Astronomy Club of Tulsa Observer

February 2014

Photo: Orion and Jupiter shine over Los Cabos, January 2014 by Tamara Green.

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UPCOMING EVENTS:

Back-Up Night	Sat, Feb 1	ACT Observatory	7:00 PM
General Meeting	Fri, Feb 7	TCC NE Campus	7:00 PM
Valentine's Day	Fri, Feb 14		
Sidewalk Astronomy	Sat, Feb 15	Bass Pro	6:00 PM
Public Star Party	Fri, Feb 21	ACT Observatory	7:00 PM
Back-Up Night	Fri, Feb 22	ACT Observatory	7:00 PM
Members' Night	Fri, Feb 28	ACT Observatory	7:00 PM
MESSIER MARATHON	Sat, Mar 1	TUVA	TBA

(Please note: This event is for Astronomy Club of Tulsa and TUVA members only.)

General Meeting	Fri, Mar 14	TCC NE Campus	7:00 PM
Club Work Day	Sat, Mar 15	ACT Observatory	TBA
Sidewalk Astronomy	Sat, Mar 15	Bass Pro	6:00 PM
VERNAL EQUINOX	Thu, Mar 20		11:57 AM CDT
Public Star Party	Fri, Mar 21	ACT Observatory	7:00 PM
Back-Up Night	Sat, Mar 22	ACT Observatory	7:00 PM
Members' Night	Fri, Mar 28	ACT Observatory	7:00 PM
Messier Back-Up	Sat, Mar 29	TUVA	TBA

The Astronomy Club of Tulsa Invites All Members to Join the Fun of our Annual

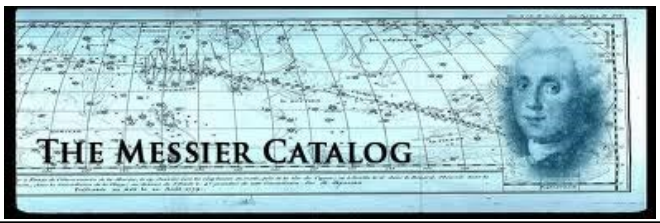
Messier Marathon

Saturday, March 1

TUVA

Each year in the late Winter or Early Spring, Club members get together at TUVA (the home of our wonderful hosts Ron and Maura, located near Muskogee, OK) for a pot-luck dinner and Messier Marathon! There will be a caravan led by Tamara, for which the time and location will be announced soon!

There are 110 objects in Messier's famous catalog. The object of the game is to see how many of them you can find in one night. How many can YOU find? Will it be YOU who wins the Big Toe (TUVA Observer Extraordinaire) Award this year?



A Very Special Guest's Image!

It is not every day that we get to have a GUEST to our Club submit a photo to our newsletter! This image comes to us from Ms. Candi McCarther, who recently visited our observatory and enjoyed her experience with us so much that it inspired her to take a beautiful photo of the moon and submit it to me for our newsletter! (I had sent out a call for articles via our Facebook page to see if that would work in getting more exciting articles, photos and what-not for the newsletter.) Says Candi via E-mail:

Hi Miss Tamara,

So this wasn't taken at your facility however it would not have been taken if I had not been introduced to your facility. I attended an event last spring and for the first time I fell in love with the universe. I was later surprised with a beautiful telescope and took this photo of the moon through it. Feel free to use it if you'd like but if not that's okay too. Can't wait to be at the observatory again!

Thanks!

Wow! Thank you for the wonderful photo Candi!

Image Credit: Candi McCarther

President's Message

By Mandy Nothnagel

Hello again, Astronomers!

This has already been an exciting year in Astronomy! If Supernova 2014J and Stephen Hawking's announcement that the event horizon has been the biggest "blunder" of his career are a sign of things to come, we've got one heck of a year ahead of us!

Despite the blistering cold weather and a few other setbacks, our last Public Night (Jan 24th), was very successful! Beautiful, clear skies helped us welcome a homeschooling group of 22 as well as about 10 other families to join us and learn about supernovae and exoplanets. We finished the night off with a bang by letting everyone see a real supernova (2014J in M82) through the telescopes and they loved it! Everyone that I spoke with said that they would definitely be returning!

So far, this year is moving in the right direction: UP! We've had **13** new members just since Jan 1st! That in itself is great news, but in even better news, these new members seem eager to learn and participate in our club events. I'm sure that I can speak for everyone in the club when I say "Welcome and I look forward to hearing you again!" (Don't worry, if you don't get it, you will next time you come to the observatory in the dark. I probably know more people by the sound of their voice than by their face!)

As I stated in last month's newsletter, one of my goals as president this year is to grow our membership while increasing Public and Membership participation in our events. **Whether you are a new member, a long-time member, or are considering joining, we would love to hear your ideas or suggestions!** We want to know what we can do to make our events more appealing to both our members and the public. Answering questions such as the ones below would help us tremendously:

- What would you change about our General Meetings? Public & Members' Nights?
- What topics would you like to discuss during these events?
- What do you like best about coming to our events? What keeps you from coming?
- What can we do to encourage more members to volunteer?

As always, my door is always open! Please feel free to send your answers to the questions above, new ideas, suggestions, or constructive criticism to: act_pres@astrotulsa.com or you can send them completely anonymously by addressing to:

Mandy Nothnagel
Astronomy Club of Tulsa
PO Box 66
Jenks, OK 74037

Of course, unless you request otherwise, all senders will remain anonymous.

I wish you all clear, beautiful skies forever and ever,

Mandy Nothnagel

Treasurer's and Membership Report

By Tim Davis

Astronomy Club of Tulsa: 121 members, including 10 new members in 2014.

Welcome to our new members this month: John Newton, Glenda Wilburn, Bob Anderson, Neil Geyer, Al Maestas, Clint Whittiker, Fred Morgan, Ed Baumgartner, Marshall Emmer, Tyler Rowland

Club Accounts as of Jan 22, 2014:
Checking: $5,110.16

Savings: $769.09

Investment account: $18,075.93 *(Value Fluctuates with Market)*

PayPal: $85.49

The club now has PayPal available for you to start or renew memberships and subscriptions using your credit or debit cards. Fill out the registration form at http://astrotulsa.com/page.aspx?pageid=16

Click Submit and you will be given the choice of either **mailing in your dues** with a check **or using PayPal** which accepts most major credit cards. A modest processing fee is added to PayPal transactions.

NEWS NOTE: Both Sky & Telescope and Astronomy have free Digital subscriptions available with print subscriptions, or Digital subscriptions may be purchased separately. Contact their websites for details.

Membership rates for 2014 are as follows:

Adults: $45 per year, includes Astronomical League Membership.

Sr. Adult: $35 per year for those 65 or older, includes Astronomical League Membership.

Students: $30 with League membership; Students: $25 without League membership.

Additional Family membership: $20 with voting rights and League membership.

$15 with voting rights but without League Membership.

The regular membership allows all members in the family to participate in club events, but only ONE Voting Membership and one Astronomical League membership.

Join Online – Add or renew magazine subscriptions. http://www.astrotulsa.com/page.aspx?pageid=16
Magazine Subscriptions: If your magazines are coming up for renewal, try to save the mailing label or renewal form you get in the mail. Forms are available on the club website.

Astronomy is $34 for 1 year, or $60 for 2 years. www.astronomy.com

To get the club discount you must go through the club group rate.

Sky & Telescope is $33 per year www.skyandtelescope.com

Sky & Telescope also offers a 10% discount on their products.

Note: You may renew your Sky & Telescope subscription directly by calling the number on the renewal form, be sure to ask for the club rate.

NEW SUBSCRIPTIONS must still be sent to the club.

The Secretary's Stuff

By Tamara Green

ASTRONOMY CLUB OF TULSA – MINUTES – GENERAL MEETING JAN 17, 2014

PRESENT:	NOT PRESENT:
Mandy Nothnagel, President	**Christopher Proctor, Board**
Richard Brady, Vice President	**Lee Bickle, Board**
Tamara Green, Secretary	
Tim Davis, Treasurer	
James Taggart, Board	
Skip Whitehurst, Board	
John Land, Board	
Michael Blaylock, Board	
Stan Davis, Board	

The meeting was held at Southwood Baptist Church Conference Center, 10110 E. 41st St. There were 29 attendees.

WELCOME AND INTRODUCTION: Mandy called the meeting to order at 7:10 PM and welcomed members and guests.

PROGRAM: Richard Brady, Tamara Green, and Mandy Nothnagel, various topics.

Richard gave a presentation about AL Observing Programs.

Following that, Tamara gave a demonstration of one of the Night Sky Network kits, which was called "Our Magnetic Sun".

After that, Mandy talked about a kit that she would like to see us use at public night on Jan 24, called the PlanetQuest Celestial Treasure Kit.

OFFICERS'/STAFF REPORTS:

PRESIDENT – Mandy expressed her gratitude about being elected to serve as President, and mentioned the possibility of our club developing a relationship with the planetarium at Jenks High School for the possibility of having our monthly meetings there and maybe some planetarium shows. Also, she would like for us to do an event for Astronomy Day, one in the Spring and one in the Fall. She asked for any ideas to be brought to her. She then turned the floor over to Richard.

VICE PRESIDENT – Richard introduced himself and expressed his agreement with Mandy that we need to become more active as a club and get involved.

SECRETARY – Tamara announced that if anyone wanted a copy of the minutes from the last general meeting to call or email her. She then announced that for those who have completed an observing program she will be happy to submit their logwork to the AL so they can get their certificate and pin. Then she announced a call for articles for the February newsletter, due to be out on or around January 24.

TREASURER – Tim introduced himself and discussed how much money the club has in its accounts and talked briefly about the roof repair expense. We have also had a few generous donations. Telescopes 101 was good, we got $57.00 in donations plus more from the sale of the 2014 Astronomy Calendars. We have about 14 new members, 10 of whom joined just in the past month.

The Secretary's Stuff, Ct'd.

GROUPS – On Mon, Jan 20 there is a Boy Scout group at Patrick Henry Elementary, (Pack 66). The school is located on 41st Street between Yale and Harvard. Richard will talk to the gentleman who put this together to find out what they are wanting us to do for their group. Richard suggested bringing telescopes for the scouts to look through if the weather is nice enough, or to just come out and answer questions about astronomy. The kids are first through fourth grade. The next group event is on Sat, Feb 8, Holy Family Cathedral, about 90 people, at the observatory.

FACILITIES – James thanked everyone who came out for work day on Jan. 4, announced that we have repaired the plumbing in the bathroom and the roof repair is now complete. If you have any ideas for future projects then please get with him.

PR/OUTREACH/SIDEWALK – Sidewalk Coordinator Owen Green was unable to attend tonight's meeting due to being ill. Tamara announced that Sidewalk Astronomy will take place Saturday, Jan. 18 at 6:00 PM at Bass Pro, weather permitting, for those who want to go.

OBSERVING – Tamara told attendees that if they have completed any AL observing program to submit their logwork to her and she will forward it to the appropriate observing club chair at the AL.

NIGHT SKY NETWORK – Richard talked about the NSN Teleconference, Jan. 27, 8:00 PM. Globe At Night is an organization that is trying to raise awareness of light pollution. They are having a webinar about light pollution.

OTHER BUSINESS - Mandy mentioned that we really should start accepting donations via credit or debit card, using "square", which is an attachment that plugs into a smartphone or tablet (apple or android). She said that she would like to see this discussed at a board meeting.

She then mentioned the upcoming events.

Being no other business, Mandy adjourned the meeting.

The Globe at Night

by Richard Brady

This month I've decided to write about Globe at Night. As it states on the globeatnight.org website, it is "an international citizen-science campaign to raise public awareness of the impact of light pollution by inviting citizen-scientists to measure their night sky brightness and submit their observations to a website from a computer or smart phone." In others words, we can make simple observations to help show how widespread light pollution is locally, and contribute to the effort globally. It is an easy way to become involved in the battle against light pollution.

If you look around the skyline from our observatory, you can see the effects of this pollution even at our "rural" location. In every direction, north to Tulsa and Glenpool, south to Okmulgee, east to Bixby, and west to Sand Springs, the glow from our urban community makes seeing anything within around 30 degrees of the horizon nearly impossible. Even at the zenith, we are lucky to see 5th magnitude on good nights.

The process of making an reporting your observations is detailed in the Globe at Night website. The instructions are under the "Observe" tab. (Warning to Apple users: the maps used to find your latitude and longitude use Flash, so they don't work for us.) Briefly, it requires looking at the magnitude charts on the website, going outside for 10 minutes to let your eyes adjust to the darkness, making your estimate of the limiting magnitude (the faintest stars you can see), then reporting the results on the form on the website. All you will be asked to provide are your location, the time you observed, which chart best represents what you could see, how cloudy it was, and any notes you have about the observation. There are examples on the website.

The dates for the first three months this year are January 20-29, February 19-28, and March 21-30. These three months you make your observations by looking at Orion, the famous winter constellation. Other dates and constellations to be used are on the Globe at Night website.

I plan on making a Globe at Night observation and report it when I'm out at the observatory during one of the weeks listed above. And I'll try to take more observations throughout the year. I also plan to make other observations at home and elsewhere. I wonder how "dark" it is at Bass Pro and the TCC-NE campus. There's no reason why you can't make and report your observations too, even if you do it from the same location. And anywhere you are on any evening during the observation weeks is a good time to observe. All you need is look up and see what stars you can see in Orion, then report your findings. And maybe you'll take a moment to ponder how beautiful the night sky is and what we might lose.

Clear skies!
Richard

P.S. I've updated the Roster on the Night Sky Network page for our club. Please check that everything is correct. If not, you can edit your profile yourself, or send me an email at act_vp@astrotulsa.com and I'll take care of it. I also updated the Events list.

Pilot Report: The Orion Spacecraft

by Ed Downs

Okay, perhaps the title of this article does fringe on practices made famous by Hollywood tabloid publications, but not by much. The Orion, officially known as the Multi-Purpose Crew Vehicle (MPCV) is a manned space vehicle now being readied for launch by NASA in September, 2014. Built by Lockheed Martin as a dedicated NASA project, the Orion represents America's step back into the leadership role of interplanetary space travel. This launch will be historic; as it is the first time a man capable spacecraft will have entered interplanetary space in 42 years. Let's look at this another way, what would history have to say if the Wright Brothers had waited 42 years to make their second flight. That is effectively what happened to America's interplanetary space program following the last Apollo mission to the moon in December, 1972. No spacecraft capable of carrying astronauts into interplanetary space has been launched since the flight of Apollo 17. Orion will change that, and this writer had the opportunity to spend "hands on" time in the engineering prototype of the Orion Spacecraft. The first flight capable Orion is now being assembled at the Kennedy Space Center to be launched, unmanned, on a heavy lift United Launch Alliance Delta IV booster for a two orbit test flight at a distance of 3,600 mile from Earth. This first flight will not simply be a robotic "launch and recovery" mission. The vehicle will "be flown" through the separation sequence and maneuvers needed for reentry. These first mission objectives will verify operations before flying a crew, but there are also many other flight test objectives which are continually being developed and refined to maximize mission data return on the early test flights.

Are you confused by the statement "No spacecraft capable of carrying astronauts into interplanetary space has been launched since the flight of Apollo 17?" Wasn't the Space Shuttle an interplanetary "space ship?" What about the international Space Station (ISS); isn't it orbiting in "space." Let's slow down and take a look at what is going on, but stick with me, as you are going to join this writer inside a space ship.

Most folks tend to have a singular view of NASA. Many flying and space enthusiasts tend to look at NASA's manned flight programs as the primary function of the agency. But this is not the case. Those involved in astronomy, planetary studies and astrophysics are astounded by recent achievements in unmanned interplanetary missions and advanced telescopic satellite discoveries that have forever changed the way we view our universe. The realization that planetary star systems are the norm, not the exception, open science and the mind to extraterrestrial possibilities that were pure science fiction just a few years ago. NASA is also involved in extensive earth based atmospheric research and seeking out information that will keep our somewhat abusive species from destroying our own little space ship, called Earth. But most NASA fans remember the incredible achievements of the moon missions of nearly half a century ago and long to see the United States reassert itself in the world community of space explorers.

The U.S. commitment to interplanetary space travel was kicked off by *President John F. Kennedy on September 12, 1962, at Rice University, Houston, Texas*. The moon missions were continued by both the Johnson and Nixon administrations. The Ford, Carter and Regan Administrations placed emphasis on low Earth orbit missions designed to teach us more about our own planet, with the Skylab Space Station, the Russian MIR Space Station and the International Space Station (ISS) taking the lead. Astronaut carrying space craft were essentially dedicated to supporting these low earth orbit flights, with special credit given to the Space Shuttle, without which the ISS would not exist. While an international effort, the fact remains that the great majority of ISS costs have been borne by the American taxpayers. NASA did not make the decisions as to where priorities would lie in terms of manned space travel, being an agency that answers to the political agendas of the Executive Office. NASA is given a budget and then basically sent on their way to figure out how political agendas can be met while still performing good science. To be sure, NASA management has received justifiable criticism for being too involved in the political game, with tragic results, but there is no doubt that at the heart of the agency are teams of people with extraordinary skill and commitment. As a personal note, this writer has worked with NASA on a number of projects, over the years, and has always been impressed with the talent, commitment and "can do" attitude of those I have encountered.

In January, 2004, President George W. Bush reasserted the national desire to return astronauts to the task of interplanetary space exploration and set plans in place to return to the moon and then push on to Mars. Called the Constellation Program, plans included the development of a new and flexible crew module and heavy lift rockets, the Ares I launcher and finally the Ares V booster, the new "moon rocket." The crew module was to be a versatile vehicle that could sustain a crew of four in long term lunar orbit and be used for all future missions planning as a re-entry vehicle when returning to Earth. This crew module is Orion. To fund the program, plans were set in place to decommission the expensive Space Shuttle in 2010 in order to free money for Constellation. It was expected that the U.S. would be back in the business of launching manned spacecraft as early as 2013, with a lunar mission possible by 2015. But 2008 election results changed the direction of our national goals away from technological world leadership and turned federal funding inward to social and ideological issues. The Constellation program was formally canceled in October, 2010 when the U.S. National Space Policy Act was passed. The Space Shuttle was allowed to pass into history in 2011, leaving the U.S. without the ability to launch astronauts into space from U.S. soil. We currently rent astronaut launch services (at about $90 million a pop) from Russia. While the National Space Policy drastically cut funding for a return to the moon, the act did allow for the development of the Space Launch System (SLS), a heavy lift booster that combines the capabilities of both Ares boosters into a single design. The Orion spacecraft also survived, and when combined with the SLS, enables the launch of astronauts into high earth orbit, lunar orbit, asteroid capture missions and explorative travel to Mars, all while maintaining the ability to provide crew and cargo support to the ISS. With funds drastically cut, both Orion and SLS have been on the slow track, but steady progress is being made.

It is not surprising that most Americans do not realize that a Mars capable space craft will lift off in less than a year. What limited coverage that is provided by contemporary media concentrates on the connection NASA has with commercial space service providers, with emphasis on the jobs being created. To be sure, the development of commercial launch vehicles and astronaut carrying spacecraft is underway, with funding from NASA to supplement private venture capital. These commercial programs are dedicated to delivering cargo to the ISS and have the capability to replace the aging Russian Soyuz spacecraft as the only way to transport personnel back and forth to ISS. NASA will soon choose which of these competing space delivery systems will become the primary support methodology for ISS. So, with all this private industry capability on the horizon, why do we need an Orion? Simple, while Orion can service ISS needs, both with cargo and personnel, it is designed for interplanetary space travel, not low earth orbit, which is generally defined as somewhere between 100 and 1,200 miles above the earth. Well, you might think, if these commercial space vehicles can fly into space in a low orbit, why can't we just hook it to a bigger booster and make it go farther? The rhetorical answer is that the ISS dedicated support vehicles, including the Space Shuttle, are all designed to fly and orbit within the environment of the earth's upper atmosphere, not in interplanetary space.

Did that last statement leave the reader hanging? Certainly, you think, the International Space Station and all the rockets that go to and from the ISS are in "outer space," right? No, they fly in low earth orbit which is within the Earth's upper atmosphere, called the thermosphere. The thermosphere resides between approximately 50 and 300 miles above the Earth's surface. There is residual atmospheric drag (meaning stray gas atoms) at these altitudes that can decay the orbit of a satellite. That is why there are a number of bits and pieces of space debris raining down on our poor old planet every year. The ISS maintains a stable orbit between 200 and 240 miles, although satellites in the range of 160 miles need assistance to stay in orbit. But the atmosphere goes even higher with the upper most region of the Earth's atmosphere called the exosphere, coming in between 300 and 600 miles high, depending upon solar activity. The highest flight flown by the Space Shuttle was during a Hubble repair mission, reaching 385 miles above the Earth. The exosphere merges with interplanetary space. Once out of the exosphere, space travelers must take on another hazard, the Van Allen Belt. The Van Allen Belt surrounds the earth as one of the properties of the Earth's magnetic field that helps keep the sun from cooking us radiation sensitive critters. Basically a "solar radiation catcher" the Van Allen Belt has an inner belt the ranges from between about 600 miles to 3,700 miles above the Earth and an outer belt that ranges from about 8,000 miles to 37,000 miles above the Earth. Long term human exposure to Van Allen radiation is not a good thing, one of the reasons all manned space flight except the Apollo moon missions (one Gemini mission reached an apogee of 850 miles) to stay below this region of space. Apollo did carry dedicated radiation shielding, but also relied on limited mission duration. The longest mission was just over 12 days for Apollo 17, the last mission to the moon in December, 1972. Even then, Apollo 17 did not remain in the Van Allen Belt for an extended period of time. This is like an IFR flight that departs IFR to VFR on top and then descends IFR to the landing. Not much time is actually spent in IMC conditions. Orion is designed to transit and even live within this region of space.

The bottom line is that manned orbital flight, including Space Shuttle missions, ISS and all ISS supply and crew missions are technically in an Earth environment, not interplanetary space. The first test flight of Orion will place the vehicle in Earth orbit at 3,600 miles above the Earth, about 15 times higher than the Space Shuttle normally operated. With Orion, we are back in the interplanetary "space game."

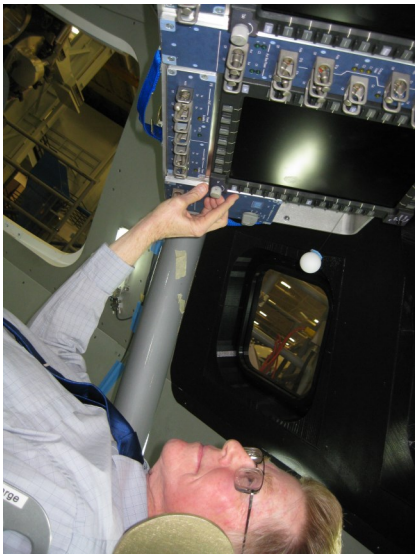
So, given the preceding fun filled facts, how did this writer end up at the Lynden B. Johnson Space Center in Houston, Texas, sitting in the launch position in an Orion spacecraft? In short, it was a matter of timing, luck and the support of dedicated NASA folks, in particular, Brandi Dean, Public Affairs Office, Johnson Space Center, and John McCullough, Manager, Orion Vehicle Integration, as well as un-named management that made the decisions to let me in the door. In early September, 2013, this writer received a news release from NASA regarding a meeting with astronauts and an evaluation of Orion avionics displays. Like many, I was not familiar with the Orion program, but it caught my eye. At first glance, it seemed as though the Orion was little more than a re-do of the Apollo, being a conically shaped craft that (according to the PR photos) appeared to seat three and returned to earth by parachute. Acting as Editor, Industry and Government Affairs for *In Flight USA*, I elected to take a closer look. Why, I asked myself, was NASA developing this "Orion" when I knew that commercial companies were developing ISS support vehicles? I contacted Ms. Dean for more information and was assisted with additional facts. It became immediately apparent that my first impressions were profoundly wrong. As a matter of chance, I was scheduled to teach a Flight Instructor Refresher Clinic (FIRC) in Houston at the end of October and queried Ms. Dean as to the possibility of me visiting the engineering development mock-up for a firsthand look at Orion. While our discussions were in progress, our national leadership (?) inside the beltway decided to let the government go out of business, and Johnson Space Center staff was placed on stand-down. It looked like the entire article would not happen. Fortunately, the sequester ended just a week before my planned FIRC class, and Ms. Dean was able to pull NASA's end of the effort together. With only a few days' notice, John McCullough was asked to provide me with a briefing, and questions were sent to NASA so that a presentation could be arranged. It was an out and out "can do" effort. I arrived at the Johnson Space Center visitor building to meet Brandi, who would serve as my escort into the restricted area that I would visit. We drove to a huge building just a short distance away, entering through a non-descript door, at which point this writer was overwhelmed by the amount of space hardware in play, most of which is used for astronaut training. It was like being at Disney World for the first time and not knowing where to begin. Fortunately, John was waiting for us at a group of tables set in front of the two Orion engineering mock-ups, prepared to answer my questions with an excellent presentation. John McCullough is a NASA veteran, intimately connected with the Space Shuttle program and a person whose enthusiasm for the Orion project made me instantly know that I was in good hands. I could not have asked for a better "check airman."

Much of what we discussed has been covered in the preceding paragraphs, so let me stick to the machine itself. First, let's address the term "engineering mock-up." The two Orion vehicles I was to visit contained actual hardware, and are an integral part of the vehicle development program. They permit engineering staff to perform "fit and feel" of a variety of components, some which are designed and constructed by local engineering colleges and even high schools as a part of NASA's educational outreach program.

These were not pretty wooden display models used for PR. The Orion is larger than Apollo, 16.5 ft. in diameter versus the Apollo at 12.8 feet. This may not seem like much but it adds up to an interior volume that is approximately 60% larger than Apollo. Designed to carry six when servicing the ISS, and four when used for long range missions, it is not crowded. The interior "cabin width" of Orion is slightly larger than that of the ubiquitous Boeing 737 which crams 6 abreast seating into that space versus the Orion's three abreast seating. While unlike the Boeing, the sidewalls do taper in on Orion, one must remember that most of Orion's flight will be in weightless conditions, making a small space seem much larger. The conical shape of Orion is not simply a copy of Apollo, but dictated by aerodynamics that insures a stable reentry with minimum attitude guidance needed once the descent begins. Seat structures are designed to fold out of the way for weightless flight, as they are simply not needed. Both the Apollo and Space Shuttle use batteries and fuel cells for power, which means they had very finite fuel limits. Not so with Orion, which uses batteries and solar cells to provide power for missions lasting many months. The Apollo Command Module weighed in at almost 13,000 lbs. while the Orion Command Module tips the scales at about 22,000 lbs. To be sure, Orion is a larger, long range machine.

Using the term "Orion" to describe the spacecraft is not completely accurate. The Orion space craft system actually consists of several major components that are "stacked" together as mission needs dictate.. The first of these is an abort system which permits the crew to break free from a booster that might misbehave and also incorporates a shroud that completely covers the crew module during launch. Second is the crew module which provides a human habitat for both launch and recover and contains the primary flight management system from which the spacecraft is controlled by the crew. The crew module incorporates a universal docking collar that permits the crew module to dock with the ISS, a lunar lander, or even an extended range habitat for asteroid and Mars missions. Also included in the crew module is the three parachute package that will gently lower Orion to a water landing. Although initially designed for both hard surface and water landings, the normal mode of recovery will be similar to Apollo, utilizing the flexibility of returning to a point in the ocean. The decision to concentrate on ocean landings greatly simplified the need for complex shock absorption technology which is both space consuming and heavy. Next in the stack is the crew module adapter which is the portion of the service module that the U.S. is producing (with the European Space Agency building the ESA service module below that). This area contains the avionics interfaces and systems that tie to the crew module through the crew module/service module umbilical. Different avionics configurations can be installed to permit mission flexibility. The crew module adapter plugs into the service module (built through a cooperative agreement with the European Space Agency) which provides electrical power, propulsion (utilizing the Space Shuttle orbital maneuvering engine), attitude control and environmental control. Once in flight, four solar panels deploy from the service module, taking on an appearance wonderfully similar to the Star Wars X-fighter. How cool is that! If flying beyond earth orbit, an Interim Cryogenic Propulsion Stage is added to this total stack for the final push from the earth's gravitational grip.

A spacecraft adapter is used to connect the Orion stack to the launch booster of choice. Unlike Apollo, which was a single purpose system, Orion embodies a high degree of mission flexibility.



Author in the right seat position viewing a Primary Flight Display

Having completed a detailed presentation, it was time to enter the spacecraft, but not without a safety briefing. Another member of the Orion team provided a thorough briefing regarding those things that one can touch and those that are best left alone. In some cases, installed equipment is in place for integration fitting and interference checking, but you would not want to place any real force on them. Colored "grab straps" were installed in various locations to assist creaky old guys like this writer move about with some degree of dignity. The crew seating is lying on its back in the launch position, and one can get a bit disorientated. The best advice received; think before placing your hands and feet anywhere …a good tip. As I entered the spacecraft, the primary flight displays were not immediately visible. One must be seated in the pilot position to clearly see the three flat panel displays and system control switches. This is a great simplification from the Space Shuttle which had up to 11 displays. The flight displays are suspended from the side wall and, due to being on one's back, appear to be somewhat over your head. The switches are easily accessed and, unlike many advanced technology panels in modern business and GA aircraft, switches are large, guarded and easy to grasp. Only three flat panel displays are needed to pilot the Orion, one in front of each of the tree abreast "pilot" seats. Any crewmember can operate any or all three, displays from any position. A side control stick (actually a flexible stalk) is operated by the left hand and contains a multi-position thumb switch that can run a curser to any selection on the Primary Flight Management Display. Much like using a mouse, it is not necessary to use the alternate touch screen technology. The "smart stick" also permits activation of the attitude thrusters. In short, one can work just about everything necessary, in comfort, under high "G" conditions. Attitude control, engine operations, navigation, communications and environmental control (a mix of ISS and shuttle-like technology, with new developments for mission specific environmental applications) are all managed from the three primary flight displays. This old time pilot found the arrangement intuitive and logical. The three astronauts seated in the command positions have limited (but adequate) forward visibility through two relatively large windows, and lateral visibility through windows to the left and right of the pilot seats. Additional "porthole" type windows permit a view from several other locations in the spacecraft. There is no sense of confinement. John pointed out the mock-up that I was in was a bit more confined than the final version in that it incorporated a space eating shock absorption system originally designed for landing on a hard surface. The number two mock-up was configured closer the final version and incorporates helicopter type shock absorbing seats, making it feel quite spacious. The base (floor?) of the Orion has numerous compartments for storage. The Orion does not have an airlock, so a spacewalk would necessitate depressurization of the entire crew module. All systems in the crew module are designed to operate in a complete vacuum. Finally, but certainly not last, is the largest single unit heat shield ever used in space flight, manufactured by Textron, consisting of a fiberglass-phenolic honeycomb structure on the skin, with each of the honeycomb's 320,000 cells filled with the ablative material and an Avcoat-treated shell that will shield Orion from the extreme heat it will experience as it returns to Earth's atmosphere at over 20,000 mph. The ablative material will wear away as it heats up during Orion's re-entry into the atmosphere, preventing heat from being transferred to the rest of the capsule.

International Space Station training mock-up

Having already overstayed my scheduled time, this writer was willing to call this adventure to a close, but John was not done. Upon exiting the Orion, I was led to a section of the building that was blocked from view by a large structure supporting a training crew cabin for the Space Shuttle. Around the corner was a complete training suite of the entire International Space Station ... yep … it was a big building! As we approached the ISS, John pointed out a Soyuz spacecraft which is use for astronaut training. Having just exited the Orion, I was frankly shocked at the small size of the Soyuz. While this writer has certainly seen photos of this classic spacecraft, the Soyuz made me appreciate the comparatively roomy cabin of a Cessna 150! Finally, the visit came to a close, with this writer leaving with a sense of excitement that was once thought lost. With minimum funding and a launch schedule that challenges the ability to maintain a continuously working infrastructure, NASA pros are managing to rebuild a space flight capability that had been all but lost. *In Flight USA* thanks Johnson Space Center and dedicated staff for making this visit possible. Stay tuned as *In Flight USA* covers this ongoing story of America's return to interplanetary space travel.

For an update on Orion activity, visit www.nasa.gov and search for "Orion Spacecraft." Watch this history making effort as it matures into the manned space program of the future.

2 Enigineering Mock-up with mannequins placed in the pilot positions. Note the three panel display suspended over the astronauts

Author and John McCullough standing next to the #1 engineering mock-up

NITELOG - **N**orway **I**n**TE**rurban **L**ocal **O**bserving **G**roup
By Tom Hoffelder

It's early to be talking galaxies, but that's where we are with the two year schedule of all the M's and H400's. All of the objects except two are in Leo and he is high enough for sweeping up objects by 9 PM at month's end.

OBSERVING: Still very iffy for the Norway/South Paris area, the Twitchell Observatory being still snowed/iced in. It's possible the road will be cleared for the regularly scheduled open house, which would be Monday the 3rd, but do not go unless you see an email stating it is actually happening. Early that evening, per the Jupiter data, the shadow of Callisto will be on the planet. Also per the data, you will note that is NOT something that happens very often.

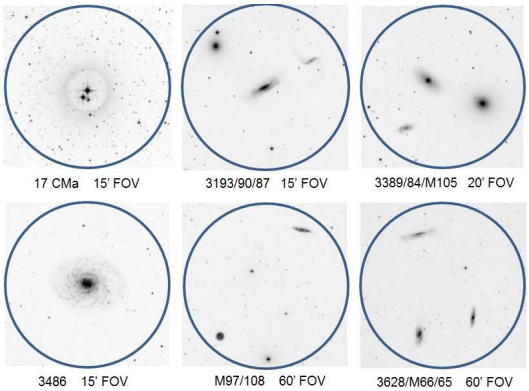
MOON: There are no new moons this month, but with one Jan 30th and one the first day of March, it's pretty much the same as last month when there were two. See info on Mercury below for thin crescent viewing in Feb; first quarter is on the 6th, so if you feel the need to show someone the moon (or I guess even look at it yourself) the 6th or 7th would be the best days.

COMETS: Back before ISON's untimely but not totally unexpected demise at perihelion, there was the possibility of seeing it near Comet Lovejoy, with both at mag 6, in Hercules. That would have been something I'd never seen in my 40 years of comet observing - two comets that bright in the same constellation - and obviously I still haven't. Once however I did see two comets, Hale-Bopp and Kopff, mags 7 and 8, in the same binocular field of view in June of '96. If you look at the comet data sheet, you will see that Lovejoy and LINEAR (12X1) are predicted to both be 8th mag and that the sweep values for the latter are always from the former because they are so close together in the sky. In fact, from the 3rd thru the 10th, they are within 3 degrees or less, so if you have a scope with a field of view of that (I do!) or larger, you might be able to see two 8th mag comets at the same time. Most unusual!!! It means getting out there just before dawn, in February, in Maine, but I'll be there if we get a clear morning and the magnitudes hold!

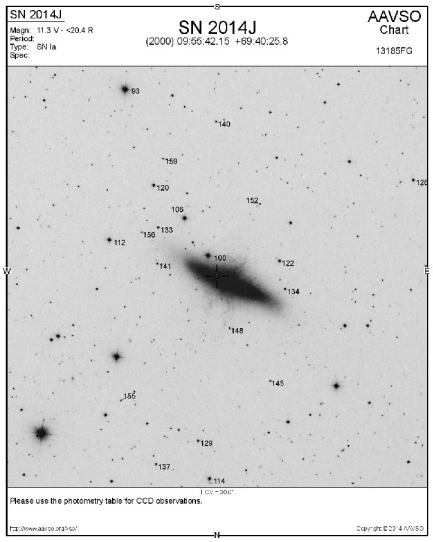
PLANETS: Jupiter still in Gemini is plenty high for observation starting as soon as you can see it and remains so until about 4 AM on the 1st and therefore 2:00 at month's end. Red spot and shadow transits attached. (Note the two hilited red spot/shadow combos, especially the first one; sorry to say it is at 01:30.) Mercury reached greatest eastern elongation on Jan 31, so you might be able to pick it out of the murk on the western horizon not long after sunset. Merc being in (the murk in) Aqr, the farther south you are, the higher it will be and the easier to find. Jan 31 and Feb 1 should be easiest, since on the former it is aprox 5 degrees to the left of the moon and on the latter approx 10 degrees below. The moon itself will be difficult to find on the 31st; being only one day old, binocs will probably be required. By month's end Mars (in Virgo) rises around 9:30, however opposition (a poor one, but a little better than the last) isn't until April 8th so maybe a little early to start looking seriously. Saturn in Virgo follows Mars by a couple hours, so if you are observing (comets?) in the morning you'll want to check out the rings which are now tipped at 22+ degrees.

STARS: Four carbons with B-Vs of 3.0 to 4.0. Four doubles and three triple comprise the multiple star section, with one of the triples again making it to the DSS photo sheet.

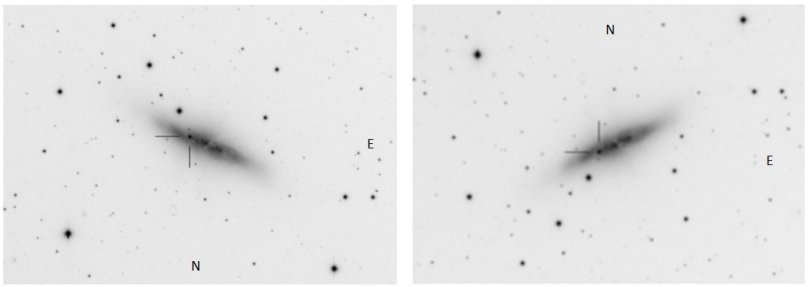
THE GOOD STUFF: Seven Messiers (6 GX's and 1 well known PN) and 16 Herschel 400 Objects (all GX's), two of which double as M's. Not that any of you use the RAS, but if you did, you'd see that "prev" shows up 10 times in the Sweep Star column. That means you only have to line up on a star 10 times to get to 21 objects. Even better, in this case sometimes you use the same star more than once, which means you only have to locate 7 stars. As far as the one planetary, it is M97, the Owl, located a little less than one degree from the galaxy M108. Since you are using your one degree true field eyepiece to sweep to the objects, you will be able to view both objects at the same time by placing each near opposite edges of the field. When you do that, realize (per the distance column) that photons streaming into your eye from the galaxy have traveled 20,000 times farther thru space, and obviously that same factor



longer thru time, than those from the planetary. If that doesn't make you at least slightly dizzy, you aren't thinking about it hard enough.

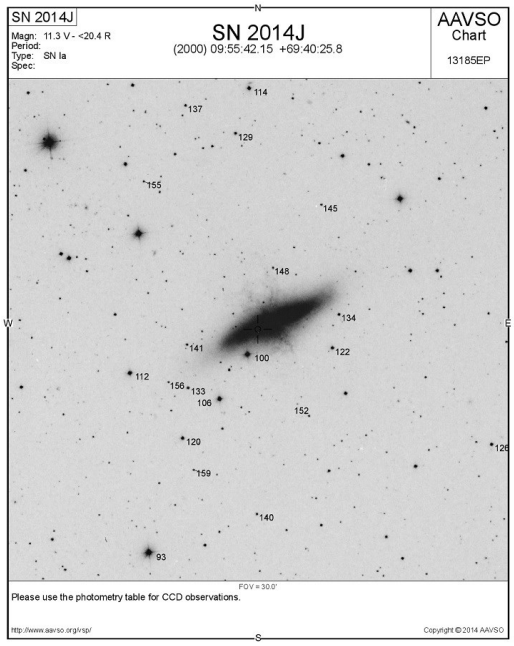


Supernova: SN 2014J in M82! So, supernova rule revision: If one pops in a Messier galaxy, or reaches mag 11, I will notify all and/or include with the monthly email, as with this current example. Info for those between mag 11 and 14 will only be sent to those who request to be added to that list. (So far that list is very short; please let me know if you want to be included.) In case you would like to try estimating 2014J's magnitude, I have included in the attachments two 30' FOV AAVSO charts, one inverted and one reversed.



INVERTED REVERSED

QUESTIONS: As always, questions and comments are welcome!



tom hoffelder
rocksnstars@gmail.com

Come with me now, Pilgrim of the stars,
For our time is upon us and our eyes
Shall see the far country
And the shining cities of infinity ~ Robert Burnham, Jr.

2/1			2/21		(2/22)	2/28			
SS	NTE	MS	SS	NTE	MR	SS	NTE	ATE	MS
16:52	17:58	19:31	17:20	18:23	00:28	17:29	18:32	19:06	17:03

Object (Type)	RA	Dec	Star	N/S	E/W	Mag*/(# of Stars)	Size (')/ *Sep (")*	Spect/ M# or H#	Dist (ly)	Uranol Page	Comment, [B-V], {crnt mag} (opt x)
TU Gem (CS)	06 10.9	+26 01	1 Gem	2.8 N	1.5 E	7.5-8.4		CII		137	[3.2] {7.5}
UU Aur (CS)	06 36.5	+38 27	θ Gem	4.6 N	3.2 W	5.1-7…		CII		99	[3.0] {6.0}
W Mon (CS)	06 52.4	-07 09	θ Cma	5.0 N	0.4 W	9.0-13…		Nvar		273	[3.3] OC 2302 0.1 NW
RY Mon (CS)	07 06.9	-07 33	θ Cma	4.5 N	3.2 E	7.7-9.2		Nvar		273	[4.0]
β Mon (MS)	06 28.8	-07 02	-	-	-	5, 5.5, 6	*7.4, 2.8*	B3	700	272	(100/265)
δ Gem (MS)	07 20.1	+21 59	-	-	-	3.5, 8	*6.3*	F0, dK6	60	139	(120)
α Gem (MS)	07 34.6	+31 53	-	-	-	2.5, 3.5	*2.5*	A1, A5	50	100	(300)
*17 CMa (MS)	06 55.0	-20 24	α CMa	3.7 S	2.4 E	6, 9, 9	*44, 50*	A2, K5	600	318	(20)
ε CMa (MS)	06 58.6	-28 58	-	-	-	1.5, 8	*18*		430	360	(100)
Σ1097 (MS)	*06 27.8*	*-11 36*	α Mon	2.0 S	3.2 W	6,8.5,9.5	*20, 23*	G8, B		274 ni	(40) OC 2396 0.2 SE
h3945 (MS)	07 16.6	-23 19	o^2 CMa	0.5 N	3.2 E	5, 7	*27*	M0, F0		319 ni	(30)
*NGC 3190 (Sa)	10 18.1	+21 50	ζ Leo	1.5 S	0.3 E	[13.0]	4.4x1.5	*H44-2	65M	144	GX 3187 is 0.1 W
*NGC 3193 (E2)	10 18.4	+21 54	prev	0.1 N	0.1 E	[12.4]	2.0x2.0	*H45-2	65M	144	
NGC 3226 (E2)	10 23.4	+19 54	γ Leo	-	0.8 E	[13.3]	2.8x2.0	*H28-2	60M	144	
NGC 3227 (Sba)	10 23.5	+19 52	prev	2' S	2' E	[13.3]	4.1x3.9	*H29-2	60M	144	

NGC 3245 (S0)	10 27.3	+28 30	ζ Leo	5.1 N	2.5 E	[12.5]	3.2x1.8	*H86-1	68M	144	
NGC 3277 (Sab)	10 32.9	+28 31	prev	-	1.3 E	[13.0]	2.1x1.8	*H359-2	68M	145	
NGC 3351 (SBb)	10 44.0	+11 42	α Leo	0.2 S	8.7 E	[13.6]	7.4x5.0	M95	33M	190	
NGC 3368 (Sbab)	10 46.8	+11 49	prev	0.1 N	0.7 E	[13.2]	7.8x5.2	M96	35M	190	
*NGC 3379 (E1)	10 47.8	+12 35	prev	0.8 N	0.2 E	[13.1]	5.3x4.8	M105	36M	190	also *H17-1
*NGC 3384 (E/SB0)	10 48.3	+12 38	prev	-	0.1 E	[12.9]	5.4x2.7	*H18-1	30M	190	GX 3389 is 0.1 S
NGC 3377 (E5)	10 47.7	+13 59	prev	1.3 N	0.1 W	[13.2]	5.0x3.0	*H99-2	34M	190	GX 3367 is 0.3 SW
NGC 3504 (Sbab)	11 03.2	+27 58	54 Leo	3.3 N	1.7 E	[12.6]	2.7x2.1	*H88-1	62M	146	GX 3512 is 0.2 E
*NGC 3486 (SBc)	11 00.4	+28 59	prev	1.0 N	0.6 W	[14.1]	7.1x5.2	*H87-1	30M	146	
NGC 3489 (SB0-a)	11 00.3	+13 54	θ Leo	1.5 S	3.3 W	[12.3]	3.6x2.2	*H101-2	30M	191	
*NGC 3556 (Sc)	11 11.5	+55 40	β UMa	0.7 S	1.4 E	[13.0]	8.6x2.4	M108	42M	46	also *H46-5
*NGC 3587 (PN)	11 14.8	+55 01	prev	0.7 S	0.4 E	9.9	2.8	M97	2000	46	Owl Nebula
NGC 3593 (S0-a)	11 14.6	+12 49	θ Leo	2.6 S	0.1 E	[13.4]	5.2x1.9	*H29-1	26M	191	
*NGC 3623 (Sa)	11 18.9	+13 05	θ Leo	2.3 S	1.2 E	[12.7]	9.8x2.9	M65	35M	191	
*NGC 3627 (Sb)	11 20.3	+12 59	prev	0.1 S	0.3 E	[12.7]	9.1x4.1	M66	35M	191	
*NGC 3628 (Sb)	11 20.3	+13 35	prev	0.6 N	-	[13.5]	13x3.1	*H8-5	35M	191	
NGC 3626 (S0-a)	11 20.1	+18 21	δ Leo	2.2 S	1.5 E	[12.6]	2.7x1.9	*H52-2	80M	146	

*DSS image

*[Surf Brtnss for GX's] - mag per square arcmin

*H400

ni=shown, not identi-fied

JUPITER IN Feb 2014 (EST)

DATE	GRST*	I SHAD	E SHAD	G SHAD	C SHAD
1	03:57 & 23:48			17:10-20:22	
2	19:40		16:04-18:46		
3					
4	**01:26** & 21:18	**00:19-02:35**			
5		18:48-21:03			
6	03:05 & 22:56				
7	18:47				
8				21:09-	
9	00:34 & **20:26**		**18:41-21:23**	00:23	
10					
11	02:13 & 22:04	02:14-04:29			
12	17:55	20:43-22:58			
13	23:42				
14	19:34				
15					

16	01:21 & 21:12		21:17-23:59	01:03-04:23	
17					
18	02:59 & 22:50				
19	18:42	22:38-			
20		00:53			
21	00:29 & 20:20	17:06-19:22			
22					22:09-
23	02:07 & 21:59		23:53-		01:54
24			2:35		
25	23:37				
26	19:29				
27		00:33-02:48			
28	01:16 & 21:09	19:02-21:17			
29					
30					
31					

*Transit, visible +/- 50 min

Comet	RA	Dec	Star	N/S	E/W	Mag[1]	Urano I	Alt[2]	Date	EST
Lovejoy 2013R1	18 12.1	+07 48	72 Oph	1.7 S	1.4 E	8	204	30	2/1	05:30
LINEAR 2012X1	18 03.0	+05 04	prev	2.7 S	2.3 W	8	204	30	2/1	
Lovejoy 2013R1	18 13.0	+07 30	72 Oph	2.1 S	1.6 E		204	28	2/2	05:15
LINEAR 2012X1	18 05.9	+04 53	prev	2.6 S	1.8 W		249	27	2/2	
Lovejoy 2013R1	18 14.0	+07 11	72 Oph	2.4 S	1.8 E		204	28	2/3	
LINEAR 2012X1	18 08.8	+04 42	prev	2.5 S	1.3 W		249	27	2/3	
Lovejoy 2013R1	18 14.9	+06 53	72 Oph	2.7 S	2.0 E		204	29	2/4	
LINEAR 2012X1	18 11.7	+04 32	prev	2.4 S	0.8 W		249	27	2/4	
Lovejoy 2013R1	18 15.9	+06 36	72 Oph	3.0 S	2.2 E		204	29	2/5	
LINEAR 2012X1	18 14.5	+04 21	prev	2.3 S	0.3 W		249	28	2/5	
Lovejoy 2013R1	18 16.8	+06 18	72 Oph	3.3 S	2.4 E		204	29	2/6	
LINEAR 2012X1	18 17.4	+04 10	prev	2.1 S	0.2 E		249	28	2/6	
Lovejoy 2013R1	18 17.6	+06 01	72 Oph	3.6 S	2.6 E		204	29	2/7	
LINEAR 2012X1	18 20.2	+04 00	prev	2.0 S	0.7 E		249	28	2/7	
Lovejoy 2013R1	18 18.5	+05 44	70 Oph	3.2 N	3.2 E		249	30	2/8	
LINEAR 2012X1	18 23.1	+03 49	prev	1.9 S	1.1 E		249	28	2/8	
Lovejoy 2013R1	18 19.3	+05 27	70 Oph	2.9 N	3.4 E		249	30	2/9	
LINEAR 2012X1	18 25.9	+03 39	prev	1.8 S	1.5 E		249	28	2/9	
Lovejoy 2013R1	18 20.2	+05 11	70 Oph	2.6 N	3.6 E		249	30	2/10	
LINEAR 2012X1	18 28.7	+03 28	prev	1.7 S	2.1 E		250	28	2/10	
Lovejoy 2013R1	18 21.0	+04 54	70 Oph	2.3 N	3.8 E		249	31	2/11	
LINEAR 2012X1	18 31.5	+03 18	prev	1.6 S	2.6 E		250	28	2/11	

[1]http://www.aerith.net/comet/future-n.html

[2]Maine, at time noted

Messier Marathon Survival Guide

by Tom McDonough

Introduction

Most articles about the Messier Marathon focus on equipment, search sequences, and strategies; this one will focus on the other side of the equation: physical survival. One of the biggest challenges rarely mentioned is staying awake, alert, and comfortable during the marathon. A big part of maximizing the number of objects observed is fighting fatigue and the elements.

Oklahoma Meteorology 101

The first rule to live by is NEVER UNDERESTIMATE THE WEATHER! March is a very turbulent month in our state with conditions ranging from deep winter to pleasant springtime, sometimes in the same day. One of the most significant conditions is the wind speed. No other factor will turn observing comfort from good to miserable more than wind over 10 MPH. Always come prepared to dress for the worst conditions possible. With this in mind, let's investigate the first step.

Yes Virginia, There is a Dress Code

Dressing for warmth during low activity is one of the keys for comfort. Even temperatures in the upper 50's will quickly suck the heat from your body during observing. Thanks to modern textiles you don't need to look like the Michelin Man to stay comfortable. First, forget cotton for the base layer. Even though it feels great against you skin, cotton holds moisture like a magnet. Modern synthetic fabrics wick moisture away from your body and allow it to dissipate quickly, leaving you feeling warm and dry. Start with nylon/spandex briefs (and sports bra for the ladies) followed by a high quality pair of long underwear. This is one of the most important layers because you want to trap a thin layer of warm air next to the skin. It pays to get high quality garments; for the price of a decent eyepiece you can get a Capilene® or 100% silk set that will keep you warm without bulk.

For the next layer, a long sleeve polyester turtle neck shirt and a pair of lined ski pants works very well. These garments will form a good seal at the neck, arms, and legs to preserve the warmth trapped by the base layer. Don't wear jeans, they provide very little insulation or wind resistance. Add a lined ski jacket or fleece pullover with drawstring waist to enhance core warmth.

Moving on to the feet, I recommend the hiker's system. Start with a thin pair of synthetic liner socks followed by a thick pair of wool ones. Again, don't use cotton for the same reasons as above. Wool is unparalleled in the ability to keep feet warm and cushioned even in the presence of moisture. For shoes, a good pair of thick leather hiking boots or lined winter boots are ideal. The key here is not to have shoes that are too tight as this will restrict circulation. I suggest that you get your socks first then take them to find the shoes. You will probably want a pair that are a size or two bigger than your street shoes. Remember, you want plenty of room for the socks along with some airspace. You aren't going to be walking twenty miles in these, so a loose fit is perfectly fine.

Next we need to turn to the hands. Over the years I have tried about every glove in existence and found that to get decent warmth the gloves need to be so thick that they render your hands almost useless for writing, keypads, or manipulating the myriad of tiny thumbscrews that seem to abound on most telescopes. I finally found the solution in convertible mittens with flaps to expose the fingers and thumbs. With these your hands stay fully covered until needed for ultimate dexterity. As with the shoes, get a larger size to leave room for chemical hand warmer packets. If you simply must use gloves it's hard to beat Isotoner®. They are thin but pack incredible warmth and leave your hands relatively useful.

For the head there is nothing that can beat a balaclava. These can be worn in many different ways to adapt to changing weather conditions. Their best feature is that they seal around the neck to prevent heat escaping from your core. A wool blend stocking cap is also very good and they are not itchy.

Lastly, to seal the entire package get a good one piece Ski & Rescue Snowmobile suit. This will provide a seamless windproof outer covering and is essentially a wearable sleeping bag. The newest ones use high tech insulation which is very thin so you don't feel like you're wearing a straightjacket.

Messier Marathon Survival Guide, by Tom McDonough, Ct'd.

Energy Crisis

The second big factor to overcome for a successful marathon is fatigue. This is one area where the younger members have a distinct advantage. As we age our stamina and energy levels degrade at an alarming rate. All is not lost; there are several things that can be done to conserve energy on marathon day.

Plan Ahead

The last thing you want on the big day is to be running around like a headless chicken stressing out over gathering up all the equipment and supplies for the night. Make it a goal to prepare, test, and pack all clothes and equipment the weekend before the event. This way all you have to do is load and go.

If you are bringing a dish to the potluck dinner, prep and refrigerate any dishes that need to be cooked at least one day before the marathon. A cold dish should be ready to go. Pop the prepped food in the oven to cook while you're loading your gear.

Fuel the Body

Eat light meals on the day of the marathon. Gorging yourself at the buffet will make you lethargic since it takes a lot of energy to digest a big feast. It is better to eat small frequent meals than a few large ones. This will ensure that your blood sugar and energy stay at a more constant level. We always have so much food available I promise you will not go hungry. During the night the best snacks are things like fresh fruit slices, peanut butter, yogurt, pretzels, and granola bars. Avoid highly processed foods and sugars. If you need a quick boost of alertness, pop three or four Altoids® mints in your mouth; I guarantee you'll wake up!

You must also drink plenty of plain water. Fatigue and headaches are the two biggest symptoms of dehydration. Start drinking early in the day so you start off fully hydrated. The general rule of thumb is if your urine is yellow you're not drinking enough water. Have several bottles at your observing station so they are handy. Get bottles with a pull spout so there is no screw cap to fumble with or lose in the dark. Coffee and tea are okay in moderate amounts, just be sure to not overdo it and drink your water also.

Take a Nap

Since I'm sure you followed the above advice and have all you gear ready to go ahead of time, you should have plenty of time to take a nap before heading out. I've found that a three hour nap followed by a quick lukewarm shower goes a long way towards sustaining me throughout the night. If you do shower, I suggest you use body lotion from neck to toe to prevent dry skin. There is nothing worse than having an itch under four layers of clothes at 1AM while working your way through the Virgo Cluster!

It is also good to take a nap before driving home after the marathon; it will make the trip much safer and pleasant.

Keep it Loose

Take several breaks during the night to do a few light stretching exercises. This feels great after hunching over a telescope and invigorates the whole body and promotes circulation.

Conclusion

Hopefully the tips outlined above will ensure that you're concentrating on finding Messier objects rather than fighting your own body for a successful marathon.

An Adventure with my Meade 60 AZ-T, 60 mm f/5.9 Refractor
by Bill Steen

Well, I had an interesting experience this evening, January 21, 2014. We are staying in a hotel, in a red zone area, with lots of lights all over the place. There is a light breeze blowing. The temperature is, I think, in the mid twenties. I have my Meade 60AZ-T, 60 mm by 350 mm focal length scope with 20, 15, 10 mm UO 70 degree eyepieces. I also have 6, 5, 4, and 3.2 mm TMB Planetary eyepieces. All of the eyepieces fit nicely into the telescope case. I have my camera tripod to mount the scope on. We had a grab and go, unplanned situation and this is what I had together that I could just grab.

Going outside around 7:30, I look around and "feel" that I need to stay in the wind shadow of the hotel building. I know that I will not see much, but I want to try anyway. I find a nice electrical box to sit on….under a parking lot light. The base of the light is brickwork with a cap ring of bricks, making a shelf to set eyepieces and things on. I can sit on the electrical box, set up the tripod (which has to have different lengths on the legs to allow one leg to be off the curb while the other two are on grass above the curb. I can reach out and actually touch the light pole while sitting on the electrical box.

Well, if I can see anything at all, it will really be a good story to tell on cloudy nights!

My first object is Jupiter. With the four degree chunk of sky that I can see with the 20 mm eyepiece, Jupiter was not hard to get in the field, even with no finder. My cataracts made Jupiter a complete blur, even though I could see all four moons…I think. I put in the 10 mm eyepiece, still a blur with signs of the two main bands showing up. Went to the 6 mm TMB Planetary….just right! Sitting there, under the light, eyes watering, watching Jupiter slowly move across the field…move it back…watch it move across the field. Eyes coming into and out of focus……Presto! There is the whole Northern Temperate Band for a second! I think I can see signs occasionally of the southern one, but may be wishful thinking. I can see signs occasionally of mottling in the big bands.

I went then to the multiple star, Castor. (For any beginner reading this fairly soon after my adventure, stick your fist out at arms length and put Jupiter on the south side of your fist by your pinky finger, then look on the north side of your fist. A little lower than straight across will be the star, Castor. There will be another, brighter star below and to the right of Castor. This is Pollux, the other of the Gemini twins.) With the 20 mm eyepiece, no split. I put in the 10 mm….I can see there are two stars there that are just kissing. I put in the 6 mm TMB Planetary eyepiece….good split between Castor A and B. I pulled out the 3.2 mm TMB eyepiece. The dark space between the two stars is about as wide as the B star disk or maybe a tiny bit bigger. I can definitely see that the two stars are a different color as well as size. The separation between the two stars is listed in the 2013.8 version of the Washington Double Star List is 5 arc-seconds. Most likely, I will be able to see a kissing pair of stars at 2.5 arc-seconds with this scope.

The next object is Orion's Sword. With the 20 mm eyepiece in this scope, I had no problem finding it in the four degree sky field. The sword actually takes up about two degrees. Even though not much of the nebulosity showed in the Great Orion Nebula, the view was really nice and well framed with the extra field. At the 17.5X magnification, the trapezium was too small for me to really distinguish the fourth star in the trapezium. I put in the 10 mm eyepiece. I could definitely see four stars in the Trapezium…parking lot light, watery eyes, terrestrial scope, etc. Well, an hour has past and my feet and face are getting a little too cold for our circumstances. Time to go in. I think this little scope is going to work out well. I just need to keep its strengths and weaknesses in perspective. It is amazing what you can see under much less than optimum conditions and less than optimum equipment, if you really try.

Bill Steen

Surprising Young Stars in the Oldest Places in the Universe

By Dr. Ethan Siegel

Littered among the stars in our night sky are the famed deep-sky objects. These range from extended spiral and elliptical galaxies millions or even *billions* of light years away to the star clusters, nebulae, and stellar remnants strewn throughout our own galaxy. But there's an intermediate class of objects, too: the *globular star clusters*, self-contained clusters of stars found in spherically-distributed halos around each galaxy.

Back before there were any stars or galaxies in the universe, it was an expanding, cooling sea of matter and radiation containing regions where the matter was slightly more dense in some places than others. While gravity worked to pull more and more matter into these places, the pressure from radiation pushed back, preventing the gravitational collapse of gas clouds below a certain mass. In the young universe, this meant no clouds smaller than around a few hundred thousand times the mass of our Sun could collapse. This coincides with a globular cluster's typical mass, and their stars are some of the oldest in the universe!

These compact, spherical collections of stars are all less than 100 light-years in radius, but typically have around 100,000 stars inside them, making them nearly 100 times denser than our neighborhood of the Milky Way! The vast majority of globular clusters have extremely few heavy elements (heavier than helium), as little as 1% of what we find in our Sun. There's a good reason for this: our Sun is only 4.5 billion years old and has seen many generations of stars live-and-die, while globular clusters (and the stars inside of them) are often *over 13 billion years old*, or more than 90% the age of the universe! When you look inside one of these cosmic collections, you're looking at some of the oldest stellar swarms in the known universe.

Yet when you look at a high-resolution image of these relics from the early universe, you'll find a sprinkling of hot, massive, apparently *young* blue stars! Is there a stellar fountain of youth inside? Kind of! These massive stellar swarms are so dense -- especially towards the center -- that mergers, mass siphoning and collisions between stars are quite common. When two long-lived, low-mass stars interact in these ways, they produce a hotter, bluer star that will be *much* shorter lived, known as a *blue straggler star*. First discovered by Allan Sandage in 1953, these young-looking stars arise thanks to stellar cannibalism. So enjoy the brightest and bluest stars in these globular clusters, found right alongside the oldest known stars in the universe!

Learn about a recent globular cluster discovery here: http://www.nasa.gov/press/2013/september/hubble-uncovers-largest-known-group-of-star-clusters-clues-to-dark-matter.

Kids can learn more about how stars work by listening to The Space Place's own Dr. Marc: http://spaceplace.nasa.gov/podcasts/en/#stars.

Globular Cluster NGC 6397. Credit: ESA & Francesco Ferraro (Bologna Astronomical Observatory) / NASA, Hubble Space Telescope, WFPC2.

National Aeronautics and Space Administration

the Space Place

January – February 2014 / Vol. 7, Issue 1

NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

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

It's colorful!
It's dynamic!
It's fun!

It's rich with science, technology, engineering, and math content!

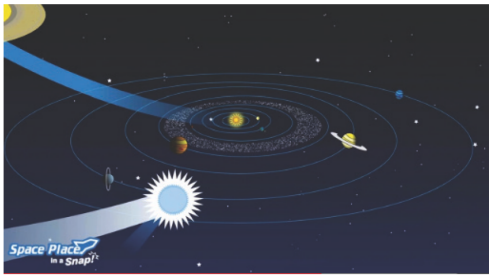
It's informal.
It's meaty.
It's easy to read and understand.
It's also in Spanish.
And it's free!

It has over 150 separate modules for kids, including hands-on projects, interactive games, animated cartoons, and amazing facts about space and Earth science and technology.

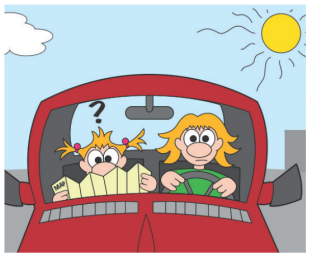
NASA's Space Place doesn't just bring you great educational material across a wide range of topics; it also presents that material in many different formats. From games and activities to articles and illustrations, we make it easy for students to learn in whatever format suits them best. This philosophy is the driving force behind our latest product—Space Place in a Snap. These pages combine animated videos with posters and reading material for a cross-disciplinary learning experience.

What's New? Space Place in a Snap!

Space Place is pleased to announce an entirely new and totally exciting product—Space Place in a Snap! These short animations provide quick narrated explanations of some of the most interesting science questions by taking you on a guided tour of an infographic. The best part: You can download a poster of the infographic after you watch the animation. We have already released our first "Snap"—How did our Solar System Come to Be? Check it out at http://spaceplace.nasa.gov/solar-system-formation. Stay tuned for more "Snaps" in the very near future!



Space Place en Español: Loopy Legends



Why limit yourself to telling stories in only one language? Our popular mad-libs-style activity, "Loopy Legends," is now available in both English and Spanish. Kids get to create their own zany adventures in this web activity. You might find yourself traveling toward the center of a black hole. Or maybe you'll become lost because an angry sun's space weather knocked out some GPS satellites. Who knows, you might even go surfing on Jupiter's moon Titan! Check it out at http://spaceplace.nasa.gov/loopy-legends/sp.

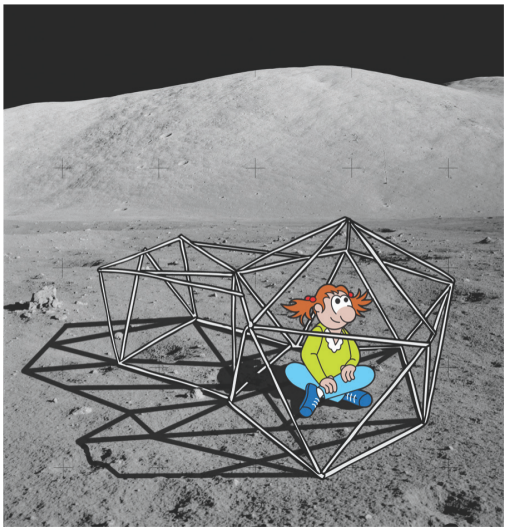
Spotlight on a Solar Mystery

The surface of the sun is a scalding 10,000 degrees Fahrenheit. But the sun's atmosphere can reach millions of degrees. That doesn't make too much sense, does it? Why would the stuff around the sun be warmer than the sun itself? And if the atmosphere were so hot, then why doesn't it warm the surface up to a temperature closer to the atmosphere? Check out one of Space Place's newest articles to learn more about this solar mystery. http://spaceplace.nasa.gov/sun-corona.

Where kids and grown-ups have fun with space science and technology

For the Classroom

Looking for a hands-on activity that reinforces engineering concepts? Look no further than Space Place's moon habitat activity. Have you ever wondered what it would take for humans to have an extended stay on the Moon? Surely they would need some sort of place to live. But how would such a structure make the long journey through space? Learn all about what astronauts might want in their moon habitat. Then build your own! http://spaceplace.nasa.gov/moon-habitat.



For Out-of-School Time

How about an exciting web game to teach students all about solar weather in their out-of-school time? The sun is a scorching mass of hot gas that is constantly shooting energy and particles out into space. In "Shields up!" you must use a GOES-R weather satellite to detect the first signs of any crazy solar weather and warn other satellites to protect themselves before it is too late. http://spaceplace.nasa.gov/shields-up.

Special Days

January 1: New Year's Day. Galileo saw Saturn's rings through a telescope in 1610. Could a spaceship land on Saturn's rings? http://spaceplace.nasa.gov/dr-marc-solar-system.

January 11: Amelia Earhart is the first woman to fly solo across the Pacific in 1935. How did her airplane stay up? http://spaceplace.nasa.gov/dr-marc-technology.

January 13: Galileo discovers Jupiter's moon Ganymede in 1610. Jupiter and Ganymede play tug o' war with little moon Io. http://spaceplace.nasa.gov/io-tides.

January 25: Mars rover Opportunity landed on Mars in 2004. Get the inside story on the latest Mars rover—Curiosity. http://spaceplace.nasa.gov/mission-chronicles/#milkovich.

February 6: Apollo 14 astronauts played golf on the Moon in 1971. See astronauts at work and play: http://spaceplace.nasa.gov/gallery-technology/#astronauts.

February 12: Charles Darwin born this day in 1809. You will understand evolution of species after playing with the "Emoticonstructor." http://spaceplace.nasa.gov/emoticonstructor.

February 20: Introduce a Girl to Engineering Day. Watch Space Place Live! and meet a woman engineer. http://spaceplace.nasa.gov/space-place-live/#douglas.

February 25: Quiet Day. Did you know the most violent events in space make no sound? Make a "Super Sound Cone," and listen for very tiny sounds. http://spaceplace.nasa.gov/sound-cone.

Send Feedback

Please let us know your ideas about ways to use The Space Place in your teaching. Send to info@spaceplace.nasa.gov.

And For The Young Stargazers:

Check out these fun websites from NASA!

http://climate.nasa.gov/kids

http://scijinks.gov

http://spaceplace.nasa.gov

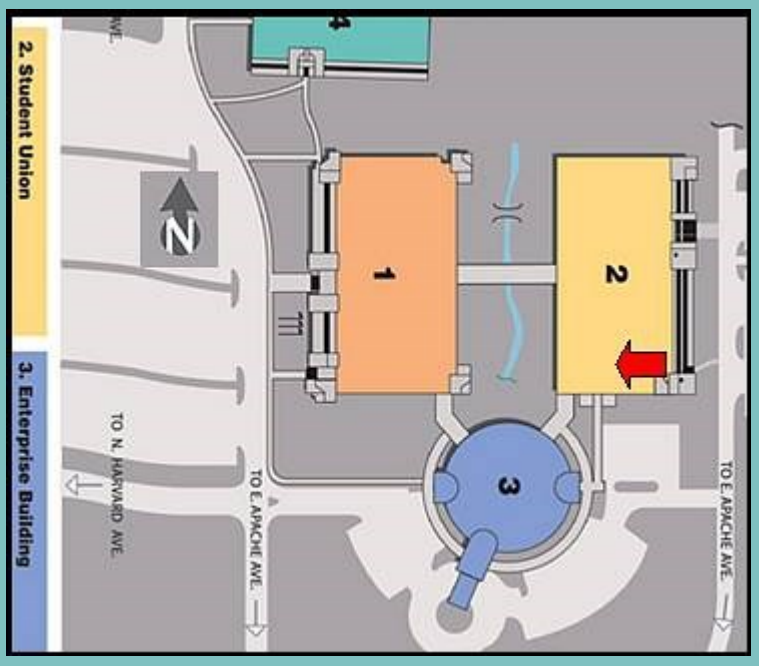
Where We Meet:

TCC Northeast Campus, 3727 E. Apache St., Student Union Bldg. 2, Room 1603

There is PLENTY of parking, lighting and security on this campus.

To get to TCC NE Campus, take the Harvard Exit off of Hwy. 11 (Gilcrease Expressway). Go south for about 1/2 mile to the campus located at the corner of N. Harvard and Apache. Turn east on Apache and take the entrance in front of Bldg. 3 (the large round building). Then turn right and park in front of Student Union Building #2. Room 1603 is just off of the lobby.

Google-type driving direction map at http://www.tulsacc.edu/13273/



The General Meetings are free and open to the public.

We hope to see you there!

CLUB OFFICERS

President	Mandy Nothnagel	act_pres@astrotulsa.com
Vice President	Richard Brady	act_vp@astrotulsa.com
Secretary	Tamara Green	astronomer.misstamara@yahoo.com
Treasurer	Tim Davis	act_tres@astrotulsa.com

BOARD MEMBERS AT LARGE

Lee Bickle	blotobeast@gmail.com
Michael Blaylock	mblaylock535@gmail.com
Stan Davis	stan.home@cox.net
John Land	astroclubbiz@windstream.net
Christopher Proctor	bishop@busoutoshi.net
James Taggart	act_maint@astrotulsa.com
Skip Whitehurst	skip.whitehurst@gmail.com

APPOINTED STAFF

Newsletter Editor	Tamara Green	astronomer.misstamara@yahoo.com
Webmaster	Jennifer Jones	jjones@seedtechnologies.com
Membership Chairman	John Land	astroclubbiz@windstream.net
Observing Co-Chairman	Owen Green	darthnewo@yahoo.com
Observing Co-Chairman	Tamara Green	astronomer.misstamara@yahoo.com
PR/Outreach	Owen Green	darthnewo@yahoo.com
Sidewalk Astronomy	Owen Green	darthnewo@yahoo.com
Group Director	Mandy Nothnagel	actgroupscheduling@gmail.com
Night Sky Network	Mandy Nothnagel	act_pres@yahoo.com
Facilities Manager	James Taggart	act_maint@astrotulsa.com

MEMBERSHIP INFORMATION

MEMBERSHIP RATES FOR 2014 WILL BE AS FOLLOWS:

Adults - $45 per year. Includes Astronomical League membership.

Senior Adults - $35 per year. *For those aged 65 and older.* Includes Astronomical League membership.

Students - $30 per year. Includes Astronomical League Membership.

Students - $25 per year. *Does not include Astronomical League membership.*

The regular membership allows all members of the family to participate in Club events, but only ONE voting membership and ONE Astronomical League membership per family.

Additional Family Membership - $15 with Astronomy Club of Tulsa voting rights, $20 with Club voting rights *and* Astronomical League membership.

THOSE WISHING TO EARN ASTRONOMICAL LEAGUE OBSERVING CERTIFICATES NEED TO HAVE A LEAGUE MEMBERSHIP.

MAGAZINES:

Astronomy is $34 for one year or $60 for 2 years.

www.astronomy.com

Sky & Telescope is $33 per year.

www.skyandtelescope.com

Sky & Telescope offers a 10% discount on their products.

If you are an existing S&T subscriber, you can renew directly with S&T at the same Club rate. Both S&T and Astronomy now have digital issues for computers, iPads and smart phones.

ONLINE REGISTRATION

We now have an automated online registration form on the website for new memberships, membership renewals and magazine subscriptions. Just simply type in your information and hit "send" to submit the information. You can then print a copy of the form and mail it in with your check, or use our convenient PayPal option. .

Link: http://www.astrotulsa.com/Club/join.asp


Happy Cosmic
Valentine's Day!


You
Me

Photo: Winter Stars over the Microwave Tower, taken December, 2012 by Tamara Green.

THE ASTRONOMY CLUB OF TULSA INVITES YOU TO MAKE PLANS THIS SPRING TO JOIN US AT A STAR PARTY!

OPEN TO THE PUBLIC

For more information please visit www.astrotulsa.com.

The Observer is a publication by the Astronomy Club of Tulsa. The Astronomy Club of Tulsa is a 501C 3 non-profit organization open to the public. The Club started in 1937 with the single mission to bring the joy and knowledge of astronomy to the community of Tulsa, OK and the surrounding area. Today our mission remains exactly the same. We travel to local schools, churches and many other venues with scopes and people to teach. Our observatory is located in Mounds and many public programs are offered there. To join the Astronomy Club of Tulsa please visit www.astrotulsa.com where you will find all the information necessary to become a member.