



Astronomy  
APAD  
Picture of the Day  
2016



## Total Solar Eclipse over Svalbard

Image Credit & Copyright: Thanakrit Santikunaporn

Explanation: Going, going, gone. That was the feeling in Svalbard, Norway last month during a total eclipse of the Sun by the Moon. In the featured image, the eclipse was captured every three minutes and then digitally merged with a foreground frame taken from the same location. Visible in the foreground are numerous gawking eclipse seekers, some deploying pretty sophisticated cameras. As the Moon and Sun moved together across the sky — nearly horizontally from this far north — an increasing fraction of the Sun appears covered by the Moon. In the central frame, the Moon's complete blockage of the disk of the Sun makes the immediate surroundings appear like night during the day. The exception is the Moon itself, which now appears surrounded by the expansive corona of the Sun. Of course, about 2.5 minutes later, the surface of the Sun began to reappear. The next total eclipse of the Sun will occur in 2016 March and be visible from Southeast Asia. [ap150420.html](http://ap150420.html)

# December

# 2015

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



### Comet Lovejoy before a Globular Star Cluster

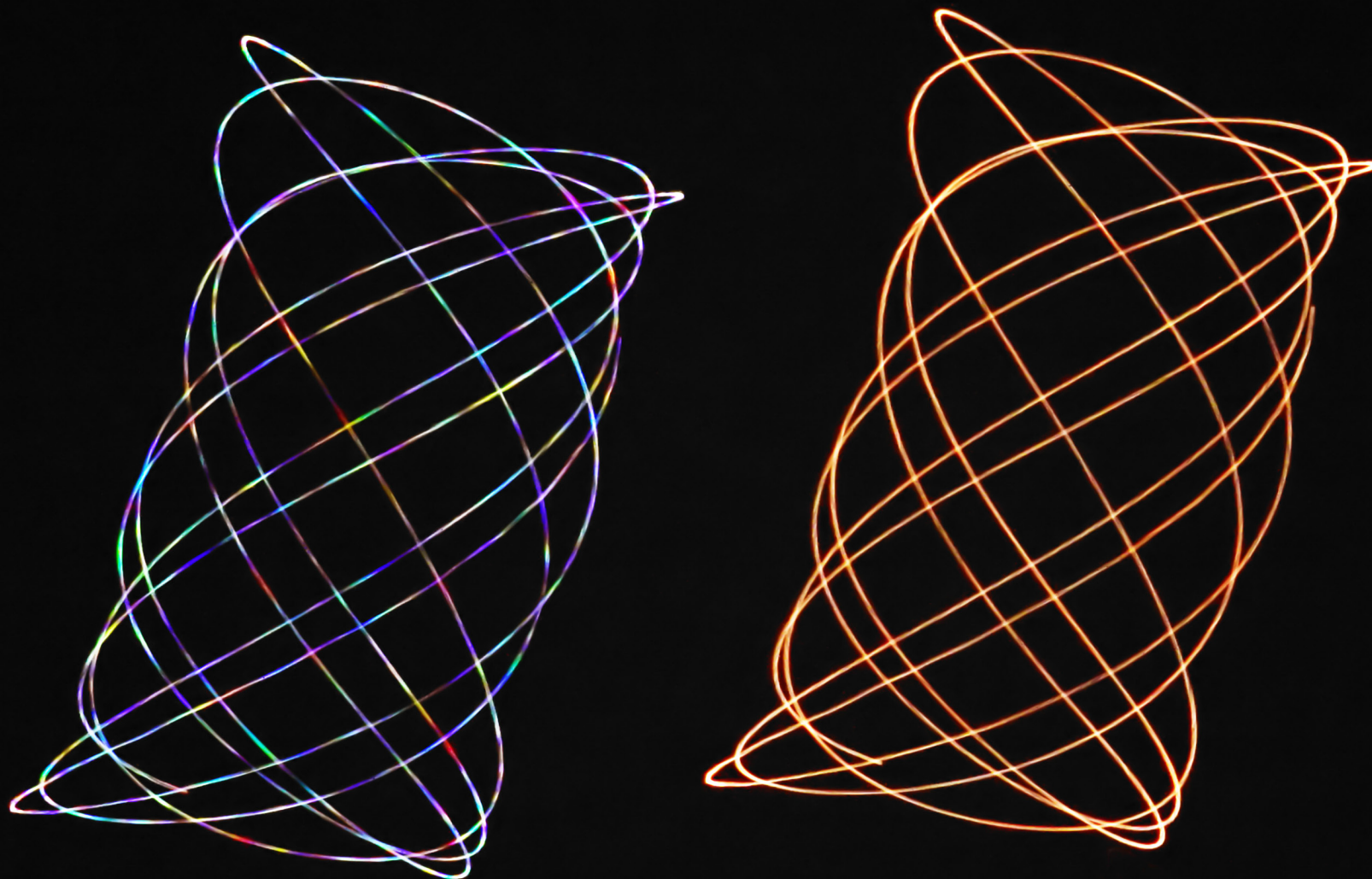
Image Credit & Copyright: Dieter Willasch (Astro-Cabinet)

Explanation: Comet Lovejoy has become visible to the unaided eye. To see the comet, just go outside an hour or so after sunset and look for a fuzzy patch to the right of Orion's belt. Binoculars and a star chart may help. Pictured here, Comet C/2014 Q2 (Lovejoy) was captured three days ago passing nearly in front of M79, the globular star cluster visible as the bright spot slightly above and to the left of the comet's green-hued coma. The nucleus of Comet Lovejoy is a giant dirty iceberg that is shedding gas into a long and intricate ion tail, extending across the image, as it nears the Sun. The comet is expected to become even easier to spot for northern observers during January, as it rises earlier and, hopefully, continues to brighten. [ap141231.html](http://ap141231.html)

# January

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 Quadrantids	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						






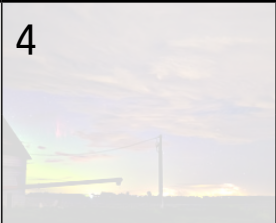
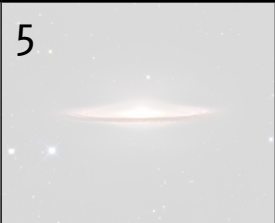

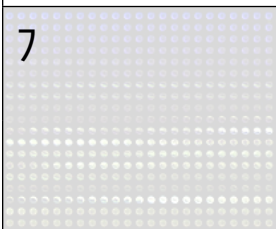

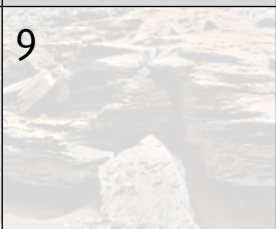
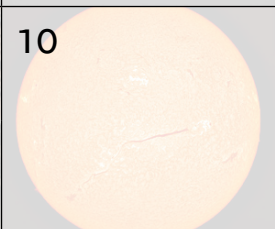
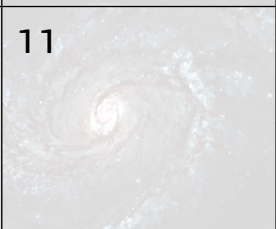
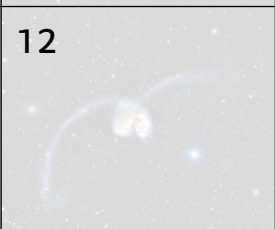
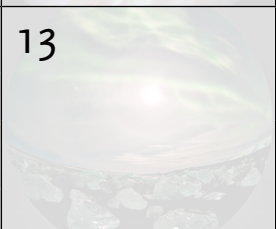
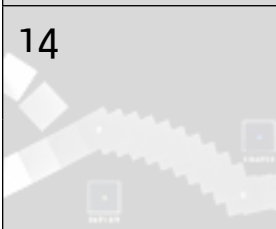
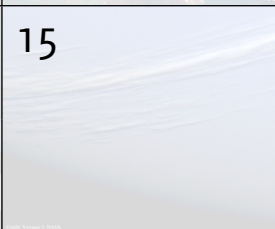
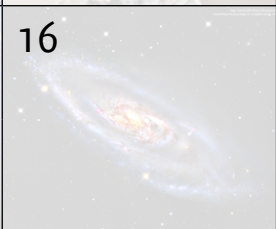
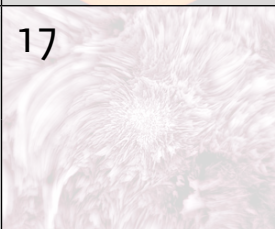
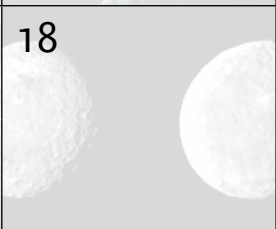

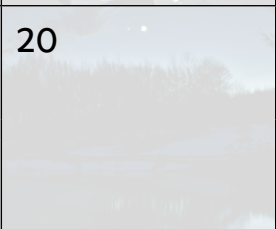
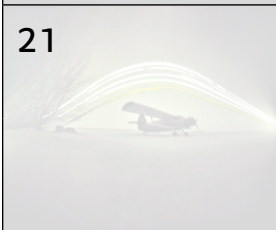
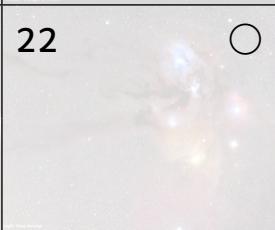
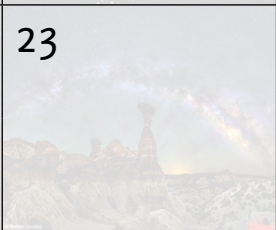
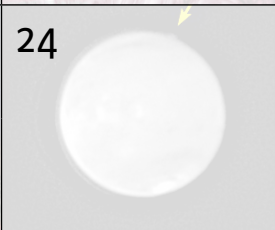
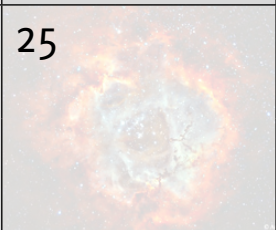
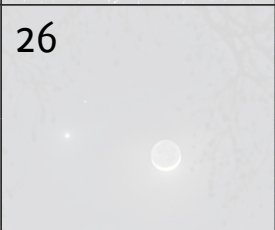
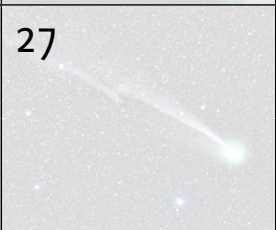


## Scintillating

Image Credit & Copyright: Juergen Michelberger

Explanation: On June 4, 2010 Regulus, alpha star of the constellation Leo, and wandering planet Mars were at about the same apparent brightness, separated on the sky by 1.5 degrees. An ingenious and creative 10 second exposure from a swinging camera recorded these gyrating trails of the celestial pairing. Can you tell which trail belongs to the star and which to the planet? Hint: atmospheric turbulence causes the image of the star to scintillate or vary in brightness and color more readily than the planet. The scintillation is more pronounced because the star is effectively a point source of light seen as a narrow bundle of light rays. Rapidly changing refraction due to turbulence along the line of sight affects different colors of light by different amounts and generally produces a twinkling effect for stars. But Mars is much closer than the distant stars and an extended source of light. Though tiny, its disk is seen as a bundle of light rays that is substantially broader compared to a star's and so, on average, less affected by small scale turbulence. The result is the varied, rainbow like trail for Regulus (left) and the steadier, consistently reddish trail for Mars. [ap110428.html](http://ap110428.html)

# February

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	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 					



## Atlantis Reflection

Image Credit: NASA, Bill Ingalls

Explanation: Space shuttle orbiter Atlantis left planet Earth on Friday, July 8, embarking on the STS-135 mission to the International Space Station. The momentous launch was the final one in NASA's 30 year space shuttle program that began with the launch of the first reusable spacecraft on April 12, 1981. In this reflective prelaunch image from July 7, Atlantis stands in a familiar spot on the Kennedy Space Center's pad 39A, after an early evening roll back of the pad's Rotating Service Structure. The historic orbital voyages of Atlantis have included a Hubble Space Telescope servicing mission, deployment of Magellan, Galileo, and the Compton Gamma-ray Observatory, and seven trips to the Russian space station Mir. Scheduled to dock once again with the International Space Station on Sunday, Atlantis has now made its 33rd and final trip to orbit. [ap1110709.html](http://ap1110709.html)



# March

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8 Jupiter at Opposition	9 Total Solar Eclipse	10	11	12
13	14	15	16	17	18	19
20 Equinox	21	22	23 Penumbral Lunar Eclipse	24	25	26
27	28	29	30	31		



## Martian Sunset

Image Credit: Mars Exploration Rover Mission, Texas A&M, Cornell, JPL, NASA

Explanation: What would it be like to see a sunset on Mars? To help find out, the robotic rover Spirit was deployed in 2005 to park and watch the Sun dip serenely below the distant lip of Gusev crater. Colors in the above image have been slightly exaggerated but would likely be apparent to a human explorer's eye. Fine martian dust particles suspended in the thin atmosphere lend the sky a reddish color, but the dust also scatters blue light in the forward direction, creating a bluish sky glow near the setting Sun. Because Mars is farther away, the Sun is less bright and only about two thirds the diameter it appears from Earth. Images like this help atmospheric scientists understand not only the atmosphere of Mars, but atmospheres across the Solar System, including our home Earth. [ap140302.html](#)

# April

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					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 



### Stars and Dust Pillars in NGC 7822 from WISE

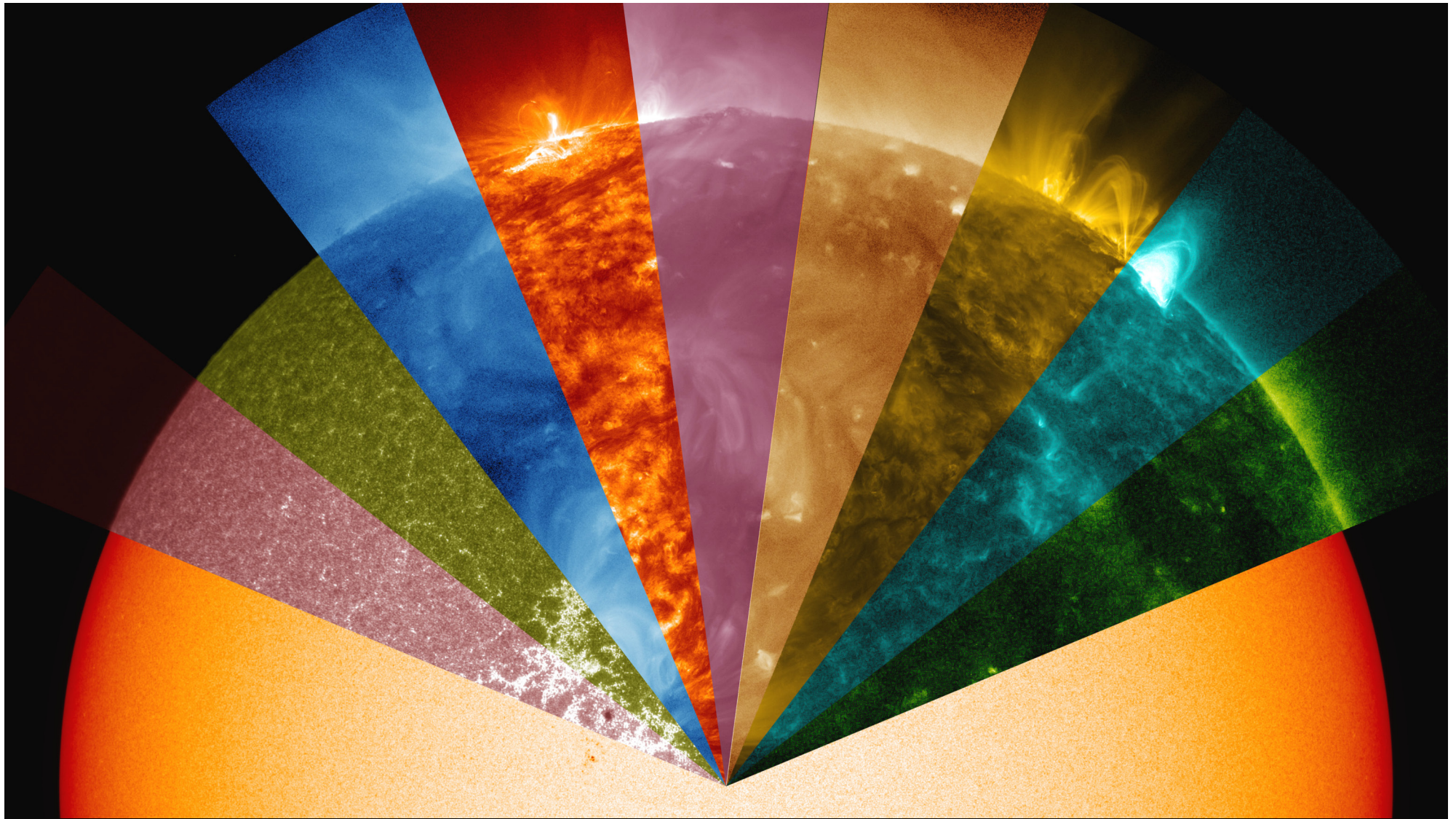
Image Credit: WISE, IRSA, NASA; Processing & Copyright : Francesco Antonucci

Explanation: Hot, young stars and cosmic pillars of gas and dust seem to crowd into NGC 7822. At the edge of a giant molecular cloud toward the northern constellation Cepheus, this glowing star forming region lies about 3,000 light-years away. Within the nebula, bright edges and complex dust sculptures dominate this detailed skyscape taken in infrared light by NASA's Wide Field Infrared Survey Explorer (WISE) satellite. The atomic emission by the cluster's gas is powered by energetic radiation from the hot stars, whose powerful winds and light also sculpt and erode the denser pillar shapes. Stars could still be forming inside the pillars by gravitational collapse, but as the pillars are eroded away, any forming stars will ultimately be cut off from their reservoir of star stuff. This field spans around 40 light-years at the estimated distance of NGC 7822. [ap141201.html](http://ap141201.html)

# May

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 	2 	3 	4  Eta-Aquarids	5 	6  ●	7 
8 	9  Mercury transits the Sun	10 	11 	12 	13 	14 
15 	16 	17 	18 	19 	20 	21  ○
22  Mars at Opposition	23 	24 	25 	26 	27 	28 
29 	30 	31 				







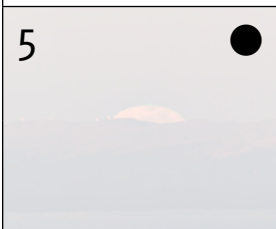
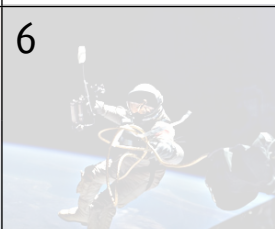
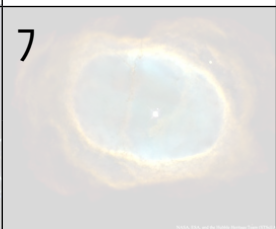
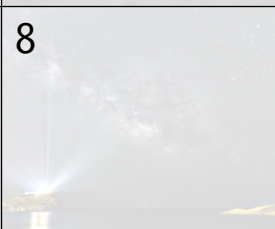
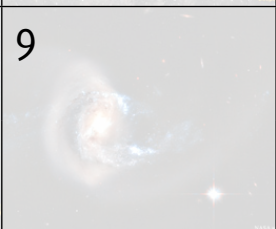
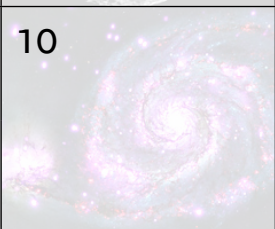
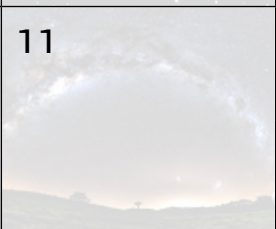
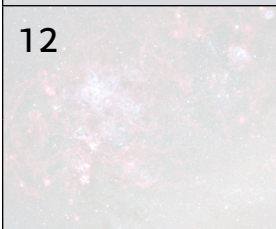
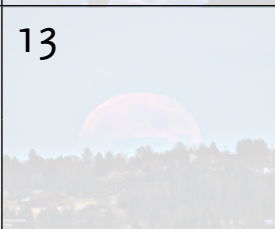
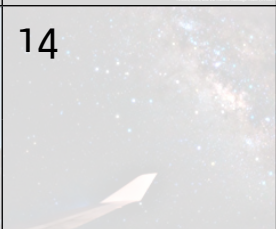
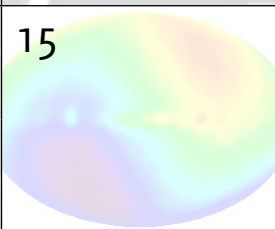
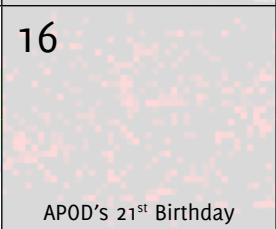
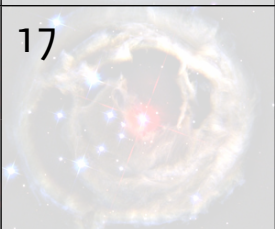
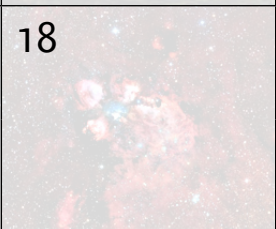
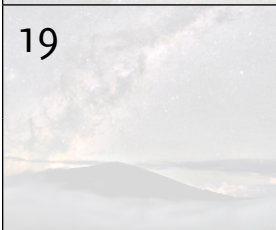
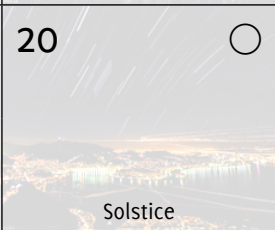
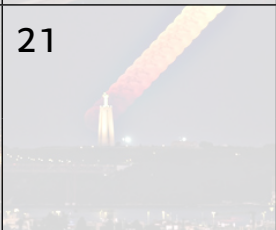
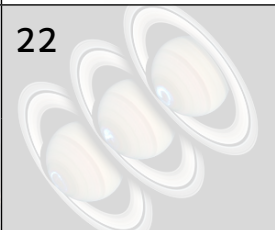

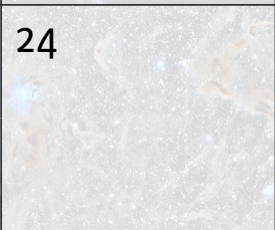
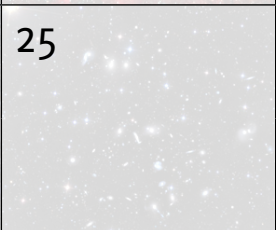
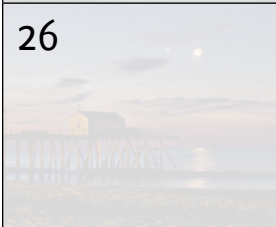

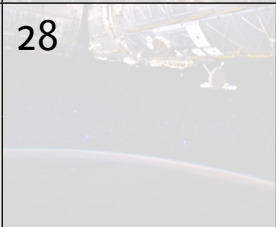
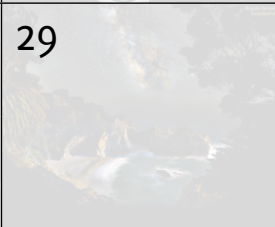

## SDO's Multiwavelength Sun

Image Credit: GSFC Scientific Visualization Studio, SDO, NASA

Explanation: Today, the solstice is at 17:11 Universal Time, the Sun reaching the southernmost declination in its yearly journey through planet Earth's sky. The December solstice marks the astronomical beginning of winter in the northern hemisphere and summer in the south. To celebrate, explore this creative visualization of the Sun from visible to extreme ultraviolet wavelengths, using image data from the orbiting Solar Dynamics Observatory (SDO). Against a base image made at a visible wavelengths, the wedge-shaped segments show the solar disk at increasingly shorter ultraviolet and extreme ultraviolet wavelengths. Shown in false-color and rotating in a clockwise direction, the filters decrease in wavelength from 170 nanometers (in pink) through 9.4 nanometers (green). At shorter wavelengths, the altitude and temperature of the regions revealed in the solar atmosphere tend to increase. Bright at visible wavelengths, the solar photosphere looks darker in the ultraviolet, but sunspots glow and bright plasma traces looping magnetic fields. Watch the filters sweep around the solar disk in this animation of SDO's multiwavelength view of the Sun. [ap131221.html](http://ap131221.html)

# June

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1 	2 	3  Saturn at Opposition	4 
5  ●	6 	7 	8 	9 	10 	11 
12 	13 	14 	15 	16  APOD's 21 <sup>st</sup> Birthday	17 	18 
19 	20  ○ Solstice	21 	22 	23 	24 	25 
26 	27 	28 	29 	30 		



### **The Cliffs of Comet Churyumov-Gerasimenko**

Credit:

Image Credit & Licence (CC BY-SA 3.0 IGO):  
ESA, Rosetta spacecraft, NAVCAM;  
Additional Processing: Stuart Atkinson

Explanation: These high cliffs occur on the surface of a comet. They were discovered to be part of the dark nucleus of Comet Churyumov-Gerasimenko (CG) by Rosetta, a robotic spacecraft launched by ESA which began orbiting the comet in early August. The ragged cliffs, as featured here, were imaged by Rosetta about two weeks ago. Although towering about one kilometer high, the low surface gravity of Comet CG would likely make a jump from the cliffs, by a human, survivable. At the foot of the cliffs is relatively smooth terrain dotted with boulders as large as 20 meters across. Data from Rosetta indicates that the ice in Comet CG has a significantly different deuterium fraction — and hence likely a different origin — than the water in Earth's oceans. The Rosetta spacecraft is scheduled to continue to accompany the comet as it makes its closest approach to the Sun in 2015 August. [ap141223.html](http://ap141223.html)



# July

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1  Moon at Perigee (365983 km)	2 
3 	4  ●	5 	6 	7  VLBI 1.7 and 5 GHz	8 	9  Gliese 832 c Earth
10  Venus at Perihelion	11 	12 	13 	14 	15 	16 
17 	18 	19  ○	20 	21 	22 	23 
24 	25 	26 	27  Delta-Aquarids	28 	29 	30 
31 						



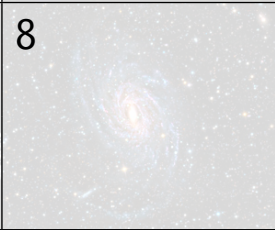
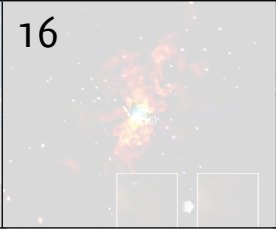
## A Partial Solar Eclipse over Texas

Image Credit & Copyright: Jimmy Westlake (Colorado Mountain College) & Linda Westlake

Explanation: It was a typical Texas sunset except that most of the Sun was missing. The location of the missing piece of the Sun was not a mystery — it was behind the Moon. Sunday night's partial eclipse of the Sun by the Moon turned into one of the best photographed astronomical events in history. Gallery after online gallery is posting just one amazing eclipse image after another. Pictured above is possibly one of the more interesting posted images — a partially eclipsed Sun setting in a reddened sky behind brush and a windmill. The image was taken Sunday night from about 20 miles west of Sundown, Texas, USA, just after the ring of fire effect was broken by the Moon moving away from the center of the Sun. Coming early next month is an astronomical event that holds promise to be even more photographed — the last partial eclipse of the Sun by Venus until the year 2117. [ap120522.html](http://ap120522.html)

# August

# 2016

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



### In the Arms of NGC 1097

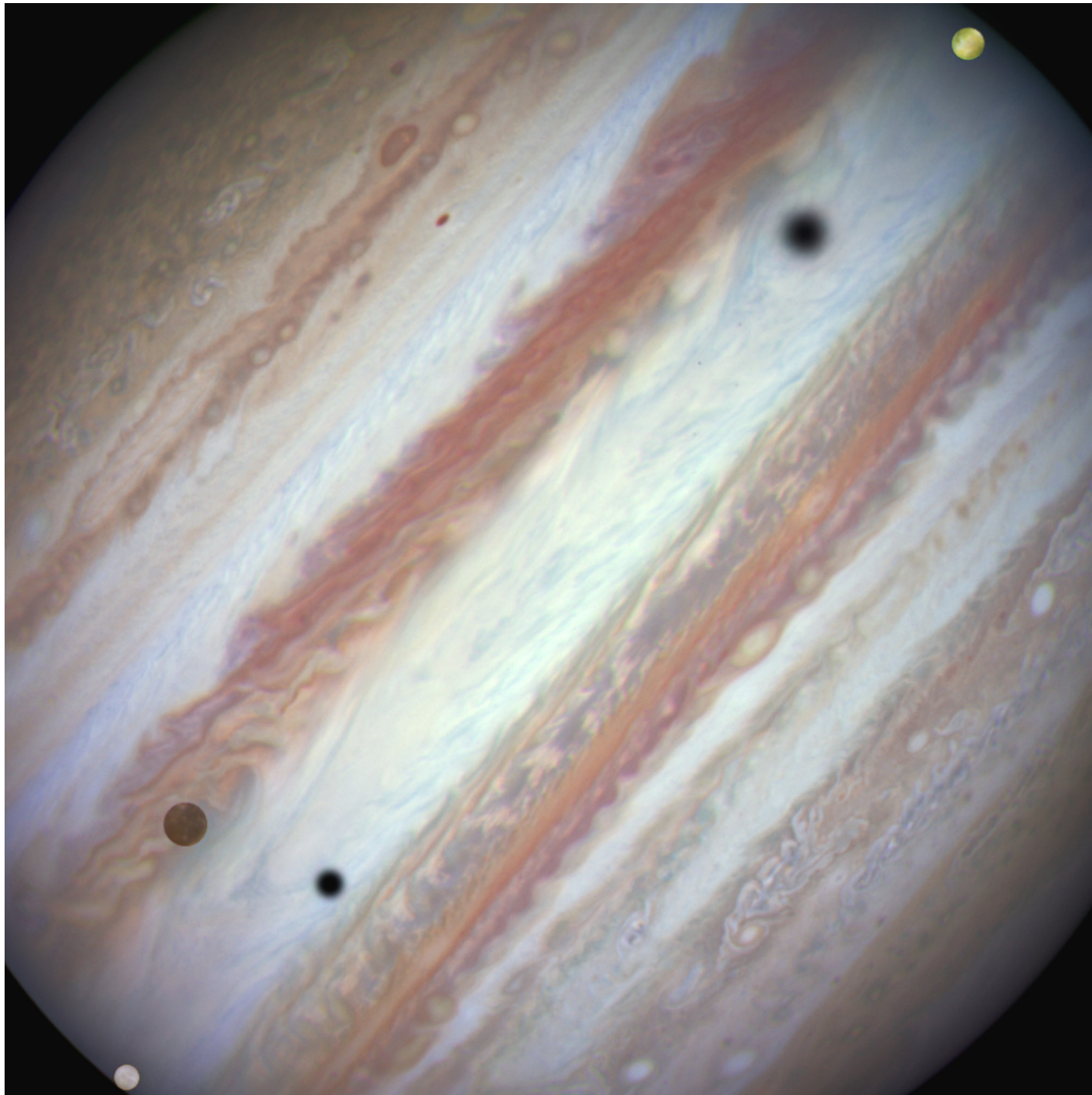
Image Credit & Copyright: Steve Mazlin, Jack Harvey, Jose Joaquin Perez; SSRO-South, at PROMPT/CTIO

Explanation: Spiral galaxy NGC 1097 shines in southern skies, about 45 million light-years away in the chemical constellation Fornax. Its blue spiral arms are mottled with pinkish star forming regions in this colorful galaxy portrait. They seem to have wrapped around a small companion galaxy below and left of center, about 40,000 light-years from the spiral's luminous core. That's not NGC 1097's only peculiar feature, though. The very deep exposure hints of faint, mysterious jets, most easily seen to extend well beyond the bluish arms toward the left. In fact, four faint jets are ultimately recognized in optical images of NGC 1097. The jets trace an X centered on the galaxy's nucleus, but probably don't originate there. Instead, they could be fossil star streams, trails left over from the capture and disruption of a much smaller galaxy in the large spiral's ancient past. A Seyfert galaxy, NGC 1097's nucleus also harbors a supermassive black hole. [ap150109.html](http://ap150109.html)

# September

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 	2  Neptune at Opposition	3 
4 	5 	6 	7 	8  Super Moon 09.05.2012 Harvest Moon 29.11.2012	9 	10 
11 	12 	13 	14 	15 	16  Penumbral Lunar Eclipse	17 
18 	19  Uranus Titan Enceladus 1,000 km	20 	21 	22  Equinox	23 	24 
25 	26  Oxygen Reflected Sunlight Compos	27 	28 	29 	30 	




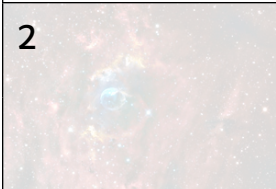





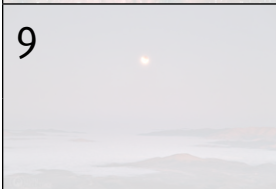
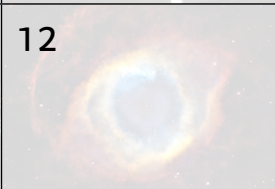

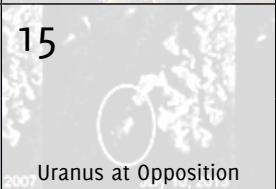

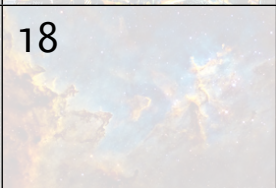
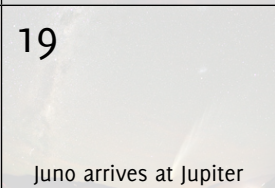
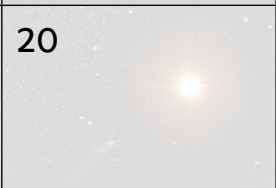
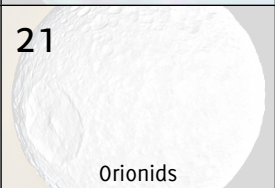
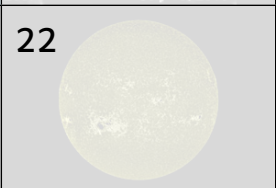
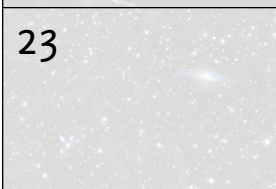
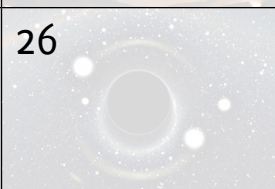
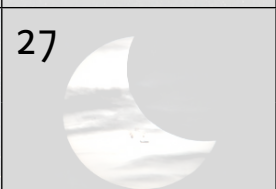

### Jupiter Triple-Moon Conjunction

Image Credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA)

Explanation: Our solar system's ruling giant planet Jupiter and 3 of its 4 large Galilean moons are captured in this single Hubble snapshot from January 24. Crossing in front of Jupiter's banded cloud tops Europa, Callisto, and Io are framed from lower left to upper right in a rare triple-moon conjunction. Distinguishable by colors alone icy Europa is almost white, Callisto's ancient cratered surface looks dark brown, and volcanic Io appears yellowish. The transiting moons and moon shadows can be identified by sliding your cursor over the image, or following this link. Remarkably, two small, inner Jovian moons, Amalthea and Thebe, along with their shadows, can also be found in the sharp Hubble view. The Galilean moons have diameters of 3,000 to 5,000 kilometers or so, comparable in size to Earth's moon. But odd-shaped Amalthea and Thebe are only about 260 and 100 kilometers across respectively. [ap150206.html](#)

# October

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 
2 	3 	4 	5 	6 	7 	8 
9 	10 	11 	12 	13 	14 	15  2007 Uranus at Opposition
16 	17 	18 	19  Juno arrives at Jupiter	20 	21  Orionids	22 
23 	24 	25 	26 	27 	28 	29  Mars at Perihelion
30 	31 					



### **Wolf-Rayet Star 124: Stellar Wind Machine**

Image Credit: NASA, ESA

Processing: Judy Schmidt

Explanation: Some stars explode in slow motion. Rare, massive Wolf-Rayet stars are so tumultuous and hot that they slowly disintegrate right before our telescopes. Glowing gas globs each typically over 30 times more massive than the Earth are being expelled by violent stellar winds. Wolf-Rayet star WR 124, visible near the above image center spanning six light years across, is thus creating the surrounding nebula known as M1-67. Details of why this star has been slowly blowing itself apart over the past 20,000 years remains a topic of research. WR 124 lies 15,000 light-years away towards the constellation of Sagitta. The fate of any given Wolf-Rayet star likely depends on how massive it is, but many are thought to end their lives with spectacular explosions such as supernovas or gamma-ray bursts. [ap140701.html](http://ap140701.html)



# November

# 2016

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



### **In Green Company: Aurora over Norway**

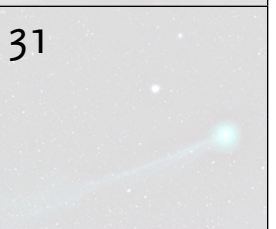
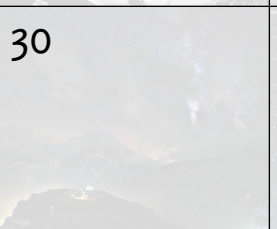
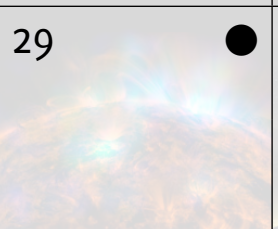
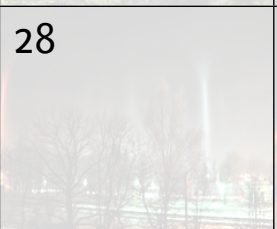
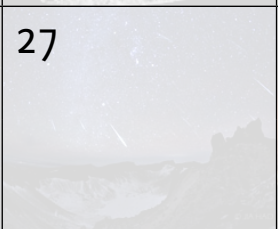
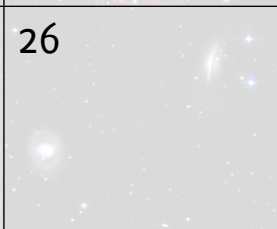
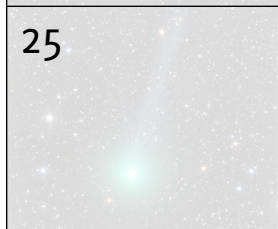
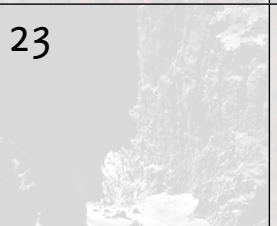
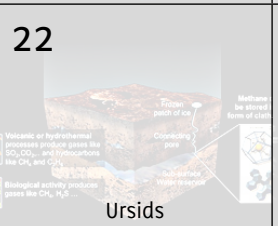
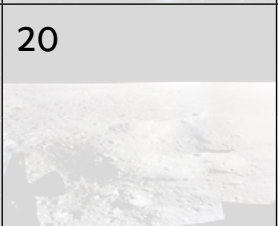
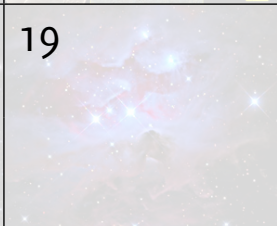
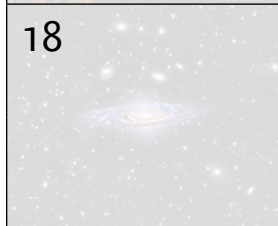
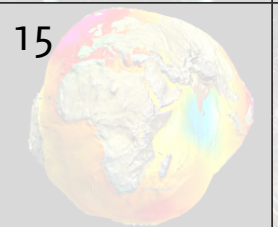
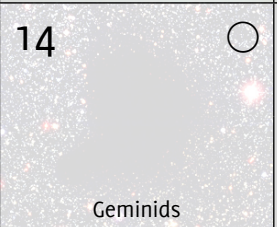
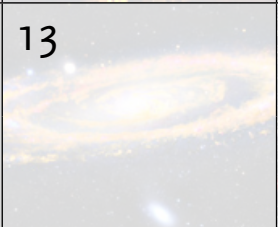
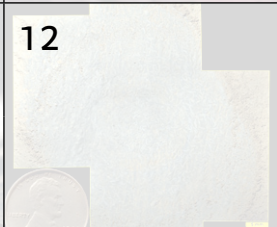
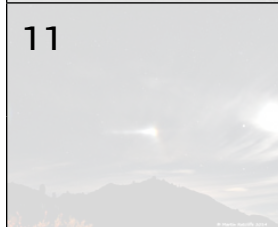
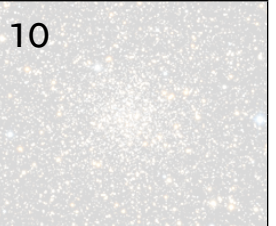
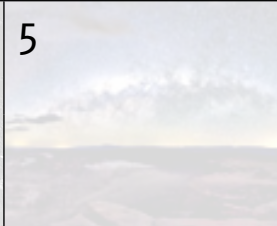
Image Credit & Copyright: Max Rive

Explanation: Raise your arms if you see an aurora. With those instructions, two nights went by with, well, clouds – mostly. On the third night of returning to same peaks, though, the sky not only cleared up but lit up with a spectacular auroral display. Arms went high in the air, patience and experience paid off, and the amazing featured image was captured. The setting is a summit of the Austnesfjorden fjord close to the town of Svolvær on the Lofoten islands in northern Norway. The time was early March. Our Sun has been producing an abundance of picturesque aurora of late as it is near the time of its maximum surface activity in its 11-year magnetic cycle. [ap141103.html](http://ap141103.html)

# December

# 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				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



# 2017

## January

S	M	T	W	T	F	S
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

S	M	T	W	T	F	S
			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

S	M	T	W	T	F	S
			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	

## April

S	M	T	W	T	F	S
						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

S	M	T	W	T	F	S
	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			

## June

S	M	T	W	T	F	S
				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

S	M	T	W	T	F	S
						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

S	M	T	W	T	F	S
		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

S	M	T	W	T	F	S
					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

S	M	T	W	T	F	S
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

S	M	T	W	T	F	S
			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		

## December

S	M	T	W	T	F	S
					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						

# 2018

## January

S	M	T	W	T	F	S
	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

S	M	T	W	T	F	S
				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

S	M	T	W	T	F	S
				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

## April

S	M	T	W	T	F	S
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

S	M	T	W	T	F	S
		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		

## June

S	M	T	W	T	F	S
					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

S	M	T	W	T	F	S
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

S	M	T	W	T	F	S
			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

S	M	T	W	T	F	S
						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

S	M	T	W	T	F	S
	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

S	M	T	W	T	F	S
				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	

## December

S	M	T	W	T	F	S
						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					

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