NASA/JHU APS/SWRI

Wall Calendar 2017: NASA
Best of the Astronomy Picture of the Day

Jupiter's Clouds from New Horizons

Explanation: The New Horizons spacecraft took some stunning images of Jupiter on its way out to Pluto. Famous for its Great Red Spot, Jupiter is also known for its regular, equatorial cloud bands, visible through even modest sized telescopes. The featured image, horizontally compressed, was taken in 2007 near Jupiter's terminator and shows the Jovian giant's wide diversity of cloud patterns. On the far left are clouds closest to Jupiter's South Pole. Here turbulent whirlpools and swirls are seen in a dark region, dubbed a belt, that rings the planet. Even light colored regions, called zones, show tremendous structure, complete with complex wave patterns. The energy that drives these waves surely comes from below. New Horizons is the fastest space probe ever launched, has successfully complete its main flyby of Pluto in 2015, and is now heading further out and on track to flyby Kuiper belt object 2014 MU69 in 2019. (APOD on 2016 June 26)

July 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4  Earth farthest from Sun	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19  Thunder Moon	20	21	22	23
24	25	26	27	28	29	30
31						

Pluto in Enhanced Color

Explanation: Pluto is more colorful than we can see. Color data and images of our Solar System's most famous dwarf planet, taken by the robotic New Horizons spacecraft during its flyby in July, have been digitally combined to give an enhanced view of this ancient world sporting an unexpectedly young surface. The featured enhanced color image is not only esthetically pretty but scientifically useful, making surface regions of differing chemical composition visually distinct. For example, the light-colored heart-shaped Tombaugh Regio on the lower right is clearly shown here to be divisible into two regions that are geologically different, with the leftmost lobe Sputnik Planum also appearing unusually smooth. New Horizons now continues on beyond Pluto, will continue to beam back more images and data, and has been directed to change course so that it can fly past asteroid 2014 MU69 in 2019 January. (APOD on 2015 August 31)

August 2016

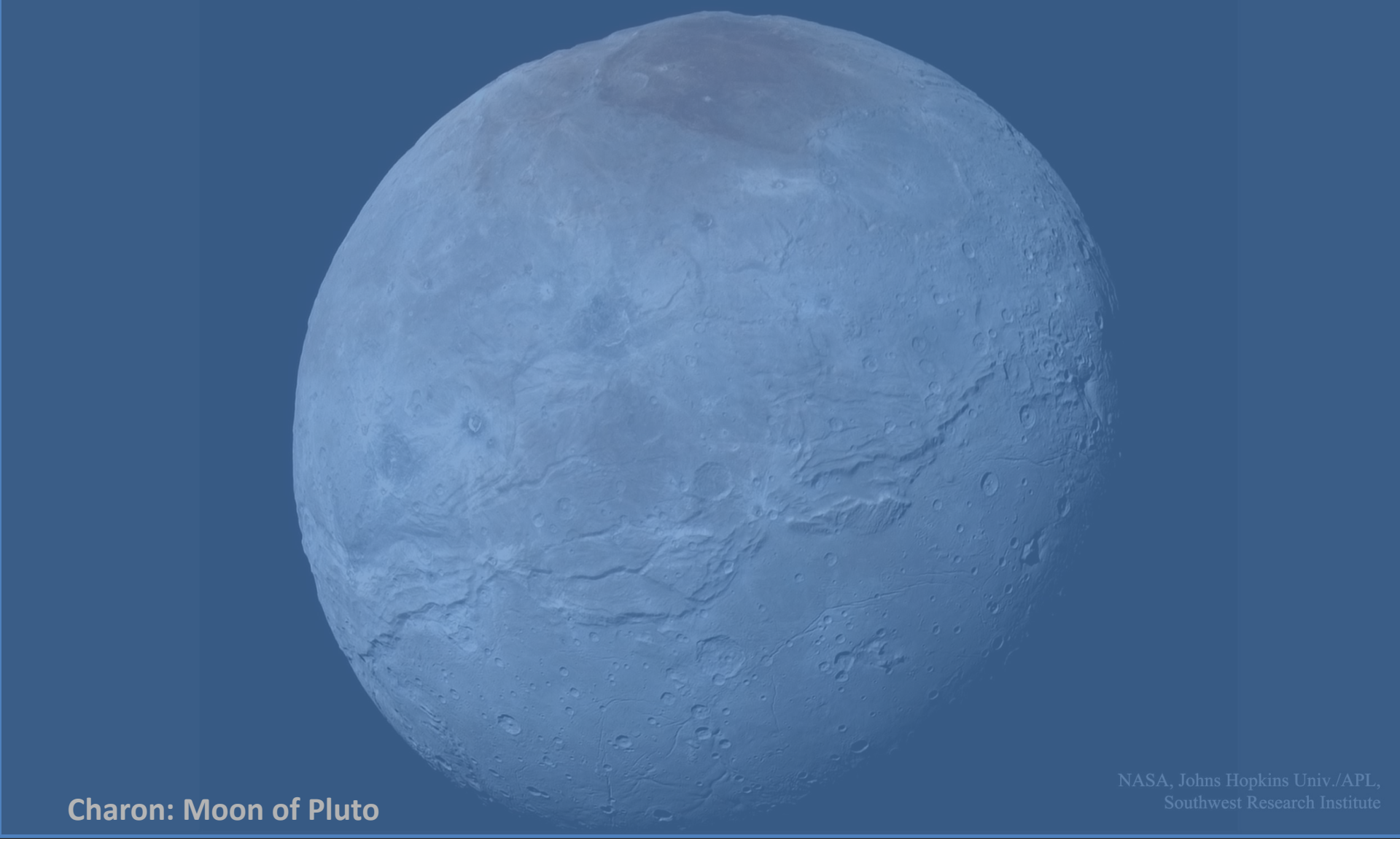
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12 Perseids meteor Shower	13 Perseids meteor shower
14	15	16	17	18 Grain Moon	19	20
21	22	23	24	25	26	27 Venus nearest Jupiter
28	29	30	31			

Spiral Galaxy M96 from Hubble

Explanation: Dust lanes seem to swirl around the core of Messier 96 in this colorful, detailed portrait of the center of a beautiful island universe. Of course M96 is a spiral galaxy, and counting the faint arms extending beyond the brighter central region, it spans 100 thousand light-years or so, making it about the size of our own Milky Way. M96, also known as NGC 3368, is known to be about 35 million light-years distant and a dominant member of the Leo I galaxy group. The featured image was taken by the Hubble Space Telescope. The reason for M96's asymmetry is unclear -- it could have arisen from gravitational interactions with other Leo I group galaxies, but the lack of an intra-group diffuse glow seems to indicate few recent interactions. Galaxies far in the background can be found by examining the edges of the picture. (APOD on 2015 September 21)

September 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1  Solar Eclipse (Annular)	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16  Harvest Moon Lunar Eclipse (Penumbral)	17
18	19	20	21	22 Equinox	23	24
25	26	27	28	29	30	



Charon: Moon of Pluto

NASA, Johns Hopkins Univ./APL,
Southwest Research Institute

Explanation: A darkened and mysterious north polar region informally known as Mordor Macula caps this premier high-resolution portrait of Charon, Pluto's largest moon. Captured by New Horizons near its closest approach on July 14, the image data was transmitted to Earth on September 21. The combined blue, red, and infrared data is processed to enhance colors, following variations in surface properties with a resolution of about 2.9 kilometers (1.8 miles). In fact, Charon is 1,214 kilometers (754 miles) across, about 1/10th the size of planet Earth but a whopping 1/2 the diameter of Pluto itself. That makes it the largest satellite relative to its planet in the solar system. This remarkable image of Charon's Pluto-facing hemisphere shows a clearer view of an apparently moon-girdling belt of fractures and canyons that seems to separate smooth southern plains from varied northern terrain. (APOD on 2015 October 2)

October 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16  Blood Moon	17	18	19	20	21	22
23	24	25	26	27	28	29
30  Venus nearest Saturn	31					

Explanation: Since November 2000, people have been living continuously on the International Space Station. To celebrate humanity's 15th anniversary off planet Earth, consider this snapshot from space of our galaxy and our home world posing together beyond the orbital outpost. The Milky Way stretches below the curve of Earth's limb in the scene that also records a faint red, extended airglow. The galaxy's central bulge appears with starfields cut by dark rifts of obscuring interstellar dust. The picture was taken by Astronaut Scott Kelly on August 9, 2015, the 135th day of his one-year mission in space. (APOD on 2015 November 7)

November 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13	14  Beaver Moon	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29 	30			

Herbig-Haro 24 from Hubble

Explanation: This might look like a double-bladed lightsaber, but these two cosmic jets actually beam outward from a newborn star in a galaxy near you. Constructed from Hubble Space Telescope image data, the stunning scene spans about half a light-year across Herbig-Haro 24 (HH 24), some 1,300 light-years or 400 parsecs away in the stellar nurseries of the Orion B molecular cloud complex. Hidden from direct view, HH 24's central protostar is surrounded by cold dust and gas flattened into a rotating accretion disk. As material from the disk falls toward the young stellar object it heats up. Opposing jets are blasted out along the system's rotation axis. Cutting through the region's interstellar matter, the narrow, energetic jets produce a series of glowing shock fronts along their path. Acknowledgment: D. Padgett (GSFC), T. Megeath (University of Toledo), B. Reipurth (University of Hawaii) (APOD on 2015 December 18)

December 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13 Geminids meteor shower	14 Oak Moon Geminids meteor shower	15	16	17
18	19	20	21 Solstice	22	23	24
25	26	27	28	29	30	31

Star Cluster R136 Bursts Out

Explanation: In the center of star-forming region 30 Doradus lies a huge cluster containing some of the largest, hottest, and most massive stars known. These stars, known collectively as star cluster R136, were captured in the featured image in visible light by the Wide Field Camera 3 in 2009 peering through the Hubble Space Telescope. Gas and dust clouds in 30 Doradus, also known as the Tarantula Nebula, have been sculpted into elongated shapes by powerful winds and ultraviolet radiation from these hot cluster stars. The 30 Doradus Nebula lies within a neighboring galaxy known as the Large Magellanic Cloud and is located a mere 170,000 light-years away. (APOD on 2016 January 24)

January 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3 Quadrantids meteor shower	4 Earth closest to Sun Quadrantids meteor shower	5	6	7
8	9	10	11	12 Wolf Moon	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

A Supernova through Galaxy Dust

Explanation: Telescopes around the world tracked a bright supernova that occurred in a nearby dusty galaxy. The nearby galaxy is the photogenic Centaurus A, visible with binoculars and known for impressive filaments of light-absorbing dust that cross its center. Cen A is featured here in a high-resolution archival Hubble Space Telescope image, with an inset image featuring the supernova taken from the ground only two days after discovery. Designated SN2016adj, the supernova is highlighted with crosshairs in the inset, appearing just to the left of a bright foreground star in our Milky Way Galaxy. This supernova is currently thought to be of Type IIb, a stellar-core-collapse supernova, and is of high interest because it occurred so nearby and because it is being seen through a known dust filament. Future observations of this supernova may give us new clues about the fates of massive stars and how some elements found on our Earth were formed. (APOD on 2016 February 23)

February 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11  Hunger Moon Lunar Eclipse (Penumbral)
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26  Solar eclipse (Annular)	27	28				

NASA's Curiosity Rover at Namib Dune

Explanation: Point or tilt to see a spectacular view of Mars visible to the Curiosity rover last December. In the foreground, part of Curiosity itself is visible, including its dusty sundial. Starting about seven meters back, the robotic rover is seen posing in front of a 5-meter tall dark sand dune named Namib, one of many dunes that span Bagnold field. Further in the distance is the summit of Mt. Sharp, the 5.5-kilometer peak at the center of 150-km wide Gale crater, the crater where Curiosity landed a few years ago. The featured composite spans a full 360-degrees around by combining several images taken on the same day, while the result has been color adjusted to mimic Earth lighting. Most recently, Curiosity is crossing the rocky and uneven Naukluft Plateau as it continues to make its way around and up Mt. Sharp. (APOD on 2016 March 29)

March 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12  Crow Moon	13	14	15	16	17	18
19	20 Equinox	21	22	23	24	25
26	27	28 	29	30	31	

LL Orionis: When Cosmic Winds Collide

Explanation: What created this great arc in space? This arcing, graceful structure is actually a bow shock about half a light-year across, created as the wind from young star LL Orionis collides with the Orion Nebula flow. Adrift in Orion's stellar nursery and still in its formative years, variable star LL Orionis produces a wind more energetic than the wind from our own middle-aged sun. As the fast stellar wind runs into slow moving gas a shock front is formed, analogous to the bow wave of a boat moving through water or a plane traveling at supersonic speed. In three dimensions, LL Ori's wrap-around shock front is shaped like a bowl that appears brightest when viewed along the "bottom" edge. The complex stellar nursery in Orion shows a myriad of similar fluid shapes associated with star formation, including the bow shock surrounding a faint star at the upper right. Part of a mosaic covering the Great Nebula in Orion, this composite color image was recorded in 1995 by the Hubble Space Telescope.(APOD on 2016 May 22)

April 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11  Egg Moon	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26 	27	28	29
30						

The International Space Station over Earth

Explanation: The International Space Station is the largest object ever constructed by humans in space. The station perimeter extends over roughly the area of a football field, although only a small fraction of this is composed of modules habitable by humans. The station is so large that it could not be launched all at once -- it continues to be built piecemeal. To function, the ISS needs huge trusses, some over 15 meters long and with masses over 10,000 kilograms, to keep it rigid and to route electricity and liquid coolants. Pictured above, the immense space station was photographed from the now-retired space shuttle Atlantis after a week-long stay in 2010. Across the image top hangs part of a bright blue Earth, in stark contrast to the darkness of interstellar space across the bottom. (APOD on 2016 April 18)

May 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10  Milk Moon	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25 	26	27
28	29	30	31			

The Horsehead Nebula in Infrared from Hubble

Explanation: While drifting through the cosmos, a magnificent interstellar dust cloud became sculpted by stellar winds and radiation to assume a recognizable shape. Fittingly named the Horsehead Nebula, it is embedded in the vast and complex Orion Nebula (M42). A potentially rewarding but difficult object to view personally with a small telescope, the above gorgeously detailed image was taken in 2013 in infrared light by the orbiting Hubble Space Telescope in honor of the 23rd anniversary of Hubble's launch. The dark molecular cloud, roughly 1,500 light years distant, is cataloged as Barnard 33 and is seen above primarily because it is backlit by the nearby massive star Sigma Orionis. The Horsehead Nebula will slowly shift its apparent shape over the next few million years and will eventually be destroyed by the high energy starlight. (APOD 2016 June 8)

June 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9 ○ Strawberry Moon	10
11	12	13	14	15	16	17
18	19	20	21 Solstice	22	23	24 ●
25	26	27	28	29	30	

Zeta Oph: Runaway Star

Explanation: Like a ship plowing through cosmic seas, runaway star Zeta Ophiuchi produces the arcing interstellar bow wave or bow shock seen in this stunning infrared portrait. In the false-color view, bluish Zeta Oph, a star about 20 times more massive than the Sun, lies near the center of the frame, moving toward the left at 24 kilometers per second. Its strong stellar wind precedes it, compressing and heating the dusty interstellar material and shaping the curved shock front. Zeta Oph was likely once a member of a binary star system, its companion star was more massive and hence shorter lived. When the companion exploded as a supernova catastrophically losing mass, Zeta Oph was flung out of the system. About 460 light-years away, Zeta Oph is 65,000 times more luminous than the Sun and would be one of the brighter stars in the sky if it weren't surrounded by obscuring dust. The image spans about 1.5 degrees or 12 light-years at the estimated distance of Zeta Ophiuchi. (APOD on 2015 July 5)

July 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 Earth farthest from Sun	4	5	6	7	8
9  Thunder Moon	10	11	12	13	14	15
16	17	18	19	20	21	22
23 	24	25	26	27	28	29
30	31					

Apollo 17 at Shorty Crater

Explanation: On the Moon, it is easy to remember where you parked. In December of 1972, Apollo 17 astronauts Eugene Cernan and Harrison Schmitt spent about 75 hours on the Moon in the Taurus-Littrow valley, while colleague Ronald Evans orbited overhead. This sharp image was taken by Cernan as he and Schmitt roamed the valley floor. The image shows Schmitt on the left with the lunar rover at the edge of Shorty Crater, near the spot where geologist Schmitt discovered orange lunar soil. The Apollo 17 crew returned with 110 kilograms of rock and soil samples, more than was returned from any of the other lunar landing sites. Now forty three years later, Cernan and Schmitt are still the last to walk on the Moon. (APOD on 2015 August 2)

August 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7  Grain Moon Lunar Eclipse (Partial)	8	9	10	11	12 Perseids meteor shower
13 Perseids meteor shower	14	15	16	17	18	19
20	21  Solar Eclipse (Total)	22	23	24	25	26
27	28	29	30	31		

In the Shadow of Saturn's Rings

Explanation: Humanity's robot orbiting Saturn has recorded yet another amazing view. That robot, of course, is the spacecraft Cassini, while the new amazing view includes a bright moon, thin rings, oddly broken clouds, and warped shadows. Titan, Saturn's largest moon, appears above as a featureless tan as it is continually shrouded in thick clouds. The rings of Saturn are seen as a thin line because they are so flat and imaged nearly edge on. Details of Saturn's rings are therefore best visible in the dark ring shadows seen across the giant planet's cloud tops. Since the ring particles orbit in the same plane as Titan, they appear to skewer the foreground moon. In the upper hemisphere of Saturn, the clouds show many details, including dips in long bright bands indicating disturbances in a high altitude jet stream. Recent precise measurements of how much Titan flexes as it orbits Saturn hint that vast oceans of water might exist deep underground. (APOD on 2012 July 3)

September 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6  Harvest Moon	7	8	9
10	11	12	13	14	15	16
17	18	19	20 	21	22 Equinox	23
24	25	26	27	28	29	30

Starburst Galaxy Messier 94

Explanation: Beautiful island universe Messier 94 lies a mere 15 million light-years distant in the northern constellation of the hunting dogs, Canes Venatici. A popular target for earth-based astronomers, the face-on spiral galaxy is about 30,000 light-years across, with spiral arms sweeping through the outskirts of its broad disk. But this Hubble Space Telescope field of view spans about 7,000 light-years or so across M94's central region. The sharp close-up examines the galaxy's compact, bright nucleus and prominent inner dust lanes, surrounded by a remarkable bluish ring of young, massive stars. The massive stars in the ring are all likely less than 10 million years old, indicating the galaxy experienced a well-defined era of rapid star formation. As a result, while the small, bright nucleus is typical of the Seyfert class of active galaxies, M94 is also known as a starburst galaxy. Because M94 is relatively nearby, astronomers can explore in detail reasons for the galaxy's burst of star formation. (APOD on 2015 October 23)

October 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5  Blood Moon Venus nearest Mars	6	7
8	9	10	11	12	13	14
15	16	17	18	19  ExoMars reaches Mars	20	21
22	23	24	25	26	27	28
29	30	31				

Dark Sand Cascades on Mars

Explanation: They might look like trees on Mars, but they're not. Groups of dark brown streaks have been photographed by the Mars Reconnaissance Orbiter on melting pinkish sand dunes covered with light frost. The above image was taken in 2008 April near the North Pole of Mars. At that time, dark sand on the interior of Martian sand dunes became more and more visible as the spring Sun melted the lighter carbon dioxide ice. When occurring near the top of a dune, dark sand may cascade down the dune leaving dark surface streaks -- streaks that might appear at first to be trees standing in front of the lighter regions, but cast no shadows. Objects about 25 centimeters across are resolved on this image spanning about one kilometer. Close ups of some parts of this image show billowing plumes indicating that the sand slides were occurring even while the image was being taken. (APOD on 2015 November 29)

November 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4 ○ Beaver Moon
5	6	7	8	9	10	11
12	13 Venus nearest Jupiter	14	15	16	17	18 ●
19	20	21	22	23	24	25
26	27	28	29	30		

M2-9: Wings of a Butterfly Nebula

Explanation: Are stars better appreciated for their art after they die? Actually, stars usually create their most artistic displays as they die. In the case of low-mass stars like our Sun and M2-9 pictured above, the stars transform themselves from normal stars to white dwarfs by casting off their outer gaseous envelopes. The expended gas frequently forms an impressive display called a planetary nebula that fades gradually over thousand of years. M2-9, a butterfly planetary nebula 2100 light-years away shown in representative colors, has wings that tell a strange but incomplete tale. In the center, two stars orbit inside a gaseous disk 10 times the orbit of Pluto. The expelled envelope of the dying star breaks out from the disk creating the bipolar appearance. Much remains unknown about the physical processes that cause planetary nebulae. (APOD on 2013 September 15)

December 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3  Oak Moon Supermoon	4	5	6	7	8	9
10	11	12	13 Geminids meteor shower	14 Geminids meteor shower	15	16
17	18 	19	20	21 Solstice	22	23
24	25 Venus nearest Saturn	26	27	28	29	30
31						

A Solar Filament Erupts

Explanation: What's happened to our Sun? Nothing very unusual -- it just threw a filament. Toward the middle of 2012, a long standing solar filament suddenly erupted into space producing an energetic Coronal Mass Ejection (CME). The filament had been held up for days by the Sun's ever changing magnetic field and the timing of the eruption was unexpected. Watched closely by the Sun-orbiting Solar Dynamics Observatory, the resulting explosion shot electrons and ions into the Solar System, some of which arrived at Earth three days later and impacted Earth's magnetosphere, causing visible aurorae. Loops of plasma surrounding an active region can be seen above the erupting filament in the ultraviolet image. Over the past week the number of sunspots visible on the Sun unexpectedly dropped to zero, causing speculation that the Sun has now passed a very unusual solar maximum, the time in the Sun's 11-year cycle when it is most active. (APOD on 2014 July 20)

2018

January

Su	M	Tu	W	Th	F	Sa
	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			

February

Su	M	Tu	W	Th	F	Sa
				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			

March

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	7	8	9	10
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18	19	20	21	22	23	24
25	26	27	28	29	30	31

April

Su	M	Tu	W	Th	F	Sa
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May

Su	M	Tu	W	Th	F	Sa
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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		

June

Su	M	Tu	W	Th	F	Sa
					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

July

Su	M	Tu	W	Th	F	Sa
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				

August

Su	M	Tu	W	Th	F	Sa
			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	

September

Su	M	Tu	W	Th	F	Sa
						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						

October

Su	M	Tu	W	Th	F	Sa
	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			

November

Su	M	Tu	W	Th	F	Sa
				1	2	3
4	5	6	7	8	9	10
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18	19	20	21	22	23	24
25	26	27	28	29	30	

December

Su	M	Tu	W	Th	F	Sa
						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					

Since June 1995, Astronomy Picture of the Day® (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 by and continues to be edited by Robert J. Nemiroff and Jerry T. Bonnell.

http://apod.nasa.gov/

This free downloadable calendar features images that have appeared on APOD. Moon phases and astronomical event dates are in UTC. The editors thank the many astrophotographers and professional astronomers whose images are submitted to and appear on APOD. The presentation of Astronomy Picture of the Day ® from NASA is a service of ASD at NASA / GSFC & Michigan Tech. U.
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