Highlights of the March Sky. . .

- - - 1st - - -
DAWN: The Moon, Jupiter, Mars, and Saturn form a celestial arc from the west to southeast.

Full Moon
7:51 pm EST

- - - 3rd - - -
DUSK: Only 1° separates Venus and Mercury, look for them low in the western sky.

- - - 7th - - -
PM: A waning gibbous Moon and Jupiter are 4° apart.

- - - 9th - - -
Last Quarter Moon
6:20 am EST

- - - 11th - - -
Daylight Saving Time starts at 2:00 am. Set your clocks ahead one hour.

- - - 17th - - -
New Moon
9:12 am EDT

- - - 20th - - -
Spring begins in the Northern Hemisphere at 12:15 pm EDT.

- - - 22nd - - -
PM: A waxing crescent Moon is less than 1° from Aldebaran in Taurus.

- - - 24th - - -
First Quarter Moon
11:35 am EDT

- - - 28th - - -
DUSK: Brilliant Venus and dim Uranus are only 4° apart. Binoculars or a telescope is required to see distant Uranus.

- - - 29th - - -
AM: Mars and Saturn are 2° apart above the Teapot asterism in Sagittarius.

- - - 31st - - -
Full Moon
8:37 am EDT

Prime Focus

A Publication of the Kalamazoo Astronomical Society

★ ★ ★ March 2018 ★ ★ ★

This Months KAS Events

General Meeting: Friday, March 2 @ 7:00 pm

Kalamazoo Area Math & Science Center - See Page 12 for Details

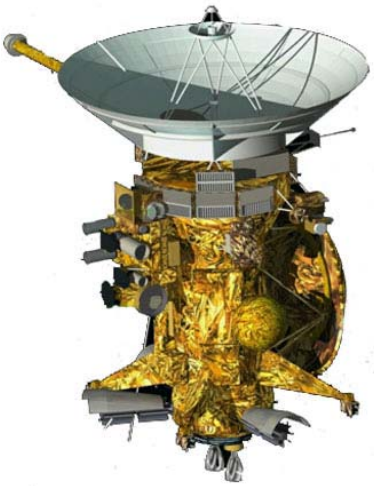
Board Meeting: Sunday, March 11 @ 5:00 pm

Sunnyside Church - 2800 Gull Road - All Members Welcome

Observing Session: Saturday, March 17 @ 7:00 pm

Messier Marathon - Richland Township Park - See Page 11 for Details

Inside the Newsletter. . .



February Meeting Minutes

The general meeting of the Kalamazoo Astronomical Society was brought to order by President Richard Bell on Friday, February 2, 2018 at 7:10 pm EDT. Approximately 28 members and guests were in attendance at the Kalamazoo Area Math & Science Center (KAMSC).

Richard opened the meeting with a brief President's Report. The KAS has been invited to participate in several outreach events across the community already this year. These all require volunteer support from members and he mentioned our usual cast of volunteers are feeling a little burnt out. Participation is required from new members, so he encouraged others to step forward.

The guest speaker for the evening was the new KAS Publicity Manager Joe Comiskey. This was Joe's third presentation for the KAS and was entitled *Trouble in Paradise: Astro Problem Solving 101*. Joe took a quick survey from the audience of the most memorable celestial phenomena they've ever seen. He then encouraged everyone not to wait for those special events and that there are plenty of spectacular targets every clear day or night.

While attendance at our Public Observing Sessions at the Kalamazoo Nature Center is always encouraged, Joe said observing can also be done right from home despite rampant light pollution. Tarps or even beach umbrellas can be set up to block stray light. It also never hurts to ask neighbors to turn off lights while you're stargazing or contact city official to install shielding on street lights.

Don't let the weight of your telescope discourage you from setting up in the front or backyard. Joe uses a hand truck to move his 10-inch Dobsonian to and from his driveway. He also recommended using a telescope that's not too complicated to setup and take down at the end of the night. In the end, the best telescope is the one you use most often.

Comfort is very important while observing, especially when it comes to colder times of the year. The main objective is to minimize skin exposure to the elements. Dress in layers in order to trap heat and wear long underwear. Joe also recommended wearing a scarf and a thick hand band, hood, or hat on your head. Thick soled boots with wool or wool blend socks will keep your feet toasty warm.

Joe Comiskey offered solutions to observing challenges during his presentation at the meeting on February 2nd.

Using an observing chair promotes more relaxed observing and more details in astronomical objects can be seen if you're comfortable. There's also less strain on the back, neck, and legs. To this end, Joe suggested using a right-angle finderscope as opposed to a straight through finder. A mounted green laser pointer could also be used for rough aiming (these aren't too popular at star parties though). In lieu of a laser pointer, Ted-Rads are a very popular one-power finder and are recommended for all non-computerized telescopes.

If your finderscope tends to slip out of place, Joe showed how to drill a hole part of the way into the base, so the set screw locks into place. Another common problem with equatorial mounts is cone error; where the optical tube is not parallel to the Right Ascension axis. This can be solved by using raising the rear mounting ring with metal and rubber washers.

There are also many solutions for binocular users as well. One of the most popular are parallelogram mounts. They allow for steady viewing and frees your hands and arms. However, neck strain can still be an issue. Downward looking binoculars mounts (using a mirror) are a popular alternative for some, as are binocular chairs or even simple monopods. In conclusion, Joe recommend seeking out several sources for additional help. First and foremost are KAS members themselves. The *Sky & Telescope* column *Astronomer's Workbench* is a helpful resource, as well as the book *Star Ware* by Phillip Harrington. YouTube videos and the forums and articles on Cloudy Nights are also a tremendous source of information.

Members shared observing reports after the snack break. Those in the southern part of Kalamazoo County got to see the lunar eclipse on January 31st. People further north reported cloudy conditions. The Moon set before totality began, so those that encountered clouds didn't miss much.

The biggest item under astronomical news was the Michigan Meteor that occurred on January 16th. Richard shared a video posted on YouTube that captured the meteor as seen from a dashcam on I-75 near Bloomfield Hills. Fragments of the meteor were collected by professional meteorite hunters and staff from Longway Planetarium on a frozen lake in Hamburg Township on February 18th. The sonic boom from the meteor even resulted in a minor (2.0-magnitude) earthquake. The American Meteor Society received 657 reports of the bolide with some as far away as Iowa and southern Ontario. At its peak, the meteor was brighter than the Full Moon and left an orange trail.

After discussing upcoming events, the meeting concluded at 8:53 pm EDT.

BOARD Meeting Minutes

The Kalamazoo Astronomical Society Board held a regular meeting on February 18, 2018 at Sunnyside Church. The meeting was held a week later than originally scheduled because of absences and illnesses. The meeting was called to order at 5:20 pm. Members present were Joe Comiskey, Jean DeMott, Scott Macfarlane, Jack Price, Don Stilwell, and Roger Williams.

The Treasurer's Report had been submitted by e-mail from Rich Mather, so the Board had examined it before the meeting. One item of note was the yearly fee owed to Plaza Storage. Roger had mailed a check for $550, according to Rich's instructions. However, Rich then realized that the amount due was $660, so Roger agreed to send the remaining $110 to Plaza Storage. There were no other questions regarding the Treasurer's Report.

Richard summarized March/April events. The general meeting on March 2nd will feature Abrams Planetarium Director Dr. Shannon Schmoll, speaking about the Cassini mission. Richard himself will present the program for the April 6th meeting. A Public Observing Session was scheduled on April 7th, and the Messier Marathon was planned for March 17th at Richland Township Park.

In the follow-up category, Richard reported that he had ordered the Public Observing Session brochures approved by the Board in January. On the subject of the Robotic Telescope Project, he reported that the power and signal cords threaded inside the mount had apparently caused enough drag to prevent it from slewing properly. With the cords all on the outside, the mount worked better. It still had not been demonstrated that a guide star could be selected and calibrated automatically under internet control. The Observatory Solutions company had spent considerable time operating the mount, but there was not yet any official agreement about cost and guaranteed performance in the use of their services. Since this was emphasized in the decision of the Board to contract with Observatory Solutions, the importance of a clear contract was emphasized. Regarding the 2018 general meeting program, Richard had an agreement from Dr. Zachary Constan of MSU to give the June 1st program. Autumn Cain had chosen the James Webb Telescope as her topic for the September 7th meeting.

Under New Business, Richard requested that each board member try to find an example of a member survey carried out by some other club, as a source of ideas for how we might conduct such a survey. It has been some time since we tried to assess what the members gain (or would like to gain) from club membership. On a related topic, Richard suggested that Full Moon Theater has outlived its usefulness and should be discontinued. There was considerable reluctance expressed by board members to give up this activity, and no action was taken at this time. Jean repeated a recommendation from earlier meetings that we do more activities like field trips to build group spirit. The Apollo Rendezvous was mentioned again as a possibility, perhaps in combination with a visit to the Air & Space Museum in Wapakoneta, Ohio.

Also under New Business, Richard displayed telescope equipment generously donated to KAS by Becky & Kalman Csia. It includes an 8" Celestron Schmitt-Cassegrain telescope, 25×100 binoculars, and many accessories. There was substantial discussion on what use we should make of the gift, with favored alternatives being using it as club loaner equipment, keeping it as a spare 'scope in Owl Observatory, or selling it. After a motion by Jack and second by Don, the Board voted unanimously for KAS to keep the equipment for now.

On the topic of outreach, Richard and Jean had prepared kits for making 300 planispheres and 300 Big Dipper Clocks. They were planning to be present at Family Science Night at Hastings (February 21st). Richard reminded everyone of the Science Night at Vicksburg Middle School (March 7th, 5-8 pm) and reported that more workers were need to cover this event. A request had also been received from the city of Portage for a short talk on the Perseid Meteor Shower on Sunday, August 12th, location to be determined. They had chosen Sunday because they knew of our plans for an observing session at the Nature Center on August 11th. The Board showed little enthusiasm for this event, since it was not clear what the KAS could contribute to the Portage event. Jean moved to politely decline the request and to offer consulting if desired. After a second by Joe, the motion passed with five votes in favor and one abstention.

The subject of adding Don Stilwell to the list of authorized signatures for our Advia Credit Union account had not been officially addressed since the last board meeting. A motion was made by Jack and a second by Joe to have Don's name added to this list. All voted in favor of the motion. Don said that Rich would need to be present to carry out the action, so it was to be done as soon as possible after Rich's return.

After further brief discussion of possible field trips, the meeting was adjourned at 6:40 pm. The next meeting date was set for Sunday, March 11th, 5pm at Sunnyside.

Respectfully submitted by Roger Williams

Observations

by **Richard S. Bell**

Much of 2017 was devoted to the *Great American Eclipse*, as it should have been. The November General Meeting was devoted to celebrating the 40th anniversary of the launch of *Voyager 1* and *Voyager 2*. We played the excellent documentary, *The Farthest - Voyager in Space*. If you missed the November meeting, it's currently available for streaming on Netflix. I have a Blu-ray copy and need to watch it again in the near future. Another significant event toward the end of the summer was the conclusion of the highly successful Cassini mission to Saturn and its system of moons. There simply wasn't time to pay homage to Cassini. We'll finally remedy this at the general meeting on March 2nd. Dr. Shannon Schmoll, the director of Abrams Planetarium, will present *Goodbye Cassini: What the Space Probe Taught Over the Past 20 Years*. Attendance for meetings has been in a bit of a slump lately, so I hope YOU plan to join us on March 2nd at KAMSC.

Another February Freeze Out was clouded out. Let's hope the Messier Marathon on March 17th fares better, but its record of success isn't much better. I'm anxious to get back out under the stars. None of my telescopes have seen a starry night since late-September. If you're serious about conducting a marathon then be sure to check out the March 2008 issue of *Prime Focus*. That was the last time I published my article *Stargazer Online's Guide to the Messier Marathon*. It's a very thorough step-by-step article on this one night search for Messier's legacy. There is also a biography on Charles Messier himself that Mark Miller wrote a couple of decades ago (time flies). If it is clear on March 17th, please join us at Richland Township Park.

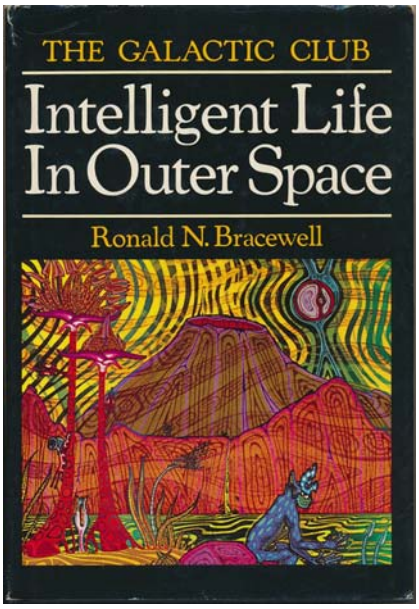
From the KAS Library:

The Galactic Club: Intelligent Life In Outer Space by Ronald N. Bracewell

Ronald Bracewell was a faculty member at Stanford University when he wrote *The Galactic Club* in 1974. Before joining the faculty at Stanford, he lectured in the Astronomy Department of the University of California, Berkeley. The summary on the back of the book suggests that it was intended as a supplementary textbook for courses in biology, astronomy, physical sciences, and engineering, but it works just as well for a general reader interested in the question of intelligent life in outer space. Chapters begin with quotations and even poems by other authors, and unexpected artwork appears through the book (with a particular emphasis on works by Jesse Allen, J.J. Grandville, and M.C. Escher).

In only 129 pages, Bracewell works his way through a logical consideration of whether life on other planets could exist, how it could exist, whether we could make contact, or whether these other planets would be more likely to make contact with us. His starting point is the familiar question "Are We Alone?" He uses simple analogies to bring the reader through his arguments, and the book also benefits from diagrams that make the concepts brilliantly clear.

Reading this book more than forty years after it was published is an interesting experience because so many things have changed. It predates the Hubble Space Telescope by sixteen years and NASA's Kepler Mission by more than three decades, as I was reminded on page two when he speculates as to how we could find planets orbiting other stars. Science has moved forward, and exoplanets.nasa.gov now lists a total of 3,605 confirmed exoplanets, with 890 of them considered to be terrestrial. Instead of rendering the book obsolete, though, these advances make his main topic even more relevant. What is the best way to contact a planet outside of our solar system? How would we know if they contacted us? Could we set up a two-way communications system -- and how long would such communications take to go round-trip? What could a more advanced civilization gain by contacting us, and what could we learn from them?



The book also discusses some topics that were quite current in 1974 but don't seem to have made a lasting cultural impression. He spends a chapter debunking the works of Erich von Däniken, who is rarely discussed these days. In another chapter, he analyzes (and dismisses) the theories of Dr. Immanuel Velikovsky as published in three books between 1950 and 1955. The most interesting chapter of new information to me concerned Project Cyclops, a 1971 NASA "design study of a system for detecting extraterrestrial intelligent life." Many of our members may be familiar with Project Cyclops already, but if you are not, you can download the 253-page report.

The final pages of the book include reader's guides for each chapter that provide additional reading on the topics discussed. An index is included. You could read the entire book in a single day, but the chapters are subdivided in a way that also makes it easy to read in short sittings over multiple days. Because the book came to our library as a donation, it includes marginal notes and underlining by the previous owner, which creates an additional layer of meaning with which to interact.

Submitted by Karen M. Woodworth, Ph.D.
KAS Librarian

Collimation of a Newtonian Telescope

(with or without special tools)

by Don Stilwell

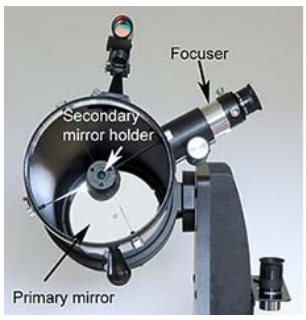
A modern Newtonian telescope featuring a parabolic mirror will provide virtually aberration free images to a visual astronomer's eyepiece once it is properly collimated. If, like me, you like to transport your telescope to various locations both near and far, you will need to collimate (at least a tweak) it each time you move.

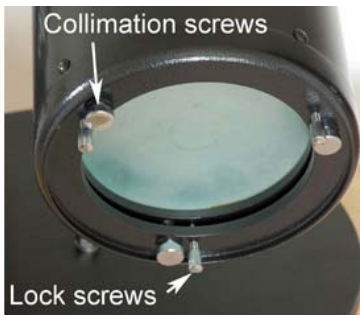
Your Newtonian is composed of mechanical columns and optical columns which must be in proper alignment to deliver a proper image to your eye. When moving your 'scope by car the primary and secondary will usually jostle or bounce out of adjustment.

Mechanically the primary mirror is attached and centered in the bottom of the main tube within a mirror cell. At the tube's top, secured and centered by the spider, is the secondary mirror. The focuser tube must be mounted perpendicular to the main tube with the center of its column directed to the center of the main tube's column.

Either from the manufacturer or from your workshop, barring a catastrophic jolt, the mechanical collimation should be okay from day to day, trip to trip. Our concern here will be the collimation of the optical axis.

Collimation can be done with or without special tools (collimating eyepiece or laser collimator). My demo here will be using a laser collimation device placed in the focuser as you would an eyepiece. **Click this link** for YouTube demo.





Align the Secondary First

Before placing the laser collimation device in the focuser ensure the secondary mirror is centered in the view through the focuser tube using secondary mirror adjustment screws to move as needed. Next, when turned on the laser light pattern will reflect off the secondary mirror and shine on the primary mirror. Now you align the secondary by manipulating the three adjustment screws. The secondary mirror should direct the laser pattern to the center of the primary mirror (usually center marked).

Align the Primary

With the secondary pointing at the primary center mark the reflected laser light will bounce off the secondary and through the focuser tube and throw the laser pattern onto the target area of the laser device.

After loosening the primary mirror locking screws, use the three collimation screws to direct the laser pattern to the center of the target area (as seen on the illustration at right). If the primary is grossly out of alignment, the laser light may not strike the target area at first. But look at the primary's tilt and use your adjustment screws to direct the pattern onto the secondary and the target's center. Then lightly tighten the locking screws and again check to see if your primary alignment held and readjust as needed. At the point, your Newtonian is, at least, well collimated enough for visual observing.

For photography or most excellent eyepiece viewing, you need to "Star Test" your collimation and make further fine adjustments as needed. For an in depth discussion of collimation with and without devices and "star testing," please follow **this link**.

What Do I Look At?

by Mike Sinclair

One of the most common questions asked by new amateur astronomers is "What should I look for in the sky?" I contend that the ideal starting place is with a reasonably comprehensive plan of action; in my case, the Semester Observing Log that I require all students in my astronomy class at the Kalamazoo Area Mathematics & Science Center to complete over the course of the spring semester. Note: Many of the objects listed are not found by my students as success is (1) weather- dependent, (2) restricted by their extracurricular activities, or (3) limited by time before the end of the term. But with more free time and no "grade requirement," this is a good start for any amateur astronomer interested in developing the proper skills to "see" the night sky.

By the way, many astronomy instructors – high school and beyond – have developed logs like these; check with Richard Bell, Kirk Korista, and Mark Miller (all of whom have taught astronomy) for their versions. This is simply my way of encouraging students to start going outside.

One last item: Since my course is offered over the late Winter through mid-Spring period of the calendar year, the objects listed (i.e. bright stars and deep sky objects) are primarily found during roughly five months of January through May.

Mike Sinclair's OBSERVING CHALLENGE

INTRODUCTION

In order to "see" the big picture, amateur astronomers usually work through a comprehensive long-term observing program which encompasses all of the notable observational themes in the heavens.

In this case, lunar, solar system, stellar, and non-stellar objects are all part of this thorough investigation. Note: extremely difficult objects to find are annotated with the symbol ¤.

Lunar Features

You will likely need to make your observations of craters and mountains when these features are near the Moon's *terminator* (the dividing line between the dark and lighted side). Most objects will need binoculars, but the Alpine Valley and the Straight Wall are telescopic objects. *Sky & Telescope's Moon Map* is a handy guide to locate all the features listed below.

Naked Eye Features:

Feature	Date	Time
Apennine Mountains		
Mare Crisium		
Mare Imbrium		
Mare Nubium		
Mare Serenitatis		
Mare Tranquillitatis		
Oceanus Procellarum		

Telescopic Features:

Feature	Date	Time
Alpine Valley		
Straight Wall¤		

Binocular Features:

Craters	Date	Time
Alphonsus		
Archimedes		
Clavius		
Copernicus		
Eratosthenes		
Kepler		
Plato		
Ptolemy		
Schickard		
Theophilus		
Tycho		

Four Meteors

Plot the paths of at least four (4) meteors on an all-sky star map, such as the one available in each issue of *Prime Focus*. Be as accurate as possible and be sure to label the drawing [time, date, and brightness]. The best time for viewing meteors will likely be during the *Perseid Meteor Shower* in August.

Date	Time	Length (°)	Location (Constellation)

Three Planets

You will need to find *at least* <u>three</u> of the five planets listed. Most can be seen in southwest Michigan over the course of a single season. Be sure to accurately identify the altitude and azimuth of each object. You should be able to confirm the identity of each planet with binoculars or telescope.

Planets	Date	Time	Azimuth	Altitude
Mercury☿				
Venus				
Mars				
Jupiter				
Saturn				

Solar Observation

You will need to observe the face of the solar disk at least ten (10) times. Annotate any sunspots and mark the change in position of major sunspot groups as well as sketch the total number of sunspot groups seen on the solar disk. You may use the GONG site at Big Bear Observatory or the National Solar Observatory at Sacramento Peak. Both of these sites can clearly show sunspot activity.

PLEASE NOTE: If you do complete direct observation of the Sun, remember: ***DO NOT*** look directly at the Sun without proper eye protection; otherwise, it may result in permanent eye damage.

Twelve Bright Stars

You will need to learn and identify twelve of the brightest stars that can be seen from southwest Michigan. You will also need to draw a rough sketch of the constellation in which they are found. Be sure to label the star(s) in each constellation. The brightest stars are generally identified on star charts by a letter of the Greek alphabet. The stars are found within each constellation in order of star brightness, with alpha α the brightest and omega ω the dimmest.

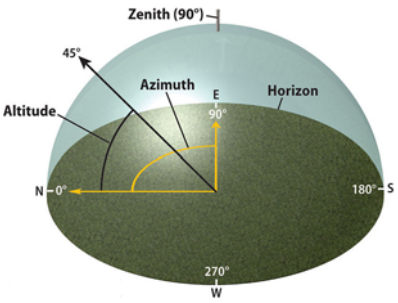
Star	Constellation	Date	Time
Aldebaran	α Taurus		
Arcturus	α Boötes		
Bellatrix	γ Orion		
Betelgeuse	α Orion		
Capella	α Auriga		
Castor	α Gemini		

Star	Constellation	Date	Time
Polaris	α Ursa Minor		
Pollux	β Gemini		
Procyon	α Canis Minor		
Regulus	α Leo		
Rigel	β Orion		
Sirius	α Canis Major		

Estimate the Azimuth and Altitude of . . .

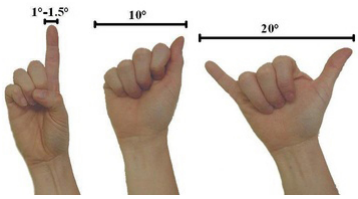
Remember azimuth is the angular measure from north (= 0°, east = 90°, etc.) and altitude is from the horizon = 0° to the zenith, directly overhead = 90°.

	Date	Time	Azimuth	Altitude
Aldebaran				
Arcturus				
Betelgeuse				
Regulus				
Sirius				



Estimate the Angular Distance Between . . .

			Date	Time	Angle
Aldebaran	&	Betelgeuse			
Sirius	&	Castor			
Castor	&	Pollux			
Procyon	&	Regulus			
Regulus	&	Vega			



Hand Scale

Deep Sky Objects

You will need to identify these eighteen (18) deep sky objects; this list includes double stars, open clusters, globular cluster, nebulae, and galaxies. Most will require a fairly powerful pair of binoculars or a mid-sized telescope, and one or two will need an even bigger telescope. You can make these observations at some of the Kalamazoo Astronomical Society's Public Observing Sessions at the Kalamazoo Nature Center; members of the Society will assist you, but you alone are to find and identify the object.

Object	Constellation	Mag.	Date	Time	Comments
γ Andromeda	Andromeda	2.3, 4.8			Double star
M31[¤]	Andromeda	4.4			*The Andromeda Galaxy*
M34	Perseus	5.2			Open cluster
NGC 869/884	Perseus	4.3, 4.4			*The Double Cluster*
M45	Taurus	1.2			*The Pleiades*
$\theta^{1,2}$ Tauri	Taurus	3.4, 3.8			Double star
M37	Auriga	5.6			Open cluster
M42	Orion	5.0			*The Orion Nebula*
M41	Canis Major	4.5			Open cluster
M35	Gemini	5.1			Open cluster
M50[¤]	Monoceros	5.9			Open cluster
M48[¤]	Hydra	5.8			Open cluster
M47	Puppis	4.4			Open cluster
M44	Cancer	3.1			*The Beehive Cluster*
M3[¤]	Canes Venatici	5.9			Globular cluster
M5[¤]	Serpens	5.7			Globular cluster
24 Coma Berenices	Coma Berenices	5.1, 6.3			Double star
ζ Ursa Major	Ursa Major	2.1, 3.9			Double star (Mizar & Alcor)

What is the Ionosphere?

by Linda Hermans-Killiam

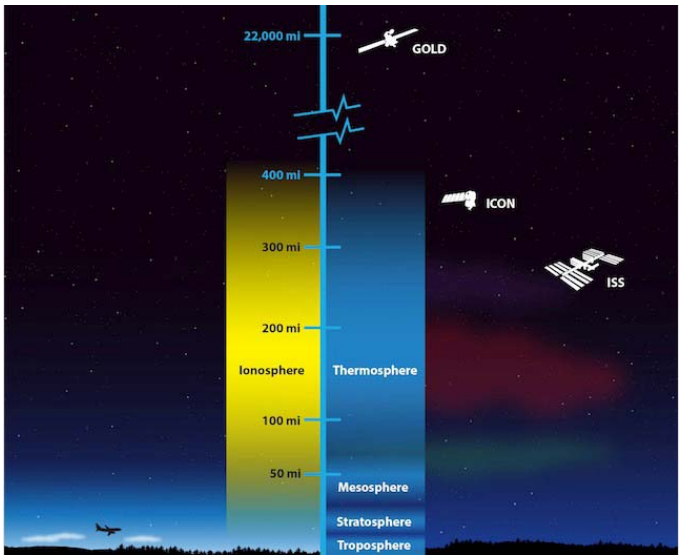
High above Earth is a very active part of our upper atmosphere called the ionosphere. The ionosphere gets its name from ions — tiny charged particles that blow around in this layer of the atmosphere.

How did all those ions get there? They were made by energy from the Sun!

Everything in the universe that takes up space is made up of matter, and matter is made of tiny particles called atoms. At the ionosphere, atoms from the Earth's atmosphere meet up with energy from the Sun. This energy, called radiation, strips away parts of the atom. What's left is a positively or negatively charged atom, called an ion.

The ionosphere is filled with ions. These particles move about in a giant wind. However, conditions in the ionosphere change all the time. Earth's seasons and weather can cause changes in the ionosphere, as well as radiation and particles from the Sun — called space weather.

These changes in the ionosphere can cause problems for humans. For example, they can interfere with radio signals between Earth and satellites. This could make it difficult to use many of the tools we take for granted here on Earth, such as GPS. Radio signals also allow us to communicate with astronauts on board the International Space Station, which



This illustration shows the layers of Earth's atmosphere. NASA's GOLD and ICON missions will work together to study the ionosphere, a region of charged particles in Earth's upper atmosphere. Changes in the ionosphere can interfere with the radio waves used to communicate with satellites and astronauts in the International Space Station (ISS). Credit: NASA's Goddard Space Flight Center/Duberstein (modified)

orbits Earth within the ionosphere. Learning more about this region of our atmosphere may help us improve forecasts about when these radio signals could be distorted and help keep humans safe.

In 2018, NASA has plans to launch two missions that will work together to study the ionosphere. NASA's GOLD (Global-scale Observations of the Limb and Disk) mission launched in January 2018. GOLD will orbit 22,000 miles above Earth. From way up there, it will be able to create a map of the ionosphere over the Americas every half hour. It will measure the temperature and makeup of gases in the ionosphere. GOLD will also study bubbles of charged gas that are known to cause communication problems.

A second NASA mission, called ICON, short for Ionospheric Connection Explorer, will launch later in 2018. It will be placed in an orbit just 350 miles above Earth — through the ionosphere. This means it will have a close-up view of the upper atmosphere to pair with GOLD's wider view. ICON will study the forces that shape this part of the upper atmosphere.

Both missions will study how the ionosphere is affected by Earth and space weather. Together, they will give us better observations of this part of our atmosphere than we have ever had before.

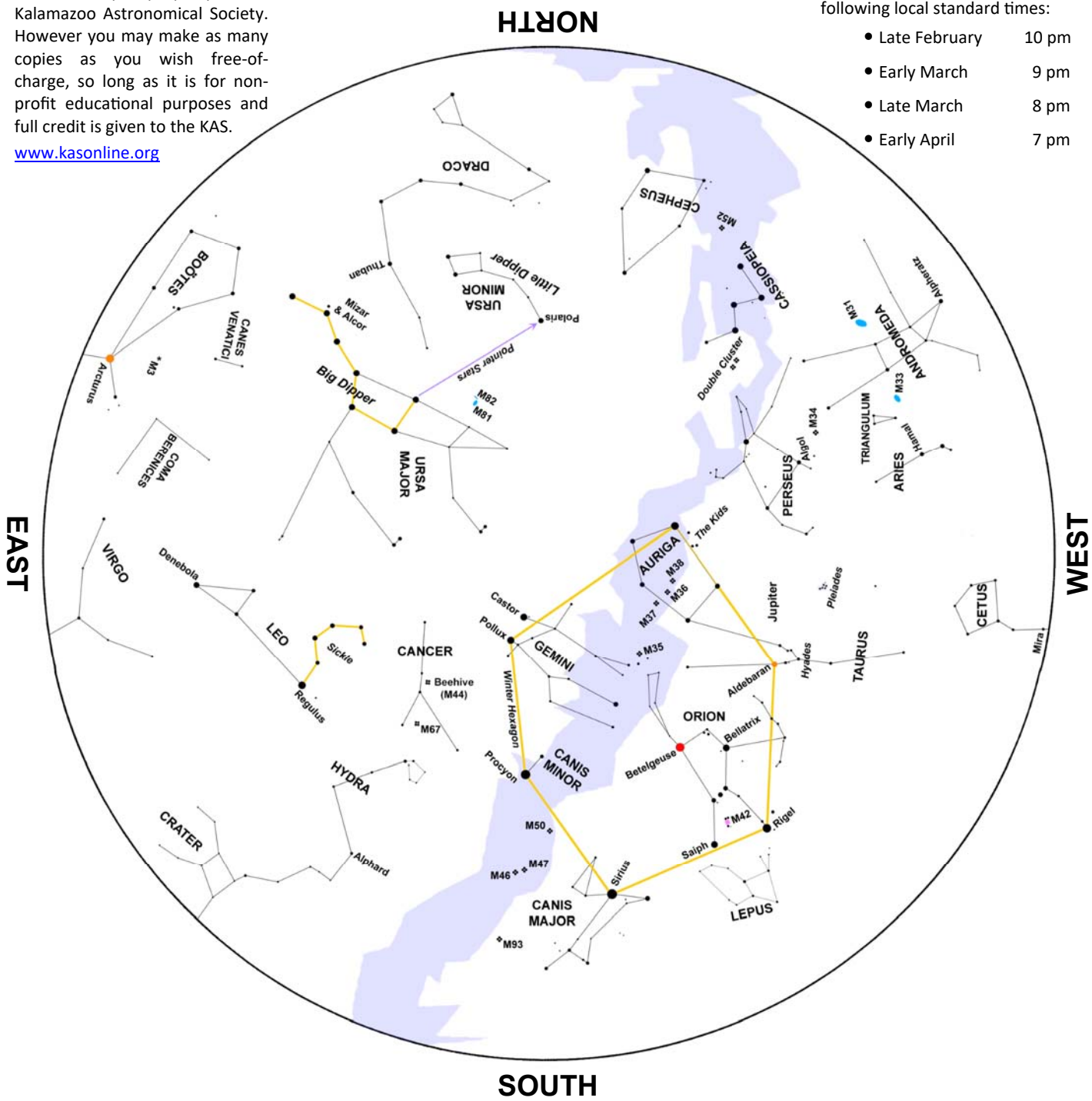
To learn more about the ionosphere, check out NASA Space Place: https://spaceplace.nasa.gov/ionosphere

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 to explore space and Earth science!

— March Night Sky —

This map represents the sky at the following local standard times:

- Late February 10 pm
- Early March 9 pm
- Late March 8 pm
- Early April 7 pm



The nearly Full Moon, which is 2.5° east of Regulus, forms a celestial arc with the planets Jupiter, Mars, and Saturn before dawn on March 1st. The Moon sets in the western sky at 7:13 am, while Saturn can be found in the southwest above the Teapot asterism.

Only 1° separates inferior planets Venus and Mercury on the evening of March 3rd. Venus will be easy to spot in the western sky, but Mercury will be a challenge.

A waning gibbous Moon and Jupiter rise together in the east less than 4° apart shortly before midnight on March 7th.

The Moon, now a waxing crescent, will be less than 1° from Aldebaran in Taurus on the night of March 22nd. Viewing the pairing through binoculars will also give a pleasing view of the Hyades cluster.

Brilliant Venus and faint Uranus will only be 4° apart at dusk on March 28th. You'll need a pair of binoculars or a telescope to spot distant Uranus.

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Volunteers Needed @ Science Night

The KAS has been asked to participate in the fourteenth annual Science Night at Vicksburg Middle School (located at 348 East Prairie St.). Members are needed to help setup and take down classroom displays, hand out KAS literature, and answer questions from students and parents. Members are also needed to setup telescopes outside if skies are clear. Please contact us if you'd like to lend a helping hand.

Wednesday, March 7th, 6 - 8 pm | Vicksburg Middle School

Get Your KAS Apparel Today!

It's been well over ten years since the KAS has offered a full line of clothing. We now have several items in stock and ready for purchase. These include:

Short-sleeve T-Shirts:	**$17.00**
Long-sleeve T-Shirts:	**$20.00**
Sweatshirts (unhooded):	**$17.00**
Sweatshirts (hooded):	**$22.00**
KAS Embroidered Caps:	**$15.00**

Please contact us for available sizes and colors. Clothing will also be available to purchase at most general meetings.

Messier Marathon

The work of comet-hunter and nebulae cataloger Charles Messier comes alive in March of each year as amateur astronomers participate in a one night search for all of the objects in his catalog of nebulae, star clusters and galaxies. By a quirk of fate, we are fortunate that most of the objects Messier and Méchain took 24 years to discover can be observed in one night around the time of the vernal equinox. Members are encouraged to bring a good pair of binoculars or a telescope and participate in this one night race across the sky.

Saturday, March 17th @ 7:00 pm | Richland Township Park - 6996 N. 32nd St.

General Meeting Preview

GOODBYE CASSINI

What the Space Probe Taught Over the Past 20 Years

presented by **Dr. Shannon Schmoll**
Abrams Planetarium Director

Saturn has been known since antiquity and continues to be a favorite planet because of its famed rings. The Cassini-Huygens mission was a 20 year long mission that ended this past September. Its goal was to help unlock the secrets of Saturn and study its moons in more depth. In particular, the Huygens lander studied the moon Titan in depth, but Cassini revealed that Enceladus was just as intriguing. The mission resulted in a lot of surprises about the moons, Saturn's atmosphere, and its ring system giving us a lot to unpack in years to come. This talk will take us through the journey of learning about Saturn from ancient times to the modern era and explore some of the most exciting discoveries of the Cassini-Huygens mission before it crashed into the atmosphere of Saturn. .

Friday, March 2 @ 7:00 pm

Kalamazoo Area Math & Science Center

600 West Vine, Suite 400 • Use Dutton St. Entrance

– ***Dutton Entrance Locked by 7:10 pm*** –

Kalamazoo Astronomical Society
c/o KAMSC
600 West Vine, Suite 400
Kalamazoo, MI 49008

STAMP