



M78 taken by Alan Smallbone from the club's Anza site in January and February 2011. It was captured with STL11000 camera and LRGB filters through a Borg 125 refractor.

## Upcoming Events

<b>Club Meeting</b> - free and open to the public	13 Dec	7:30 PM at Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The speaker will be Robert Quimby from San Diego State University with a talk entitled "Astro-cinematography from the Mount Laguna Observatory"
	10 Jan	Speaker TBD
<b>Anza star party</b>	21 Dec 28 Dec	Members are encouraged to check the website calendar for updates on star parties
<b>Local (O.C.) star party</b>	21 Dec	January date is to be determined
<b>Outreach</b>	Many	Please check the website calendar for the outreach events this month. Volunteers are always welcome
<b>Beginner's class</b>	3 Jan	7:30 to 9:30 PM at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana
<b>Astro Imagers SIG</b>	4 Dec No Jan	6:30 to 8:30 PM at The Urban Workshop in Costa Mesa --- note that there is no AI SIG meeting in January 2020 ---
<b>Astrophysics SIG</b>	20 Dec 17 Jan	7:30 to 9:30 PM, at the Heritage Museum in Santa Ana
<b>Youth SIG</b>		Contact Doug Millar
<b>Dark Sky Group</b>		Contact Barbara Toy

# President's Message

By Barbara Toy

To start off with, a bit of holiday cheer –

## A Special Speaker for December

It was a real pleasure to see the announcement on the website of our December speaker – Dr. Robert Quimby, whom many of us regard as One of Our Own who has made good in the broader world of astronomical research. I wasn't one of those members who knew him as he was growing up, but have had the pleasure of meeting him when he's spoken to our club before, along with the pleasure of knowing, working with and becoming friends with his mother, Helen Mahoney (long time member, board member and past president of OCA), and stepfather, Doug Millar (also a long time member and board member).

Most of us get pretty excited about supernovae and those who discover them. Robert carried this business of discovering supernovae a major step further – discovering a new type of supernova, much brighter than typical Type 1a's, which can serve as probes to explore further back into the history of our universe.

While his past studies and work have taken him to Texas and Japan, he's now come closer to home as a faculty member at San Diego State University and Director of the Mt. Laguna Observatory. By its title, his talk is on astro-cinematography at that observatory – which seems like a great chance to learn about a research facility we don't hear about much, some new aspects of astro-imaging, and also to enjoy having Robert back among us again.

It should be a great meeting. I hope to see you there!

## Nightfall Star Party

A number of our members have been regular attendees at the Nightfall Star Party in Borrego Springs, some from its beginning. This is an event that was started in 1993, per their website, originally as an auxiliary event to RTMC but now run by Riverside Astronomical Society (RAS), which was intimately involved with RTMC, through the Palm Canyon Hotel & Resort.

Nightfall has always been held in Borrego Springs, next to Anza Borrego State Park. This is a town that takes justifiable pride in its designation as an International Dark Sky Community, and is also notable for a variety of metal sculptures – apparently over 130 of them now – located at various places outside the town itself (my personal favorite of those I've seen so far is the sea serpent that undulates under the highway, with its tail on one side and head on the other – great as a foreground for night sky photography).

Some members who attended Nightfall in October this year told me afterward that, as usual, they had a good time and, relevant to recent events on the regional star party circuit, it looks like Nightfall may become more of a replacement for RTMC now that RTMC is no longer with us.

Nightfall has some distinct advantages over the RTMC Astronomy Expo we have known and loved – much less dust, more reliable weather, hotel rooms near the action for those that want more comfort, good conference rooms for talks, and no separate charge for the event itself (the charges are through reservations for rooms or RV spaces through the Palm Canyon Hotel & Resort). For more information, in case you might want to attend next year, especially for those suffering RTMC withdrawal, please see the Nightfall website: <https://nightfallstarparty.com/>, particularly the page on "General Information."

One note from the website, in case you're thinking of getting a room for next year – the room reservations go fast, so it's best to reserve in June or July for Nightfall the following autumn. Also, be sure to tell the resort that you're reserving for Nightfall, as you may otherwise be told there are no vacancies when there are some for Nightfall attendees.

It's good to know we still have at least one regional star party event in Southern California. It'll be interesting to how things develop with Nightfall in the future.

## **OCA Election – Now Under Way...**

We are now in the midst of the actual election for the 2020 OCA Board. I realize that this is an event that doesn't make headlines, even in our own illustrious newsletter (at least I don't think it will be given its own headline, but I could be wrong). Nevertheless, it has some importance to us as it allows us to comply with our bylaws for the governance of the club.

Even though we have only one candidate for each position for the 2020 Board, as you can see on the ballot, and you might think there is no real purpose in your voting, your vote is important in validating the membership of the Board. Also, all voting members have the option to write in candidates (if you do this, please be sure anyone you write in meets the requirements for that position and also that you've checked with that person to be sure there won't be a problem if he/she gets elected. Some people are pretty aggressively uninterested in serving on the Board, sad to say). If you happen to prefer the listed candidate for a position but don't vote and someone writes in a candidate, the one you prefer could be voted out. If those reasons aren't enough for you to get your vote in, please keep in mind that Tim Hogle, our last remaining Charter Member, who has generously volunteered to count the votes, would like a reasonable number of ballots to count.

A ballot should be enclosed with your December issue of the Sirius Astronomer. It is also available on the website and copies will be available at the January meeting.

So, please take this opportunity to exercise your franchise and send in your ballot before the January General Meeting, or put your ballot in the ballot box at the January meeting. Full instructions are on the ballot, and we look forward to receiving yours.

## **Mercury Transit**

I hope a lot of you had a chance to see the Mercury transit, which was already in progress when the sun rose here on November 11. In my area, the sky was overcast, and it just started breaking up as we approached 9:00, when I had a conference call I had to attend. In spite of attempts to catch a glimpse of it before going in for the call, nothing was visible. Fortunately, the call was shorter than expected, and the sky around the sun cleared by the time I made it back outside, so I got to see the last 15 minutes or so. My conclusions from what I could see of this event were:

1. Mercury is REALLY tiny compared to the sun. Technically I knew this already, but there's nothing like visual proof to us visual astronomers.
2. The sun is REALLY bare. There was nothing else visible, only that tiny speck of Mercury moving across it. That might meet the ancients' idea of solar perfection, but we moderns like a bit more activity, and a good sunspot or two would have spiced things up nicely. One of these days this extraordinary solar minimum will come to an end...

If you missed it, there's another Mercury transit coming up in 2032 – something to look forward to!

## **An Apology...**

For those who may have had problems getting a response from me or otherwise have found me distracted, I do apologize. In my other life, I'm a lawyer, used to working with paper files. My office has been in the throes of scanning all of its files for our new paperless system, and also preparing to move to a new location (we've been in our current space almost 20 years), all while somehow continuing to do our normal work. This hasn't left much time for anything else over the last few months. Hopefully, everything will be done – other than our ongoing work – and we'll be settled into our new location and routines by the end of December. In the meantime, if you can't get hold of me, please contact Alan Smallbone (a very capable individual who happens to be our current Secretary, so he's on the Contacts page on the website and the back of the Sirius Astronomer. He's also my long-suffering husband. Even my mother has been calling him first these days). You can reach him at [asmallbone@earthlink.net](mailto:asmallbone@earthlink.net).

Happy December, happy holidays, and happy New Year to all of you!

© Barbara Toy, November 2019

# AstroSpace Update

December 2019

Astronomy and space news summarized by Don Lynn from NASA and other sources

**Neutron Star Found** – In 1987 the nearest supernova in hundreds of years was seen to explode in the nearby dwarf galaxy known as the Large Magellanic Cloud. Being the first of the year, it was named SN 1987A. Astronomers continue to monitor the aftermath of this explosion, learning much about supernovas. It was determined that the star that exploded should have left a neutron star. But it was never found, until now. ALMA (radiotelescope array in Chile) found it. The difficulty in finding it was caused by its being surrounded by thick dust clouds, and the radio frequencies used in the observations penetrate the dust better.

**Super Spirals** – A new study of the largest known spiral galaxies, termed super spirals, has found how these differ from more normal spirals like our Milky Way. The stars orbit about twice as fast, indicating they have substantially more dark matter. They are about 2-4 times the diameter and up to 20 times the mass. Surprisingly, though they have more stars, there are not enough stars to be proportional to their masses. It is believed that above a certain galaxy mass it becomes somewhat more difficult to form stars. Only about 100 super spirals are known.

**Star Formation Cause** – It has long been hypothesized that when galaxies collide, bursts of star formation result. But there are other theories for what causes high rates of star formation. A new study that looked at 200,000 galaxies concluded that collision is the major factor causing bursts of star formation. Because of the huge number of galaxies studied, the astronomers had to write a computer program that learned from samples of images of colliding galaxies how to find the collisions among those 200,000 galaxies.

**Most Energetic Gamma-ray Burst** – A number of telescopes, including the Hubble Space Telescope, followed up observing the source of a gamma-ray burst that occurred last January. The burst was extremely bright and long lived. Some photons of the burst had the highest energy ever observed: 1 tera electron volt. It is believed such high-energy bursts are caused by material being thrown out of a collapsing star at 99.999% the speed of light, and the material hits surrounding gas, emitting gamma rays. The Hubble observations showed the source was in the center of a galaxy 5 billion light-years away that is interacting (colliding) with another galaxy. It is surmised that this unusual environment for a gamma-ray burst contributed to its high energy.

**Galaxy Wind** – Galaxies are known to have gas surrounding them that, if cool enough, will fall in to be used in star formation. Further, it is believed that winds from the galaxy replenish the gas surrounding it. An imaging instrument at the Keck Observatory in Hawaii has for the 1<sup>st</sup> time directly observed gas blowing out of a galaxy, replenishing the outside gas supply. Images and spectra were taken. Previous detections of galaxy winds have not been able to trace the winds as far out of the galaxy as the gas supply is located. The observing astronomers are calling the galaxy Makani, which means wind in Hawaiian.

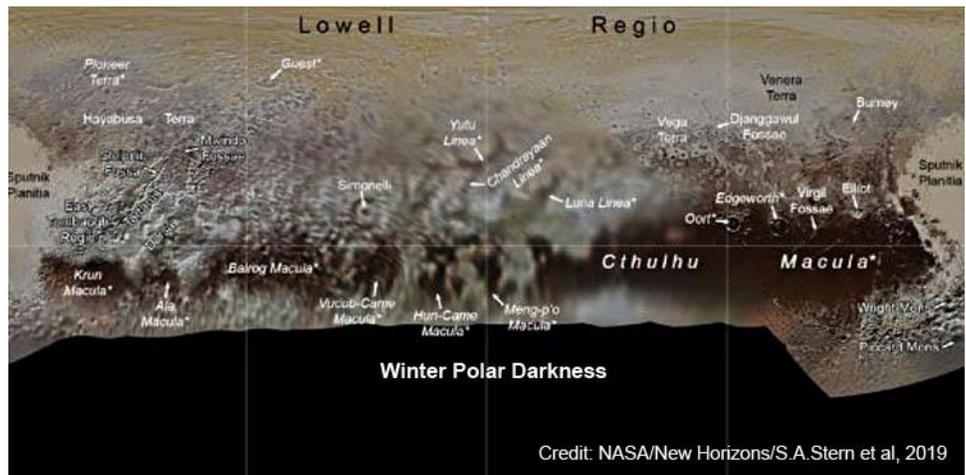
**Exoplanets and Multiple Stars** – A new study examined 1300 stars known to have orbiting exoplanets in order to determine which of these stars had companion stars orbiting them. 200 companion stars were found. They included closely orbiting companion stars (20 AU, where an AU is Earth's distance from the Sun) up to distant companion stars (over 9000 AU). The masses of the companion stars ranged from 8% to 140% of the Sun's mass (solar mass). 8 white dwarf companion stars were found, meaning those exoplanets had survived a nearby stellar collapse to the white dwarf stage. The systems included 2 dozen triple stars and one quadruple. These findings were less than average (of non-planet-bearing stars) numbers of companion stars and greater than average for distance between companion stars. These differences indicate that the presence of companion stars definitely impacts how planets form.

**3 Sun Planet** – An exoplanet has been discovered that has 3 suns, which by its size is likely a rocky planet. Its 3 suns are all red dwarf stars. It is known as LTT1445Ab and is only 22 light-years away. It is too close to its primary star to be in the habitable zone, that area where temperatures will allow liquid water to exist. Its year is only 5.5 Earth days. Because it transits (passes in front of) its primary star and is nearby, future observations of starlight passing through its possible atmosphere could likely determine atmospheric constituents. The planet was discovered by TESS, a planet-finding space telescope.

**Least Massive Black Hole** – There is a gap in masses between the largest known neutron star (2.17 solar masses) and the smallest black hole (3.8 solar masses). Both neutron stars and black holes form as a result of stars collapsing at the end of life. A black hole has been found in that gap, with an estimated mass of 3.3. It was found by sifting through spectra of 100,000 stars, looking for any star whose spectral lines wobbled in the manner expected from orbiting a black hole. It is possible that this is the 1<sup>st</sup> of a new class of black holes, formed by a different kind of stellar collapse that does not happen often.

### Pluto Far Side Image –

When the New Horizons spacecraft flew by Pluto in 2015, it got a close-up look at only one side of the dwarf planet. That is because it takes 6 Earth days for Pluto to revolve, so the side opposite of the flyby was visible about 3 days before encounter, and the speed of the spacecraft was so great that it was millions of miles away then, too far to get detailed images.



The New Horizons team has just released a mosaic of the far side (far in relation to the side seen at close encounter), using the best images available of the various areas of Pluto. The quality varies over the areas, and is nowhere near the resolution of the encounter-side images. But several conclusions can be reached from this new image. The far side has nothing like the Sputnik Planitia, the heart-shaped feature on the encounter side. This feature is believed to be an impact crater that later filled with frozen nitrogen. However, there is a feature exactly opposite Sputnik Planitia, which may be a shock wave feature caused by the Sputnik impact. A similar feature is seen on Mercury opposite the largest impact on that planet. The team also made a geological feature map of Pluto's far side, based on the image mosaic. The strange bladed terrain seen near the edge of the encounter side was found to extend across large parts of the far side. The bladed terrain is composed of huge methane ice towers believed to be caused by uneven sublimation, since they resemble ordinary ice features seen high in the Andes of South America, though Pluto's are far larger.

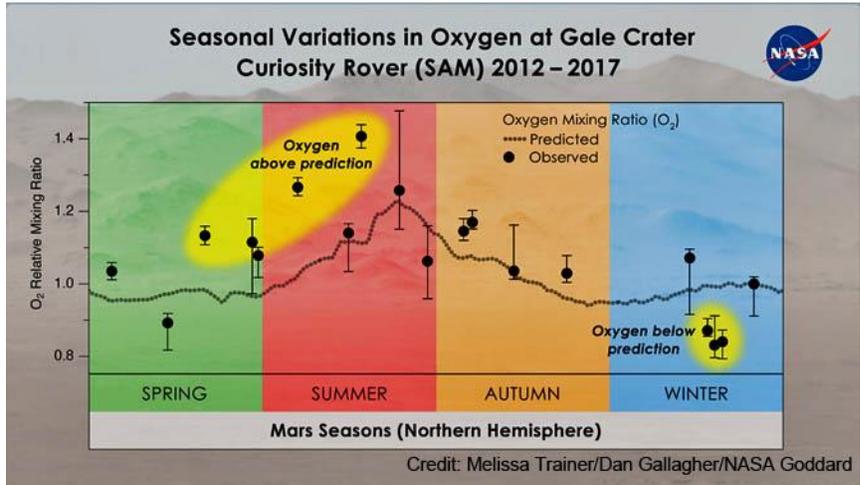
**Arrokoth Named** – More than 3 years after Pluto, New Horizons flew past a Kuiper Belt object named 2014 MU<sub>69</sub>. The New Horizons team nicknamed the object Ultima Thule. But the IAU has declared that Kuiper Belt objects are to be named with mythological names related to creation. So the New Horizons team submitted Arrokoth, and it was accepted as the official name. Arrokoth is a name from a Maryland area Native American creation myth. Maryland is the home of the Space Telescope Institute, which operates the New Horizons spacecraft. Data from the flyby of Arrokoth is still being sent from the spacecraft. Submission to the IAU of names for features on Arrokoth will probably wait until 2021 after all the data is received.

**Runaway Star** – Another runaway star has been discovered, moving about 10 times the speed of most stars in the Milky Way. It is escaping the gravity of our galaxy. It is dubbed S5-HVS1. Tracing its path shows that it was ejected during an encounter with the supermassive black hole at the center of the Milky Way. This was theoretically known to happen when a black hole pulls apart a binary pair of stars, consuming one and throwing the other out of the galaxy. The S5 project was actually studying stellar streams about our galaxy when it stumbled on this runaway star.

**DESI Installed** – An instrument known as DESI made its 1<sup>st</sup> images after being installed on the 4-meter Mayall Telescope in Arizona. It has 5000 optical fibers that can be positioned by computer in about 2 seconds, with each feeding a spectrograph. It is designed to take spectra of 5000 different galaxies every 20 minutes. It will start its observational program early in 2020. The goal is to get data including redshifts of 35 million galaxies and 2.4 million quasars. Since objects are as they were when the light left them, those that are more distant yield data from farther back in time. This observation program will allow scientists to get a picture of how the structure of the Universe changed over time. Analysis of these changes will show what effects dark energy and gravity had over the life of the Universe.

**InSight** – After successfully resuming hammering InSight's heat probe into the Martian ground, as reported here last month, the probe started backing out of its excavation. Spacecraft controllers are planning the next steps. The probe must reach 2-3 yards deep to get meaningful data. The probe is designed to measure the heat escaping from the core of Mars, and so tell scientists a great deal about the planet's interior.

**Martian Oxygen** – Measurements of the oxygen levels in Martian atmosphere, made by the Curiosity rover, have shown seasonal changes that are so far unexplained. No source of oxygen that has been yet investigated could produce the size of changes observed. It appears that some source of oxygen is releasing that gas, but only in spring or summer, and then the oxygen is being consumed by some process more quickly than expected. The amount of rise varies Martian year to year. Oxygen represents about 1/6 of 1% of Martian atmosphere, but this is well within the capabilities to be accurately measured by a sensitive instrument on Curiosity. Further research is needed.



**European Water** – Scientists have for the 1<sup>st</sup> time detected water vapor above Jupiter’s moon Europa. There is good evidence that a liquid ocean lies beneath the icy surface and some evidence that water is leaking and escaping the moon. Hydrogen and oxygen, presumed to be the result of escaping water breaking down into its elements, have been found above the moon, but this is the 1st time water vapor was found before it broke down. The vapor was found only occasionally during many observations, so the water is likely escaping in episodes, perhaps as geyser activity. The observations were made by the Keck Observatory in Hawaii.

### Instant AstroSpace Updates

A nonprofit foundation that was formed to save the historic **Yerkes Observatory** in Wisconsin, home of the world’s largest refractor telescope, has come to agreement with the University of Chicago to take over the property, restore it, and reopen it. The University closed the observatory in October 2018 because they couldn’t afford to keep it open when it no longer contributed to their research.



New observations of the main-belt asteroid **Hygiea** made with adaptive optics on the Very Large Telescope in Chile show that the body is quite nearly spherical, so falls under the definition of a dwarf planet. At about 390 miles across it is destined to be declared the smallest dwarf planet.

A **gas cloud** has been discovered that is being seen as it was when the light left it only 850 million years after the Big Bang. It already contained small amounts of heavier elements, showing that at least one generation of stars had formed and gone supernova, distributing those heavy elements, before this time.

An X-ray instrument named NICER aboard the International Space Station has detected the **brightest burst of X-rays** ever seen emitted by a neutron star. It is believed that both a hydrogen and a helium explosion occurred almost simultaneously in order to make the X-rays so powerful.

# The Manned Apollo Missions – a Very Brief Summary

Gathered by David Fischer from NASA material available on these web-sites:

[https://www.nasa.gov/mission\\_pages/apollo/missions/index.html](https://www.nasa.gov/mission_pages/apollo/missions/index.html)

<https://airandspace.si.edu/explore-and-learn/topics/apollo/apollo-program/>

<https://science.nasa.gov/toolkits/apollo-anniversary>

Our celebration of the 50<sup>th</sup> anniversary of the Man's first landing on the moon continues with the third part of an article about the manned Apollo missions. The NASA sites have much better (but longer) descriptions of the missions along with very nice photographs. I recommend visiting them for a very enjoyable reading experience.

## Apollo 13

### Crew

James Lovell Jr., Commander

John L Swigert Jr., Command Module Pilot

Fred W. Haise Jr., Lunar Module Pilot

### Backup Crew

John W. Young, Commander

John L Swigert Jr., Command Module Pilot

Charles M. Duke Jr., Lunar Module Pilot

### Payload

Odyssey (CSM-109)

Aquarius (LM-7)

### Launch

April 11, 1970; 2:13 PM EST

### Lunar

Landing Site: Fra Mauro (planned)

### Landing

April 17, 1970; 1:08 PM EST

Recovery Ship: USS Iwo Jima

### Mission Objectives

Moon landing, extra-vehicular activity (walk) on lunar surface, surface sample collection, return to Earth.

### Mission Overview

#### Pre-Launch issues:

In the weeks leading up to the launch, some mechanical issues arose while testing the Oxygen tank system within the Service module. When trying to remove loaded liquid Oxygen to look for the problem, tank # 2 failed to purge half of its contents using the normal extraction methods so the technicians had to boil the remainder off using the heaters built into the tank. Due to an undiscovered error in design, this extensive use of the heating element damaged it.

Other testing raised questions about whether the helium tank in the lunar module was properly insulated. Some doubts remained about this tank also but not to the extent of scrubbing or delaying the launch. Instead the mission was modified to have the crew go into the LM early in the flight to check the tank pressure.

A week before launch date, two of the planned crew had to be replaced by backup crew due to exposure to German Measles.

#### Launch Phase:

Launch into earth orbit went normally, though the S-II stage center engine shut down early (by 2 minutes) which required extending the burn of the other 4 engines to compensate. After dropping the S-II stage, the S-IVB stage burn was also extended by 9 seconds to achieve the intended orbit. Otherwise systems performed nominally. Once in orbit, the docking and extraction maneuvers were done followed by the Trans-Lunar Insertion burn, sending the entire system on its trip to the moon.

#### Oxygen Tank Failure:

Just short of 56 hours into the flight, nearly 200,000 miles from Earth, the crew had recently finished a TV interview with Earth. A loud bang was heard followed by vibrations throughout the ship. Warning lights came on indicating loss of 2 fuel cells, no pressure in one of the Service module oxygen tanks, and slowly dwindling pressure in the second tank.

Not sure of where the gas was leaking from, the crew tried quickly to shut the hatch between LM and capsule. It wouldn't latch closed but since cabin pressure did not seem to be going down, they gave up trying to close it and returned to investigating what had occurred.

A few minutes later Lovell looked out one of the windows and saw some gasses venting into space from the SM. Over the next hour it became evident that the remaining oxygen would soon be lost along with the use of the fuel cell that provided CSM electrical power.

#### Lunar Module as Lifeboat

The decision was soon made to keep the crew in the LM and use it as a lifeboat. This contingency was not anticipated in LM's design. To make it work required a lot of quick analysis, engineering, and creative problem solving.

The first key to all of this was coming up with a way of adjusting flight path for a direct return from the moon using the LM descent engine instead of the one in the SM. Navigation without the Command Module computer required novel procedures worked out between the crew and ground support. Orientation of the ship for the burns that would put it back onto an Earth return path were critical yet had to be done using a sextant using just the Sun as a reference point. That orientation measurement and adjustment was one of the truly high tension moments in the flight.

Secondly, a plan for rationing remaining expendables had to be worked out. LM had not been intended to provide life support for such an extended period of time. The LM design was for 45 hours of life support while the anticipated return flight time was 90 hours. Electrical power was a critical concern. They needed to save enough power in the LM to recharge the Command Module batteries when the time came to descend to Earth. Power usage was cut to 20% of normal to make this happen. This had the consequence of reducing the waste heat ordinarily used to maintain cabin habitability to such an extent that internal temp was only 38 F.

Water and CO2 build-up were other major factors. The water problem was dealt with by severe rationing, allocating only 6 ounces per day per person, barely 20% of normal. CO2 removal was done using Lithium hydroxide canisters. Those used in LM would not have lasted through this extended mission so the ones in CM would also need to be used. Shape-wise, the CM canisters (square openings) were different than those used in LM (round openings) and could not be plugged in as replacements. Once the LH canisters from LM and the lunar backpacks were used up, the crew had to kludge together what amounted to interface adapters between the CM canisters to the round Lunar Module hoses using scrap cardboard, plastic bags and tape.

While coasting back to Earth, a scheme was developed, from scratch, for powering the CM back up using LM electricity. This had never been contemplated before. The low cabin temperature had led to condensation of water vapor all over the command module. There was some risk that when powered back up an electrical short would be caused by this water which would prevent CM from working. There would have been no time to work around the problem and it had to be hoped that this would not occur.

Just a few hours before descent was to occur, the crew powered up the Command Module successfully and then disconnected the Service Module. They took pictures of its damage as it floated away. One hour before descent they transferred into the CM and disconnected the Lunar Module.

The final descent had no problems and the crew was recovered. Though the crew survived, they certainly suffered during the flight. All were severely dehydrated, losing over 30 pounds of body water collectively. The cold cabins were miserable and CO2 levels were sometimes getting dangerously high.

#### Root Cause

Later analysis by NASA showed how design flaws arose from recent design modifications which changed the oxygen tank heater voltage from 28 VDC to 65 VDC were not fully thought out. The extensive operation of the tank heater during the pre-launch system checkout had burned the insulation of wires near the tank heater wires and damaged the thermostat switches by welding themselves shut. These led to the rupture of oxygen tank #2 shortly after the crew had turned the heaters on to mix the tank contents. When that tank ruptured, pieces from it damaged the pipes for tank #1 causing it to leak.

There is much more detail available online, in books, and in the movie "Apollo 13" that completes this story.

## **Next Month: Later Apollo missions**

# OCA Loaner Scope Program

Telescopes are checked in and out only on one designated weekend every 3 months. The loan period is 6 months. Available scopes are listed on the club website and in the club newsletter. Reservations will be accepted until 7 days prior to the next pickup day. To reserve one, send the program director an email at [scopes@ssccorp.com](mailto:scopes@ssccorp.com)

The request should contain the desired scope's inventory number, the member's name, address, telephone number and email contact address. Pick up time and location will be sent to the borrower via email. Please bring proper identification and sign the club's loan agreement at the time of scope pickup.

## NEXT SCOPE EXCHANGE DATES

**25 January, 2020 – Returns**

**26 January, 2020 – Pickups**

Email: [scopes@sscorp.com](mailto:scopes@sscorp.com)

## OCA Scope Loan Program Inventory

INV#	Type	Size	Mfg	Model	Accessories/Notes	Due / Available	Rent	Value
<b>Active Inventory</b>								
1	Mac	3.5"	Meade	ETX90	Alt/Az Goto	10/27/2019	\$5/Mo	\$600
2	Newtonian	4.5"	Meade	DS2114ATS	Alt/Az Goto	10/27/2019	\$5/Mo	\$300
5	SCT	8"	Meade	LT8	Alt/Az Goto	4/26/2020	\$5/Mo	\$800
6	Newtonian	4.5"	Celestron	1114EQ	Wt Bars In Storage	4/26/2020	Free	\$200
7	Newtonian	5"	Vixen	R130S	German Mount Goto	10/27/2019	\$5/Mo	\$200
10	SCT	8"	Celestron	Orange Tube	w/Encoders,Wedge,Tripod & SlowMo. Ctl	10/27/2019	Free	\$500
13	Mac	3.5"	Meade	ETX90	Alt/Az Goto	10/27/2019	\$5/Mo	\$250
16	SCT	10"	Meade	LX200 Classic	Alt/Az Goto	4/26/2020	\$5/mo	\$1,000
17	Newtonian	8"	Celestron	????	electronics not working	1/25/2020	\$5/mo	\$500
19	Mac	2.25"	Meade	ETX60	Alt/Az Goto	10/27/2019	\$5/mo	\$150
20	Reflector	8"	Orion	SkyView	German Mount wTracking & SloMo 2 axis	10/27/2019	Free	\$300
22	Reflector	4.5"	Celestron	NexStar	Alt/Az Goto	4/26/2020	\$5/Mo	\$300
24	Reflector	4.5"	Meade	4504	German Mount Goto	10/27/2019	Free	\$100
26	Dobsonian	8"	Celestron	Starhopper	Alt/Az Manual	10/27/2019	\$5/Mo	\$550
27	Schmidt-Cas	8"	Celestron	NexStar 8	Alt/Az Goto	1/25/2020	\$5/Mo	\$600
29	Schmidt-Cas	8"	Celestron	NexStar 8	Alt/Az Goto	1/25/2020	\$5/Mo	\$600
31	MAK-Cas	5"	Meade	ETX-125	Alt/Az Goto	10/27/2019	\$5/Mo	\$350
32	Newtonian	4.5"	Meade	DS-114AT	Alt/Az Goto	4/26/2020	\$5/Mo	\$200
34	Dobsonian	12"	Meade	Light Bridge	Alt/Az Manual	4/26/2020	\$5/Mo	\$500
35	Newtonian	4.5"	Meade	DS-2114	Alt/Az Goto	10/27/2019	\$5/Mo	\$250
36	Schmidt-Cas	8"	Celestron	Ultima 8	Fork Mount w/Wege, Tripod Motorized	10/27/2019	\$5/Mo	\$600
45	Refractor	4"	Tashihaki	106FSQ	Motoroized German Mount Astrolmaging	10/27/2019	\$5/Mo	\$4,500

### Available For Purchase

INV#	Type	Size	Mfg	Model	Accessories/Notes	Asking Price
11	Dobsonian	13"	Hand made		Alt/Az Manual	\$300
41	SCT	14"	Celestron	C14 Classic	w/Wedge, and Tripod	\$1,500
42	Dobsonian	16"	???	Truss Tube DSS	Wheely Bars, Truss Tub, Dgital Encoders	\$1,200

## From the Editor

### Sirius wants photograph submissions from club members

We have sufficient submissions for remainder of this year. New submissions will be queued up for inclusion starting in January.

### Ideas for Future articles

The newsletter includes articles from members and / or about subjects suggested by our members. We seek ideas and writers to cover them. To contribute an article or work with the editor to produce one, please contact me at [newsletter@ocastronomers.org](mailto:newsletter@ocastronomers.org).

### Due dates for submission of articles, pictures and advertisements

<u>Issue</u>	<u>Due date</u>
January	19 Dec
February	25 Jan
March	22 Feb
April	21 Mar

## Advertisements

Buy, Sell or Trade some of your gear ? This is where club members can place advertisements. Please contact the editor at [newsletter@ocastronomers.org](mailto:newsletter@ocastronomers.org) to place an advertisement or to learn more about placing one. There is no cost to club members for non-commercial advertisements in the newsletter.

For Sale	contact	Val Akins	<a href="mailto:vlakins@comline.com">vlakins@comline.com</a>	
•		Celestron piggyback mount for 35mm DSL cameras or finderscopes		\$20
•		Orion Astro View 120ST f/5.0 Richfield refractor OTA with rings and dove trail attached		\$175

For Sale	contact	Catherine Bailey	<a href="mailto:oneleaf1@cox.net">oneleaf1@cox.net</a>	
•		Astrophysics Mach 1 GTO mount, control box, keypad, counter weights, shaft, pier adapter, 2-12v power supplies, Y cable for RA & Dec		\$6,174
•		TEC 140 APO Refractor, Starlight Feathertouch focuser, tube rings, dew strap, Scopeguard case, Losmandy dovetail plate, 7x50 viewfinder. Has just been cleaned and serviced by manufacturer; optics tested as "near-perfect performance."		\$5,010
•		Denkmeier Bino-viewer and 2 SW 6 mm eyepieces.		\$690
•		CG-4 Equatorial Mount with CG-4 stainless steel tripod, dual axis drive, motors, hand controller, eyepiece tray, Losamandy vixen style saddle, shaft & weights		\$395
•		ST-4 autoguider system with flip mirror, complete with case		\$200
•		Orion Short Tube 80 mm telescope		\$80
•		Binoculars, eyepieces, and accessories also for sale. Send inquiries to: <a href="mailto:oneleaf1@cox.net">oneleaf1@cox.net</a>		

For Sale      contact      Rick Hull      [hull3@cox.net](mailto:hull3@cox.net)

Prices are for OCA members and local pickup. Get these now before I place ads on CN / Astromart

- Moonlite CF 2" focuser for refractors, BLUE anodized, Dual speed w/ Shaft Lock, 4.5" Drawtube, Dual finder dovetails for Synta, Vixen, etc, 1 1/4" EP adapter \$200
- Stellarvue SFF-3 Field Flatteners for refractors, threaded metal dust caps, supports Full Frame image circle > 43mm, 63mm threaded fit to FeatherTouch 2.5", can use adapter for other large focusers, Camera side is M48 threads \$225
- Losmandy DVR-108mm Guide Scope Rings, like new never used, work with both Losmandy D and Vixen V plates \$80
- Losmandy DUP-14inch Universal Dovetail Plates, like new never used. These are the newer version with Scale imprinted, 2 plates available \$65 for one \$120 for pair
- Lymax R1 SCT Cat Cooler / Ventilator, new in box never used. C11 size, should also work on Meade10 / 12 or larger Mak \$65
- Refractor hard shell carrying case, printed with Astro Tech sized nominally for 4" to 5" scopes. Inside padded dimensions: 30x7.5x7.5 inches \$65
- For the ATMs in the group contemplating a large Newtonian: I have a Carbon Fiber / Kevlar tube, mirror cell, and spider sized nominally for a 22 inch. Inquire if interested in knowing more Email me

Contact Rick Hull      [hull3@cox.net](mailto:hull3@cox.net)      for more info, to request photo, etc.

## UPCOMING TOTAL SOLAR ECLIPSE TRIPS

- **December 2020 – Patagonia/Argentina\***
    - 6 Day/5 Night Tour
    - "Glamping" at the observation site night before the eclipse
    - 2 Nights in Buenos Aires
    - 2 Nights in San Carlos de Bariloche
    - Best weather prospects along eclipse path
    - Price includes hotels, ~ 1/2 meals, ground and air transportation, technical support
    - Nearly 2 minutes of totality
    - Nighttime sky observing before eclipse day
    - Optional extension to the Patagonian ice field, Glacier National Park, Moreno Glacier
  - **April 2024 – San Antonio, TX\***
    - 4 Day/3 Night Tour
    - 5 Star hotel accommodation in the famous Riverwalk tourist area (Alamo, etc.)
    - Daily breakfast, transportation to reserved site 20 km from centerline (4 min 15 sec totality)
    - Celebration banquet following the eclipse
    - Optional added days in San Antonio available
    - Transportation to/from eclipse site, daily breakfast, early equipment setup on site with security
- \* Led by 30 year OCA Member Joel Harris  
Veteran of 21 Total Eclipses/Tours  
90%+ Success Rate Seeing Totality**



**For more information, go to: [www.twilighttours.net](http://www.twilighttours.net)**

# SIRIUS

www.ocastronomers.org



# ASTRONOMER

The Newsletter of the Orange County Astronomers

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<b>DATED MATERIAL DELIVER PROMPTLY</b>
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## RETURN SERVICE REQUESTED

### HANDY CONTACT LIST

OCA WEBSITE: <http://www.ocastronomers.org> STARLINE 24-HR. Recording: 714-751-6867 ANZA OBSERVATORY: 951-763-5152

**CLUB OFFICERS (to contact the entire board at once, send an email to [board@ocastronomers.org](mailto:board@ocastronomers.org))**

President	Barbara Toy	btoy@cox.net	714-606-1825
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### COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS

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MTW Star Parties	Bob Nanz	bob@nanzscience.com	760-751-3992
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### SPECIAL INTEREST GROUPS (SIGS)

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