Longmont Astronomical Society

January 2025

LBN 903
by M. J. Post

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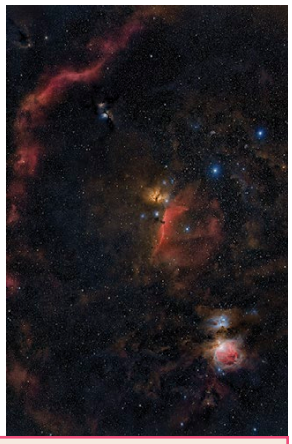
Next LAS Meeting Thursday January 16

The first LAS meeting this year will be at Pinocchio's Incredible Italian, 210 Ken Pratt Blvd., Ste. 260, Longmont, CO 80501 on January 16 starting at 6 pm. We have had annual banquets for many years but that tradition was interrupted by covid. This is a social occasion; there will not be a speaker and it will not be available online. We will have a quick election of officers; see the current candidates who have volunteered at the bottom of the next page. You may of course volunteer for any position whether or not there is a current candidate.

This is not a buffet style meal; you just order from the menu and pay for your own. See Pinocchio's menu at https://www.pinocchioslongmont.com/menu . A 20% gratuity is required as we have an area reserved. Note that there are lots of choices, the prices are reasonable and the food is great (in my opinion). I must tell them how many people are coming. Send an email to vern@raben.com and **let me how many people will be in your group no later than noon on Monday, January 13**. I'll try to have badges for everyone so please list the name of each person in your group.

Front Cover: LBN 903 by M. J. Post. This area is just west of the Cone Nebula and Christmas Tree cluster. I came upon it by mistake, shooting for LBN 902 but mis-typing 903 instead. It doesn't fit into one frame of the CDK14 scope so I took two frames, one high and one low. This project went quickly for a mosaic - just two nights including acquisition and processing. That's a rare joy when mostly we trip on something between start and finish! Three hours acquisition time for each panel from DSNM. There are many cataloged objects in this image: LBN 903 and 904; LDN 901, 1605, 1609; IC 446, 447, 448, 2169; NGC 2245, 2247; vdB 77,78, 79. (Note by M. J.)



Back Cover: Heart of Orion by Rolando Garcia. Here's a very wide FOV image of the "heart of Orion". This was taken a couple years ago with a Sigma Art 105 mm f/1.4 lens. No filters since I have no way to attach them—just the lens on my Nikon D5600. Total exposure was just 1/2 hour worth of 30 sec subs at ISO 200. I never liked the original result because of gradients that were hard to remove and somewhat bloated stars.
However, with the magic of PI 1.9 (including BlurXterminator, SpectrophotometricColorCalibration and the new MultiscaleGradient Correction tool) it is possible to make a somewhat silky purse from the sow's ear. Included in the ~ 8° x 12° FOV from upper right to lower left are M42, IC434 (Horsehead), NGC2024 (Flame), M78, and Sh2-276 (Barnard's Loop). I wish there were more patches of the sky with such a photogenic set of bright DSOs. (Note by Rolando)

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 Sarah Davis. 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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Exec Candidates for 2025
President: Vern Raben
Vice President: Open
Secretary: Eileen Hall-McKim
Treasurer: Bruce Lamareux

Board Candidates for 2025
David Elmore, Gary Garzone, Mike Hotka, and Tally O'Donnell

Appointed Positions for 2025
Webmaster: Mike Hotka
Library Telescope Coord: Bruce Lamoreaux
Pubic Outreach Coord.: Aref Nammari
Newsletter Ed: Vern Raben and Eileen Hall-McKim

Planets in January

Mercury

Mercury is visible very low in the SE before sunrise but only for the first week this month; it is magnitude -0.4 magnitude in apparent brightness and 5.7 arc sec across.

Venus

Venus is prominent in the SW after sunset. It is magnitude -4.5 in apparent brightness and the disk is 23 arc sec across.

Mars

Mars is visible in the NE a couple hours after sunset. It is magnitude -1.2 and 14 arc sec across as the month begins. Its closest approach to earth is on Jan 12 and opposition is Jan 15. It will be magnitude -1.4 in brightness and 15 arc sec across on those dates.

Jupiter

Jupiter is visible in the SSE after sunset. It is magnitude -2.8 on the first and dims to -2.6 by the end of the month. Its apparent size decreases from 47 arc sec across to 44 arc sec. The following is a list of best times to observe its Great Red Spot at mid disk this month:

- Jan 2 at 12:35 am alt 54°
- Jan 2 at 8:26 pm alt 65°
- Jan 4 at 2:13 am alt 33°
- Jan 5 at 5:56 pm alt 40°
- Jan 6 at 11:43 pm alt 59°
- Jan 7 at 7:34 pm alt 60°
- Jan 9 at 1:21 am alt 39°
- Jan 9 at 9:12 pm alt 73°
- Jan 10 at 5:04 pm alt 35°
- Jan 11 at 10:51 pm alt 64°
- Jan 12 at 6:42 pm alt 55°
- Jan 14 at 12:29 am alt 45°
- Jan 14 at 8:21 pm alt 71°
- Jan 16 at 2:08 am alt 24°
- Jan 16 at 9:59 pm alt 68°
- Jan 17 at 5:51 pm alt 49 °
- Jan 18 at 11:38 pm alt 51°
- Jan 19 at 7:29 pm alt 67°
- Jan 21 at 1:16 am alt 30°
- Jan 21 9:08 pm alt 72°
- Jan 23 at 10:46 pm alt 56°
- Jan 24 at 6:38 pm alt 63°
- Jan 26 at 12:25 am alt 36°
- Jan 26 at 8:16 pm alt 73°
- Jan 28 at 9:55 pm alt 62°
- Jan 29 at 5:47 pm alt 57
- °Jan 30 at 11:34 pm alt 42°
- Jan 31 at 7:25 pm alt 72°

Saturn

Saturn is visible in the SW after sunset in constellation Aquarius. It is magnitude 1.1 in apparent brightness and the disk is 16 arc sec across.

Uranus

Uranus is visible in the evening eastern sky in constellation Aries; It is magnitude 5.6 in brightness and the disk is 3.7 arc sec across.

Neptune

Neptune is visible in the southern sky after sunset in constellation Pisces. It is magnitude 7.9 in brightness and the disk is 2.2 arc sec across.

Lunar Phases in January

- First quarter moon at 4:58 pm on Jan 6
- Full moon on Jan 13 at 3:28 pm
- Third quarter moon on Jan 21 at 1:32 pm
- New moon on Jan 29 at 5:37 am

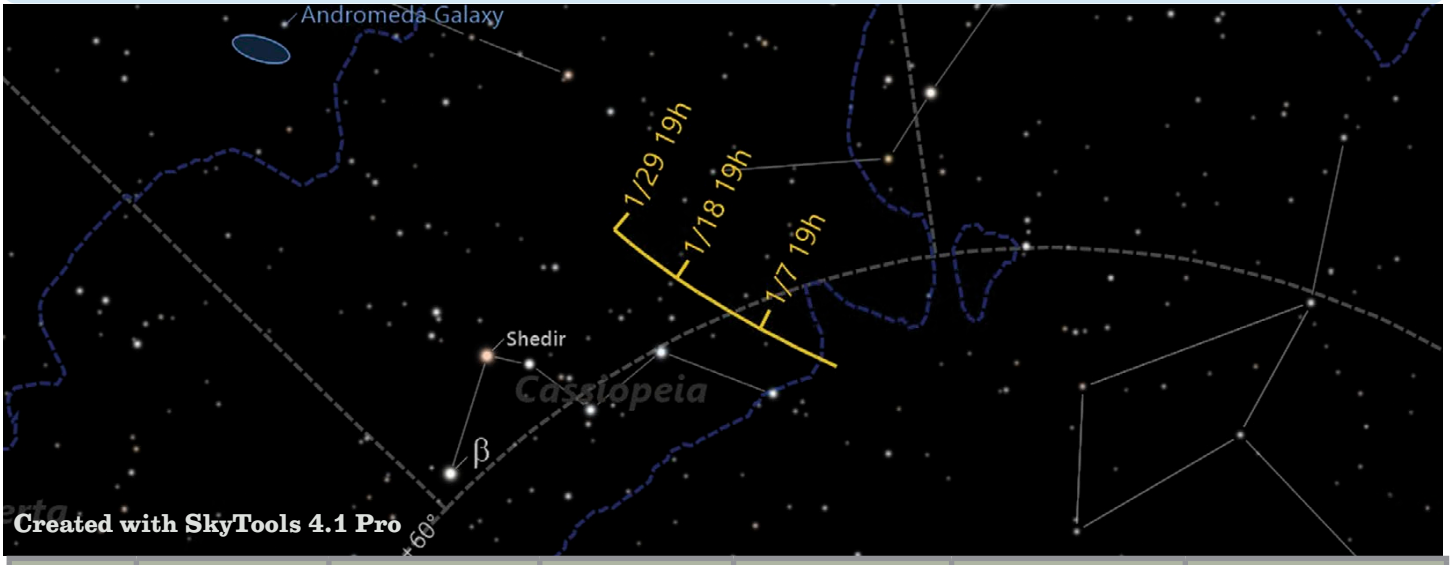
Meteor Showers in January

The Quadrantids meteor shower begins on Dec 28 through Jan 12 and peaks on the night of Jan 3 - 4. On that night the Moon is a thin crescent and it sets shortly after 9 pm; it won't interfere much at all. The Quadrantids is a major meteor shower. From a dark location you might see from 20 to 80 per hour. The Quadrantids are caused by debris from asteroid 2003 EH1 hitting the Earth's atmosphere.

Showpiece Objects in January

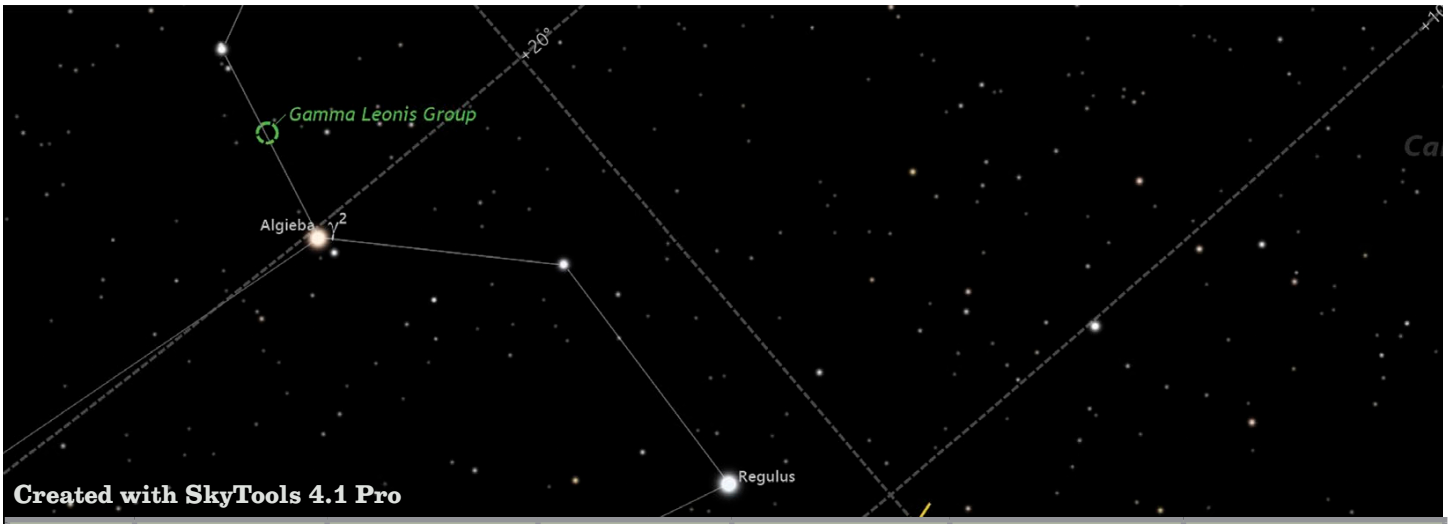
- M31, Andromeda Galaxy in And, mag 4.3
- M81, Bodes Galaxy in UMa mag 7.8
- NGC 281, Pacman Nebula in Cas, mag 7.4
- NGC 253, Sculptor Galaxy in Sct, mag 7.9
- NGC 7662, Blue Snowball in And, mag 8.6
- NGC 7635, Bubble Nebula in Cas. mag 11
- NGC 1499, California Nebula in Per mag 5
- NGC 2264, Cone Nebula in Mon
- M1, Crab Nebula in Tau mag 8.4
- NGC 2024, Flame Nebula in Ori mag 10
- IC405, Flaming Star Nebula in Aur mag 10
- B 33, Horsehead Nebula in Ori mag 16.5
- NGC 2244, NGC 2239 in Mono mag 4.7
- M101, Pinwheel Galaxy in UMa mag 8.4
- NGC 2237, Rosette Nebula in Mon mag 9
- NGC 1909, Witch Head Nebula in Eri mag 13
- NGC 1435, Cleopatra's Eye in Eri mag 9.4
- IC 418, Spirograph Nebula in Lep mag 9.6
- IC 434, LBN 954 HII region in Ori mag 11
- NGC 891, Outer Limits galaxy in And mag 10.9
- NGC 6946, spiral galaxy in Cep mag 9.8

Comet C/2022 E2 (ATLAS)



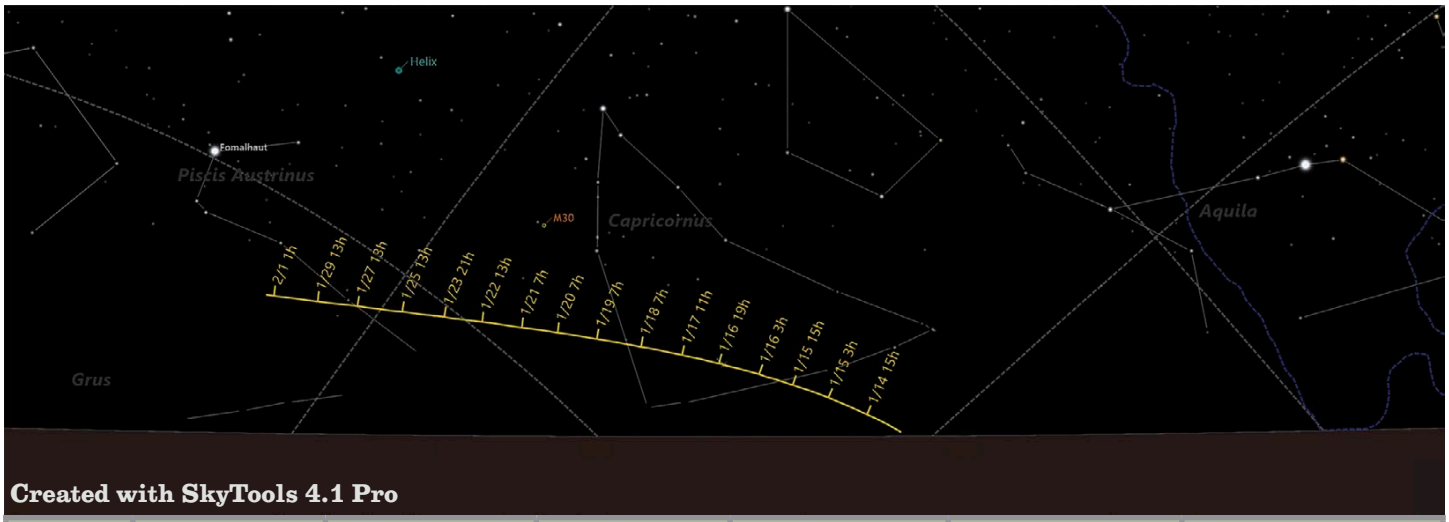
Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Jan 1	7:27 pm	02h15m09.9s	+62°58'59"	Cassiopeia	13.0	1
Jan 7	6:41 pm	02h00m28.8s	+61°10'51"	Cassiopeia	13.0	1
Jan 13	6:27 pm	01h49m20.0s	+59°24'01"	Cassiopeia	13,1	1
Jan 19	6:48 pm	01h41m02.6s	+57°41'57"	Cassiopeia	13.2	1
Jan 25	6:51 pm	01h35m04.9s	+56°07'30"	Cassiopeia	13.2	1
Jan 31	6:42 pm	01h30m57.3s	+54°41'42"	Cassiopeia	13.3	1

Comet 29P/Schwassmann-Wachmann



Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Jan 1	3:23 am	10h12m10.2s	+08°43'27	Leo	11.5	3.9
Jan 7	2:58 am	10h10m45.5s	+08C45'14"	Leo	11.5	4.0
Jan 13	none - moon	10h09m01.4	+08°48'53"	Leo	11.5	4.0
Jan 19	9:44 pm	10h07m01.9s	+08°54'08"	Leo	11.4	4.1
Jan 25	1:41 am	10h04m42.3s	+09°01'09"	Leo	11.4	4.1
Jan 31	1:16 am	10h01m47.0s	+09°10'50"	Leo	11.4	4.1

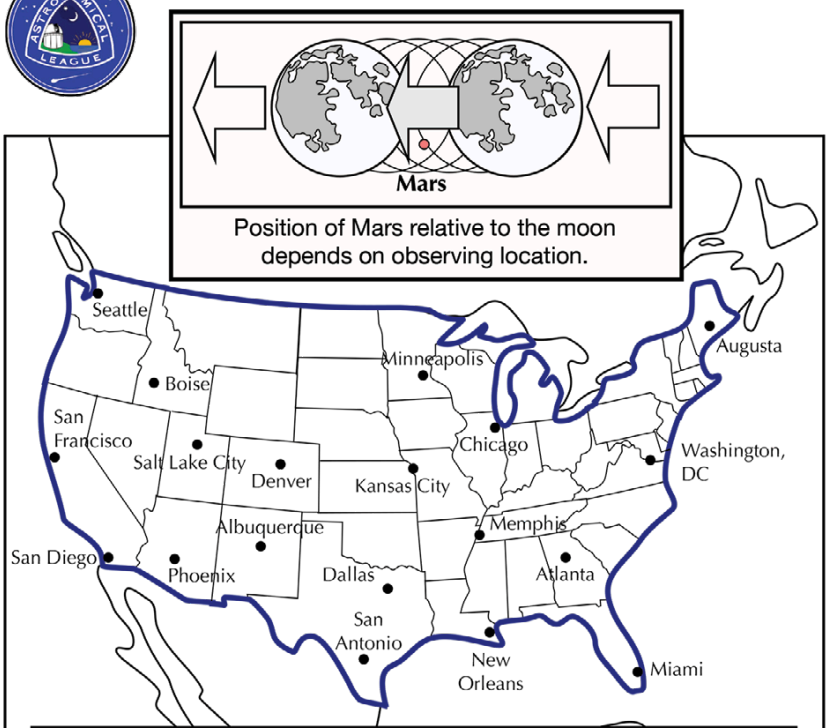
Comet C/2024 G3 (ATLAS) -- (will probably disintegrate)



Created with SkyTools 4.1 Pro

Date	Optimal time	RA	Dec	Constellation	Magnitude	Size (arc min)
Jan 3	6:54 am	17h55m57.1s	-27°23'19"	Sagitarius	3.5	1.9
Jan 7	6:50 am	18h26m17.2s	-22°44'25"	Sagitarius	1.2	2.1
Jan 13	12:13 pm	19h50m44.1s	-16°40'43"	Sagitarius	-3.5	2.5
Jan 19	5:29 pm	21h17m37.9s	-26°29'13"	Capricornus	2.2	2.1

If you can see only one celestial event this January, see this one.



Lunar occultation of Mars across the contiguous United States: Jan. 13. Extreme southern US sees Mars move behind the southern portion of the moon, and the northern US sees the planet move behind the northern portion of the moon.

Full Moon occults Bright Mars

In the evening hours of **January 13**, the brilliant full moon passes in front of bright Mars, which is near opposition. It may not be easy to spot because of the moon's bright glare!, but give it a try!

Approximate local times of disappearance and reappearance.
Begin viewing ten minutes before your estimated time. Mars' time and position of reappearance is difficult to judge since the planet lies concealed behind the moon beforehand.

City	Disappearance	Reappearance
Albuquerque	6:51 pm	7:52
Augusta	9:29	10:44
Atlanta	9:06	10:13
Boise	7:06	7:49
Boston	9:26	10:42
Chicago	8:08	9:16
Dallas	7:54	8:57
Denver	6:57	7:57
Kansas City	8:00	9:06
Memphis	8:00	9:07
Minneapolis	8:08	9:10
Los Angeles	5:51	6:45
Miami	9:30	9:53
New Orleans	8:00	8:59
New York	9:21	10:37
Phoenix	6:49	7:48
Salt Lake City	6:59	7:52
San Antonio	7:52	8:50
San Diego	5:49	6:45
San Francisco	5:58	6:45
Seattle	6:23	6:39
Washington DC	9:16	10:31

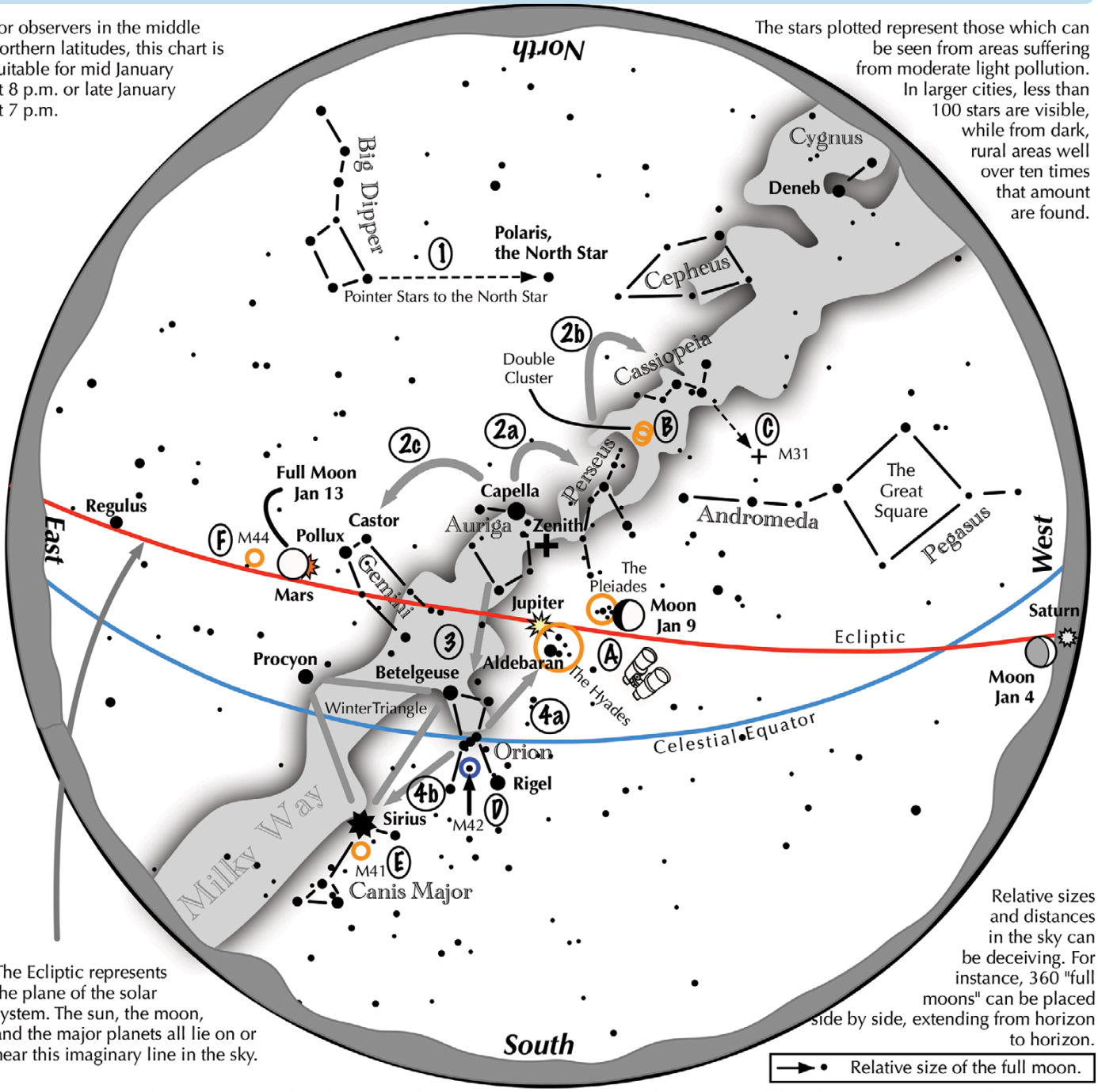
Be sure to use binoculars!

Occultations demonstrate the moon's eastward orbital motion as Earth's rotation causes it to move in a westward arc across the night night sky.

Navigating the mid-January Night Sky by John Goss

For observers in the middle northern latitudes, this chart is suitable for mid January at 8 p.m. or late January at 7 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 winter night sky: Simply start with what you know or with what you can easily find.

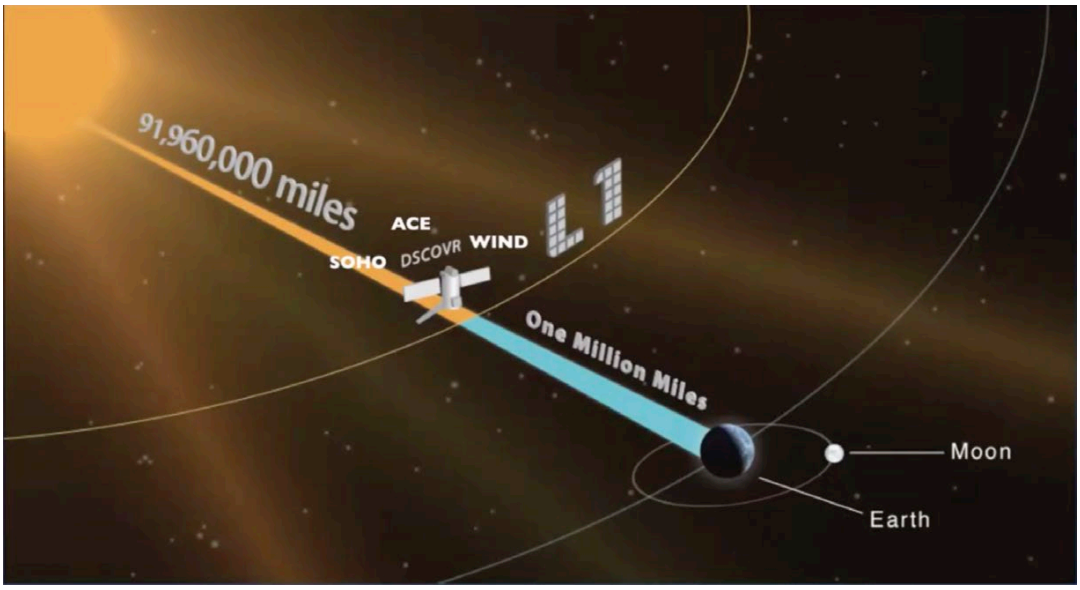
1. Above the northeast horizon rises the Big Dipper. Draw a line from its two end bowl stars upwards to the North Star.
2. Face south. Overhead twinkles the bright star Capella in Auriga. Jump northwestward along the Milky Way first to Perseus, then to the "W" of Cassiopeia. Next Jump southeastward from Capella to the twin stars Castor and Pollux of Gemini.
3. Directly south of Capella stands the constellation of Orion with its three Belt Stars, its bright red star Betelgeuse, and its bright blue-white star, Rigel.
4. Use Orion's three Belt stars to point to the red star Aldebaran, then to the Hyades, and the Pleiades star clusters. Travel southeast from the Belt stars to the brightest star in the night sky, Sirius.

Binocular Highlights

A: Examine the stars of the Pleiades and Hyades, two naked eye star clusters. **B:** Between the "W" of Cassiopeia and Perseus lies the Double Cluster. **C:** The three westernmost stars of Cassiopeia's "W" point south to M31, the Andromeda Galaxy, a "fuzzy" oval. **D:** M42 in Orion is a star forming nebula. **E:** Look south of Sirius for the star cluster M41. **F:** M44, a star cluster barely visible to the naked eye, lies to the southeast of Pollux.

Astronomical League *www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.*

Nov 21, 2024 Meeting Presentation by Dr. Tom Berger
"How we Monitor, Quantify, and Predict Space Weather"
Part 2 Speaker presentation summary by Eileen Hall-McKim

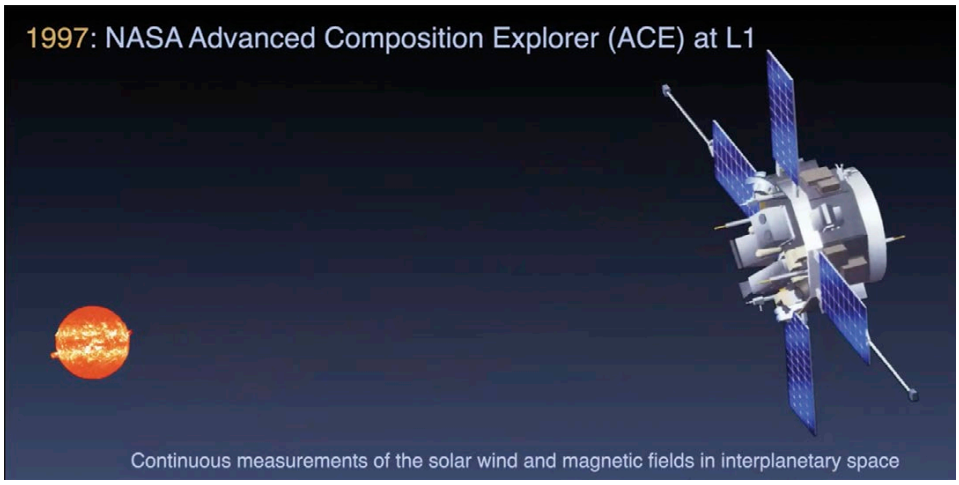


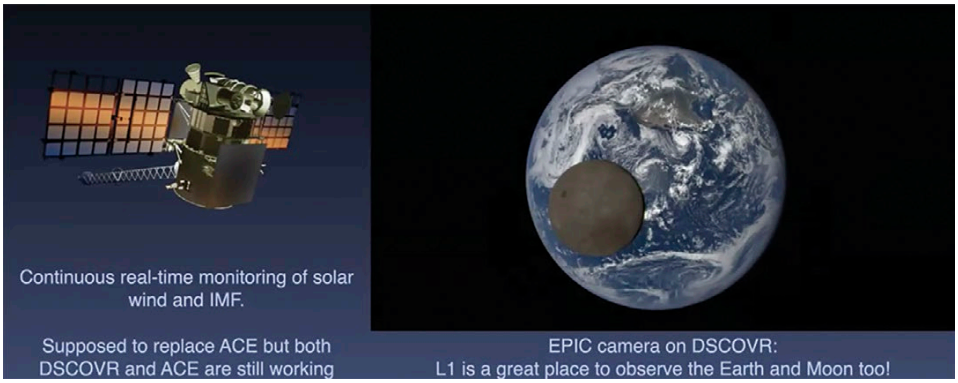
How we monitor space weather these days

- L1 is a great place to observe the Sun!
- About 1 million miles from Earth and 91,960,000 miles from the Sun
- Have spacecraft out at this special gravitational balance point
- Great place to observe the Sun because nothing gets in the way
- NASA measures solar wind, now have near real-time

1997: NASA Advanced Composition Explorer (ACE) at L1 – Continuous measurements of the solar wind and magnetic fields in interplanetary space, beams down data in near real time to SWPC, so now get a little bit of warning of whats coming in with the solar wind.

2015: TRIANA satellite proposed by Al Gore becomes NOAA DSCOVR at L1. Continuous real-time monitoring of solar wind and IMF. Was supposed to replace ACE but both DSCOVR and ACE are still working.

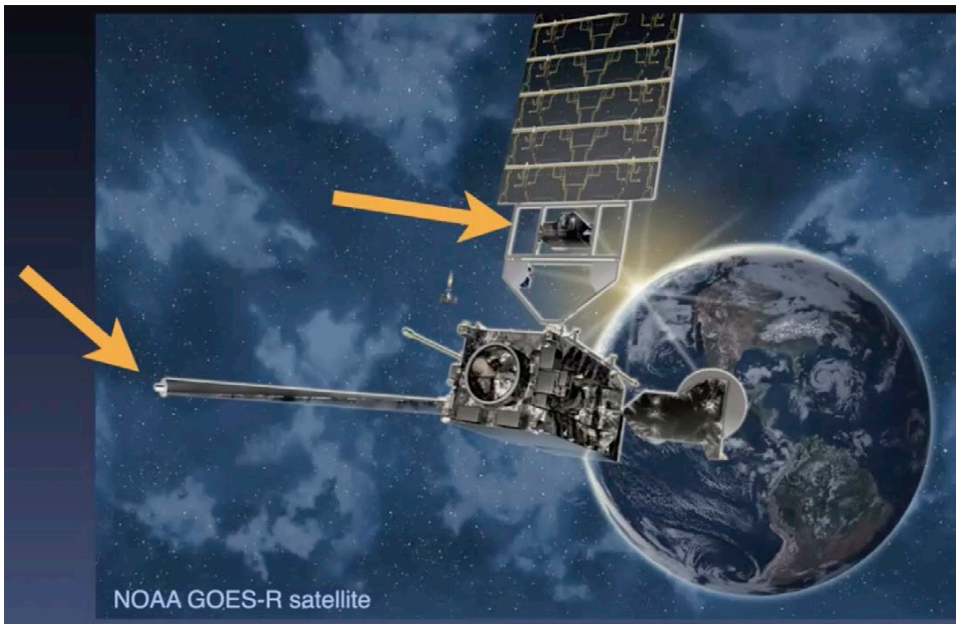


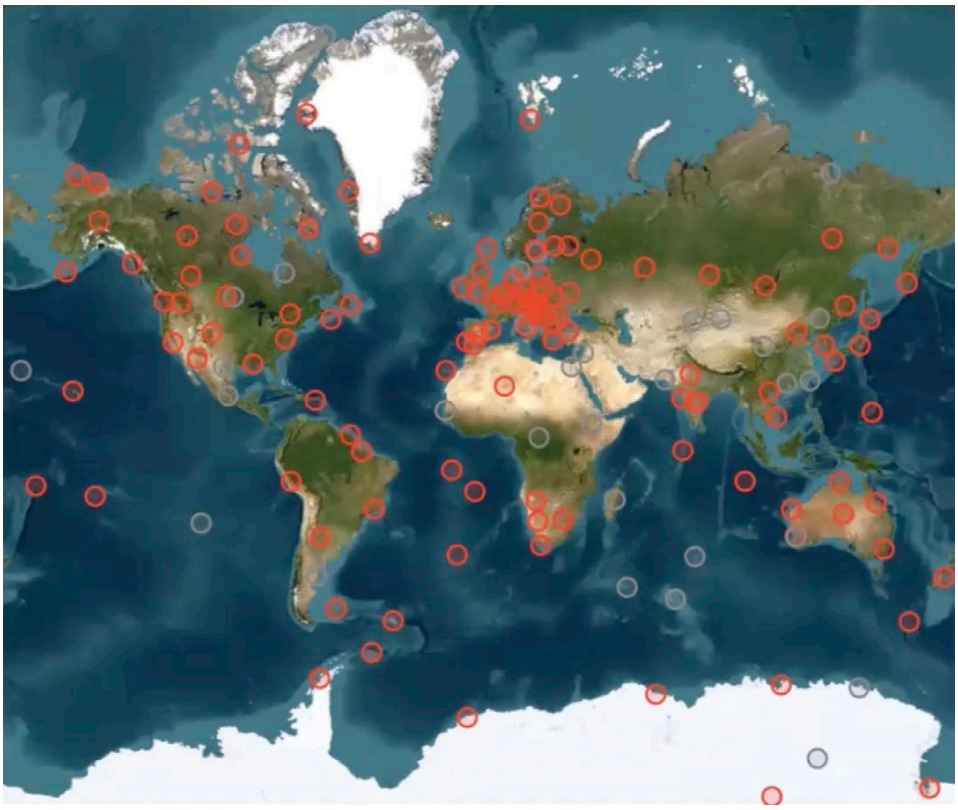


EPIC camera on DSCOVR: L1 is a great place to observe the Earth and Moon too!

1997- Present: NOAA GOES geosynchronous weather satellites provide 24/7 real-time space weather monitoring – have magnetometer boom off side measuring the magnetic field of the solar wind and the Earth, and a bunch of cameras mounted on the solar panel that always look at the Sun. No longer have to rely on the 1995 SOHO satellite- This instrument measures:

- Solar x-ray irradiance
- Solar x-ray and EUV images
- Solar Energetic Particles
- Solar coronograph (just launched 2024)
- Magnetic field

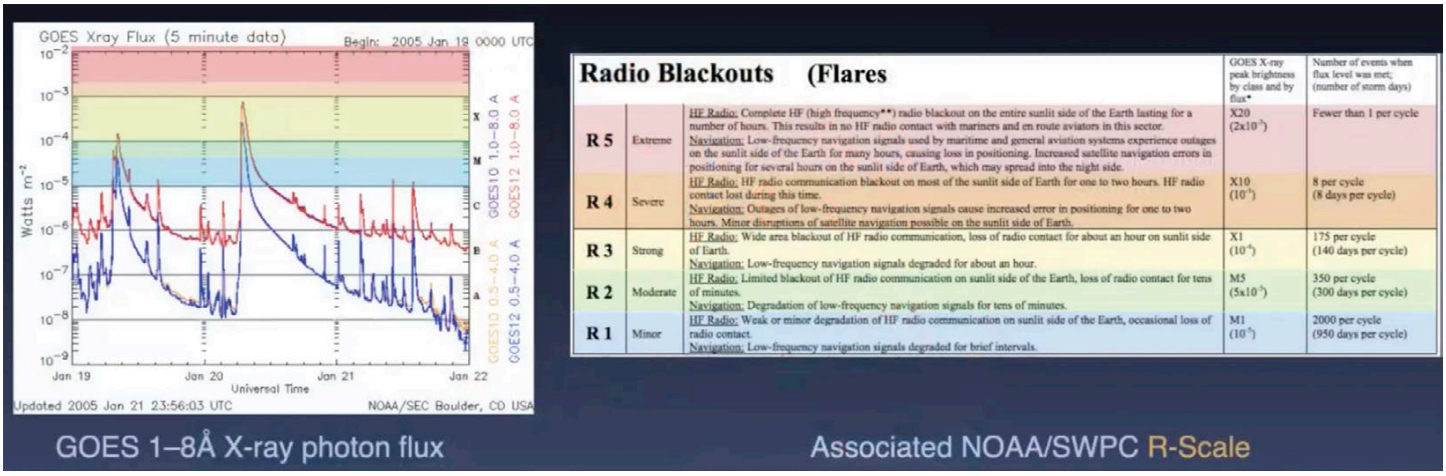




The INTERAGNET Network

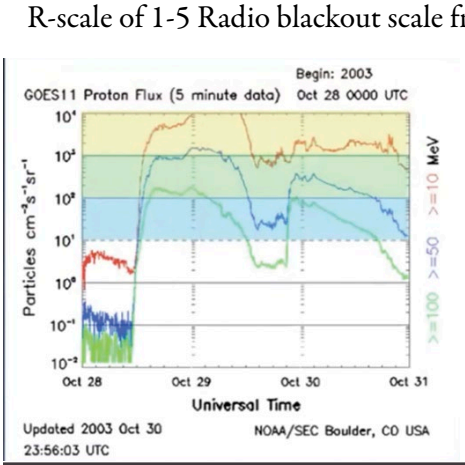
The international network of ground-based magnetic observations – magnetometers

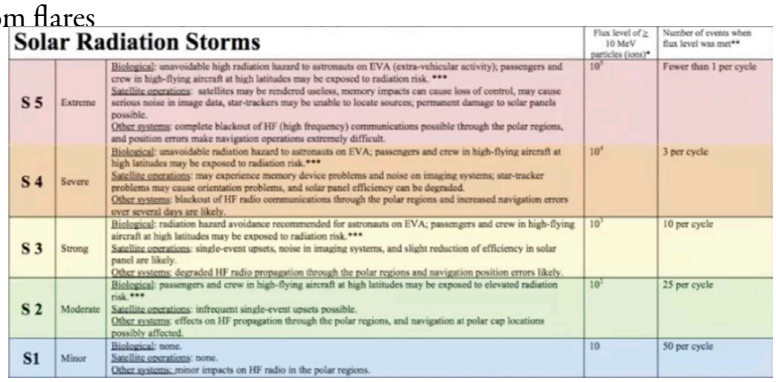
- The geomagnetic storm alert system – now hundreds around the world
- Now used to determine Kp and Dst indices of geomagnetic storming



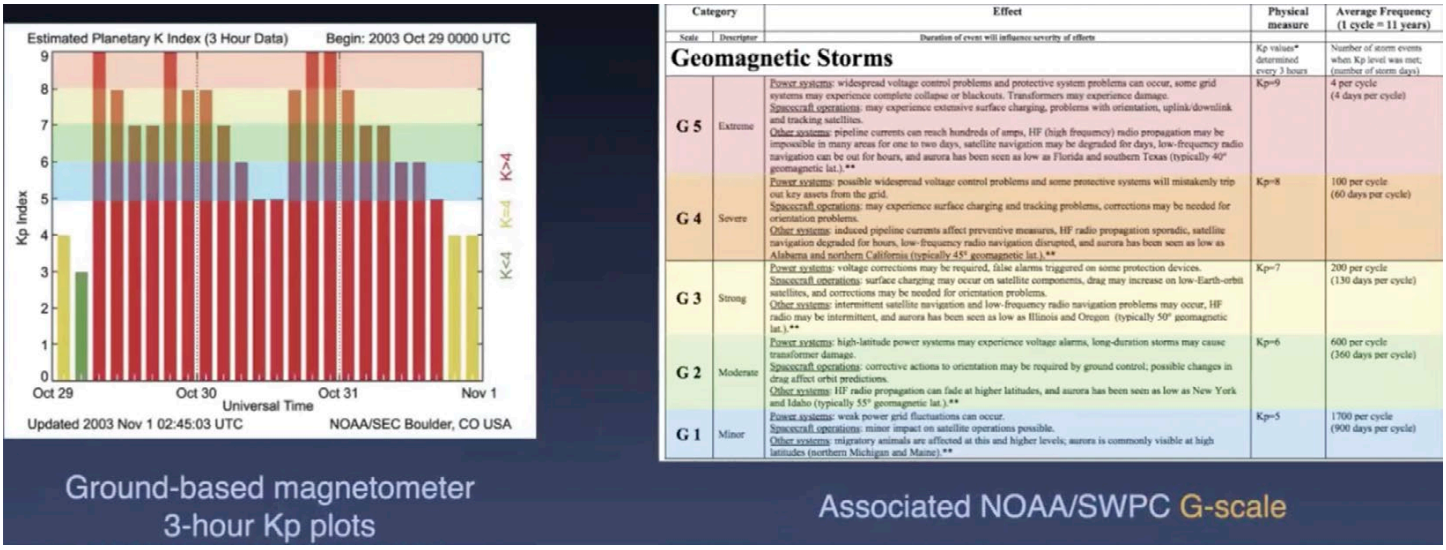
SWPC logarithmically classified flares as A, B, C, M, and X based on GOES 1-8 Å X-rays – "Common, Medium, eXtreme and A and B..."

- GOES 1-8 X-ray photon flux – Red line measures between 1-8 Å in wavelength – big spikes are flares
- Associated NOAA/SWPC R-Scale – breaks data down on the GOES 1-8 Å X-ray scale into better known by public R-scale of 1-5 Radio blackout scale from flares





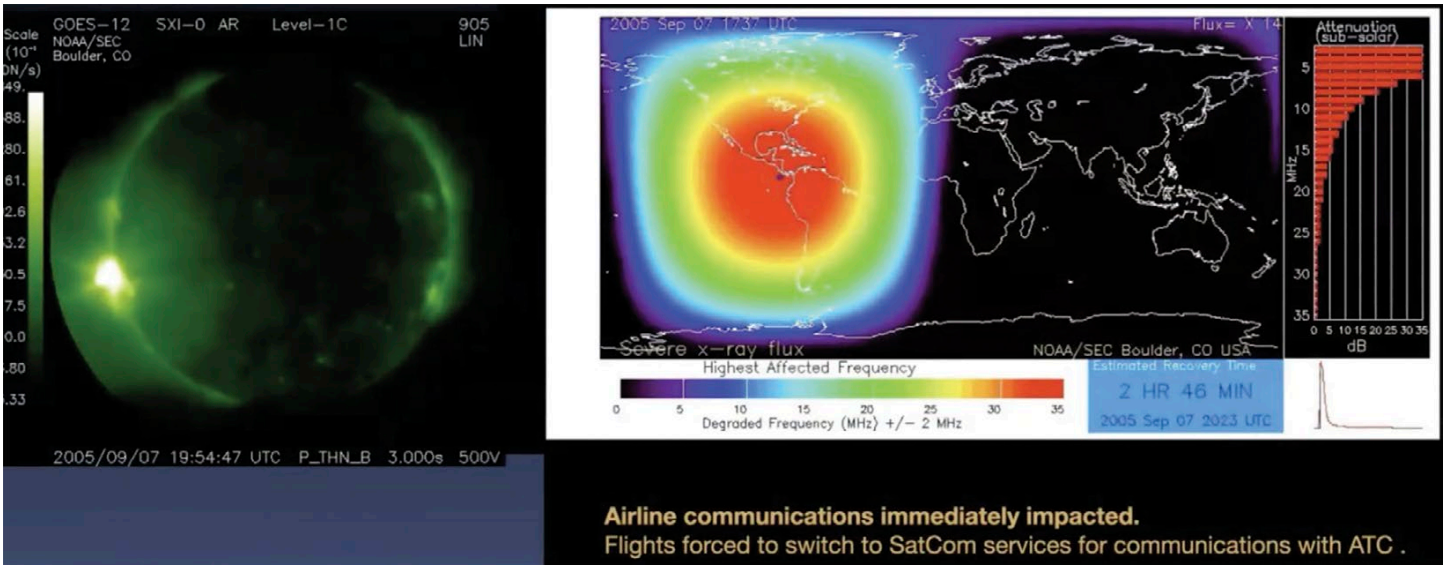
Similarly with energetic particles (snow on camera image) SWPC has S-scale based on GOES protons



Geomagnetic storms are classified G1 to G5, based on Kp

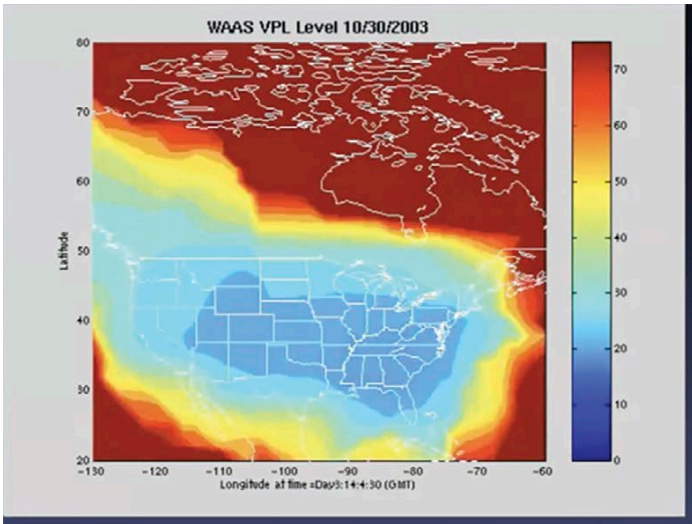
- Ground-based magnetometer 3-hour Kp Plots
- Associated NOAA/SWPC G-scale

Solar Flare Impacts: HF Radio Blackout

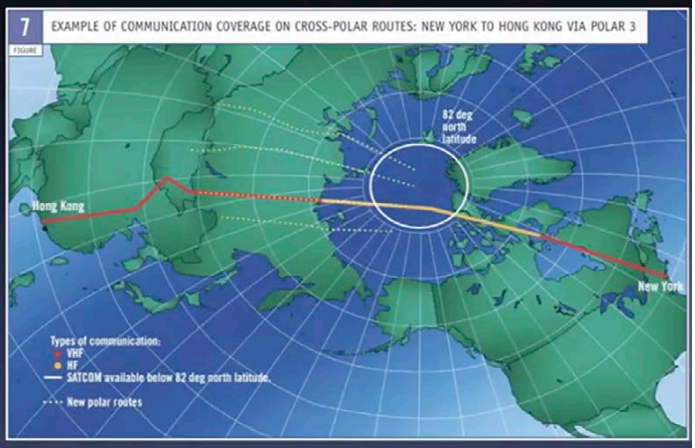


- What happens when the flares go off with the ionosphere?
- The sunlit side of the Earth suddenly becomes highly ionized, radio waves are not being absorbed as they should, all radio communications immediately impacted and shutdown during a flare
- Flights forced to switch to SatCom services for communications with ATC

Solar Flare Impacts: Airlines GPS Landing System and HF Radio communication



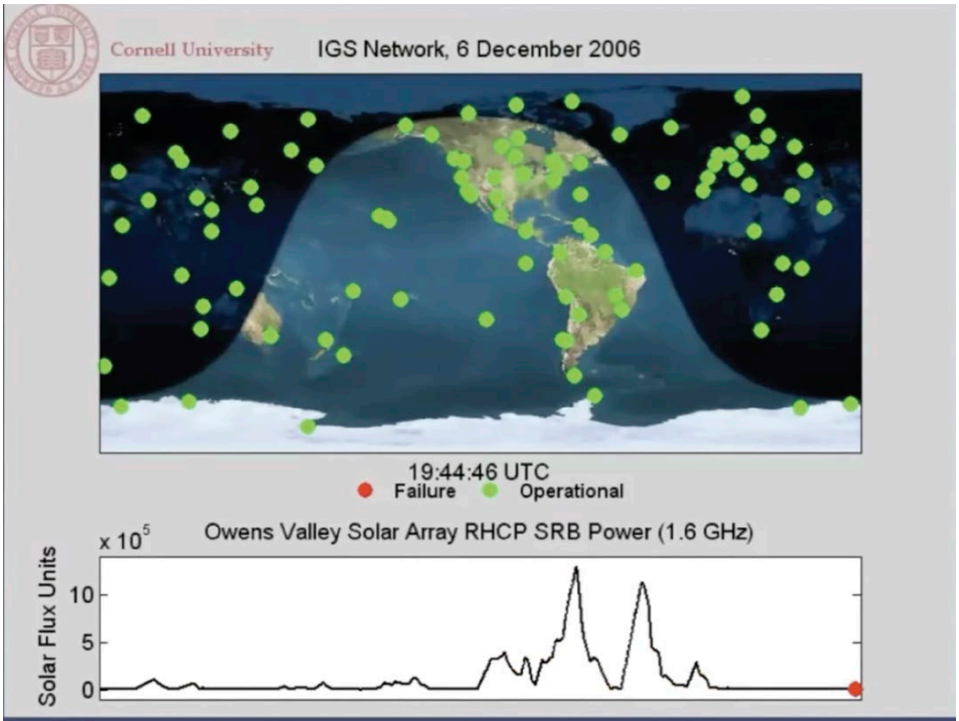
FAA Wide Area Augmentation System (WAAS) Vertical Protection Level (VPL, essentially error in position) in *meters*



Polar route communications: above 82° can't use satellite communications as backup

- FAA Wide Area Augmentation System (WAAS) Vertical Protection Level (VPL, essentially error in position) in meters, way too much error had to stop using during storm
- Flares also inhibit geosynchronous satellites from beaming down accurate timing information, cannot use GPS to land airplanes
- Polar route communications: Flights US to Hong Kong, above 82° area in circle can't use satellite communications as backup

Solar Flare Impacts: Solar Radio Noise and GPS Signal Loss



Approximately 10 minutes of GPS signal swamping on Day Side of Earth

The Solar Flare of 6 Dec 2006 had unusually large radio output in the L1 Band (1.6 GHz) used by GPS.

Solar Flare Impacts: Solar radio noise & GPS signal loss

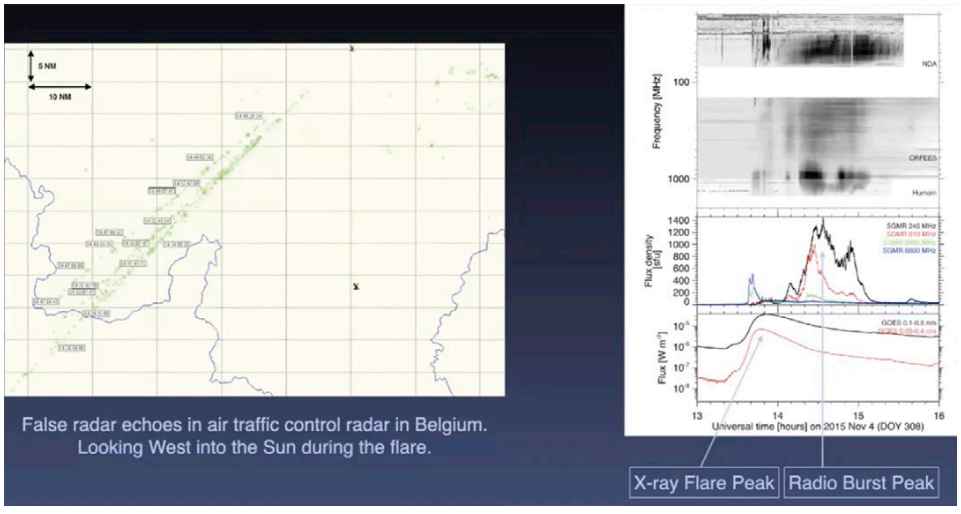
- Approximately 10 minutes of GPS signal swamping on Day Side of Earth
- The solar flare of 6 Dec 2006 had unusually large radio output in the L1 band (1.6 GHz) used by GPS, GPS receivers no longer usable

Solar Flare Impacts: 1967 Nuclear War Alert

Ballistic Missile Early Warning System (BMEWS), Anderson Alaska, 1962

- Ballistic Missile early warning system (BMEWS) Anderson Alaska 1962 (Knipp et al, 2016)
- On 23 May 1967 missile radars were suddenly swamped with noise: Russian Jamming Prior to Attack?
- No! It was a Solar Flare sending out gazillions of photons in the BMEWS frequency bands
- This information stood down American attack that could have been catastrophic

Solar Flare Impacts: 2015 Swedish ATC Radar Blinding

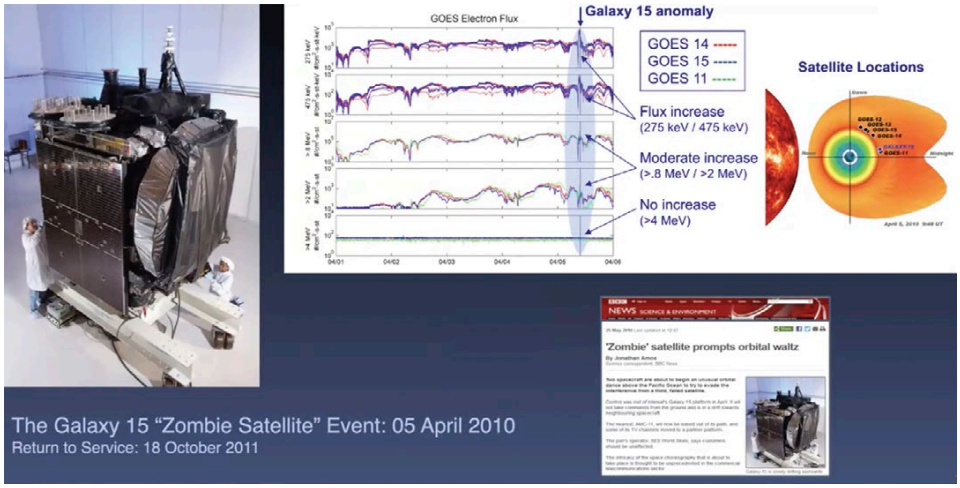


November 4th, 2015, 14:30 UT: "Long duration" M4 flare at sunset shuts down Swedish airspace

- False radar echoes in air traffic control radar in Belgium; looking west into the Sun during the flare -swamped with noise for a good hour
- Associated graph of X-ray Flare Peak (bottom)
- Radio Burst Peak (second from bottom)

Geomagnetic Storm Impacts: "Killer Electrons" in the Van Allen Belts

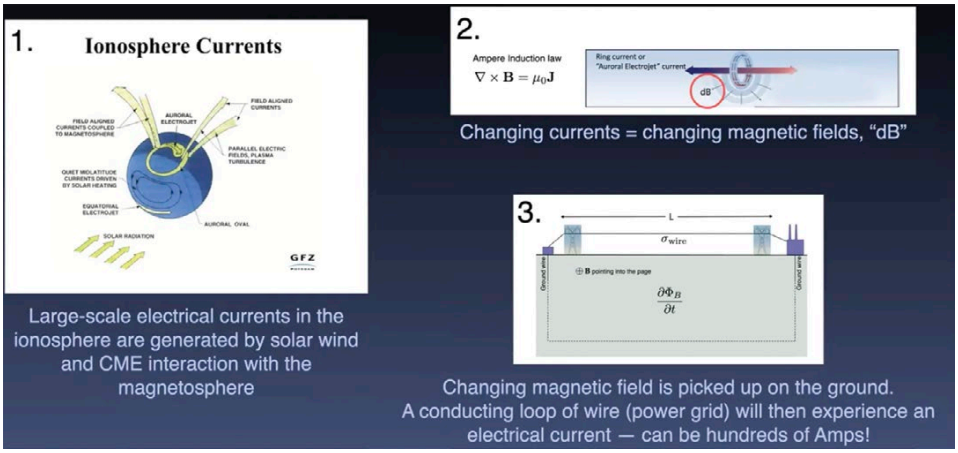
- Bigger impact is Geomagnetic Storming – can go on for hours
- April 05 2010 – the Galaxy 15 "Zombie Satellite" Event gigantic geosynchronous orbit communication satellite, hit by geomagnetic storm enough to cause "snapback" of magnetic tail of the Earth, reconnects and accelerates electrons earthward
- Shorted out the Galaxy 15, became brain dead, called "Zombie Sat" no longer controllable, others had to move out of the way, eventually recovered, later happened again, not properly grounded, but because a valuable asset decided to keep using



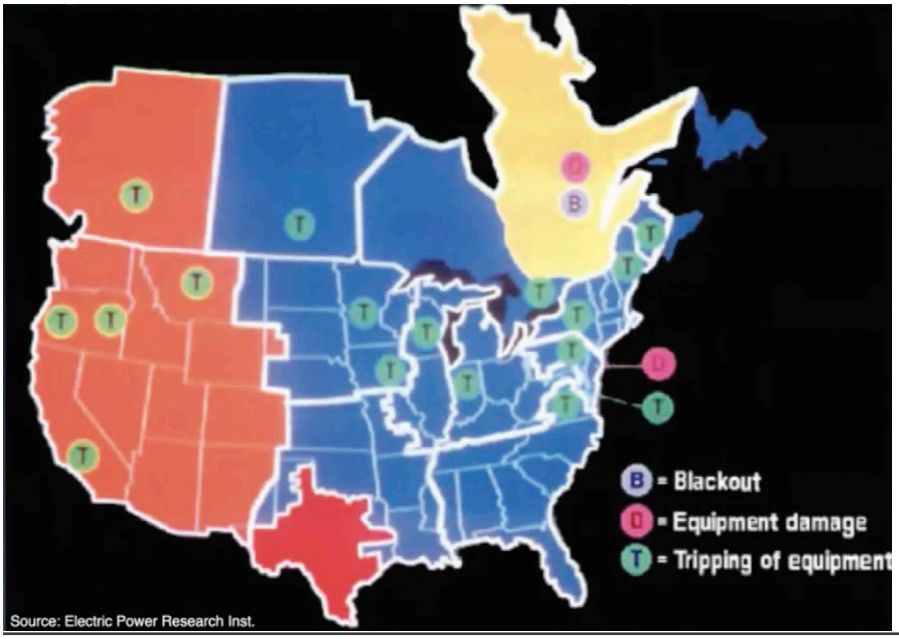
Geomagnetic Storm Impacts: Geomagnetically Induced Currents (GICs)

Geomagnetic Storm Impacts: Most consequential: Geomagnetically Induced Currents (GICs)

- Large-scale electrical currents in the ionosphere and in the ground are generated by solar wind and CME interaction with the magnetosphere- loops of currents shown in yellow where currents close
- Changing currents = changing magnetic fields, "dB" shown in circular currents around ionospheric currents



- Propagated down into the ground- changing magnetic field is picked up on the ground, a conducting loop of wire (power grid) will then experience an electrical current- and can be hundreds of Amps!
- This is a very bad thing for power grids, they are not meant to have DC currents coming up from the ground power



Geomagnetic Storm Impacts: Power grid destabilization by GICS

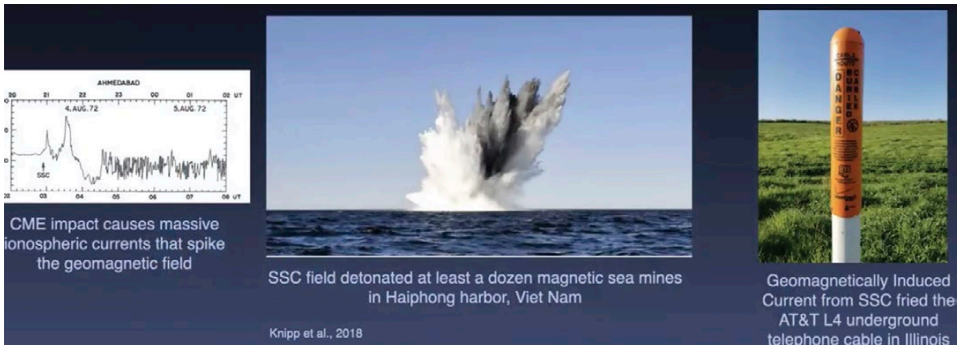
- 13 March 1989 geomagnetic storm- Quebec, Canada, grid goes down for 9 hours
- Entire province blacked out for 90 seconds – 6 million people affected
- Power grids are very finely balanced systems, they have to have voltages approximately balanced across the system, if one gets way out of balance, currents start to flow and relays start tripping, kind of a house of cards, Province of Quebec crashed in middle of night in late winter

Geomagnetic Storm Impacts: Ground currents

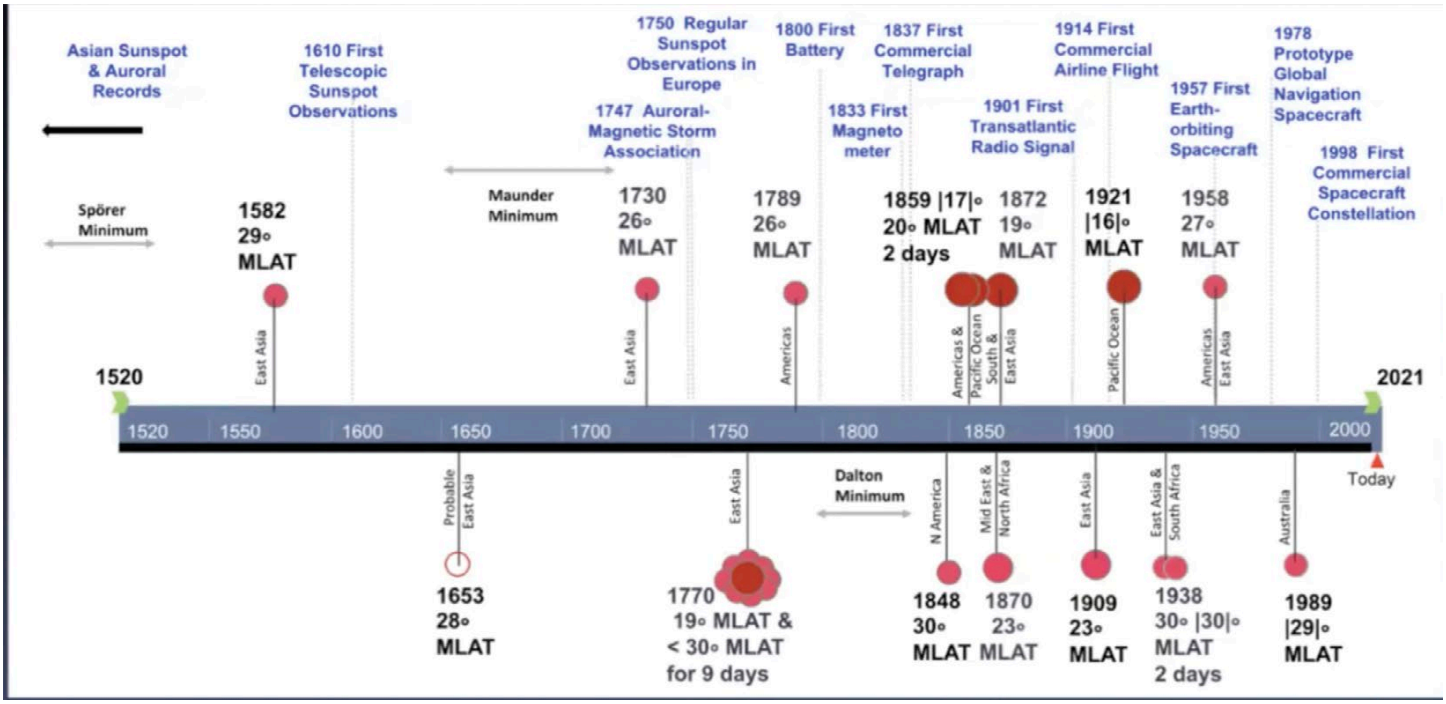
- Another example from 1989, in New Jersey, affecting part of U.S. Grid
- Came very close to collapsing
- 13 March 1989 – Extremely High voltage transformer destroyed in New Jersey, started to melt – did not have a blackout however, the grid managers handled it well

Geomagnetic Storm Impacts: Sudden Storm Commencement (SSC) fields

- August 1972: Fastest CME ever recorded – Sun-To-Earth arrival in 14.5 hours – 2.5 hours faster than Carrington event (17 hours) – 2850 km/sec = 6,375,000 mph
- CME impact causes massive ionospheric currents that spike the geomagnetic field
- SSC field detonated at least a dozen magnetic sea mines in Haiphong harbor, Viet Nam
- Geomagnetically Induced Current from SSC fried the AT&T L4 underground telephone cable in Illinois



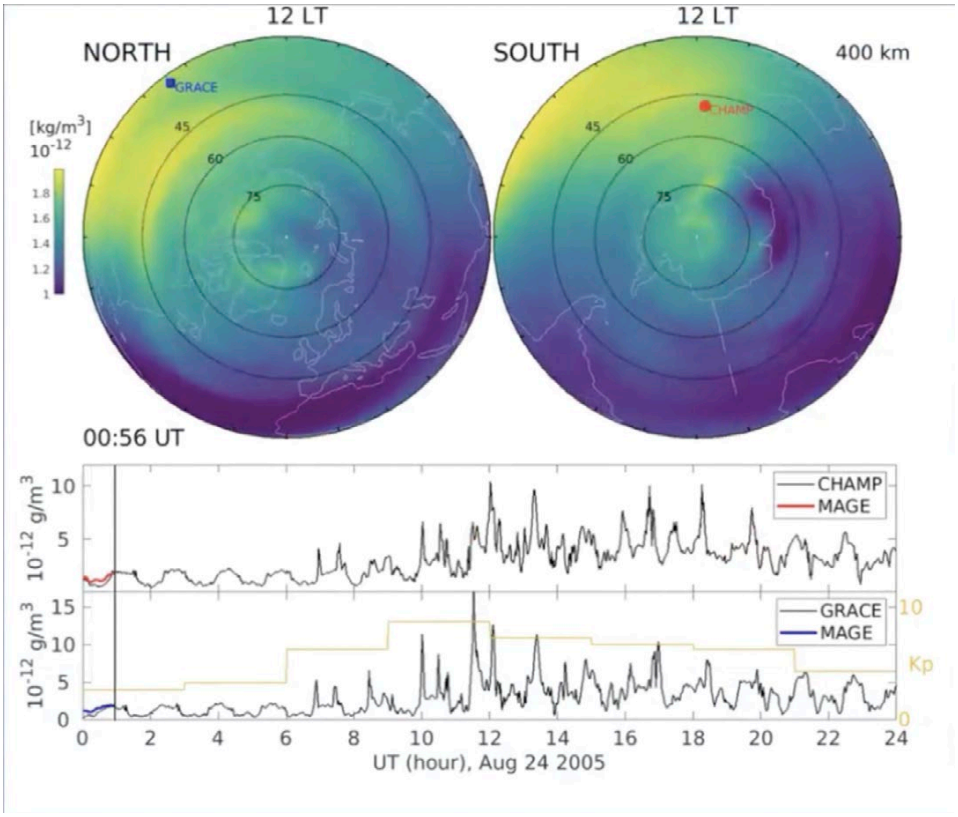
How often do extreme solar storms hit Earth to cause extreme geomagnetic storms?



Extreme geomagnetic storms defined here by aurora being visible below 30° magnetic latitude
(Graph courtesy Prof. Delores Knipp, CU Boulder)

- How often do extreme solar storms hit Earth to cause extreme geomagnetic storms?
- Not that often- timeline going back to about 1550
- 1770, there was 9 straight days of auroras sited down in Cuba!
- Appears from graph, nothing really huge has hit us since 1770

Geomagnetic Storm Impacts: Upper atmospheric expansion & Satellite Drag

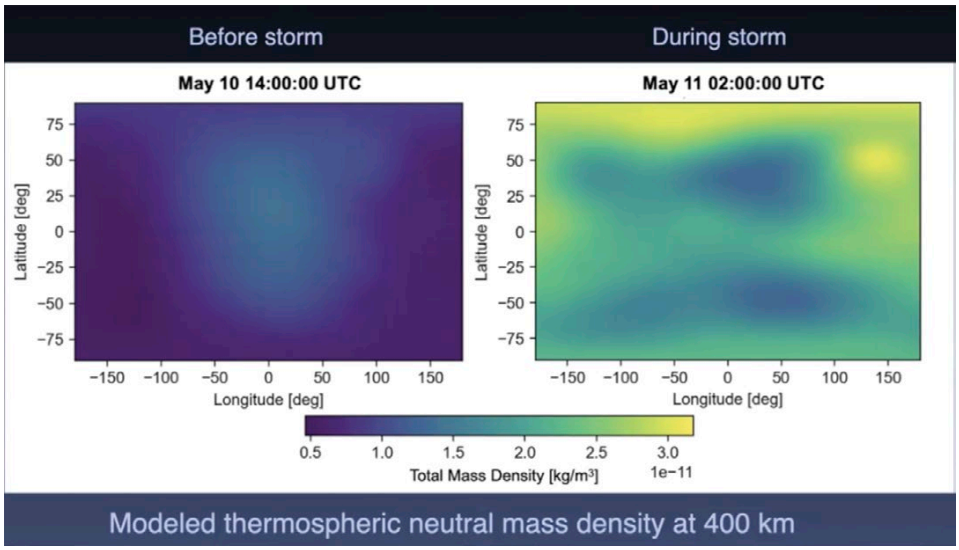


- During a large geomagnetic storm, the aurora injects hundreds of Gigawatts of power into the upper atmosphere
- This power injection heats the atmosphere causing it to expand upward into space
- Satellites in Low Earth Orbit (LEO) suddenly see much greater density than normal
- Begin to get wave-like behavior of density, larger density causes drag on the satellite making it start to lose altitude and speed up

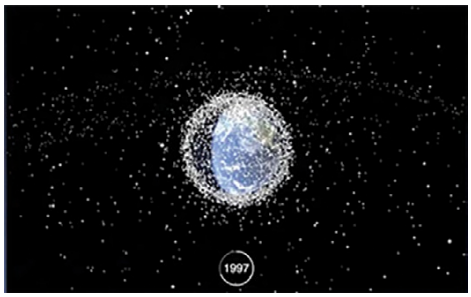
Geomagnetic Storm Impacts: Upper atmospheric expansion & Satellite Drag

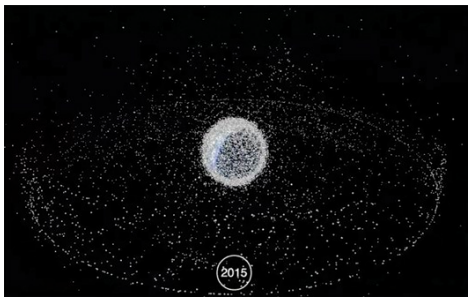
Modeled thermo-spheric neutral mass density at 400 km (Parker & Linares, 2024)

- Mother's Day extreme geomagnetic storm May 10-11, 2024
- Before storm, May 10 – calm density
- During storm, May 11 – 6-8 X more density, satellite feeling much more drag, not where they think it is in the sky, its ahead and lower
- During the peak of the storm, over 5000 satellites in LEO were maneuvering to keep altitude – most of these were SpaceX Starlink satellites at 500km



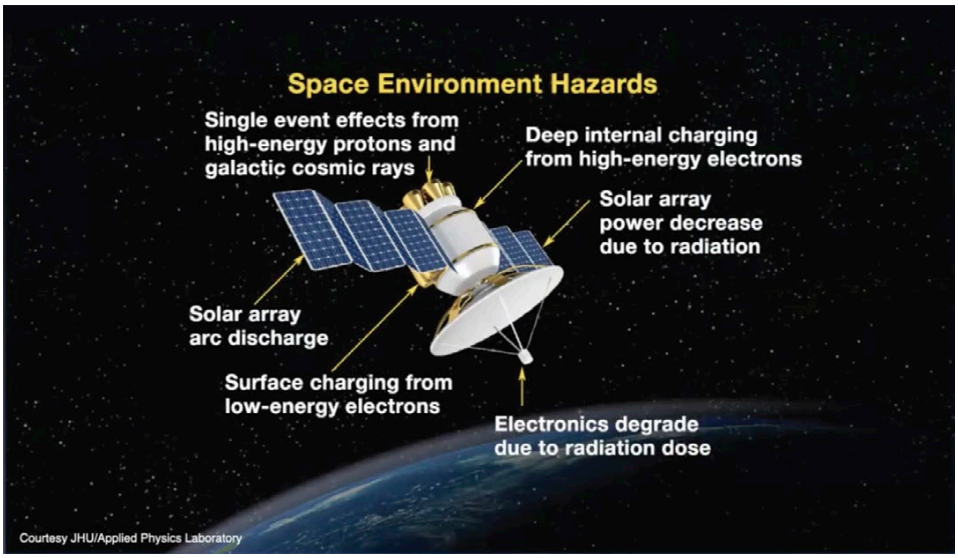
Orbital debris: a growing problem





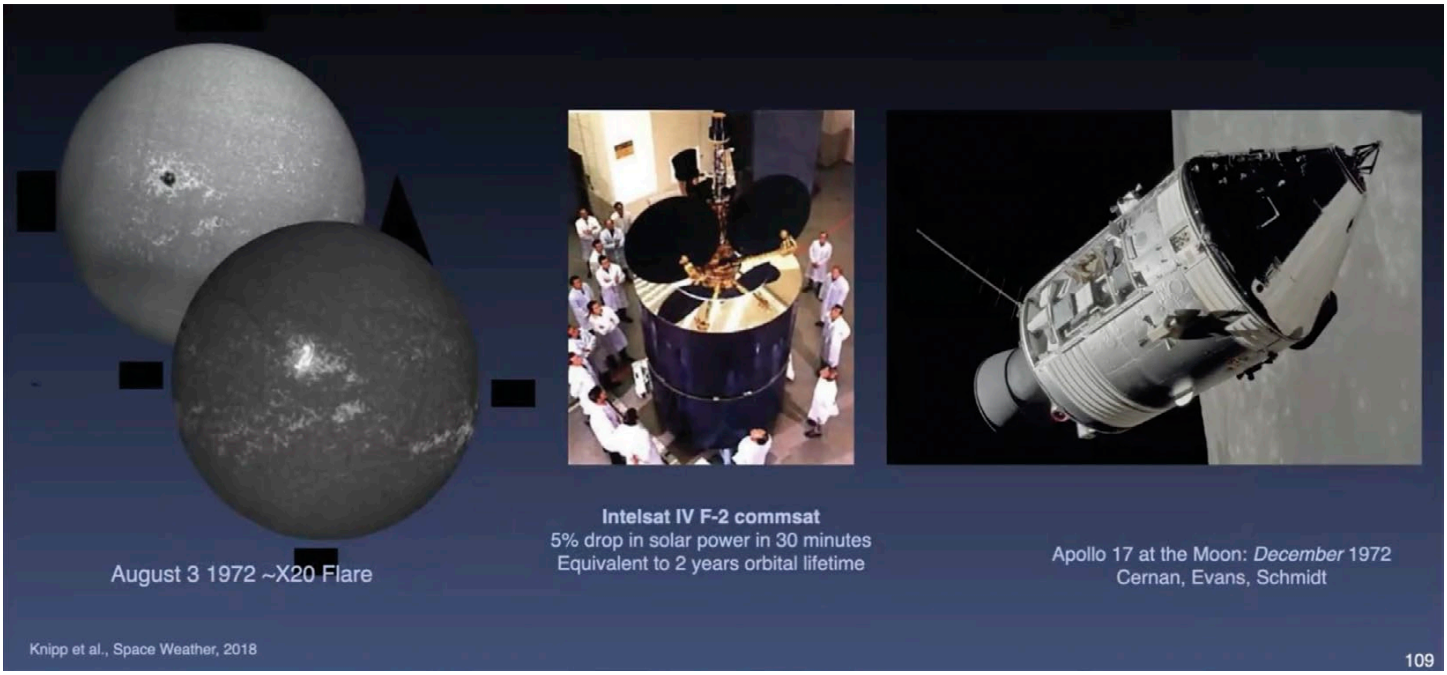
- In 1958 there were two satellites orbiting the Earth
- 6000+ satellites in LEO (through 2024)
- 29,000 debris objects > 10 cm (catastrophic collisions)
- 700,000 debris objects 1-10 cm (damaging collisions)
- Solar storms cause sudden increases in drag forces, moving satellites and debris from their nominal orbits, this makes collision avoidance much harder: you can't avoid something that you've lost track of!
- The more debris there is in orbit, the more objects you can potentially collide with during the "unknown" period of a geomagnetic storm
- Everything at low orbit, more likely for collisions, if these start colliding, create more debris, we are trying to avoid chain reaction in which there is so much debris, we may not be able to use this space anymore, this is a possibility
- Big emphasis currently in studying orbital space… How do we model the movement of stuff in space as to what happens in a geomagnetic storm, big problem if we can't track

Radiation Storm Impacts: Satellite avionics and solar panel damage



Radiation Storm Impacts; Satellite avionics and solar panel damage – Also a Geomagnetic Storm impact as Van Allen Radiation Belts flare up…. (Courtesy JHU/Applied Physics Laboratory)

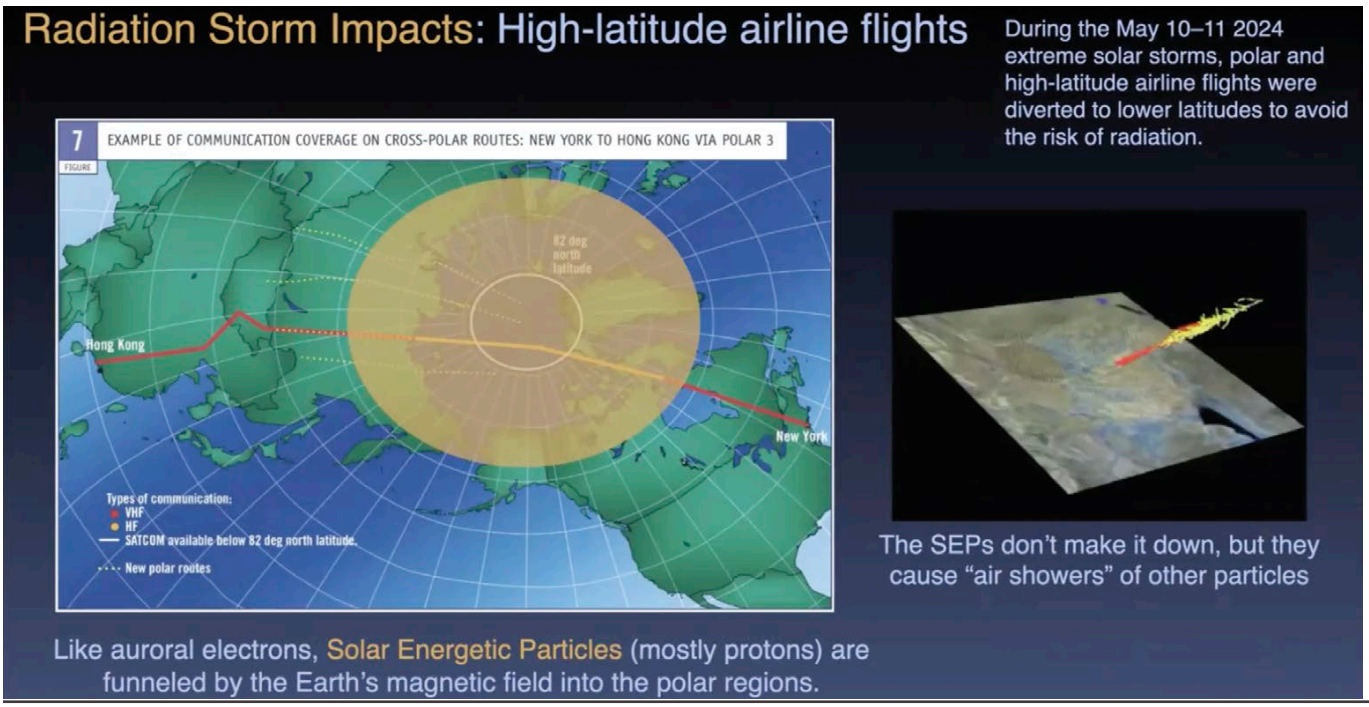
Radiation Storm Impacts: 1972 Extreme CME and SEP event



The larger and faster the Solar Magnetic Eruption and CME, the larger the radiation event. (Knipp et al., Space Weather, 2018)

- August 3, 1972 – X20 Flare – pushed in largest radiation storm we have had in front of it, probably was an S-5 but that scale wasn't in use then so we don't know
- Intelsat IV F-2 commsat 5% drop in solar power in 30 minutes – equivalent to 2 years orbital lifetime
- Fortunately happened between Apollo 16 and Apollo 17 missions – Apollo 17 at the Moon: December 1972, Cernan, Evans, Schmidt, had the astronauts been up there at the time, they would have at least had radiation sickness and could have been killed outright
- Just a reminder there are no magnetic fields around Mars or Moon or in deep space between them to offer protection, there is little way to shield them, a problem not talked about much in space programs, counting on engineering advancements

Radiation Storm Impacts: High-latitude airline flights



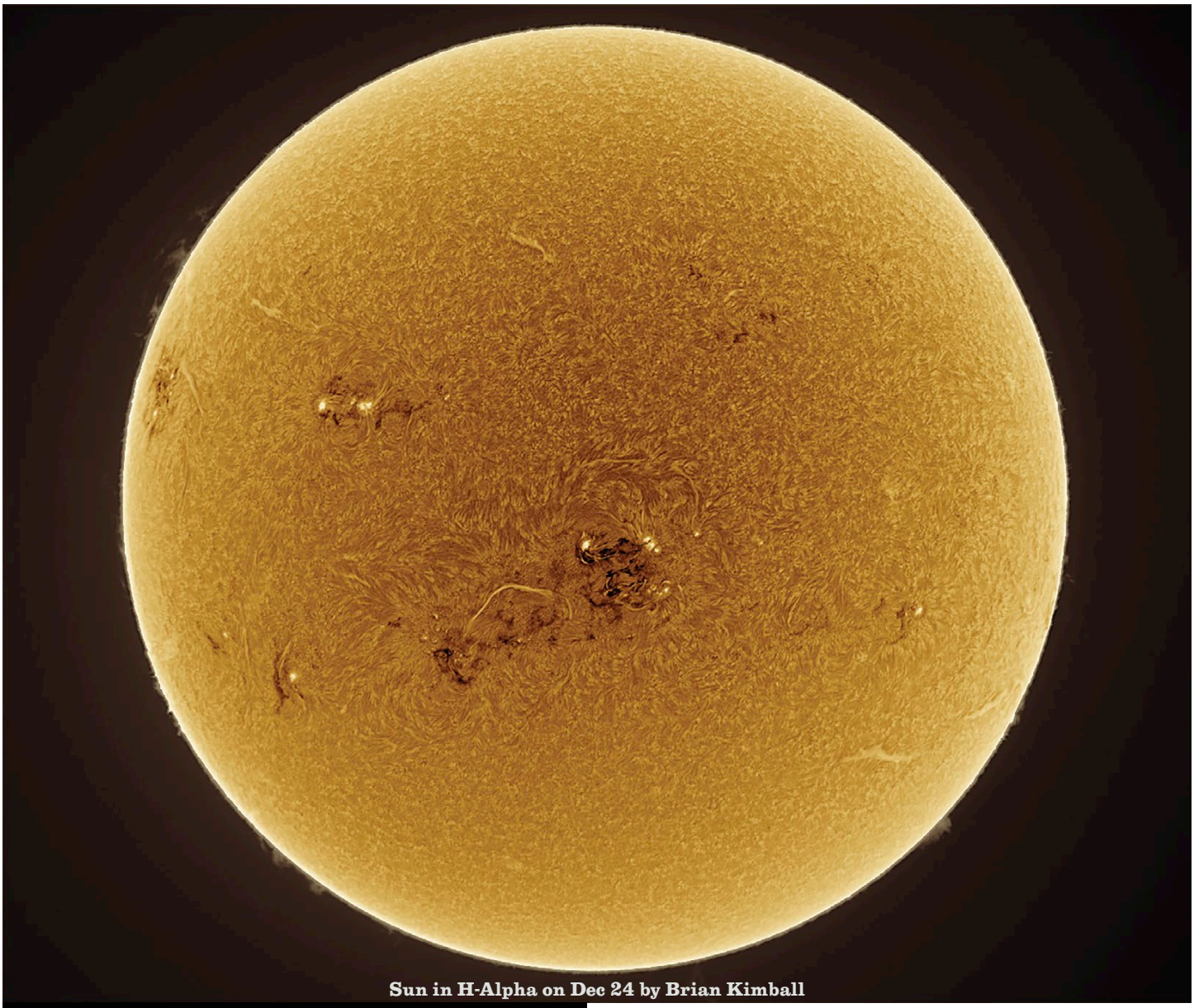
- Example of communication coverage on cross-polar routes: New York to Hong Kong
- Like auroral electrons, Solar Energetic Particles (SEPs) (mostly protons) are funneled by Earth's magnetic field into the polar regions
- The SEPs don't make it down, but they cause "air showers" of other particles
- During the May 10-11 2024 extreme solar storms polar and high-altitude airline flights were diverted to lower latitudes to avoid the risk of radiation

For more information;
Hundreds of live space weather datasets: https://lasp.colorado.edu/space-weather-portal

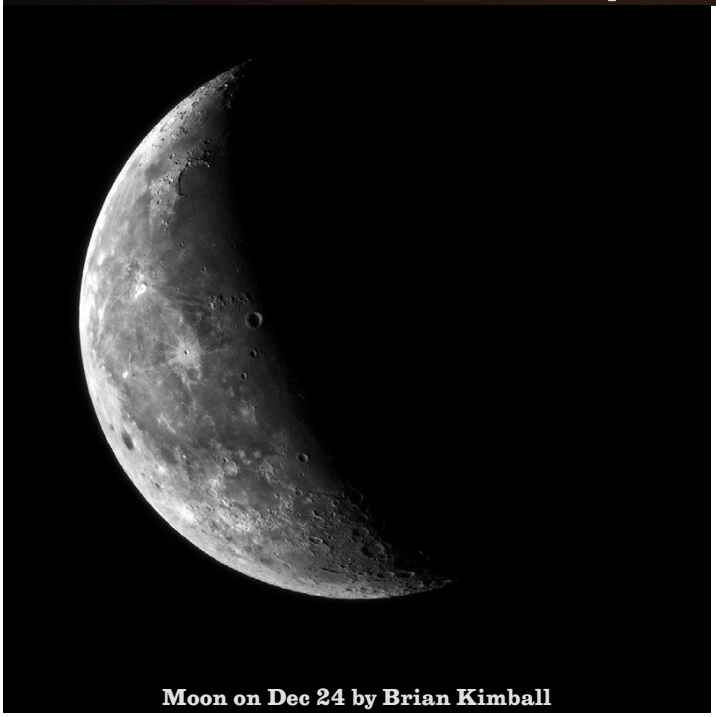
Official government forecasts and reports: https://swpc.noaa.gov

Weekly space weather review and forecasts: https://www.youtube.com/@TamithaSkov

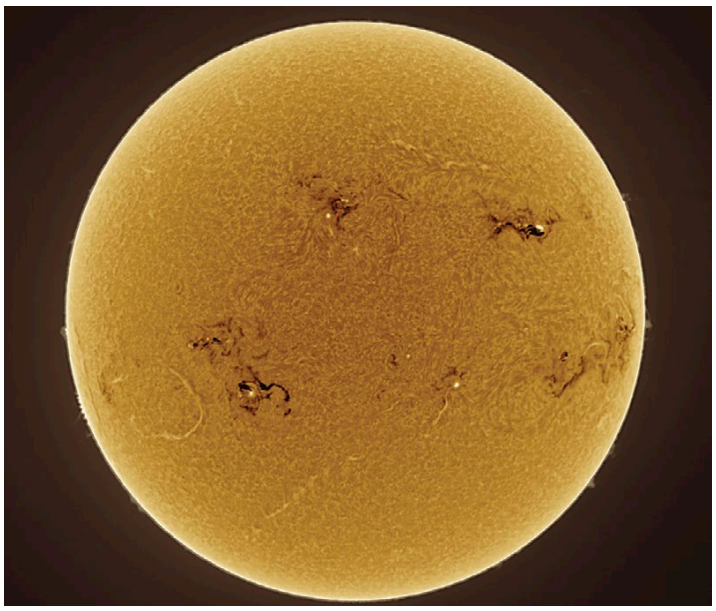
Moon on Dec 20 by Brian Kimball



Sun in H-Alpha on Dec 24 by Brian Kimball

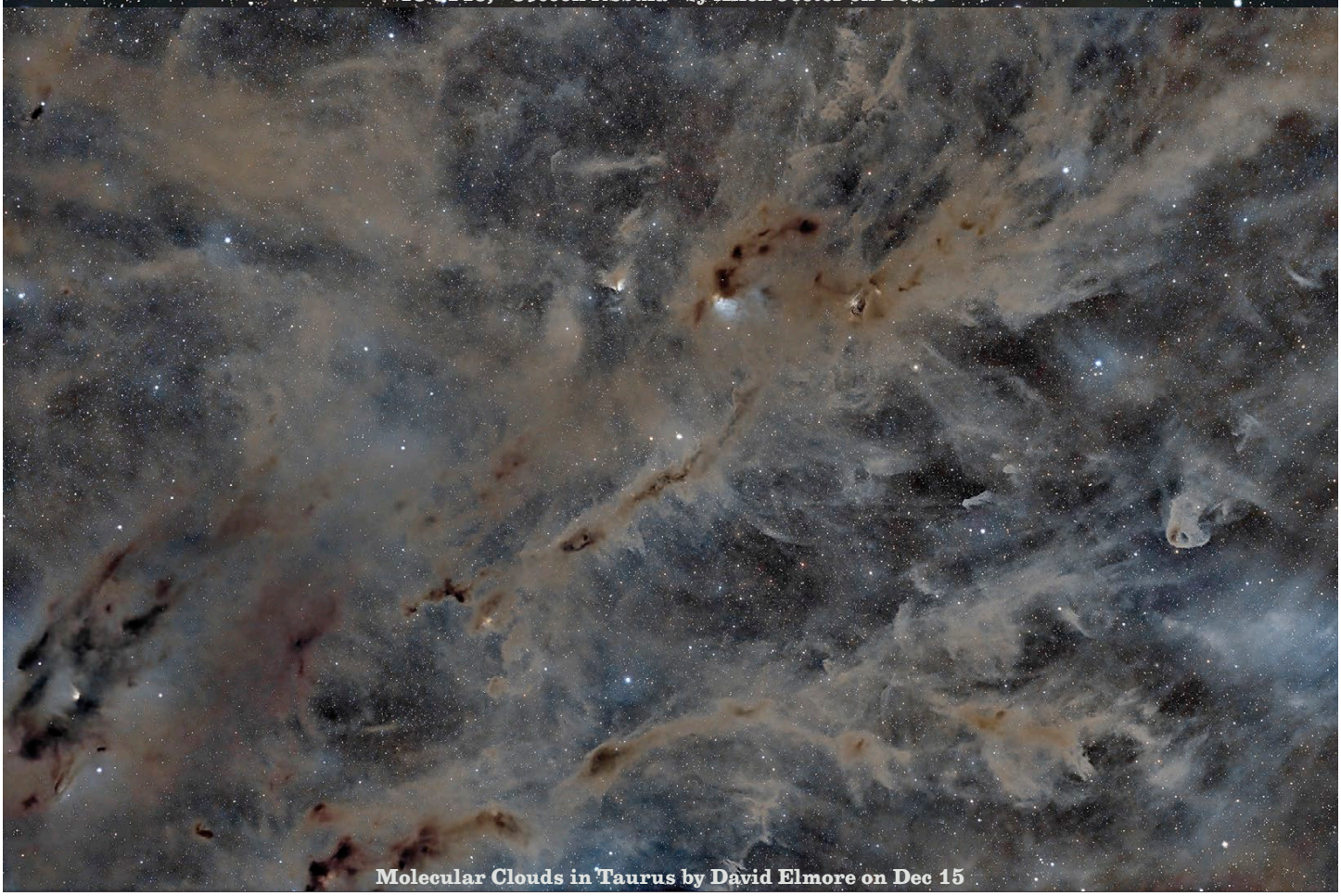


Moon on Dec 24 by Brian Kimball

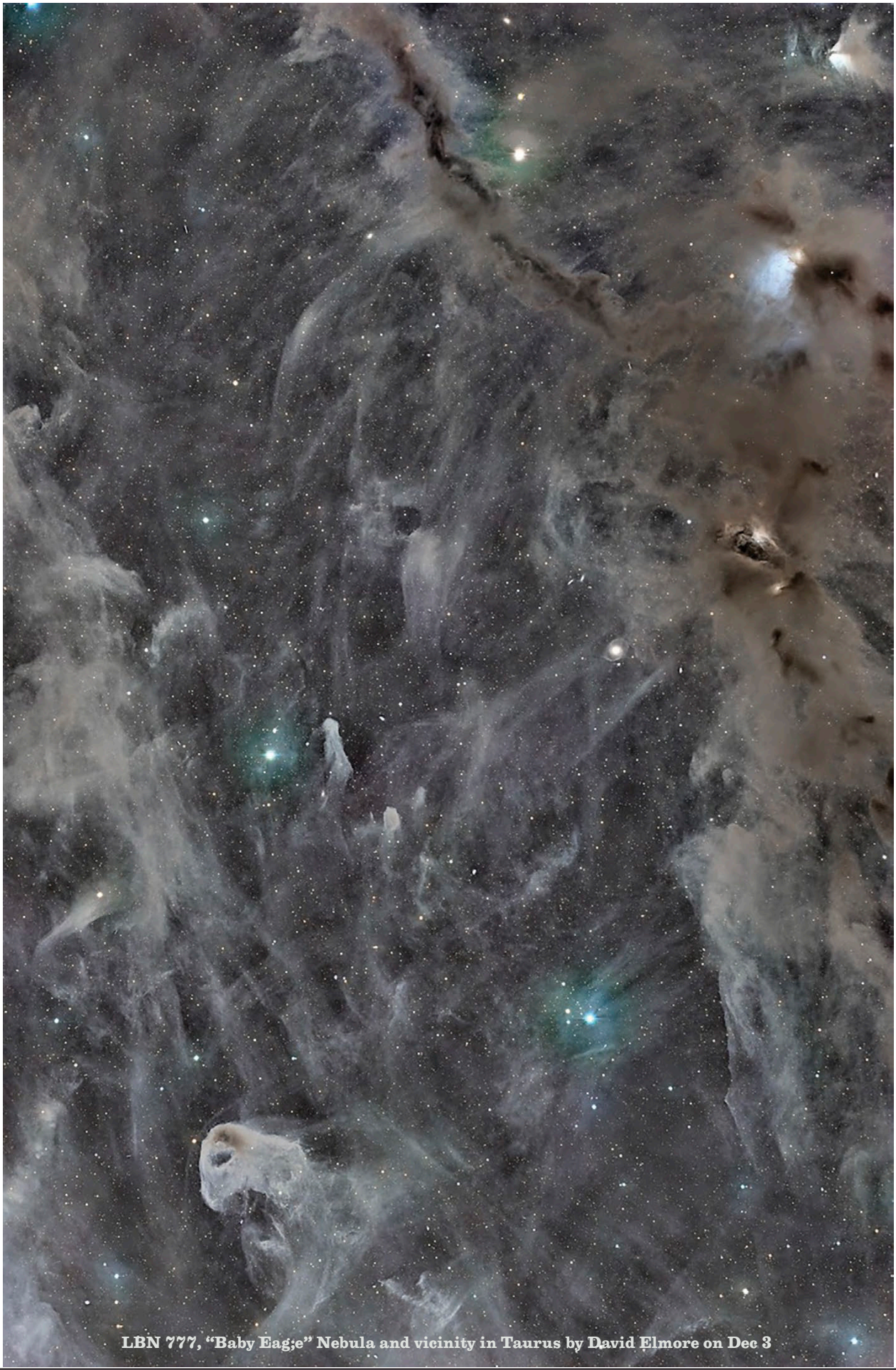


Sun in H-Alpha on Dec 29 by Brian Kimball

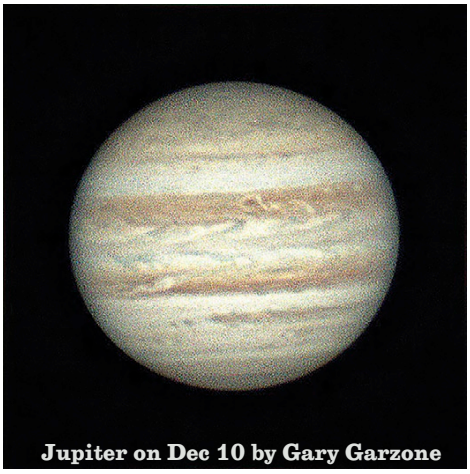
IC 5148, "Cocoon Nebula" by Allen Jeeter on Dec 9



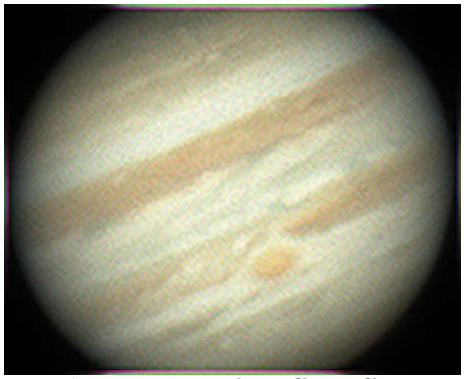
Molecular Clouds in Taurus by David Elmore on Dec 15



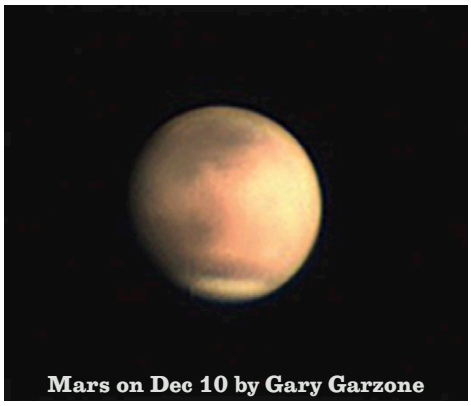
LBN 777, “Baby Eag;e” Nebula and vicinity in Taurus by David Elmore on Dec 3



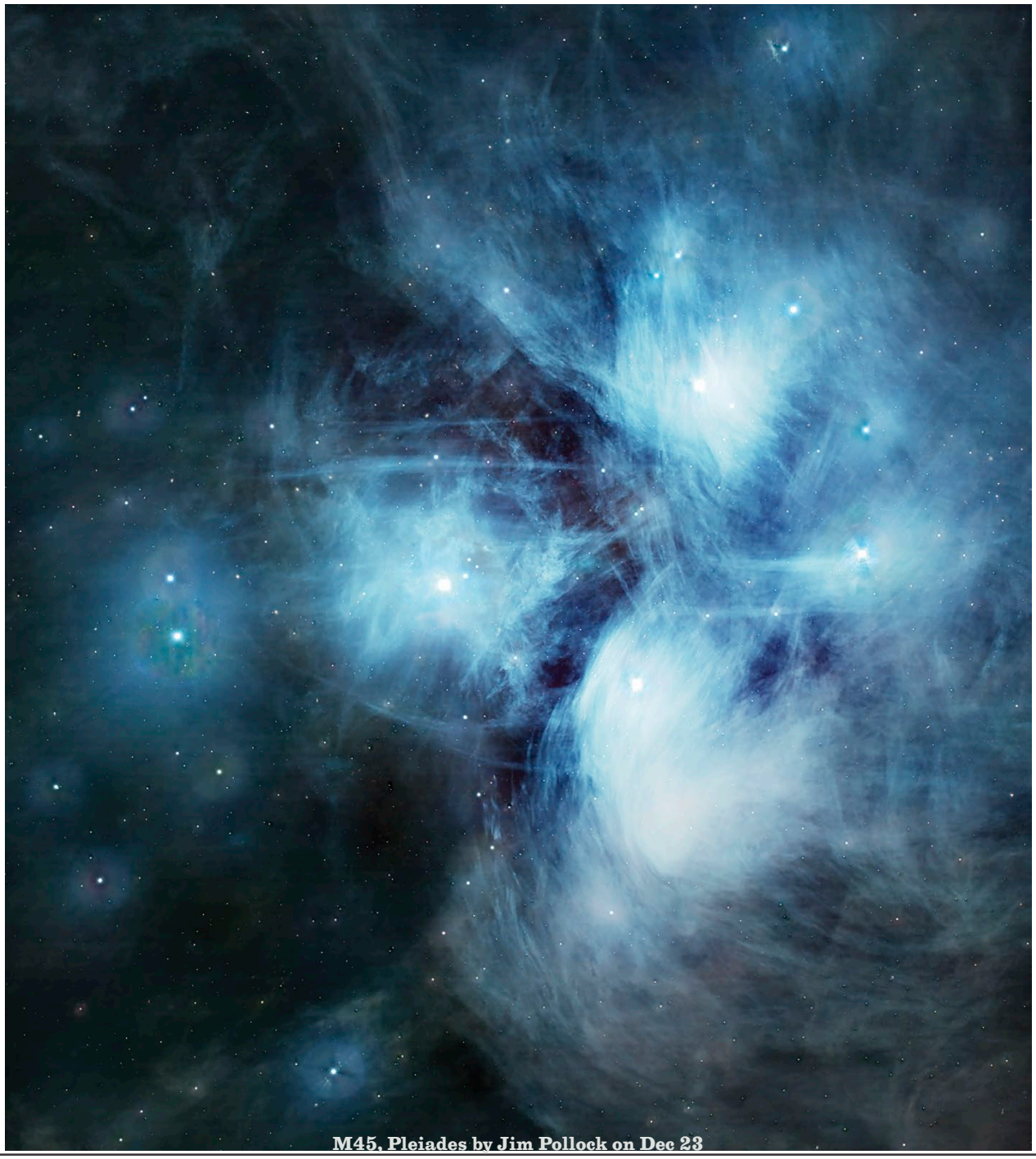
Jupiter on Dec 10 by Gary Garzone



Jupiter on Dec 10 by Gary Garzone



Mars on Dec 10 by Gary Garzone



M45, Pleiades by Jim Pollock on Dec 23

NGC 7023, Iris Nebula by Jim Pollock on Dec 23

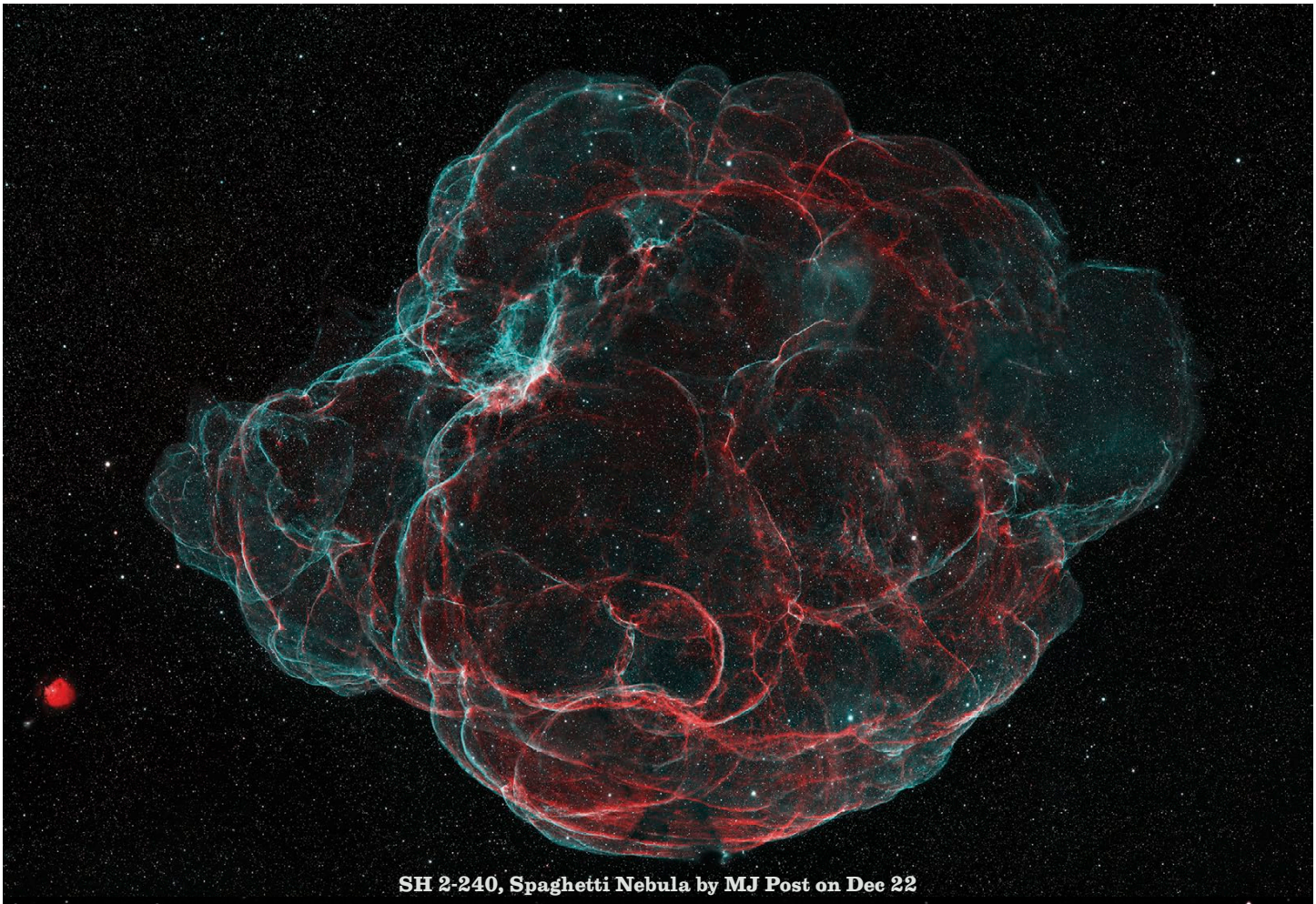
Cygnus Wall by Jim Pollock on Dec 24

M42, Orion Nebula by Jim Pollock on Dec 27

M42, Orion Nebula by on Dec 22 by John Freeman on Dec 22

NGC 2170, Angel Nebula by Martin Butley on Dec 16

IC 348 by Martin Butley on Dec 20



SH 2-240, Spaghetti Nebula by MJ Post on Dec 22

NGC 1514, Crystal Ball Nebula by MJ Post on Dec 30

M35 and NGC 2138 by MJ Post on Dec 31

IC 63 by Rolando Garcia on Dec 8

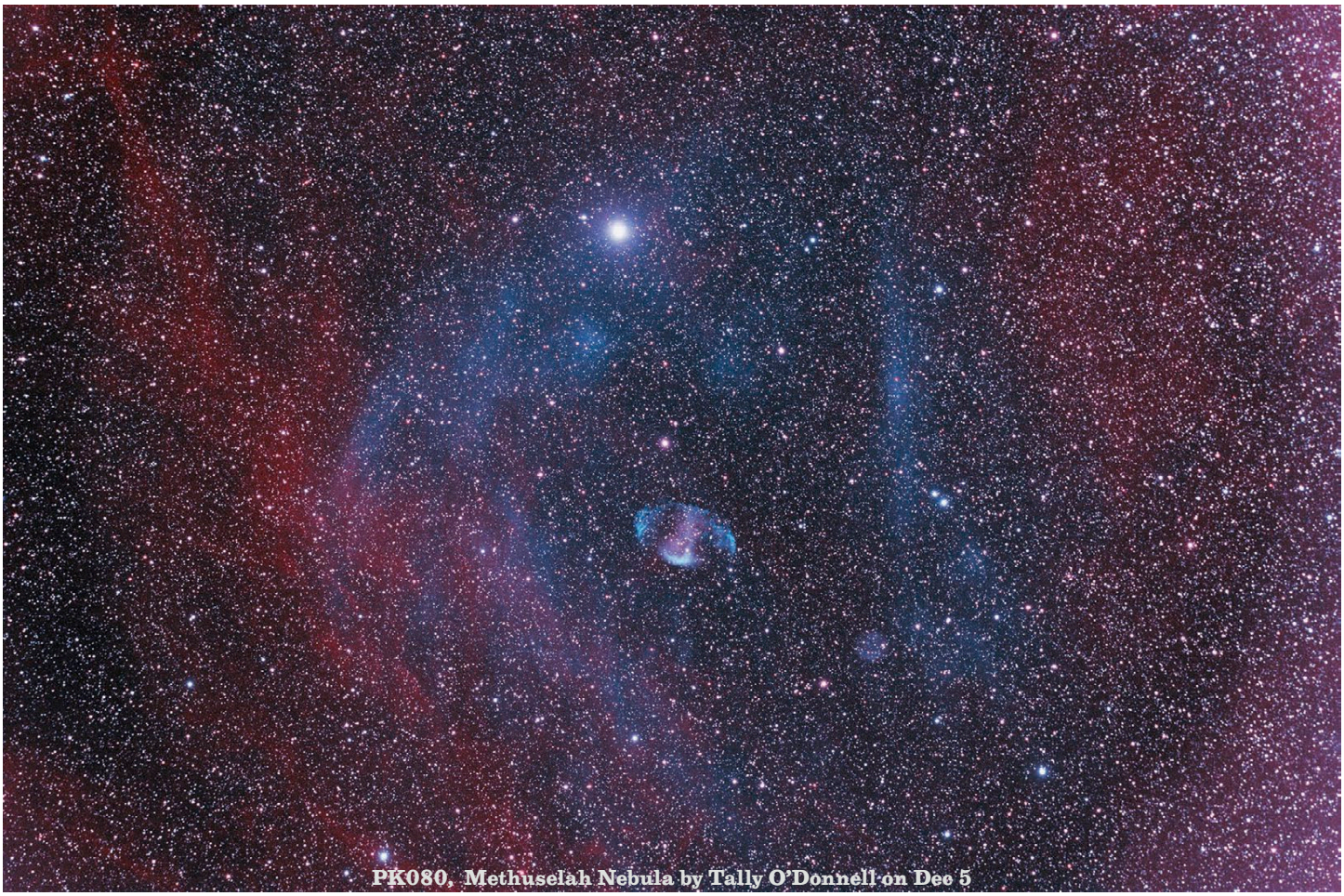
M33, Triangulum Galaxy by Rolando Garcia on Dec 5

IC 405 by Stephen Garretson on Dec 5

IC 406 (cropped) by Stephen Garretson on Dec 5

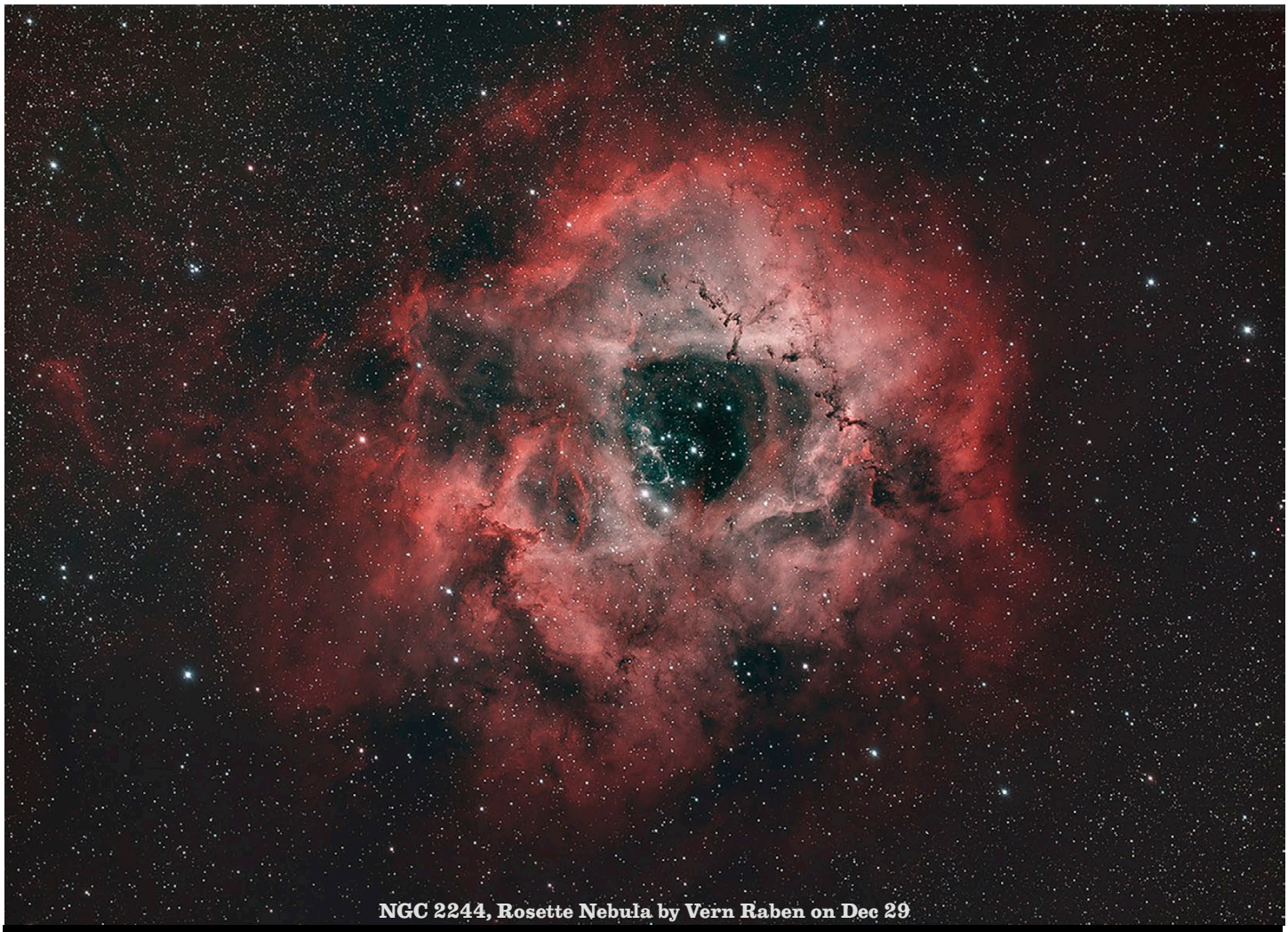
SH 2-210 Area by Stephan Garretson on Dec 23

SH 2-224 by Stephen Garretson on Dec 23

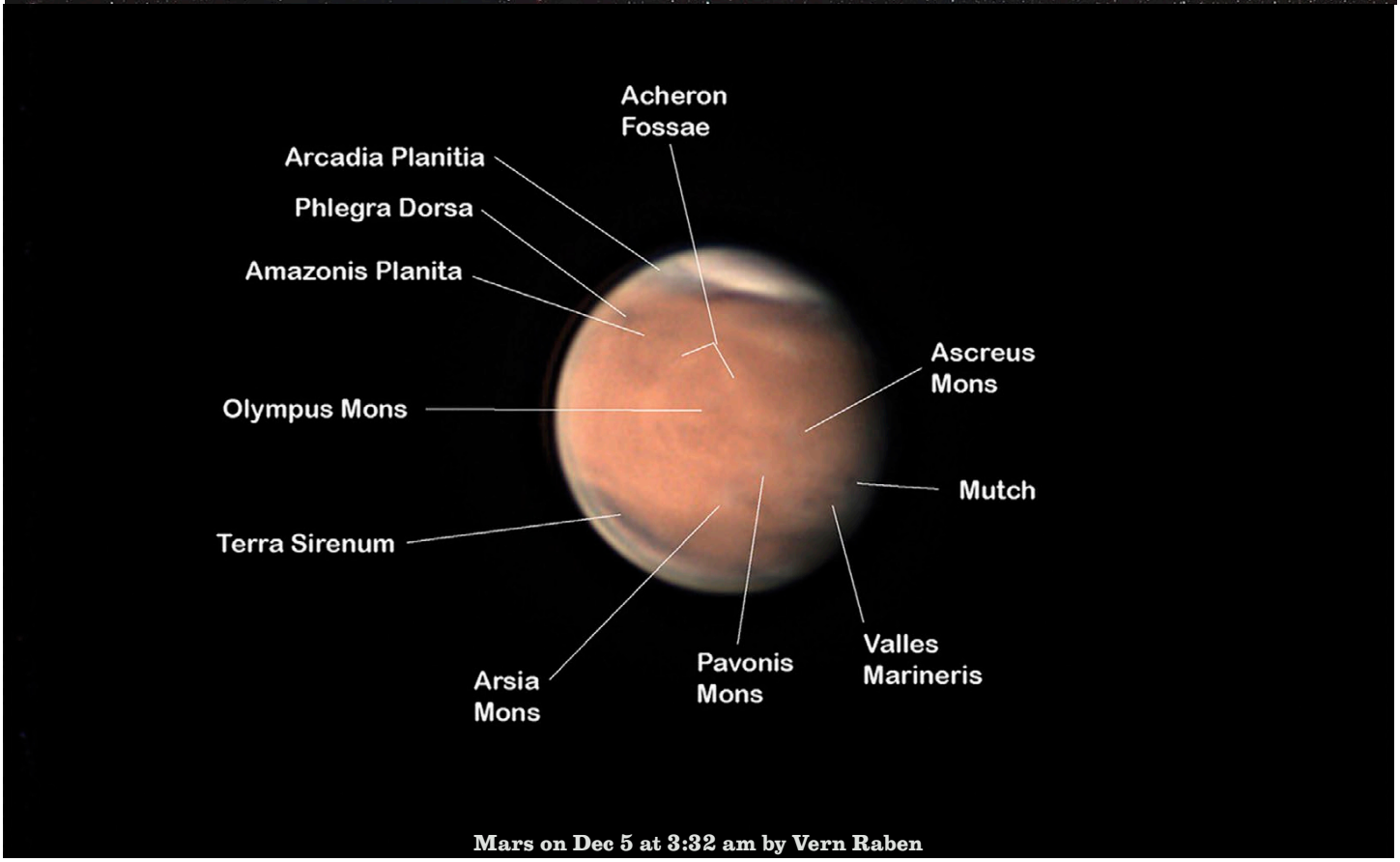


PK080, Methuselah Nebula by Tally O'Donnell on Dec 5

IC 434, Horse Head Nebula by Tally O'Donnell on Dec 22



NGC 2244, Rosette Nebula by Vern Raben on Dec 29



Mars on Dec 5 at 3:32 am by Vern Raben

Newsletter Archives by Eileen Hall-McKim

30 Years Ago January 1995

There was no formal December meeting, instead the annual LAS banquet was held at the China Gardens restaurant. After much socializing and consuming of edibles, it was time for some club business. Several "awards" were given out. Dave Street received a new type of hubcap to try in his all sky camera, and Bob Spohn received a new lighting device to take meteor observing. On a more serious note, Bob Ross received a well-deserved award of merit for his efforts in amateur astronomy.

The LAS in Cyberspace – The LAS now has a presence on the world wide web! For those with access to a net browser, the Internet and the WWW. Thanks to Steve Albers for putting together the home page. It's still "under construction" so if you have any suggestions of what you would like to see included please mention to Steve Albers or the editor. We would like to place some LAS astrophotos into the home page, so if you have some good ones we would like to see them!

Upcoming Star parties! To help you plan your observing for the new year, here is the when and where for LAS star parties until June: Feb 25th DSES, March 4th Woodrow (new site) April 29th Woodrow, May 27th Caribou, June 24th Deadman. Speaking of star parties, this month's will be on the 28th and will be hosted at Randy and Judy Cunningham's residence.

20 Years Ago January 2005

Image on the front page of the newsletter (on the left) is an RGB image with 3 minute exposures through each filter by Brian Kimball.

Cactus Flat report by Bill Possel:
Here's a report on January 8th's viewing at Cactus Flats. We had a pretty good night with Bob, Dave and Eric (high school students and members of LAS) with their 10" dobsonian, 5" reflector/eq mount and 70mm refractor. Also, Dan LaFaive showed up later with his Celestron SCT. I had my 20" Starmaster. The first few hours we struggled to catch objects between clouds or just view to the north which stayed mostly clear.

It was pretty cold, around 20 degrees, with a slight breeze - just cold enough to remind you that it's January! But once the skies cleared, we really had some nice views! Thors' Helmet (NGC 2359) and the Medusa nebula (Abell 21) were impressive along with the usual inspiring objects - Orion nebula, M31, M33, Double Cluster and, of course, Saturn! Dan had Saturn in his scope at over 400x - what a sight! Comet Macholz was easily seen naked eye and with the telescope its nucleus looked like a bright star. Dave and Bob even found the Cat's Eye planetary nebula with the 5".

Flanders Star Part report by Dick Mallot:
We had about a dozen or so folks show up for the star party at Flanders in December. Had a very nice time out there as it was not too cold. Some of the highlights: Monica Martens working on her Messier award from the Astronomical League; Roy Martens showing off some excellent views with his very wide angle lens on his 12" scope; Julie Carmen and her husband getting some great views of Saturn and working to split some double stars like Castor. Gary Garzone and Bob Spohn showed up later in the evening as well. Bob started practicing his new role as Astronomical League coordinator and was prodding Monica to find and document more objects. What a taskmaster he can be!! Gary brought along his digital camera and was working on trying to take comet pictures through Julie Carmen's refractor. The comet was quite visible and a good sight for the night. We saw some good long meteor trails as well out there that were spectacular. Had some folks from the public come by and visit for a while as well.

December meeting notes:

Webmaster report from Steve Albers: Latest images from Cassini, including first close-up views of moon Dionne.

- Tim Brown is in the Reflector for exoplanet discoveries.
- Telescope report by Don Bunker – Last two weekends, good sessions building scopes One scope coming together, asking club to approve 10 more focusers. We are off and running, looking forward to good winter of fun making scopes.
- Publicity and Fundraising report from Ray Warren. New books for drawing. New sticker designs. Lots of goodies. Sales during break. We have order for 60 planispheres, to accompany packets for students. New prizes for Astronomy Day, 6 Skywatching books by David Levy.
- Sign up for the banquet. Banquet is a good time, good food and company. Wayside Inn in Berthoud.
- The suggestion box for short topics will be starting next month. First short topic will be on celestial coordinates, much requested.
- Election results in, hanging chads, multiple recounts: Gary Garzone, President, Mark Propp, Secretary, Ray Warren Publicity, Dick Mallot, VP Julie Carmen, Fiske rep., Bob Spohn, AL correspondent. Philippe Bridenne, newsletter editor.
- Any observations? Steve Albers, Jupiter occultation by the moon. Pretty rare last time in 1980s. Saw one last week, Tuesday morning at 3 am. Had binoculars, saw Jupiter come from behind the moon, saw Ganymede pop out first, also saw meteor. Might be another twenty years until next visible one.

The Cincinnati Observatory by Bill Possel. While on Christmas vacation in Ohio, I had an opportunity to visit the birthplace of American astronomy - the Cincinnati Observatory. The observatory was founded by Ormsby McKnight Mitchel (who later discovered the "Mountains of Mitchel" on Mars) in 1842. He was a professor and generated local interest in astronomy through a series of lectures. The telescope was built by Merz & Mahler and is the oldest telescope still in use in the US. In 1904 another observatory building was added and the new owners, the University of Cincinnati, purchased a 16 inch Alvin Clark & Sons. During the 1900's both telescopes were active in minor planet research and public education. These magnificent telescopes are still active today with classes for local K-12 schools and amateurs giving public viewing sessions. Friends of the Observatory (FOTO) and CAS are working to develop techniques to use the scopes for variable star measurements and extra-solar planet search.

10 Years Ago January 2015

The annual banquet and meeting will be on Sunday, January 18, 2015 at Pinocchio's Incredible Italian, 210 Ken Pratt Blvd, Longmont CO from 6 to 8 pm

Star Party Announcement: "Superior Brings Night Sky to You". Location will be near the Coalton Trail head in Superior.


Moon by Glenn Frank


M 1 Crab nebula M1 by Gary Garzone

M1 was observed by English astronomer John Bevis in 1731. French astronomer Charles Messier added it as the first entry in his catalog of comet-like objects in 1752. In 1844 the Earl of Rosse observed it with his 36" reflecting telescope. His sketch of the object with numerous filaments resembled a crab and it has been known by that name ever since.

Longmont Astronomical Society
P. O. Box 806
Longmont, CO 80506

Heart of Orion by Rolando Garcia