

LONGMONT ASTRONOMICAL SOCIETY

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M33 TRIANGULUM GALAXY
BY JIM POLLOCK

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LAS Meeting on October 15

Presentation about the early universe by David Barker

I'll go through an overview of the early universe and what we can learn from instruments observing at different frequencies, focusing on some cutting-edge radio astronomy from the moon that may allow us to observe the cosmic Dark Ages, an era before the first stars were born that has never been observed.

I'm a graduate student working with Jack Burns at CU Boulder. My research focuses on detecting the radio signal from the Dark Ages and using that signal to potentially identify exotic physics.



I started my college career at the University of Idaho in Moscow, ID studying criminology. After graduation I joined the US Navy as a Surface Warfare Officer (SWO), where I would serve for 4 years. After completing my time in the Navy in 2018, I continued my education at University of Colorado Boulder in the Astrophysical and Planetary Sciences department, graduating in 2022. I've worked with groups studying a wide variety of different topics from passive dark matter detectors to cislunar orbital architectures. I enjoy many different research subjects, but am particularly interested in all things cosmology, especially dark matter and its structure and gravitational dynamics at galactic scales.

Location

The meeting will be at the First Evangelical Lutheran Church, 803 Third Avenue, Longmont, CO 80501. The meeting starts at 7 pm.

About LAS

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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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 Library Telescope Coord.: Bruce Lamoreaux
 Public Outreach Coord.: Aref Nammari
 Newsletter: Vern Raben and Eileen Hall-McKim

Planets in October

Mercury

Mercury is not visible naked eye, in binoculars or small scopes this month.

Venus

Venus becomes visible in binoculars in early morning after Halloween.

Mars

Mars brightens a bit from +1.1 to +0.9 this month. The disc increases from 5.6 to 6.5 arc sec across.

Jupiter

This month Jupiter increases in apparent size from 33 to 35 arc sec across and its apparent brightness increases slightly from -1.9 to -2.1 magnitude. The following are good times to view Jupiter Great Red Spot:

Date	Time	Altitude	Date	Time	Altitude
Oct 1	5:29 am	30	Oct 20	6:14 am	50
Oct 6	5:38 am	24	Oct 23	3:44 am	24
Oct 8	6:17 am	43	Oct 25	5:23 am	43
Oct 13	5:26 am	30	Oct 27	7:01 am	60
			Oct 30	4:32 am	37

Saturn

Saturn is +0.4 magnitude in apparent brightness and the disc is 20 arc sec across. Saturn is at opposition with Earth on October 4.

Uranus

Uranus is in constellation Taurus. The apparent magnitude +5.6 in brightness and the disc is 3.8 arc sec across

Neptune

Neptune's apparent brightness is +7.8 and the disc is 2.3 arc sec across. It is in constellation Pisces.

Lunar Phases in October

October 3 - Third Quarter Moon at 7:26 am

October 10 - New Moon at 9:51 am

October 18 - First Quarter Moon at 10:14 am

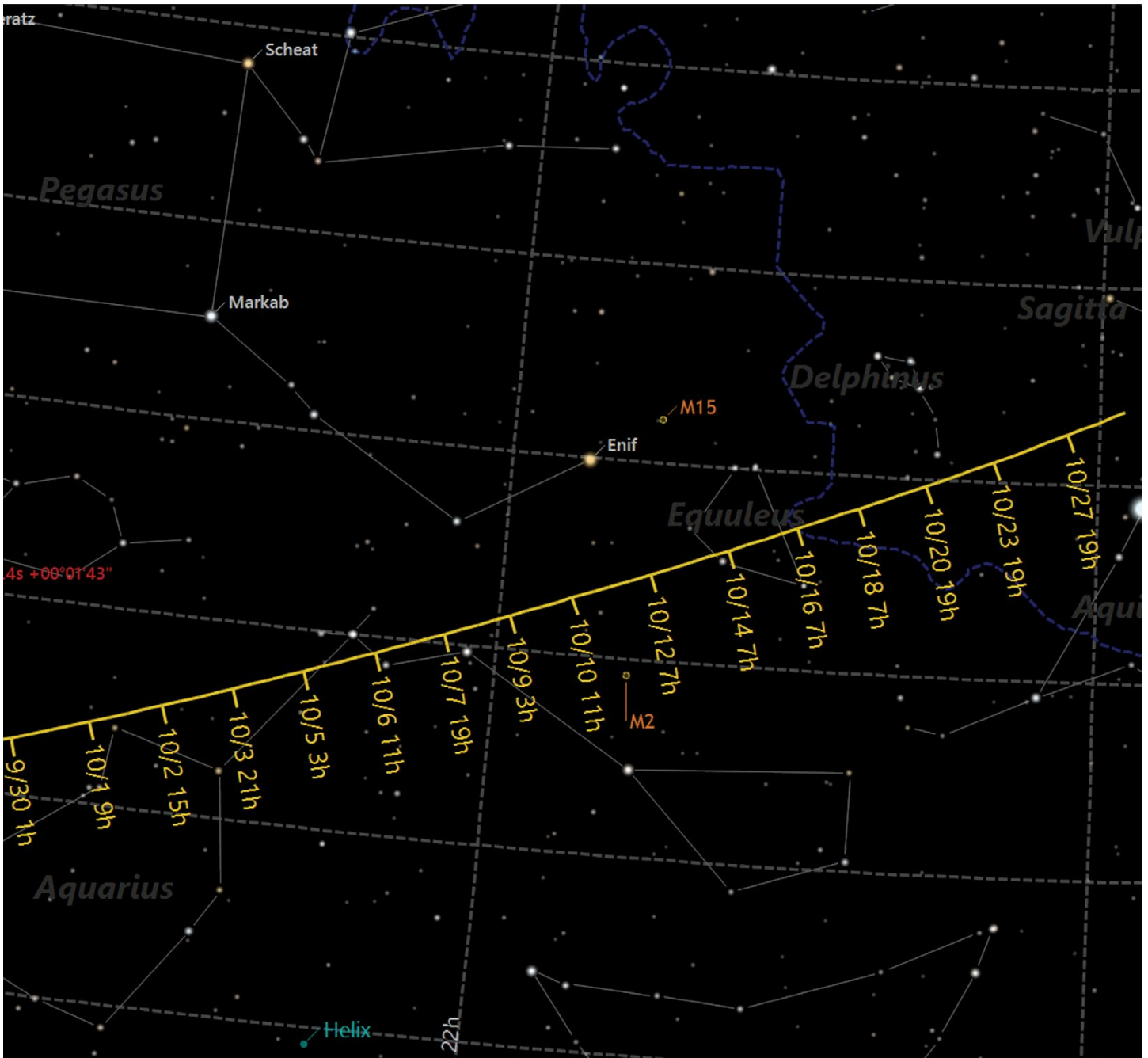
October 25 - Full Moon 10:13 pm

Meteor Showers in October

On night of October 8/9 the Draconids meteor shower peaks. At best expect to see 5 meteors per hour. Draconids are from the debris of comet 21P/Giacobini-Zinner.

Orionids peak on the night of October 21/22. The moon is only 3 days before being full so it will obscure most of them. Orionids are known for being bright and fast moving. Normally about 10 to 20 per hour may be observed. The Orionids are from the debris of Halley's comet.

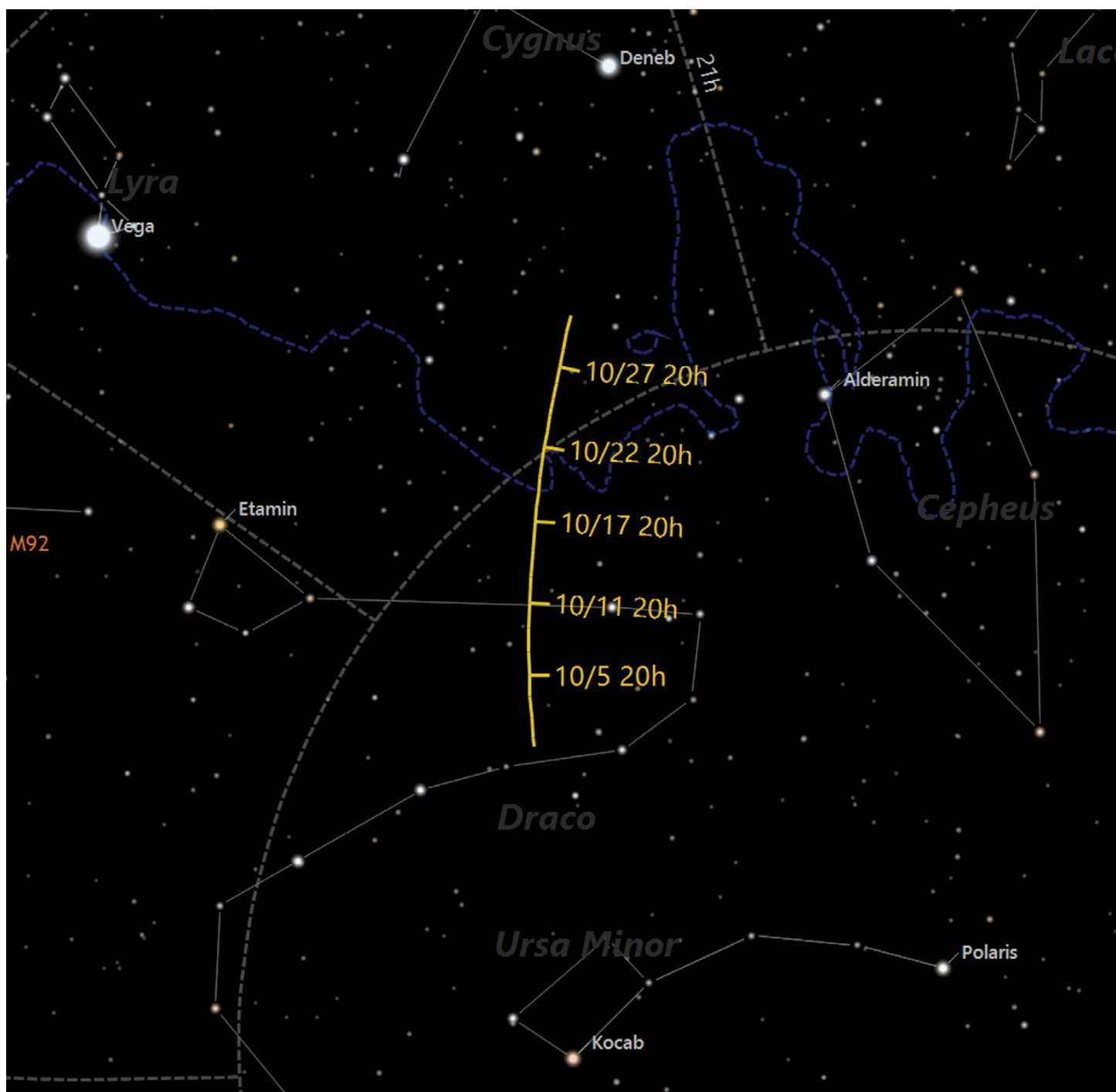
Comet 161P/Hartley-IRAS



Created with SkyTools 4.1 Visual

Date	Optimum Time	Right Ascension	Declination	Constellation	Apparent Magnitude	Apparent size in arc min
Oct 1	10:23 pm	23h14m31.7s	-05°09'31"	Aquarius	11.3	2.7
Oct 7	10:04 pm	22h10m29.3s	+00°43'54"	Aquarius	11.3	2.6
Oct 13	8:49 pm	21h19m06.6s	+05°39'23"	Equuleus	11.4	2.3
Oct 19	7:55 pm	20h41m28.8s	+09°16'55"	Delphinus	11.7	2.0
Oct 25	7:33 pm	20h14m49.7s	+11°53'36"	Aquila	11.9	1.7
Oct 31	7:16 pm	19h55m59.0s	+13°50'35"	Aquila	12.2	1.5

Comet C/2026 A2 (Bok)



Created with SkyTools 4.1 Visual

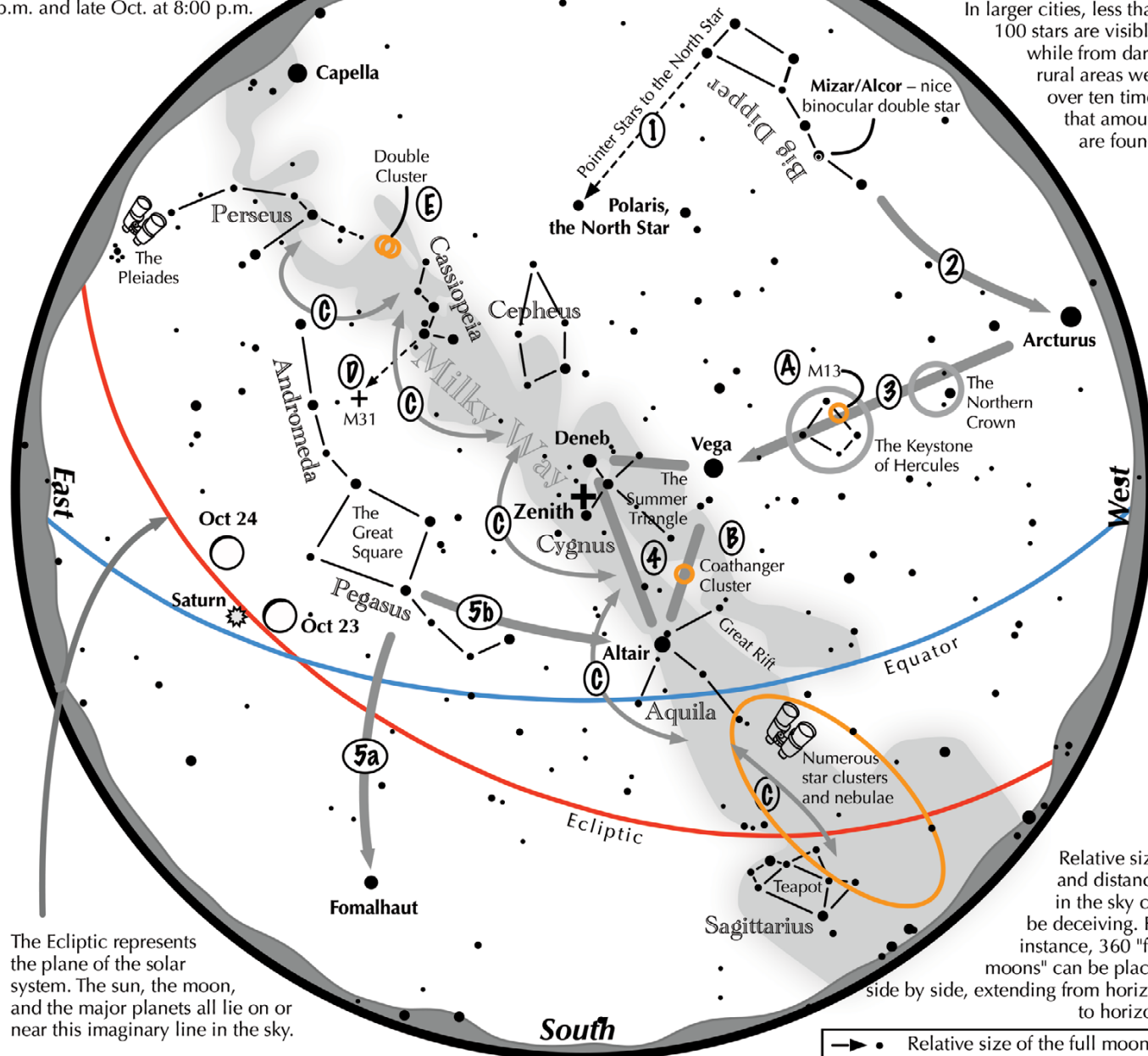
Date	Optimum Time	Right Ascension	Declination	Constellation	Apparent Magnitude	Apparent size in arc sec
Oct 1	8:19 pm	18h04m52.1s	+68°29'08"	Draco	13.5	43
Oct 7	8:09 pm	18h29m06.6s	+66°29'50"	Draco	13.4	44
Oct 13	8:00 pm	18h53m52.5s	+64°08'56"	Draco	13.1	46
Oct 19	7:51 pm	19h18m38.9s	+61°24'15"	Draco	13.0	48
Oct 25	7:32 pm	19h42m57.3s	+58°14'54"	Cygnus	12.8	49
Oct 31	7:36 pm	20h06m31.9s	+54°40'31"	Cygnus	12.7	51

Navigating the October Night Sky

2026

For observers in the middle northern latitudes, this chart is suitable for early Oct. at 9:00 p.m. and late Oct. at 8:00 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 October 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 intersects Arcturus, the brightest star in the early October evening sky.
- 3 To the northeast of Arcturus shines another star of the same 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.
- 4 Nearly overhead lie the summer triangle stars of Vega, Altair, and Deneb.
- 5 High in the east are the four moderately bright stars of the Great Square. Its two southern stars point west to Altair. Its two western stars point south to Fomalhaut.

Binocular Highlights

A: On the western side of the Keystone glows the Great Hercules Cluster, a ball of 500,000 stars. **B:** 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger. **C:** Sweep along the Milky Way for an astounding number of fuzzy star clusters and nebulae amid many faint glows and dark bays, including the Great Rift. **D:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **E:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster.



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LAS September 17th Meeting Notes by Eileen Hall-McKim

I. Introduction

Our LAS September meeting was held in-person and by zoom on September 17th at the Longmont Evangelical Lutheran Church, 803 Third Ave. President, Vern Raben began the meeting with self-introductions of those attending in person. Twenty-six attended in person, 8 by Zoom.



II. Main Presentation

The speaker this evening is Dr. Fran Bagenal and her topic is "Jupiter's Four Galilean Moon". Most of us know Fran as she has been our speaker quite a few times over the last 15 or so years. She is a Professor Emerita of Astrophysical and Planetary Sciences at the University of Colorado Boulder and a senior research scientist at LASP and is co-investigator on NASA's New Horizons mission to Pluto and the Juno mission to Jupiter. Her main area of expertise is the study of charged particles trapped in planetary magnetic fields and the interaction of plasmas with the atmospheres of planetary objects, particularly in the outer solar system. Born and raised in the UK, Fran received her bachelor degree from the University of Lancaster, England, and her doctorate degree in Earth and Planetary Sciences from MIT (Cambridge, Mass) in 1981. She has participated in several of NASA's planetary exploration missions, including Voyager 1 and 2, Galileo, Cassini, New Horizons and Juno. She has been a plasma scientist on Voyager, Galileo, Deep Space 1, and Cassini. On NASA's New Horizons mission to Pluto she served as co-investigator and parti-

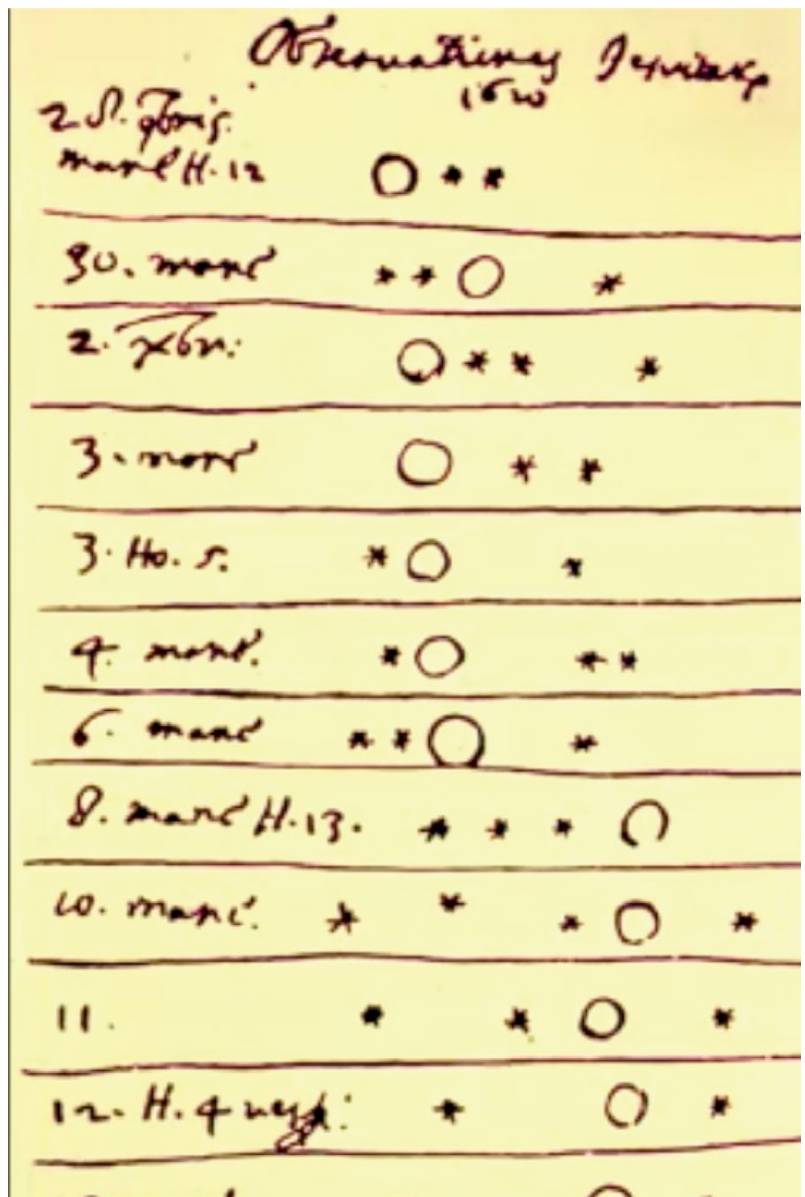
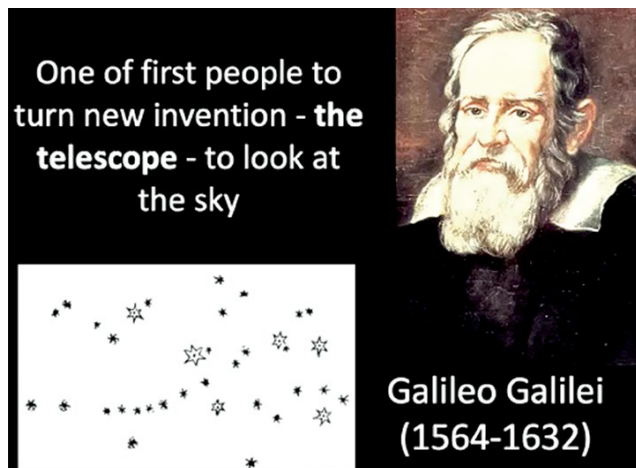
cles-and-plasma science team lead. On the Juno mission to Jupiter she is co-investigator and co-chair of the magnetospheric working group—again leading the plasma investigations.

After changing our view of the cosmos with Galileo's discovery in 1610, the four large moons of Jupiter – Io, Europa, Ganymede and Callisto – have been challenging our scientific understanding of planetary bodies ever since. In this presentation, Fran will present our current understanding of the workings of these four very different objects and outline the plans for their future exploration, including NASA's Europa Clipper mission and ESA's JUICE mission.

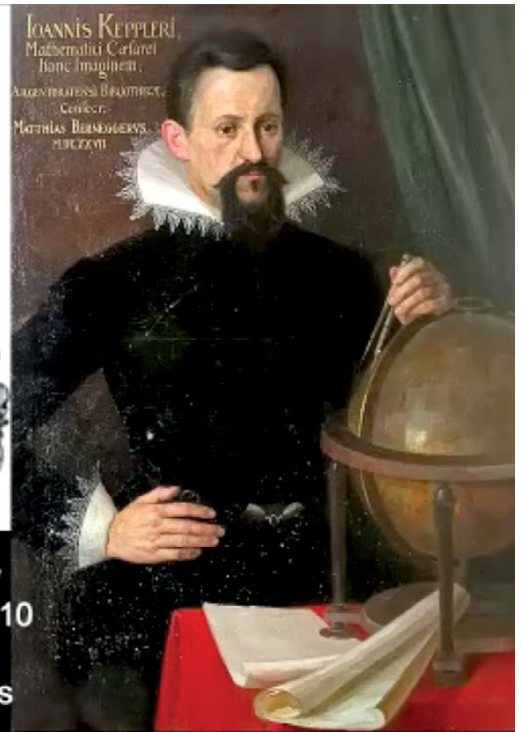
Galileo Jupiter's Four Galilean Moon's; Past Present, and Future by Fran Bagenal, APS

Galileo in the 1600s was one of the first people to take a telescope that was normally used for spying or military uses, and look at the sky. In January, 1610 he observed four objects near Jupiter that changed location each night.

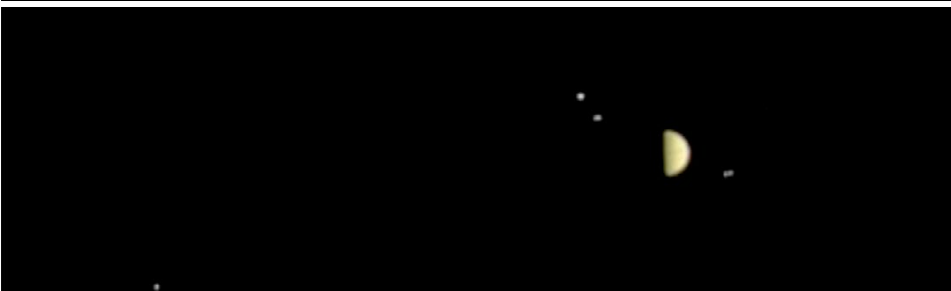
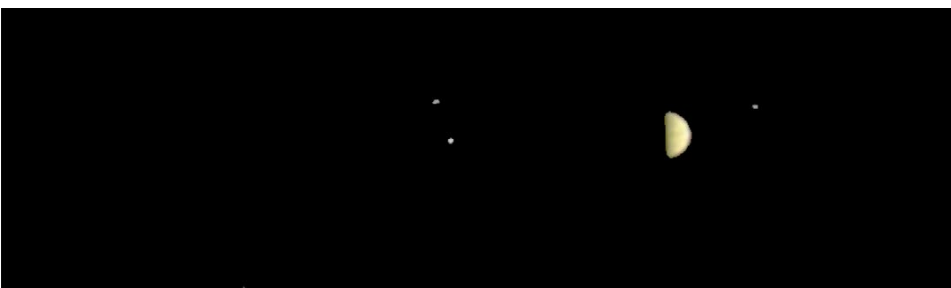
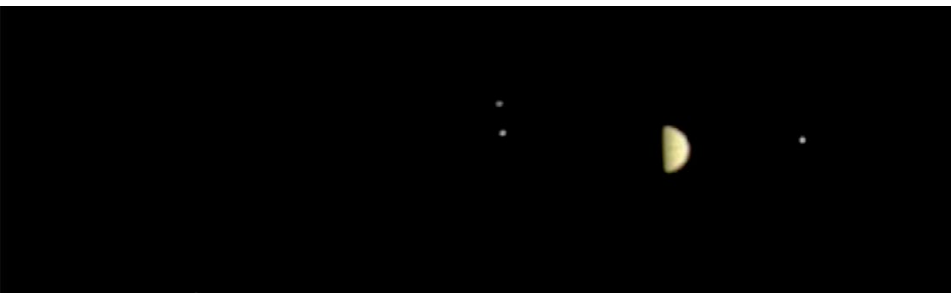
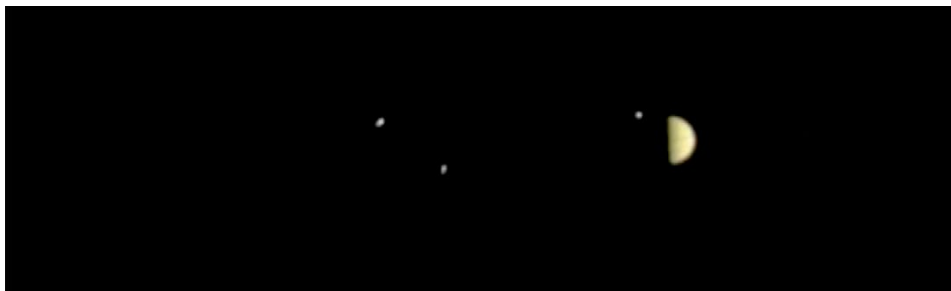
- He first named the moons after his sponsors; Medicean stars
- Very important observations - for this showed that not everything orbits the Earth, a very controversial topic at the time and got him into trouble



- Simon Marius independently discovered the moons about the same time in 1610
- Johannes Kepler suggested the mythical names to Marius – Io, Europa, Ganymede and Callisto – named after Jupiter’s lovers



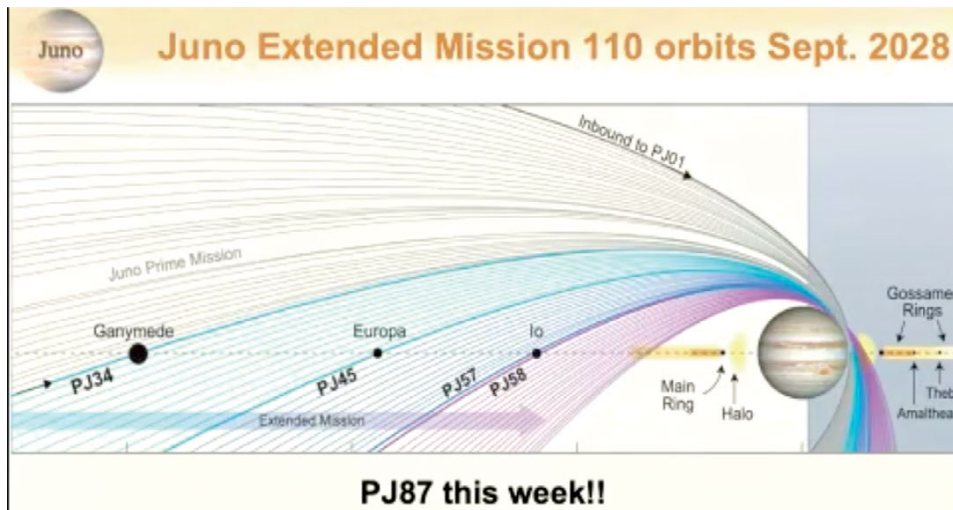
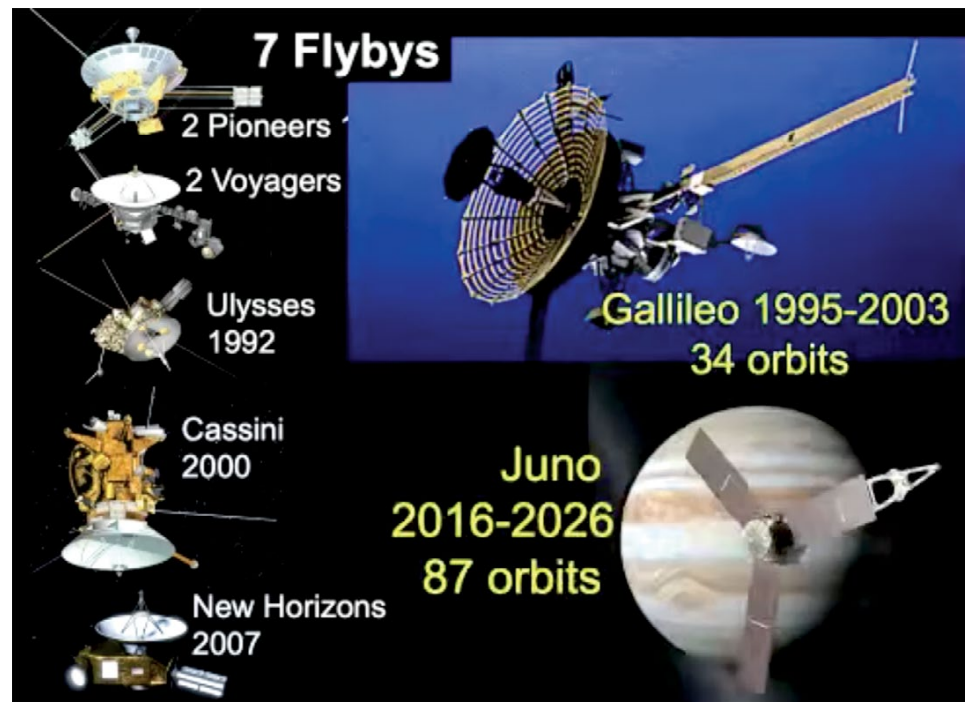
Simon Marius independently discovered the moons in 1610
Johannes Kepler suggested the mythical names to Marius



Video of Jupiter & Moons taken in July 2016

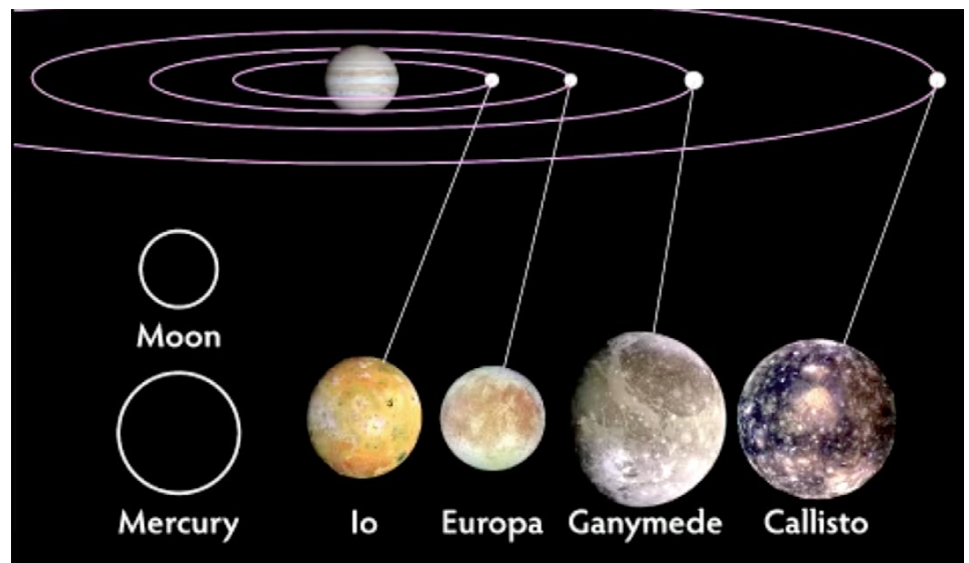
- This is NOT a computer simulation but an actual movie taken as the Juno spacecraft approached Jupiter
- For humanity, our first glimpse of celestial harmonic motion

Not only are we looking with telescopes but also with spacecrafts, we have had 7 flybys of the Jupiter System – latest on Juno 2016-2026 – has done 87 orbits and still going



Juno Extended Mission 110 orbits by September 2028 – PJ 87 this week – Flew past Ganymede, Europa and Io. What's happening is orbiter goes over the poles, crossing the equator, going into the radiation belts on either side so radiation hammers computers, makes it hard to communicate, they lose a lot of data, not clear how long they will survive, may until next year.

Galilean Moons – Size comparable to our Moon or small planet Mercury

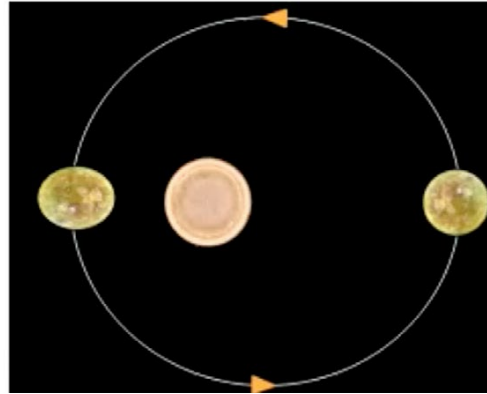
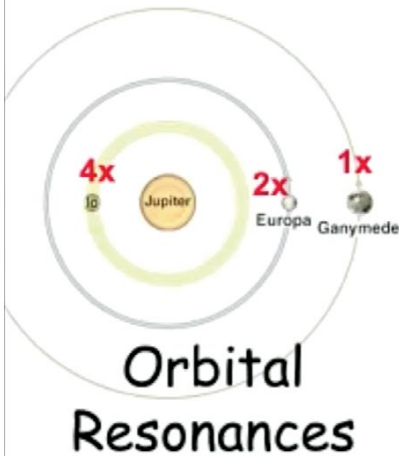


Tidal Heating

- Orbit disturbed by **orbital resonance** -> Elliptical orbit

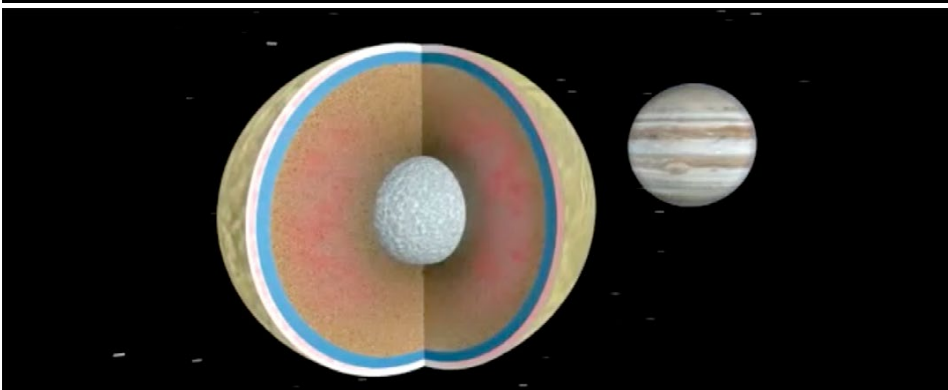
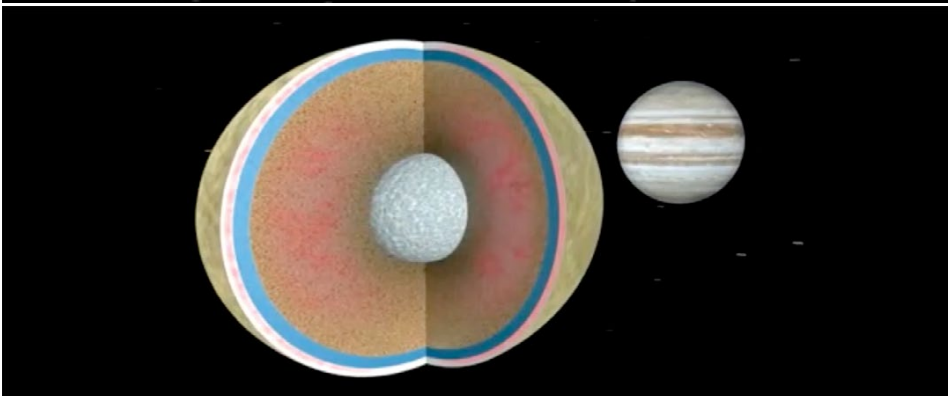
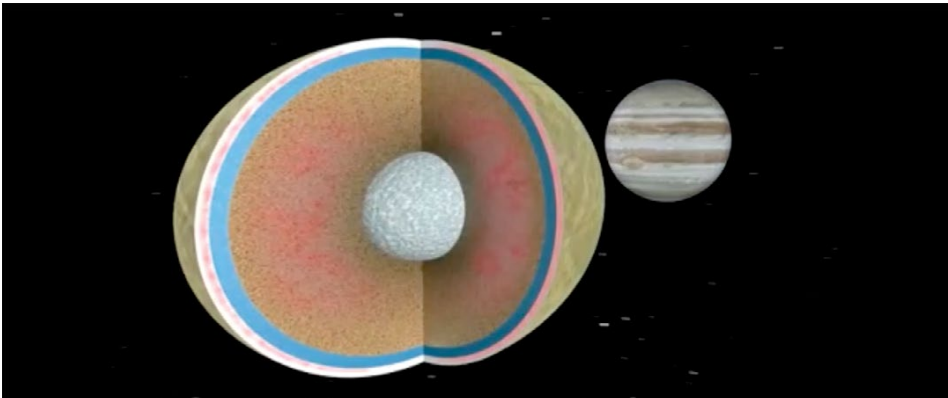
- Tides distort moon shape

- Continually changing shape heats interior



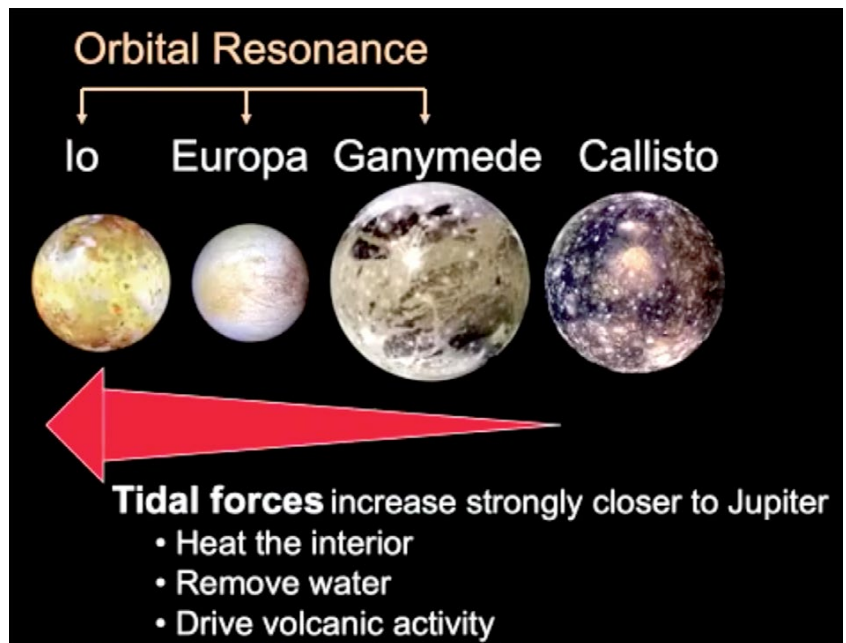
Tidal Heating - Inner most 3 are in orbital resonances – for each time Ganymede goes around, Europa goes around 2x and Io goes around 4x

- This causes tidal forcing on these moons being pulled back and forth by Jupiter
- Orbit disturbed by orbital resonance -> Elliptical orbit
- Tides distort moon shape; continually changing shape heats interior

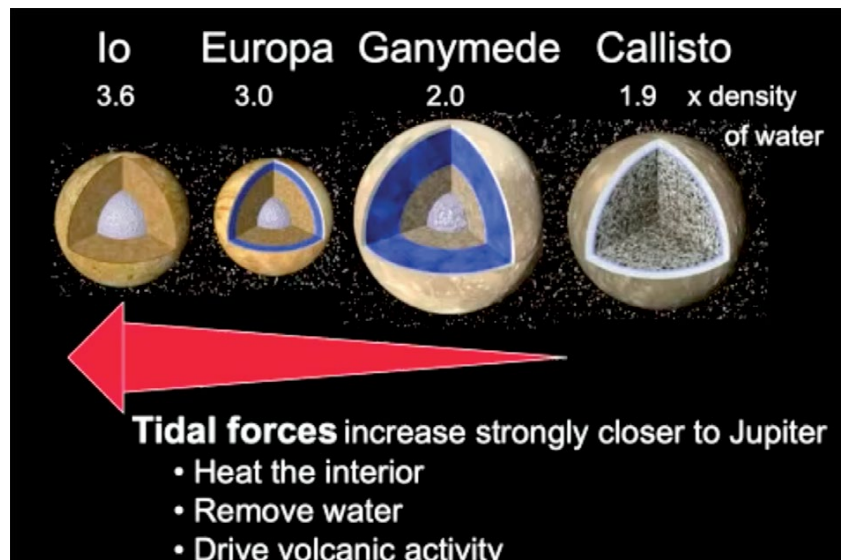


- This force causes Tidal Flexing - Europa example- stretching of ice crust being flexed
- Io crust flexes +/- 300 ft= height of Statue of Liberty

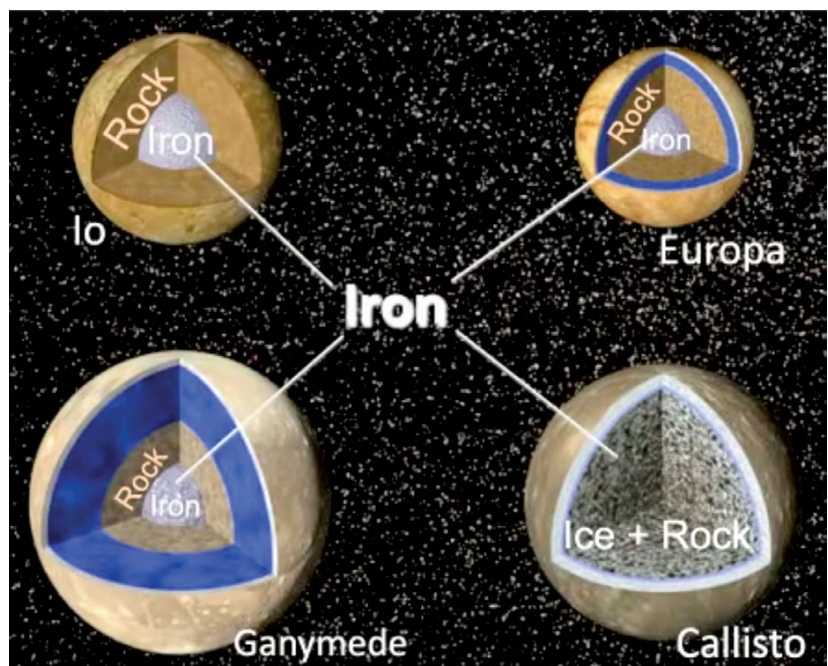
- Consequence of being closer to Jupiter – more tidal force – heats the interior, removes water and drives volcanic activity
- The result is that the interiors of these moons are very different

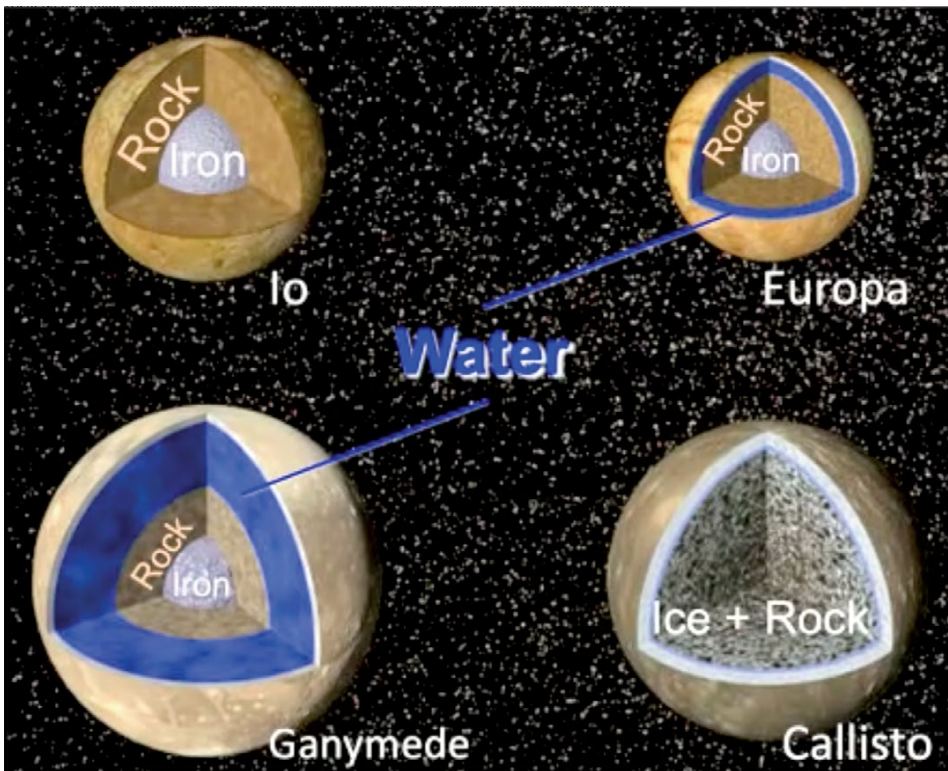


- Callisto a mixture of water, rock and metals not differentiated 1.9 x density of water
- Ganymede heated up inside, iron has gone to center, have rock then water then thick layer of ice – 2.0 x density of water
- Europa has lost a lot of its water but not all of it, ice on outer layer 3.0 x density of water
- Io – no water at all, density of rock, iron on inside, rock outer, 1.9 density of water



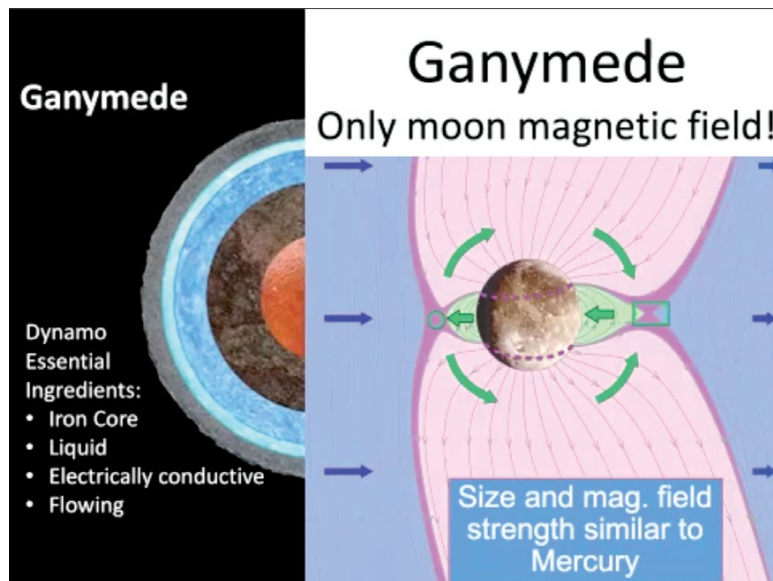
Amount of Iron in each moon - there is some Iron in all of them





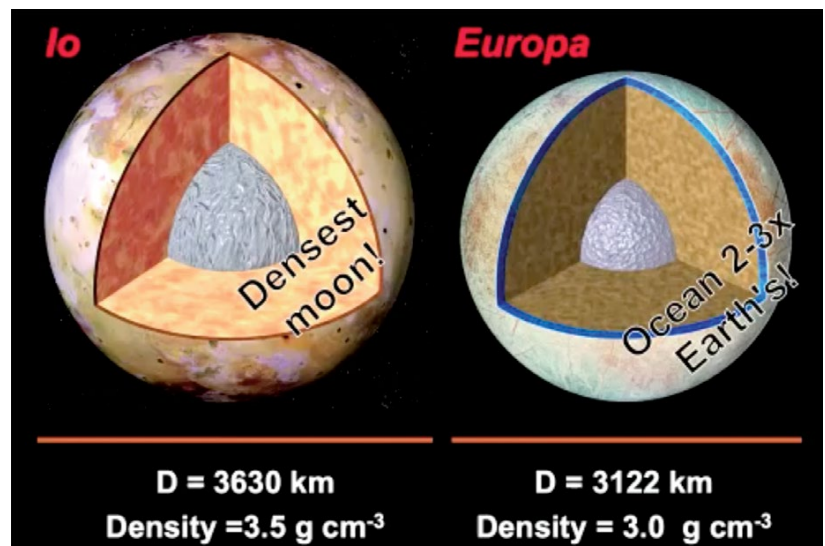
Water is only present as an ocean in Europa and Ganymede

Ganymede is the only moon in our solar system that has its own magnetic field with the size and magnetic field strength similar to Mercury



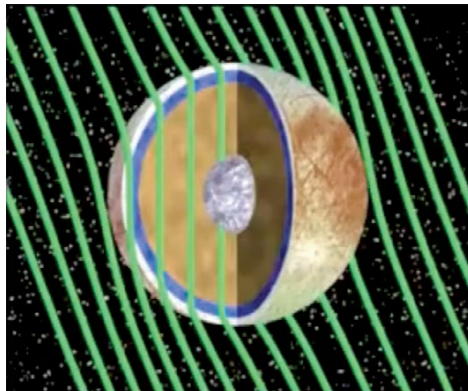
Comparing Io and Europa – they have about the same densities

- Io has lost all its water
- Europa has enough water that is 2-3x the amount of water in Earth's oceans with ice on the outside
- How do we know there is water inside? Electrical conductivity



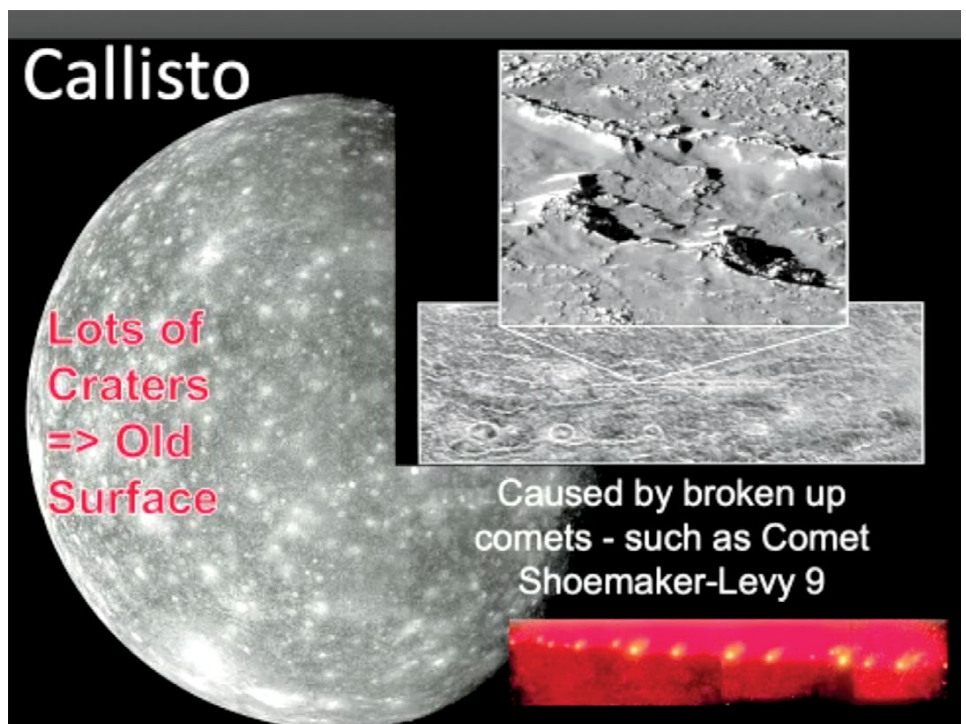
Electrical Conductivity: Water>>Ice

- Use an interesting technique that measures the perturbation in the magnetic field that penetrate though to the liquid inside
- Magnetic Field Perturbations measured by Galileo Magnetometer showed the water under the ice has to be liquid

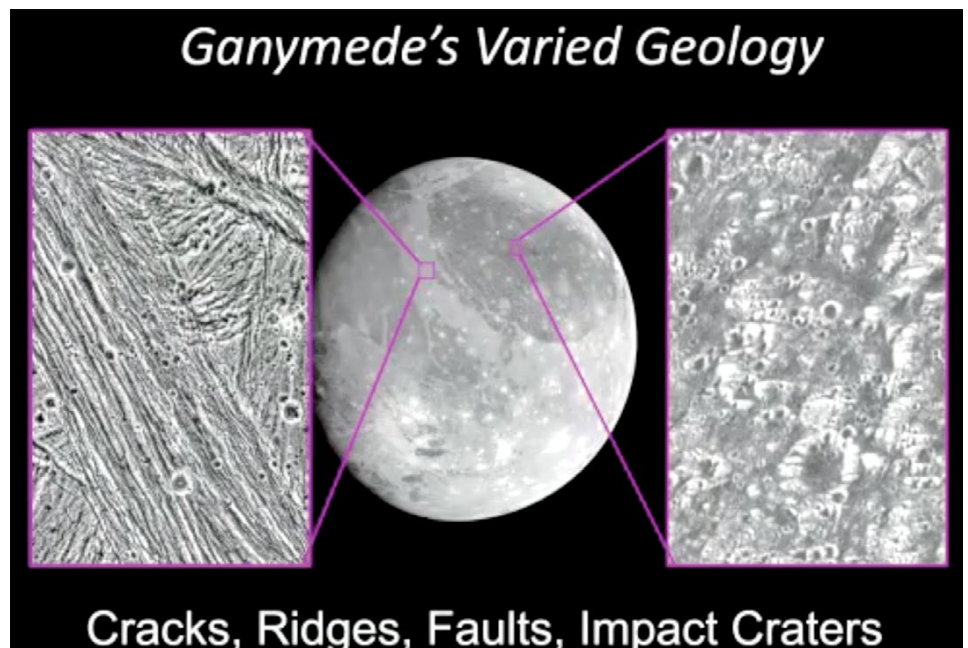


Surfaces of the moons

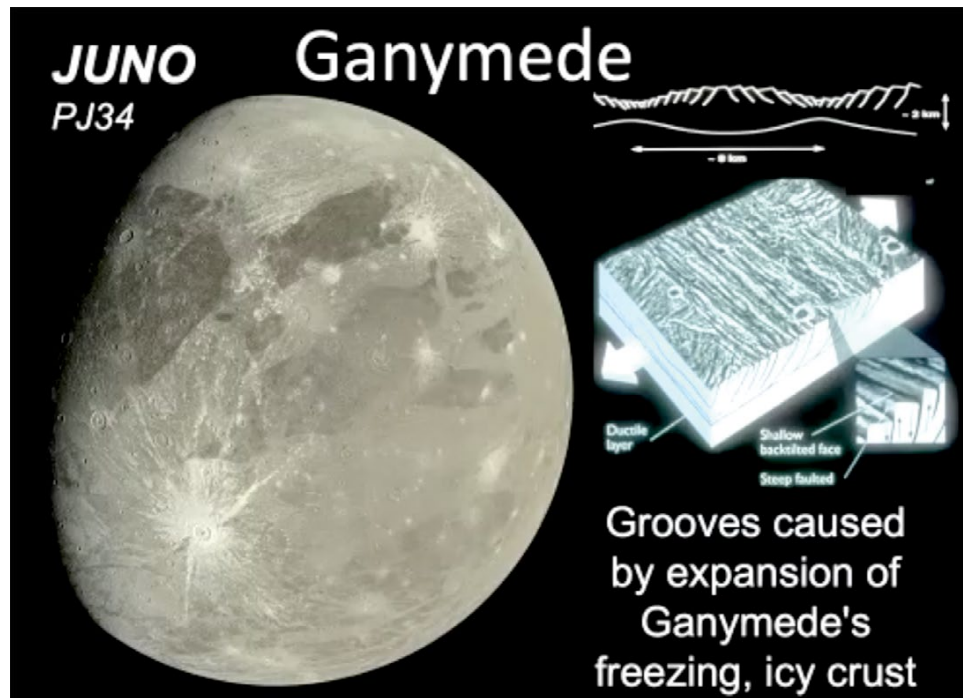
- Callisto – Lot of old craters = old surface
- Saw series of craters wondered what could cause that? Then saw the impact of Shoemaker-Levy 9 a comet that got broken up and hit in string of impacts



- Ganymede's Varied Geology; cracks, ridges, faults, impact craters
- Geology similar to Earth's – may have plate tectonics, surface old enough to have impact craters, can date by density of impact craters; right surface older than left



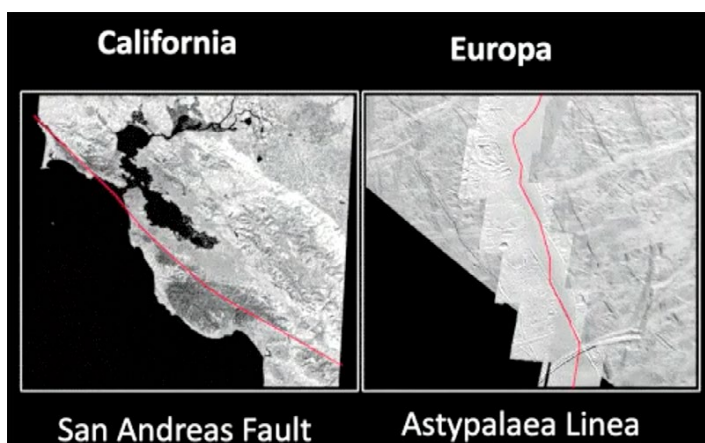
- Juno did a close flyby June 2021 and took some really cool pictures; lots of detail
- Grooves show cracking of surface as it expanded as ice flows



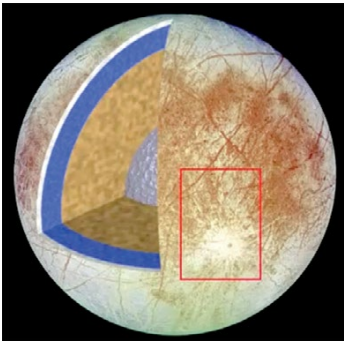
- Closeup of Ganymede during Juno Mission – can see difference in color fresh surfaces impact craters looking white, older surfaces accumulate dust from space look darker



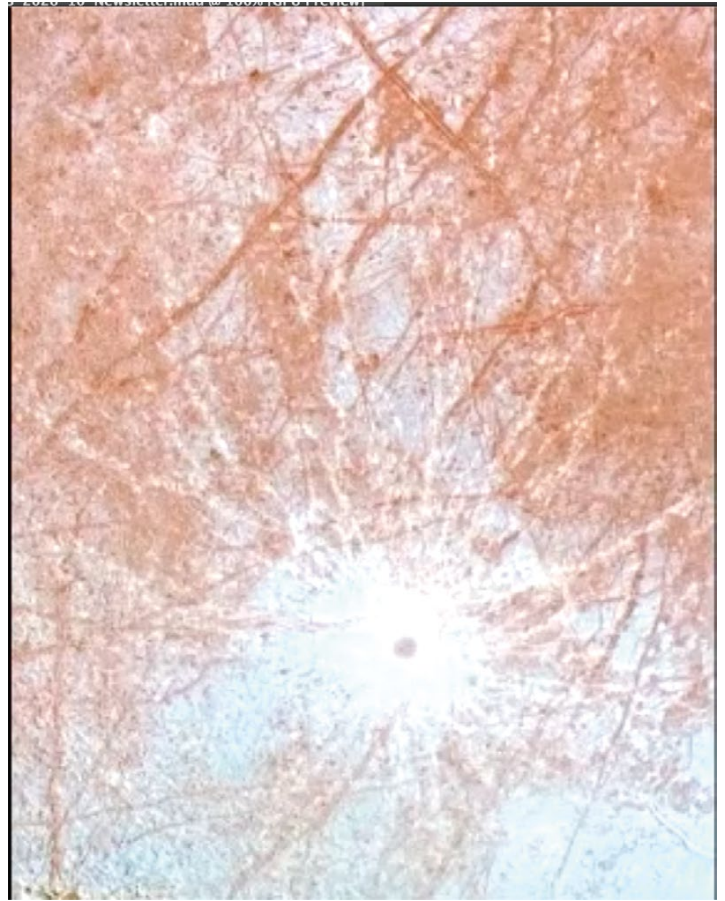
- Moving to Europa – surface covered with cracks – young surface not a lot of impacts
- A few large impact craters – one site Tyre – suggests 60 Myr surface age; thickness of ice if 15-20 km; looks as if the impactor went right through the ice!



For scale: cracks compared to San Andreas Fault

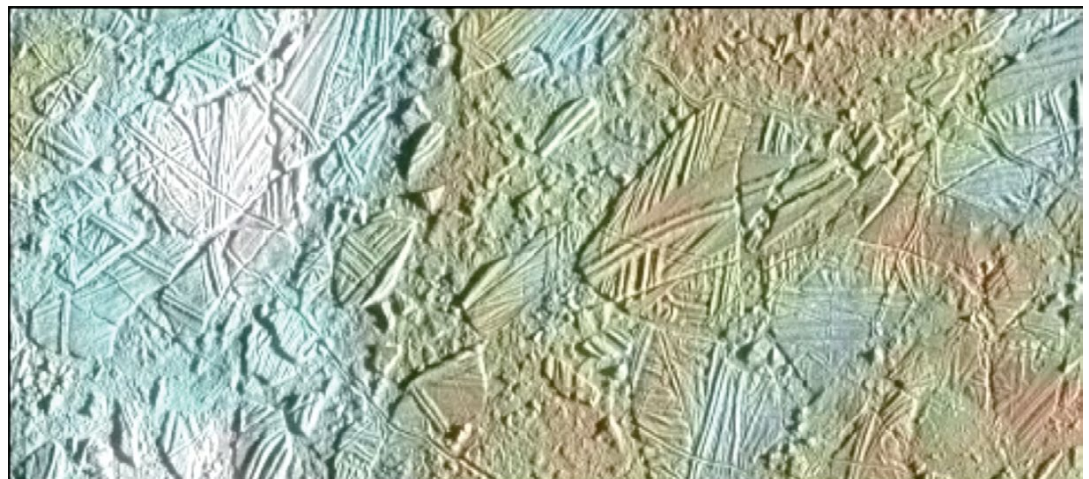


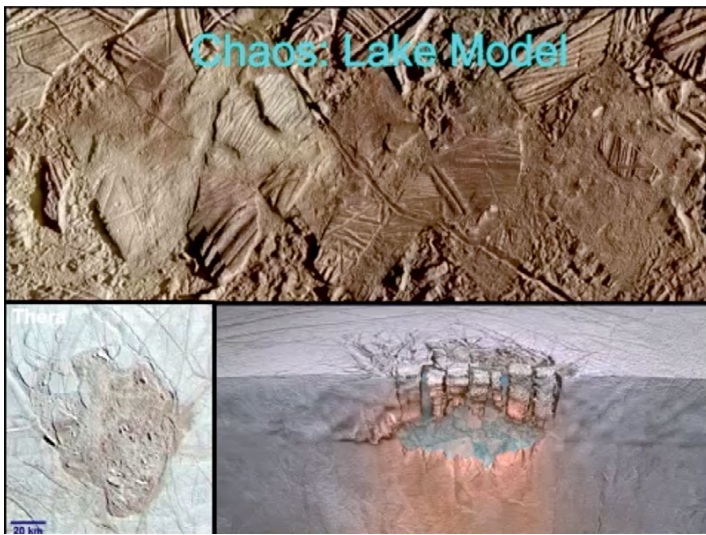
- Zoom in on Europa looking at surface
- 600 miles across, few impacts, many fractures – indicates young surface



(Zoomed In) Also see cracks, broken-up surface (75 miles across)

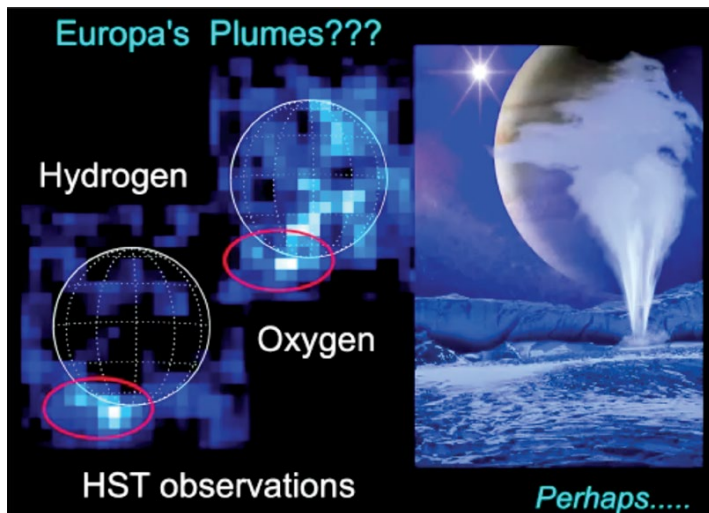
(Zoomed In) Rafts of Ice – Icebergs floating in ice? What is the brown stuff? Look like they are floating in water





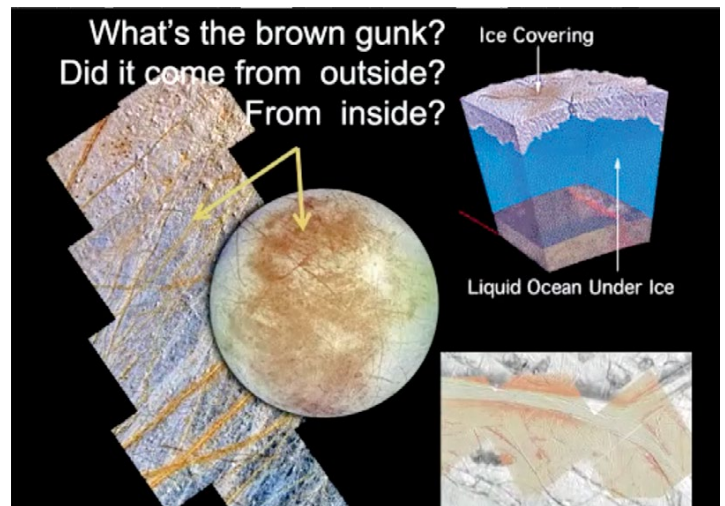
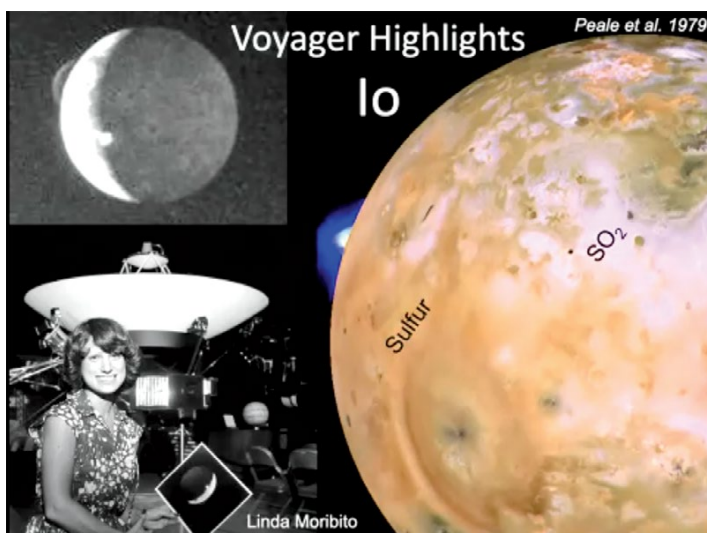
Chaos Terrain: Lake Model

- Could be a terrain with chunks floating around: may be an area where this ice layer on Europa is thinner, possibly regions due to warmer water coming up

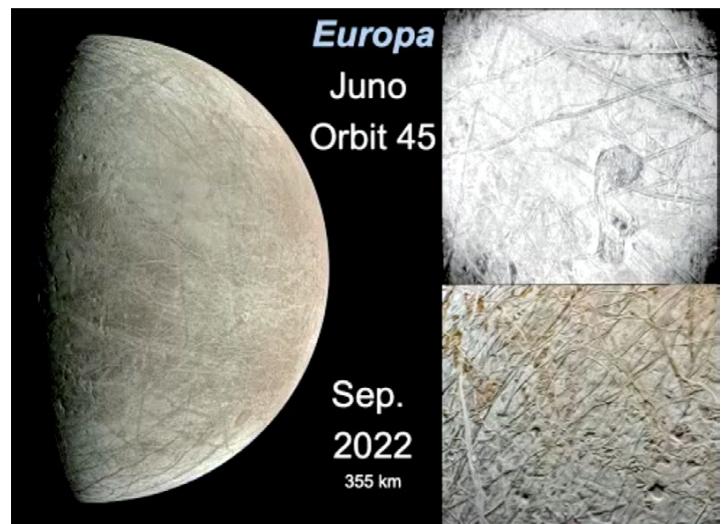


Europa's Plumes??

- Debate over whether plumes or not, but enough to launch a NASA mission



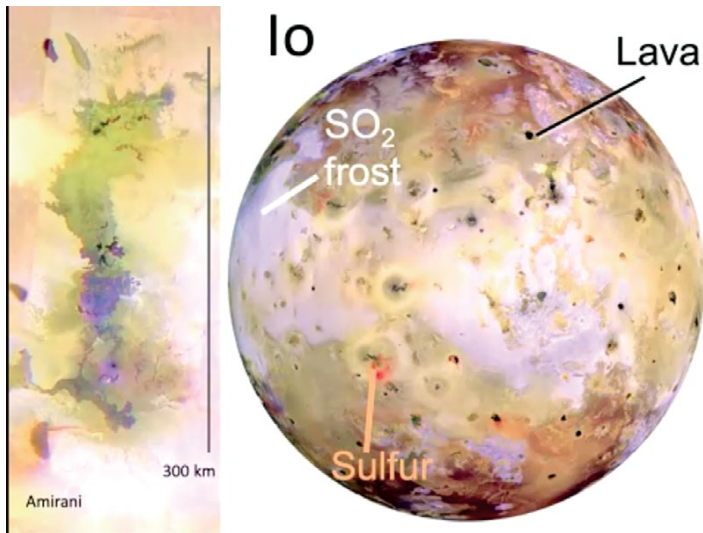
- What is the brown area? Did it come from inside or outside ?
- Haven't gotten in close enough to do a spectroscopic study, hard to do when something is buried in water; it interferes with spectral signature
- Looks like there are areas of thinner ice where material comes up and spreads out



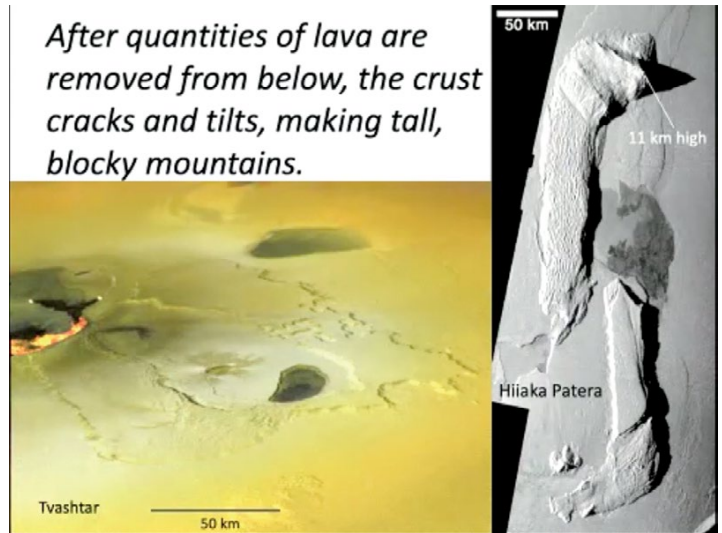
- Juno Orbit 45 did close flyby September 2022, got to see up close ridges, dimples where it looked like maybe material coming out; it gives us hints of what might be there

Io – Voyager Highlights

- Before Voyager we knew there was something strange about Io – it triggered radio emission, it seemed to have some spectral studies of sodium, sulfur around it
- Linda Moribito – Navigator noticed what looked like plumes, many said no

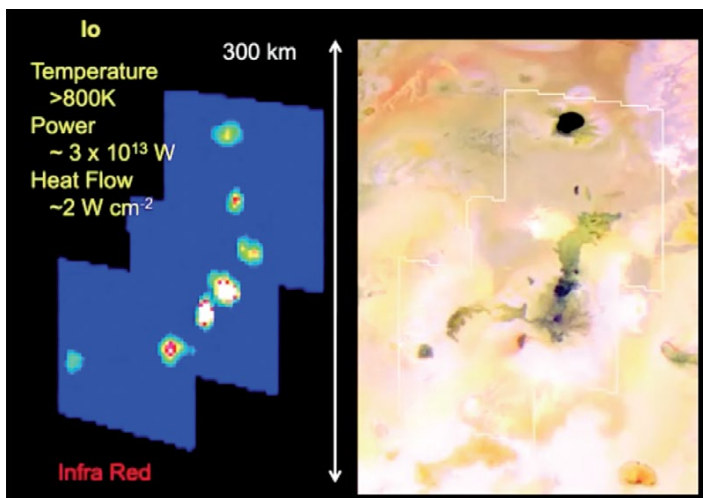


alized big 11km mountains, higher than Everest, formed from spewed out lava, makes cavity underneath causes crust to tip forming these mountains

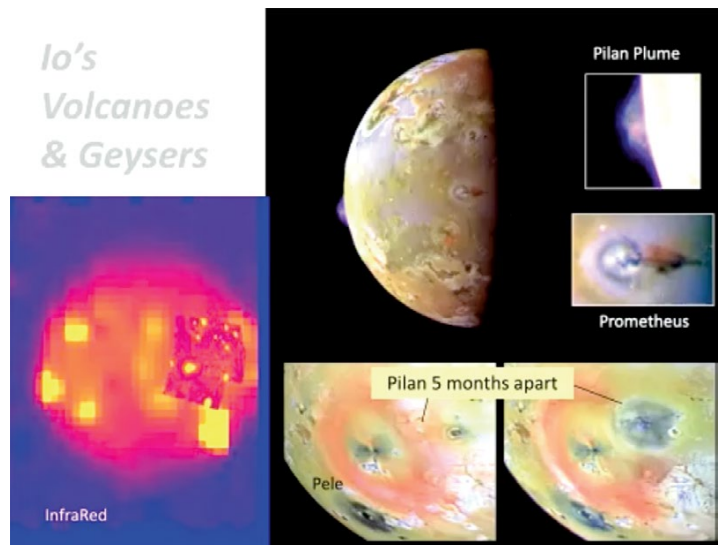


Lava removed from below making tall, blocky mountains

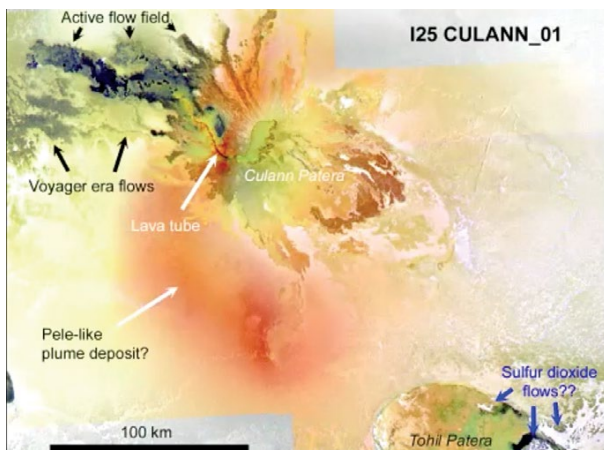
- Later confirmed volcanic plumes, surface of sulfur dioxide, yellow sulfur, black – lava
- Io - (Left) – Amirani Volcano: large- about the size of Colorado
- Hundreds of these lava beds across the surface



- Voyager was able to get infrared images of the surface this means it is glowing – it is hot



Can see variability with different spacecrafts that orbit around, lots of volcanoes and geysers; Pilon huge patch or lava in one of two images taken 5 months apart



More observations from Galileo Spacecraft – saw fresh lava flows and lava lakes on the surface, re-



Tvashtar, an erupting plume near the North Pole, observed by New Horizons 2007 during flyby



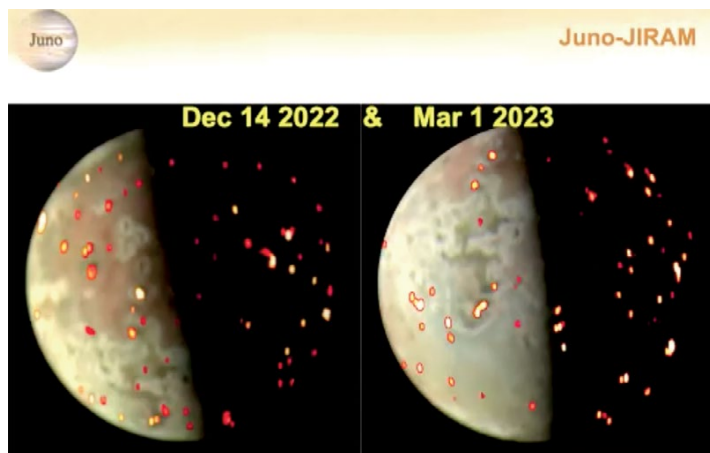
Two flybys of Juno PJ57, 58 2023; 2024 Saw these big volcanos and mountains sticking up



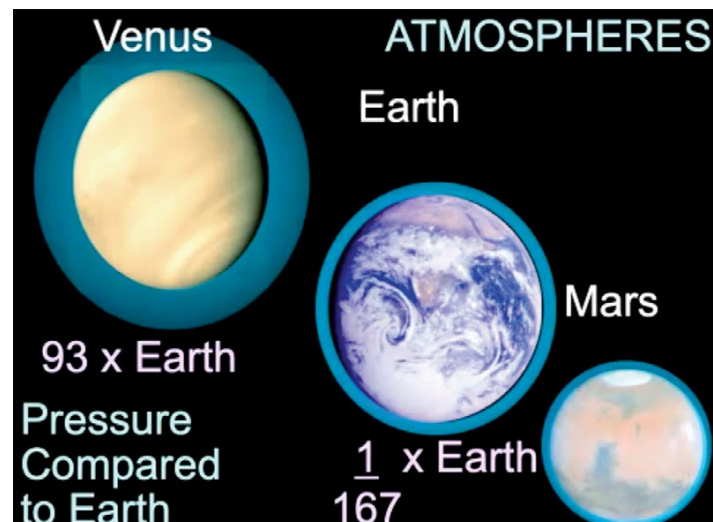
With Juno we have a really good infrared camera, can see the hundreds of hot spots all over the surface, glowing in the infrared



Detailed views of lava flows; can see material spewing off the surface



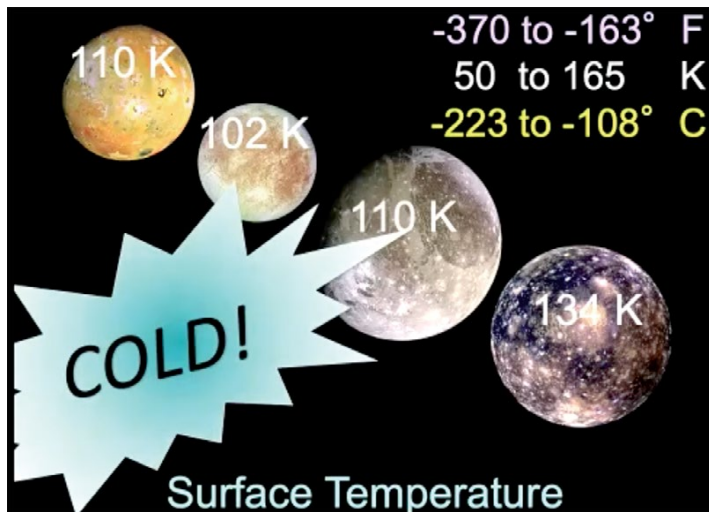
Juno- JIRAM Dec 14 2022 & Mar 1 2023 Can see a lot of activity happening; comes and goes



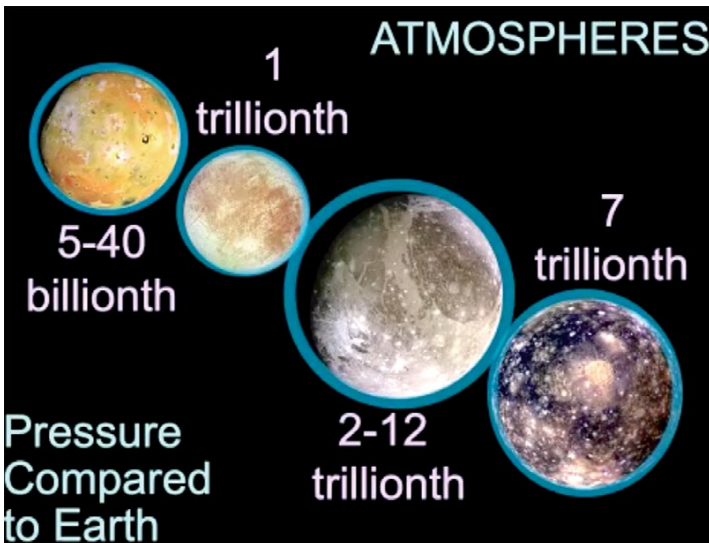
Atmospheres – Compare Earth, Venus & Mars; very different atmospheres, very thick atmosphere on Venus;

why our neighbors are different from us remains a big question

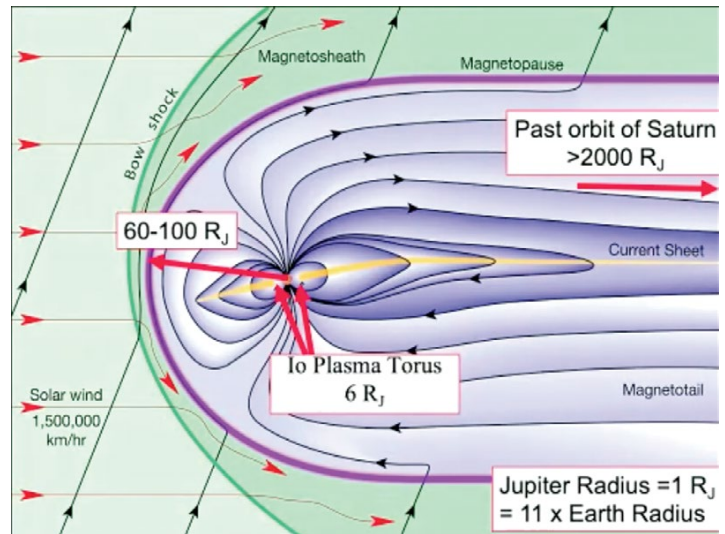
Pressure – Venus & Mars compared to Earth



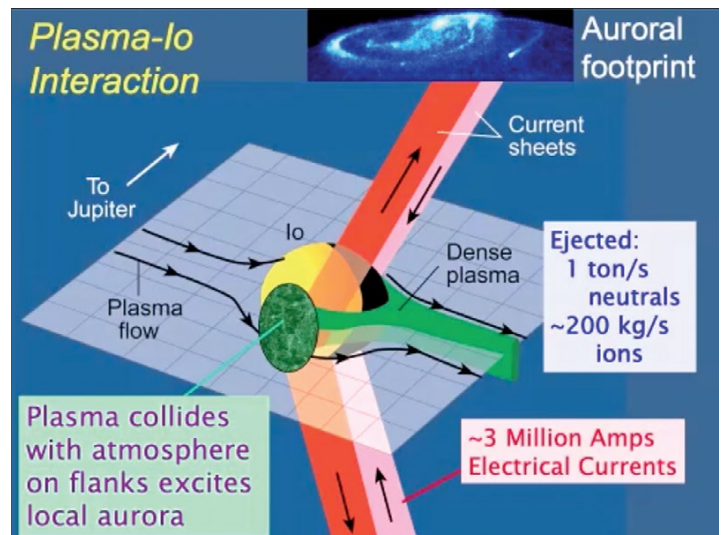
Moon are smaller, much less gravity to hold the gas in and also very cold, very low pressures



Pressure of Jupiter's Moons compared to Earth; atmospheres all very tenuous

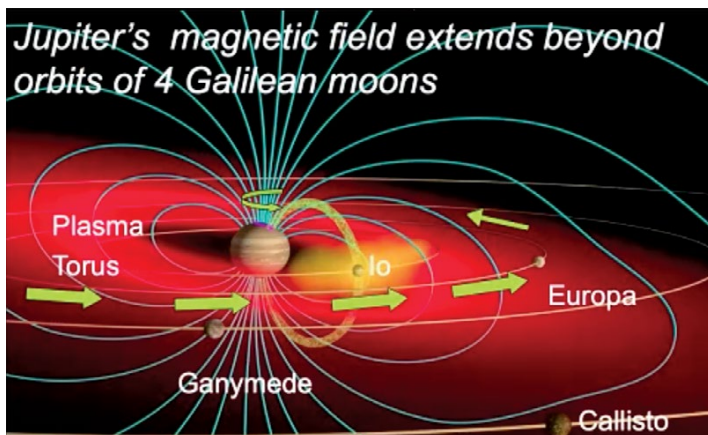


Moons sit in volume way down stream out past the orbit of Saturn – a vast magnetosphere

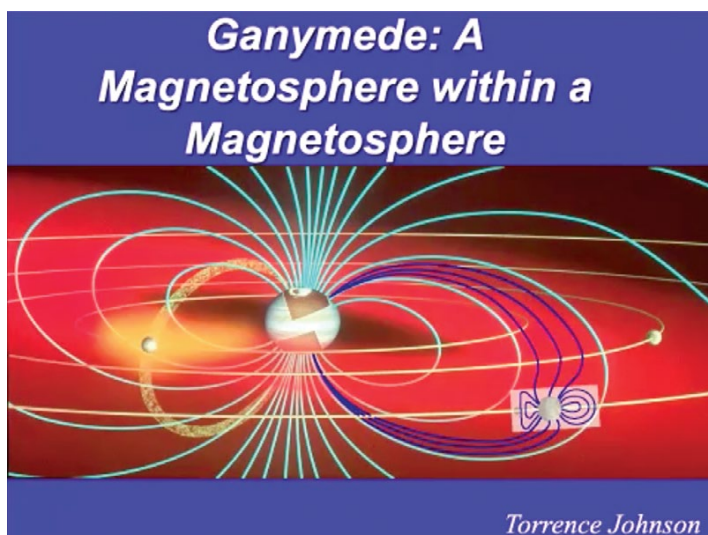


The moons are sitting in this plasma trapped in Jupiter's magnetic field, plasma flows around electrical forces around the magnetic field, when electrons hit planet produce an aurora

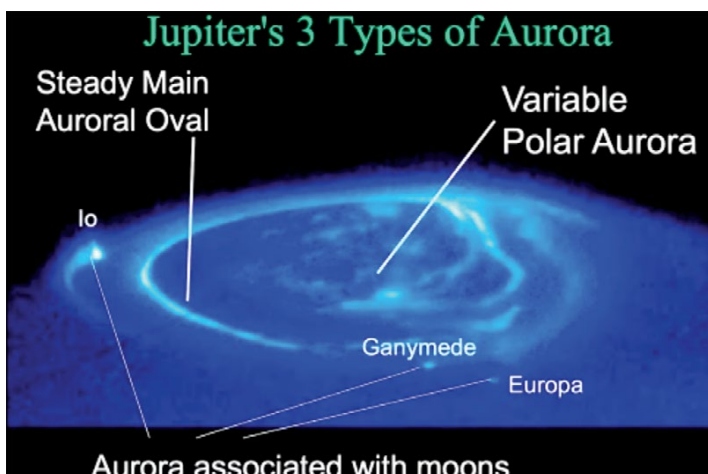
- Plasma collides with atmosphere on flanks excites local aurora



- Moons within Jupiter's magnetic field; field extends beyond orbits of the moons
- Io ejects 1 ton/second volcanic gas – million amp currents couples Io to Jupiter
- Electrical current couple to moons to the planet

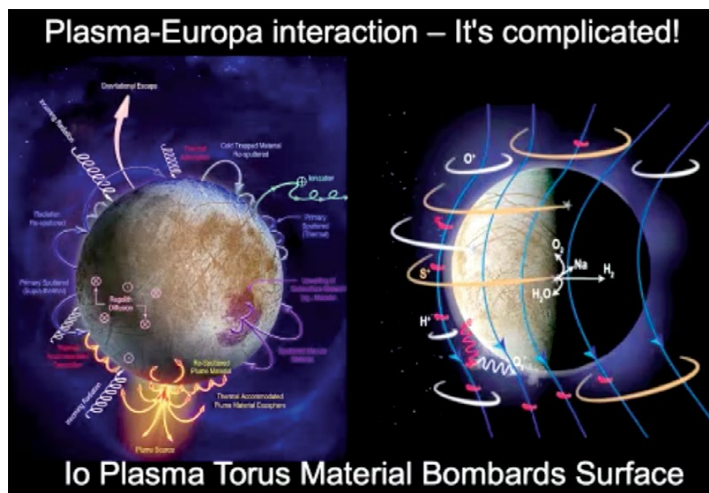


Because Ganymede has its own magnetic field we have a magnetosphere within a magnetosphere - couples to Jupiter, creates aurora

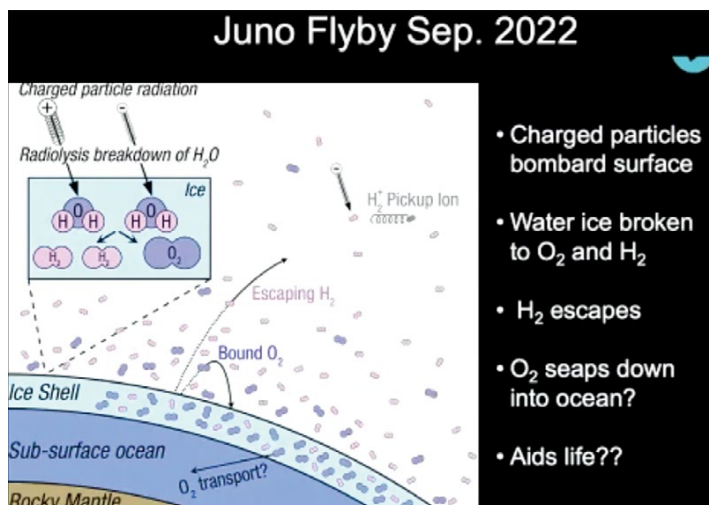


Jupiter's three types of aurora. Can see the variable aurora in the polar regions inside Jupiter's orbit, but looking

closely can see spots associated with Io, Europa and Ganymede, a way to observe from Hubble from Earth



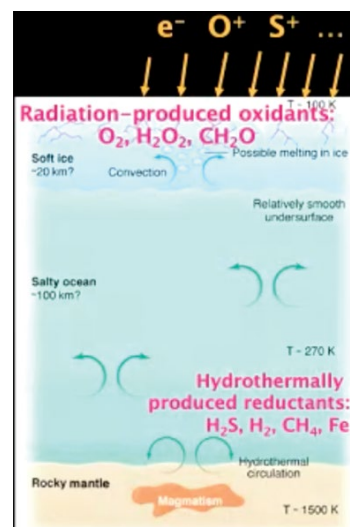
Looking at interaction of Plasma-Europa is complicated! Io plasma Torus material bombards surface, water ice bombarded causing material to come off, electrical currents associated with



Juno Flyby Sept. 2022 provided further information

Does the ocean on Europa have the ingredients for life? Speculative but quite plausible..

- Salty warm ocean
- Ingredients from ocean floor volcanism
- Oxidants from above
- Time..

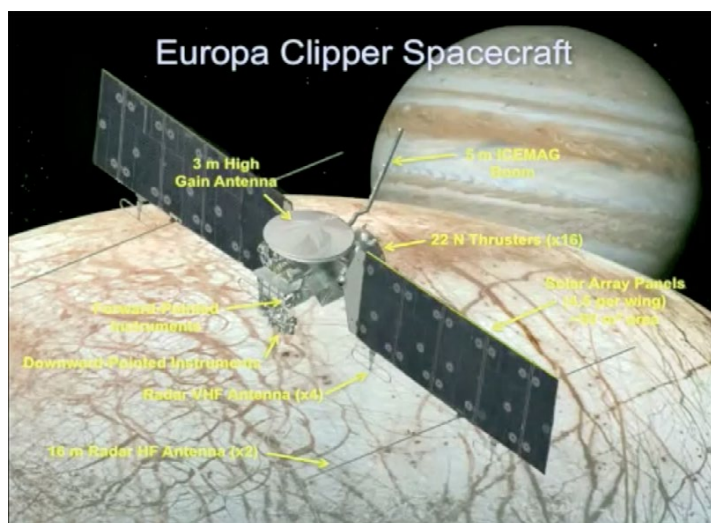




Major goals of Europa's Clipper Mission 2030-2034

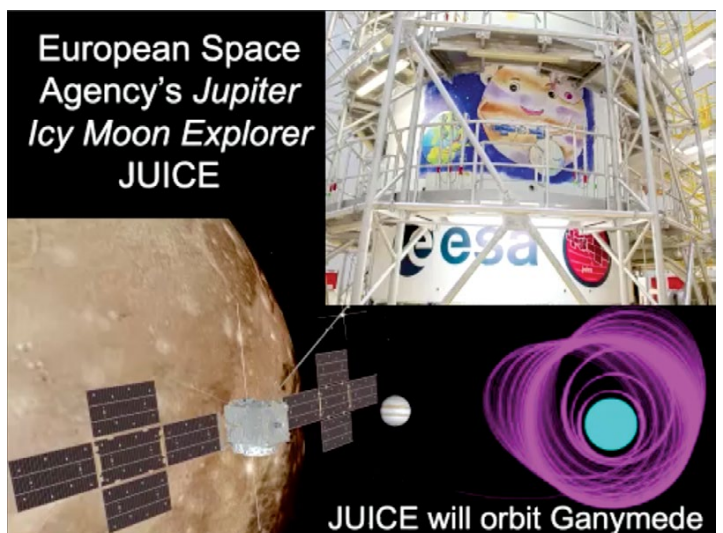
- Launched Oct. 2024 - Fifty close flyby passes – Can we deduce from the surface what is underneath? What is brown gunk? How thick is the ice? Does water reach the surface? What is in the water?

- Dust Detector Instrument came from CU LASP
- When it flies by Europa if there is a plume it will measure the composition, has done this already on Saturn with the CU instrument on Cassini Mission
- Will explore how atmosphere and surface interact



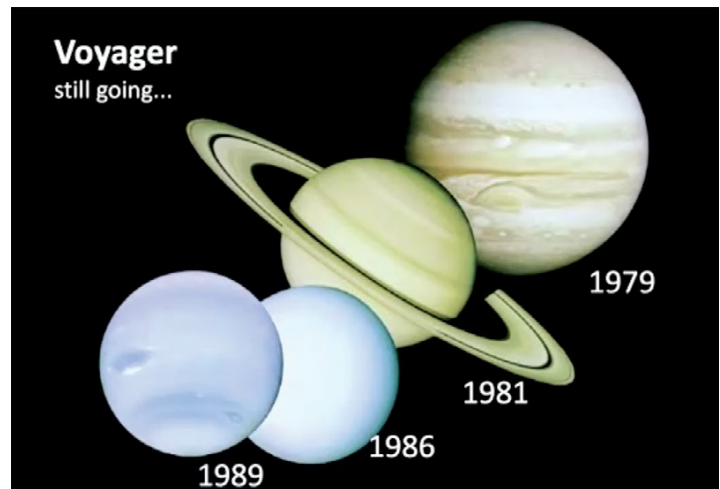
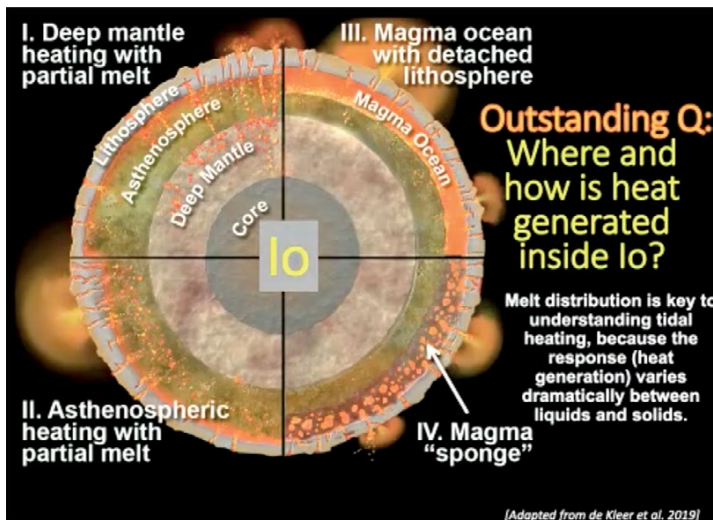
Europa's Clipper Spacecraft

- Powered by solar power
- Has antenna that communicates with Earth
- Magnetometer, radar instruments, bounce signals off the ice
- Will measure some of the structure of the ice, plasma interaction
- Cameras will look at surface to look for structure of ice thickness
- Look for places for landers but first need surface mapping



Another Mission on its way is the ESA's JUICE Mission (Jupiter Icy Moon Explorer)

- JUICE will orbit Ganymede, also solar paneled
- Will look at geology, internal structure surface, geologically active but not as much as Io
- Launched in 2023 will start orbiting Jupiter in 2031; start orbiting Ganymede 2034
- Overlap between NASA's Clippers mission and ESA's JUICE mission – hope to collaborate



Understanding Io – Most dynamic moon in our solar system: How and where is heat generated?

- Deep mantle heating with partial melt
- Asthenospheric heating with partial melt
- Magma ocean with detached lithosphere
- Magma “sponge”

Reminder Voyagers Mission 50 years and Still Going – Fiske Planetarium Nov. 5th, 6th

Fran will be giving a talk at Fiske Planetarium on November 5 & 6 about Voyager 1. Celebrating 50 years since launch of Voyager 1 next year. On November 18th Voyager 1 will be exactly 1 light day away! We are using that as an opportunity to review what we have learned from Voyager so this will be a very interesting talk.

Also Fran has been working with Liberty Puzzles to create puzzles of planets, they make a nice size round ones and bigger ones for the Europa mission: such as clouds of Europa for example, these are not artsy they are based on science..... These are only available at the website.

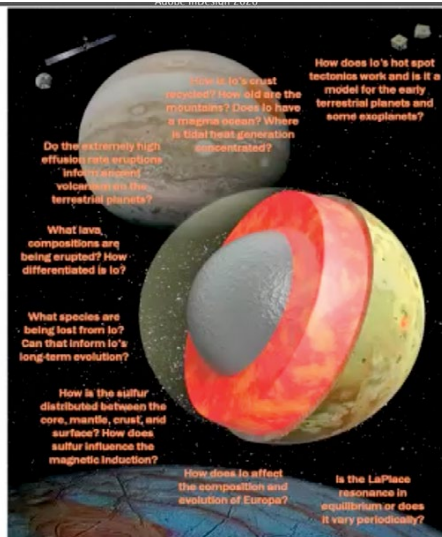
https://lasp.colorado.edu/home/mop/home/people/fran_bagenal

https://www.imdb.com/name/nm3293128/bio?ref=nm_ov_bio_sm

Io mission???

Orbiter??

How long will we have to wait...???



Scientists and researcher want to go to Io but difficult place to get to: nasty environment, strong radiation, closer to Jupiter, harder to get into, NASA has not decided yet to go

Questions??

- * So Europa has iron in its core? Water? Is there rust?
- * Where do we think these moons came from?
- * Why is Io so sulfuric compared to the others?
- * How does Ganymede's magnetic field compared to Earth?
- * Recent research shows Mars has lost its atmosphere because it lost its magnetic field, why does Venus still have theirs with no magnetic field?
- * Why have there been no missions to Venus
- * What if we were to shade Venus?
- * I don't remember what moon it was but does loose material loss we saw come back?
- * Is Venus cooler on the dark side than on the light side?
- * There has been a lot of hype with exoplanet research, while we really know very little about our own planet what is the relationship between those two pools of people who study this?

III. Business Meeting



Longmont Astronomical Society

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

LAS Treasurer's Report - Bruce Lamoreaux

9/17/2026

<u>Main Checking Account</u>	(xxx-1587)	(x8379)
Begin Balance:	\$ 4,220.00	8/1/2026
Deposits:	\$ 25.00	Membership
Expenses:	\$ -	
Current Balance:	\$ 4,245.00	8/20/2026

<u>2-Year Savings Account</u>	(xxx-1478) (matures 10/23/25)	(x7771)
Past Balance:	\$ 8,355.00	8/1/2026
Interest:	\$ -	
Balance:	\$ 8,355.00	8/20/2026

<u>Telescope Fund</u>	(xxx-0165)	(x2469)
Past Balance:	\$ 1,090.00	8/1/2026
Deposits:	\$ -	
Expenses:	\$ -	
Balance	\$ 1,090.00	8/20/2026

Petty Cash

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

<u>Total Assets</u>	\$ 13,740.00	\$25.00 Up from August
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Active Membership:	113
Student Membership:	0
Total	113 Active

Business Meeting Continued

- Account at PNC (Formally First Bank) – Moving funds from Telescope Funds to another account? First Bank has changed to PNC they have marked our account as inactive. Motion moved to move the telescope fund into checking account. Was approved.
- Yearly Calendar- 2027 Calendar coming up- discussion on number to order and price.
We will order 75-100 and they will be \$10.00. Deadline for getting in photos you wish to submit to Vern by email by Oct. 10 those interested will meet at Vern's and select calendar images.
- Nominations in November – We will have nominations for officers at November meeting, if interested volunteer to be a club officer in 2027. Vern will send out an email before November describing the responsibilities of each position
- Celebration Plans for 40th Anniversary - Next year is LAS's 40th Anniversary and we want to start thinking about what we want to do. Some ideas: 40 year yearbook; notify the Astronomical League of our coming Anniversary; can draw on articles in our 40 year "Archives" that have been digitized and preserved by Vern. Will be thinking more about ideas and planning at next two meetings.

IV. Upcoming Events by Aref Nammari

October Schedule:

- Rabbit Mountain on 10/9/26 event start at 5:00 pm
- Beech Shelter (the last event for the year at this location) on 10/14/26 from 6:30 to 9:30 pm.

Great News: We will now continue the Rabbit Mountain program throughout the year!

In November we will have two special events:

- Longmont Library and Erie Elementary School events. Aref will send out more information
- October will be the last star party at Beech Shelter for the year, but will continue throughout the year at Rabbit Mountain Star Parties – something new for us!

In the early morning of October 6, try this challenge:

View through a very low power telescope

**Moon occults Jupiter for the eastern US.
For the rest of us, it lies very close to Jupiter**

On the morning of October 6, the moon appears very close to Jupiter.

For those in the eastern half of the US, the planet and its Galilean satellites fully emerge from occultation after 5:00 a.m. The exact time depends on observing location.

Those in the western US see Jupiter immediately next to the dark edge of the crescent moon.

About 5:35 a.m. EDT, Ganymede's shadow begins transiting the planet. It lasts until 9:15 a.m. EDT. Its exit can be seen by west coast telescope users.

And Mars can be found approaching the Beehive star cluster.

**View low in the east on October 6
2 hours before sunrise**



North America Nebula by Martin Butley

When I first started taking pictures with my telescope I will always remember the image of the North American Nebula that MJ posted. I was so impressed by the incredible star field - it was (is) an inspirational image for me. I finally decided to try imaging it myself - in true color at Starry Meadows last Thursday.

This is with my Takahashi 130 FSQ and a ZWO 6200 monochrome camera

All 5 min subs

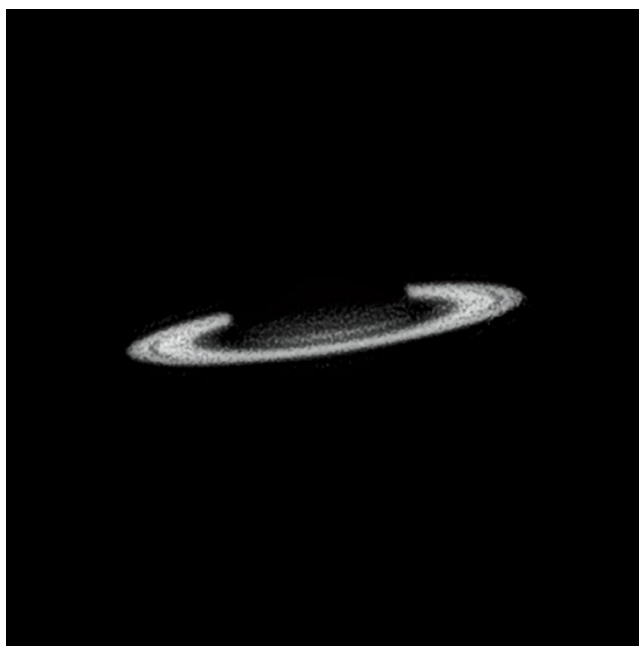
R x 18, G x 22, B x 18. L x 31 7.4 hours at f/5

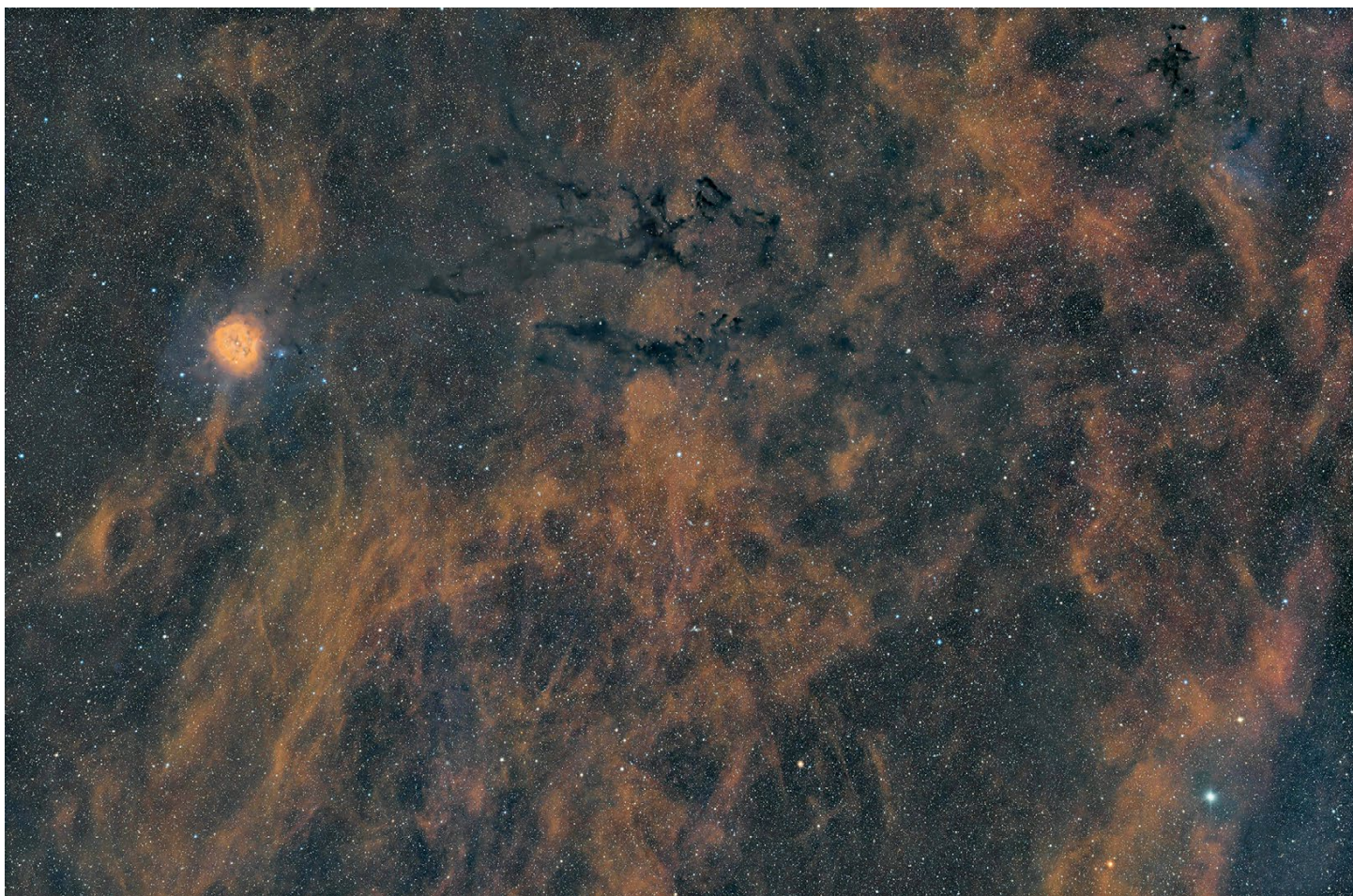
Marty



Saturn by London Crosby

Saturn early this morning as I did some testing with different camera sensors on the 9.25. Really happy with the detail I started to get with the methane band.

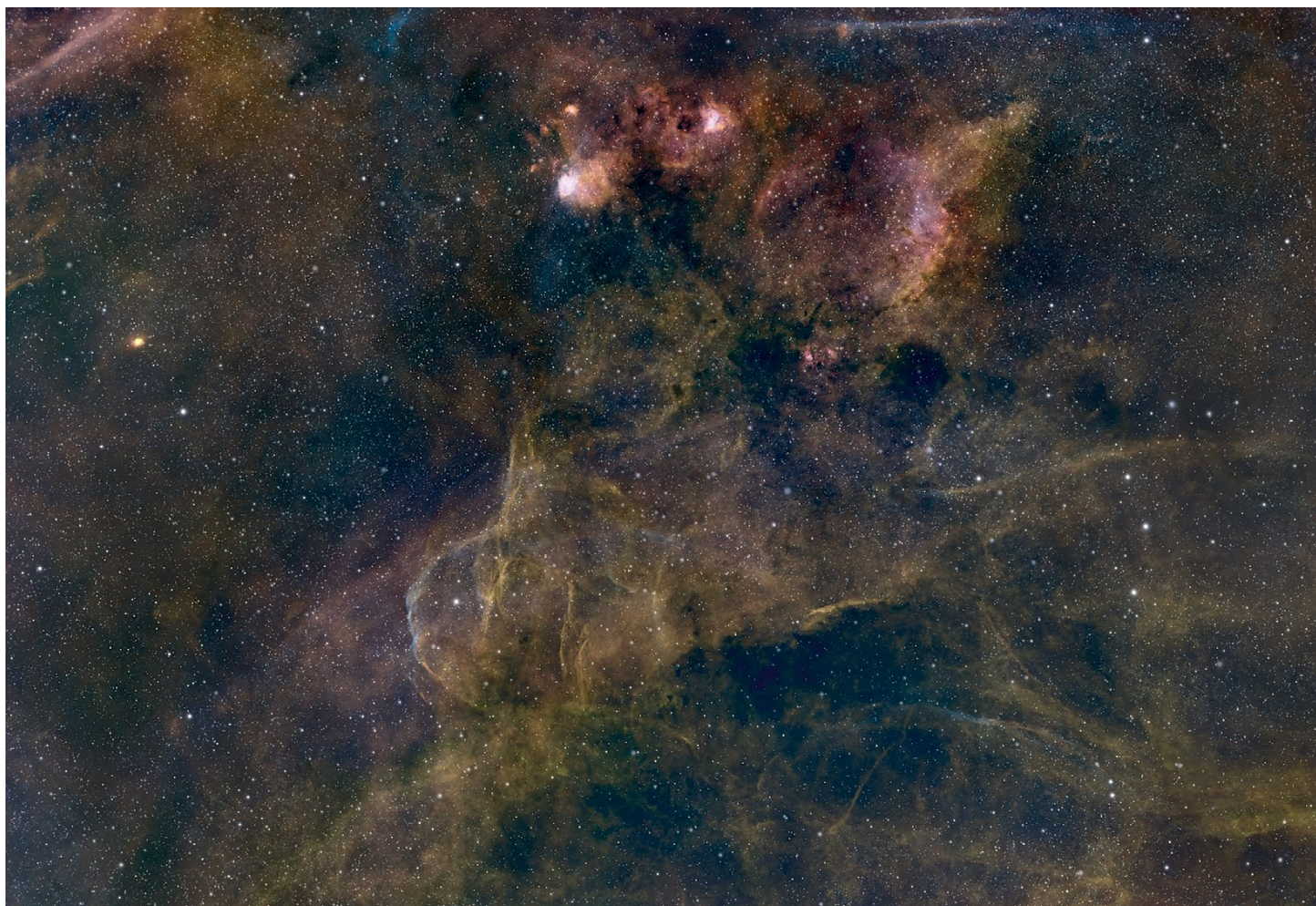




Cocoon Nebula and mystery nebula by David Elmore

The Cocoon Nebula is a star forming region in Cygnus. Next to the nebula is a trail dark molecular gas. Near the nebula some of the gas is illuminated by new stars being formed in the Cocoon. A project of mine is to photograph wide field images of all the objects in the Sharpless catalog in narrowband, this $5^\circ \times 3^\circ$ field includes the Cocoon, Sh2-125. The molecular clouds near Sh2-125 show up better in broadband RGB imagery but narrowband is interesting as well though perhaps not as nicely colored. Filters used were H-alpha shown as red, Oxygen III as cyan and Sulfur II as yellow and reveal features not seen in RGB. Images of mine have been involved in the discovery of 16 previously unidentified nebulae in the Milky Way. One potential new candidate appears as a ring of H-alpha emission filled with OIII. Below is a close up of the H-alpha alone in monochrome. This unidentified potential planetary nebula is only 2 arc-minutes across, tiny in this field of view. Can you find it?

H-alpha 6h20m, OIII 6h50m, SII 5h10m, Borg107, ASI 6200MM Pro, iOptron CEM70 mount
From Cosmos Siding, my little observatory at Dark Sky New Mexico.



LBN 159, Modified HOS by Stephen Garretson

I finally had the chance to grab some SII data for this project; posted the HOO version a bit ago.

- [24] 600s guided Ha subs
- [12] 600s guided OIII subs
- [18] 600s guided SII subs
- Total integration: 9 hours

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

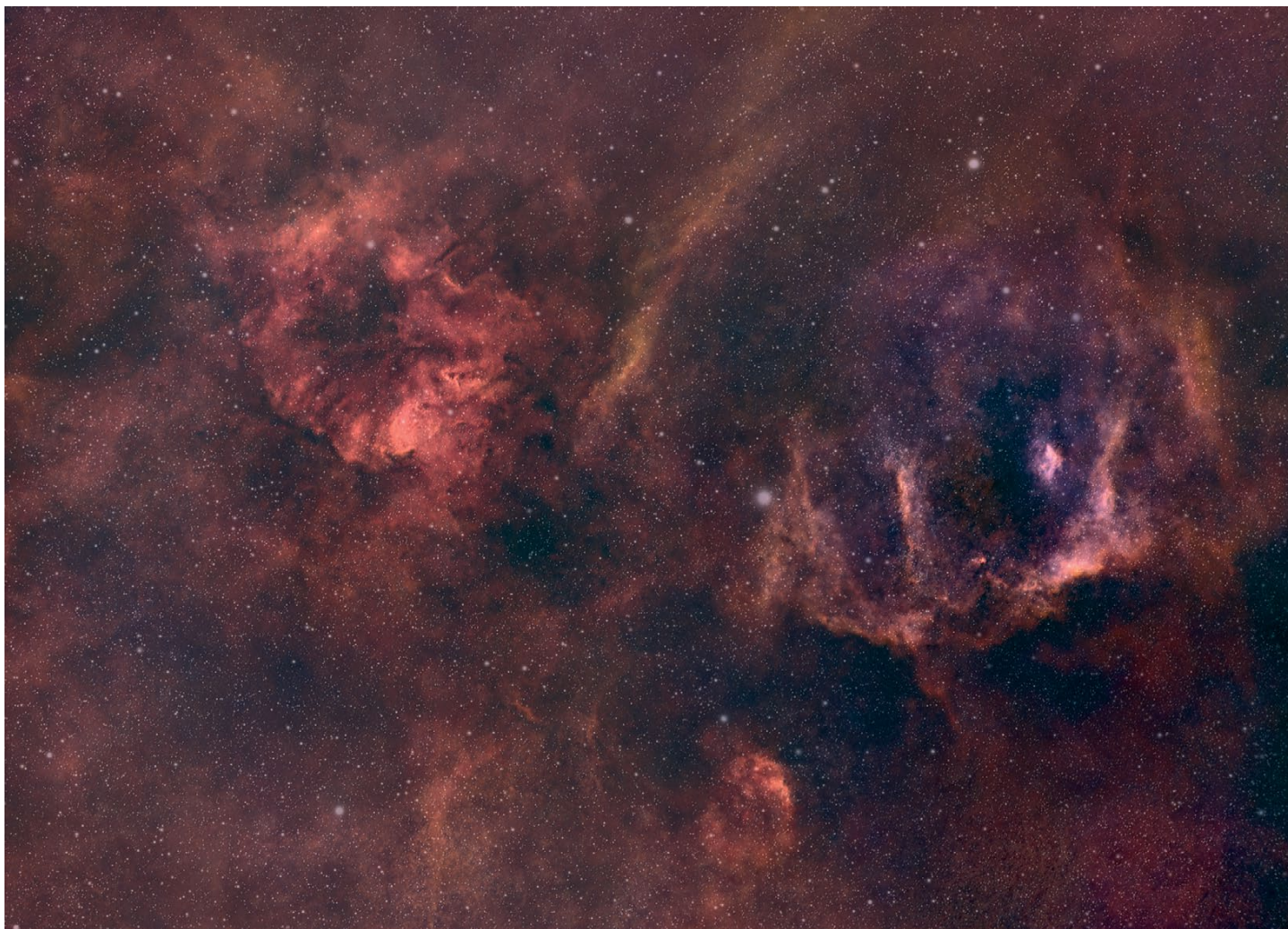
Guiding:

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

From the Beevo Dome

- TheSkyX, SGP, PHD2
- PixInsight, MacOS Photo, Preview

...Stephen



SH2-98 & 2 SNRs, Modified HOS by Stephen Garretson

This has been a problematic project. This FOV is between Sadr and Albireo in Cygnus. As with much of Cygnus, there is a dense "fog" of stars. And as often happens, the initial Ha data showed great promise if the stars were significantly limited. OIII was elusive, even for an SNR. As with the LBN 159 project, weather and the Moon delayed gathering SII data, and processing it was also challenging.

This FOV is ~70% of the 132/2600 field. Sh2-98 is on the left; SNR G067.6+00.9 is on the right; SNR G067.8+00.5 is the smaller object below the left side of the other SNR.

- [42] 600s guided Ha subs
- [18] 600s guided OIII subs
- [18] 600s guided SII subs

Total integration: 13 hours

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



SNR G 66.6 -00.0, Modified HOS by Stephen Garretson

Alberio and Sadr lie on a line running roughly southwest to northeast. Fun stuff along that general line includes a couple I have imaged and posted recently: LBN 159, Sh2-98 Area. But there's this little [respectively] faint and apparently not often imaged SNR; that's this object, obviously upper left. I have not yet identified the bright smudge right center, and the HII area just below that was not named in the image I used as a reference that got me to this area in the first place [not my shot]. Processing was a long haul; the stars were particularly troublesome, and in this area of Cygnus quite abundant. I finally had to just stop. Stars are modified from SHO; starless was from NBCM with Ha as Reddish/Orange, OIII as Teal, SII as yellow.

- [16] 600s guided Ha subs
- [11] 600s guided OIII subs
- [12] 600s guided SII subs

Total integration: 6 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

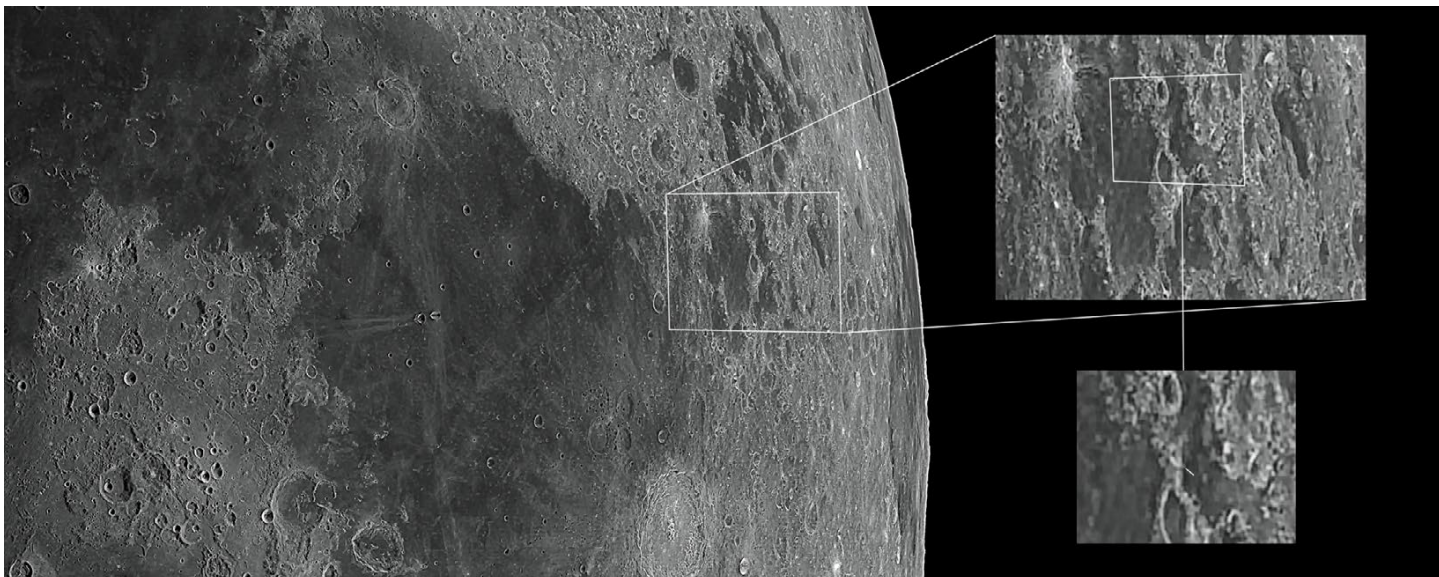


Adler Planetarium by Eddie Hunnell

Here in Chicago for work. Oldest planetarium in the western hemisphere and its observatory.

Eddie





McGetchin crater by Brian Kimball

Officially named McGetchin after pioneering lunar scientist Tom McGetchin, the crater formed on the Moon's eastern edge sometime between April 11 and May 22, 2024, after a comet or asteroid the size of a three- to six-story building hit the surface.

The crash left a crater, 728 feet wide, that spans the length of two football fields. And at 141 feet deep, the crater could fit three vertically stacked yellow school buses.

Scientists estimate that an impact of this magnitude happens on the Moon about once in a century or even longer.

This information was taken from science.nasa.gov

Here is an image I took back in March that might show the crater.

Thanks for looking, and thanks to Steve Albers for pointing this out at the meeting.

Brian Kimball



**AR 4535 on September 21
by Brian Kimball**



IC 5146 (Cocoon Nebula) by Aref Nammari

IC 5146 (Cocoon Nebula) in Cygnus. 781 subs 10 sec. each taken with Seestar S50 processed in Seti Astro Suite Pro. Taken over two nights during the last two star parties at the Colorado Therapeutic Riding and Beech shelter.



SH 2-119 by Tally O'Donnell

This is an HOO image of Sh2-119 in Cygnus and is 2 hours each of Ha and OIII. This one is rather faint and would benefit from more time on the object, but alas the monsoon is not cooperating.

Tally



A grand design spiral - Eye of God Galaxy by Jim Pollock

Hi all,

This is a quite lovely face-on galaxy. It is considered to be “nearly” a grand design spiral albeit with a few slightly bent arms. The bent arms are thought to have been caused by a long-ago dwarf galaxy that merged and dissipated within NGC 1232. The bent arms got it designated as a “peculiar galaxy” and listed as Arp41;

The cute little galaxy on the upper side, NGC 1232A appears to be a satellite companion galaxy, but it’s not. It is quite a few million light years further away with different red shifts. Still pretty darn cute.

Love this galaxy!

This image: 61 frames of 5-min for 5 hours exposure with 9.25” EdgeHD at $f/7$ into a ZWO 2600mc duo color camera.

Always amazed,

Jim



Shrimp on the (Cassiopeia) Barbie by Jim Pollock

Hey All,

That hot supernova in NGC7331 got me thinking it's time for shrimp on the barbie. So naturally, that means a shot of SH2-188, the Shrimp Nebula. 188 is actually a planetary nebula, although with my setup, I didn't net any blue oxygen that some images reveal. It is also THE most asymmetric planetary known. It has some nice bow waves as it is moving fast through our galaxy.

This image: 80 frames at 5-mins, for 6.7 hours at $f/7$ on the 9.25" EdgeHD into my ZWO 2600mc duo color camera.

Always amazed,



Abell 56 Planetary Nebula by M. J. Post

This ring-shaped planetary in Aquila is relatively large (3 arc min diameter). Strangely, I could not detect a central star. It glows almost entirely in H-alpha (red) and has only a barely-perceptible signature in OIII (teal). So if one combines the actual signal levels before stretching to make an HOO image, no teal appears.

However, several notable planetary imagers on Astrobin have posted images of this target showing a central core of blue, and that makes for a much more pleasing image. So I have followed suit here, first greatly stretching the OIII image before combining it with the less-stretched H-alpha image, both in their non-linear stages.

RASA11 telescope, 2.5 hours H-alpha filter, 3.0 hours OIII filter, RGB stars from CDK14 telescope and its OSC camera (9 minutes). DSNM. FOV is about 27 x 18 arc minutes.

M.J. Post

LAS Archives for October 1996, 2006, and 2016

by Eileen Hall-McKim

LAS Archives Oct. 96'06'16'

30 Years Ago – 1996

The View From Up Here – Bob Spohn, President

Trick or Treat:: As I write this I am looking forward to clear skies and a large turnout for the October star party at Pawnee this weekend. That's the kind of treat that won't rot your teeth? After the early winter scare a couple of weeks ago, the weather has been great - hope it hangs in there through the weekend.

20 Years Ago – 2006

Hello Astronomers and friends, We have had quite a good month for viewing, despite the mostly cloudy nights, we did manage to get a few good nights in. The Greeley star party at Crow valley Sept 23rd was cancelled because of poor weather outlook. Some of the diehards showed up anyway, about 7 of us but most bugged out because of clouds, I thanked Bill Possel and others for coming, and told them it would clear as soon as they left, so I thanked them for going. Darn, it did clear at 11 PM and we stayed up till 4:30 am. We chased as many photons as we could. Pam Wheaton, old astronomy friend showed up Saturday and we did so many objects, I did not keep a count. She sure lucked out for such a good night. I was hoping to use Crow Valley more in winter months, let's see what happens. I like the place for star gazing but do not like the car lights and campers at times. Compromise sometimes, most go to bed early and then from 11 on it's usually good and dark then.

The following weekend we went to Crow Valley again, moon went down at 10:50 PM Friday night and 11:50 PM Saturday night which left us lots of good viewing hours in the darkness of the grasslands. Galaxies pop out at you there, nebula show more contrast and hue. Globulars leave you seeing spots like looking at the moon, so bright in 30 scope.

This Month's Field Trip - the Kansas Cosmosphere in Hutchinson, Kansas. This is in my personal list as the best unknown space museum in the United States. In 2004-5, I was collecting visits to the Apollo capsules, and the Cosmosphere has the Apollo 13. At that time, their website was really bad, so when I went online, there was very little information. I thought "blow in, take the picture, leave" would be a good description on my mission plan, but I wound up ruining the schedule with a 4 hour visit

When you enter the museum, you face a half a shuttle on one wall and a SR-71 Blackbird inverted over your head. Then the minor attractions: they have a lunar lander mockup, a lunar instrument, the Apollo 13 capsule, Apollo suits, Glamorous Glennis replica (Chuck Yeager broke the sound barrier – the original's in the Smithsonian Air and Space museum), a rocket sled that they developed the g-suit with (and a movie of a test). The prize of the whole collection is a Russian Soyuz – the only one in America – so if that's on your list, it's off to Kansas.

Outside the museum, there's a couple of rockets and engines to take your picture with. The museum store is pretty decent. Warning: the museum isn't easy to find and there aren't very many signs around, so come equipped with an online map from Yahoo or Mapquest.

On the way to Hutchinson, stop at the Sternberg Natural History Museum beside I-70 in Hays, Kansas. They have the famous "fish inside a fish" fossil – a 25 footer that had just eaten a 6 footer-mounted on one wall. Nice introduction to fossils of western Kansas, and easy to get to.

10 Years Ago – 2016

Announcements: Upcoming events this month are the Hall Ranch Star Party on Sept. 23, Louisville Public Library "Observe the Moon" night on Oct. 7, and Lyons Elementary on Oct. 10. Members should contact Vern Raben if they are interested in training at Alpine Observatory in early October.

"Before the First Photon – Planning the Shot" – By Robert Arn

Robert Arn loves creating “nightscape” photographs. He also is moderator for the Front Range Astronomical Community (FRAC). Check his website www.astroarn.com if you are interested in joining that group. Nightscape photography is about juxtaposition of the night sky with earth or earth based objects. It is very similar to landscape photography. It can have a very wide range of requirements in regards to equipment and planning. When he first started doing nightscape photography 10-12 years ago there were very few people participating.

Robert displayed some examples such as the one of the Milky Way at the end of a road in moonlight called “Unpaved Roads”. (image to the right)

A nightscape imager can use some of the light pollution that we are all trained to hate. This means that instead of going out and observing once or twice a month we can go out and collect photons 25 or 30 times a month. An example of this is the image called “Meteor Storm” (below) of the Perseids meteor shower out on Pawnee Grasslands under a light-



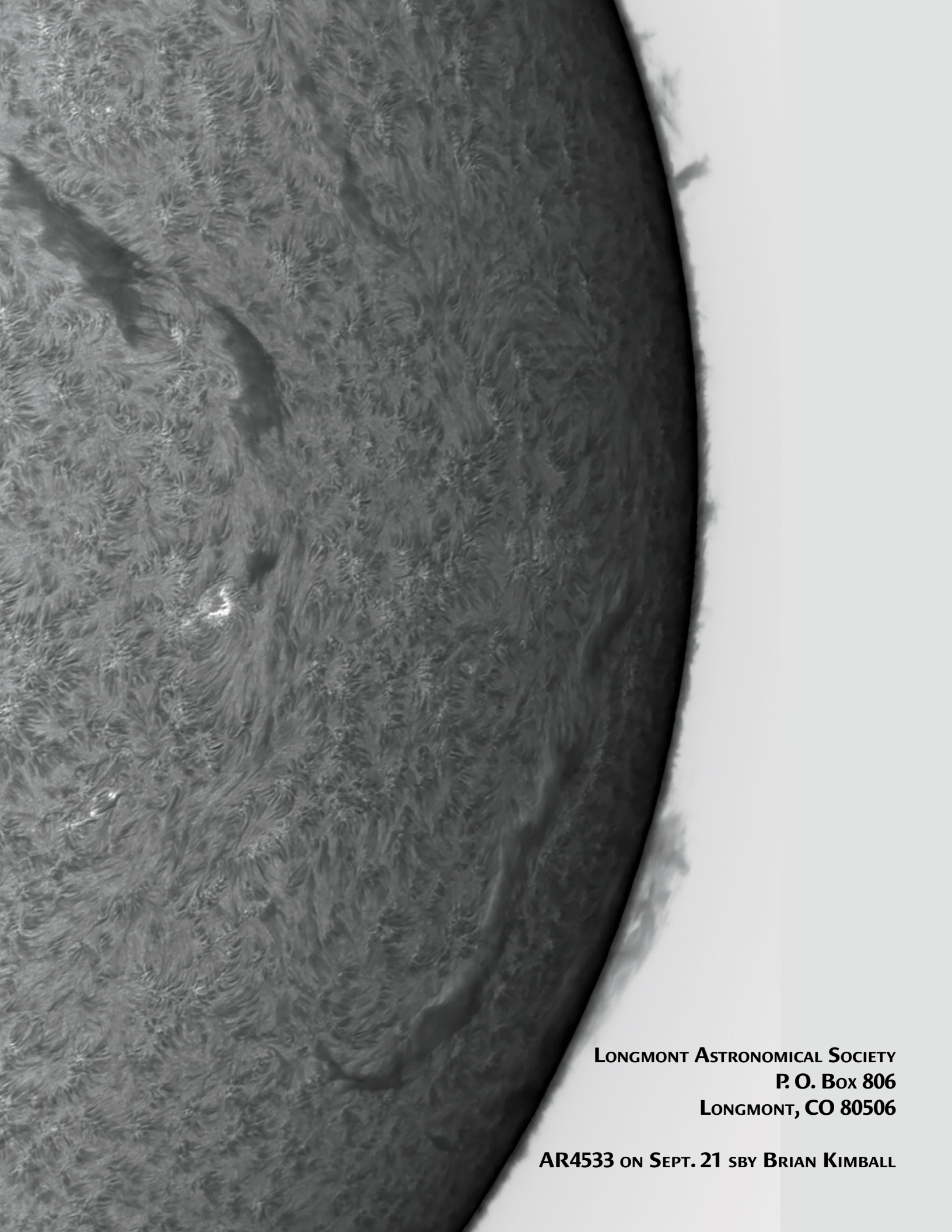
ning storm.

In planning for a shot of Devils Tower he wanted to have the Milky Way arching over Devils Tower with a nice field in front. So first he needed to find when in the year that will be a good shot at each possible location using SkySafari.

Image was done with individual shots, no tracking, with the camera on a tripod. An HDR for 20 sec was used to get semi pin point stars in the night sky. This is a very dark location but with advances in camera technology over the past 2-3 years we are now getting to a point that we can take very long exposures with very little noise even in warm conditions. Shooting during civil twilight (sun is 0° to 6° below horizon) is when people get spectacular sunset shots. Only the biggest and brightest

objects can be seen. If you wait until nautical twilight (sun is 6° to 12° below the horizon) then the brighter stars and planets pop out.





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AR4533 ON SEPT. 21 SBY BRIAN KIMBALL