Astronomy Picture of the Day

2019

2018 August 3

Central Lunar Eclipse

Image Credit & Copyright: Anthony Ayiomamitis (TWAN)

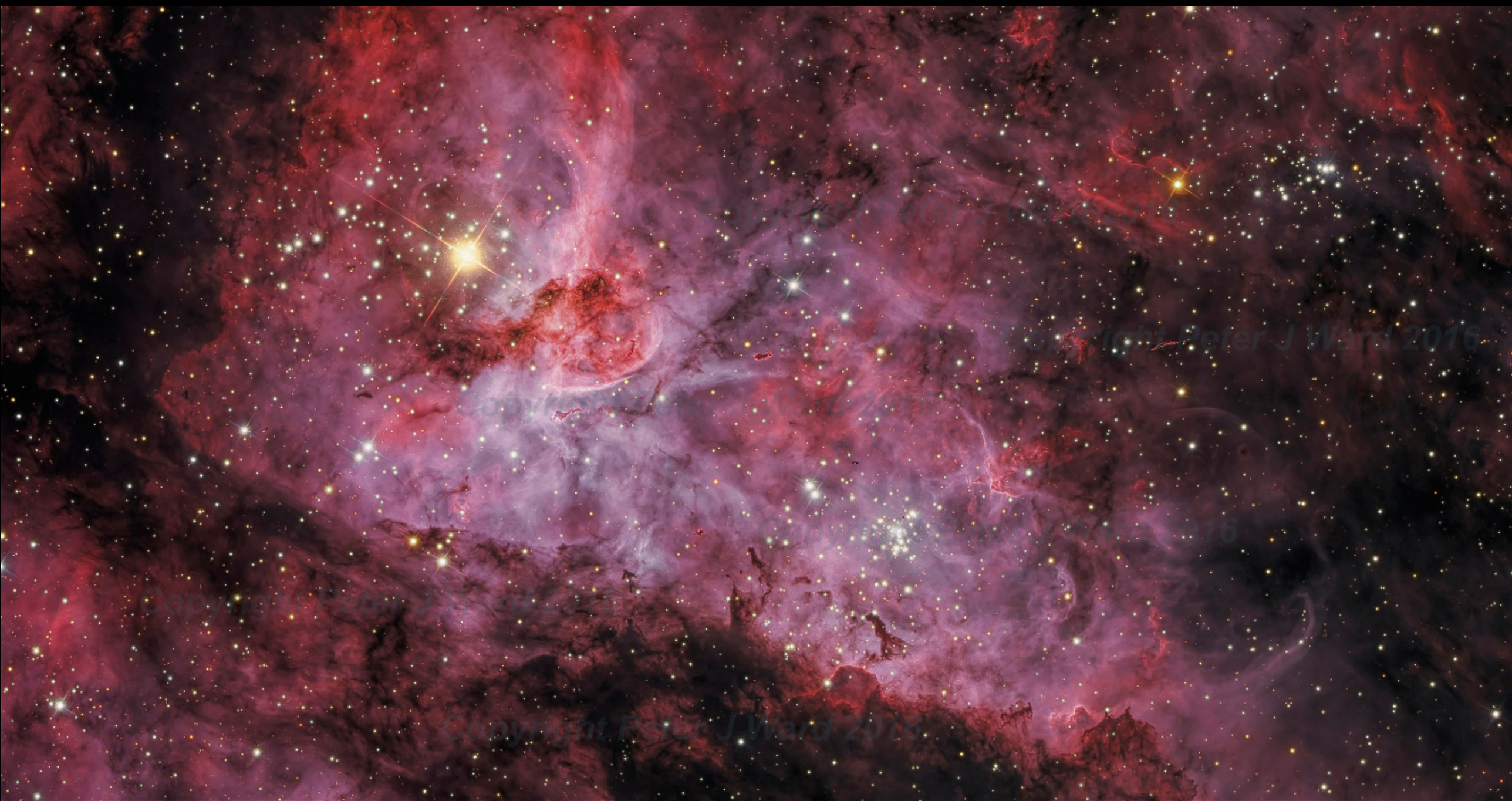
Explanation: Reddened by scattered sunlight, the Moon in the center is passing through the center of Earth's dark umbral shadow in this July 27 lunar eclipse sequence. Left to right the three images are from the start, maximum, and end to 103 minutes of totality from the longest lunar eclipse of the 21st century. The longest path the Moon can follow through Earth's shadow does cross the shadow's center, that's what makes such central lunar eclipses long ones. But July 27 was also the date of lunar apogee, and at the most distant part of its elliptical orbit the Moon moves slowest. For the previous lunar eclipse, last January 31, the Moon was near its orbital perigee. Passing just south of the Earth shadow central axis, totality lasted only 76 minutes. Coming up on January 21, 2019, a third consecutive total lunar eclipse will also be off center and find the Moon near perigee. Then totality will be a mere 62 minutes long.

January 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		Jan 1	*2*	*3* *Earth at Perihelion*	*4*	*5*
6 *New Moon*	*7*	*8*	*9*	*10*	*11*	*12*
13	*14* *First Quarter Moon*	*15*	*16*	*17*	*18*	*19*
20	*21* *Full Moon* *Total Lunar Eclipse*	*22*	*23*	*24*	*25*	*26*
27 *Last Quarter Moon*	*28*	*29*	*30*	*31*	*Feb 1*	*2*

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Feb 1	*2*
3	*4*	*5*	*6*	*7*	*8*	*9*
10	*11*	*12*	*13*	*14*	*15*	*16*
17	*18*	*19*	*20*	*21*	*22*	*23*
24	*25*	*26*	*27*	*28*	*Mar 1*	*2*


Copyright Peter J Ward 2016

The Great Carina Nebula

Image Credit & Copyright: Peter Ward (Barden Ridge Observatory)

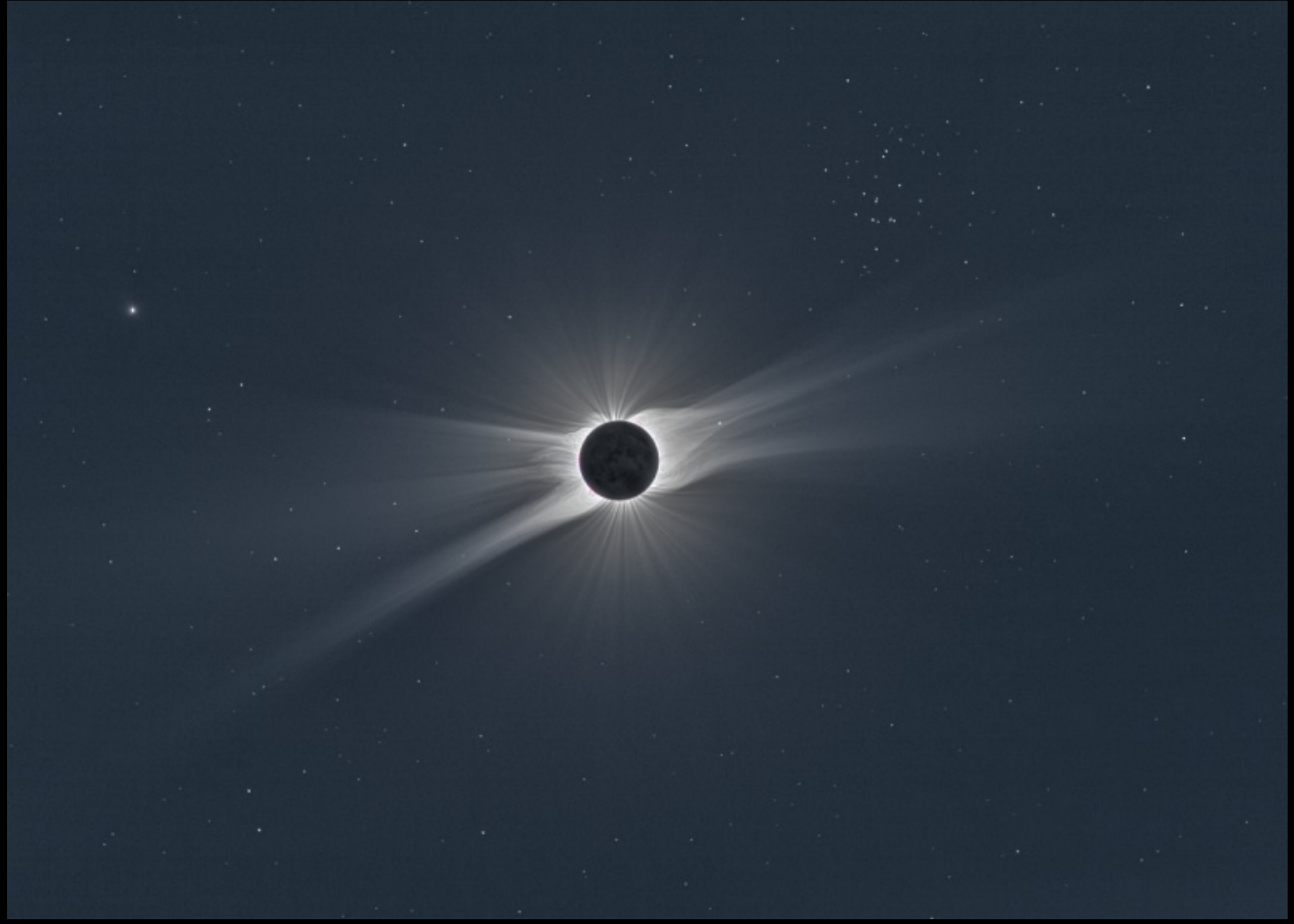
Explanation: A jewel of the southern sky, the Great Carina Nebula, also known as NGC 3372, spans over 300 light-years, one of our galaxy's largest star forming regions. Like the smaller, more northerly Great Orion Nebula, the Carina Nebula is easily visible to the unaided eye, though at a distance of 7,500 light-years it is some 5 times farther away. This gorgeous telescopic close-up reveals remarkable details of the region's central glowing filaments of interstellar gas and obscuring cosmic dust clouds. The field of view is over 50 light-years across. The Carina Nebula is home to young, extremely massive stars, including the stars of open cluster Trumpler 14 (below and right of center) and the still enigmatic variable Eta Carinae, a star with well over 100 times the mass of the Sun. Eta Carinae is the brightest star, seen here just above the dusty Keyhole Nebula (NGC 3324). While Eta Carinae itself maybe on the verge of a supernova explosion, X-ray images indicate that the Great Carina Nebula has been a veritable supernova factory.

February 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Feb 1	2
3	4 New Moon	5	6	7	8	9
10	11	12 First Quarter Moon	13	14	15	16
17	18	19 Full Moon	20	21	22	23
24	25	26 Last Quarter Moon	27	28	Mar 1	2

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Mar 1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	Apr 1	2				



A Darkened Sky

Credit & Copyright: Miloslav Druckmuller (Brno University of Technology), Peter Aniol, Vojtech Rusin

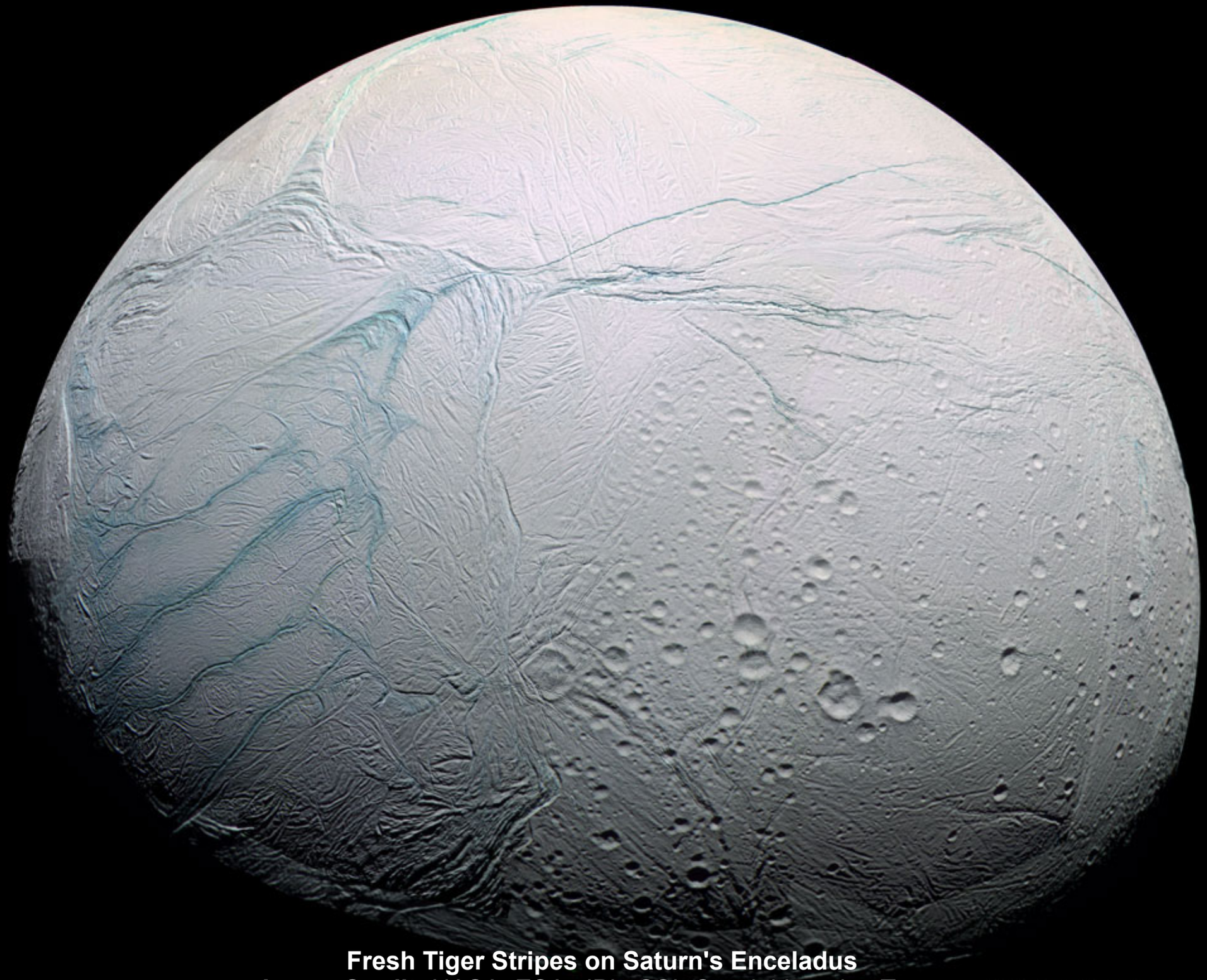
Explanation: For a moment on August 1st, the daytime sky grew dark along the path of a total solar eclipse. While watching the geocentric celestial event from Mongolia, photographer Miloslav Druckmuller recorded multiple images with two separate cameras as the Moon blocked the bright solar disk and darkened the sky. This final composition consists of 55 frames ranging in exposure time from 1/125 to 8 seconds. It spans nearly 12 degrees, with the relative position of the Moon and Sun corresponding to mid-eclipse. On the left is bright planet Mercury, but many stars are also visible, including the Praesepe star cluster (also known as M44 or the Beehive cluster) in Cancer, above and to the right of the silhouetted Moon. Remarkably, the nearly perfect conditions and wide range in individual exposures allow the composite picture to register the lunar surface and follow the delicate solar corona out to a distance of nearly 20 times the radius of the Sun. In fact, the composite presents a range in brightness beyond what the eye could see during the eclipse.

March 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Mar 1	*2*
3	*4*	*5*	*6* *New Moon*	*7*	*8*	*9*
10	*11*	*12*	*13*	*14* *First Quarter Moon*	*15*	*16*
17	*18*	*19*	*20* *Vernal Equinox*	*21* *Full Moon*	*22*	*23*
24	*25*	*26*	*27*	*28*	*29*	*30*
31	*Apr 1*	*2*				

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	Apr 1	*2*	*3*	*4*	*5*	*6*
7	*8*	*9*	*10*	*11*	*12*	*13*
14	*15*	*16*	*17*	*18*	*19*	*20*
21	*22*	*23*	*24*	*25*	*26*	*27*
28	*29*	*30*	*May 1*	*2*		



Fresh Tiger Stripes on Saturn's Enceladus
Image Credit: NASA, ESA, JPL, SSI, Cassini Imaging Team

Explanation: Do underground oceans vent through the tiger stripes on Saturn's moon Enceladus? Long features dubbed tiger stripes are known to be spewing ice from the moon's icy interior into space, creating a cloud of fine ice particles over the moon's South Pole and creating Saturn's mysterious E-ring. Evidence for this has come from the robot Cassini spacecraft that orbited Saturn from 2004 to 2017. Pictured here, a high resolution image of Enceladus is shown from a close flyby. The unusual surface features dubbed tiger stripes are visible in false-color blue. Why Enceladus is active remains a mystery, as the neighboring moon Mimas,approximately the same size, appears quite dead. A recent analysis of ejected ice grains has yielded evidence that complex organic molecules exist inside Enceladus. These large carbon-rich molecules bolster -- but do not prove -- that oceans under Enceladus' surface could contain life.

April 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	Apr 1	*2*	*3*	*4*	*5* *New Moon*	*6*
7	*8*	*9*	*10*	*11*	*12* *First Quarter Moon*	*13*
14	*15*	*16*	*17*	*18*	*19* *Full Moon*	*20*
21	*22*	*23* *Lyrid Meteor Shower*	*24*	*25*	*26* *Last Quarter Moon*	*27*
28	*29*	*30*	*May 1*	*2*		

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			May 1	*2*	*3*	*4*
5	*6*	*7*	*8*	*9*	*10*	*11*
12	*13*	*14*	*15*	*16*	*17*	*18*
19	*20*	*21*	*22*	*23*	*24*	*25*
26	*27*	*28*	*29*	*30*	*31*	*Jun 1*

NASA-ESA-JPL-SSI-Cassini

An Avalanche on Mars

Credit: HiRISE, MRO, LPL (U. Arizona), NASA

Explanation: What caused this sudden cloud of dust on Mars? An avalanche! The first avalanche imaged in progress on another planet was recorded last month on Mars by NASA's robotic Mars Reconnaissance Orbiter. Visible in the above picture, digitally rescaled, are several layers of white ice thawing over red rock, with darker colors toward the right indicated Martian soil that mixed with lesser amounts of ice. As the cliff of over 700 meters high was thawing, falling ice crashed down raising plumes of ice and dust so thick they cast visible shadows. The scarp has slopes with grades greater than 60 degrees. The entire scene is illuminated from the upper right by the Sun. A thaw occurs each spring in the Northern Hemisphere of Mars, as the warming climate causes solidcarbon dioxide ice to sublimate directly to vapor. Studying such avalanches allows planetary geologists to better understand soil configurations on Mars.

May 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			May 1	*2*	*3*	*4* *New Moon*
5 *Eta-Aquarid Meteor Shower*	*6*	*7*	*8*	*9*	*10*	*11*
12 *First Quarter Moon*	*13*	*14*	*15*	*16*	*17*	*18* *Full Moon*
19	*20*	*21*	*22*	*23*	*24*	*25*
26 *Last Quarter Moon*	*27*	*28*	*29*	*30*	*31*	*Jun 1*

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Jun 1
2	*3*	*4*	*5*	*6*	*7*	*8*
9	*10*	*11*	*12*	*13*	*14*	*15*
16	*17*	*18*	*19*	*20*	*21*	*22*
23	*24*	*25*	*26*	*27*	*28*	*29*
30	*Jul 1*					

The Milky Way over the Seven Strong Men Rock Formations
Image Credit & Copyright: Sergei Makurin

Explanation: You may have heard of the Seven Sisters in the sky, but have you heard about the Seven Strong Men on the ground? Located just west of the Ural Mountains, the unusual Manpupuner rock formations are one of the Seven Wonders of Russia. How these ancient 40-meter high pillars formed is yet unknown. The persistent photographer of this featured image battled rough terrain and uncooperative weather to capture these rugged stone towers in winter at night, being finally successful in February of 2014. Utilizing the camera's time delay feature, the photographer holds a flashlight in the foreground near one of the snow-covered pillars. High above, millions of stars shine down, while the band of our Milky Way Galaxy crosses diagonally down from the upper left.

June 2019

Copyright, Sergei Maku

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						Jun 1
2	3 New Moon	4	5	6	7	8
9	10 First Quarter Moon	11	12	13	14	15
16	17 Full Moon	18	19	20	21 Summer Solstice	22
23	24	25 Last Quarter Moon	26	27	28	29
30	Jul 1					

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	Jul 1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	Aug 1	2	3

The Old Moon in the Young Moon's Arms
Image Credit & Copyright: Stan Honda

Explanation: Tonight the Moon is young again, but this stunning image of a young Moon near the western horizon was taken just after sunset on October 10. On the lunar disk Earthshine, earthlight reflected from the Moon's night side, is embraced by the slim, sunlit crescent just over 2 days old. Along the horizon fading colors of twilight silhouette the radio telescope dish antennas of the Very Large Array, New Mexico, planet Earth. The view from the Moon would be stunning, too. When the Moon appears in Earth's sky as a slender crescent, a dazzlingly bright, nearly full Earth would be seen from the lunar surface. A description of earthshine, in terms of sunlight reflected by Earth's oceans in turn illuminating the Moon's dark surface, was written 500 years ago by Leonardo da Vinci.

July 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	Jul 1	*2* *New Moon*	*3*	*4* *Earth at Aphelion*	*5*	*6*
7	*8*	*9* *First Quarter Moon*	*10*	*11*	*12*	*13*
14	*15*	*16* *Full Moon*	*17*	*18*	*19*	*20*
21	*22*	*23*	*24*	*25* *Last Quarter Moon*	*26*	*27*
28 *Delta-Aquarid Meteor Shoer*	*29*	*30*	*31*	*Aug 1*	*2*	*3*

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				Aug 1	*2*	*3*
4	*5*	*6*	*7*	*8*	*9*	*10*
11	*12*	*13*	*14*	*15*	*16*	*17*
18	*19*	*20*	*21*	*22*	*23*	*24*
25	*26*	*27*	*28*	*29*	*30*	*31*

HH 666: Carina Dust Pillar with Jet

Image Credit: NASA, ESA, Hubble, HLA; **Processing & Copyright:** Domingo Pestana

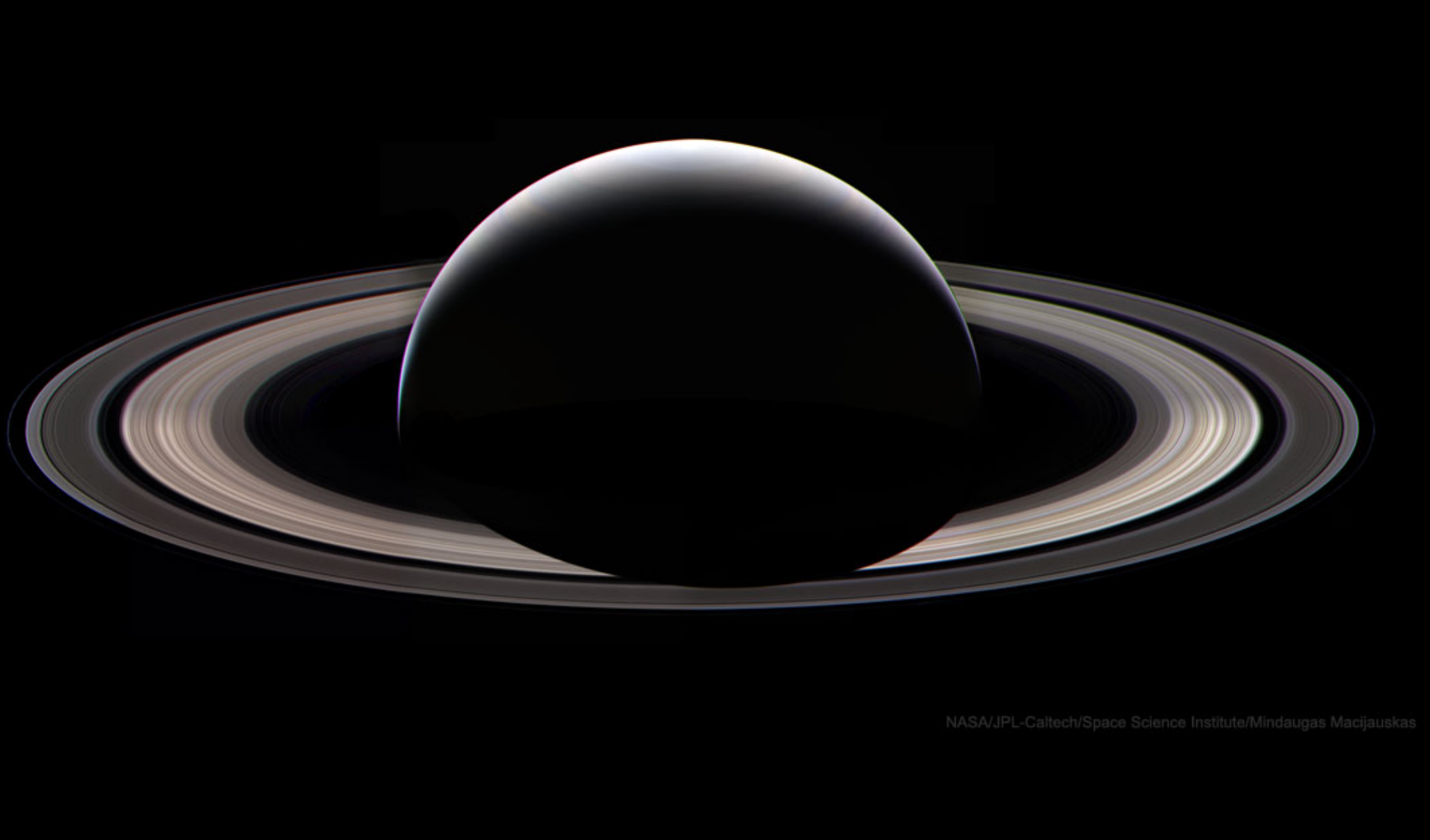
Explanation: To some, it may look like a beehive harboring an evil bee. In reality, the featured Hubble image captures a cosmic pillar of dust, two-light years long, inside of which is Herbig-Haro 666 -- a young star emitting powerful jets. The structure lies within one of our galaxy's largest star forming regions, the Carina Nebula, shining in southern skies at a distance of about 7,500 light-years. The pillar's layered outline are shaped by the winds and radiation of Carina's young, hot, massive stars, some of which are still forming inside the nebula. A dust-penetrating view in infrared light better shows the two, narrow, energetic jets blasting outward from a still hidden infant star.

August 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				Aug 1 New Moon	2	3
4	5	6	7 First Quarter Moon	8	9	10
11	12	13 Perseid Meteor Shower	14	15 Full Moon	16	17
18	19	20	21	22	23 Last Quarter Moon	24
25	26	27	28	29	30 New Moon	31

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Sep 1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	Oct 1	2	3	4	5



Cassini's Last Ring Portrait at Saturn

Image Credit: NASA, JPL-Caltech, Space Science Institute, Mindaugas Macijauskas

Explanation: How should Cassini say farewell to Saturn? Three days before plunging into Saturn's sunny side, the robotic Cassini spacecraft swooped far behind Saturn's night side with cameras blazing. Thirty-six of these images have been merged -- by an alert and adept citizen scientist -- into a last full-ring portrait of Cassini's home planet for the past 13 years. The Sun is just above the frame, causing Saturn to cast a dark shadow onto its enormous rings. This shadow position cannot be imaged from Earth and will not be visible again until another Earth-launched spaceship visits the ringed giant. Data and images from Cassini's mission-ending dive into Saturn's atmosphere on September 15 continue to be analyzed.

September 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Sep 1	*2*	*3*	*4*	*5*	*6* *First Quarter Moon*	*7*
8	*9*	*10*	*11*	*12*	*13*	*14* *Full Moon*
15	*16*	*17*	*18*	*19*	*20*	*21*
22 *Last Quarter Moon*	*23* *Autumnal Equinox*	*24*	*25*	*26*	*27*	*28* *New Moon*
29	*30*	*Oct 1*	*2*	*3*	*4*	*5*

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		Oct 1	*2*	*3*	*4*	*5*
6	*7*	*8*	*9*	*10*	*11*	*12*
13	*14*	*15*	*16*	*17*	*18*	*19*
20	*21*	*22*	*23*	*24*	*25*	*26*
27	*28*	*29*	*30*	*31*	*Nov 1*	*2*

Galaxies in the River

Image Credit & Copyright: Michel Meunier, Laurent Bernasconi, Janus Team

Explanation: Large galaxies grow by eating small ones. Even our own galaxy practices galactic cannibalism, absorbing small galaxies that get too close and are captured by the Milky Way's gravity. In fact, the practice is common in the universe and illustrated by this striking pair of interacting galaxies from the banks of the southern constellation Eridanus, The River. Located over 50 million light years away, the large, distorted spiral NGC 1532 is seen locked in a gravitational struggle with dwarf galaxy NGC 1531 (right of center), a struggle the smaller galaxy will eventually lose. Seen edge-on, spiral NGC 1532 spans about 100,000 light-years. Nicely detailed in this sharp image, the NGC 1532/1531 pair is thought to be similar to the well-studied system of face-on spiral and small companion known as M51.

October 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		Oct 1	2	3	4	5 First Quarter Moon
6	7	8	9	10	11	12
13 Full Moon	14	15	16	17	18	19
20	21 Last Quarter Moon Orionid Meteor Shower	22	23	24	25	26
27	28 New Moon	29	30	31	Nov 1	2

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Nov 1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Good Morning Leonid

Image Credit & Copyright: Stephane Vetter (Nuits sacrées), TWAN

Explanation: On November 17, just an hour before sunrise, this bright and colorful meteor flashed through clear predawn skies. Above a sea of clouds this striking autumn morning's moment was captured from Hochblauen, a prominent 1165 meter high summit in southern Germany's Black Forest. Shining through the twilight, Sirius as well as the familiar stars of Orion are recognizable near the southwestern horizon, and the meteor seems headed right for the hunter's belt and sword. Still, as part of the annual Leonid meteor shower, the meteor trail does point back to the shower's radiant. The constellation Leo is high above the horizon and off the top left of the frame.

November 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					Nov 1	2
3	4 First Quarter Moon	5	6 S Taurid Meteor Shower	7	8	9
10	11	12 Full Moon N Taurid Meteor Shower	13	14	15	16
17	18 Leonid Meteor Shower	19 Last Quarter Moon	20	21	22	23
24	25	26 New Moon	27	28	29	30

Notes:

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Dec 1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	Jan 1	2	3	4

Meteors over Inner Mongolia
Image Credit & Copyright: Haitong Yu

Explanation: Did you ever get caught in a meteor shower? If yes, then every minute or so the sky sparked with fleeting flashes of light. This was the fate of the pictured astrophotographer during last year's Perseids meteor shower. During the featured three-hour image composite, about 90 Perseids rained down above Lake Duolun of Inner Mongolia, China. If you trace back the meteor streaks, you will find that most of them appear to radiate from a single constellation -- in this case Perseus. In fact, you can even tell which meteors are *not* Perseids because they track differently. Tonight promises to be another good night to get caught in a meteor shower because it is the peak for the Geminids. Gemini, the shower radiant, should rise shortly after sunset and be visible most of the night.

December 2019

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Dec 1	*2*	*3*	*4* *First Quarter Moon*	*5*	*6*	*7*
8	*9*	*10*	*11*	*12* *Full Moon*	*13*	*14* *Geminid Meteor Shower*
15	*16*	*17*	*18*	*19* *Last Quarter Moon*	*20*	*21*
22	*23* *Ursid Meteor Shower*	*24*	*25*	*26* *New Moon*	*27*	*28*
29	*30*	*31*	*Jan 1*	*2*	*3*	*4*

Notes:

Since June 1995, **Astronomy Picture of the DayTM (APOD)** has featured a different image or photograph of our fascinating universe along with a brief explanation written by a professional astronomer. The website was created and is written and edited by Robert J. Nemiroff and Jerry T. Bonnell.

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Cover Image:
In the Shadow of Saturn
Image Credit: Cassini Imaging Team, SSI, JPL, ESA, NASA