

# Skylights

Newsletter of the Astronomical Society of Northern New England



**JAN 2016**



Member of NASA's



**Astronomical League**

## ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

- 1) *To have fun sharing our knowledge and interest with others.*
- 2) *To provide basic education in astronomy and related sciences to all who are interested.*
- 3) *To promote the science of Astronomy.*

## What's Up In January

By Bernie Reim

**T**he month of January is named after the Roman god Janus, who faces both forwards and backwards at the same time. He is the god of beginnings and transitions and time.

The days are already getting longer now, but you will not really notice that until a week or so into this month when the latest sunrise has been reached.

There are many excellent highlights this month and some very interesting and unusual events will happen this year. Those include a total solar eclipse over Indonesia on March 9, and a rare transit of Mercury across the face of the sun visible for us right here on May 9 in the daytime.

The major highlight for us right here in Maine this month will be having all 5 of the brightest planets visible in the morning sky. Mercury will join the quartet of bright planets already well established in the morning sky by the middle of January. Before that it will be an evening planet for a week starting this year. Venus and Saturn will have an extremely close conjunction of just a quarter of a degree on the morning of the 9<sup>th</sup>, which is the closest they have been in 10 years. The moon will occult Aldebaran in Taurus, the Quadrantid Meteor Shower will peak on the 4<sup>th</sup>, and Comet Catalina should be easily visible in the morning sky all month long.

Jupiter now rises before 11 pm and it will rise before 9 pm by the end of the month. Three of its 4 large Galilean moons will transit the planet in rapid succession on the morning of the 11<sup>th</sup>. The King of the Planets is approaching its opposition, when it will be at its highest and brightest and closest to us in early March.

The next planet up in the morning sky will be orange Mars. It will rise at 1 in the morning by the end of the month. The red planet is approaching its own opposition on May 22<sup>nd</sup>, when it will be at its best since its 2005 opposition. An opposition of Mars only occurs

**NOTE: Our Club Meeting is on the 2nd Friday this month, January 8th.**

every 26 months.

Traveling down towards the horizon you will run into brilliant Venus next, now rising in Scorpius around 4:30 in the morning. Watch carefully each clear morning as Saturn is rapidly catching up with our sister planet. On Saturday morning the 9<sup>th</sup>, it will be just 17 arc minutes, or just over a quarter of a degree above Venus. Both of these planets will be visible in the same field of view in a telescope. Notice that Venus is 81% lit now and getting more illuminated by the sun as it gets farther away from the earth. It will be almost 100 times brighter than Saturn.

Then our first planet, Mercury, will join the parade by the middle of the month. You will see that it looks like a waxing crescent moon now through a telescope, since it will have just passed its inferior conjunction, when it gets closest to Earth.

Starting on January 3rd about one and a half hours before sunrise, a waning crescent

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### **What's Up "Continued from page 1"**

moon will pass by each of these planets in order on successive mornings until it disappears near the sun as a new moon on the 9<sup>th</sup>. That would be a great time to look for Comet Catalina. I haven't found this comet yet for myself in the real sky, but one recent morning I was treated to something far more spectacular than a comet. Three bright planets and a waning crescent moon with its eerie earth-shine were nicely lined up on the ecliptic. As the dawn slowly and steadily brightened the whole scene, heavy sea smoke drifted over the river and the ocean near the beach as if it were breathing life into the new day and all of its creatures. A heavy frost covered each individual strand of dune grass and everything else on the beach, including driftwood and stranded lobster traps as well as every single grain of sand. I could easily look at the sun directly and safely for half an hour after it pulled itself free from its liquid horizon since it was filtered by the all engulfing and gently drifting sea smoke. It felt like the mysterious and ever-shifting first dawn of creation itself.

Even though those exact conditions will never exist again, you may be able to see something even more spectacular and amazing early this month when there will be four planets, another waning crescent moon, and a comet plus the Quadrantid meteors expected to peak at over 100 meteors per hour this year.

Comet Catalina starts the month right next to Arcturus and travels rapidly north at the rate of 2 degrees per day. The comet will be close to M51, the Whirlpool Galaxy on the 14<sup>th</sup>, and very close to another spiral galaxy, M 101 in Ursa Major, on the 16<sup>th</sup>.

The waxing gibbous moon will occult the brightest star in Taurus, an orange giant named Aldebaran on Tuesday evening the 19<sup>th</sup> at 9:30 pm EST. You will need binoculars or a telescope to really appreciate this event and to get a good sense of the moon's constant eastward motion against the fixed background of stars.

Jan.1. On this day in 1801, Giuseppe Piazzi discovered the first and largest asteroid, named Ceres. NASA's ion propulsion DAWN spacecraft is now orbiting Ceres at about the same distance as New Horizons got to Pluto, about 8,000 miles above its surface. Ceres may have a liquid ocean under its surface. They found mysterious white spots which may be huge salt deposits and they

also found one tall mountain that vaults 4 miles above its surroundings, which is higher than Denali in Alaska. Both Vesta and Ceres were protoplanets that were well on their way to becoming complete planets until their development was mysteriously halted.

Jan. 2. Last quarter moon is at 12:30 a.m. EST. Earth is at perihelion, or closest to the sun at 91.4 million miles today. The moon is also at apogee or farthest from the earth today.

Jan.3. The moon passes near Mars this morning.

Jan. 4. The Quadrantid Meteor shower peaks this morning. It will originate from the Big Dipper.

Jan.6. The moon passes near Saturn and Venus this morning.

Jan.7. On this day in 1610, Galileo discovered Callisto, Europa, and Io. He would discover Ganymede, the largest moon in our solar system, 6 days later.

Jan.8. Jupiter ends its direct, prograde or eastward motion against the fixed background of stars today. It will reach the midpoint of its retrograde loop in 2 months in early March when it reaches opposition. Then it will become stationary again and end its retrograde motion two months after that.

Jan.9. Venus and Saturn will be only a quarter of a degree apart this morning, their closest conjunction in a decade. New moon is at 8:31 p.m.

Jan.14. The moon is at perigee, or closest to the earth today at 229,671 miles.

Jan. 16. First quarter moon is at 1 a.m.

Jan. 19. The New Horizons mission was launched to Pluto on this day in 2006, the same year that Pluto's classification was changed to dwarf planet. The moon occults Aldebaran tonight.

Jan.20. Buzz Aldrin was born on this day in 1930. He was the second man to walk on the moon.

Jan.23. Full moon is at 8:46 p.m. This is also known as the Wolf, Old, or Hunger Moon.

Jan.27. The moon passes near Jupiter this evening.

Jan.30. The moon is at apogee, or farthest from the earth today at 251,377 miles.

Jan.31. Last quarter moon is at 10:28 p.m. EST.

Moon Phases

**Jan 2**  
Last Quarter

**Jan 9**  
New

**Jan 16**  
First Quarter

**Jan 23**  
Full

Moon Data

**Jan 2**  
Moon at apogee

**Jan 3**  
Mars 1.5° south  
of Moon

**Jan 6**  
Venus 3° south  
of Moon

Saturn 3° south  
of Moon

**Jan 13**  
Neptune 2° south  
of Moon

**Jan 14**  
Moon at perigee

**Jan 16**  
Uranus 1.5° north  
of Moon

**Jan 19**  
Aldebaran 0.5°  
south of Moon

**Jan 27**  
Jupiter 1.4° north  
of Moon

Submitted by Glenn Chaple



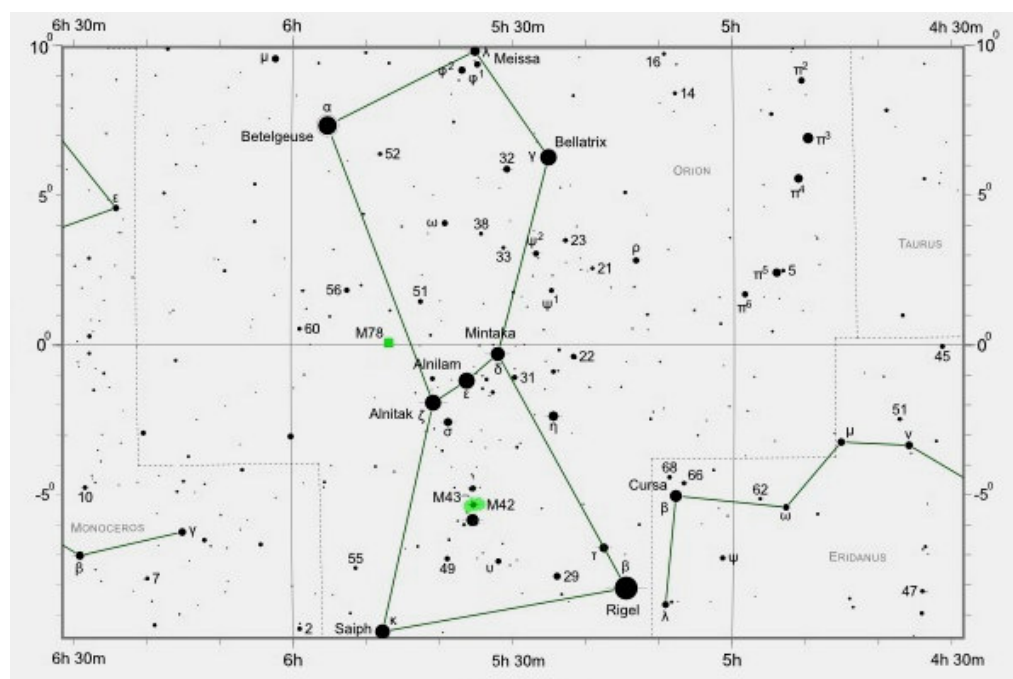
## Sky Object of the Month – January 2016

(Courtesy LVAS Observer's Challenge\*)

Messier 78 – Diffuse Reflection Nebula in Orion  
(Magnitude 8.3, Dimensions 8' X 6')

M78, Orion's "other" Messier nebula, has the distinction of being brightest diffuse reflection nebula (one whose light comes from nearby or embedded stars) in the sky. M42 and similar bright luminaries like M8, M17, and M20 are basically diffuse emission nebulas that give off their own light.

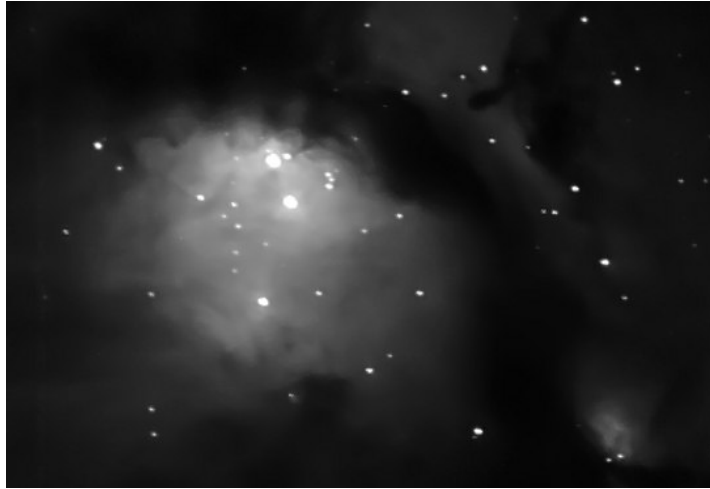
To find M78, make a low-power scan of the area 3 degrees northeast of Alnitak (the zeta [ζ] star in Orion's belt – see the finder chart below). M78 was discovered by Pierre Mechain in early 1780 and included by Messier in his Catalog later that year. At an approximate distance of 1600 light years, it spans an area some 10 light years across.



[freestarcharts.com](http://freestarcharts.com)

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*“Continued from page 3”*



**Image by Mario Motta, M.D.**

\*The purpose of the LVAS Observer's Challenge is to encourage the pursuit of visual observing. It is open to everyone that is interested, and if you are able to contribute notes, drawings, or photographs, the LVAS will be happy to include them in our monthly summary. If you would like to contribute material, submit your observing notes, sketches, and/or images to either [Roger Ivester \(rogerivester@me.com\)](mailto:rogerivester@me.com) or [Fred Rayworth \(fred@fredrayworth.com\)](mailto:fred@fredrayworth.com). To find out more about the LVAS Observer's Challenge or access past reports, log on to [lvastronomy.com/observing-challenge](http://lvastronomy.com/observing-challenge).

**Got any News?  
Skylights welcomes your Input.**



***Here are some suggestions:***

***Book reviews -- Items for sale -- New equipment --  
Ramblings -- Star parties -- Observing -- Photos.***

**Principal Meteor Showers in 2016**

**January 4**  
Quadrantids

**April 22**  
Lyrids

**May 6**  
Eta Aquarids

**July 30**  
Delta Aquarids

**August 12**  
Perseids

**October 9**  
Draconid

**October 21**  
Orionids

**November 9**  
Taurids


**November 18**  
Leonids

**November 26**  
Andromedids

**December 14**  
Geminids

**December 22**  
Ursids

*Note: Dates are for maximum*



The latest issue of the Space Place Newsletter: News and Notes for Formal and Informal Educators can be found at: <http://spaceplace.nasa.gov/en/educators> .

Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

**Check out our great sites for kids:**



The Space Place website (<http://spaceplace.nasa.gov>)



The *SciJinks Weather Laboratory* at <http://scijinks.gov>



*NASA Climate Kids* at <http://climate.nasa.gov/kids>

**Our Club has Merchandise for Sale at: [www.cafepress.com/asnne](http://www.cafepress.com/asnne)**



***ALL money raised goes to our operating fund.  
Any design can be put on any item.  
Just let our club member, David Bianchi, know.***

**This article is provided by NASA Space Place.**

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit [spaceplace.nasa.gov](http://spaceplace.nasa.gov) to explore space and Earth science!



## How will we finally image the event horizon of a black hole?

By Ethan Siegel

One hundred years ago, Albert Einstein first put forth his theory of General Relativity, which laid out the relationship between spacetime and the matter and energy present within it. While it successfully recovered Newtonian gravity and predicted the additional precession of Mercury's orbit, the only exact solution that Einstein himself discovered was the trivial one: that for completely empty space. Less than two months after releasing his theory, however, the German scientist Karl Schwarzschild provided a true exact solution, that of a massive, infinitely dense object, a *black hole*.

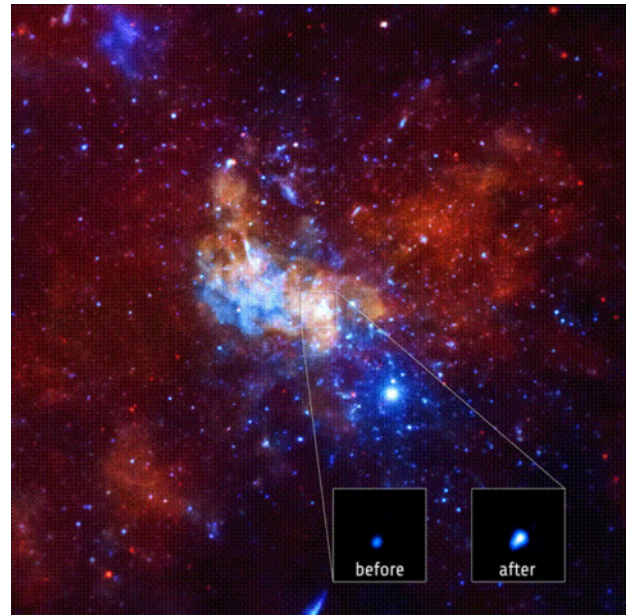
One of the curious things that popped out of Schwarzschild's solution was the existence of an event horizon, or a region of space that was so severely curved that nothing, not even light, could escape from it. The size of this event horizon would be directly proportional to the mass of the black hole. A black hole the mass of Earth would have an event horizon less than a centimeter in radius; a black hole the mass of the sun would have an event horizon just a few kilometers in radius; and a supermassive black hole would have an event horizon the size of a planetary orbit.

Our galaxy has since been discovered to house a black hole about four million solar masses in size, with an event horizon about 23.6 million kilometers across, or about 40 percent the size of Mercury's orbit around the sun. At a distance of 26,000 light years, it's the largest event horizon in angular size visible from Earth, but at just 19 micro-arc-seconds, it would take a telescope the size of Earth to resolve it – a practical impossibility.

But all hope isn't lost! If instead of a single telescope, we built an *array* of telescopes located all over Earth, we could simultaneously image the galactic center, and use the technique of VLBI (very long-baseline interferometry) to resolve the black hole's event horizon. The array would only have the light-gathering power of the individual telescopes, meaning the black hole (in the radio) will appear very faint, but they can obtain the resolution of a telescope that's the distance between the farthest telescopes in the array! The planned Event Horizon Telescope, spanning four different continents (including Antarctica), should be able to resolve

under 10 micro-arc-seconds, imaging a black hole directly for the first time and answering the question of whether or not they truly contain an event horizon. What began as a mere mathematical solution is now just a few years away from being observed and known for certain!

*Note: This month's article describes a project that is not related to NASA and does not suggest any relationship or endorsement. Its coverage is for general interest and educational purposes.*



### Caption:

*Image credit: NASA/CXC/Amherst College/D.Haggard et al., of the galactic center in X-rays. Sagittarius A\* is the supermassive black hole at our Milky Way's center, which normally emits X-ray light of a particular brightness. However, 2013 saw a flare increase its luminosity by a factor of many hundreds, as the black hole devoured matter. The event horizon has yet to be revealed.*



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## Club Meeting & Star Party Dates

Date	Subject	Location
Jan 8th  <b>NOTE:</b> <b>We are meeting on the 2nd Friday this month.</b>	<b>ASNNE Club Meeting:</b>  <b>7:30-9:30PM:</b> Club Meeting  <u><b>Meeting Agenda</b></u>  <b>Guest Speaker:</b> TBD  Bernie Reim - What's UP Astro Shorts: (news, stories, jokes, reports, questions, observations etc.) Where's Pluto - Update on the New Horizons Mission and "Planet" status. Mission 5 phases 1, Pre-encounter (now through October 2014), Immediate approach (April-May 2015), Encounter (June-August 2015), Immediate post-encounter (September-October 2015) and later post-encounter (April-December 2016).	The New School, Kennebunk, Me.
TBD	Club/Public Star Party ( <i>Visit website for updates and or cancellations</i> )	Starfield Observatory, West Kennebunk, Me.

### Directions to ASNNE event locations

#### Directions to The New School in Kennebunk [38 York Street (Rt1) Kennebunk, ME]

For directions to The New School you can use this link to the ASNNE NSN page and then click on "get directions" from the meeting location. Enter your starting location to generate a road map with complete directions. It works great. [http://nightsky.jpl.nasa.gov/club-view.cfm?Club\\_ID=137](http://nightsky.jpl.nasa.gov/club-view.cfm?Club_ID=137)

#### Directions to Starfield Observatory [Alewife Road, Kennebunk, ME]

##### **From North:**

Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

##### **From South:**

Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.



To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website: <http://www.asnne.org>



Astronomical Society of Northern New England  
 P.O. Box 1338  
 Kennebunk, ME 04043-1338

**2016 Membership Registration Form**

(Print, fill out and mail to address above)

Name(s for family): \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Telephone # \_\_\_\_\_

E-mail: \_\_\_\_\_

Membership (check one):

Individual \$35 \_\_\_\_\_ Family \$ 40 \_\_\_\_\_ Student under 21 years of age \$10 \_\_\_\_\_ Donation \_\_\_\_\_

Total Enclosed \_\_\_\_\_

Tell us about yourself:

1. Experience level: Beginner \_\_\_\_\_ Some Experience \_\_\_\_\_ Advanced \_\_\_\_\_

2. Do you own any equipment? (Y/N) And if so, what types?  
 \_\_\_\_\_

3. Do you have any special interests in Astronomy?  
 \_\_\_\_\_

4. What do you hope to gain by joining ASNNE?  
 \_\_\_\_\_

5. How could ASNNE best help you pursue your interest in Astronomy?  
 \_\_\_\_\_

6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?

Yes \_\_\_\_\_ No \_\_\_\_\_

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes \_\_\_\_\_ No \_\_\_\_\_

