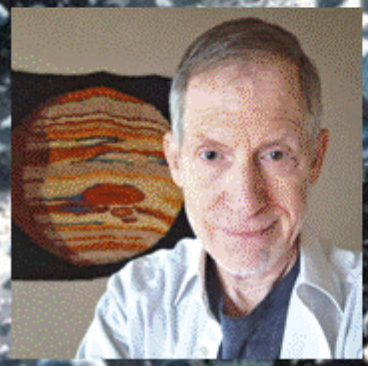
What Wondrous Worlds we Witnessed

– *a Personal Journey to the Planets*

by Lonny Buinis



2026

Itinerary

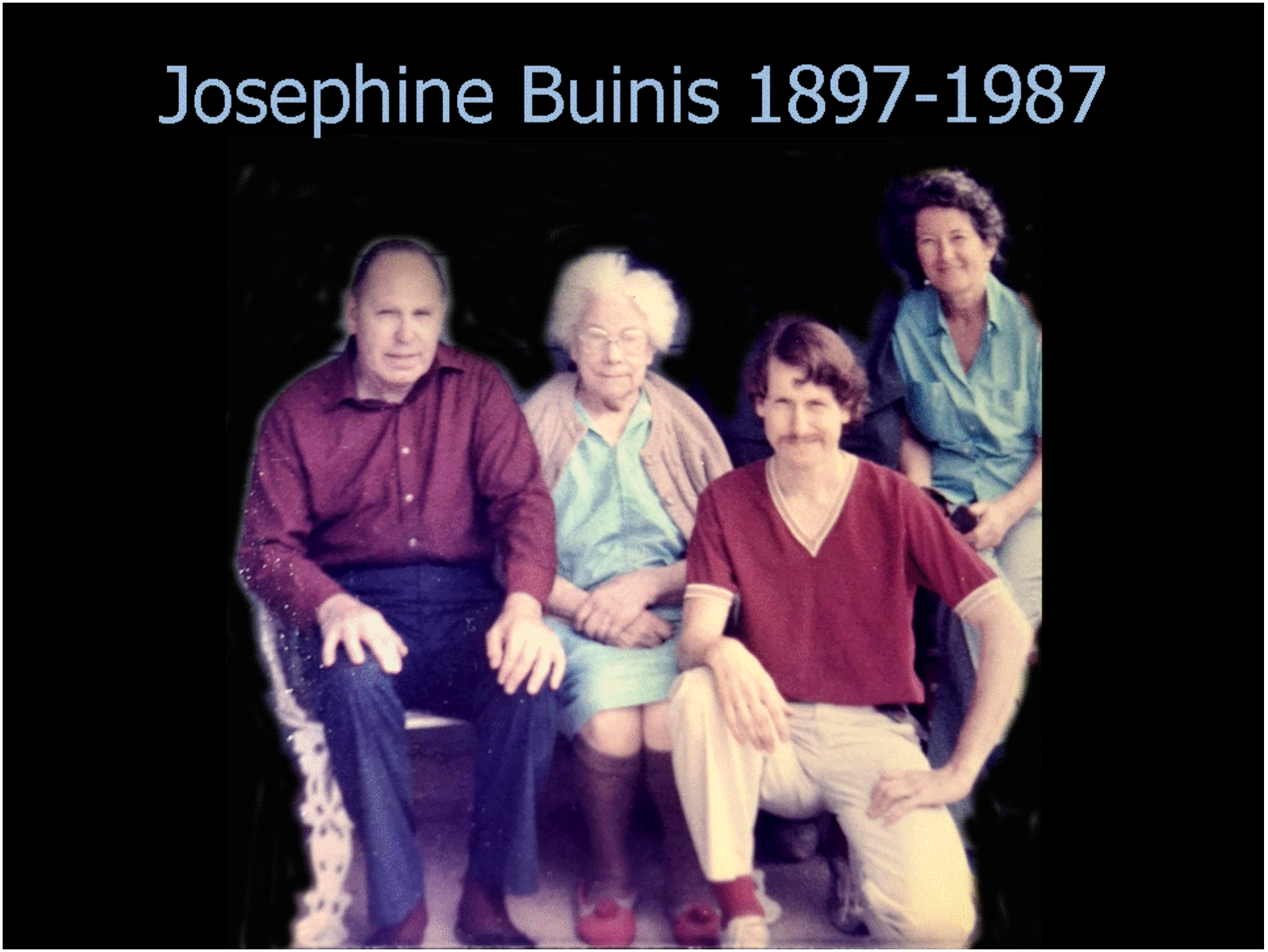
1. Pro vs. Amateur via Jupiter
2. Terrestrial Planets
3. Dwarf Planets
4. Giant Planets
5. Most Exciting Moons
6. Exoplanets

1st photograph of Jupiter 1879

Agnes Mary Clerke
"A Popular History of Astronomy During the Nineteenth Century"

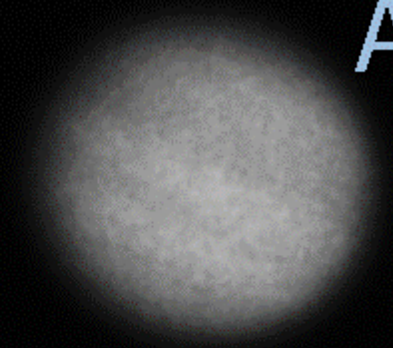
- https://www.reddit.com/r/space/comments/315wy1/jupiter_in_1879_and_2014/
- https://www.diyphotography.net/the-first-and-the-latest-jupiter-image-show-how-far-astronomy-has-come/

Josephine Buinis 1897-1987

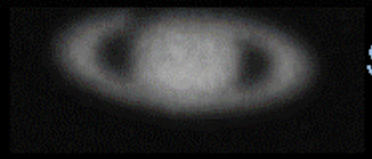


Father 1920-2004

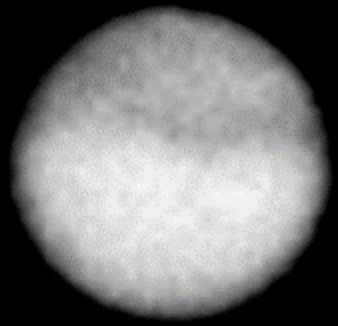
Astrophotography with film



Jupiter 4 sec yellow green filter



Saturn 4 sec no filter



Mars 1 sec orange filter

6" f/8 Newtonian reflector

- Author: Giorgos Ranger 4, Athens, Greece
- January 14, 2011
- Vintage style planetary photography
- B&W film (Agfaphoto 400) with homebrew Kodak D-11 high contrast developer
- https://www.cloudynights.com/forums/topic/734314-planets-on-black-and-white-film/

Ektachrome film

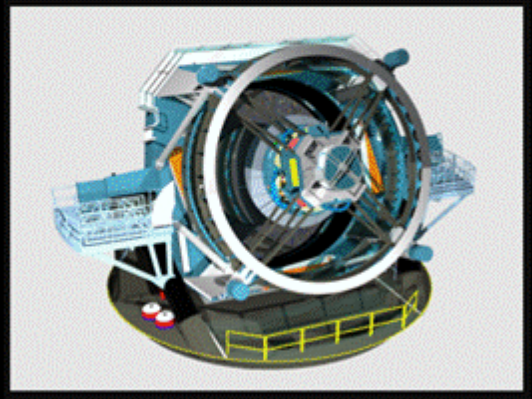
Lunar & Planetary Lab, U. of Arizona, c. 1969

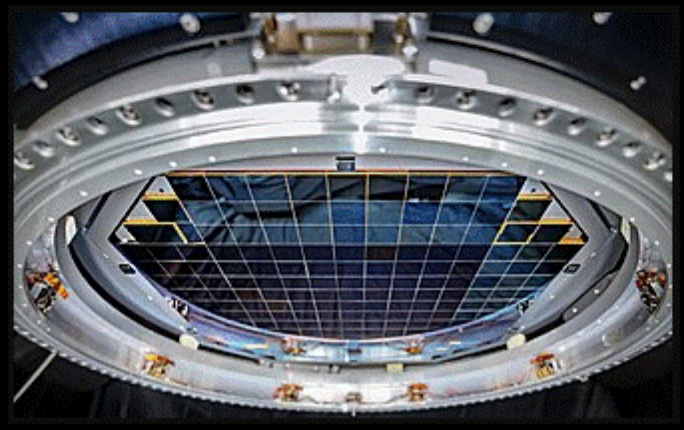
- Introduced 1946
- Allowed both professionals and amateurs to process their own films.
- Distinctive look that became familiar to many readers of National Geographic.
- Used extensively for color photographs where Kodachrome was too slow.
- Stable at shutter speeds between 10 seconds and 1/10,000 sec.

CCDs – Charge-Coupled Devices

- 1974
  - 1st scientific use of CCDs in astronomy
  - 100x100 Fairchild CCD integrated into camera
  - used with 8-inch amateur telescope to capture Moon
  - https://astronomy.stackexchange.com/questions/61412/first-scientific-use-of-a-ccd-device-for-astronomical-observation
- 1985
  - 1st mention of a CCD camera for sale
  - *Astronomy* magazine
  - https://www.astronomy.com/observing/how-amateur-astronomy-has-evolved-in-the-past-half-century/

Large Synoptic Survey Telescope camera
Vera C. Rubin Observatory





- Telescope
  - Primary mirror 8.417 m (27 ft 7.4 in), obstructed
  - Effective aperture 6.42 m (253 in = 21 ft)
  - Palomar Observatory Hale telescope: 5.08 m = 200 in.
- Camera
  - focal plane > 60 cm (2 feet) wide
  - contains 189 individual sensors
  - produces 3200-megapixel images = 3.2 gigapixels
  - 3.5-degree-diameter field of view
  - largest camera yet constructed

- **NEAF - N**orth**E**ast **A**stronomy **F**orum
- April 5-6, 2025
- Sean Walker / Sky & Telescope
- https://skyandtelescope.org/astronomy-news/new-gear-northeast-astronomy-forum/

CCD cameras for astronomy

- Sony IMX662 CMOS Sensor
- 9mm
- Resolution: 1920x1080

CCD cameras for astronomy

HIGH POINT SCIENTIFIC

ZWO ASI461MM Pro USB3.0 Cooled Monochrome Camera

Ask a question

Add to

In Stock (Only 1 Left)

Free Shipping

$14,800.00

Add Apertura Universal 5 AMP AC Adapter to your order + $49.95

Add Apertura Optics & Sensor Cleaning Kit - 20 Piece to your order + $49.95

Add Apertura Armored USB Hub with 5A Power Supply to your order + $199.95

Add accident protection powered by Extend

Covers accidental damage such as drops and spills. What's Covered?

2 Year: $449 | 3 Year: $649 | 5 Year: $1,199

- Sony CMOS sensor
- 44 mm x 33 mm
- high resolution of 11,656 x 8750
- 100MP cooled camera

picastro

Sep 25, 2024 · 6 min read

Software for Astronomy Processing of Planets and More.

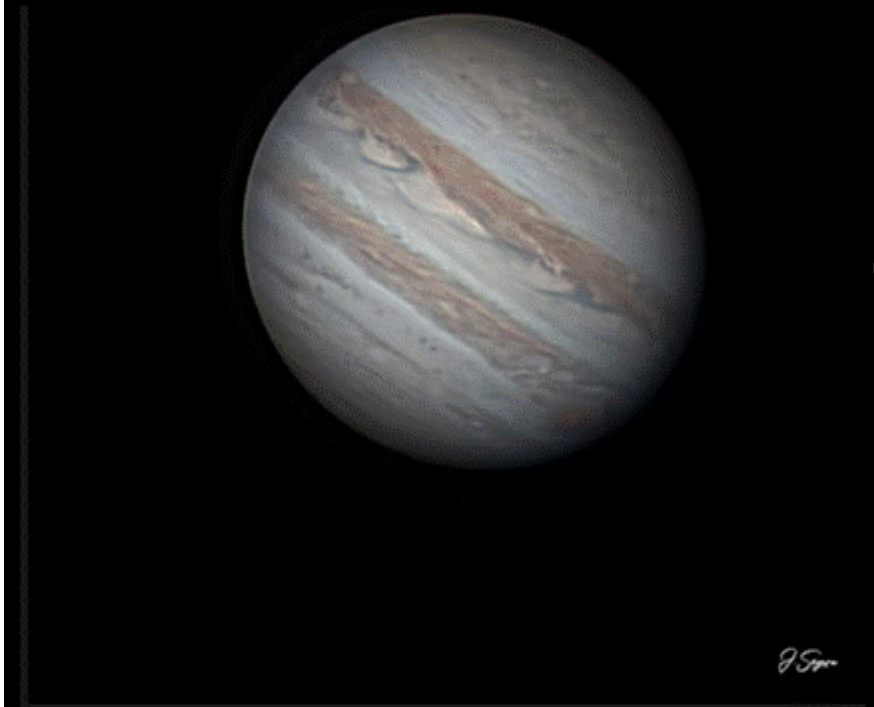
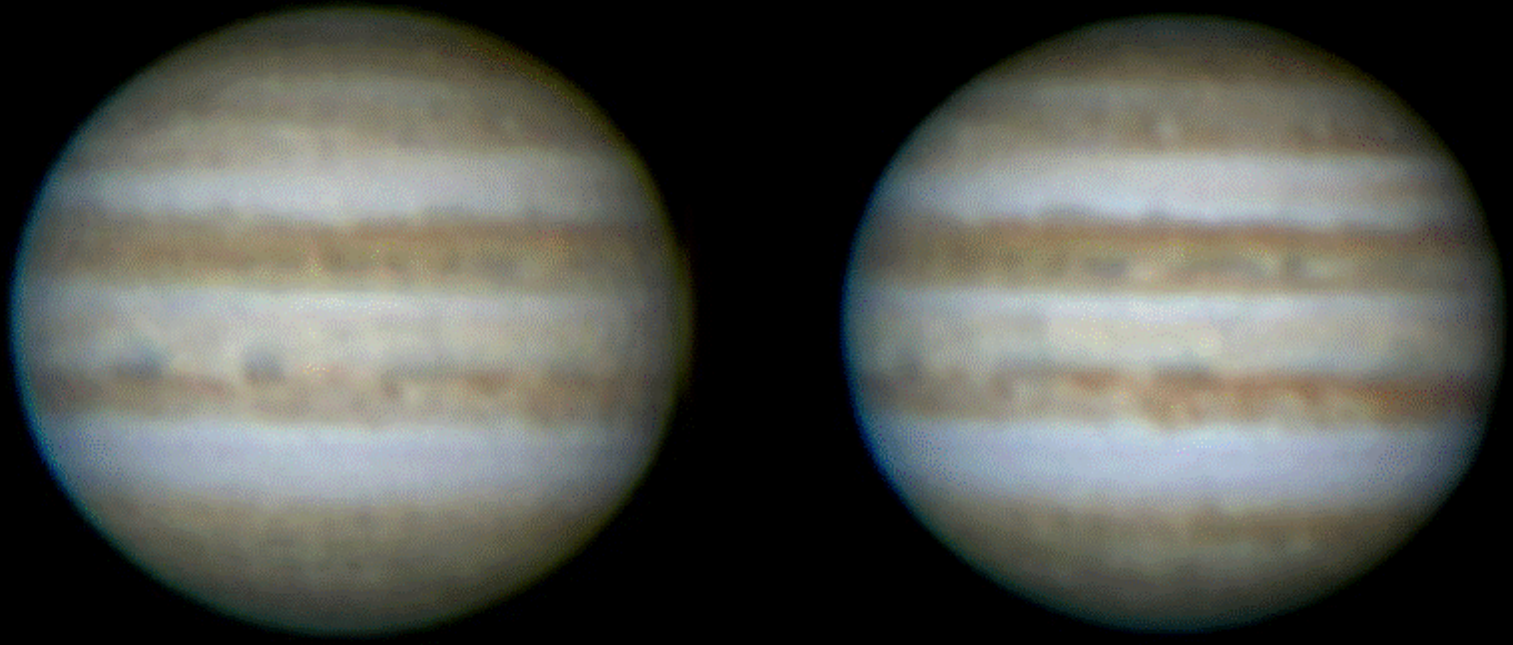


Image above by Jorge Segura - probably one of the best planetary imagers I know!

- https://www.picastroapp.com/post/best-software-for-astronomy-processing
- **RegiStax**
  - planetary, Moon, solar images
  - user-friendly stacking and sharpening
  - exclusively for PC users
- **AutoStakkert!**
  - automatic selection & stacking of sharpest frames from a video
  - primarily for planetary and lunar
  - used in conjunction with RegiStax
  - free software
- **Siril**
  - versatile, open-source
  - planetary & deep-sky images
  - convert video files into individual frames and stack them
  - tools for post-processing
  - multiple operating systems
  - advanced image calibration tools

De-Rotation

ROTATION OF JUPITER IN ONE HOUR

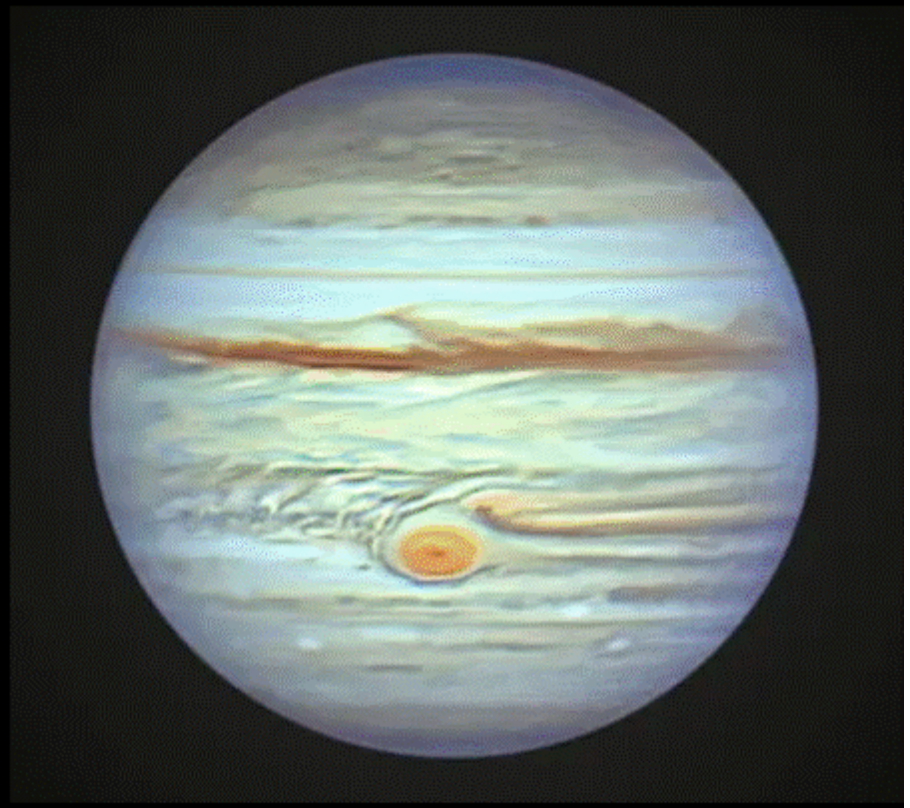


9:05 p.m. EST 10:05 p.m. EST

2004 March 26

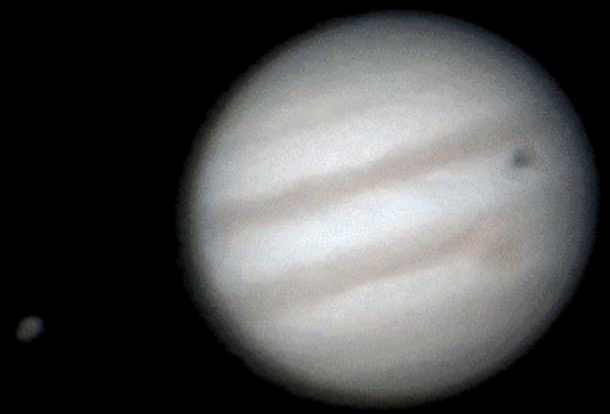
8" f/10 SCT, 2x Barlow, ToUCam Pro, Registax

- Michael A. Covington
- Author, *Astrophotography for the Amateur* and other books
- https://www.covingtoninnovations.com/astro/exhibit0.html



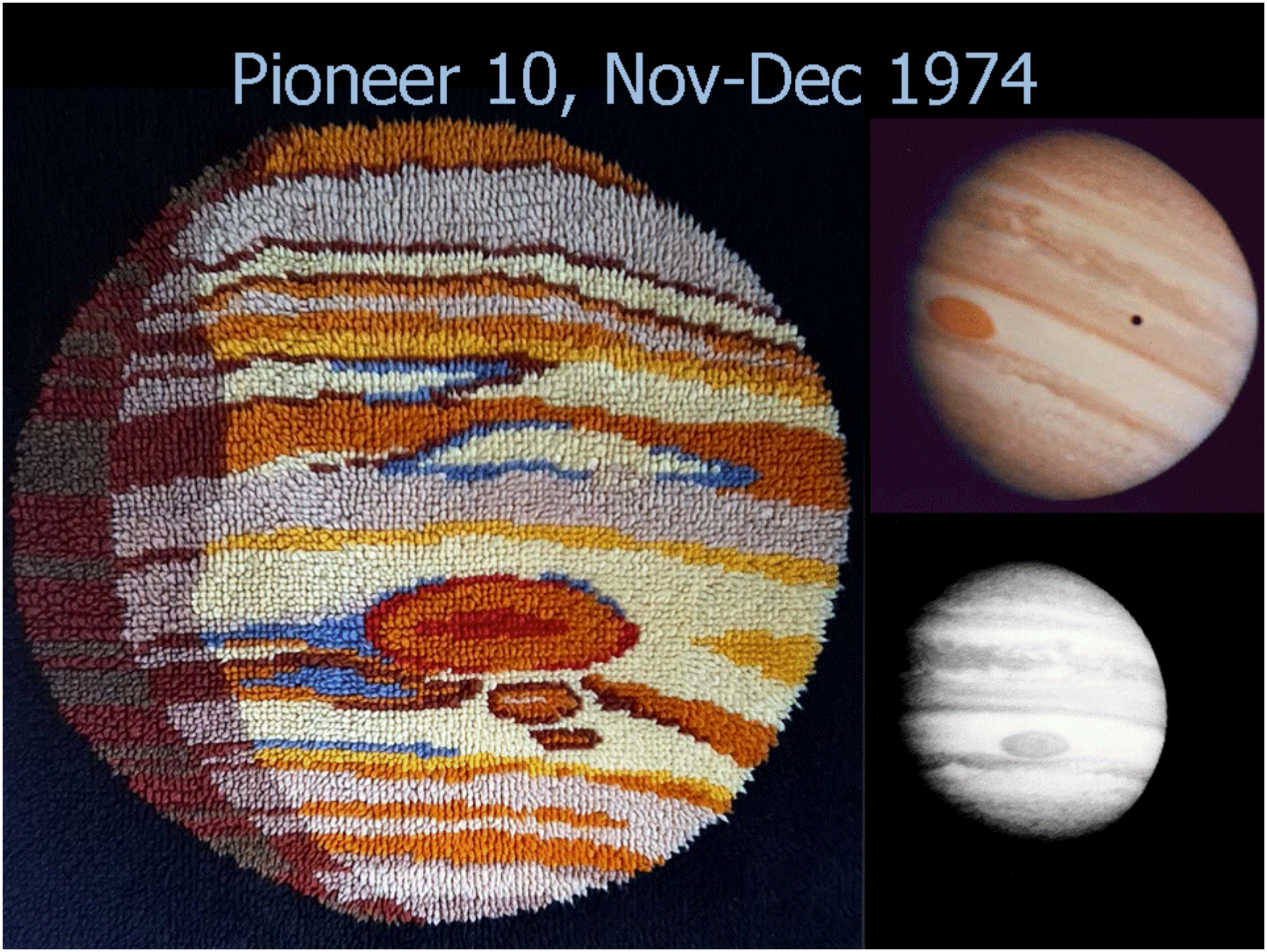
- September 17, 2022
- stacked 600,000 images
- 11 inch telescope
- https://www.space.com/jupiter-photo-most-detailed-by-photographer
- https://www.instagram.com/cosmic_background/

iPhone Astrophotography

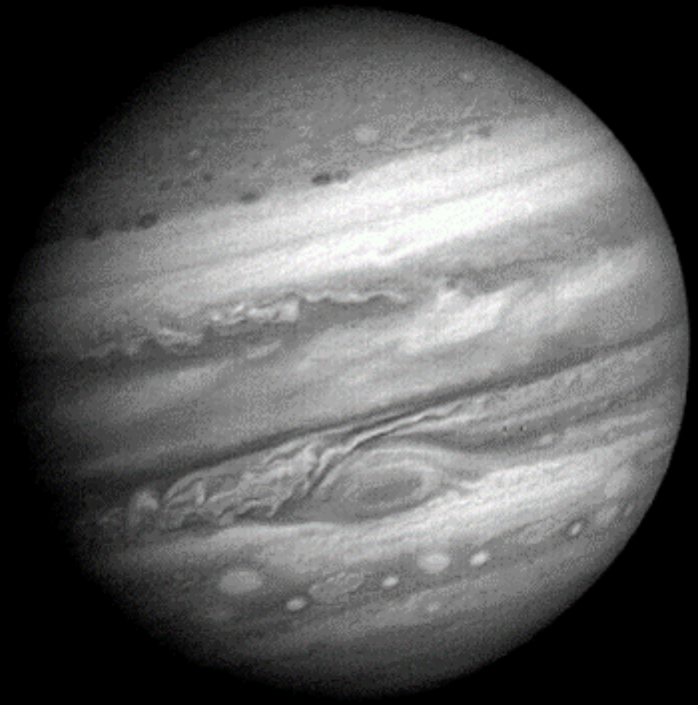


- "On April 14, 2015, I took images of Jupiter over the span of 2.5 hours with an iPhone 6 attached to my 8" Celestron NexStar 8SE telescope. I then chose the best four images and assembled them into the following GIF."
- Moon Ganymede and shadow
- Thoughts on Astronomy, Astrophotography and Spaceflight from Andrew Symes
- https://canadianastronomy.wordpress.com/tag/jupiter/

Pioneer 10, Nov-Dec 1974

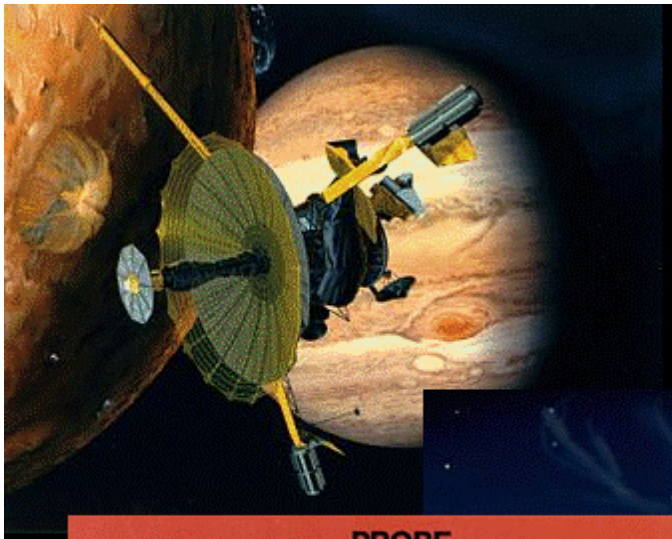


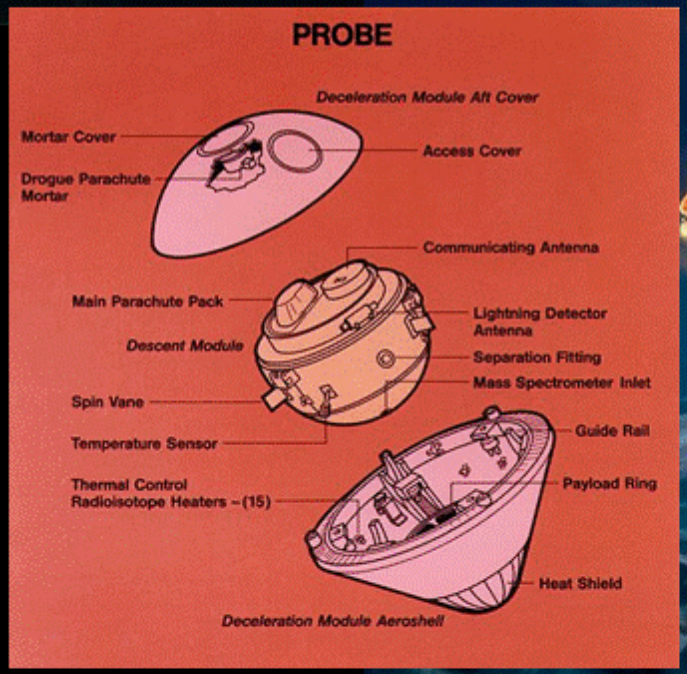
Voyager's "Blue Movie" of Jupiter

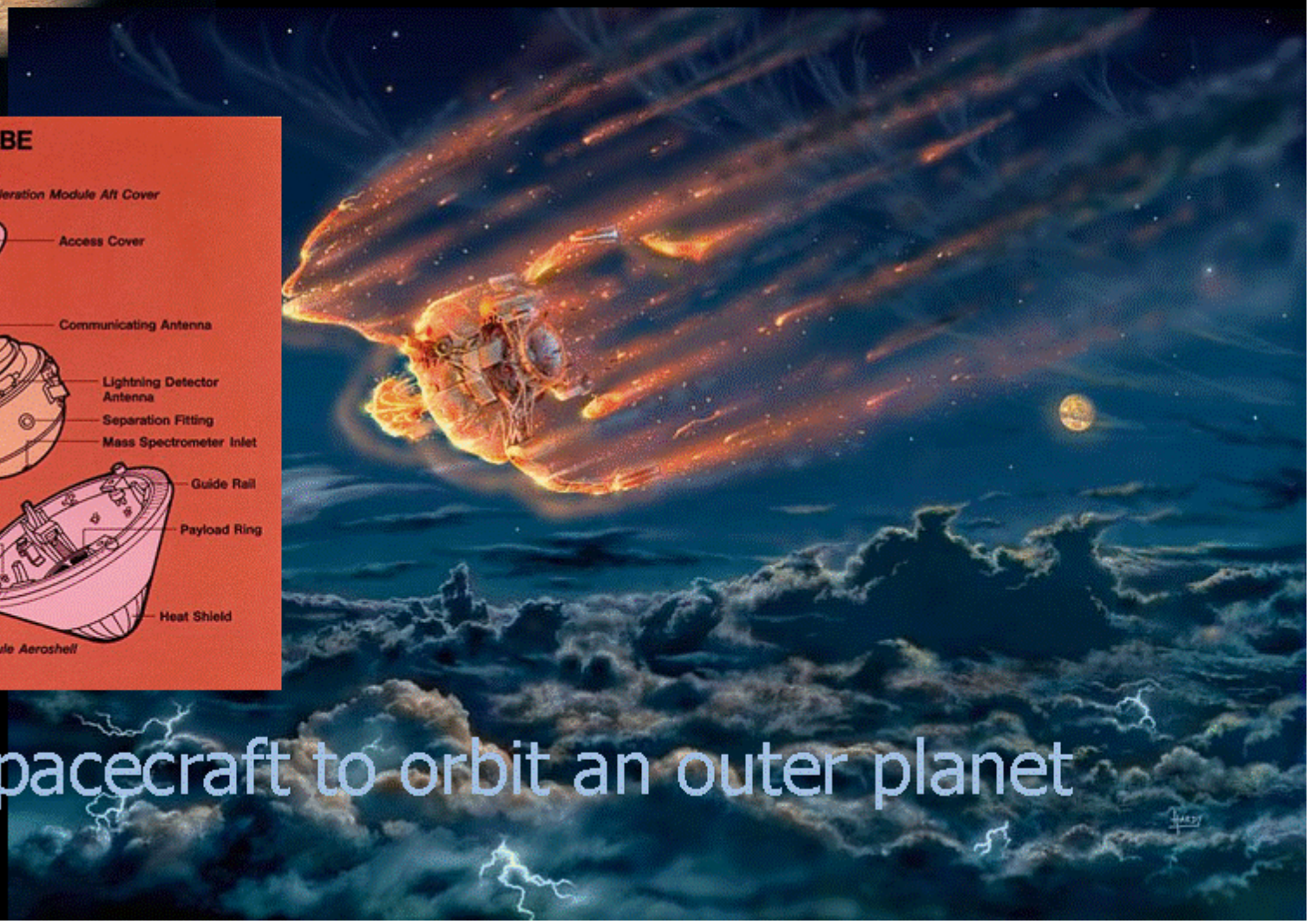


- Jupiter flyby January through April 1979
- Voyager "Blue Movie" - built from Blue filter images
- approach of Voyager 1 during >60 Jupiter days
- https://science.nasa.gov/image-detail/pia02855-4/

Galileo spacecraft 1995-2003

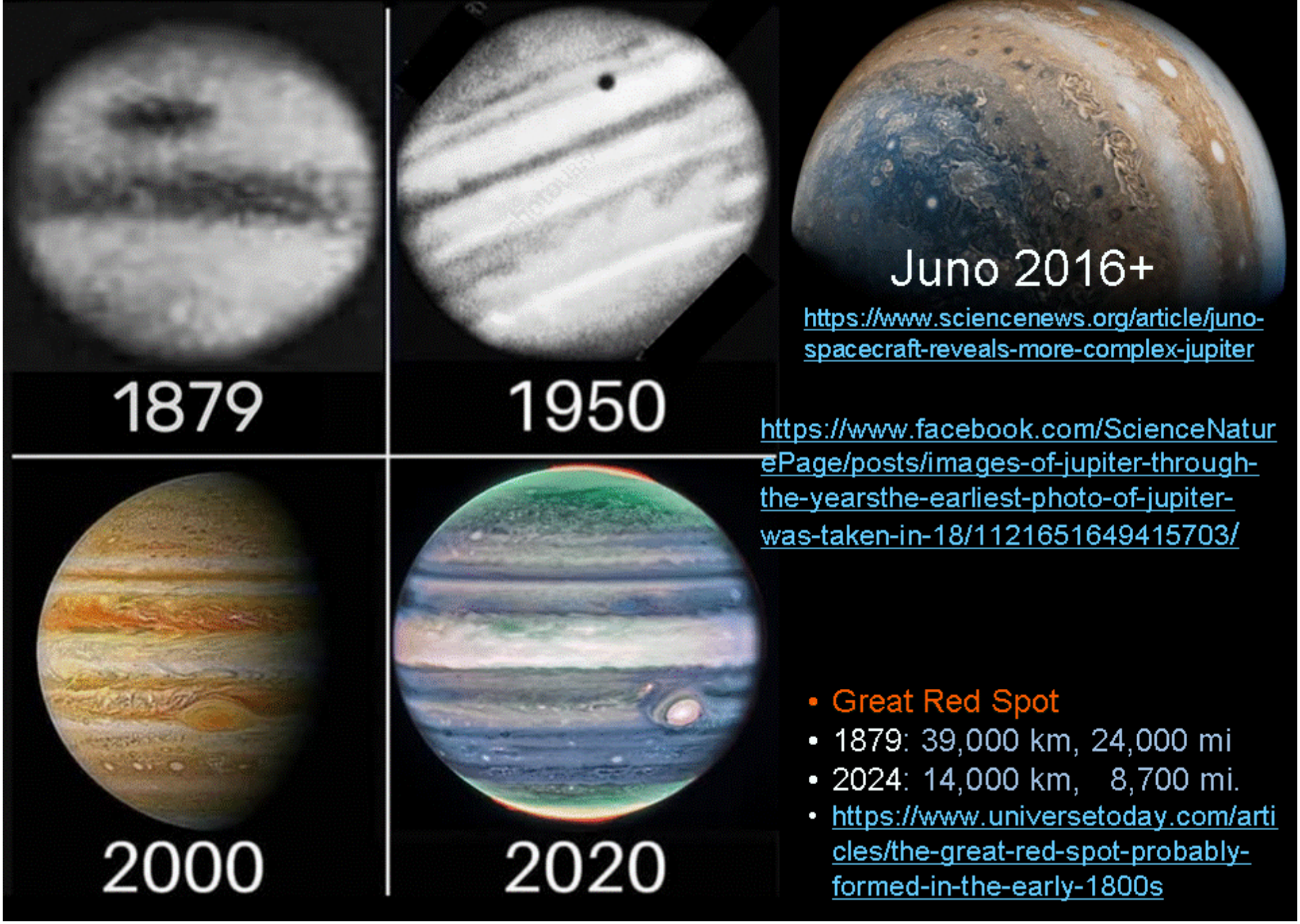






- first spacecraft to orbit an outer planet

IMAGES OF JUPITER OVER 100 YEARS

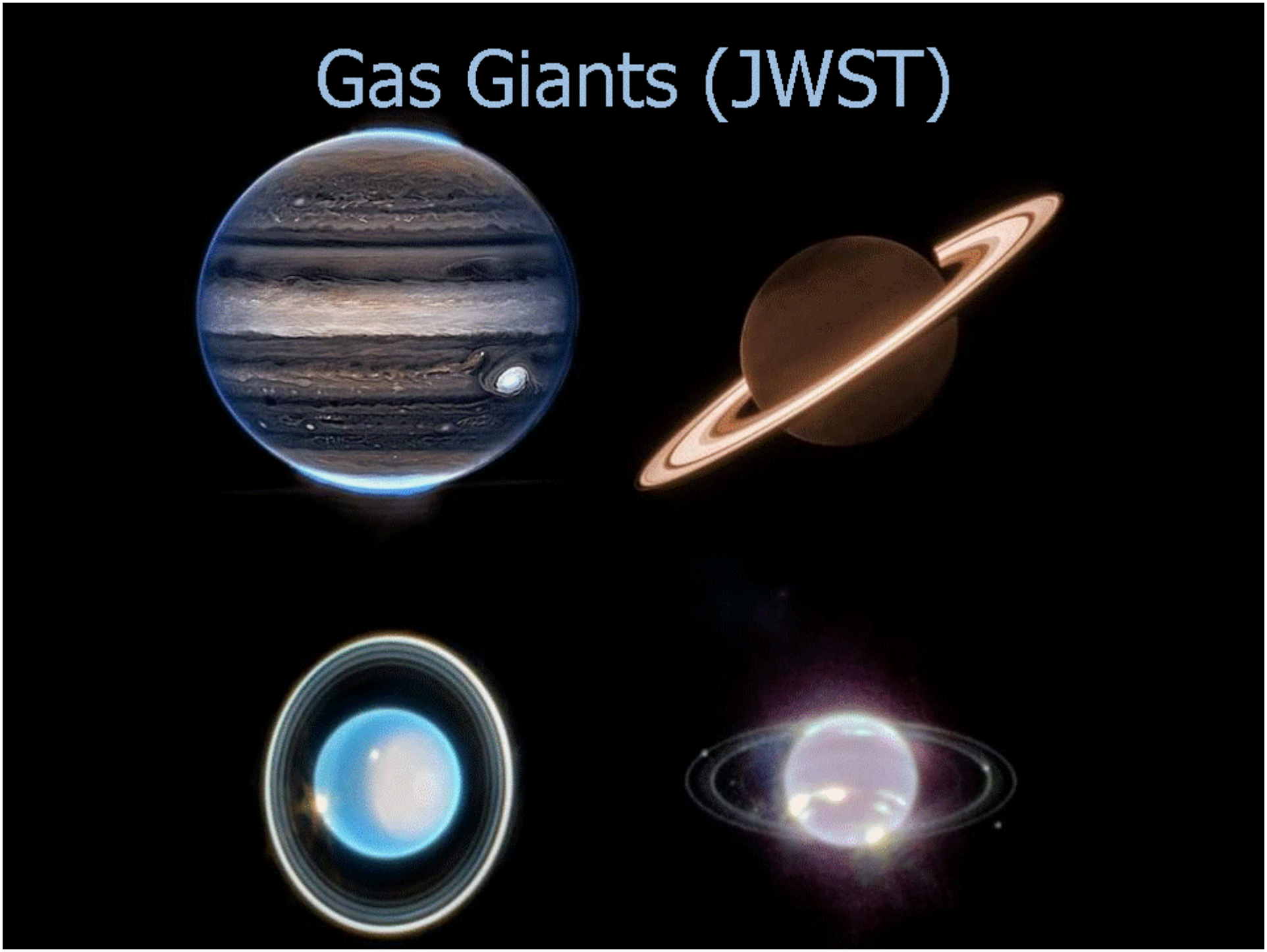


https://www.sciencenews.org/article/juno-spacecraft-reveals-more-complex-jupiter

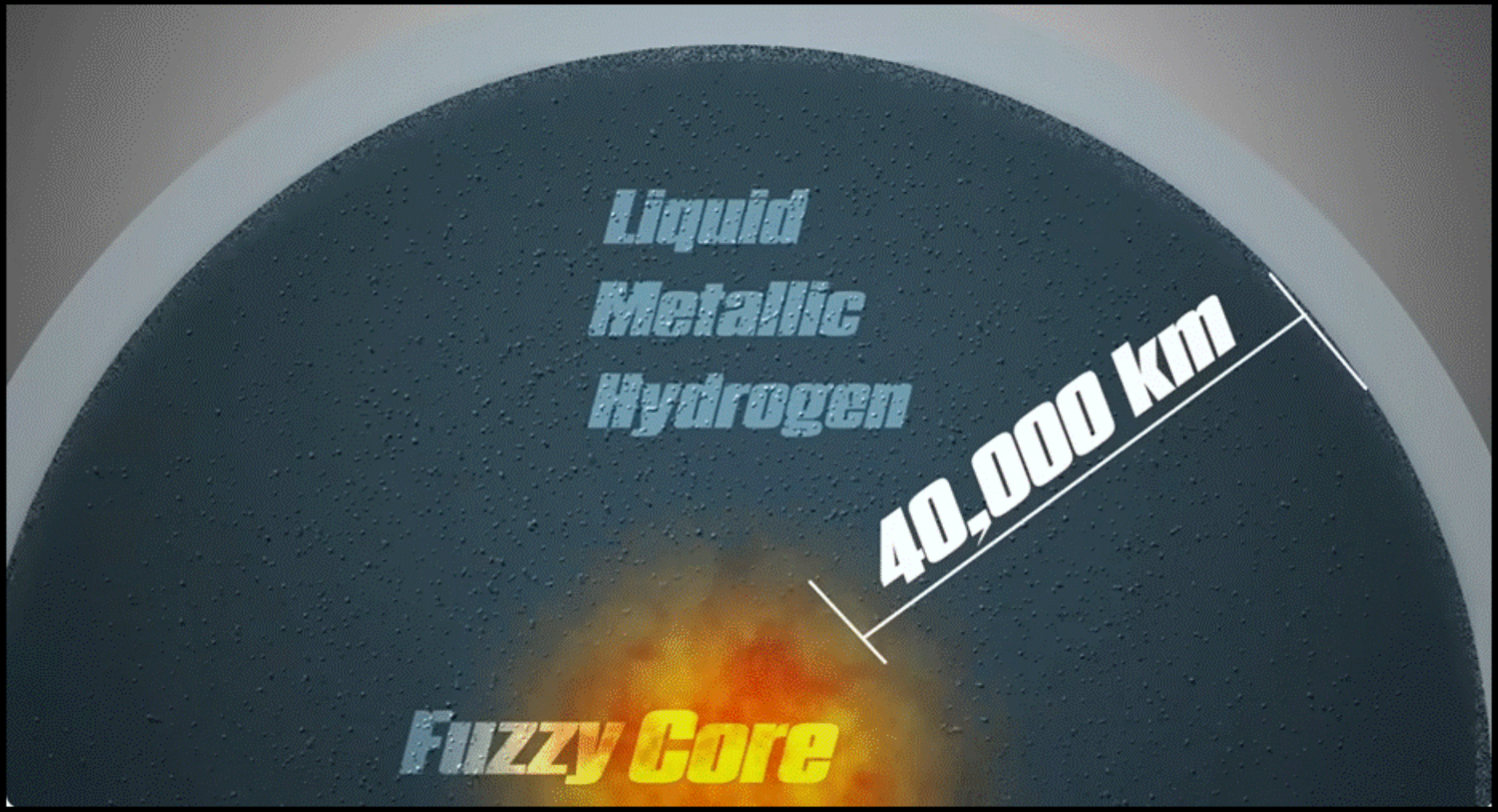
https://www.facebook.com/ScienceNaturePage/posts/images-of-jupiter-through-the-yearsthe-earliest-photo-of-jupiter-was-taken-in-18/1121651649415703/

- Great Red Spot
- 1879: 39,000 km, 24,000 mi
- 2024: 14,000 km, 8,700 mi.
- https://www.universetoday.com/articles/the-great-red-spot-probably-formed-in-the-early-1800s

Gas Giants (JWST)



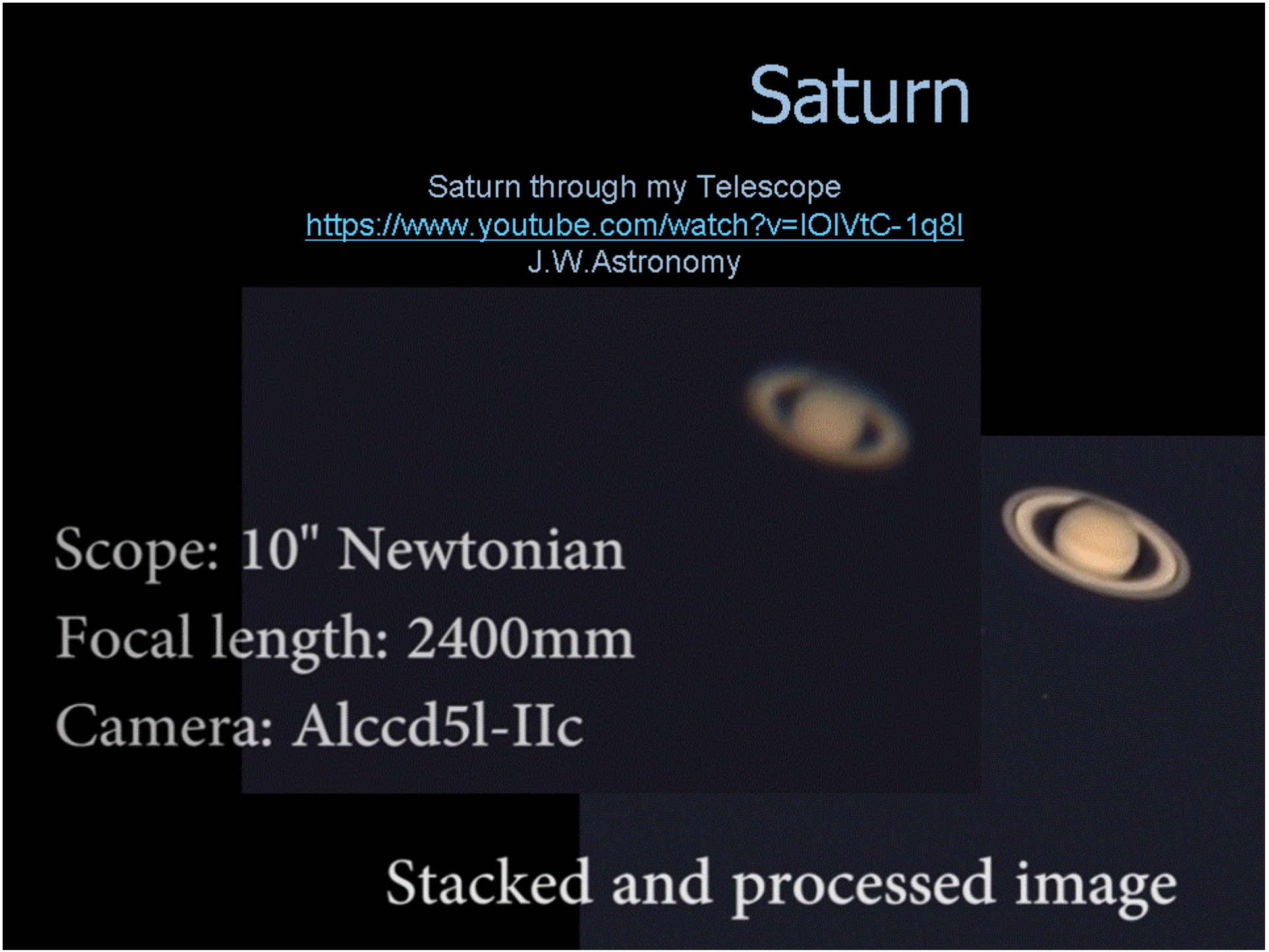
Just "Giant" ?



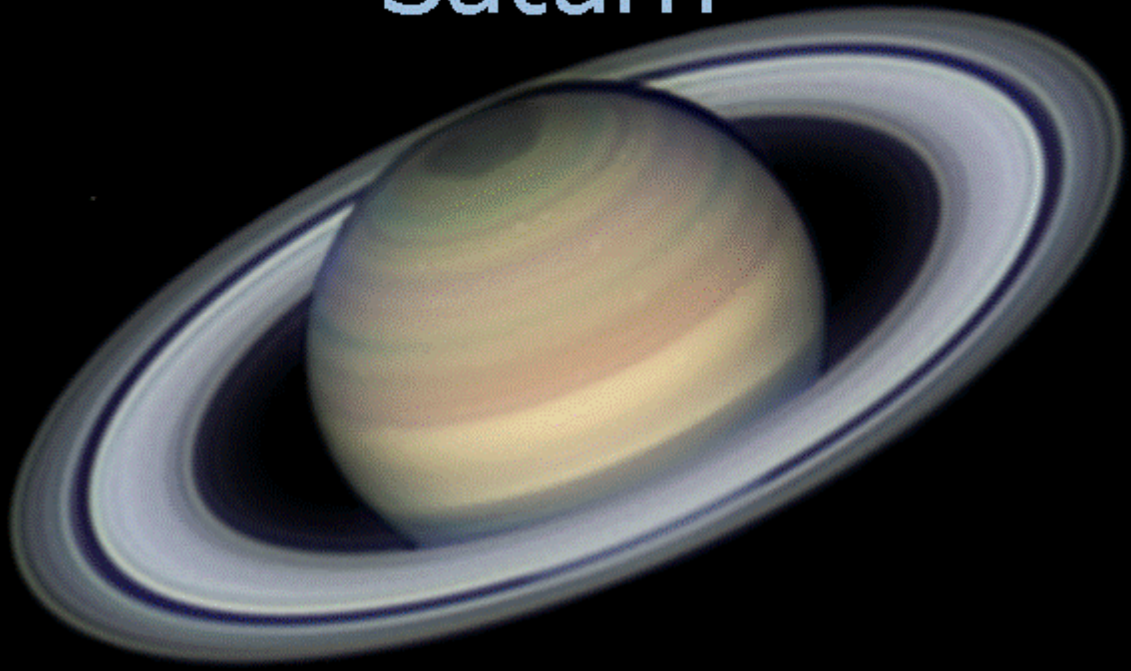
https://www.youtube.com/watch?v=cyNM4jZc24Q

Saturn

Saturn through my Telescope
https://www.youtube.com/watch?v=lOlVtC-1q8I
J.W.Astronomy

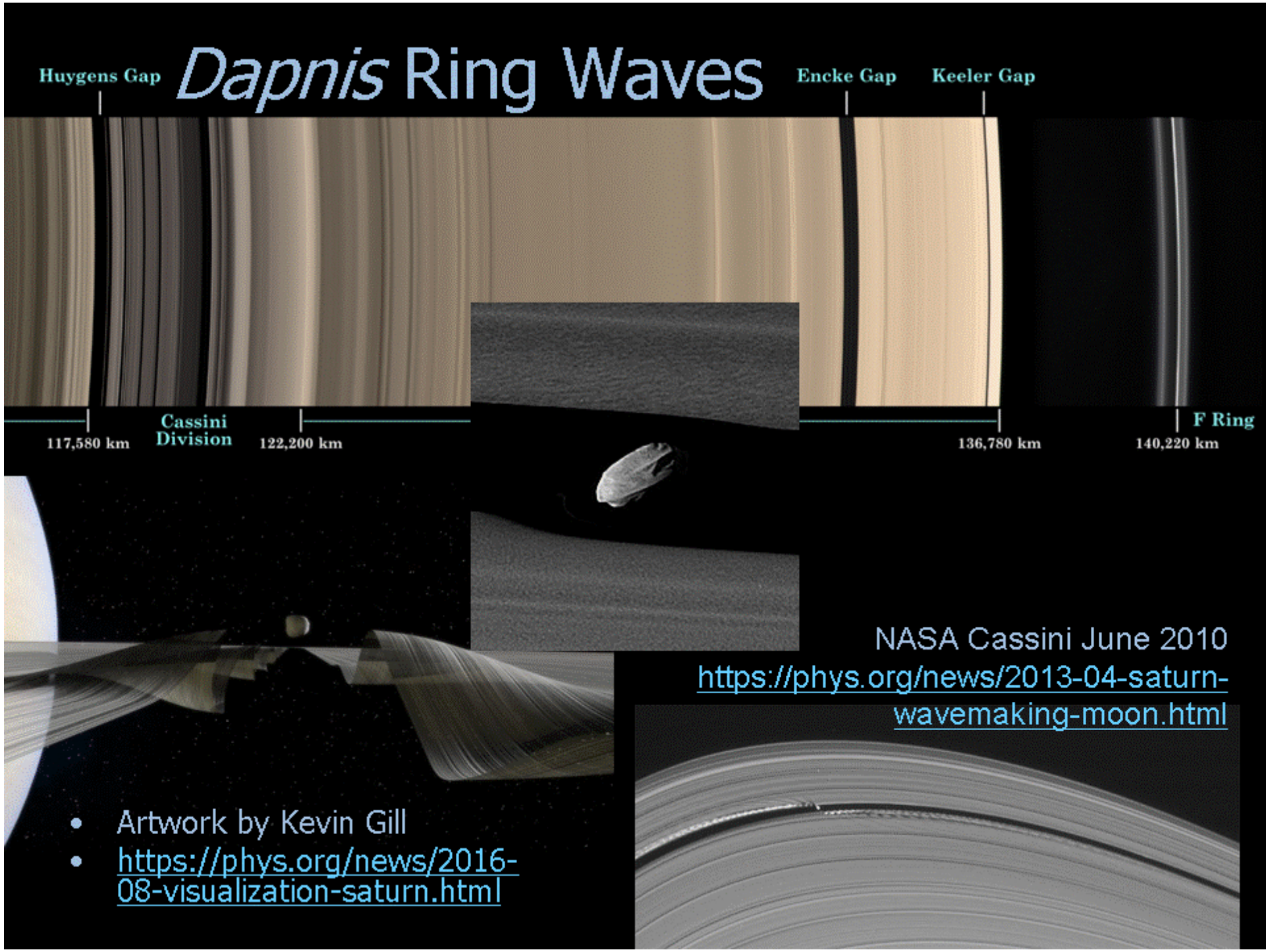


Saturn



- ZWO ASI174MM-MINI 2.1 MP CMOS Monochrome Astronomy Camera
- 6.85”
- 84,000 frames from a rapid-fire sequence
- $546
- https://www.cloudynights.com/forums/topic/498967-probably-our-personal-best-for-saturn/

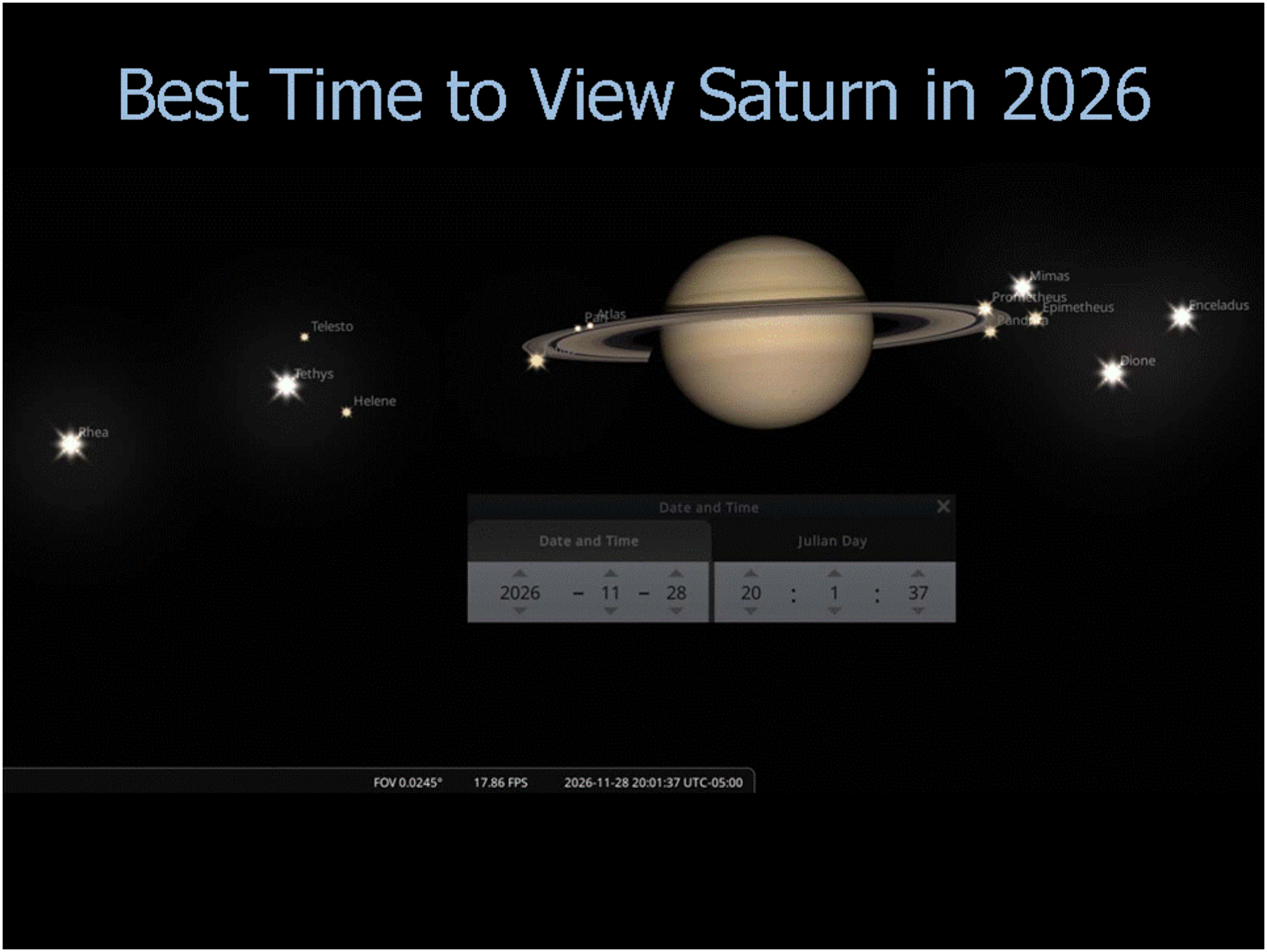
Dapnis Ring Waves



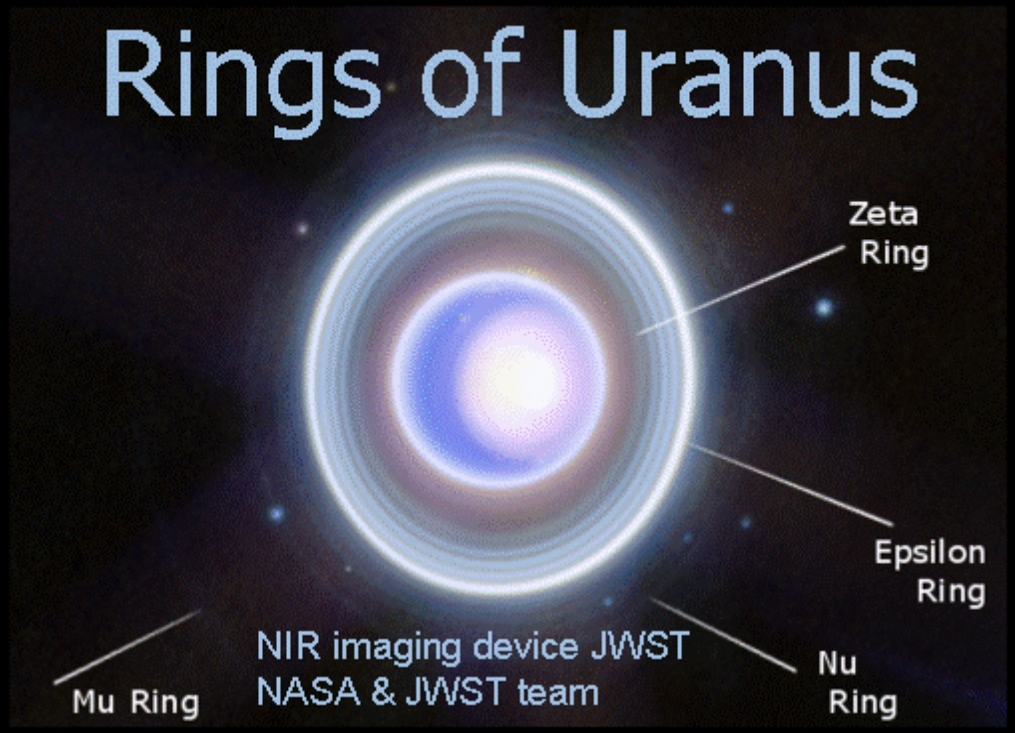
- Artwork by Kevin Gill
- https://phys.org/news/2016-08-visualization-saturn.html

NASA Cassini June 2010
https://phys.org/news/2013-04-saturn-wavemaking-moon.html

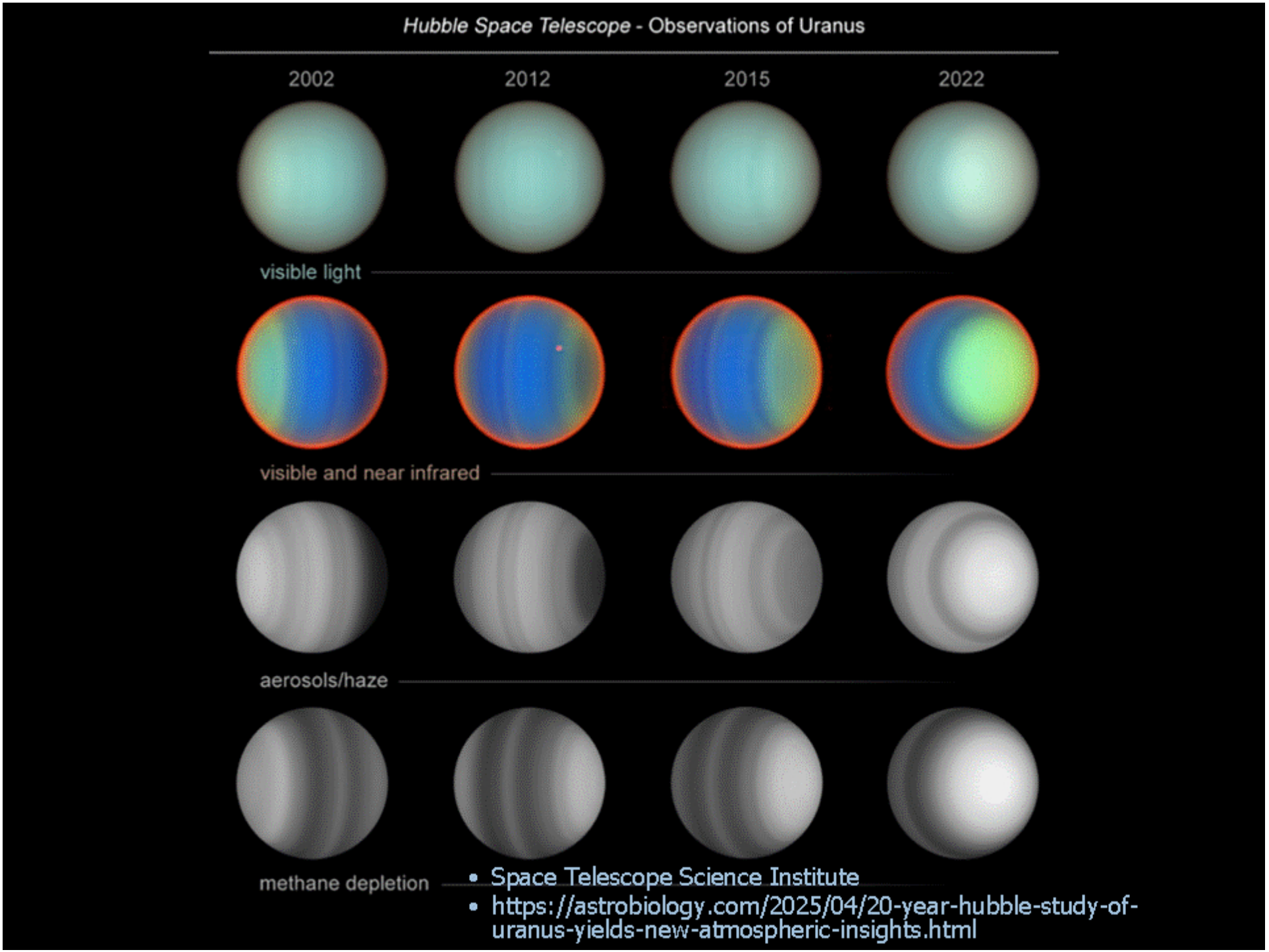
Best Time to View Saturn in 2026



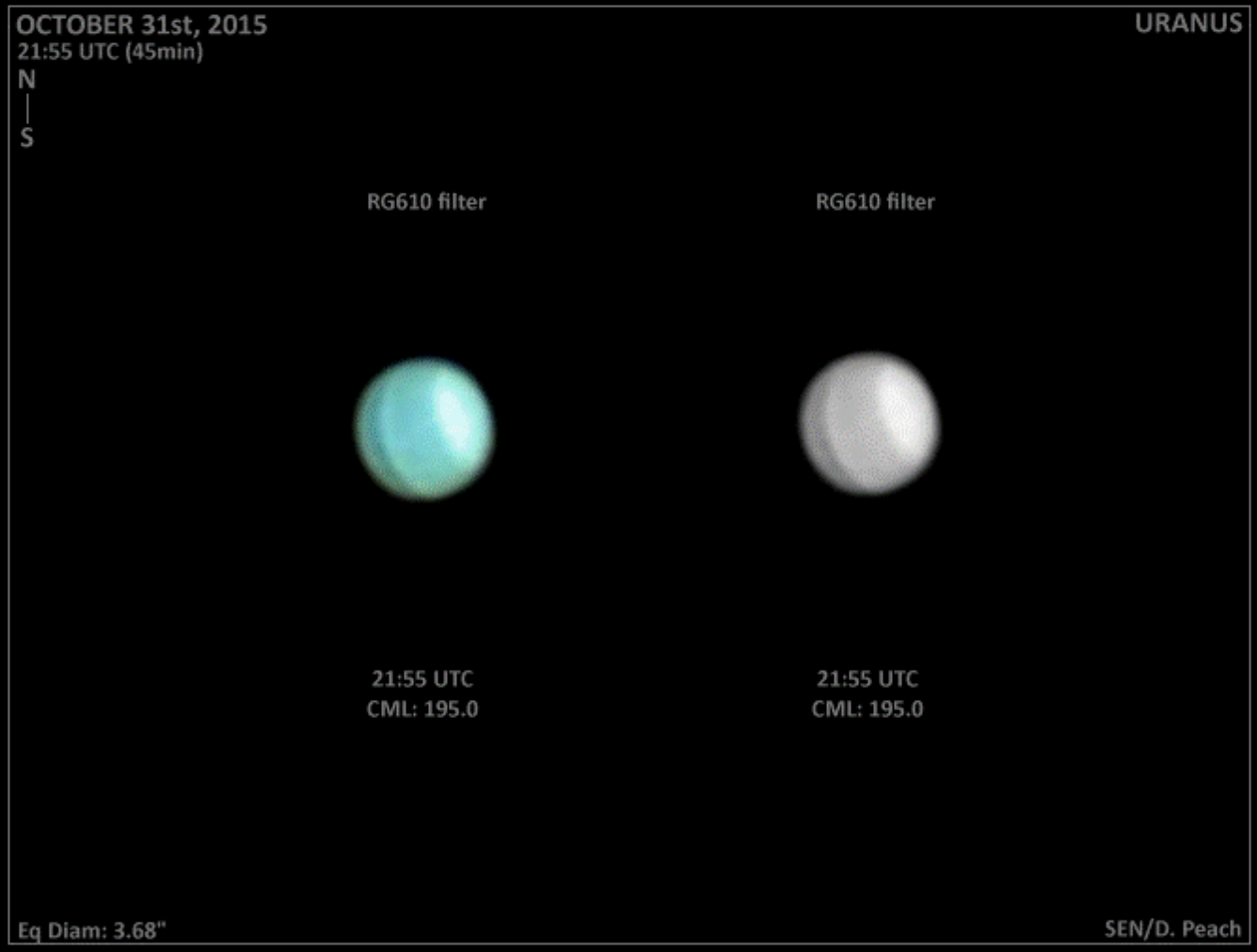
Rings of Uranus



- Discovered 10 March 1977 accidentally
  - James L. Elliot, Edward W. Dunham, and Jessica Mink
  - Kuiper Airborne Observatory
  - Planned to use the occultation of the star SAO 158687 to study its atmosphere.
- William Herschel 1789
  - sighting generally considered doubtful, because the rings are quite faint, and in the two following centuries none were noted by other observers. Still, Herschel made an accurate description of the epsilon ring's size, its angle relative to Earth, its red colour, and its apparent changes as Uranus travelled around the Sun.
    - "Uranus rings 'were seen in 1700s'". BBC News. 19 April 2007.
    - "Did William Herschel Discover The Rings of Uranus in the 18th Century?". Physorg.com. 2007.
- https://en.wikipedia.org/wiki/Uranus#Rings

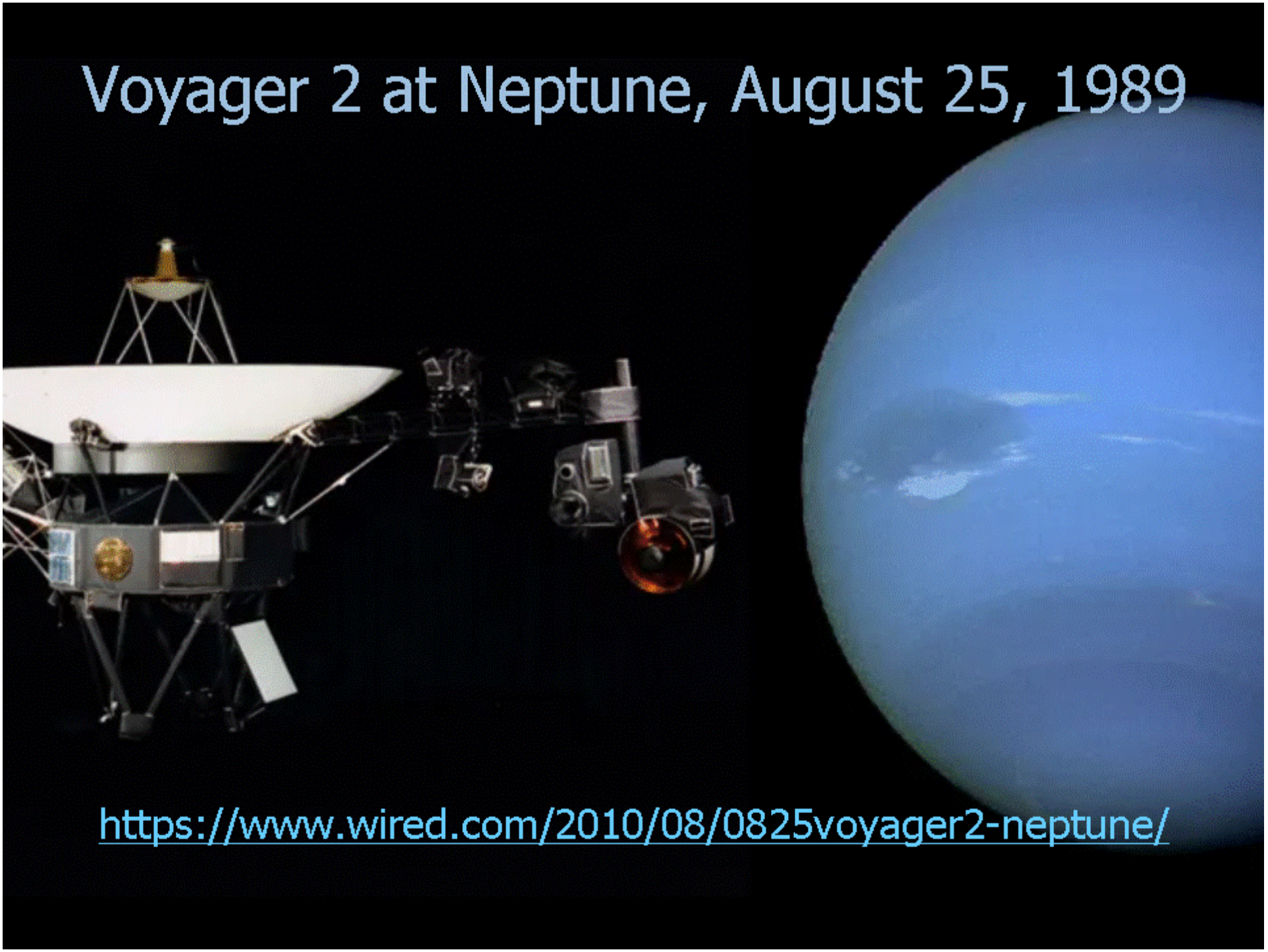

Hubble Space Telescope - Observations of Uranus
2002
2012
2015
2022
visible light
visible and near infrared
aerosols/haze
methane depletion
• Space Telescope Science Institute
• https://astrobiology.com/2025/04/20-year-hubble-study-of-uranus-yields-new-atmospheric-insights.html

Uranus by Damien Peach



https://www.damianpeach.com/uranep.htm

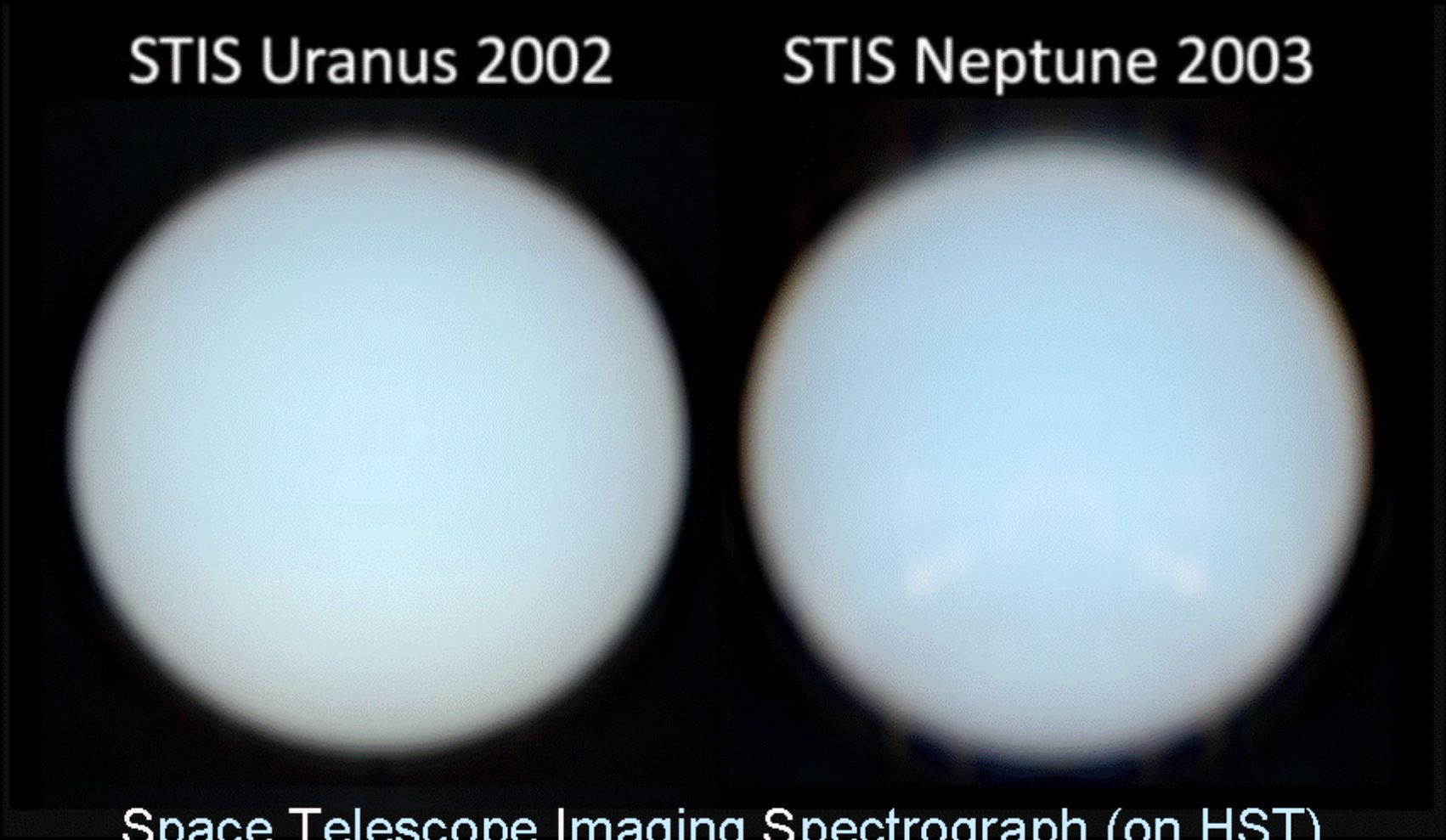
Voyager 2 at Neptune, August 25, 1989



https://www.wired.com/2010/08/0825voyager2-neptune/


Color of Neptune – Anton Petrov
https://www.youtube.com/watch?v=DEs4NWfp4Ac

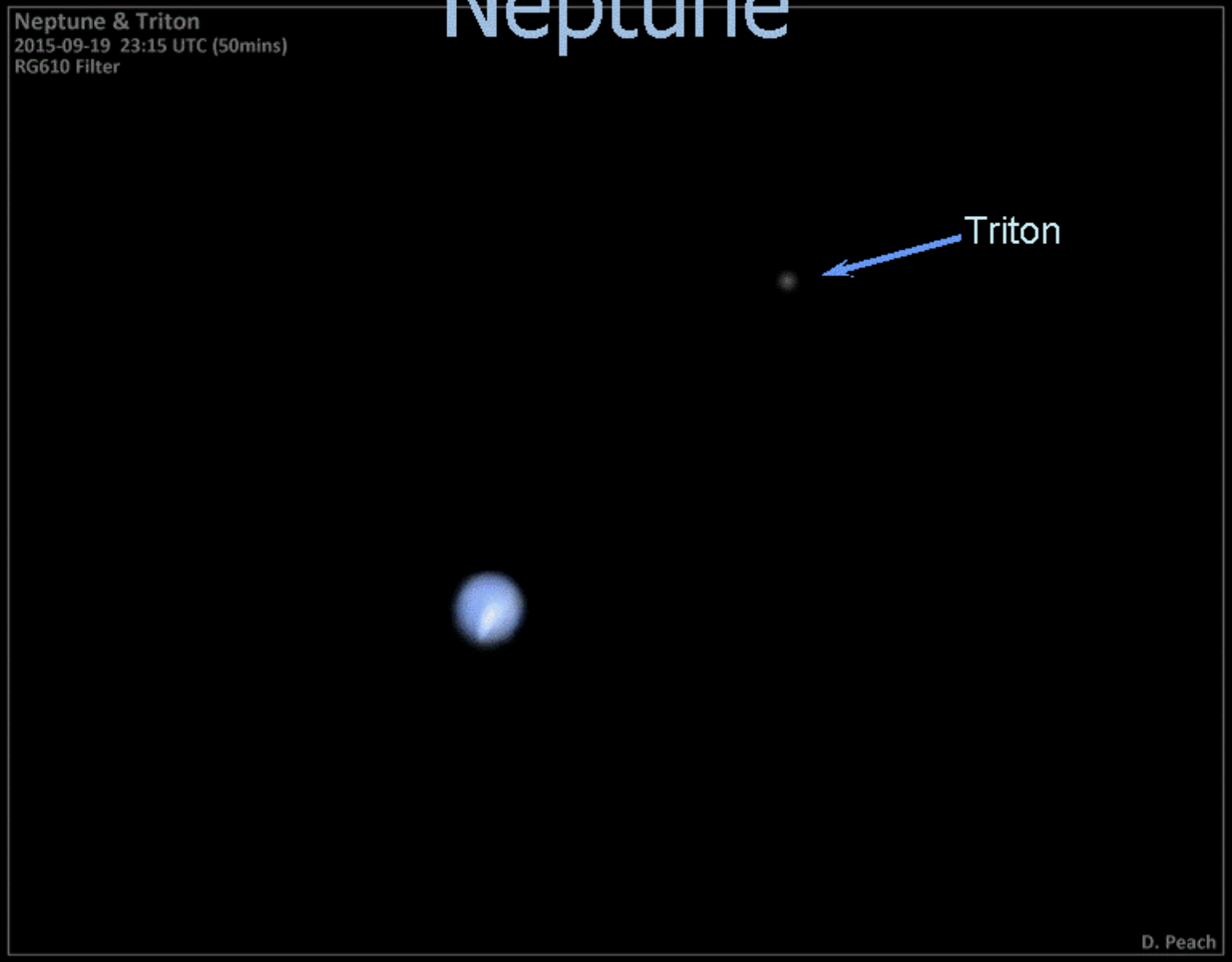
Neptune – true color



Space Telescope Imaging Spectrograph (on HST)

https://www.youtube.com/watch?v=DEs4NWfp4Ac

Neptune



- https://www.damianpeach.com/nep2015_09_19dp.jpg

Terrestrial and Dwarf Planets


Venus

Venus
before radar

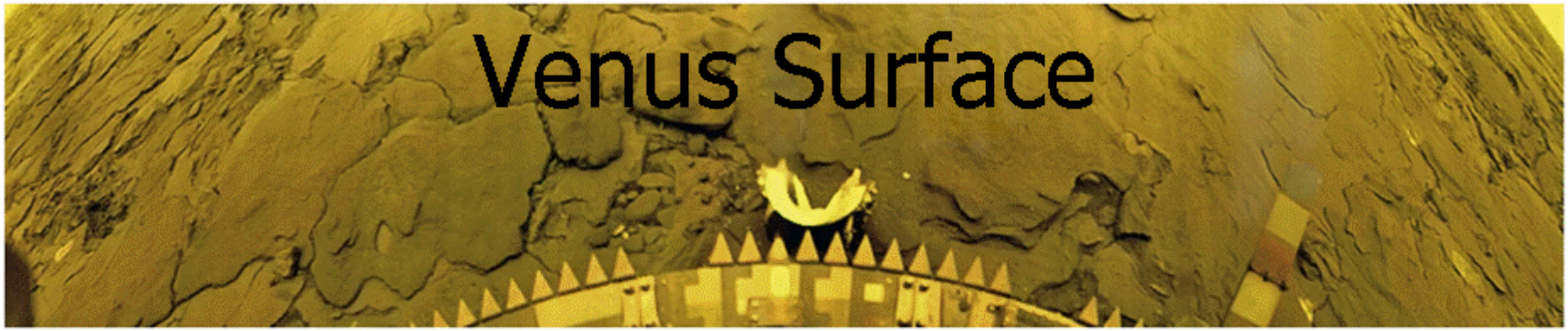
Frank R Paul

Mel Hunter

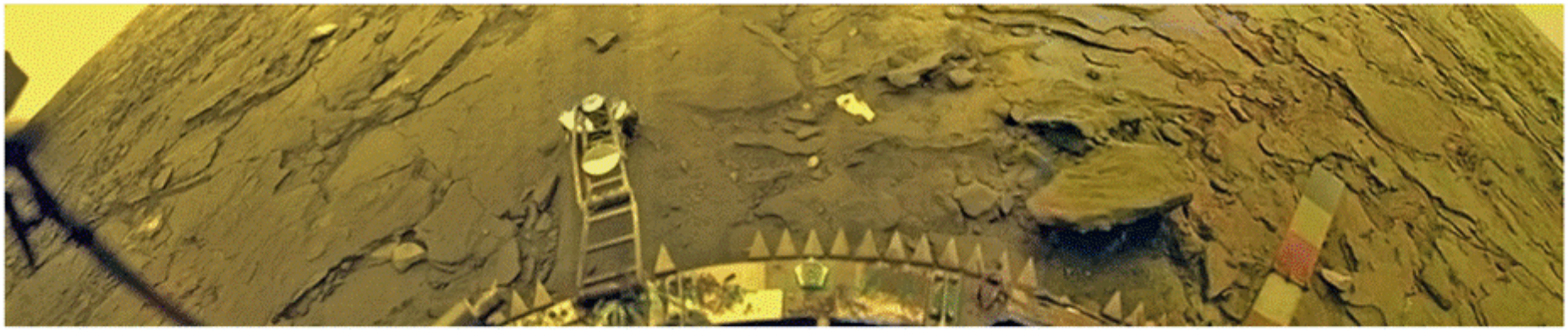
Clark Ashton Smith
"The Immeasurable Horror"
September 1931 Weird Tales

https://www.solarsystemheritage.com/venus.html

Venus Surface



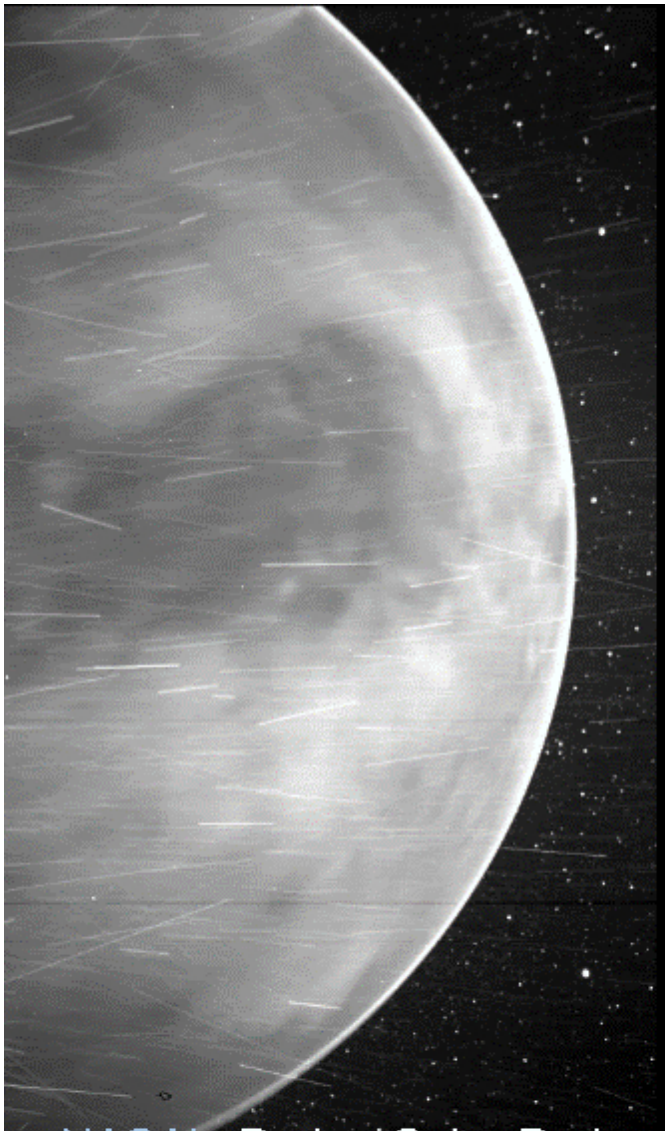
VENUS SURFACE PANORAMA FROM VENERA 14 FRONT CAMERA The Soviet Union's Venera 14 probe captured two color panoramas of Venus's surface in 1982. This panorama came from the front camera. *Image: Russian Academy of Sciences / Ted Stryk*



VENUS SURFACE PANORAMA FROM VENERA 14 REAR CAMERA The Soviet Union's Venera 14 probe captured two color panoramas of Venus's surface in 1982. This panorama came from the rear camera. *Image: Russian Academy of Sciences / Ted Stryk*

- https://www.planetary.org/articles/every-picture-from-venus-surface-ever
- Atmosphere: 96.5% carbon dioxide, 3.5% nitrogen, traces of sulphur dioxideSurface temperature: 464 °C, 867 °F
- Surface pressure: 93 bar (9.3 MPa), 92 atm

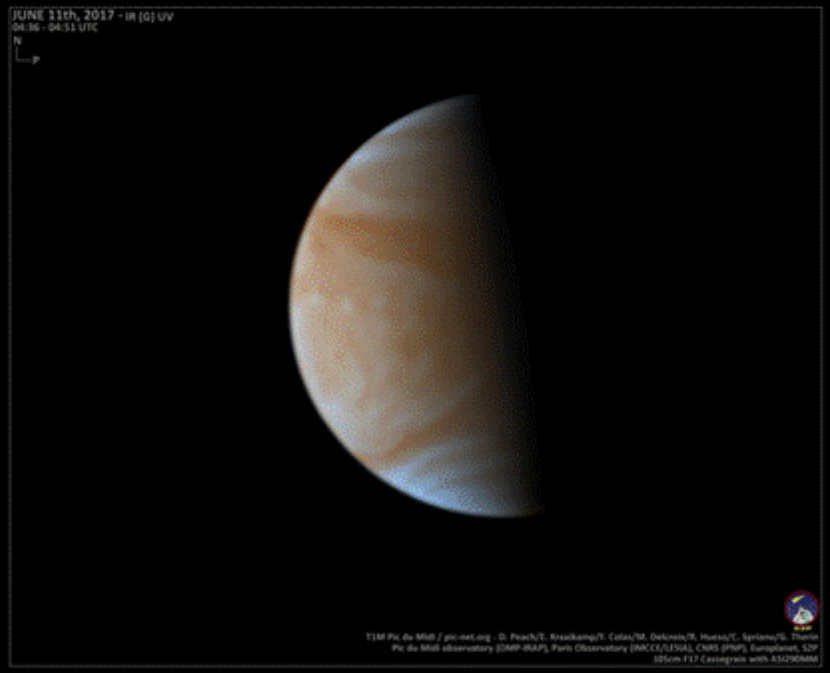
Venus

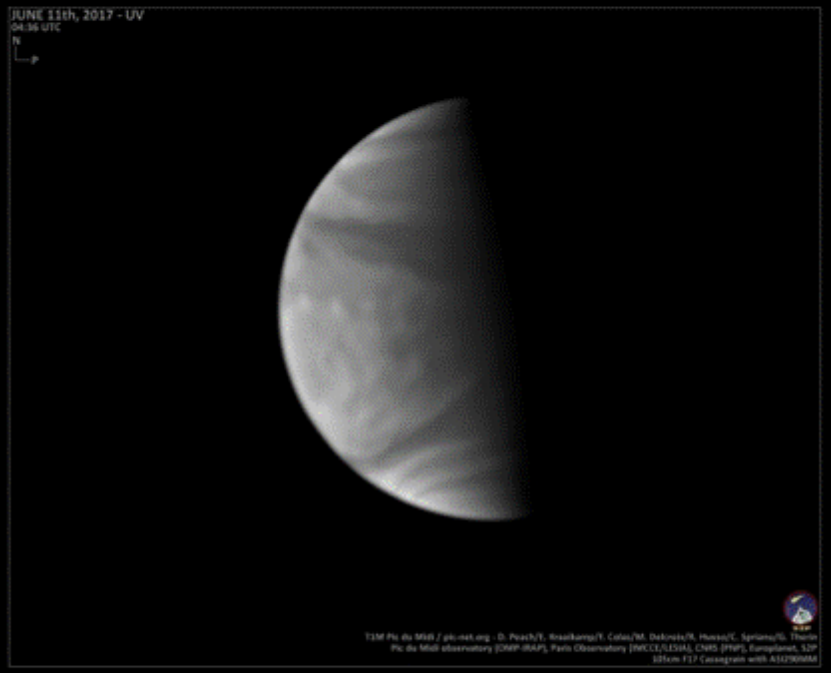


- NASA's Parker Solar Probe
- close flyby July 2020
- Credit: NASA/Johns Hopkins APL/Naval Research Laboratory/Guillermo Stenborg and Brendan Gallagher

- *Akatsuki* spacecraft 2010-2024
- Japan Aerospace Exploration Agency (JAXA)

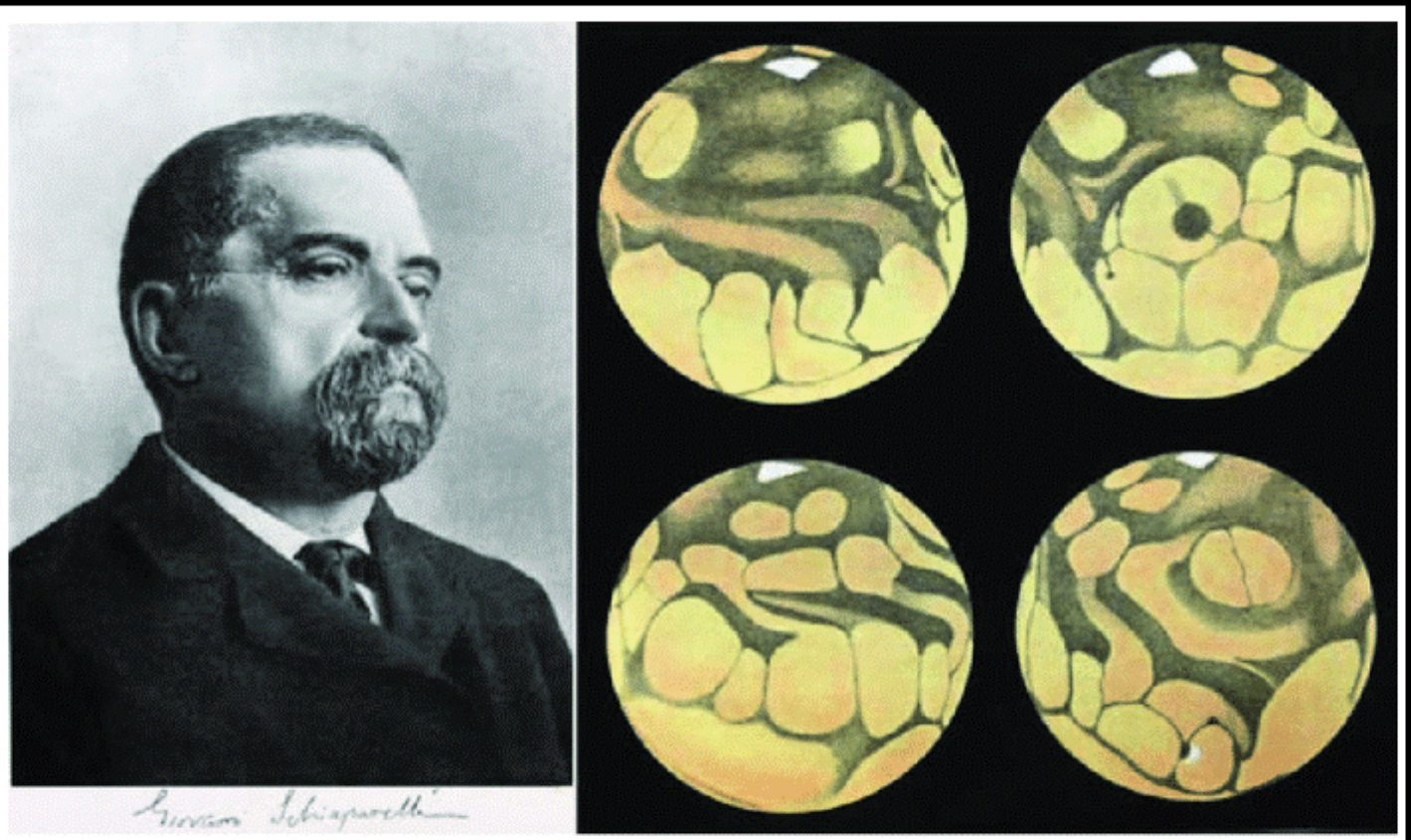
Venus





- Damien Peach
- 105 cm (41.3 in.) F17 Cassegrain with AS1290MM
- June 11th, 2017 - UV and IR/UV colour Pic du Midi Obs.

Mars



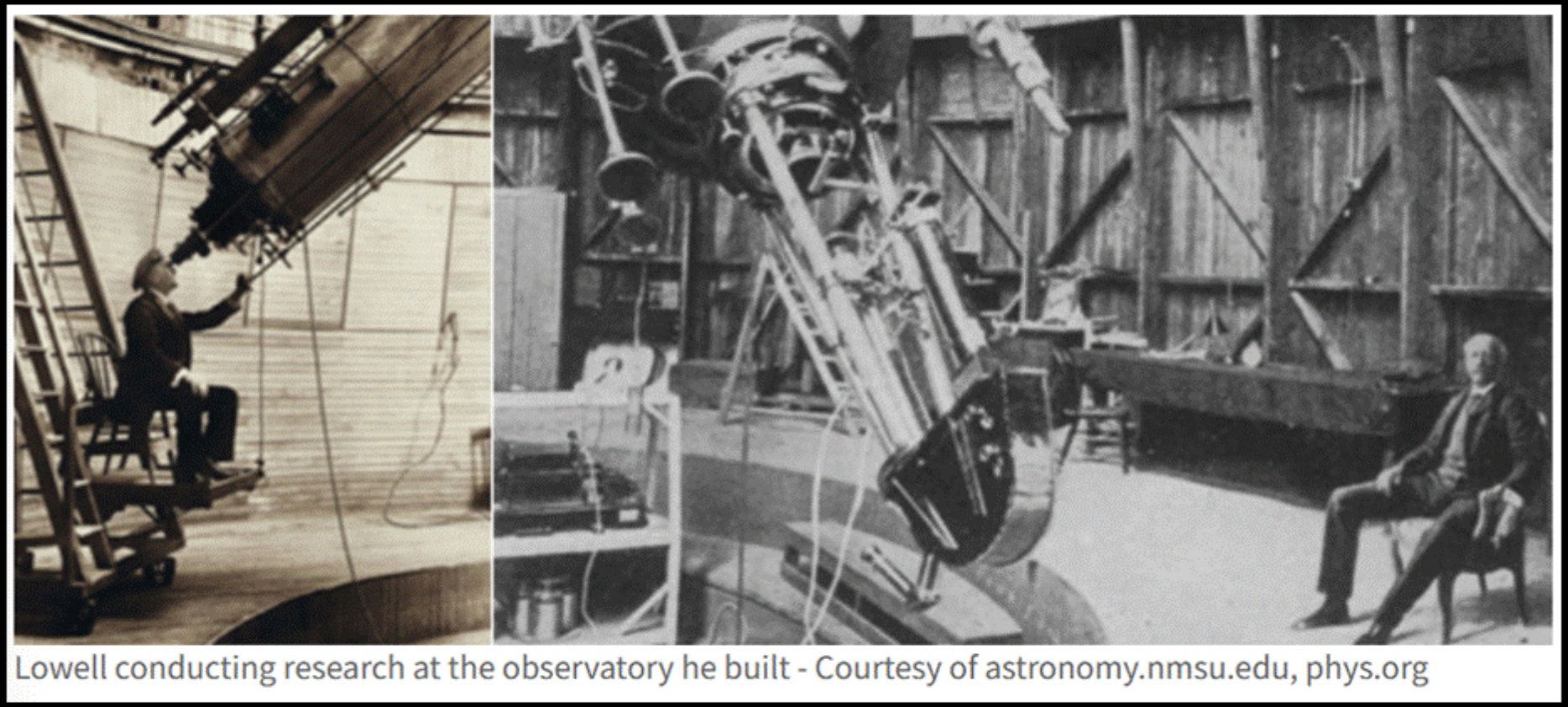
Original drawings of Mars, made by G.V. Schiaparelli during the 1877 opposition.

Giovanni Virginio Schiaparelli 14 March 1835 – 4 July 1910

https://www.researchgate.net/figure/Original-drawings-of-Mars-made-by-GV-Schiaparelli-during-the-1877-opposition_fig1_351724559

Percival Lowell

March 13, 1855 – November 12, 1916



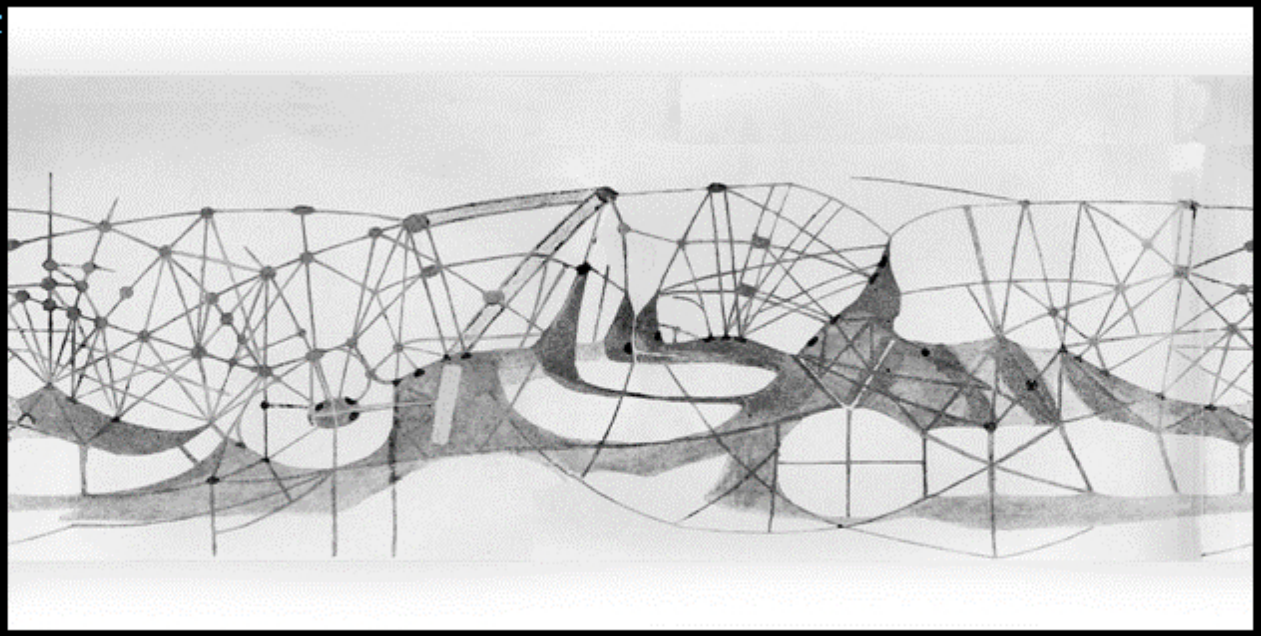
Lowell conducting research at the observatory he built - Courtesy of astronomy.nmsu.edu, phys.org

November 28, 1973 (AP Photo)
https://www.alamyimages.fr/professor-carl-sagan-of-new-yorks-cornell-university-november-28-1973-ap-photo-image526280717.html

Lowell was "*unfortunately one of the worst draftsmen who ever sat down at the telescope and the kind of Mars that he drew was composed of little polygonal blocks connected by a multitude of straight lines.*"

- Carl Sagan

(Ray Bradbury, Arthur C. Clarke, Bruce Murray, Carl Sagan, Walter Sullivan, "*Mars and the Mind of Man*", New York: Harper and Row, 1973, p. 11.)

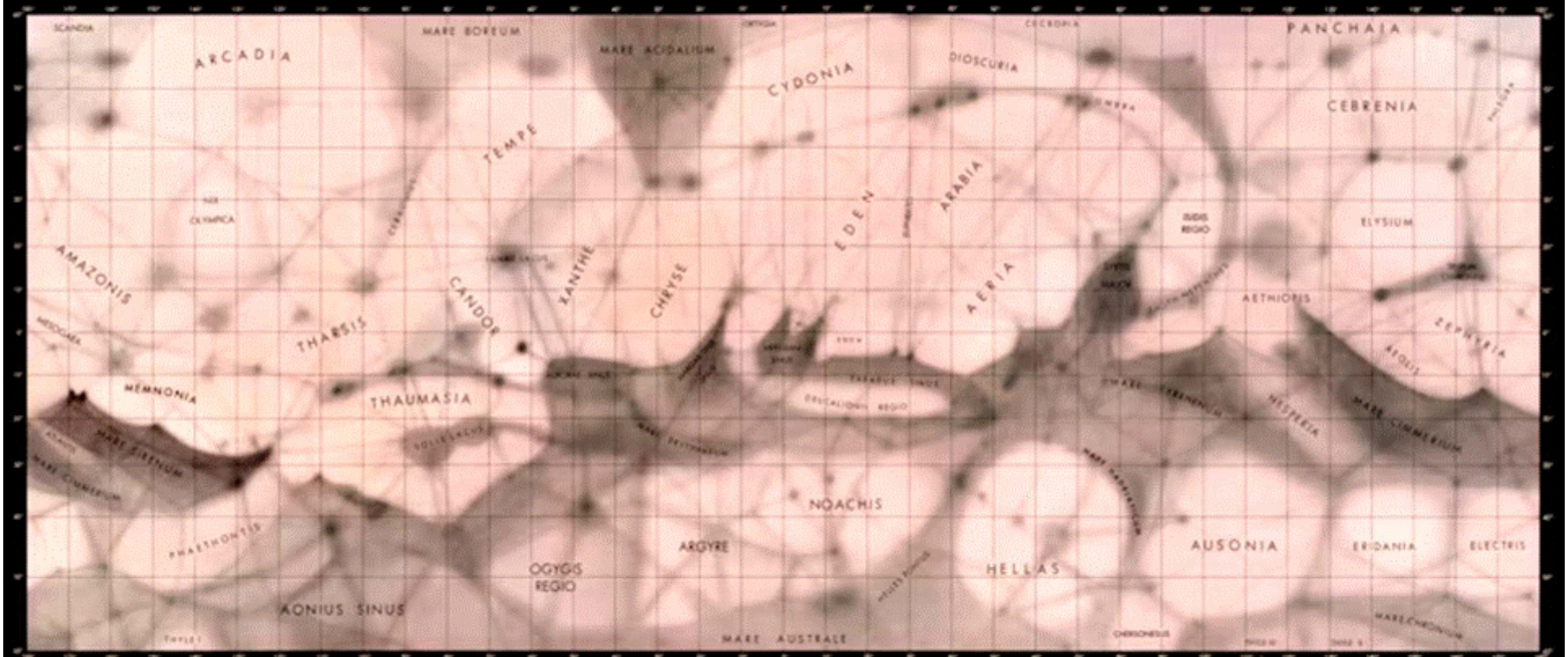


1894 map courtesy of Antoinette Beiser and Lauren Amundson, Lowell Observatory

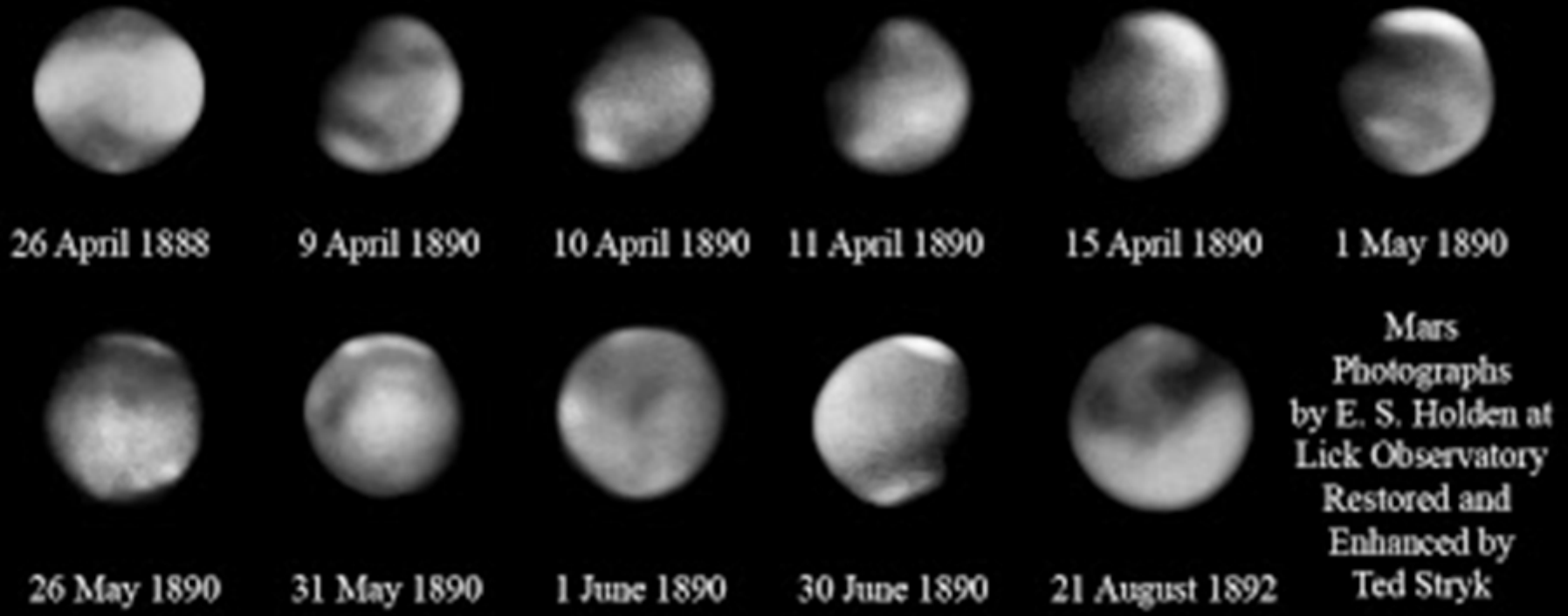
Vesto Slipher

November 11, 1875 – November 8, 1969

1962 map

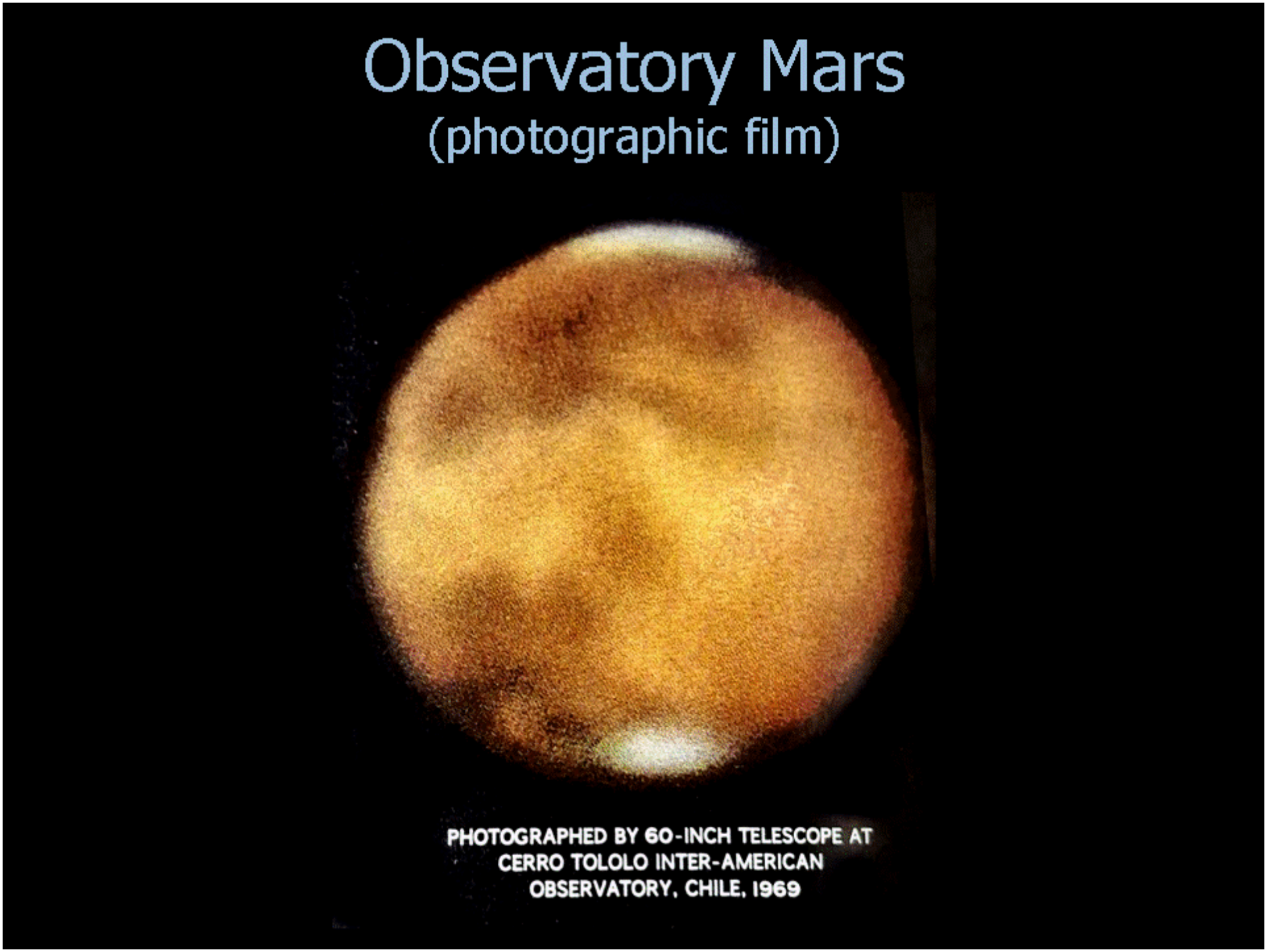


1st Photos of Mars



- Home to the photographic works & blog of physicist David E. Wolf
- https://www.hatiandskoll.com/2015/12/14/photographic-firsts-17-first-photographs-of-the-planet-mars/

Observatory Mars
(photographic film)



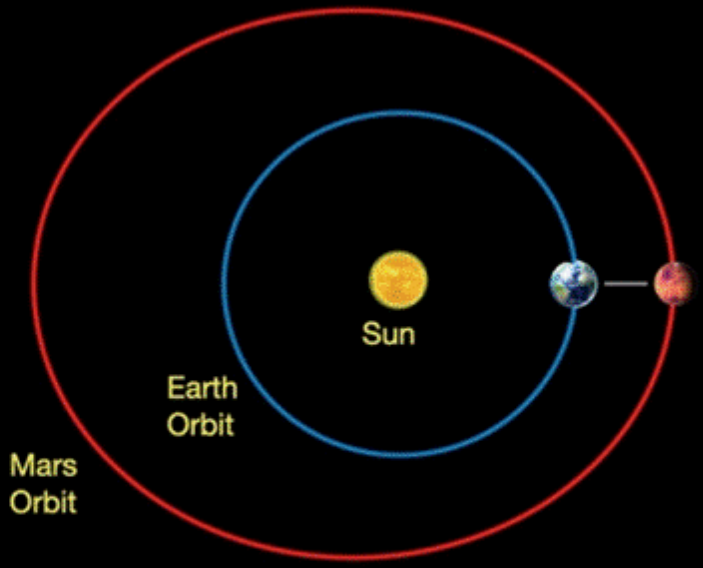
Amateur Astrophotography

Above: The Celestron 14" (35cm) Schmidt Cassegrain. The Vixen 6" F/9 Apo ready for imaging the Sun with the Daystar 0.6A ATM.

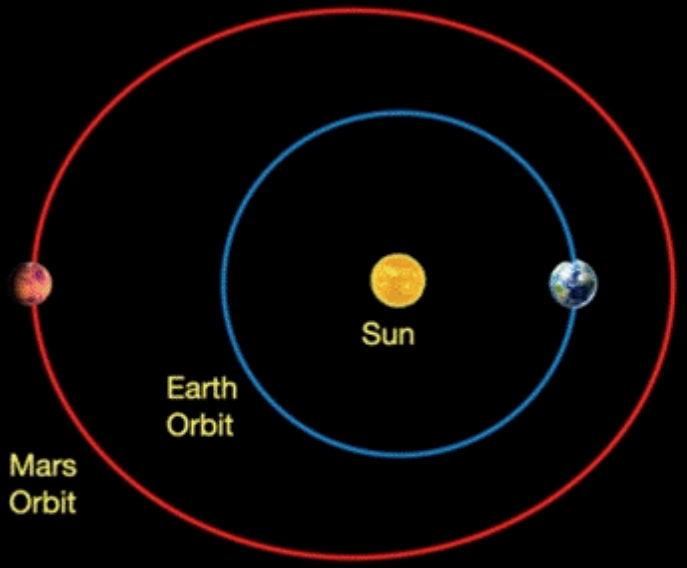
MARCH 26th, 2025
20:03:12 UTC

Ls 062

Mars 2024-2025, Damien Peach

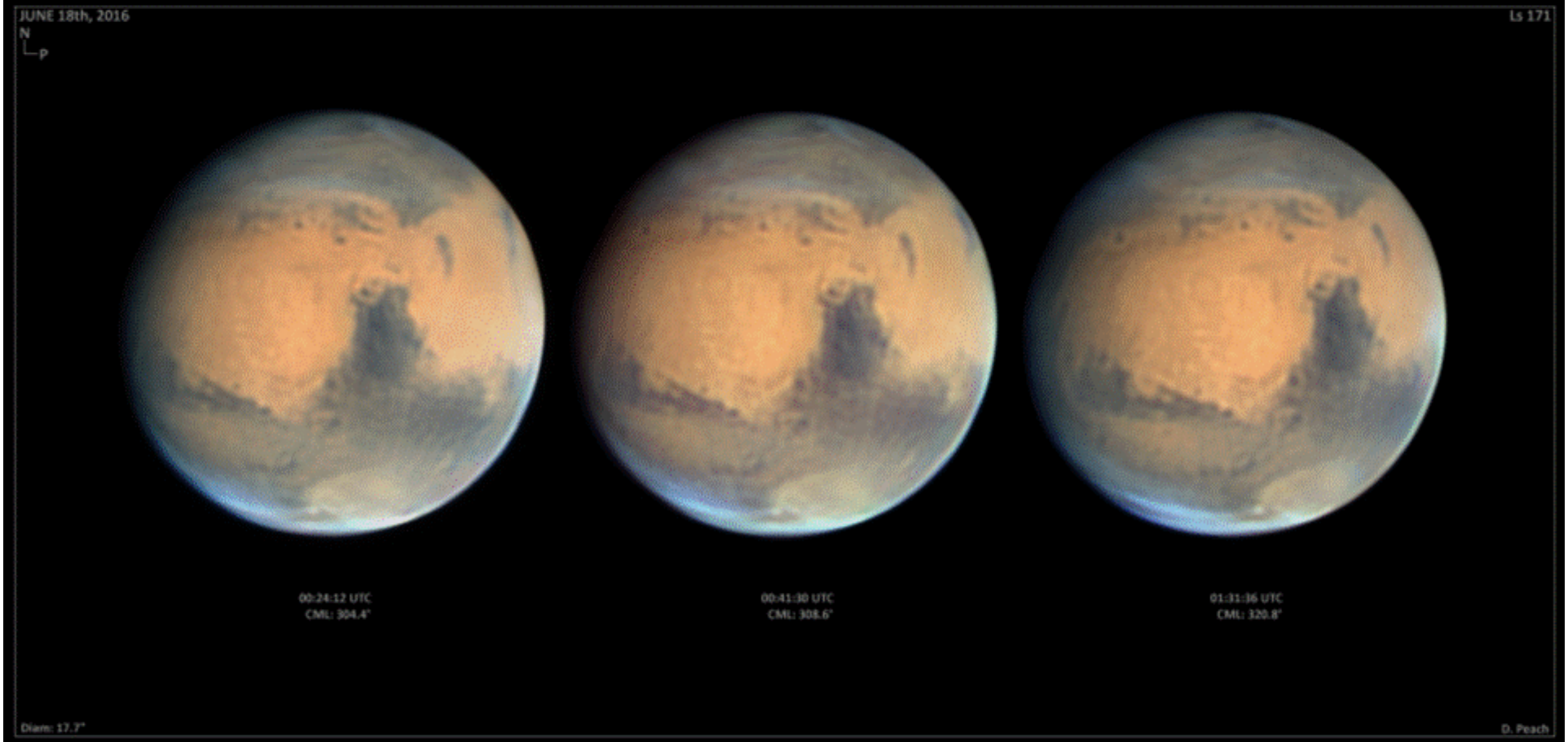


Opposition: Mars is close and bright

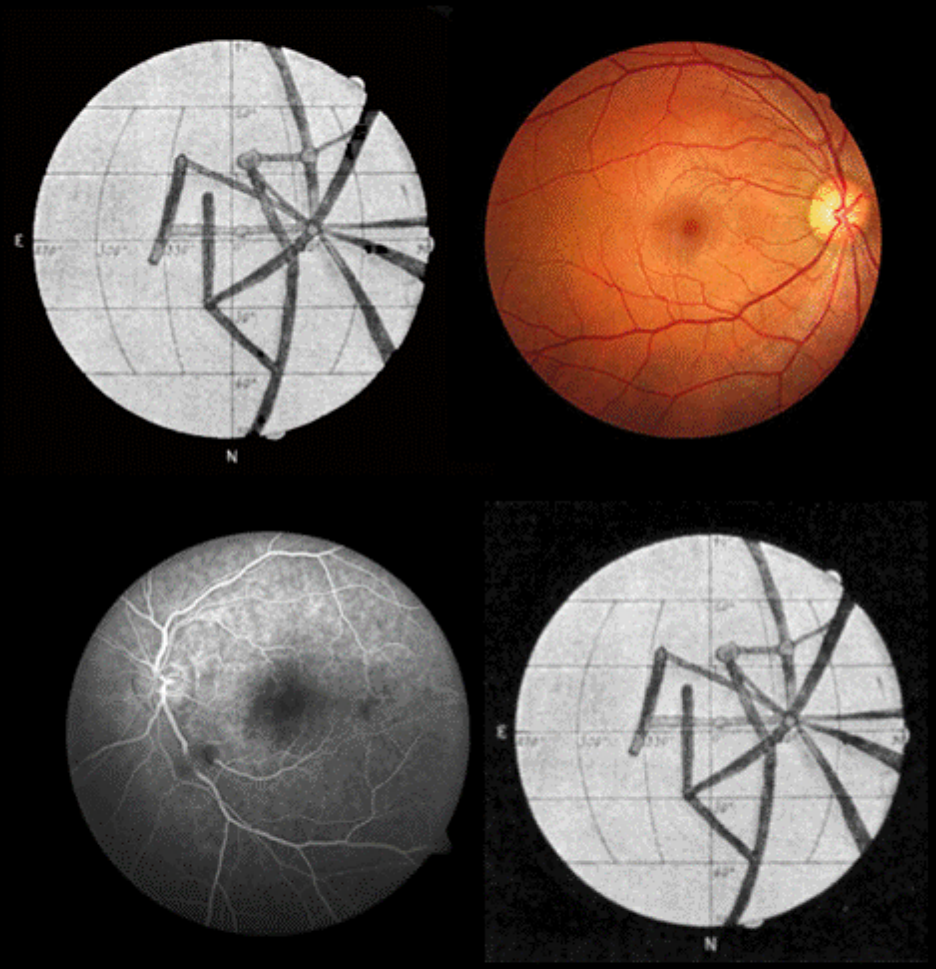


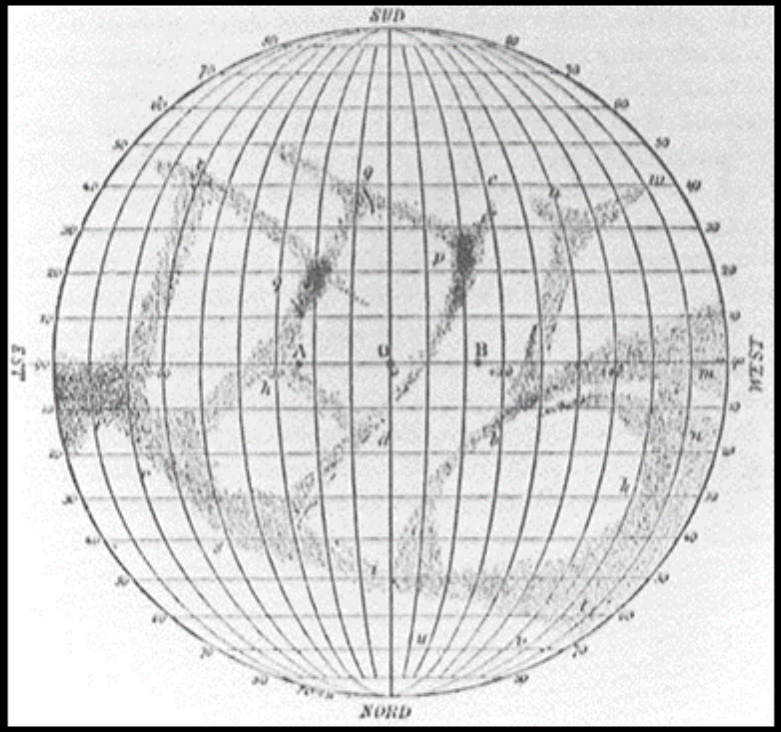
Conjunction: Mars is distant and faint

Mars 2016, Damien Peach



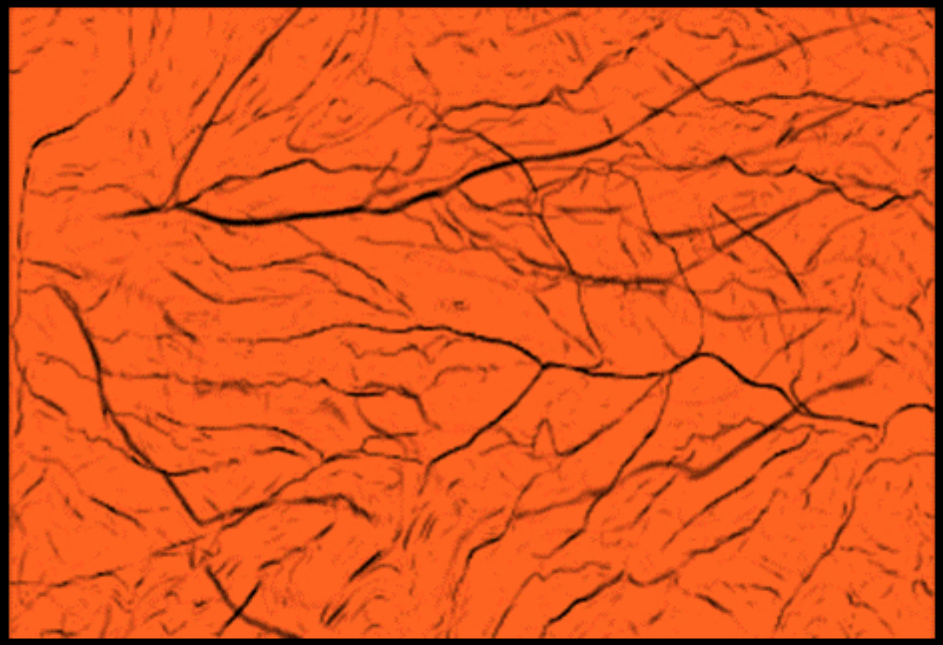
Lowell's Venus and Mercury



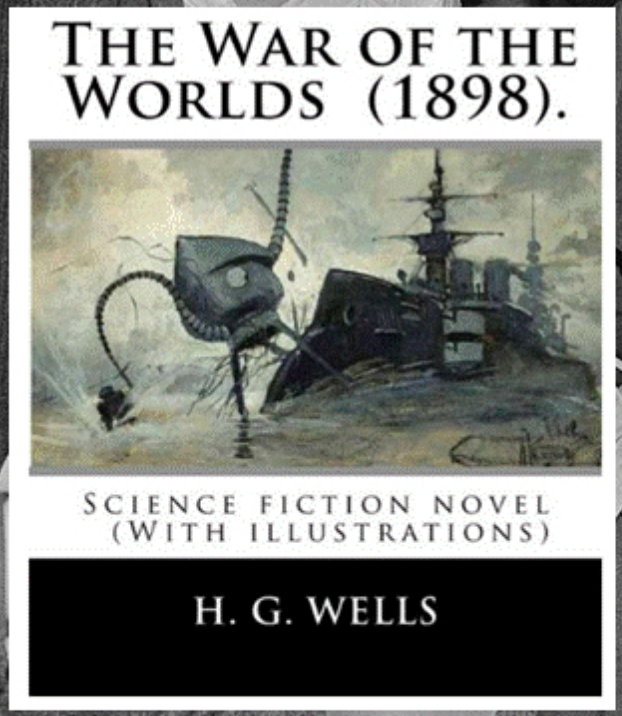


- https://sciencesoup.tumblr.com/post/33192584053/the-venus-spokes-illusion-19th-century-american
- https://link.springer.com/chapter/10.1007/978-1-4614-7951-2_1

Canals?

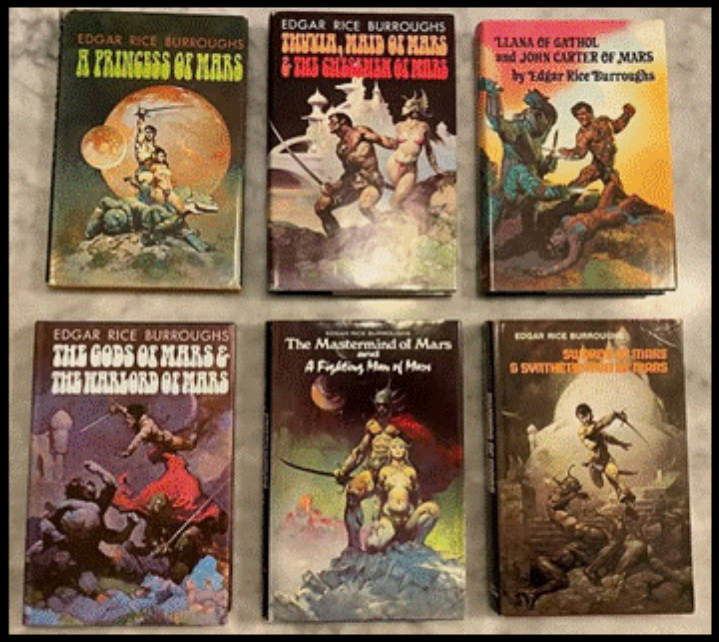


1938

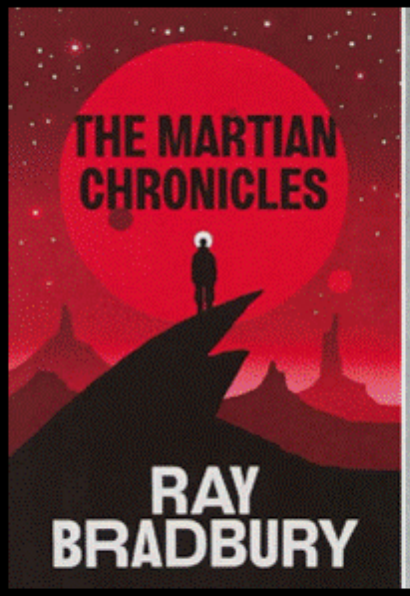


https://en.wikipedia.org/wiki/The_War_of_the_Worlds_(1938_radio_drama)

Science Fiction

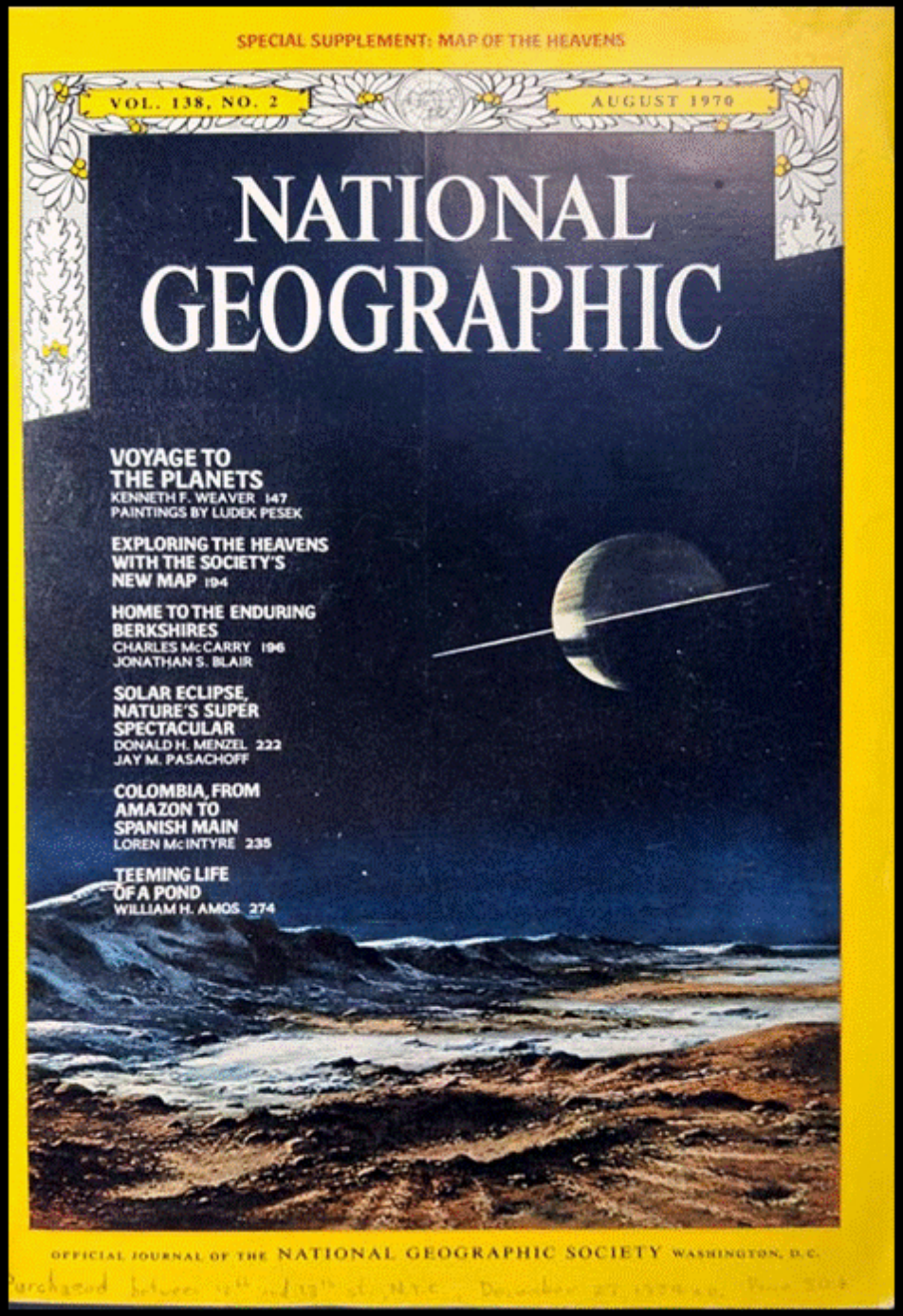


11 Books, 1912-1943



1950

Space Art

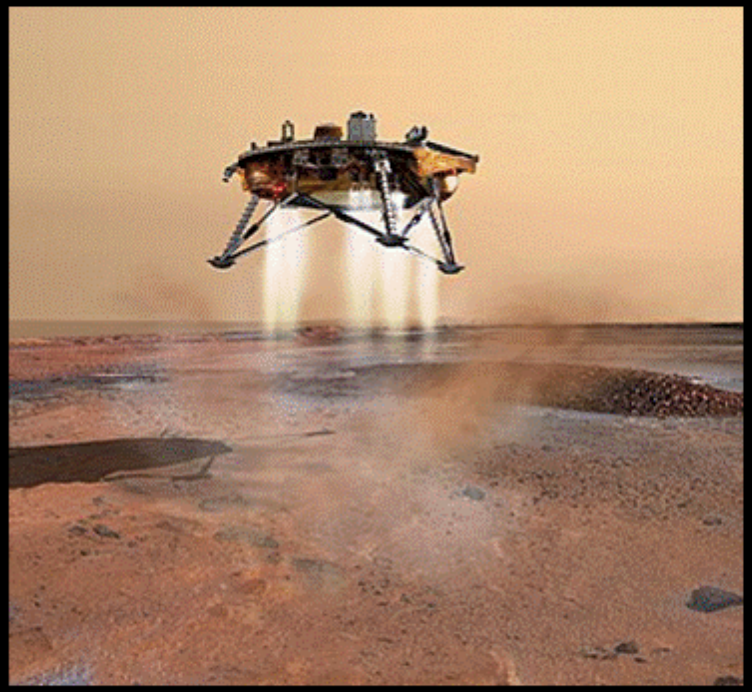

SPECIAL SUPPLEMENT: MAP OF THE HEAVENS
VOL. 138, NO. 2
AUGUST 1970
NATIONAL GEOGRAPHIC
VOYAGE TO THE PLANETS
KENNETH F. WEAVER 147
PAINTINGS BY LUDEK PESEK
EXPLORING THE HEAVENS WITH THE SOCIETY'S NEW MAP 194
HOME TO THE ENDURING BERKSHIRES
CHARLES McCARRY 196
JONATHAN S. BLAIR
SOLAR ECLIPSE, NATURE'S SUPER SPECTACULAR
DONALD H. MENZEL 222
JAY M. PASACHOFF
COLOMBIA, FROM AMAZON TO SPANISH MAIN
LOREN McINTYRE 235
TEEMING LIFE OF A POND
WILLIAM H. AMOS 274
OFFICIAL JOURNAL OF THE NATIONAL GEOGRAPHIC SOCIETY WASHINGTON, D.C.

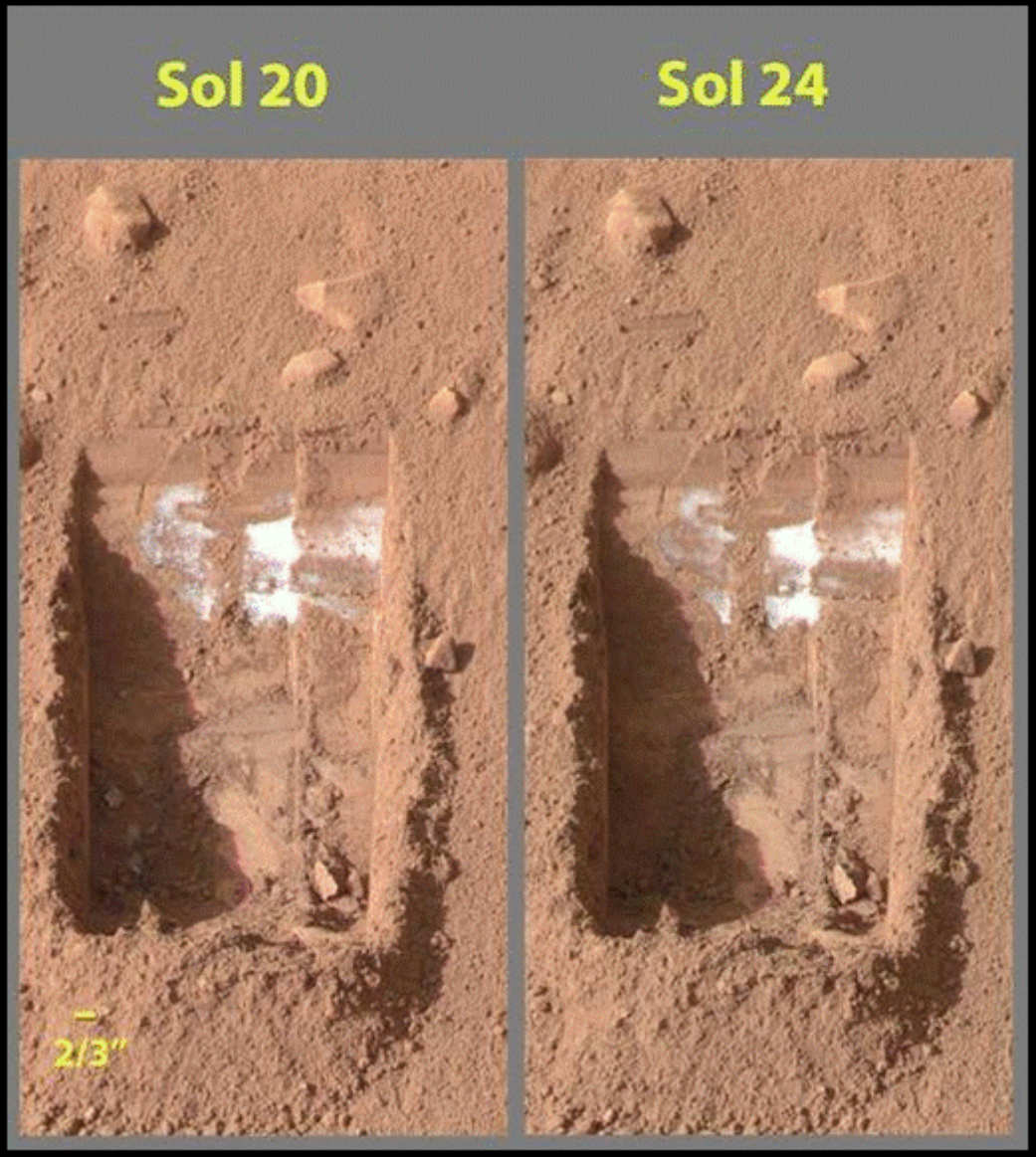
Luděk Pešek

(26 April 1919 – 4 December 1999)

Phoenix lander

May 25, 2008 to November 2, 2008

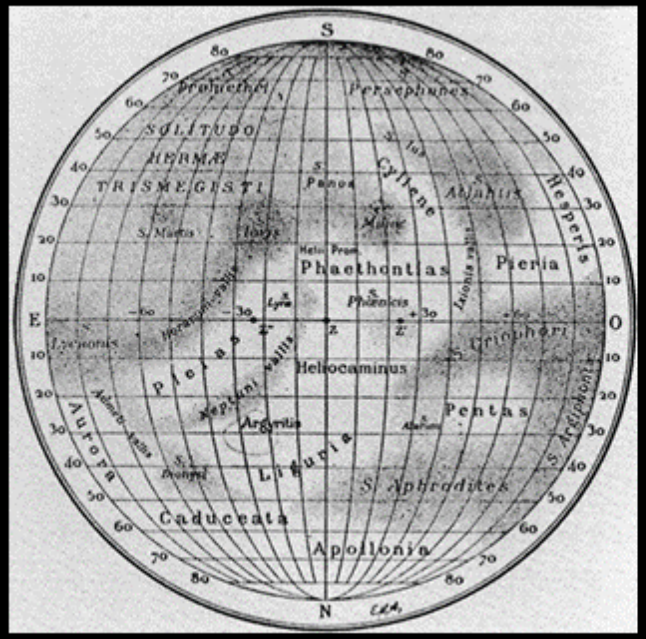




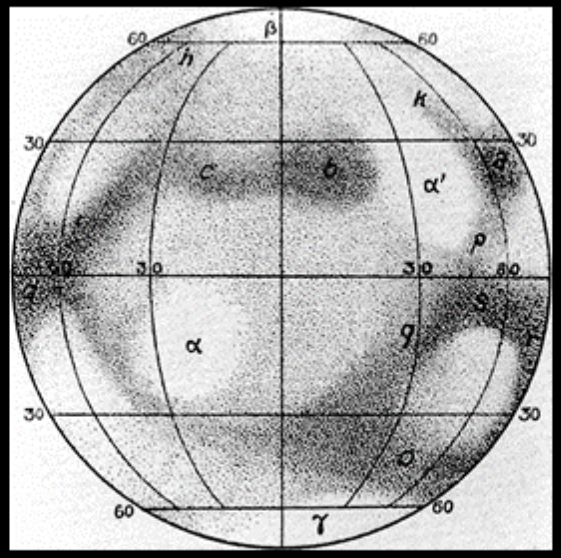
Mercury

Synchronous Rotation 1920s-1978

Mercury



Eugène Michel Antoniadi 1 March 1870 – 10 February 1944



Lucien Rudaux 1874–1947

Mercury

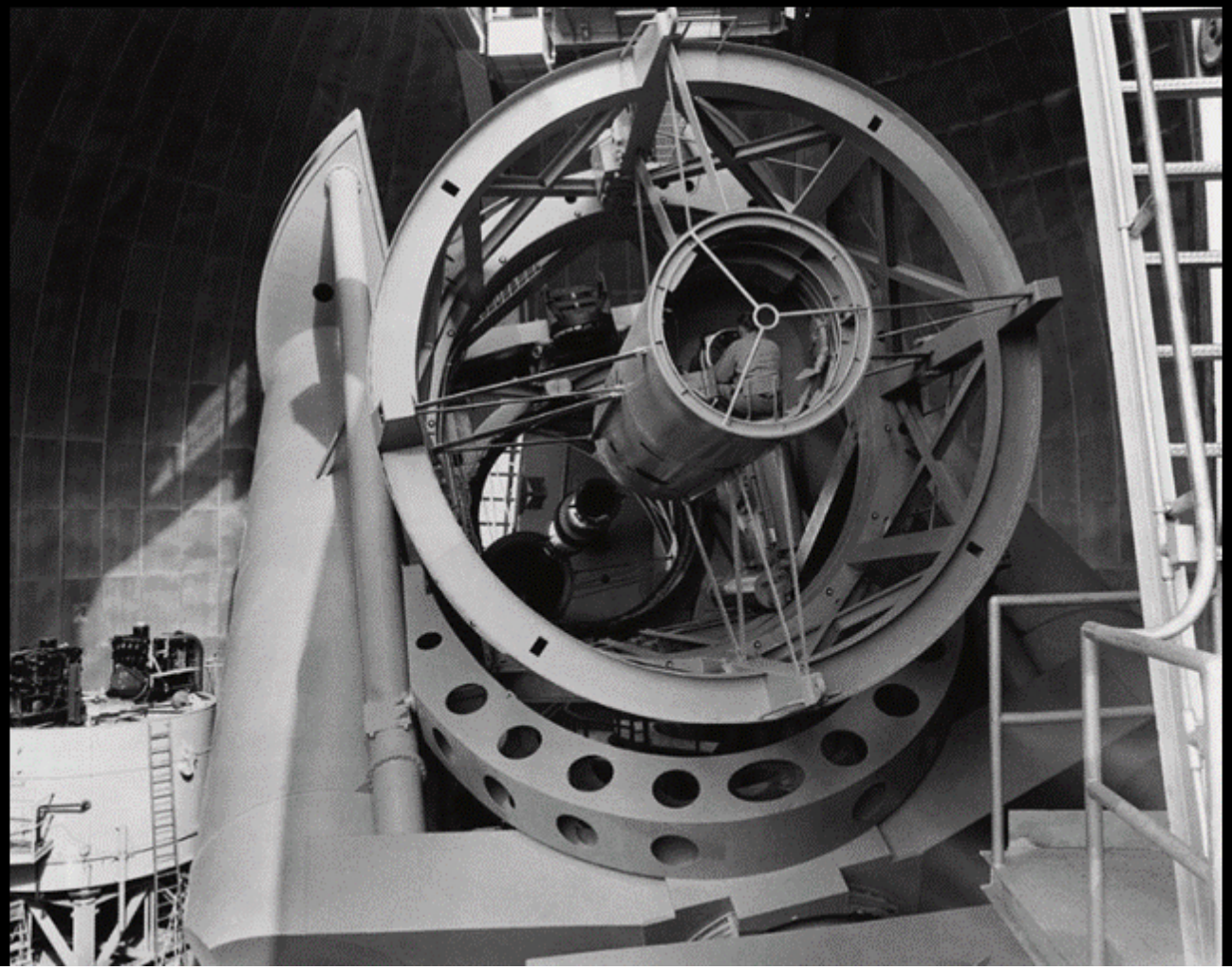
Three Synodic Periods = c.348 days

Best time to view high in sky: early May and early August

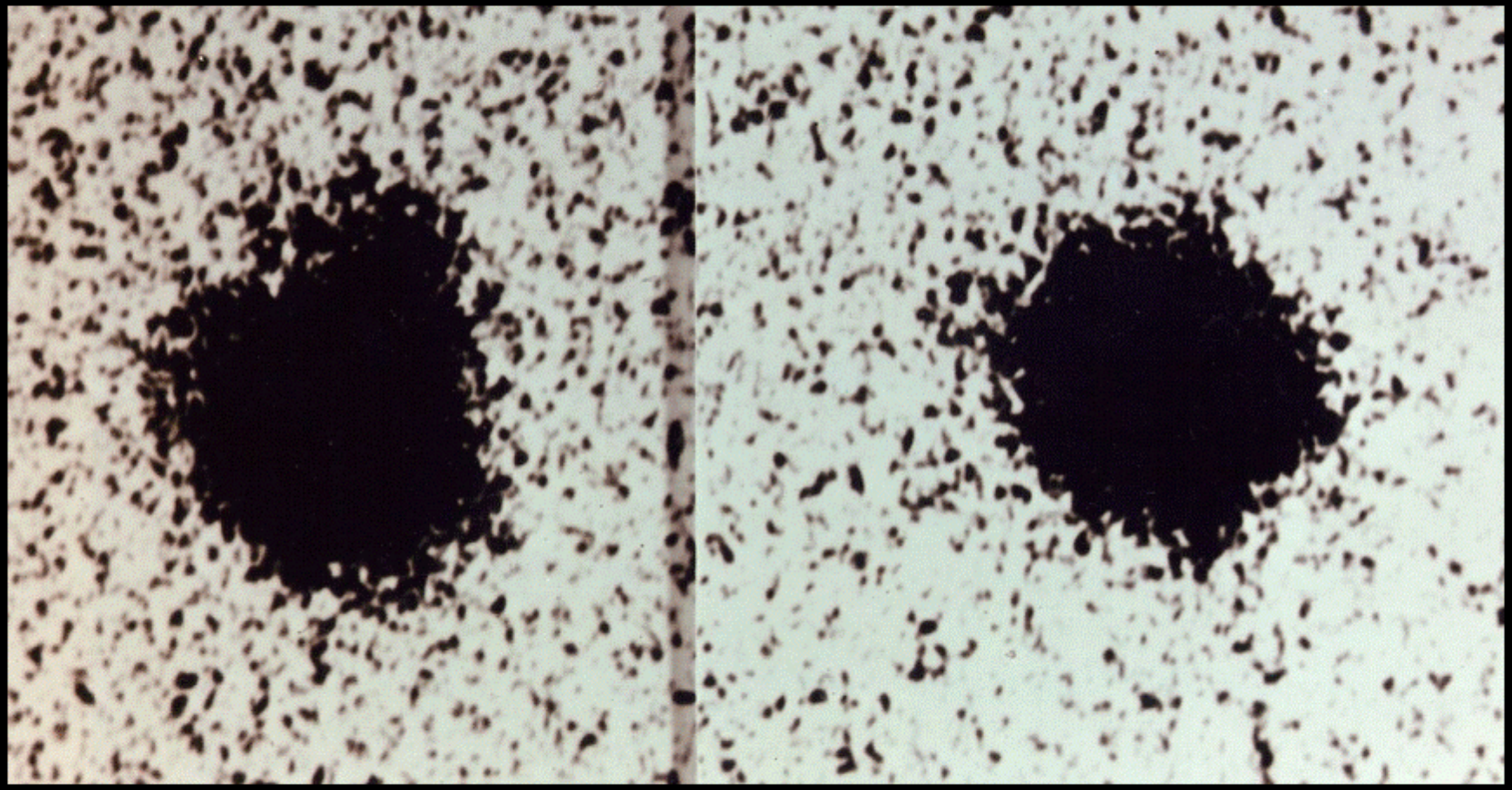
Mercury

Animation comparing maps by:
(L) Rudaux, (C) MESSENGER degraded, (R) Antoniadi

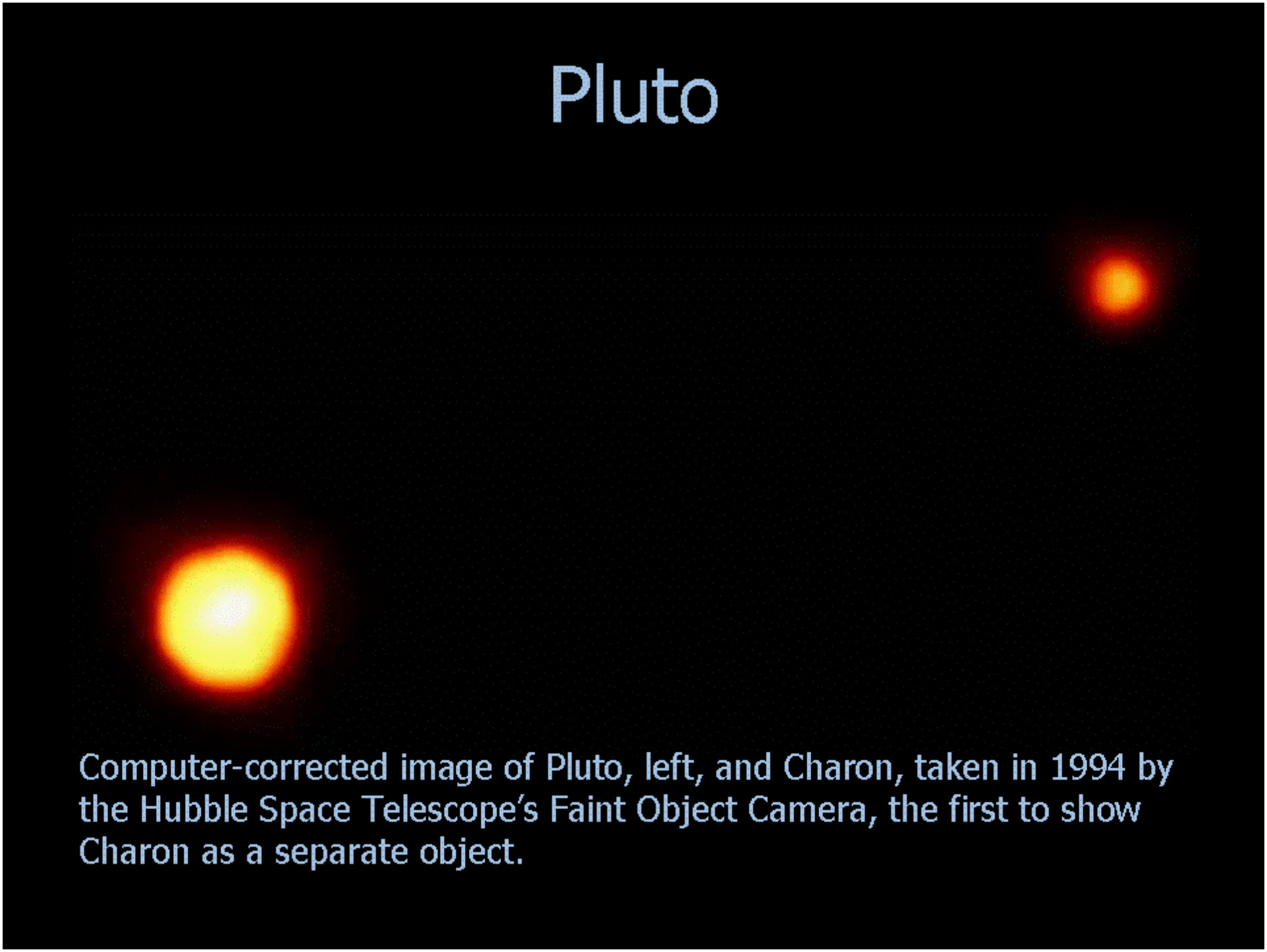
Pluto



Pluto 7 July 1978



Pluto



Computer-corrected image of Pluto, left, and Charon, taken in 1994 by the Hubble Space Telescope's Faint Object Camera, the first to show Charon as a separate object.

Pluto 2015

New Horizons (launched 2006)

Radius
736 miles

Hydra Kerberos

Nix Styx

Charon

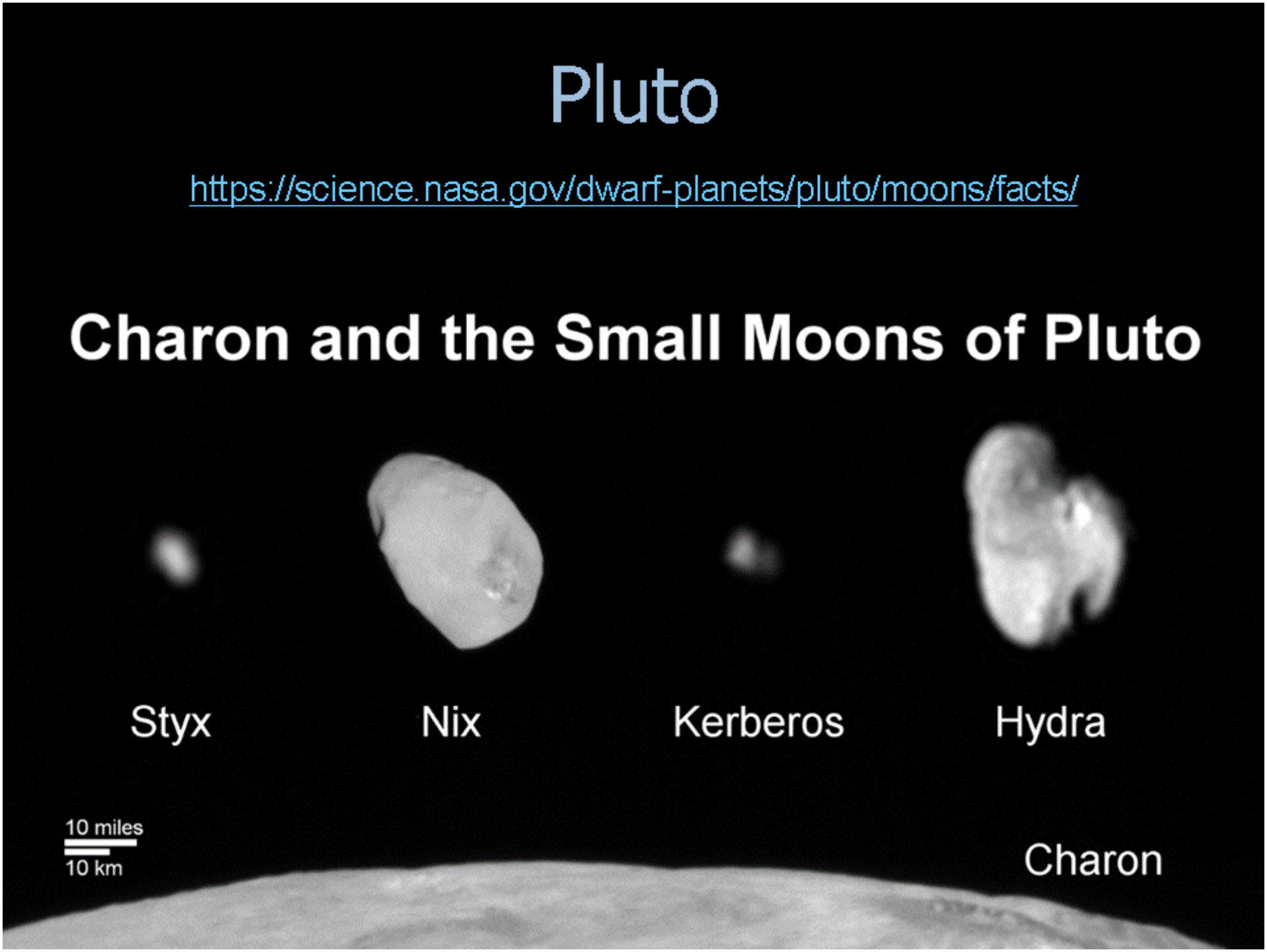
Pluto

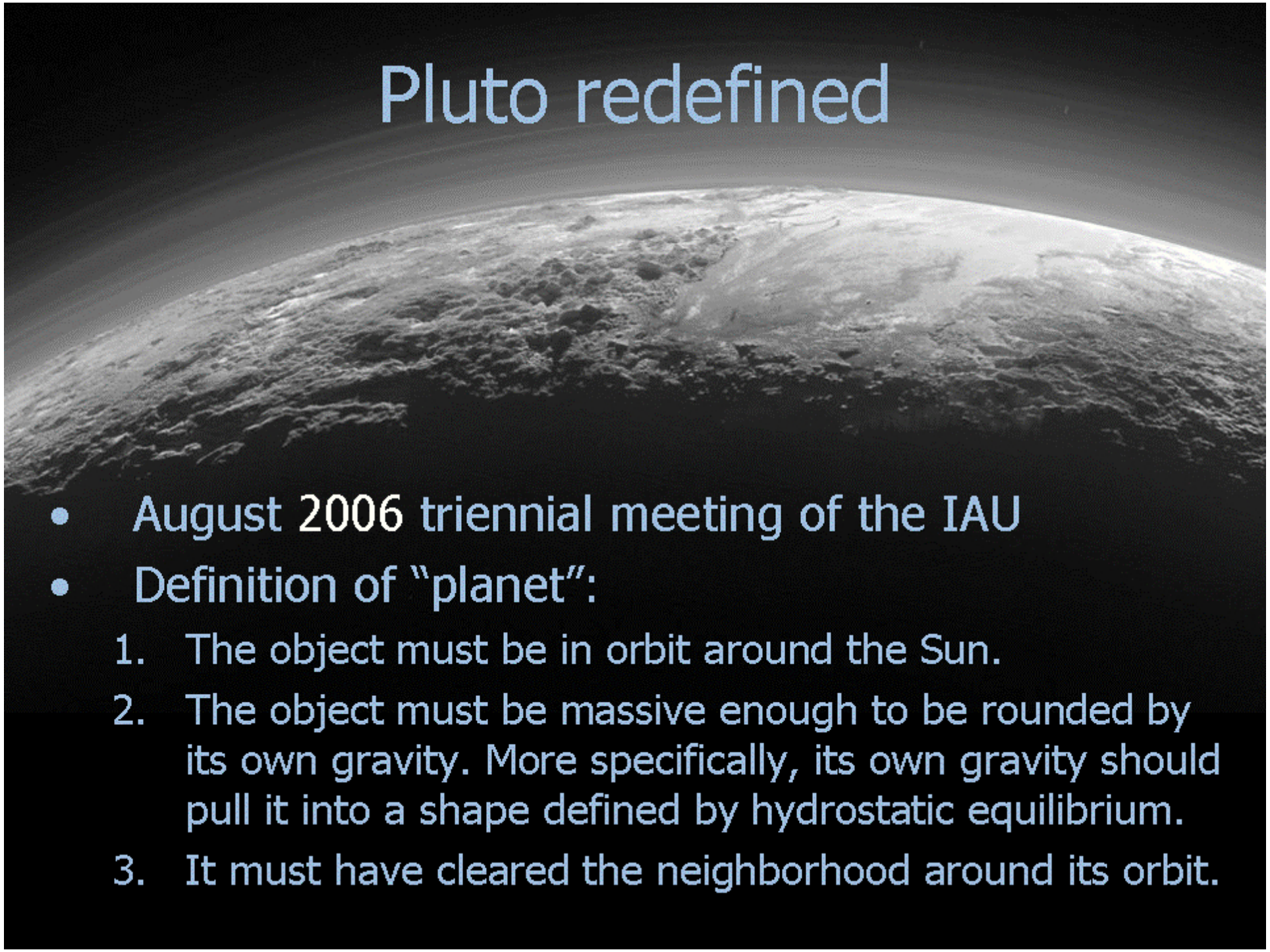
https://www.astronomicalreturns.com/2019/11/styx-nix-and-tango-dance-of-plutos-moons.html

Earth

Pluto

https://science.nasa.gov/dwarf-planets/pluto/moons/facts/





Pluto redefined

- August 2006 triennial meeting of the IAU
- Definition of "planet":
  1. The object must be in orbit around the Sun.
  2. The object must be massive enough to be rounded by its own gravity. More specifically, its own gravity should pull it into a shape defined by hydrostatic equilibrium.
  3. It must have cleared the neighborhood around its orbit.

Dwarf Planets

Name	Diameter relative to the Moon	Diameter (km)	Mass relative to the Moon	Mass ($\times 10^{21}$ kg)	Density (g/cm^3)	Rotation period (hours)	Moons	Albedo	H
Ceres	27%	939.4 ± 0.2	1.3%	0.938 35 ± 0.000 01	2.16	9.1	0	0.09	3.33
Orcus	26%	910^{+50}_{-40}	0.8%	0.55 ± 0.01	1.4 ± 0.2	13 ± 4	1	$0.23^{+0.02}_{-0.01}$	2.19
Pluto	68%	2377 ± 3	17.7%	13.03 ± 0.01	1.85	6d 9.3h	5	0.52	−0.45
(Charon)	35%	1212 ± 1	2.2%	1.59 ± 0.01	1.70 ± 0.01	6d 9.3h	–	0.38	1
Salacia	24%	846 ± 21	0.7%	0.49 ± 0.01	1.50 ± 0.12	6.1	1	0.04	4.27
Haumea	≈ 45%	≈ 1560[59]	5.5%	4.01 ± 0.04	≈ 1.8	3.9	2	≈ 0.66	0.23
Quaoar	32%	1098 ± 2	1.9%	1.21 ± 0.01	1.75 ± 0.01	17.7	1 (2?)	0.11 ± 0.01	2.42
Makemake	41%	1430 ± 14	3.7%	2.69 ± 0.20	1.76 ± 0.17	22.8	1	$0.81^{+0.03}_{-0.05}$	−0.20
Gonggong	35%	1230 ± 50	2.4%	1.75 ± 0.07	1.74 ± 0.16	22.4 ± 0.2?	1	0.14 ± 0.01	1.86
Eris	67%	2326 ± 12	22.4%	16.38 ± 0.14	2.43 ± 0.05	15d 18.9h	1	0.96 ± 0.04	−1.21
Sedna	26%	906^{+314}_{-258}	≈ 1%?	≈ 1?	?	10 ± 3	0?	$0.41^{+0.393}_{-0.186}$	1.52

https://en.wikipedia.org/wiki/Dwarf_planet#Most_likely_dwarf_planets

1 Ceres

- Discovered 1 January 1801
- Mean diameter: 939 km (584 miles)
- Equatorial surface gravity: 0.284 m/s2 (0.0290 *g*0 Earth)
- Water ice and magnesium sulfate hexahydrate

Known Moons

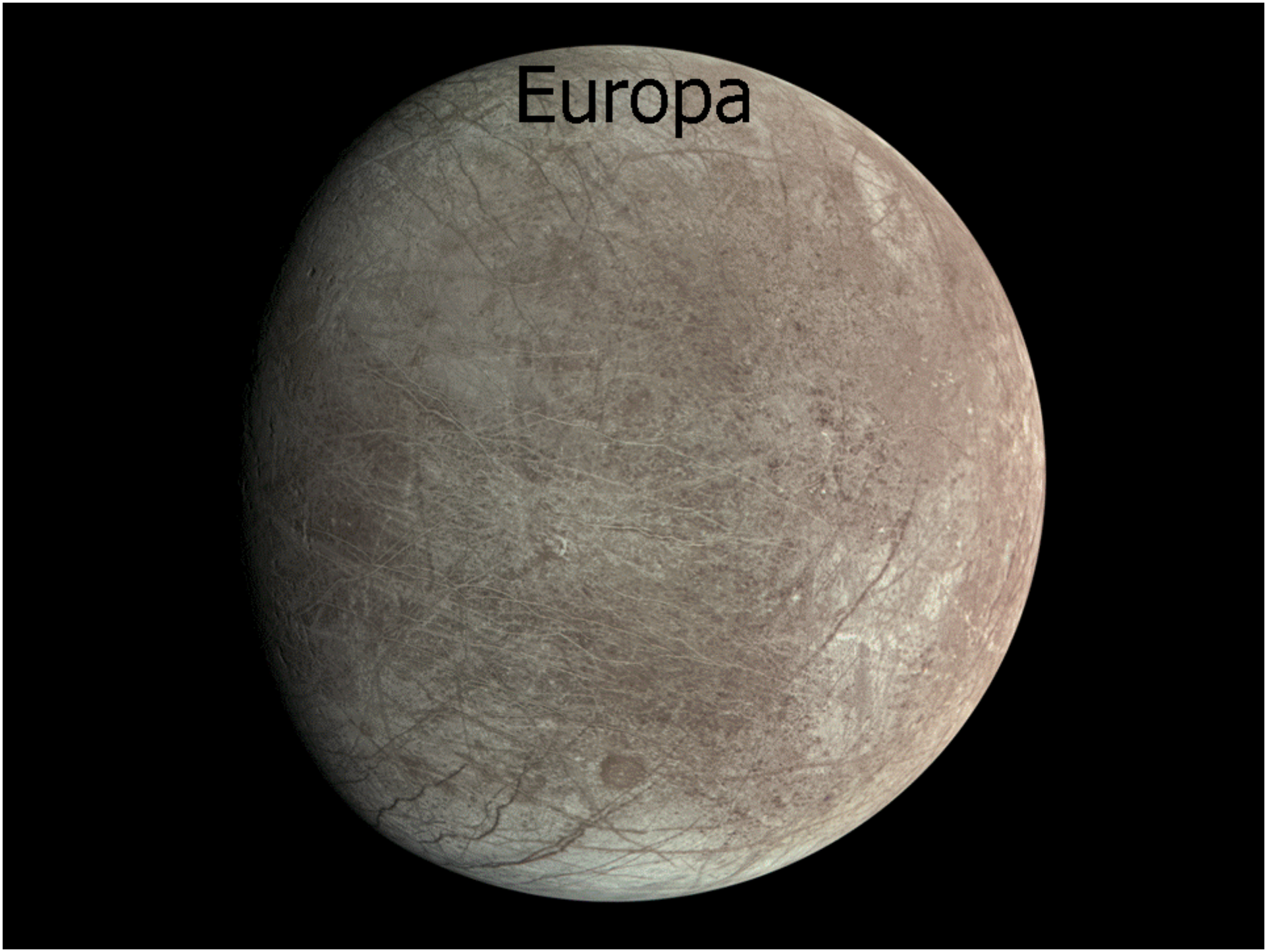
1920

- 26/419 = 6.2%
- Earth 1
- Mars 2
- Jupiter 9/97
  - 4 Galileans 1610
  - V Amalthea 1892
  - VI Himalia 1904
  - VII Elara 1905
  - VIII Pasiphae 1908
  - IX Sinope 1914
- Saturn 9/274
- Uranus 4/29
- Neptune 1/16

1966

- 33/419 = 8%
- Earth 1
- Mars 2
- Jupiter 12/97
- Saturn 11/274
- Uranus 5/29
- Neptune 2/16


(Ceres)
Titan 3200 mi.
(moon of Satum)
Enceladus 313 mi.
(moon of Satum)
5 Moons
Triton 1682 mi.
(moon of Neptune)
(Pluto 1477mi.)
Europa 1940 mi.
(moon of Jupiter)
Ceres
Miranda 298x291x289 mi.
(moon of Uranus)

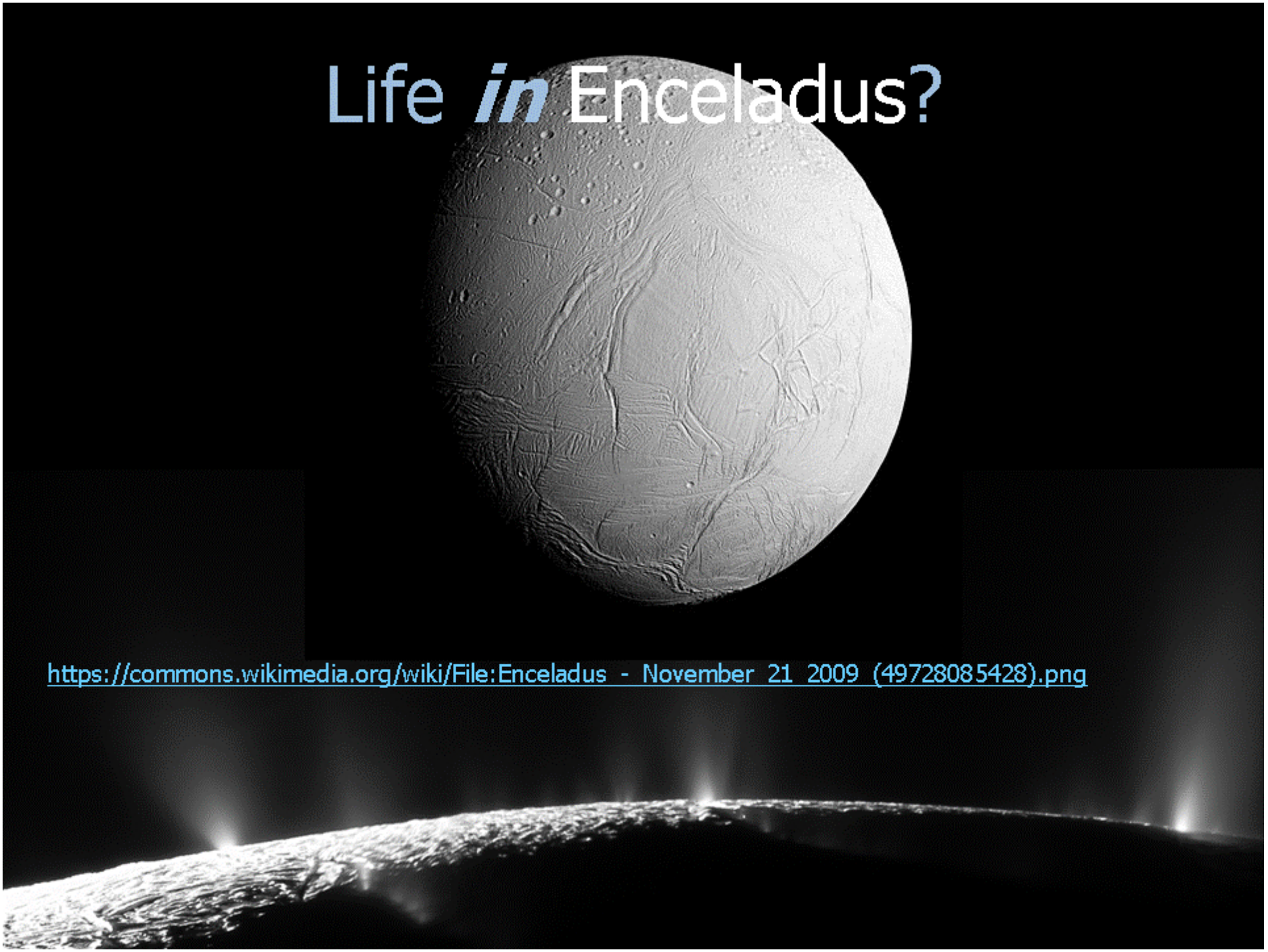

Europa

Europa Lander

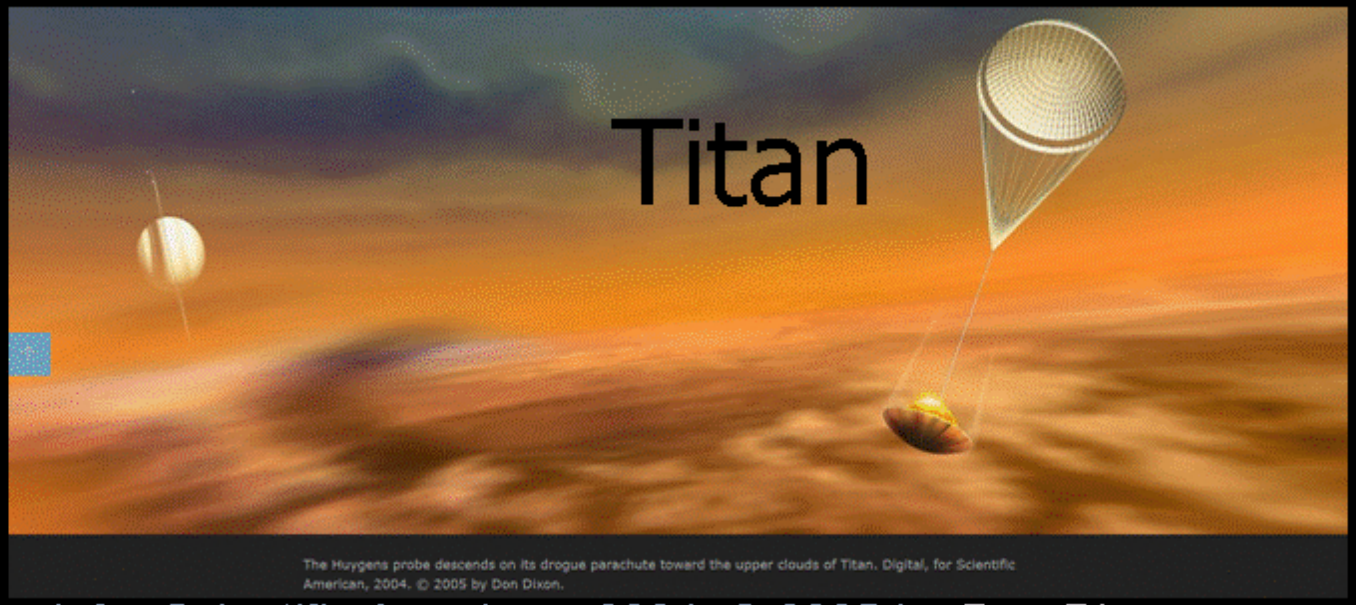
NASA's new lander prototype during field tests in Alaska (Credit: NASA/JPL-Caltech)

- Successful tests July 2022
- NASA studying potential lander concepts since 2020
- autonomous control software with drilling hardware to crack the icy surface
- search for first potentially life-containing samples
- need to withstand harsh space travel and Europan conditions
- https://thedebrief.org/nasa-field-tests-new-robot-that-could-search-jupiters-moon-europa-for-signs-of-life/
- (The *Europa Clipper* mission to arrive April 2030, but will only fly by)

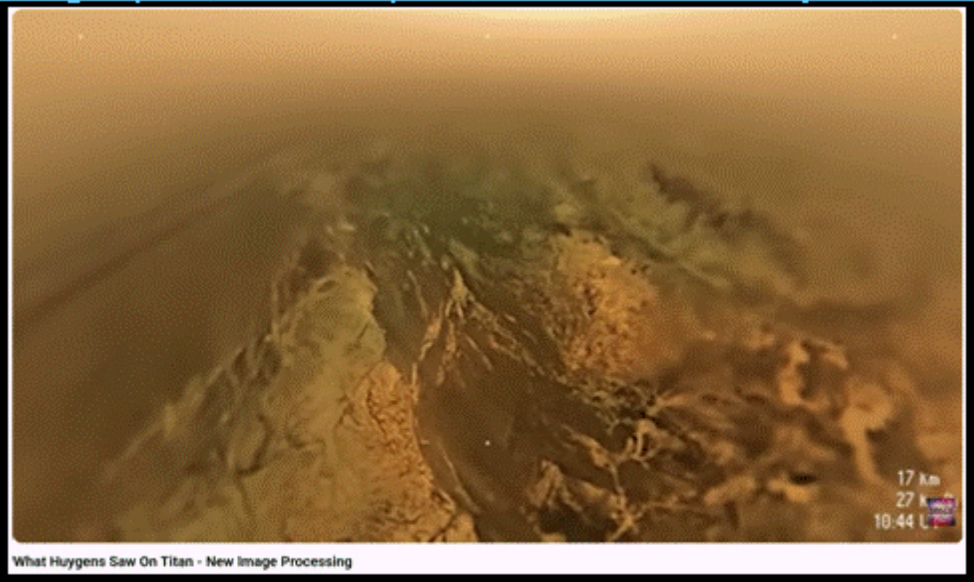
Life *in* Enceladus?



https://commons.wikimedia.org/wiki/File:Enceladus_-_November_21_2009_(49728085428).png

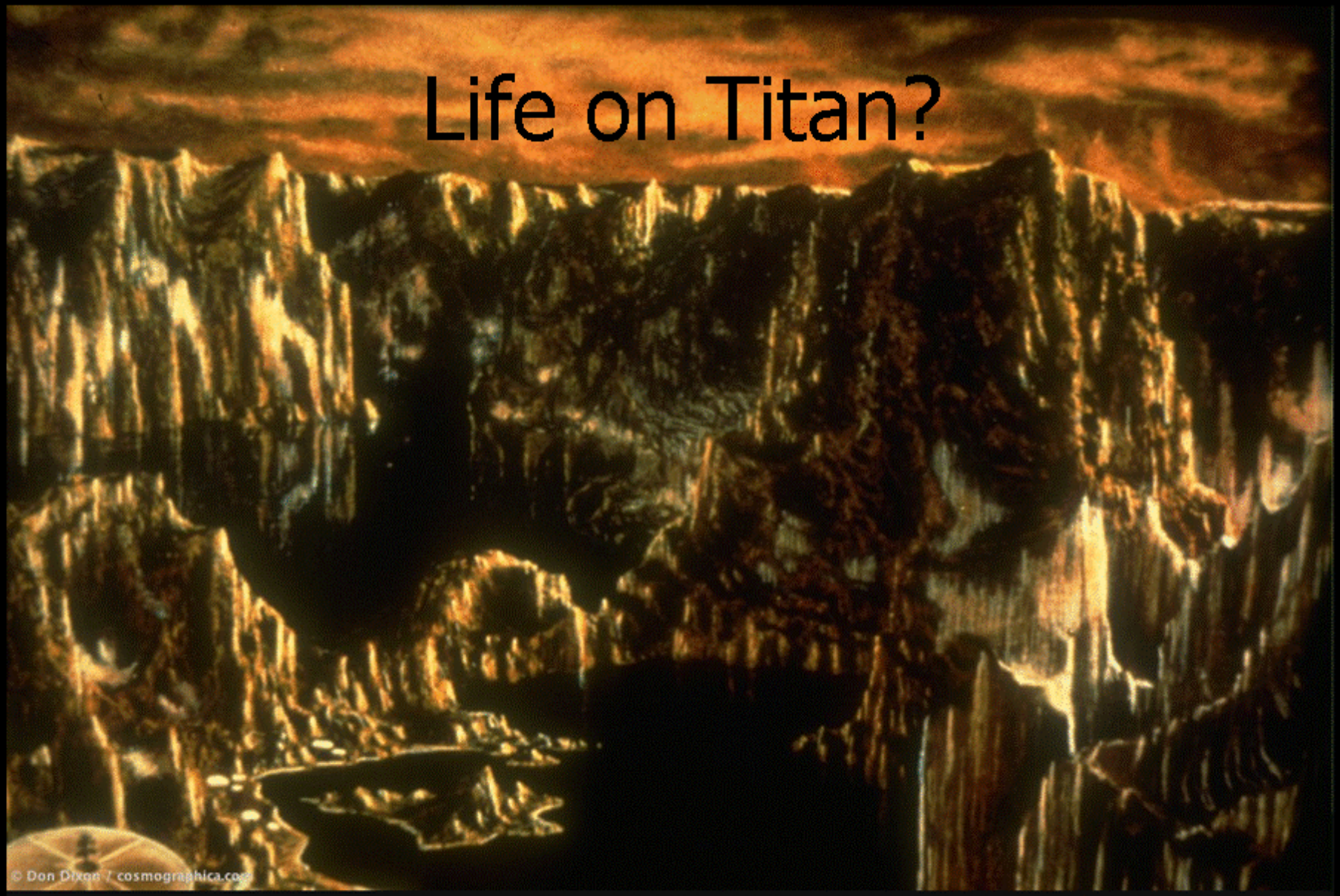


Artwork for Scientific American, 2004. © 2005 by Don Dixon
https://www.cosmographica.com/spaceart/Solar%20System/Saturn/index.html



- "What Huygens Saw On Titan - New Image Processing" (4:40)
- https://www.youtube.com/watch?v=9L471ct7YDo

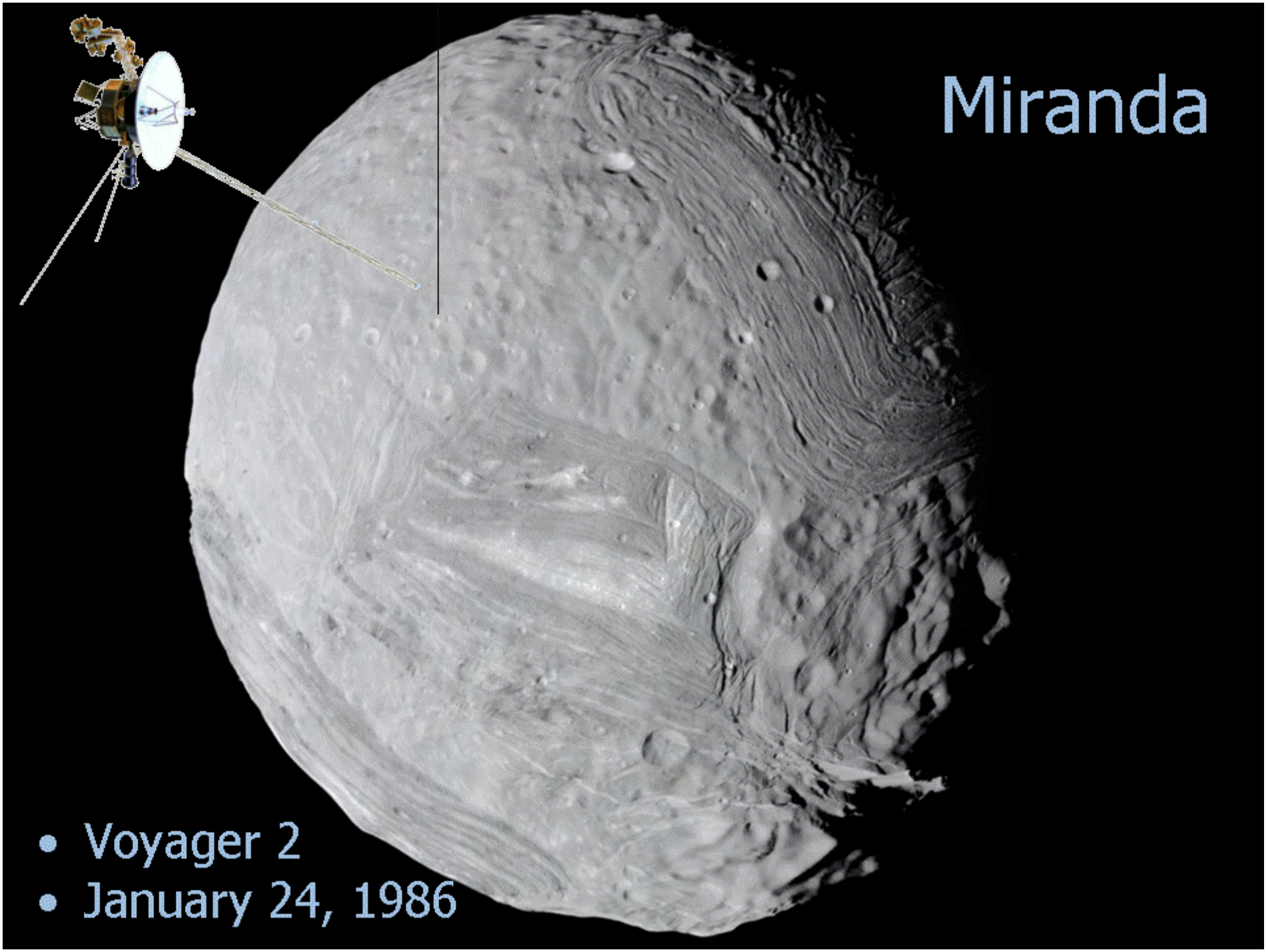
Life on Titan?



pools of hydrocarbons nestle between highly eroded cliffs of ice on Titan ; gouache on board, 1979

Artwork by Don Dixon

https://www.cosmographica.com/spaceart/Solar%20System/Saturn/index.html

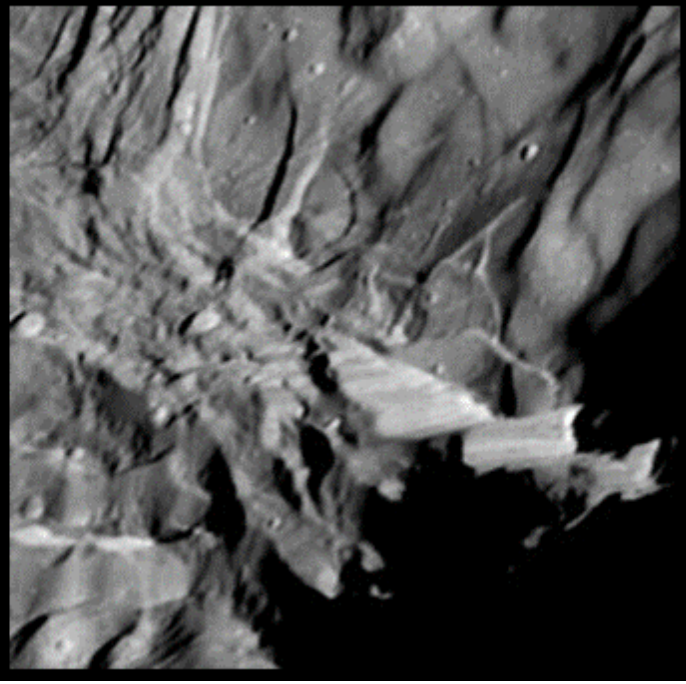

Miranda
• Voyager 2
• January 24, 1986

Verona Rupes

- Potentially tallest cliff in the Solar System

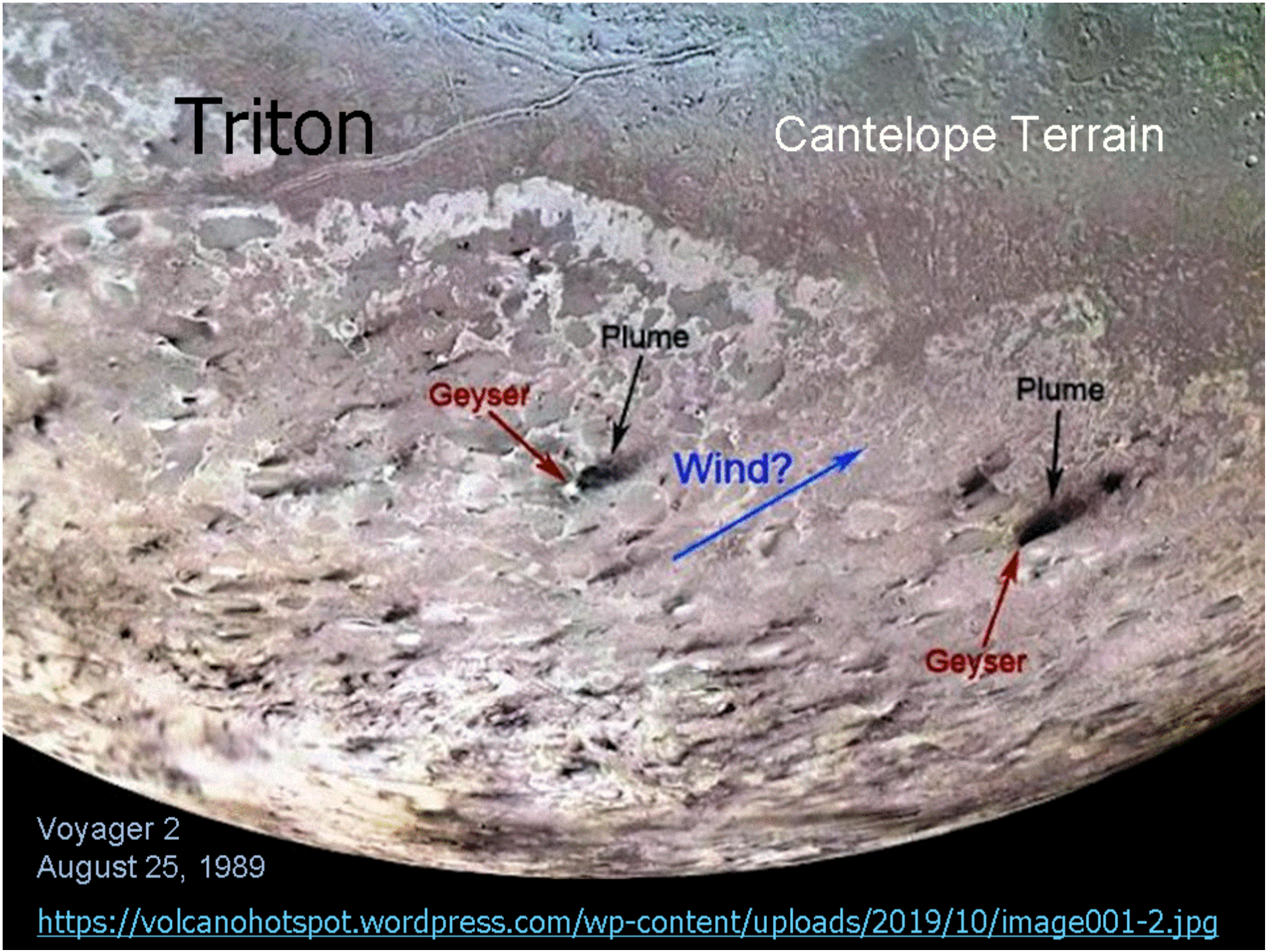
1. Between 5 and 10 km (3 and 6 mi)
2. 20 km (12 mi)
3. “True" height 5 to 15 km (3 to 9 mi) when not accounting for oblique viewing

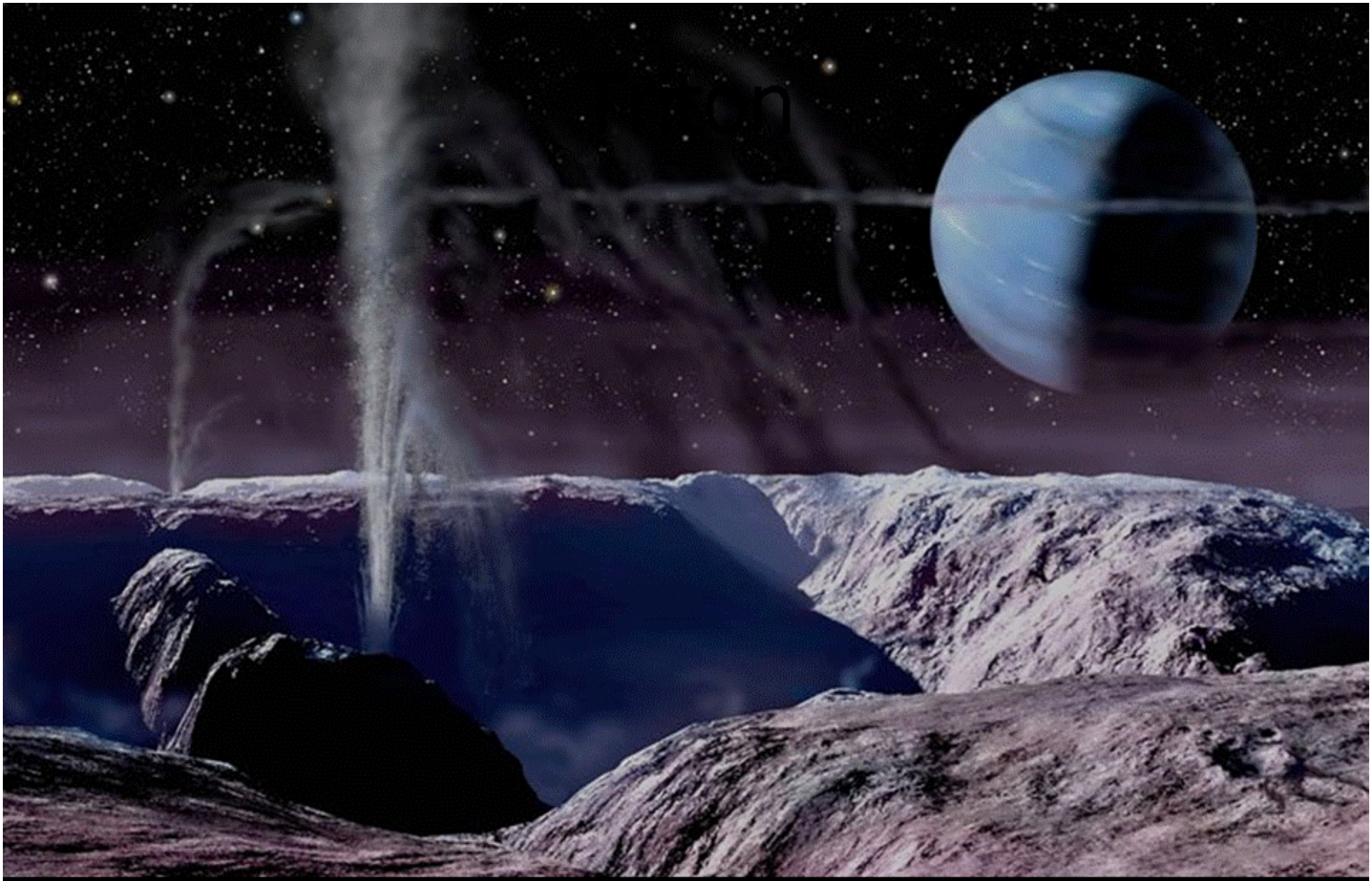
- https://www.tiktok.com/@perceptiveplanet/video/7409766921148747054



Miranda

- Astronauts BASE jumping off cliff on Uranus' moon Miranda
- Gravity: 0.076 m/s2, 0.0077 Earth gravity
  (Jump: Earth 3 ft, Miranda 380 ft)
- https://www.filmsupply.com/clips/astronauts-base-jumping-off-cliff-on-uranus-moon-miranda/694791


Triton
Cantelope Terrain
Plume
Geyser
Wind?
Plume
Geyser
Voyager 2
August 25, 1989
https://volcanohotspot.wordpress.com/wp-content/uploads/2019/10/image001-2.jpg



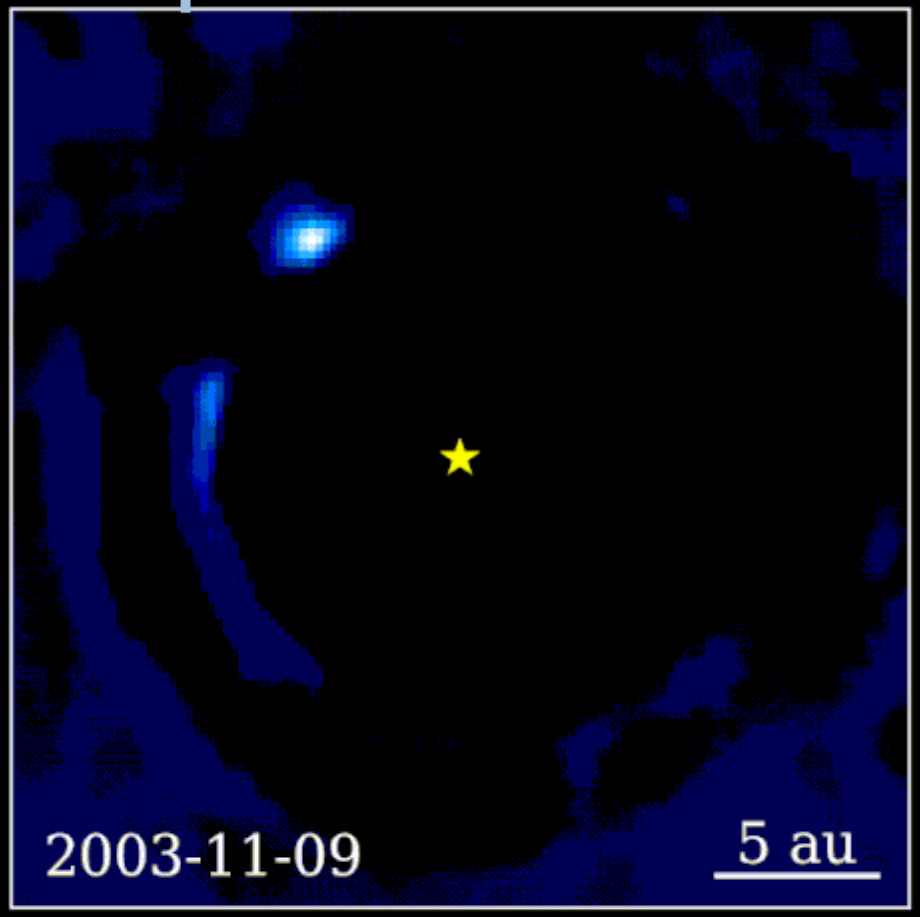
- Artwork by David A. Hardy
- https://astroart.org/galleries/the-solar-system/neptune/

David A. Hardy, 2005 Lunacon

Exoplanets

- As of 26 February 2026, there are 6,128 confirmed exoplanets in 4,560 planetary systems, with 1,038 systems having more than one planet.
  - "Planetary Systems Composite Data". NASA Exoplanet Archive. Retrieved 26 February 2026.
  - "NASA's Tally of Planets Outside Our Solar System Reaches 6,000 - NASA". 17 September 2025.

β Pictoris b



- 17-year time-lapse using over 30 frames of data
- Gemini Planet Imager, VLT/NACO, and VLT/SPHERE
- Date: 9 August 2023
- There is also a belt of rocky rubble and another gas giant planet closer in (not seen)
- Source: https://jasonwang.space/orbits.html Author: Jason Wang & Malachi Noel

Microlensed Super-Neptune

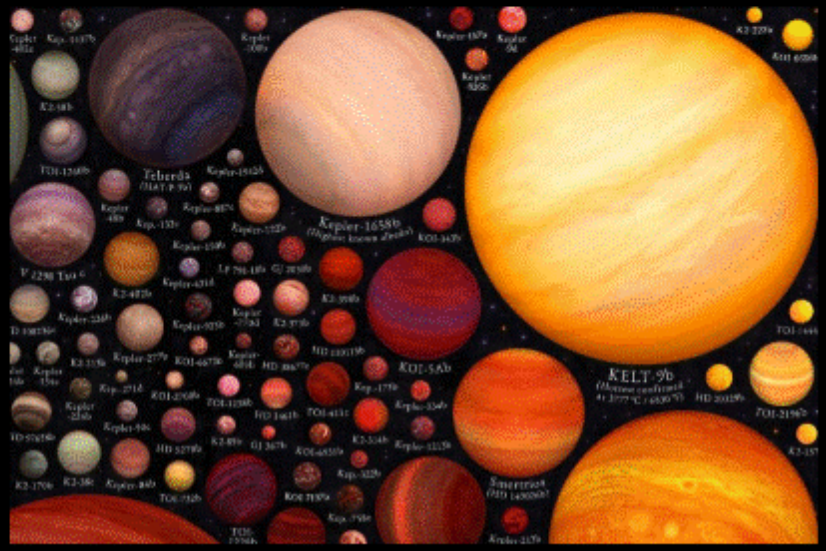
- Artist's depiction of planet OGLE-2012-BLG-0950Lb
- Super Neptune
- 8,500 light years
- Credit: NASA/JPL/GSFC/F. Reddy/C. Ranc
- https://www.syfy.com/syfy-wire/astronomers-find-a-rare-super-neptune-thanks-to-einstein

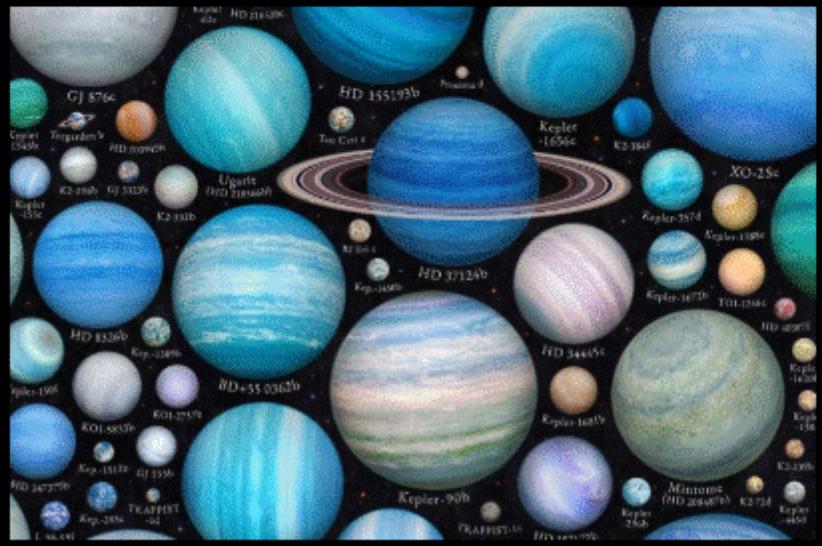
Habitable Exoplanets

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

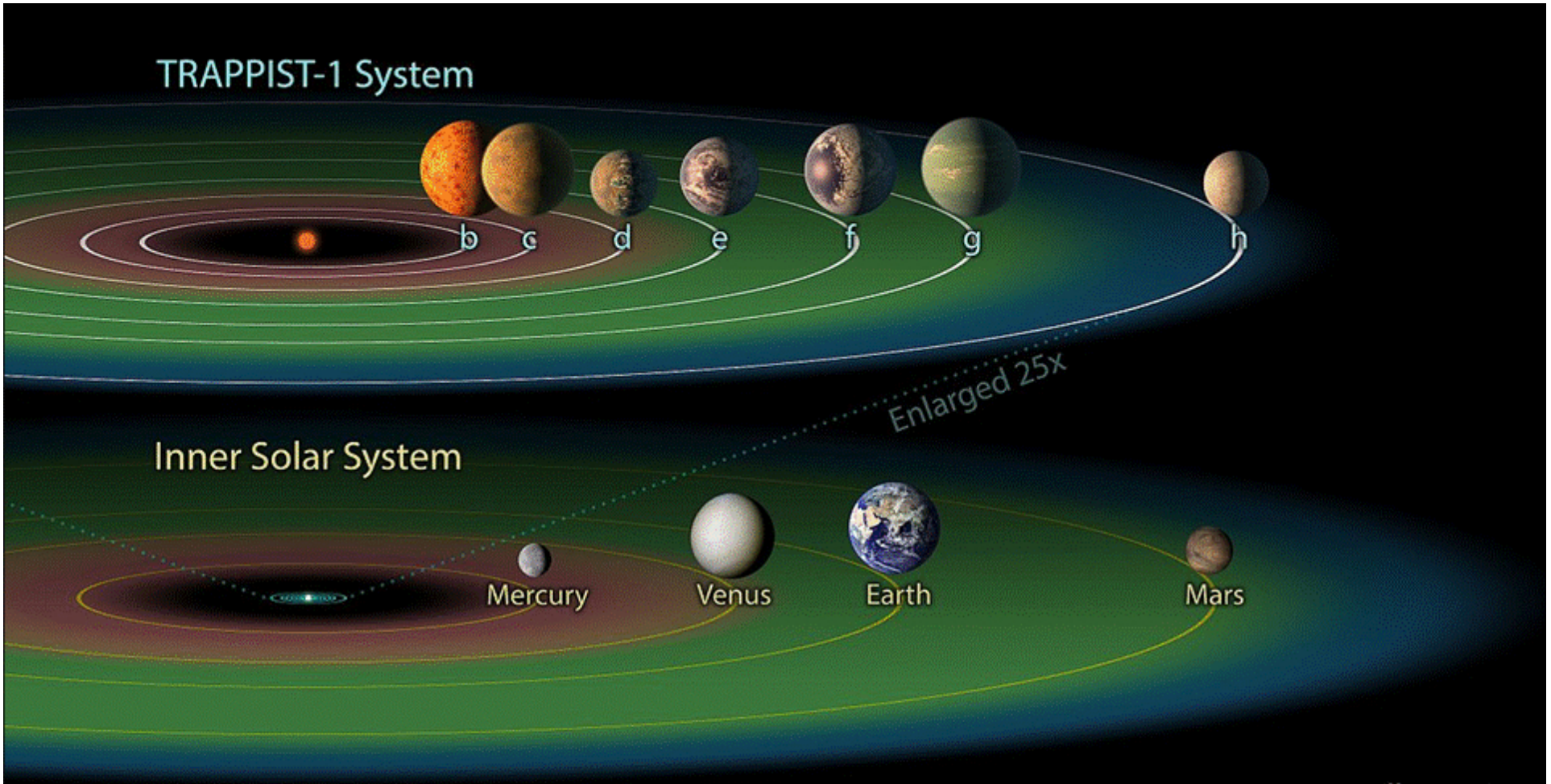
Object	Star	Star type	Mass ($M_\oplus$)	Radius ($R_\oplus$)	Density (g/cm^3)	Flux ($F_\oplus$)	T_{eq} (K)	Period (days)	Distance (ly)	Refs/notes
Earth (reported for reference)	Sun	G2V	1.00	1.00	5.514	1.00	255	365.25	0	Only planet confirmed to support life
Venus (reported for reference)	Sun	G2V	0.815	0.950	5.243	1.911	244.261	224.70	0.0000042	[5]
Mars (reported for reference)	Sun	G2V	0.107	0.533	3.934	0.431	209.8	686.98	0.0000058–0.000042	[6]
55 Cancri Bc	55 Cancri B	M4V	≥5.3	—	—	0.3	200	33.7	40.9	[7]
Gliese 12 b	Gliese 12	M4V	0.71 or 0.95[8][9]	$0.904\ ^{+0.037}_{-0.034}$[9]	5.3 or 7.1	1.6 ± 0.2	315	12.7	39.7	Near inner edge of HZ, might resemble Venus[10]
Gliese 163 c	Gliese 163	M3V	≥6.80	—	—	1.25	277	25.6	49	[1]
Gliese 180 d	Gliese 180	M2V	≥7.56	—	—	0.26	—	106.3	39	[1]
Gliese 251 c	Gliese 251	M3V	≥3.84	—	—	—	—	53.6	18.2	[11]

1100 Exoplanets 2024



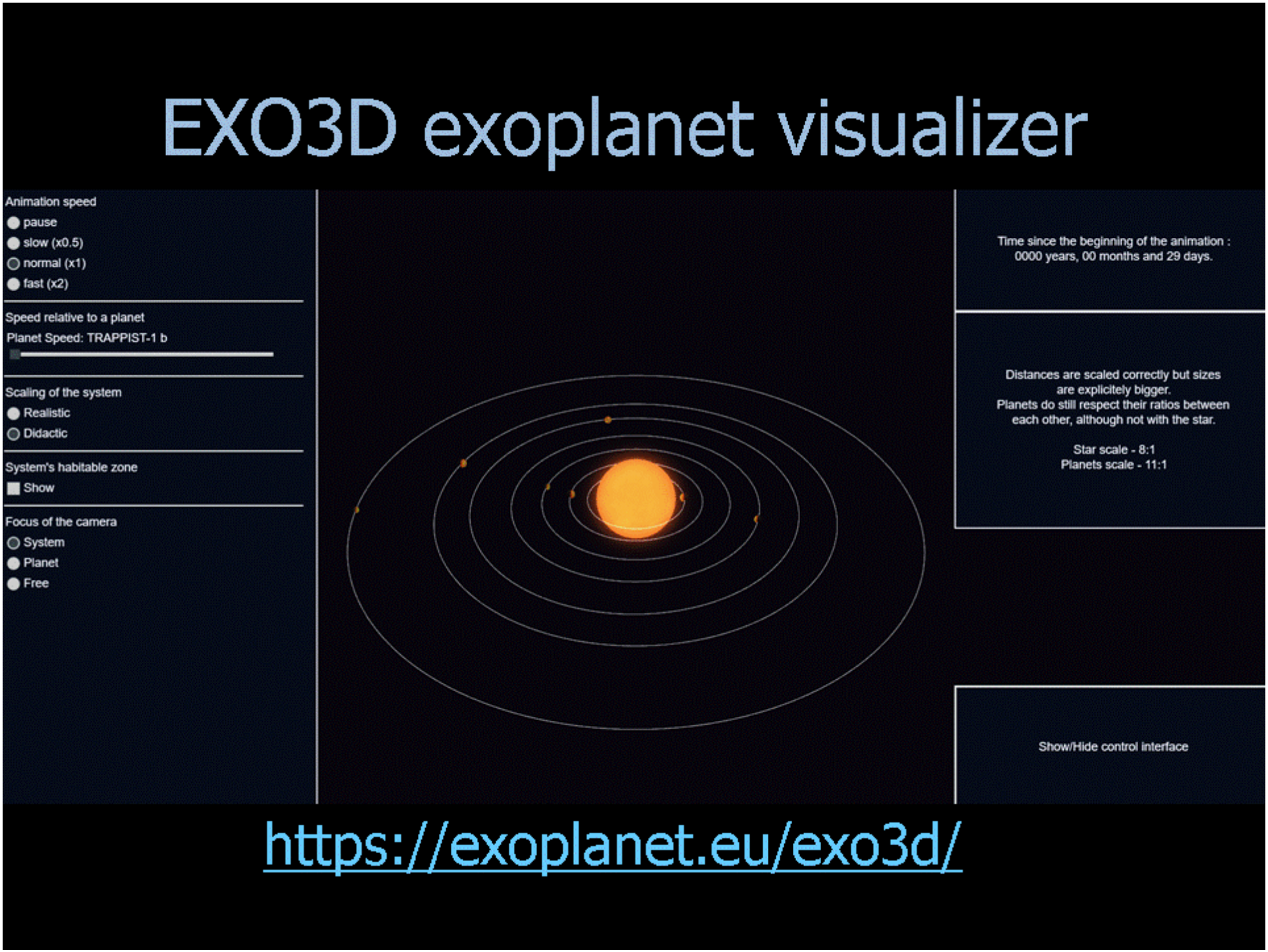


- https://www.diyphotography.net/this-satisfying-infographic-shows-over-1000-exoplanets-in-one-image/, article by Dunja Đudić
- Martin Vargic, a Slovakian designer created The Exoplanet Zoo
- >1,100 exoplanets we know {as of August 6, 2024}
- Used scientific models & latest data arranged by heat from their stars, comparing relative sizes and artistic representation of possible look
- Exoplanets colder than -200°C appear as blue or cyan globes with methane hazes, similar to Uranus and Neptune.
- Cold terrestrial planets might feature lakes and rivers of liquid hydrocarbons, similar to Saturn's moon Titan.
- Hottest gas giants show cloud layers of silicates, molten glass, or even corundum and iron, with rubies and sapphires potentially raining on these worlds



- **Tra**nsiting **P**lanets and **P**lanetes**i**mals **S**mall **T**elescope project
- La Silla Observatory, Chile
- UV flux, flares
- Star may not produce sufficient quantities of radiation for photosynthesis
- Due to proximity of the planets, it is possible rock-encased microorganisms ripped from one planet may arrive at another planet while still viable inside the rock

EXO3D exoplanet visualizer



https://exoplanet.eu/exo3d/

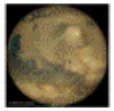
astronomyinmotion.com

VR Worlds

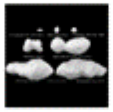
Mercury, color enhanced MESSENGER spacecraft image July 16, 2013

Moon with Apollo landing sites

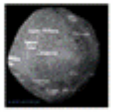
Mars 1895, from illustration by Lucien Rudaux



Mars from 1976 Viking and 2001 MGS maps, compare with Rudaux's 1895



7 Small Planetoids Compared



asteroid 101955 Bennu

asteroid 4 Vesta, with features labeled

asteroid 99942 Apophis

Io, 1st Galilean moon of Jupiter

Europa, 2nd Galilean moon

Ganymede, 3rd Galilean moon

Callisto, 4th Galilean moon

Saturn 1899 illustration by Rudaux

Enceladus, inner moon of Saturn

Titan, largest moon of Saturn

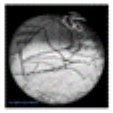
Hyperion, irregular moon of Saturn

Iapetus, largest outer moon of Saturn

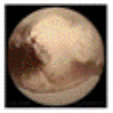
Miranda, moon of Uranus (NASA)

Miranda (3D Asteroid Catalogue)

Triton, map by Albers



Triton, map by Schenk

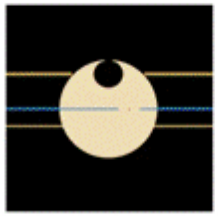


VR Pluto, from New Horizons

Charon, largest moon of Pluto

VR Objects

VR Centaur D rocket upper stage



Sun, Earth and Jupiter viewed by extraterrestrials with the transit method on January 10, 2026.