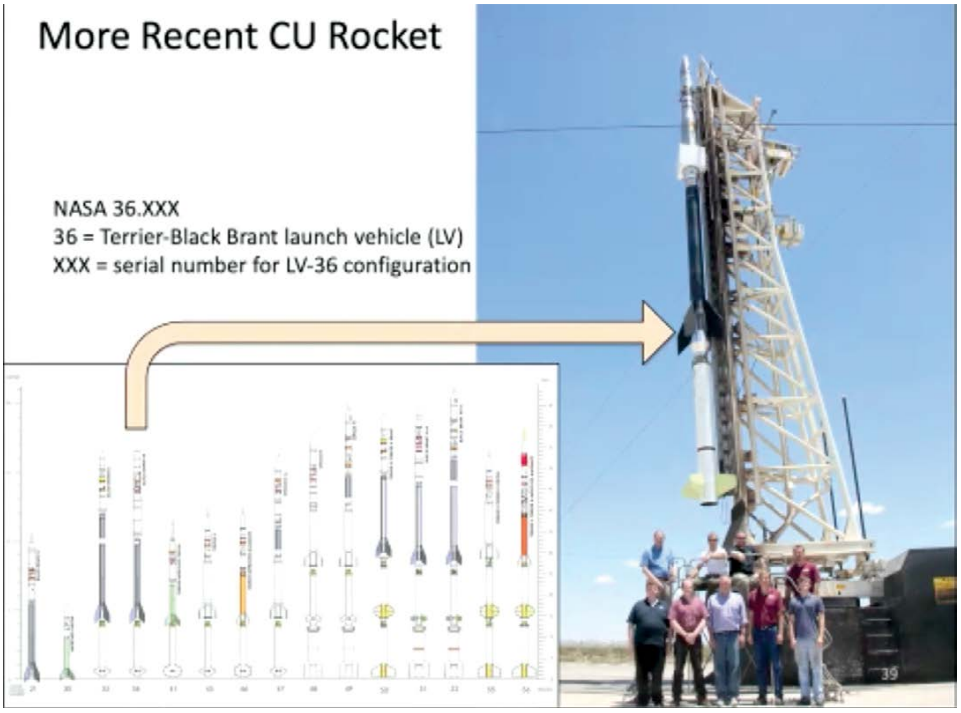
- Different launch vehicles:
  - **LV-3,4,13 (Aerobee): 71**
  - **LV-36 (Terrier+Black Brant): 64**
  - LV-31 (Taurus-Orion): 15
  - LV-14 (Nike-Apache): 12
  - LV-21 (Black Brant): 9
  - LV-18 (Nike-Tomahawk): 8
  - LV-25,26 (Astrobee): 7
  - LV-41 (Terrier-Orion): 6
  - AF and NRL launch motors before starting LV numbers (e.g., V-2 rockets): 46

- Different launch sites:
  - **White Sands Missile Range (WSMR, NM): 180**
  - HRDC: Holloman Research & Dev. Center (HRDC, NM): 19
  - Wallops Flight Facility (WFF, VA): 18
  - Poker Flat Research Range (PFRR, AK): 11
  - Fort Churchill Research Range (FCRR, Canada): 5
  - AND Range (Andoya, Norway): 6
  - AUS Range (Woomera, Australia): 7
  - Esrange (Kiruna, Sweden): 1
  - Kwajalein Atoll (KWAJ, Marshall Islands): 1

WSMR LC-36 with launch rails and towers

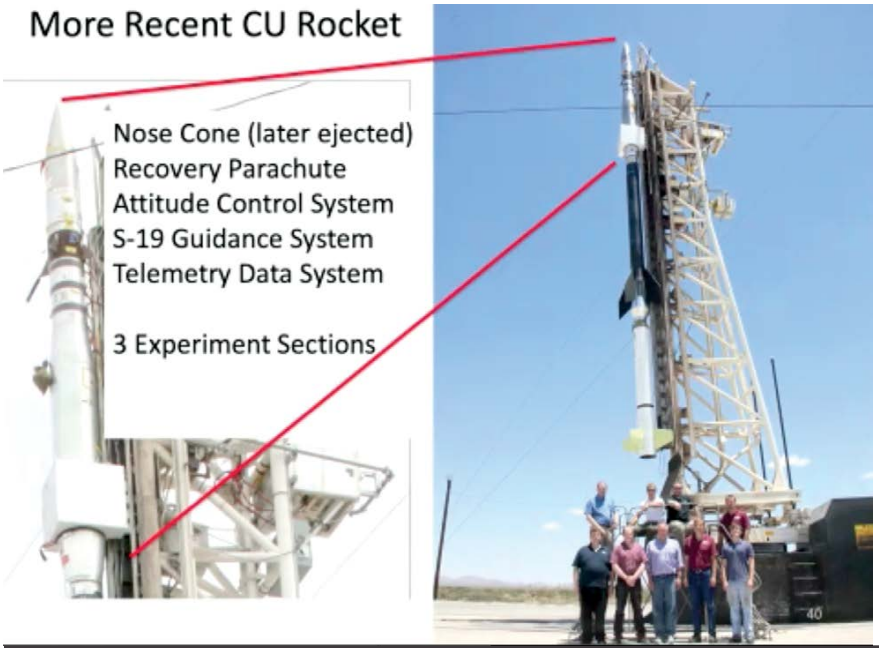
Different launch vehicles – Primary:

- Aerobee (71) Airforce designed and built – 14' model instruments
- Black Brant (64) Made in and bought from Canada
- Different launch sites – Primary one White Sands Missile Range New Mexico



More Recent CU Rocket
Typical rocket we launch now – Terrier-Brant

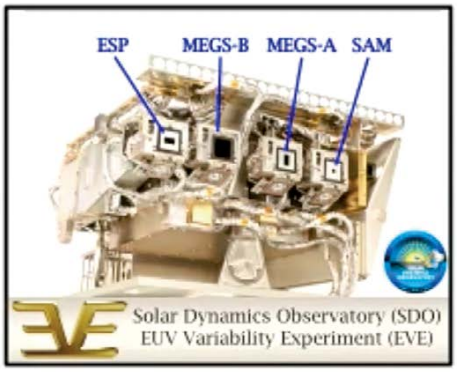
Visual display by Tom of rocket and nose cone that has flown



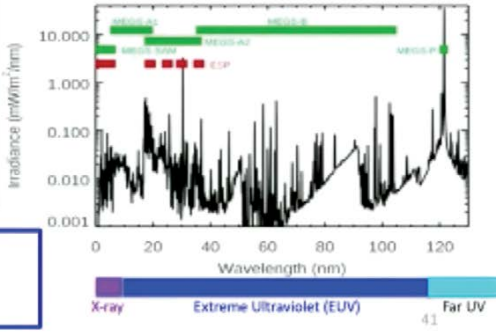
Solar Dynamics Observatory – launched satellite in 2010 to measure solar ultraviolet radiation

and we need regular underflight calibrations to track that degradation

- Extreme-Ultraviolet Variability Experiment (EVE)
- Example spectrum on right

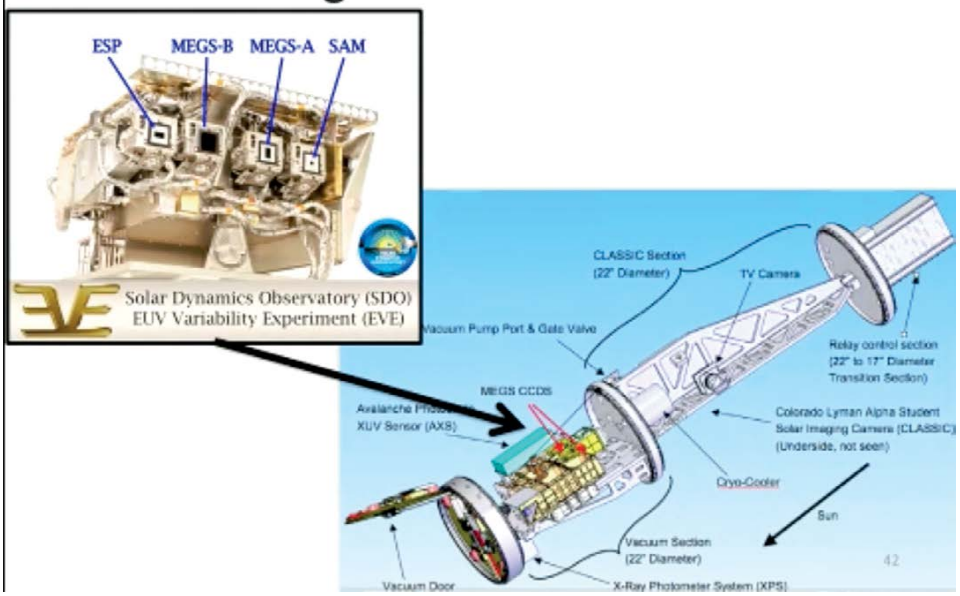


NASA Solar Dynamics Observatory (SDO)
Extreme-ultraviolet Variability Experiment (EVE)
observes the solar X-ray and EUV spectral irradiance
Launch: February 11, 2010 from KSC to GEO
Prime Mission: 2010-2015
Extended Mission: 2016-2030



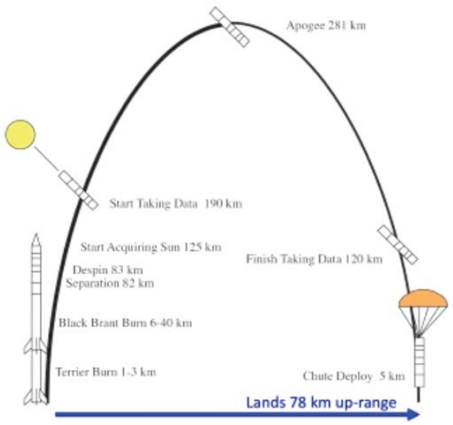
Rocket EVE payload has flown nine times between 2006 and 2023.
Its tenth flight is August 10, 2026 at WSMR.

Our latest launch was May 2023 for underflight calibration of SDO



Our three sections that we provide is the solar section, section that mounts to the Black Brant

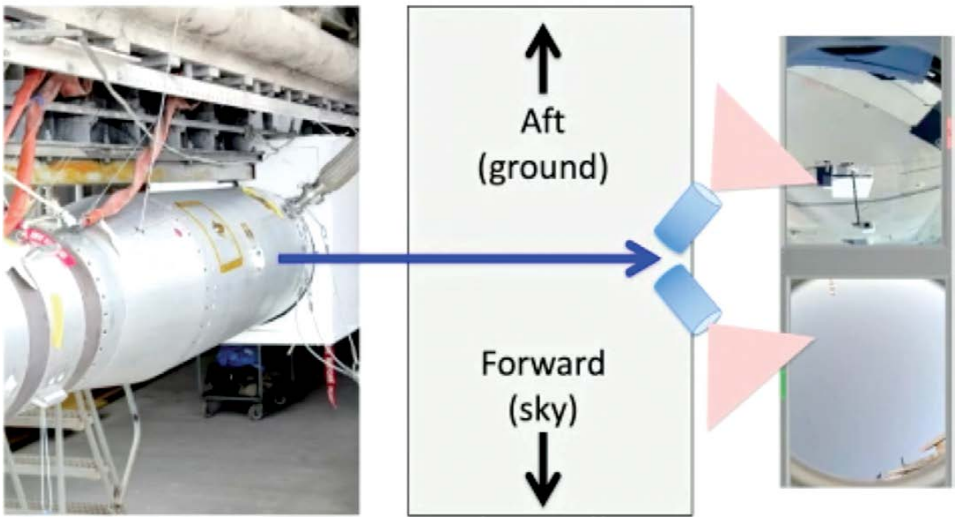
Rocket Flight Trajectory



Rocket Flight Trajectory – simple parabola of what this rocket is going to do
Launches near the Base at White Sands

Two Cameras Inside Experiment Section

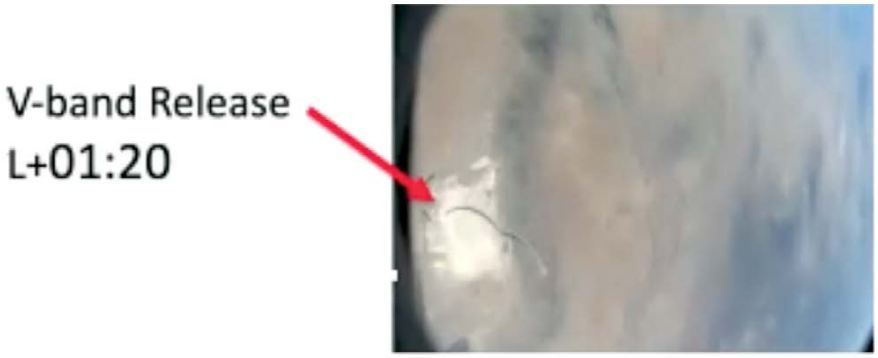
Two Cameras Inside Experiment Section – one pointing backwards looking at ground, one looking forward, like go pro cameras but more robust- cover ground to sky



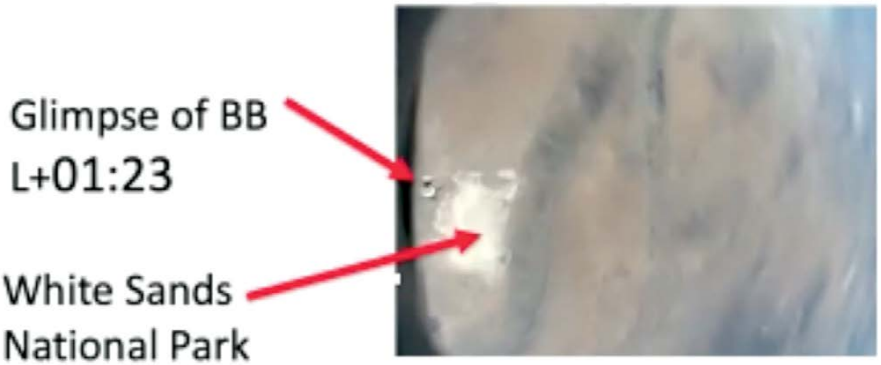
White Sands National Monument

key landmark seen during video

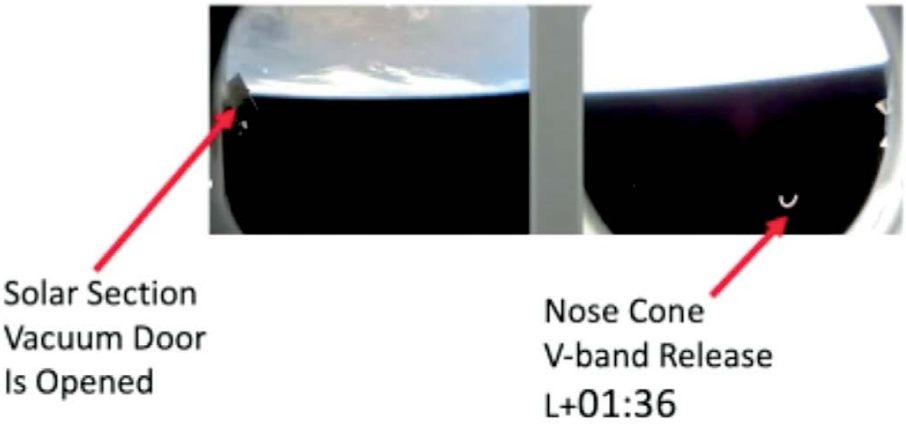
Looking down see White Sands – key landmark during video



Black Brant Separation – will see band flying off, see black brant falling back to the ground



Nose Cone Release – Looking at Earth, starting to slew up to the sun



View from Apogee

View from Apogee – once above about 150 km we are staring at the sun, one of cameras looking out west over Arizona, California, Baja Mexico and Pacific Ocean

Chute Release – near end tumbles wildly, then drogue opens to pull out parachute, chute releases, looks like a cross about the size of a basketball court

Landing – Can see the rocket's shadow, floats down until it hits the ground

Rocket Flight Movie
Meters at bottom; Left: time; Middle: Speed/Gravity; Right: Trajectory of apogee

- We look at the Sun for about 8 minutes, taking solar data
- Parachute very important; we have had parachutes fail and left a hole in the ground about 60 ft deep, payload melted from a 6ft experiment to about 6" tall

Questions?
What type of propulsion is used?

The highest this went was 100 km? How high are you going up?

You call it a sounding rocket, what does the sounding stand for?

You said there was about 1000x more UV light than we expected, I thought the Sun produced a blackbody radiation and we could generally tell how much radiation was coming?

Why is the chromosphere so much hotter?

Is there anything on board the rockets that is in communication with the surface or is it all onboard only?

When you started the balloon launch I was curious whether the balloon was going to expand as it rose toward the stratosphere?

For suborbital rockets like the video we showed are they ever used for looking outside the solar system at deep space targets or is the observing time too short?

After all this research do we have a model of the atmosphere that allows us to take images from the ground and propagate back what we think it would be on others side of atmosphere?

Does modeling enable us to be able to use ground based telescopes and correct for what the atmosphere is absorbing to actually do ground based research as well?

I'm presuming you get FAA clearance before you shoot this thing up and assume you have to worry about stuff in orbit including space junk, is that a problem?

What is the cost per rocket launch?

III. Business Report with Treasurer, Bruce Lamoreaux

Longmont Astronomical Society

P.O. Box 806
Longmont, CO 80502-0806

LAS Treasurer's Report - Bruce Lamoreaux **6/18/2026**

Main Checking Account (xxx-1587)

Begin Balance:	$ 4,970.00	**5/4/2026**	
Deposits:	$ 50.00	Membership	
Expenses:	$ (206.00)	Bank Charges, Library Telescope	
Current Balance:	**$ 4,814.00**	**6/2/2026**	

2-Year Savings Account (xxx-1478) (matures 10/23/25)

Past Balance:	$ 8,325.00	**12/31/2025**
Interest:	$ 15.00	
Balance:	**$ 8,340.00**	**3/31/2026**

Telescope Fund (xxx-0165)

Past Balance:	$ 1,090.00	**4/29/2026**
Deposits:	$ -	
Expenses:	$ -	
Balance	**$ 1,090.00**	**5/28/2026**

Petty Cash

Past Balance:	$ 50.00
Deposits:	$ -
Expenses:	$ -
Balance	**$ 50.00**

Total Assets	**$ 14,294.00**	$	(169.00) Down from May

Active Membership:	**110**	
Student Membership:	**2**	
Total	**112**	Active

Library Telescope Donation to the Broomfield Public Library

Bruce purchased the additional items such as headlamps, moon maps, totes, foam liners, bags, and zoom eyepieces needed to put together two additional telescope kits for the Broomfield Public Library. The two telescopes for the kits were purchased for spare parts when Orion went out of business a couple years ago. Bruce delivered the kits to the library as well. Thank you Bruce for all your work building the kits! The telescope kits are a popular item and the additional kits are greatly appreciated by the library.

IV. Announcements/Upcoming Events with Aref Nammari

- July 15 - Star party at Beech Shelter with City of Boulder Open Space from 9:00 to midnight
- July 16 - LAS Meeting 7 to 8:30 pm Dr. Vicky Hamilton preview of the Osiris-Apex Mission
- July 17 - Star party at Rabbit Mountain with Boulder County Parks 8:00 to 10:30 pm

City of Longmont Public Library Events

We have an agreement to start collaborating with Longmont Library for some public events; the first one this year will be on November 19. The events will be planned quarterly. The events will be at the Longmont Library; some will be solar events during the day and some will be in the evening.

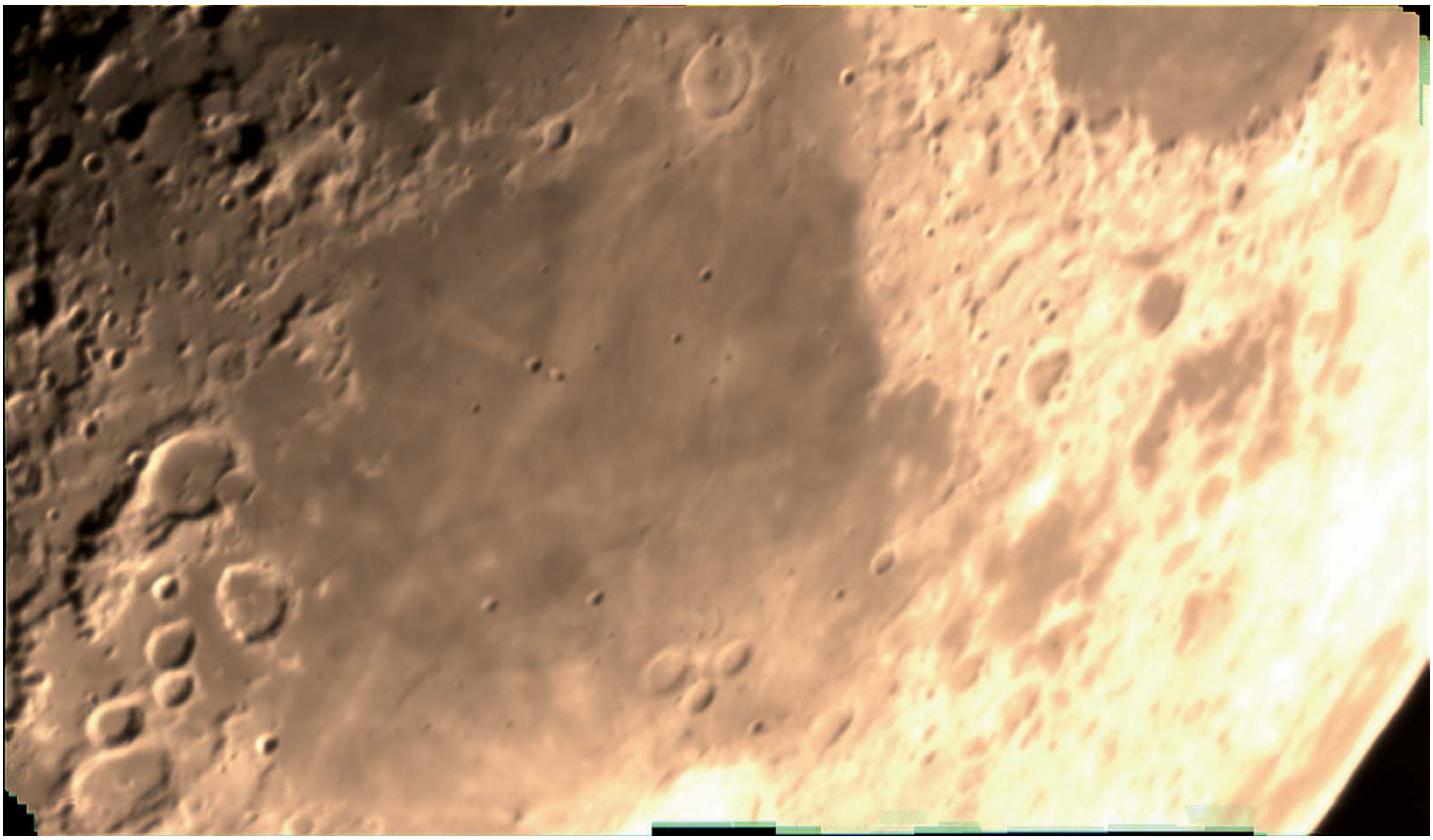
AAVSO 115th Annual Meeting Nov. 7-8, 2026 Santa Fe, NM

Registration has just opened for the 115th annual meeting of the American Association of Variable Star Observers. Kind of nice it's in Santa Fe, NM this year within driving distance AAVSO.ORG

Also of possible interest is the Astronomical Lyceum in Magdalena, NM which is not far from Santa Fe. John Briggs has a collection of historical telescopic treasures. Also great national parks nearby, Bandelier, Valles Caldera, Capulin Volcano National Park – goes good with a dark sky near New Moon.

Schiefspiegler Telescope at Rabbit Mountain Star Party. Photo by Eileen Hall-McKimm

Tim Brown (on the left) brought his Schiefspiegler telescope that he constructed to the Rabbit Mountain star party on June 20. Gary Garzone is on the right.

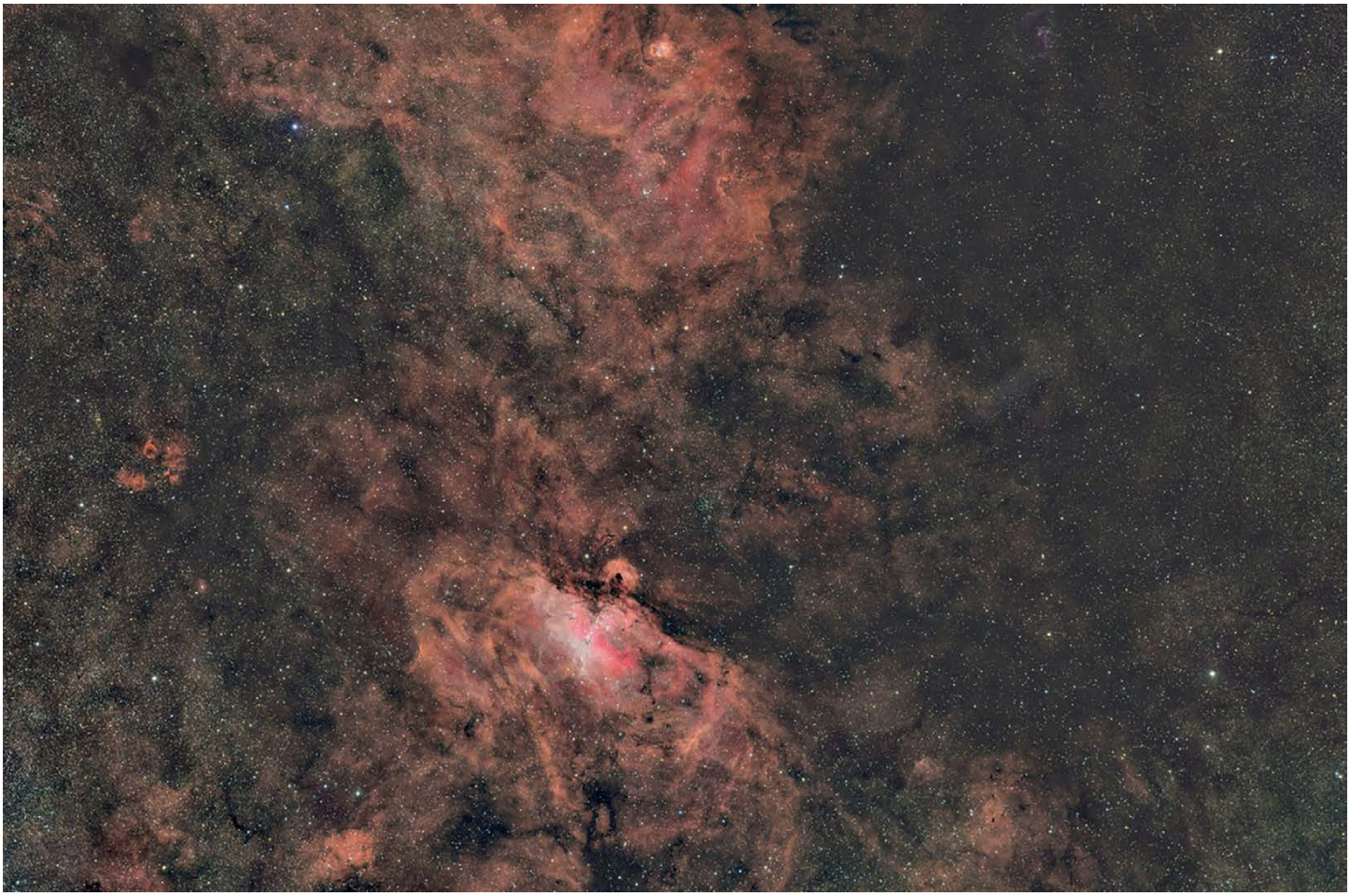


Messier A and B by Tim Brown

Stacked and sharpened image centered on craters Messier A and B, taken with the Schiefspiegler telescope at the LAS star party last Friday, in mediocre seeing (see his scope on previous page 26).

What fun.

-Tim



Eagle Nebula and friends by David Elmore

Folks,

Following my quest for capturing Sharpless Catalogue objects here is the Eagle Nebula, Sh2-049. The large object above is Sh-054 (actually only the bright core is in the catalog). To the left is splotchy Sh2-053 and bottom just left of the Eagle is Sh2-048.
The Eagle contains the famous Pillars of Creation popularized by a Hubble Telescope image. My long focal length telescope is not suited to bringing out these small details but rather the extent of nebulosity in the 5° x 7° field — as wide as the palm of your hand at arm's length.

Borg107FL refractor, ASI6200MM camera, iOptron CEM70 mount, ASI290 camera on ZWO off-axis guider. 7 hours total integration divided between H-alpha, Oxygen III, and Sulfur II. From my little observatory at Dark Sky New Mexico.

David

IC 1396, North Edge, SHO by Stephen Garretson

The Elephant Trunk Nebula is awash with interesting large and smaller dark nebulae, several of which are in this FOV; I have not yet identified these individually. The bright star center left is Garnet Star, Mu Cephae, a red supergiant. In this color palette it is more yellowish. I suppose one could re-manipulate its color but I am not a PhotoShop guy.

- [16] 600s guided Ha subs
- [12] 600s guided OIII subs
- [12] 600s guided SII subs
- Total integration: 6 hours 40 minutes

Capture:
- dual scopes each having the following components:
- William Optics FLT 132 APO Triplet, 0.8x reducer/flattener, running at f/5.6
- ZWO 2600MM Pro
- ZWO EFW
- Chroma 3nm Ha filter
- Wanderer Astro Mini V2 Rotator
- Bahtinov mask modified Wanderer Astro Eclipse
- PLL Sesto Senso 3 focus controller

Guiding:
- William Optics WhiteCat f/4.9 Astrograph
- ZWO 220 Mini
- Paramount MX+
- TheSkyX, SGP, PHD2
- PixInsight, MacOS Photo, Preview

From the Beevo Dome
...Stephen

Sh2-115, SHO by Stephen Garretson

Draw a shallow arc from the top of the Pelican's head northwest through Deneb; continue that line about equal t2-2.5° and find this sharpless object. A moderately wider field will include Sh2-112 roughly to the south. A couple years ago I shot that field, and while I was pretty happy with the individual targets, they were on the edges of the FOV and felt crowded. So this time I have elected to concentrate on the larger of the two, Situated about 7500 ly from Earth and spanning 120 ly,

- [18] 600s guided Ha subs
- [18] 600s guided OIII subs
- [15] 600s guided SII subs
- Total integration: 8 hours 30 minutes

Capture:

- Dual scopes each having the following components:
- William Optics FLT 132 APO Triplet, 0.8x reducer/ flattener, running at f/5.6
- ZWO 2600MM Pro
- ZWO EFW
- Chroma 3nm Ha filter
- Wanderer Astro Mini V2 Rotator
- Bahtinov mask modified Wanderer Astro Eclipse
- PLL Sesto Senso 3 focus controller

Guiding:

- William Optics WhiteCat f/4.9 Astrograph
- ZWO 220 Mini
- Paramount MX+

From the Beevo Dome

- TheSkyX, SGP, PHD2

PixInsight, MacOS Photo, Preview

Stephen

M104 by Gary Garzone

M 104 processed yesterday (June 9), C14 scope F 8 ZWO OSC camera, hour and half time only.
bye, Gary

At RMSS 2026 by Gary Garzone

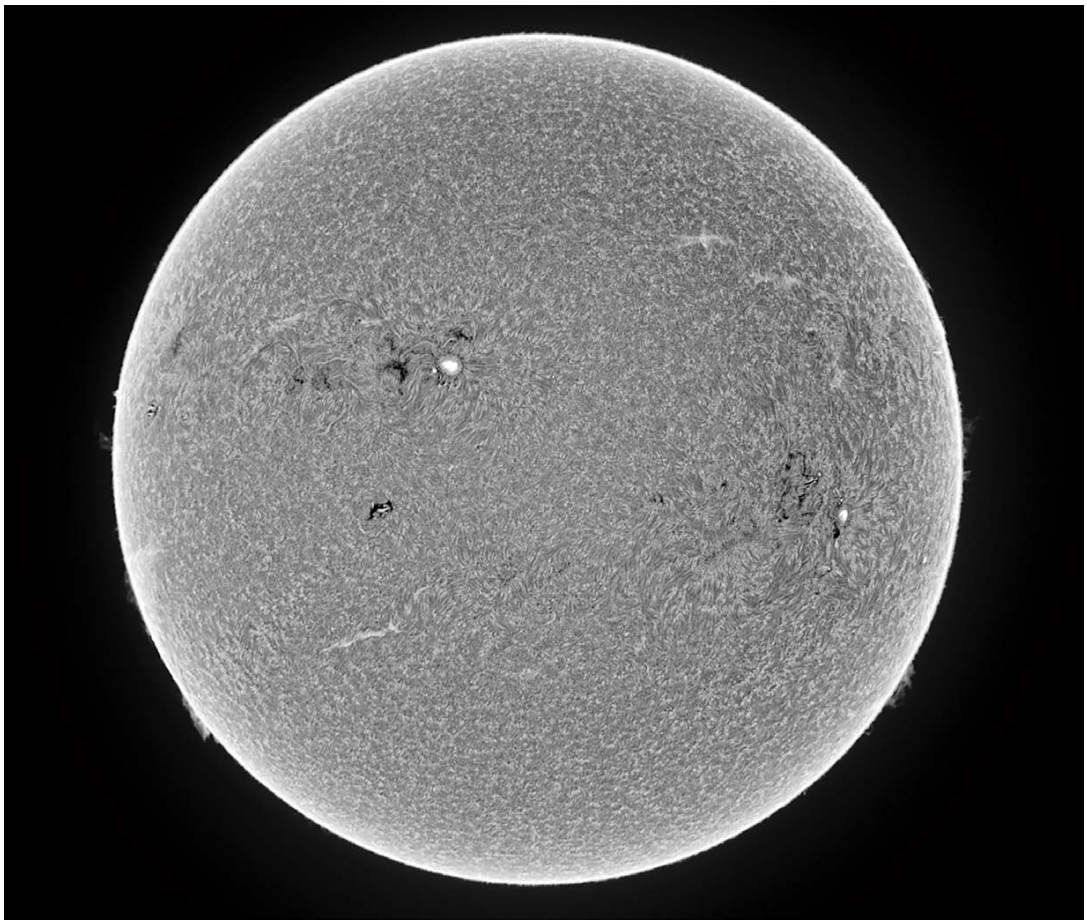
Milky Way at RMSS by Gary Garzone

The 30 waiting for dark by Gary Garzone

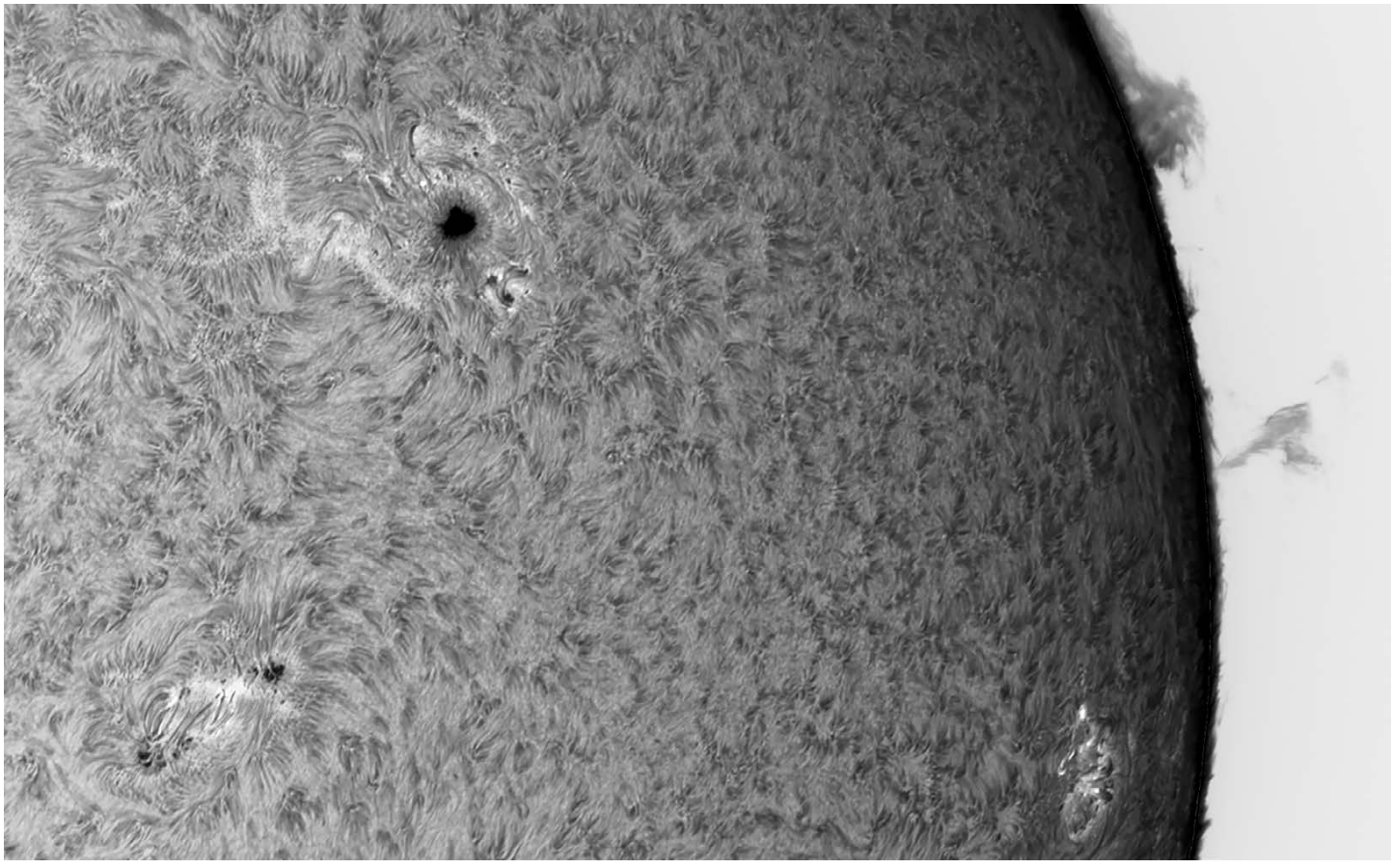
Gary Garzone At RMSS 2026 by Eddie Hunnell

Gary's scope was very nice to see! First night was too windy for imaging. Both first and second were very dark. Although it does appear there is a light dome getting brighter both northeast and east (assume Colorado Springs and Pueblo). Weather forecast was not great for the last two so I did not stay. The night sky image is one 3 sec image from an iPhone 15. I miss those Colorado sunsets. Will have to wait a few weeks until I am back at my computer to see if my images turned out OK or not.

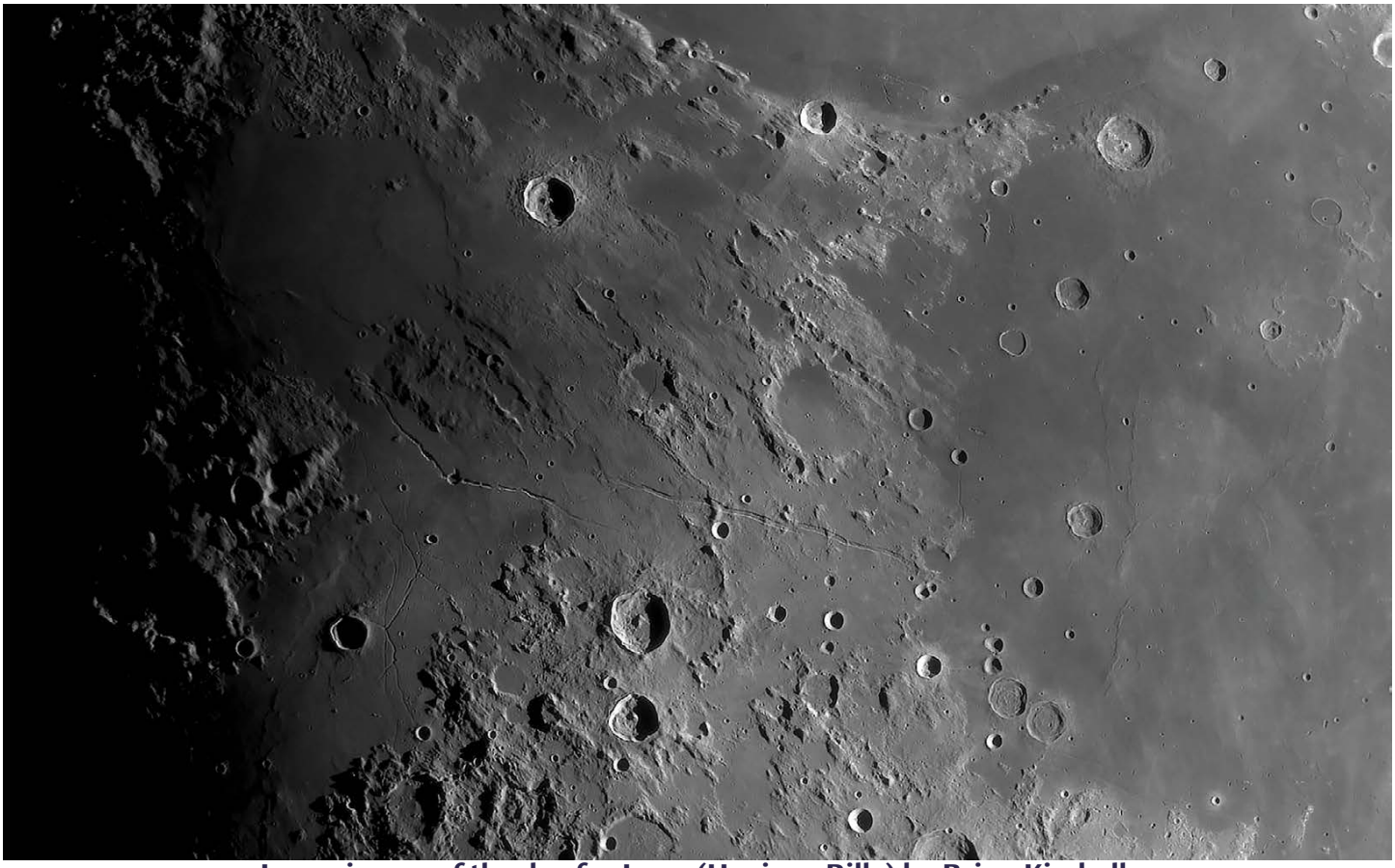
Eddie



Sun in H-Alpha on June 4 - excellent seeing by Brian Kimball



AR 4455, 4457, and 4458 on June 4 by Brian Kimball



Lunar image of the day for June (Hyginus Rille) by Brian Kimball

Between Julius Caesar and Sinus Medii is a concentration of rilles that is remarkable for its variety and ease of viewing.

The Ariadaeus Rill is a classic example of the flat-floored, parallel-walled straight rille. It is about 220 km long, 4 to 5 km wide, and roughly 0.8 km deep. the Ariadaeus Rille is an excellent example of a graben, like those found on earth. Graben form when horizontal forces pull apart with enough strength that parallel faults form, and the terrain between them drops. Where the rille crosses some ruined crater rims we can see that they also drop down a few hundred meters.

Connected to the western end of the Ariadaeus Rille by a narrow diagonal branch is the remarkable Hyginus Rille. It consists of two sections, one paralleling the nearby Ariadaeus Rille and the other aimed toward the center of the Imbrium basin. These two segments join at the 9-km-wide Hyginus crater. What makes the Hyginus Rille unique is that it contains a series of rimless collapse pits that are best visible in the segment northwest of the crater.

Thanks for looking,

Brian Kimball

M82 Cigar Galaxy by Aref Nammari

M82 Cigar Galaxy taken at the June Star Party at Rabbit mountain (last Friday). 62 minutes total exposure (372 10 sec. subs) with the Seestar S50. Stacking and processing done in siril, SetiAstroSuitePro, and Gimp

A Starburst Galaxy! The Cocoon Galaxy by Jim Pollock

Hi All,

My first stab at NGC 4490 and its small but bothersome neighbor NGC 4485. They are two of the closest interacting galaxies to Earth, being only 25 Million LY away. The little one "recently" made its closest approach to the Cocoon and is now speeding away again. Until Groundhog Day when it inevitably will return.

The gravitational force of the little guy is enough to heat things up and cause a load of star formation in 4490, as can be seen by the many hot red regions. That type of star formation causes the Cocoon to be known as a Starburst Galaxy.

These two siblings are listed in the Atlas of Peculiar Galaxies (Arp 269). Every time I hear that catalog name, I think it must be from Monty Python.

This image was ganged together with 75 frames of 300sec (6 hrs total) with my Texas-based 9.25" EdgeHD at f/7 with an L-Quad filter into my ZWO 2600mc DUO full color camera.

Finally some cloudless skies in Texas.

Jim

A flowering Iris by Jim Pollock

Hey All,

Many of you know that The Iris Nebula (NGC 7023) is one of my favorite objects and I revisit every year, I love the extensive surrounding dark lanes in wide view (at f/2) and the flower itself at longer focal lengths (f/7 in this case). This is my first longer focal length shot since I placed my scope in Texas.

The Iris is a reflection nebula illuminated by the cluster contained within. The NGC designation of 7023 actually refers to the open cluster. There is an LBN designation for the nebula. This is the first time I've imaged and been able to see the reddish area just below the center of the flower which is an area of active star formation, Young Stellar Objects (YSO's).

This image consists of 30 frames of 180sec each for 90 minutes of exposure with my 9.25" EdgeHD at f/7. I used my Optolong L-Quad filter (which is 4 narrow bands simultaneously and good for emission and reflection nebulae) into my ZWO 2600mc duo full color camera. Processed in Pixinsight and tweaked in PhotoShop.

Always amazed,

Jim

NGC7331 - Large Galaxy with drones landing by Jim Pollock

This is a fun one. NGC7331 is the large galaxy at the bottom about 45M Ly away from us. It used to be considered The Milky Way Twin, until we figured out our Milky Way is a barred spiral and 7331 doesn't serve drinks. But the fun thing is the suite of 6 other surrounding galaxies MUCH farther away at 300-400 Million Ly. They look (to me) like a swarm of drones heading in for a landing on 7331! But alas, not so much.
This image is a test image to see what's there despite a FULL MOON… 14 frames of 5min each for 70 minutes of exposure at f/7 on the 9.25" EdgeHD with the ZWO 2600mc DUO full color camera.
I'm going to shoot more images of this over the next few nights to pull those massive spiral arms out of the dark.

NOTE: A couple of nights ago, I noticed small spikes on all my stars that hadn't been there before. I asked the Starfront people to check my scope and see if my dew heater cable had popped loose and was hanging in front of my corrector plate. They checked my scope yesterday and posted an eviction notice for a spider that had built a web across the front of my scope. I guess he/she/it enjoyed the views of the heavens. (All clear again now).
'Jim

Splinter Galaxy by M. J. Post

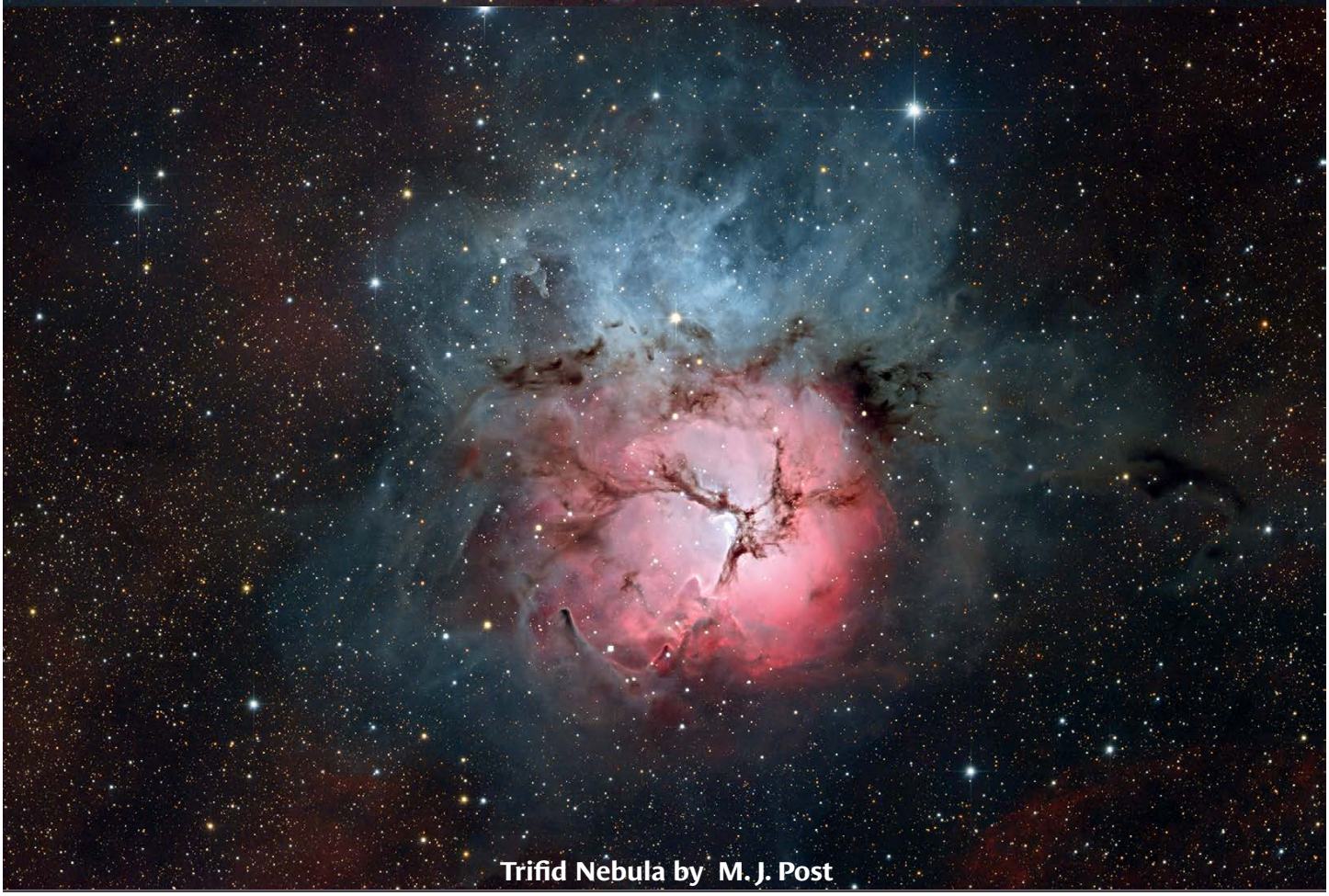
I imaged this last night (June 11) under windy conditions, so resolution is not up to par. This northern galaxy in Draco is famous for its faint and controversial loops of tidal tails, NOT detected here. It also has an extremely bright X-ray source in its interior, a neutron star whose spin has accelerated from one revolution every 1.43 second ten years ago, to once every 1.13 seconds now. That pulsar is 1000 times more luminous in X-ray emissions than theory permits, according to Eddington's luminosity limit.

NGC 5907 is also strange in having very low amounts of elements in its spectra besides hydrogen and helium. That means its history has included very few supernovae and other events (e.g., neutron star mergers) that produce heavier elements. Such a history is consistent with its other abnormality - very few giant stars. All in all, this is a strange galaxy! It is also known as the Knife Edge Galaxy, and it lies 47 M.l.y. from us.

From DSNM, CDK14 scope, 3 hours on target, OSC camera. FOV is about 33 x 22 arc minutes.
M.J. Post

Here is a close-up of the central part of the beautiful Trifid Nebula, M20. Besides the dust lanes that Messier described as dividing this strong emission and reflection nebula into three parts, there is a "column of creation" just below center that displays two Hebrig-Haro "horns". So we know new stars are indeed being born there.
This image is highly cropped from a more complete view of M20 that I obtained last night from DSNM. I will post the full image soon.
CDK scope, 3 hours on target with ASI's 6200MC color camera, through a luminance filter. FOV is about 18 x 12 arc minutes.
- M.J. Post

Heart of the Trifid by M. J. Post



Trifid Nebula by M. J. Post

LAS Archives for July 1996, 2006, and 2016 by Eileen Hall-McKim

30 Years Ago – 1996

"Twelve members attended, two old friends and one guest. We lamented the misfortune of losing our president and newsletter editor to hard times and illness. There will be an election this Thursday evening for a new newsletter editor and President. We may railroad Bob Spohn into that office. He would be great doing it again, but he has already worked so much for the club that it would be a favor to him if we could get some other victim into the office."

Bob Spohn has finished observing the first ALCOR Herschel list about 400 objects, so congratulations were enthusiastic.

After some general business we commenced recalling what the most wonderful or unexpected or memorable observations were that each of us had enjoyed;

- Thom Peck recalled a 16" Astrola telescope in IL 30 3rd graders, and a spectacular auroral display. Another time, he saw 28 Sag through the rings of Saturn, from central Kansas, with very dark, deal steady sky, using an 8" f/5
- Randy Cunningham recalls the road up to Lick, 360 turns in 26 miles and the reward of seeing M13, with a nice black background, through the 36" refractor
- When Dave Street was 17 he drove 1200 miles from WI to the GA—FL border to view his first eclipse, and an hour before totality a thin wax-paper cloud deck came over, then the moon shadow could be seen crisply coming over the cloud deck, a most unusual thing to behold.
- Jim Getson, watching a grazing occultation in '81 saw a flare star SA0158853, as it brightened from mag 8.3 to 1 and back in a few hours, and the star in the southern Libra was subsequently named after him. It was bright with yellow Sodium line.
- Bob Spohn recalled his views of the Southern sky in '86 and then the Perseids seen from the Deadman site (NW of RMNP)in '88 with multiple radiants; Dave Street is still warming up from the weather there, says he.

"We will miss Bob Ross when he moves to Wellington, New Zealand to take a job the with IBM. As most of you know, Bob is a superlatively active amateur astronomer, using his "36" Dobsonian "portable" telescope from dark places at nearly every new moon. 36" is the aperture, some of us are lucky to have telescopes with focal lengths that large. Portable means his vehicle can move it…all 750lbs or so. Bob has outgrown most star charts, so he has been using the Palomar Sky Survey plates at Sommers-Bausch Observatory on the University campus for planning and interpreting his observations. Whenever I tell people about LAS, I feel compelled to tell them about Bob's observing and the inspiring recollections and advice he has given to the club about seeing things and recording those observations."

20 Years Ago – 2006

"Hey Astronomers, It sure has been a tough month to be an astronomer. The skies were cloudy for many nights when it usually clears after dark for normal summer nights here in Colorado, then a week later we get the monsoons. The monsoon type rains for a week or so was very much needed and overdue for us, the grasses and fields were looking like end of summer brown. Glad to see things green up again. The heat wave is going on now, so it stays hot till after midnight sometimes before it cools down nicely here in Colorado. Bring the bug spray, they are back".

"Vern Raben and I really did try to see and record the Asteroid 2004 XP14 that Monday night from my yard here in Niwot. He stayed till 3:00 am or so and I went to bed at 4:00 am. I looked out again at 5:00 am when dawn was already breaking and still cloudy. Weather reports showed some chance for clearing but all my positive thinking did not work that night. I was totally convinced it would clear. Vern gets the die hard of the month award for enduring

with me. We are never smart enough to give up sometimes, that's usually when it does clear, when you go home you know how it works?? I will be out tonight with clear sky views. Moon comes up late now, so small window of almost darkness from my yard here in Niwot".

"The Home Planet Stellar Views" will get better you guys, do not sell that scope yet. WUTS is coming up this weekend so be there if you can. It's our favorite Dark Sky place, put on by our friends Marty and Marcy Curran, from CAS, Cheyenne, Wyoming, and LASSO, Robert Roten and the rest of their gang. Hopefully weather will be good. I will be giving a full report when we get back. I plan to be there Thursday to Sunday for best chance at least a few good nights."

10 Years Ago – 2016

July 14th 7:30 – 10:30 pm Carbon Valley Star Party, 7 Park Ave., Firestone, CO. "Constellation of stories" by northern Colorado story tellers followed by presentation by Bill Tschumy, LAS. Star party begins at 9:15 pm.

Presentation "Visually and Physically Realistic Ray-tracing Simulations of Earth, Moon, and Sky" by Steve Albers, NOAA. Steve received his BSc in Physics from the State Univ. of New York at Albany (1978), and MS (1986) in Atmospheric Science from the University of Oklahoma. From 1976 and 1977 he worked as part of the Viking Intern program connected with the JPL and Brown University. He did some image processing of Viking Mars Lander Images at JPL's Image Processing Laboratory as part of the Viking Lander Imaging Team. He also performed some data reduction for the Meteorology Team. In 1979 he wrote an article for Sky and Telescope about Mutual Planetary Occultations. This led to the serendipitous discovery in 1980 that Galileo actually saw Neptune in the 1600s. Steve received the R.R Newton Award from the International Journal of Scientific History in 2009 in recognition of his role. Steve has worked at various NOAA facilities in Boulder, CO, including the PROFS program, Forecast Systems Laboratory, and the Earth System Research Laboratory. In this context he came on-board CIRA in 1989. His work includes extensive development and implementation of meteorological analyses of wind, clouds, temperature, and micro physical variables for the Local Analysis and Prediction System. Steve's work seeks to build 'more real' simulated atmospheric visual representations from collected observational data. More specifically, to create visual simulation capabilities that match an actual image of the object sky, earth, sun, for a realistic representations using weather data from satellite, aerial observation, and temperature / wind speed / and particulate concentrations in the atmosphere.

Mars by Gary Garzone

Milky Way at Hall Ranch by Brian Raben

Eclipse 2017 Planning for Monday August 21 2017
(Totality at ~11:37 am MDT

Vern opened the discussion with a map of available Wyoming and Nebraska 'public' viewing locations along the path of totality and shared his thoughts on benefits and challenges of each. Discussion moved to private land options including where and how a reservation might be arranged. Vern requested authority to commit up to $2000 of club funds to begin discussions with a landowner and/or procure reservations for porta-potty rental the days surrounding the eclipse. Gary Garzone made a formal motion that the club authorize Vern to expend up to $2000 of club funds to reserve land and/or portable toilets for the August 2017 eclipse. Joe Hudson seconded. A voice vote was held. All in attendance voted aye – there were no dissenting votes. The motion carried.

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IC 983 + IC 982 = Arp 117

by M. J. Post