SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

March 2018 *Free to members, subscriptions $12 for 12 issues* **Volume 45, Number 3**

The rising full moon on the evening of 1/30/18 followed by the setting, eclipsed super blue blood moon the next morning 1/31/18. Images captured by Bill Warden from Eastbluff, CA using a ZWO ASI120MC, Takahashi FS-60C at native F/5.9, 355 mm and Skywatcher star adventurer tracking mount.

OCA CLUB MEETING

The free and open club meeting will be held on March 9 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange.

This month, Ben Zuckerman on The Search for Extraterrestrial Intelligence, and Why It Will Fail.

NEXT MEETINGS:
April 13 – Joseph Masiero
May 11 – (speaker TBA)

STAR PARTIES

The Anza and Orange County site will be open on March 17. Members are encouraged to check the website calendar for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next sessions of the Beginners Class will be held at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana on March 2 and April 6.

Youth SIG: contact Doug Millar

Astro-Imagers SIG: March 7, April 4

Astrophysics SIG: March 16, April 20

Dark Sky Group: contact Barbara Toy

President's Message

By Barbara Toy

March is upon us, which means we're heading into spring, the winter constellations are getting more westerly at nightfall, and the time for the Messier Marathon is coming up. More about that below – first, an update on our Banquet:

REMINDER: OCA Banquet on March 31, 2018, at 7:00 p.m.

We're all pretty excited about the club banquet – all that we've had since I've been a member have been a lot of fun, giving everyone a chance to socialize with fellow members in a way we normally can't do, and actually see people we may interact with mainly in the dark. This is one event that family members also often attend, giving a chance the catch up with them, as well.

Then, there's the chance to see pictures and hear about different experiences people had during the Great American Eclipse last August. I was able to attend the AstroImage meetings in the two to three months after the eclipse, where a number of different imagers talked about their experiences and showed their preliminary images. Those meetings were a lot of fun as well as informative, and it was also interesting to see how the images evolved as they experimented with different processing techniques. I'm looking forward to hearing what the different speakers at the banquet will tell us – everyone had a different experience, even those who viewed it from the same geographic area, and those who weren't able to travel to totality also had an amazing array of experiences with the partial eclipse visible from the rest of the country.

As I said last month, the banquet will be at the same location as the one we had in 2017, at JT Schmid, across the street from the Honda Center, at 2610 E. Katella, Anaheim. Instead of a buffet or set menu, everyone will be ordering from the general menu, allowing greater choice, and each person or party attending will pay for what they order directly to the restaurant rather than channeling payment through the club. What we tried this last time, we found that people generally were happier with the food choices and it was overall less expensive than past banquets, as well.

To reserve spaces for the banquet, please email Alan Smallbone (asmallbone@earthlink.net) or me (btoy@cox.net) instead of Helen Mahoney, our banquet organizer, as I suggested last month. Please do email to reserve spaces, as we need to let the restaurant know in advance how many people we expect to be there, and also because there is a limit on how many people we can fit in the room, though we don't expect that to be a problem. Please let us know how many people you expect to be in your party by March 15, 2018, so we can get the necessary information to the restaurant timely.

For those who would like to submit images for the slideshow that we plan to run during the meal, rather than emailing them to Alan Smallbone, please email him that you want to submit images, and he will send you the link for the dropbox where he will be receiving them. Unfortunately, his email server will become overwhelmed if too many images come through, so he needs to have you follow this procedure to make sure that the pictures actually do reach him. He also needs the images to be web-sized, so please be sure that your images are no more than 1920 x 1280 pixels. If you have any questions regarding this, please contact Alan (asmallbone@earthlink.net).

The person to contact if you are interested in being one of the speakers is Doug Millar; please email him at drzarkof56@yahoo.com.

We look forward to seeing everyone at the banquet on March 31!

Messier Marathon – March 17, 2018

Our Messier Marathon will be the night of the Anza and Orange County Star parties on March 17, which happens to be the night of the new moon and only three days before the spring equinox. Generally, the closer the Messier Marathon is to the equinox, the easier it is to see all of the Messier objects in one night, which is the goal of the marathon. The moon will not be an impediment this year, so it should be a particularly good year for the marathon. Of course, March 17 is also St. Patrick's Day, so the Messier Marathon this year should be particularly convivial.

Since our Orange County Star Party is the same night as the Messier Marathon this year, those who attend it should be able to do at least the first part of the marathon. We don't generally have access to the site after midnight, and I don't know if the change to the current viewing location near Irvine Lake would allow Steve Mizera arrange for all-night access if there are any intrepid in-county souls who want to attempt the full marathon – if you are interested in that possibility, please contact him.

Unfortunately, we can't control the weather, and there is a chance that it will get in the way of viewing the Messier objects that night, as it has in past years. If that night is too cloudy, you could still attempt the marathon any other clear night around the period of the equinox, but if you try it too early in the month the last objects may not rise before sunrise and, if you try it too late, the shorter night will make it harder to see the first and last objects because of the brighter skies.

The other major impediment to completing the marathon is that it does take all night, and for most people there is a period of a couple hours in the early morning when all of the visible Messier objects have been seen and you have to wait until the next objects rise. Many marathoners take a nap during this period and some then decide that it's not worth getting up again to view the last group of objects before dawn. There's no dishonor in needing sleep, and some people deal with this by deliberately splitting the marathon between two nights, covering the main part of the marathon in one night and then getting up early on another night to catch the predawn objects!

If you've never done one, you may reasonably wonder why you should want to. The easy answer is that it's fun, which it is, particularly if you're doing it with a fun group of people. Some people do it because they love a challenge – seeing all 110 objects in one night during the brief time of the year when they can all be seen in one night is definitely a challenge, particularly as the earliest and latest objects are often lost in the glare of the setting/rising sun, putting you on your honor about whether you've actually seen them. Some people compete with themselves by seeing if they can do better in the current year than in the past. Others like to increase the challenge by locating all of the objects by store hopping (they have my respect, but I have no desire to emulate them), or by taking images of each of the objects over the course of the marathon.

What I like most when I do the marathons is looking at Messier objects that I generally don't look at in other viewing sessions, the lower profile objects that are often overlooked. Of course, it's also fun to look at favorite objects, like the Orion Nebula, though there isn't much time to spend enjoying each of the objects if you want to catch everything for the marathon while they're still visible.

Our Messier Marathon form should be available on our website well before the March Star parties, and objects are listed on it in order of when they are visible, starting with the objects in the West at sunset. To do the marathon, you merely note on the form when you saw each of the objects, though sometimes people just check them off (this can be another test of honor). If you do it on more than one night, you should note which observations were on which night.

When you're done, you can scan and email me a copy, or give your form to Alan Smallbone or me, or mail it to the club's PO Box and Charlie will see that it gets to us. If all goes well, we should be able to prepare certificates for those who participate – and we hope you will!

Update on the Website

I'm happy to report that we think we've found someone who is willing to redesign the club website through a connection from our newest trustee, Cecilia Caballero. We are looking forward to her suggestions on the best approach to take with this.

In the meantime, please note that we are still having problems with compatibility with Google Chrome so, if you use that as your browser, you will likely find that some information on the website is invisible to you, such as entries on the club calendar. There is a notice about this on the website, but sometimes people overlook it. If/when we can get this problem worked out, that will be updated.

Meanwhile, have a happy March, and we look forward to seeing you all at the club banquet!!

AstroSpace Update

March 2018
Gathered by Don Lynn from NASA and other sources

Distant exoplanets – Astronomers have for many years used microlensing to find exoplanets. When a planet happens to pass exactly in front of a distant star, it gravitationally bends the starlight, and like a lens, brightens and magnifies the star. As long as the star is imageable in telescopes, it does not matter how far away the planet or star is. Thus this technique has found some of the most distant exoplanets. It was taken to a whole new level by the discovery of planets in a galaxy 3.8 billion light-years away, the first known exoplanets outside our own galaxy. The imaging was done in X-rays using the Chandra space telescope.

TRAPPIST-1 planets – The sizes and masses, and therefore the densities, have been accurately measured for the 7 planets in the TRAPPIST-1 system. From the densities, these conclusions have been drawn: the b and c planets probably have rocky cores and thick atmospheres; it is uncertain whether ice, ocean or atmosphere results in planet d's density; e is denser than Earth, so probably has a large iron core, and may not have ice, ocean or atmosphere to reduce that density; f, g and h may have frozen surfaces and little atmosphere. All are mostly rock, and the less dense ones may have substantial (much more than Earth) material lighter than rock, such as water.

Interstellar visitors – In December it was reported here that an asteroid (named 'Oumuamua) had been discovered whose orbit showed that it came from outside our Solar System and would soon exit again. A new computer simulation of the Sun and Jupiter showed that gravitational capture of such visitors should be common enough that perhaps a few thousand of them have been captured and are lurking among the bodies native to the Solar System. Differences in oxygen isotope ratios might be able to distinguish the visitors from the natives. The simulation was also run using the 2 largest stars in the Alpha Centauri system (rather than the Sun and Jupiter) and the results showed that system would much more readily capture interstellar visitors, even planet-sized ones.

Neutron star mass limit – It has long been debated how massive a neutron star can be before it collapses into a black hole, since that involves physics at higher pressures than we can create. A new study that combines theory with observed properties of the first-seen merging of 2 neutron stars (by gravitational wave and various forms of light) comes up with the value 2.16 times the Sun's mass. This is much more precise than the gap between the most massive known neutron star (about 2) and the least massive known black hole (roughly 3). A very fast rotating neutron star could theoretically be a little over this mass limit before collapsing.

Extra dimensions – Some of the theories to explain dark matter and/or dark energy involve spatial dimensions beyond the 3 we can detect. A new study shows that some of those extra-dimension theories (but not all) would substantially change the strength of gravitational waves produced by merging neutron stars. Since we now have observed one such merging, and the strength of the gravitational waves matched theory without extra dimensions, scientists can now rule out a class (but not all) of the extra-dimension theories. This study did not rule out string theory, though it involves extra dimensions.

Titan sea level – A new study of Cassini (recent Saturn mission) data has determined that all the ethane-methane seas on Saturn's moon Titan are at the same elevation. This implies that they are connected by an underground aquifer (or whatever the liquid methane equivalent of "aquifer" is). Some smaller lakes are at higher elevations, so not all liquid bodies on Titan are connected.

Galaxy formation – When telescopes look at really distant galaxies, say over 10 billion light-years away, what is seen is how they looked when the light left them over 10 billion years ago. Most such galaxies appear irregular in shape, not elliptical- or disk-shaped as most galaxies are today. This implies that it takes a few billions years for galaxies to attain their final shape. New observations by ALMA (radiotelescope array in Chile) have found 2 galaxies that were already disk-shaped only 0.8 billion years after the Big Bang (13 billion years ago). However, spiral arms had not formed in those disks. They are about 1/5 the diameter of our Milky Way galaxy and have star-forming regions within. These observations show that galaxy formation theory must account for galaxies occasionally attaining disk shape relatively quickly.

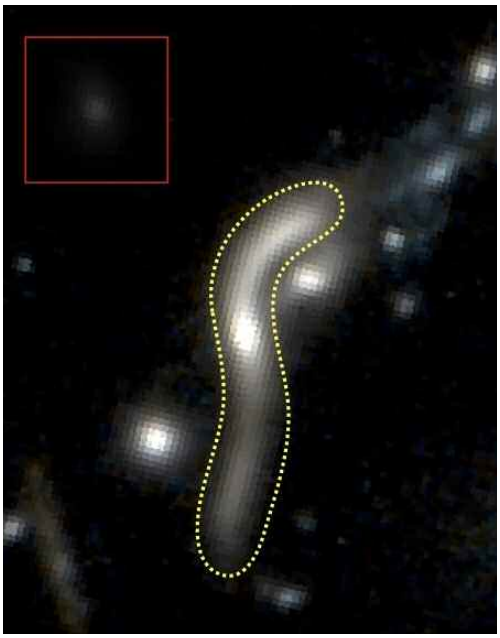
Dark Energy Survey – (DES) is using a wide-field 4-meter telescope in Chile to completely image in 5 wavelengths a large fraction of the entire sky. The goal is to analyze the gravitational lensing in the images in order to make a 3-dimensional map of dark matter. The first release of data from the DES was just made, and it covered about 1/8 of the sky. Naturally, DES has found a lot of other interesting things besides dark matter. Eleven new streams of stars were found that resulted from the Milky Way's gravity shredding dwarf galaxies. Several of those streams appear to have originated near the Magellanic Clouds, and thus the pre-shredding galaxies may have been satellites of the Magellanic Clouds rather than satellites of the Milky Way. The discoverers named the streams after rivers. Also, a value for the Hubble Constant (the rate at which the Universe is expanding) was calculated from the DES data. At 67.2, it is between the discordant values calculated from the Cosmic Microwave Background and from the supernova surveys, but it is nearer to the former. The precision of the Hubble value should increase as the DES gathers further observations.

First stars – Immediately after the Big Bang, the Universe consisted almost entirely of hydrogen and helium. So the first generation of stars had essentially no heavier (than helium) elements. Each succeeding generation had more heavier elements, since these were created in stars and supernovas. Astronomers have long searched for a star of the first generation. A new candidate has been found. Spectra taken by the Gran Telescopio Canarias (of course in the Canary Islands) showed that a star in the halo of the Milky Way has 1 millionth of certain heavier elements than the Sun has. However it has 1/6 the carbon of our Sun. More work is needed to determine the source of the carbon. But it looks like this star should tell us more about the nature of the first stars in the Universe.

Molecules in black hole winds – Harsh conditions in the winds emitted from supermassive black hole should break apart any molecules that might exist there. Yet observations keep finding molecules there. A new theory, supported by computer simulations of black hole wind, indicates that the molecules are indeed broken apart, but that new molecules form where the winds cool.

Rare black hole – Astronomers using the Very Large Telescope in Chile have found a star that appears to be orbiting an invisible object with about 4 times the Sun's mass. Likely it is a black hole that does not happen to have any matter falling into it currently (else it would be visible). This is located in the globular cluster NGC 3201. Each orbit of the star takes 167 days. Black holes are rare in globular clusters (they are probably frequently ejected gravitationally); in fact this is the only known instance of an inactive black hole in a globular.

Detailed image of distant galaxy – Gravitational lensing caused by massive galaxy clusters bending light has been used to find very distant galaxies that would normally be too dim to be imaged. Another example of this has been discovered, with rather extreme magnification of the distant galaxy, by about 30 times. Once the distortion of the gravitational lens has been removed by computer processing, the result is 30 times the resolution that could otherwise be obtained. The images were taken with the Hubble Space Telescope. The magnified galaxy was dubbed eMACSJ1341-QG-1, and the galaxy cluster in front is eMACSJ1341.9-2441. The magnification allows astronomers to see that the galaxy is not forming new stars, which is unusual for such a distant galaxy.



The quiescent galaxy eMACSJ1341-QG-1 as seen by the Hubble Space Telescope. The yellow dotted line traces the boundaries of the galaxy's gravitationally lensed image. Credit: Harald Ebeling, UH IfA

Meteor – A brilliant slow-moving fireball (very bright meteor) was seen on January 16 over Michigan and nearby states. The shock wave from it caused a magnitude 2 earthquake. Analysis of images, weather data, and seismic data narrowed down the area where pieces of the meteoroid may have fallen to the Hamburg Township area of Michigan. Searches there have turned up fragments. Preliminary analysis shows them to be L6 chondrites, a common type of meteorite.

LISA Pathfinder was launched in late 2015 with the purpose of seeing if distances in space could be measured accurately enough (finer than the size of an atom) to build a LIGO-like gravitational wave detector in space (to be called LISA). Data was taken for more than a year, and the final report on LISA Pathfinder's performance was just released. It exceeded requirements by a factor of 2 over the entire range of frequencies of gravitational waves that LISA is designed to detect. LISA is not scheduled to be launched until 2034, probably due to other spacecraft competing for resources.

Falcon Heavy – In February SpaceX launched its Falcon Heavy rocket for the first time. It can lift the most mass into orbit of any current rocket, though it is less than the Apollo Saturn V rockets did. There was no contracted payload, so SpaceX owner Elon Musk used his red Tesla Roadster electric car as test payload. The car will spend the next few months on its way to Mars' orbit, though Mars will not be at that point. The car is expected to orbit the Sun for millions of years, in an elongated path that touches Mars' orbit and Earth's orbit each time around the Sun. In the driver's seat is a test dummy who is testing SpaceX's new design for a space suit. The Falcon Heavy first stage is made up of 3 smaller rockets bundled together. The 3 parts separated, as planned, and attempted to land for later reuse. 2 of the 3 landed successfully.

SpaceX's Starman mannequin seen inside Elon Musk's red Tesla Roadster in space, with Earth as a backdrop. Photo taken from a camera mounted on the car. Credit: SpaceX

Instant AstroSpace Updates

The Nobeyama radiotelescope in Japan has imaged 2 long strips along the central plane of the Milky Way, using a new high-resolution receiver. The result is the most **detailed radio map** of much of our galaxy.

It was reported here last month that the remnant from **neutron stars merging** has continued to brighten in radio waves long after it faded in most other wavelengths of light (and gravitational waves). New observations in X-rays show that this wavelength also continued to brighten.

The **ExoMars Trace Gas Orbiter** has been aerobraking, or lowering its orbit by barely kissing the Martian atmosphere at the low point of each orbit, since shortly after arriving at the Red Planet in October 2016. It is about to complete the process and reach its science orbit on schedule to begin monitoring atmospheric gases in April.

Credit: Pauline Acalin

Falcon Heavy - Demo Launch
By Pauline Acalin

I was fortunate to have been able to attend the inaugural launch of SpaceX's long-awaited heavy-lift rocket at Kennedy Space Center on Feb. 6 through Sky & Telescope Magazine. Falcon Heavy is currently the world's most powerful operational rocket, capable of lifting 140,000 pounds of cargo into low-Earth orbit, 37,000-pound payloads to Mars and 7,700 pound payloads to Pluto. With specs like this, at a low cost of $90 million per launch, customers such as NASA would be able to more easily afford deep space missions.

Gallery

Total Lunar Eclipse, January 31, 2018 – Another gallery was in order due to the number of member images submitted. Hope you enjoy!

Conifer, CO
By Don Lynn

Don used a tripod-mounted Canon T1i camera with 250 mm lens. All images taken at f5.6, ISO 400. Exposures ranged from 1/1000 to 15 seconds. They were taken between 4:50 and 6:13 am MST, except the first image, which was taken hours before the eclipse started. The last pane reflects that the Moon set into trees during totality, and the sky was just beginning to lighten up for dawn. It was by then behind some clouds and so was barely visible naked eye.

Credit: Don Lynn

Cypress, CA
Scott Young

Scope: Explore Scientific 127ED at 952mm fL | Mount: Meade LX80 | Camera:Canon 7D
Exposures starting from left side all at ISO 400. 1/500 sec, 1/2 sec, 1 sec, 5 sec

Credit: Scott Young

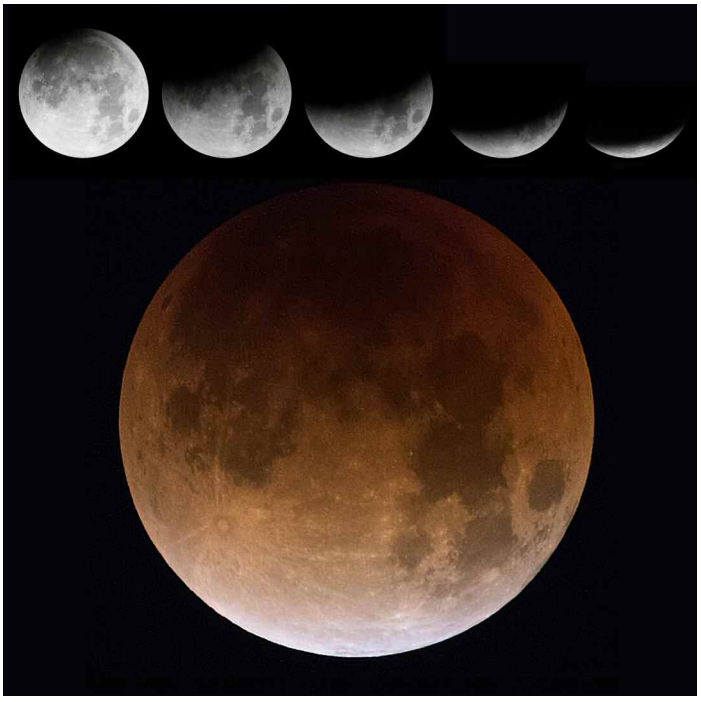
Anza, CA
Dave Kodama

2 hours and 20 minutes separated the moon fully illuminated by sunlight (left) from the moon at maximum eclipse (05:29 PST). During totality, the moon is illuminated only by refracted, reddened sunlight which has passed through the earth's atmosphere. The photo at left was shot at 1/4000 sec., while the one on the right was a 4 sec. exposure. Background stars were visible only during the eclipse.

During totality, the stars of the Beehive Cluster (M44), were visible not far away (lower right in photo). Under moonless skies, the cluster is visible to the naked eye as a fuzzy spot in the sky. The orange star is a magnitude 4 star in the constellation Cancer. The glow at the bottom of the frame is due to light pollution from the nearby town of Temecula and more distant Los Angeles.

Santa Ana, CA
Pauline Acalin

Canon 7D Mark II, 600mm Sigma
Penumbral: ISO 200, 1/500sec at f/6.3
Mid-Eclipse ISO 640, 1/10sec at f/6.3



Credit: Pauline Acalin

Seal Beach, CA
By Craig Bobchin

April Guest Speaker: Joseph Masiero

Searching for our Nearest Neighbors, the Near-Earth Asteroids: Hazard, Resource, and Destination.

Dr. Masiero is a staff Scientist at NASA's Jet Propulsion Laboratory in Pasadena, CA. He received his Ph.D. from the University of Hawaii's Institute for Astronomy in 2009, and has been with JPL ever since. Joe joined the WISE mission shortly before launch to work on the detection, tracking, and physical characterization of asteroids that were detected by the mission. He has continued this work when the spacecraft was reactivated as NEOWISE, and is now the Deputy PI of the mission. He also regularly observes with the Palomar 200-inch telescope.

The near-Earth asteroids are fragments left over from the formation of the Solar system that orbit near the Earth. NEAs in the past have impacted on the surface of the Earth, and will again at some point in the future. However, as a society we have the resources to detect them beforehand, predict their trajectories, and perhaps even deflect them with enough warning. In this talk, I will speak about the searches that are on-going, and the potential benefits the NEAs offer to humanity as we continue to explore space.

VOLUNTEER OPPORTUNITY

OCA Representative to WAA

Our club has been a member of Western Amateur Astronomers (WAA) for many years, and our representative for most of that time has been Tim Hogle, one of our Charter Members. He would like to retire from that position, and we are seeking a replacement.

WAA is an association of clubs in the western United States (different organizations serve other areas of the country), and its best known current activity is selecting the annual recipient of the G. Bruce Blair Award, which recognizes excellence in astronomy outreach activities. In the past, WAA organized conferences and provided resources for its members during times when there weren't many options available, and it is still available to provide support for its members, particularly smaller or newer clubs, though local needs have changed over the years.

The basic responsibilities of the WAA representative are to attend two Board meetings per year (one at RTMC and one elsewhere), report back to OCA on those meetings, solicit suggestions for OCA candidates for the G. Bruce Blair Award and formally deliver the nomination to WAA before the Winter Board meeting. Beyond that, our representative would potentially be able to influence the future course of WAA as it adapts to current conditions and determines how it can best serve the needs of its member clubs.

Tim is hoping to be able to overlap with whoever will be taking that over from him as WAA representative, to ease the transition to the new representative, and he is available to answer questions about WAA and what is involved in representing OCA's interests with the WAA. If you are interested in this position, please contact Tim Hogle (TimHogle@aol.com) or Barbara Toy (btoy@cox.net).

Sale:

Celestron 3.5=E2=80=9D Maksutov Telescope with 6X30mm finder and 1.25 = inch star diagonal. Scope has been recently cleaned and is like new. Comes with quarter inch mounting = block for tripods. $75

Celestron Nexstar 4=E2=80=9D se Maksutov with dovetail attach and red = dot finder. Also recently cleaned. $ 85

Contact Val at vlakins@comline.com

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 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.

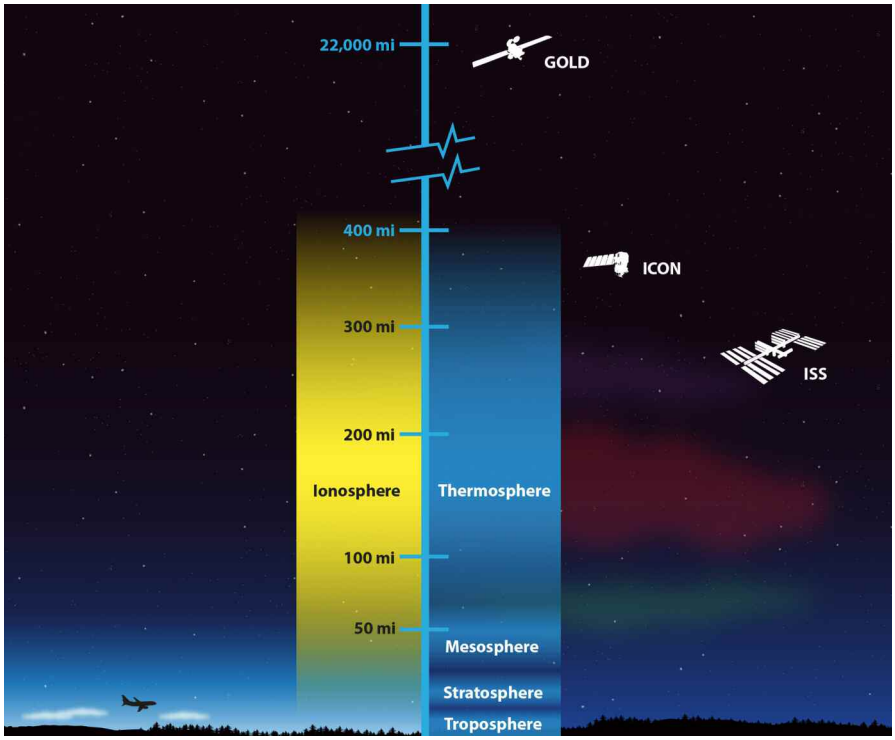
In 2018, NASA has plans to launch two missions that will work together to study the ionosphere. NASA's GOLD (Global-scale Observations of the Limb and Disk) mission launched in January 2018. GOLD will orbit 22,000 miles above Earth. From way up there, it will be able to create a map of the ionosphere 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!*



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)

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SPECIAL INTEREST GROUPS (SIG's)			
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