SKYSCRAPERS INC.

the Skyscraper

vol. 38 no. 8
August 2011

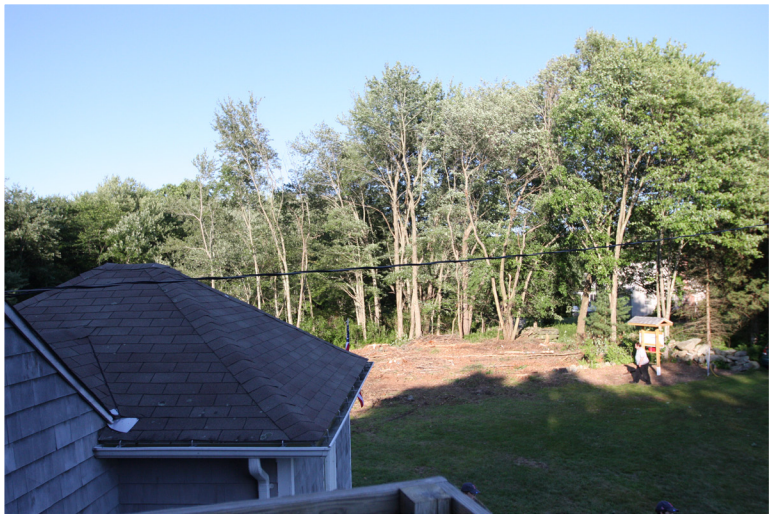
Amateur Astronomical Society of Rhode Island ★ 47 Peeptoad Road ★ North Scituate, Rhode Island 02857 ★ www.theSkyscrapers.org

August Meeting with Tom Thibault

Friday, August 5, 7:30pm
Seagrave Memorial Observatory

Skyscrapers president Tom Thibault will talk about "The Merits of Maintaining an Observing Log". He will touch upon the reasons for his interest in astronomy and the timeline of his increasing involvement. The focus of his presentation will be why, how, and what he includes in log entries as well as where the particular journal he utilizes can be purchased.

In this issue…



Recently improved northern & eastern horizons, thanks to our neighbor Gene Allen.

Phases of the Moon

6 **13** **21** **28**

Other notable events: Vesta is at opposition on the 5th. Perseid meteor shower peaks on the 12th-13th. Venus is at superior conjunction on the 16th. Mercury is at inferior conjunction on the 16th. Neptune is at opposition on the 22nd.

Seagrave Memorial Observatory is open to the public

weather permitting

Saturdays: 9:00-11:00 pm
8:00 - 10:00 pm beginning August 27

President's Message

Tom Thibault

Dear Skyscrapers Members,

We had our annual Skyscrapers Summer Cookout on Saturday, July 9th and all those that were able to attend were treated to an incredible day. The weather could not have been any better, blue skies, low humidity, and temperatures in the 80's; it was like walking into paradise. Attendees were not only greeted by the beautiful day, but also by the major changes our generous neighbor Gene Allen has completed to his property abutting Seagrave. The extensive clearing Gene completed has provided use with a significantly improved view of the sky.

While all our telescopes have benefitted, the 16" Meade has seen the most improvement. The Meade, which was limited to essentially only the west of the meridian, has now been provided access to virtually the entire east. The transformation can only be described as amazing—which was confirmed by the expressions on the faces of our members entering the main grounds of Seagrave. Gene Allen and members of his family joined us for some food and fun and was treated to an appreciative round of applauds from all in attendance.

As has become the tradition of the Skyscrapers Summer Cookout, the Burgers and Dogs were flying off the grille and the meeting hall had a delicious assortment of member prepared side dishes and desserts. Al Hall again treated us all to his wonderful home-made "chowda", um, um, good. Our great weather wasn't wasted. Bob Horton set up a 90mm Solar Scope and Steve Hubbard his PST. Solar prominences were observed, with one stretching high and appearing almost ready to detach. Of course, the Clark was open with its polished brass gleaming in the sunlight. It shared views of the 1st quarter moon as the day wore on. We held the "Donation Sale" with a number of items purchased by our members. The entire cookout was filled with good food, great friends, and fun activities.

The day could not have been better and I would like to thank all who were able to attend. Let me extend a special thank you to our Trustee's and all those who volunteered and assisted in organizing our event. I would also like to thank our members responsible for the great assortment of foods and desserts that satisfied so many. What a feast.

Our July meeting featured Adam Jermyn, an exceptional young man with a bright future. Adam is a graduate of Longmeadow High School and will be attending Caltech this fall. Adam's presentation outlined his experiences on the U.S. Physics Olympiad training camp and an in-depth look into one of his mathematical science projects. Good luck Adam in all your endeavors and we look forward to seeing you in the future.

Our business meeting followed and included updates from our Trustees in regards to the Observatory Committee and member participation on Public Nights. Kathy Siok also updated the attending membership of the speakers for our upcoming October AstroAssembly. Ed Haskell informed the membership of John Leonelli's nomination for the open Trustee position and solicited nominations from the floor. None were received. Our Special Election will be held at the August Meeting.

My final note is a reminder to all: 2011/2012 membership dues were payable beginning in April. If you haven't remitted your dues please do so at your earliest convenience to continue your support of Skyscrapers. Dues can be mailed to Skyscrapers Inc., 47 Peeptoad Road, North Scituate, RI. 02857, Attn: Jim Crawford, or feel free to see Jim personally during any of our functions he is in attendance.

Clear Skies
Tom Thibault
Skyscrapers
President

Planetarium Show
Black Holes

Please RSVP Francine Jackson at 527-5558, or acknowledge through frostydrew.org. $5.00 donation to benefit URI's planetarium and Frosty Drew Observatory.

Friday, August 19
at URI Planetarium

The Skyscraper is published monthly by Skyscrapers, Inc. Meetings are usually held on the first Friday of the month. Public observing is usually held every Saturday night at Seagrave Memorial Observatory, weather permitting.

Directions
Directions to Seagrave Memorial Observatory are located on the back page of this newsletter.

Submissions
Submissions to The Skyscraper are always welcome. Please submit items for the newsletter no later than **August 19** to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or e-mail to jim@distantgalaxy.com.

E-mail subscriptions
To receive The Skyscraper by e-mail, send e-mail with your name and address to jim@distantgalaxy.com. Note that you will no longer receive the newsletter by postal mail.

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The Constellations in August

Francine Jackson

Summer Milky Way from Stellafane. Photo by Jim Hendrickson.

Now that the signpost of summer, the Summer Triangle, is reaching its high position in the sky, it's time to use its stars to find some of the dimmer, but still easy to sight, constellations.

Beginning with Altair, look just to its left, or east. You may see what looks at first to be a small kite, with a long tail. You've actually found Delphinus, the Dolphin. This creature was placed in the sky because of its saving the singer Aryan. Aryan could be compared to whatever giant among singers you want - Frank Sinatra, Elvis Presley, I once had a 10-year-old suggest Eminem. Whatever. Aryan was sailing home after a very successful world tour; unfortunately, his shipmates decided among themselves that Aryan was so successful that he had too much riches for just one person. So, one night, as Aryan was walking the deck, some of them came up behind him and threw him overboard, then stormed his room and divided his wealth among them. Unfortunately for them, waiting at the dock for them was Aryan. It seems his music was so beautiful that not only did people love to hear him, but he had a set of dolphin groupies following the ship, just to listen. Therefore, when he was thrown into the sea, one of the dolphins swam underneath him, and carried him all the way home.

You may have a slight problem seeing this constellation at first, because its stars are all relatively dim, but because they are so close to each other, once you do find it, it will always show itself to you. Your eyes react to Delphinus just like the open star cluster the Pleiades in the winter months; the stars making up this part of the sky are also very dim, but, once you find it, your eyes will always be attracted to this close set of dim stars. Delphinus will do the same for you.

Starting at Vega, and going straight down to Altair, keep following that line until you find two stars rather close to each other; then, keep going until you find two more stars about the same distance to each other as the first two. From the bottom of the second set of stars, move to the left, or east, until you find one more star about the same brightness as the previous four. Once there, make a line back to the top of the first two stars. You may notice you've made a pretty good sail shape. Actually, you've found Capricornus, the Sea-Goat. Legend has this constellation representing Pan, who spent much of his time making peoples' lives miserable. He did, however, have the amazing ability to morph himself into any shape he wanted. One afternoon, Pan changed himself into a goat, and spent the day prancing around the forest. Suddenly, he heard a commotion behind him, and Pan realized he was being chased by people who were looking for him - some say he owed them a lot of money. Pan started to run as fast as he could, but goats aren't known to sprint very fast, and his followers were catching up to him. As Pan looked ahead of him, he noticed he was approaching a river. He immediately decided to change himself into a fish, jump into the water, and swim away from danger. But, as he was jumping into the river, he realized he hadn't morphed completely into a fish; his legs had turned into a fishtail, but his front was still a goat as his body dove underwater.

In a dark sky, you might be able to see the Milky Way splitting the triangle in half, from upper right - near Deneb, the Swan's tail - to lower left, by Altair. If not, just move your eyes downward, through the triangle, and continue until you note a shape looking a lot like your kitchen teapot. This is actually the asterism the Teapot, the major part of Sagittarius, the Archer. Sagittarius was placed in the sky as a guardian to the scorpion, located right next door, to the archer's right, or west. Scorpius is credited with killing Orion, who boasted he would kill all the animals in the world. After being placed up in the sky, there were some animals who weren't sure If the scorpion might decide to come back to Earth, so Sagittarius is ready, with his bow in position, if Scorpius moves. If so, the arrow will land directly in the scorpion's heart, and the Earth will be safe from a killer arachnoid.

Sagittarius is one of two centaurs in the sky, but for us in the Northern Hemisphere, it's the only one we can observe. The other, Centaurus, is waiting for you if you cruise around the Caribbean, or points south. But Sagittarius is a very important part of our sky. Once you find it, you may notice it doesn't rise very high in our sky; in fact, the rest of the actual constellation, the centaur's legs, never rises above our horizon. But, if you can identify the spout, you can, in a dark sky, note the teapot actually seems to have steam rising from its spout. At that position in the constellation, you've found the direction of the center of the Milky Way, our home galaxy.

Sagittarius is the part of the sky where the Sun rises out of the eastern horizon at its most southeasterly position (and, consequently sets most southwesterly). It does so on December 21st. At that point, although we can't see the constellation because the Sun is then located in it, we mark the beginning of the season of winter.

August Meteor Shower to be Mooned Out &

Observing the Last Quarter Moon

Dave Huestis

Anyone with even a casual interest in astronomy knows that sometime during the summer we are treated to a fine display of shooting stars. This meteor shower is perhaps the most well known and the most widely observed because more folks are outdoors during the summer months. Some more well-informed people may even be able to specify the month of this annual shooting star performance. But many are at least familiar with the shower's name: the Perseids.

Unfortunately the peak of this year's Perseids, August 12-13, occurs during the Full Moon. The Moon's bright light will prevent all but the brightest members of this shooting star display from being observed. You might get lucky to spot a fireball despite the moonlight, and since the Perseids can be seen in much smaller numbers for several weeks on either side of the peak night, you might try to catch a few when the Moon isn't quite so full.

While the Full Moon will interfere with this year's Perseid meteor shower, there is a lunar phase which is not observed as regularly as those phases leading up to and just after full. Today's column will highlight a few of the features that can be observed during the Last (or Third) Quarter Moon. Binoculars or a telescope will be required to adequately observe these formations.

Space does not permit me to review the reason for the cycle of lunar phases, but you can refresh your understanding by visiting http://www.theskyscrapers.org/content5074.html for a thorough explanation.

The next Last Quarter Moon, which always rises around midnight, is on August 21. You'll need to wait for it to ascend higher into the sky so you can acquire a good view. The best time to observe this phase is a couple of hours before morning twilight. At sunrise the Moon will be due south of your location and at its highest point in the sky above the southern horizon.

The accompanying Moon map will help you to locate the lunar features I will highlight. The Moon's north pole is at the top of the map, while its western limb is to the left. Keep in mind that binoculars will provide you the same view that the map shows. Various telescope designs reverse the image right to left and up and down. You'll need to orient your telescopic view to the map using a prominent surface feature as a guide.

There are many formations that can be observed during this lunar phase. And even if you have observed some of them during a different phase of illumination, the ever changing sunlight angle can reveal subtle details not seen during other phases.

Also, most native Rhode Islanders know that our state is often used as a unit of measure. East to west it is approximately 37 miles across, and the north to south dimension measures 48 miles. Keep these figures in mind when comparing to crater sizes. Here are a few Last Quarter lunar features you should try to observe.

On the edge of Mare Imbrium (Sea of Rains – yes, early astronomers once thought the Moon possessed seas and oceans) is the crater Archimedes, an almost perfect circle about 52 miles across. Under low magnification its floor is almost featureless. A short distance to the southeast and seeming to extend from the terminator (during Last Quarter the terminator defines the sunset point) is the Apennine Mountains. This range contains some of the tallest mountains on the lunar surface. Carefully scan up and down this region. Some of the mountain bases may already be in shadow while their peaks can still be catching glimpses of sunlight.

As we continue our journey south and to the west we encounter the absolutely beautiful crater Copernicus. While this crater is not the largest (only 53 miles across), the detail one can observe is remarkable. Its walls show very fine detail and the crater floor has an incredible central peak. In fact, during one perfect evening many moons ago while using the 8 ¼-inch Clark refractor at Seagrave Observatory, I was able to look deep into this crater and see where a huge boulder had tumbled down one of its steep walls. Outstanding!

Next please locate and examine the crater chain that comprises Ptolemaeus, Alphonsus and Arzachel. The detail that can be seen here is exquisite. Ptolemaeus is an old crater about 95 miles in diameter. Another impact, Herschel, blasted a 25-mile-in-diameter hole into its northern rim, and Ptolemaeus also shows smaller impacts on its crater floor. Alphonsus, 74 miles across, has a well preserved central peak, where Ptolemaeus does not. Arzachel is roughly 60 miles in diameter and is very well preserved, showing

great detail in its walls and central peak.

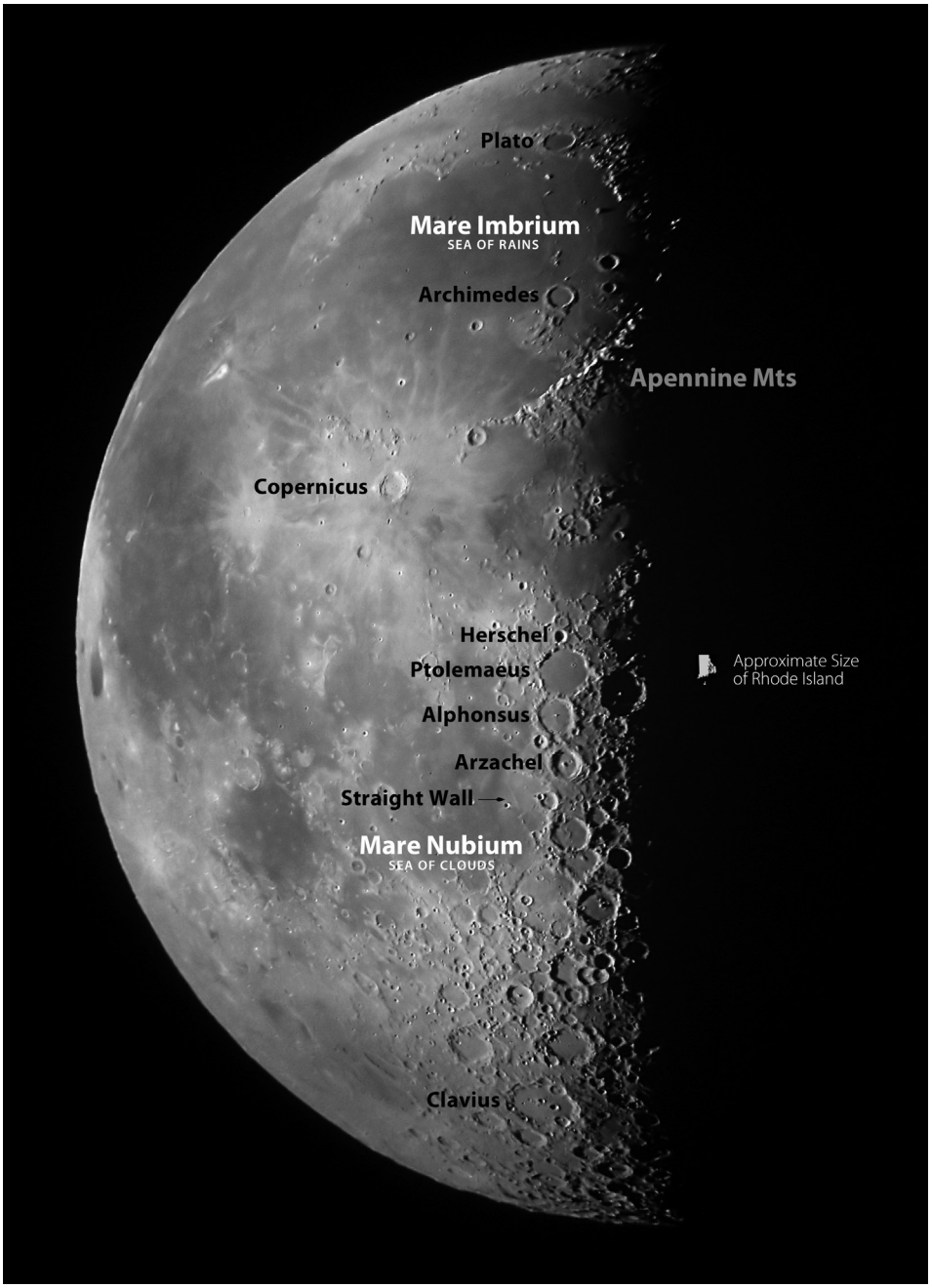
One of the most fascinating features on the lunar surface is the Straight Wall. This feature lies to the southwest of Arzachel and sits in Mare Nubium. This formation is a very impressive. It is a fault or escarpment approximately 74 miles long, 1.5 miles wide, and no more than 1,000 feet above the floor of the Mare. While it may look very steep, its slope is no more than 20 degrees. The Straight Wall's appearance changes dramatically with the sun angle, so try to observe it during other lunar phases as well.

And finally I can't end this lunar tour without noting crater Clavius. Sci-fi fans will recall that the monolith in the movie 2001: A Space Odyssey was uncovered in this crater. Clavius is huge, measuring 140 miles across. Though several smaller impacts have marred its floor, the inner crater walls are high and well defined. Several impacts have also occurred along the rim.

I hope this brief tour of our closest neighbor in space will encourage you to spend a few hours examining the lunar surface with whatever optical instrument you can use. The more magnification one is able to apply, the more detail one will be able to discern. Binoculars and telescopes should be outside collecting moonlight, not inside collecting dust in a closet or basement.

While you won't find any of the local observatories open after midnight to observe the Last Quarter Moon, don't forget that they are open to observe the heavens at more convenient times. Seagrave Memorial Observatory (http:/www.theskyscrapers.org) in North Scituate is open to the public every clear Saturday night. Also, Ladd Observatory (http://www.brown.edu/Departments/Physics/Ladd/) in Providence is open every clear Tuesday night. Frosty Drew Observatory (http://www.frostydrew.org/) is open every clear Friday night year-round. Be sure to check all the websites for the public night schedules and opening times before visiting these facilities.

Keep your eyes to the skies.



July Reports

Ed Haskell, Secretary
Jim Crawford, Treasurer

The Skyscrapers Inc.
Executive Committee Meeting
Minutes
July 7, 2011

Trustee Special Election John Leonelli volunteered to finish up the remainder of this year for the trustee position vacated by Tom Barbish. Special election ballots will be mailed to the membership. The results will be announced at the Aug meeting.

Observation Committee

Trustee Steve Siok will present at the July meeting his report which outlines a schedule of dates, names and a process to improve our public outreach program.

Astronomy equipment and material donated to Skyscrapers will be displayed at the July picnic. Several members have shown an interest in some of the items. A list will be provided at the cookout registration table.

July Meeting and Member Cookout Confirmed Friday a.m. that the Port-a-John will be positioned inside the chained entrance. Volunteers assigned to various tasks provided updates and final details for Saturday's annual picnic.

Meeting adjourned at 9pm.

Respectfully submitted

Ed Haskell

Secretary

Skyscrapers Minutes
July 9, 2011
Seagrave Observatory

One of the attributes of Skyscrapers that differentiates us from other amateur societies is the high regard in which we are held by professional astronomers. This is evidenced by their willingness to speak at our monthly meetings and at AstroAssembly. A number of our junior members have gone on to earn advanced degrees in Astronomy and Physics, at least in part, due to the inspiration of this amateur-professional exchange. It is a pleasure that many of these professional astronomers are still in their youth and relate well to our junior members. Tonight's speaker is an even more relevant role model.

Adam Jermyn is a 2011 graduate of Longmeadow, Massachusetts, High School, a member of the 2011 U.S. Physics Olympiad Team, a participant at Stellafane, and was recently accepted for admission at Harvard, MIT, Princeton, CalTech, and the University of Chicago, Adam is thinking about becoming a cosmologist. He chose to attend CalTech starting this fall. Adam's presentation will include anecdotes from his intense experience participating at the U.S. Physics Olympiad training camp as well as general reflections from his work as a serious student of science and mathematics.

Adam's talk was very well received, not only for its content but also for the plainly evident enthusiasm he feels, and communicates, about astronomy and cosmology. We look forward to hearing him speak again periodically as he progresses through his collegiate and professional paths to scientific greatness.

Business Meeting:

Secretary's Report accepted

Treasurer's Report heard.

Trustees Report by Steve Siok

Trustees were disturbed when Steve Siok and Jim Crawford arrived at the Observatory on Wednesday and discovered the elevated walkway door standing open. There was no evident vandalism to the building so it is assumed the last observing parties failed to secure the door. This kind of oversight is plainly very serious and the Trustees are taking steps to implement measures to prevent its recurrence.

An **Observatory Committee** meeting was held on June 29. Members discussed how to conduct meetings and the various activities of the Observatory going forward. These discussions included how to rationalize the process of ensuring each of the public observing sessions is properly staffed, and two subcommittees were formed:

Objects committee: to determine which objects should be preferentially assigned to which instrument so that visitors are presented with a variety of objects during their session.

Instrumentation committee: to assess what maintenance and enhancement is appropriate for each of the telescopes (a first task will be to examine the need for work on the 12 inch Meade).

1st VP report: A speaker for August has not yet been found. Work continuing.

2nd VP Report: Four featured speakers have now been obtained for AstroAssembly and a flyer is being prepared with details.

Star Party Coordinator: Tom Thibault reminded us that we were to participate in

the Newport Folk Festival (and that thus far a half dozen members have responded to the need for volunteers. More are desirable.

This large event is planned for the end of July (Newport Folk Festival) which will involve daytime observing. Will need scopes appropriately equipped.

The President requested that persons addressing the meeting stand and state their name clearly and provide notes on their issue or report so that a complete record in the Minutes is possible.

Historian: The recent work party to sift through ancient files of the Society unearthed around fifty Seagrave items including a notebook with entries beginning on June 5, 1878. Among other things it appears to contain records of relative position observations of physical binary stars.

Eventually these efforts to go through the many boxes of old documents will result in every potentially significant item being included in a catalog for ready reference.

Old Business:

The second reading for Robert Simon was conducted and he was elected to membership.

New Business:

Nominating Committee reported the slate for the special election to fill a vacancy on the Trustees.

Trustee-John Leonelli

No nominations from the floor were heard. The Elections Committee will circulate a ballot prior to the next meeting.

Meeting adjourned at 9:37pm

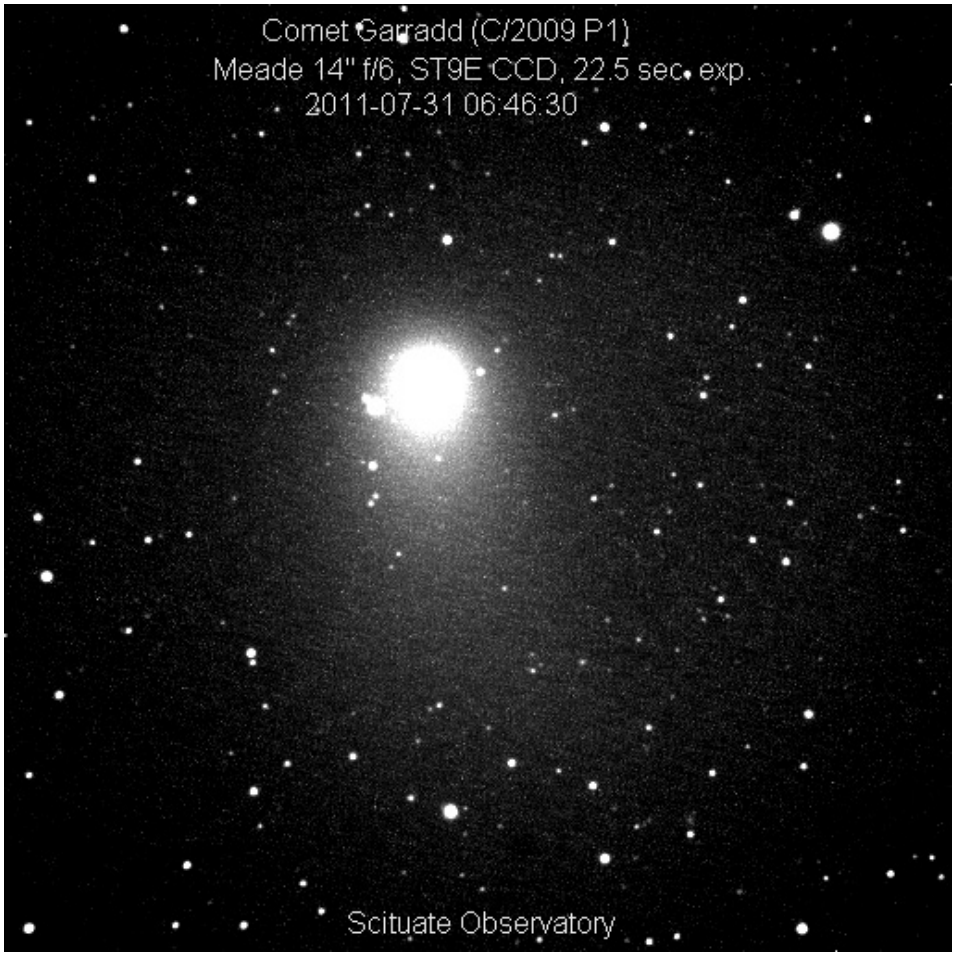
Respectfully submitted,

Ed Haskell

Secretary.

Budget as of 7/22/2011	2011-12 Budget	Actual YTD	Difference
INCOME			
Astroincome	$3,500.00	$0.00	-$3,500.00
Cookoutinc	$500.00	$554.00	$54.00
Other Donation	$300.00	$234.00	-$66.00
Dues	$3,075.00	$1,210.00	-$1,865.00
Interest Inc	$125.00	$13.46	-$111.54
Starparty Donations	$500.00	$37.00	-$463.00
TOTAL INCOME	**$8,000.00**	**$2,048.46**	**-$5,951.54**
EXPENSES			
Astroexp	$2,750.00	$0.00	$2,750.00
Cookoutexp	$423.00	$349.30	$73.70
Corporation, State Fee	$22.00	$22.00	$0.00
Domain Name	$15.00	$15.00	$0.00
Donations	$50.00	$50.00	$0.00
Electric	$175.00	$34.89	$140.11
Insurance, Property	$2,625.00	$0.00	$2,625.00
Postage and Delivery	$225.00	$11.25	$213.75
Presidents Fund	$150.00	$25.00	$125.00
Printing and Reproduction	$140.00	$0.00	$140.00
Propane	$375.00	$80.25	$294.75
Refreshment Expense	$350.00	$20.29	$329.71
Trustee Exp	$700.00	$85.00	$615.00
TOTAL EXPENSES	**$8,000.00**	**$692.98**	**$7,307.02**
Cash Accts			
Citizens Checking	$8,879.72		
Capital One	$11,483.35		
Total	**$20,363.07**		

Comet Garradd (C/2009 P1) is presently very near the globular cluster M15 at the western end of Pegasus and transits about midnight. It will move westerly in the sky through Delphinus, Sagitta and then into Hercules in October and November and becoming an earlier evening viewing object. The nucleus is quite bright with a broad hood and a very wide fan shaped tail. It should keep brightening from the current about 7.5 to 8th magnitude to possibly becoming a naked eye comet as it approaches Hercules when viewed from a light pollution free dark sky site. This comet deserves periodic observing to see if it reaches naked eye visibility in the next few months. Image by Bob Napier.



NASA's Space Place

New GOES-R to Give More Tornado Warning Time

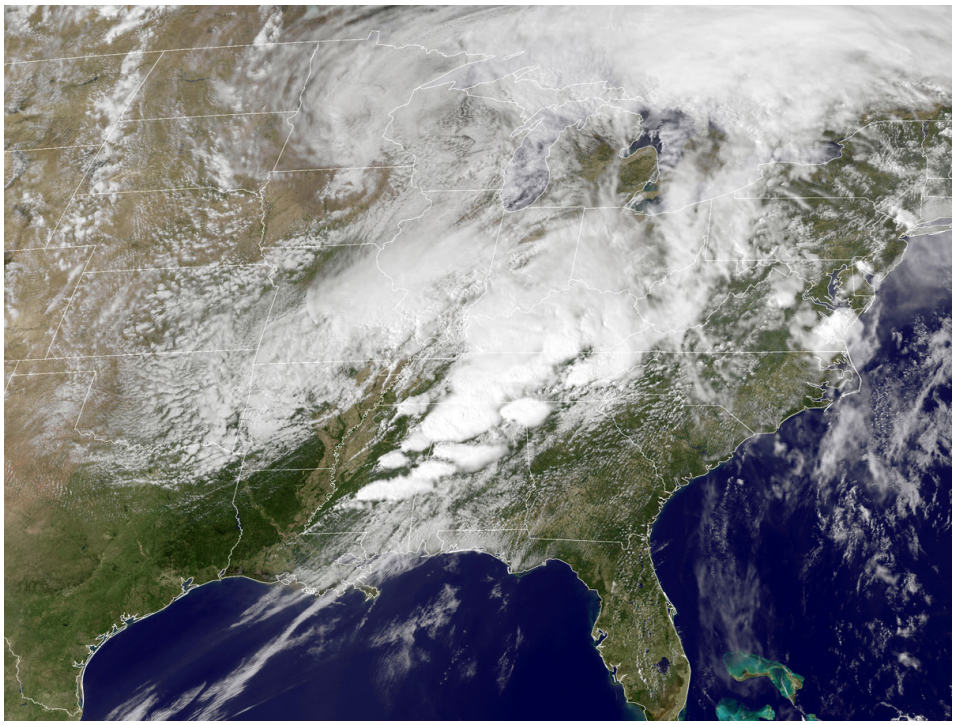
Dr. Dauna Coulter and Dr. Tony Phillips

So far this spring, more than 1,400 tornadoes have struck the U.S. Some of them have cut jaw-dropping trails of destruction across the countryside and, tragically, across inhabited communities, too. Hundreds of lives have been lost in the onslaught.

Throughout the season, the National Weather Service has routinely issued tornado alerts. In the case of the Alabama tornadoes of April 27th, forecasters warned of severe weather five full days before the twisters struck. Because they couldn't say precisely where the twisters would strike, however, many of their warnings went unheeded.

"If people get a hurricane warning, they often evacuate the area," notes NOAA's Steve Goodman. "But we react differently to tornado warnings."

Perhaps it's because tornadoes are smaller than hurricanes, and the odds of a direct hit seem so remote. Recent pictures from Tuscaloosa, Alabama, and Joplin, Missouri, however, show the perils of playing those odds. Goodman believes that more precise warnings could save lives.



This GOES image shows the storms that spurred the intense April 27 tornado outbreak in the southern U.S. Animation showing the development of weather can be seen at http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=50347.

To fine-tune tornado warnings, NOAA will soon launch the first in a series of next-generation weather satellites – GOES-R (Geostationary Operational Environmental Satellites-R series). The spacecraft is brimming with advanced sensors for measuring key ingredients of severe weather including winds, cloud growth, and lightning.

"GOES-R will be the first geostationary spacecraft to carry a lightning sensor," says Goodman, the GOES-R Program Senior Scientist. "Studies show that sudden changes in the total lightning activity correlate with storm intensity—and with tornadoes."

The lightning mapper will detect and map not only cloud-to-ground lightning, but also bolts within and between clouds. The kind of cloud-to-ground lightning we see from our front yards accounts for only 15-20 percent of total lightning. To get a clear idea of a storm's intensity, meteorologists need to know about *all* the lightning—a view GOES-R can provide.

All by itself, the lightning mapper will provide 7 minutes more lead time in tornado warnings, according to Goodman. GOES-R's state-of-the-art instruments will also improve long-range forecasts.

"The satellite's Advanced Baseline Imager (ABI), for instance, will provide a much clearer picture of clouds," says NOAA research meteorologist Tim Schmit. Compared to lesser instruments already in orbit, ABI can better detect super-cold "overshooting tops," evidence of enormous energy and upward velocity that correlate with subsequent severe weather.

"Accurate advanced notice of high-risk tornadic conditions can cue officials to close schools and businesses even before tornadoes are actually detected," says Schmit.

Forecasters doubt tornadoes can ever be predicted with 100% accuracy. The twisters are just too capricious. GOES-R, however, is a step in the right direction.

Find out more about GOES-R's unprecedented capabilities at http://www.goes-r.gov. Young people can learn more about tornadoes and all kinds of other weather at http://scijinks.gov.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

The 30-Year Legacy of NASA's Remarkable Spacecraft:

The Space Shuttles

Jim Hendrickson

It was a different time and a different world. Ronald Reagan was recently sworn in as President of the United States. Return of the Jedi was yet to be released. Video game enthusiasts were playing Asteroids and Pac-Man. I had never seen a computer, nevermind having used one. My first gaze through a telescope was still three years away. But way down south in Florida, a state with which I became familiar just a year prior, a magnificent white spacecraft roared towards the sky over a huge plume of smoke in an iconic image that would grace the covers of National Geographic and Time magazines, among many others.

Back in those days, we had three television stations to choose from, and if the weather was good, one or two more could be watched through the "snow." But despite a lack of variety on the television dial, a Space Shuttle launch was worthy of interrupting the regularly scheduled programming, and I vaguely recall watching three or four launches in the early 1980's. I do not recall if I witnessed STS-1 Columbia or not, but I recall being fascinated as I listened to the NASA commentator calling out altitude and distance every few seconds following liftoff, finding it incomprehensible how quickly the shuttle zoomed away from its launch pad as the grainy image of the huge rocketship was reduced to a bright dot just after the solid rocket boosters separated. The television camera stayed right with it all the way until main engine cutoff, at which time the commentator would declare that the astronauts were now in orbit.

While I was fascinated with the launches I had seen on television, I wasn't old enough to really appreciate what it was that I was witnessing, what the space shuttle was all about, or know anything about the people who flew it. In my mind, the space shuttle had always been flying, because I had no recollection of what happened before.

During the same time period, Voyager images of the planet Saturn, its rings, and moons began to make their way into my consciousness, which I began to take a strong interest in. I read as much as I could about Voyager, and found out about its Jupiter flyby a couple of years earlier. I learned that Voyager's next planetary flyby wouldn't come until January 1986, which was forever in the future to me at that time. I continued to read and learn about past manned as well as unmanned space exploration. I had recollections of being aware that men had walked on the Moon, but was still more engaged by the prospect of unmanned spacecraft exploring deep into the solar system.

I had watched a few Space Shuttle launches, but had more or less taken them for granted and didn't pay much more attention to the shuttle flights. Besides launches and landings, information about what the astronauts actually did on these spaceflights was hard to come by in the pre-internet era.

By mid-decade, the buzz about Halley's Comet had gone full-steam, and being equipped with a telescope and rapidly expanding interest in the solar system, I was determined to see it. I didn't have much access to the night sky besides the northwestern horizon over the lake, which actually extended from west-southwest all the way to north-northeast. I had began to learn the constellations--at least the ones I could see given my limited sky--with the hopes of finding the comet.

Then there was the excitement of Voyager 2 *finally* making it to Uranus. January 24, 1986 had been marked on my calendar since the early 80's, even though I knew it would be several weeks before I would see the pictures beamed back from the venerable little spaceprobe.

Then it happened.

The morning of January 28, 1986 would become my generation's "where were you when" moment. Space Shuttle Challenger and its seven brave astronauts never would complete their flight on mission STS-51L. I was in the sixth grade at W.L. Callahan School in Harrisville and had just come back from lunch recess when the news came across the intercom. The lights in the classroom were turned out and the school observed a moment of silence. I didn't see

Five astronauts and two payload specialists made up the Challenger crew in January of 1986. Crew members are (left to right, front row) astronauts Michael J. Smith, Francis R. (Dick) Scobee and Ronald E. McNair; Ellison S. Onizuka, Sharon Christa McAuliffe, Gregory Jarvis and Judith A. Resnik.

STS-51L
Challenger
January 28, 1986

the launch until later that evening on the news. Somehow it was unimaginable that a Space Shuttle could take off but never land. Then we listened to President Ronald Reagan give his memorial speech. A somber moon permeated everywhere. How could this happen? Will we ever fly again?

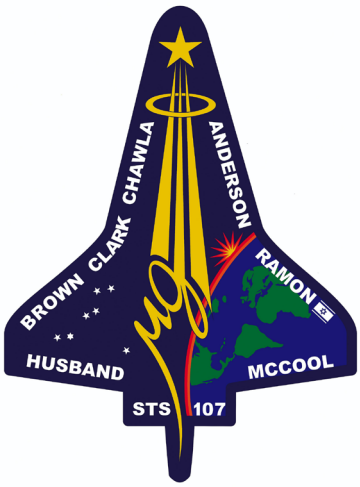
While Challenger never reached orbit on her final flight, STS-51L was able to accomplish something that no Space Shuttle flight before it had done. For the first time I realized the significance of human spaceflight and why it was important.

Within a day or two I had memorized the names of all the astronauts on STS-51L and created a memorial piece for art class. I closely followed the news reports with the curiosity of an engineer as the investigation pieced together what went wrong.

I found a copy of Space Shuttle Operator's Manual and read it cover to cover, which greatly deepened my understanding not only about how a spacecraft works, but also how unique the Space Shuttle is and what it is capable of.

Months went by, and I eagerly anticipated the return to flight. During my rapidly expanding interest in astronomy and space exploration I had come across information about the Hubble Space Telescope, the deployment of which had been delayed by the Challenger accident. This was the first direction connection between the Space Shuttle and my interest in astronomy that I had become aware of. After following the Voyager missions for several years, I looked forward to what an observatory placed outside of Earth's atmosphere could accomplish.

I occupied the hiatus in Space Shuttle flights learning even more about the history of spaceflight, including the adventures to the Moon that had taken place a few years before I was born. It was during this time that I learned about Apollo I, and how



STS-107
Columbia
January 16, 2003

Columbia crew members, seated in front from left, are astronauts Rick D. Husband, mission commander; Kalpana Chawla, mission specialist; and William C. McCool, pilot. Standing are (from the left) David M. Brown, Laurel B. Clark, and Michael P. Anderson, all mission specialists; and Ilan Ramon, payload specialist representing the Israeli Space Agency.

Apollo XIII nearly ended in disaster.

When it was finally time to fly again, I wasn't able to watch the launch live on television, but I recall sitting in social studies class thinking about the return to flight, drawing pictures of Discovery blasting off on STS-26. All was right again. We were safely flying and landing Space Shuttles once again.

I made an effort to watch as many launches and landings as possible, something that would become a mainstay of my interest in spaceflight right through STS-135 which touched down on July 21 of this year. It was easy to track Space Shuttle flights in the early days and even during the return to flight era of the late 1980's, when the major television networks would broadcast them live.

As time passed, however, public enthusiasm for spaceflight waned again but my personal connection to it would not. Television networks soon would not bother interrupting normal program to show a Space Shuttle flight, but by this time I had access to cable television and could always find CNN to show me at least the first two minutes of a launch. It remained elusive, however, to track mission details in real-time other than launches and landings. I would learn of the exploits of the astronauts in newspaper and magazine reports published days, weeks, or in some cases, months after the fact.

The public's attention would soon turn to NASA once again, however this time in a decidedly negative manner. Shortly after the long-awaited deployment of Hubble Space Telescope by deployed by Discovery during STS-31 mission, it was found that the orbiting observatory's mirror had been made to the wrong figure, rendering the entire telescope nearly useless. Having read Richard Berry's Build Your Own Telescope a year or two earlier, I had a good idea of what it takes to refigure a Newtonian telescope mirror. I had thought, if HST's mirror could be brought back to the ground, something only the Space Shuttle could accomplish, the telescope's optical flaw could be corrected.

As it turns out, repairing the telescope was possible, even without bringing it back from orbit. With the remarkable capabilities of the Space Shuttle, spacewalking astronauts performed repairs by means of swapping components on board the telescope to correct the optical flaw. Among replacing other components on the telescope, a package called COSTAR was installed by spacewalking astronauts on Endeavour's STS-61 flight. One of the astronauts that worked on the first Hubble repair mission, Story Musgrave, would visit Skyscrapers during AstroAssembly 2005. I would also later learn that my friend Phil Rounsville from the Amateur Telescope Makers of Boston had worked on some of the components of the COSTAR package. Phil was the first person to introduce me to Skyscrapers and Seagrave Memorial Observatory for AstroAssembly 1995.

As someone who grew up with the Voyager missions, I had grown very enthusiastic about unmanned missions to other planets in the solar system. During the mid

1990s, the Magellan mission to Venus and Galileo mission to Jupiter vastly enhanced our knowledge of these two planets. Both of these space probes were launched from the payload bay of Space Shuttle Atlantis back in 1989, not long after the post-Challenger return to flight and just before the deployment of Hubble. Within two years, Space Shuttle Discovery deployed the Ulysses mission, which left orbit to observe the Sun, and Atlantis deployed the Compton Gamma Ray Observatory, the second of NASA's Great Observatories program (Hubble being the first). It would turn out that the period from 1989 to 1991 was the most prolific time for the Space Shuttles' contribution to astronomical research.

The next era in Space Shuttle flights would be the first time since the closing days of the Apollo program that a joint American-Russian mission would take place. In fact there were nine Space Shuttle flights in total that would dock with the Russian Mir space station, which had been in orbit since 1986. Space Shuttle Atlantis became the workhouse of the Shuttle-Mir program, which lasted from 1995-1998. Even despite potential safety concerns following a fire on board Mir and its collision with a Progress resupply vehicle, the Shuttle-Mir program continued. This would become a signal of international trust and cooperation that would later be essential for the construction and operation of the International Space Station.

It was during the Shuttle-Mir program that I first sighted a Space Shuttle directly. In 1996, long before the days of heavens-above.com and its Space Station visibility tables, I happened across some information that listed the dates and times for a series of Shuttle-Mir pass over Rhode Island. I spotted Atlantis and Mir docked with the naked eye, and was able to track them for a brief moment using my 10-inch SCT.

I do not recall when NASA begin offering a live web stream, but I began watching it sometime around the turn of the millennium. It was a fairly low resolution view, given that high bandwidth connections were still rather uncommon. It didn't matter as I could not receive the broadcast via cable TV, and I wanted to see the whole eight plus minutes of a launch, all the way to MECO, rather than a minute or two of them.

The next few missions would be the early assembly missions for the International Space Station, an ambitious and long-term project that was one of the original design goals of the Space Shuttle. Lifting large modules into orbit, hoisting them out of the payload bay and maneuvering them into precise connections with the remote manipulator system's Canadarm, and providing a workstation for spacewalking astronauts doing all of the "finishing touches" was all well within the capabilities of the Space Shuttle.

One Space Shuttle flight I would watch launch, but not land. I recall watching the launch of STS-107 Columbia on my birthday in 2003. Sadly, this would become the final flight of the first Space Shuttle.

Following Columbia, however, we were treated with additional camera views and maneuvers that would make watching Space Shuttle flights even more enjoyable. The cameras were added to the twin solid rocket boosters and the external tank. The purpose of the cameras was to ensure the integrity of the orbiter's thermal protection system during ascent.

Even the very first return to flight, Discovery's astronauts performed the first-ever repair of a Space Shuttle orbiter in flight. It was not a major repair, but mission managers thought it wise to pluck a couple tabs of gap filler that had protruded from between thermal protection tiles under Discovery's nose. This maneuver made for an interesting spacewalk to watch as it gave never-before seen views of an orbiter in flight, but it also helped train that astronauts for this type of procedure should it become critical.

It had also been decided that the Space Shuttle would no longer fly to destinations other than the International Space Station, so that the ISS could provide an emergency quarters for a shuttle crew should the orbiter be deemed unfit for reentry while in orbit. From now on, heat shield inspections would become a regular part of the Space Shuttle flights. One would be performed during the first full day in orbit, and one was usually performed the day after undocking from the ISS.

Additionally, the r-bar pitch maneuver, also known as the RPM, or "backflip" was added to the Space Shuttle's approach procedure. The Space Shuttle would maneuver to a station-keeping position immediately "below" the station while performing a minutes-long backflip maneuver so that astronauts and cosmonauts on the space station could photography the complete underside of the orbiter. What was an essential heat shield inspection became one of the most interesting spectacles of the entire Space Shuttle flight, as NASA TV would nearly always broadcast this maneuver. Watching the Space Shuttle pitch up and over a

Some Notable Space Shuttle Flights

First Flight
Columbia STS-1
April 12, 1981 (20th anniversary of Yuri Gagarin's flight)

Manned Maneuvering Unit (untethered spacewalk)
STS-41-B Challenger
3 February 1984, 13:00:00 UTC

Woody Spring
STS-61-B Atlantis
26 November 1985, 19:29:00

Magellan mission to Venus
STS-30 Atlantis
1989-05-04 18:47:00 UTC

Galileo mission to Jupiter
STS-34 Atlantis
1989-10-18 16:53:00 UTC

Hubble Space Telescope
STS-31 Discovery
April 24, 1990

Ulysses mission to study the Sun
STS-41 Discovery
October 6, 1990

Compton Gamma Ray Observatory
STS-37 Atlantis
April 5, 1991

IntelSat VI Satellite Rescue (by three spacewalking astronauts)
STS-49 Endavour (maiden flight)
7 May 1992, 7:40 pm EDT.

Shuttle-Mir first docking
STS-71 Atlantis
27 June 1995, 19:32:19 UTC

Chandra X-Ray Observatory
STS-93 Columbia
July 23, 1999

First Shuttle/ISS Assembly Flight (2a)
STS-93 Columbia
July 23, 1999

International Space Station Complete
STS-134 Endavour
16 May 2011

	Columbia OV-102	Challenger OV-099	Discovery OV-103	Atlantis OV-104	Endeavour OV-105
First Flight	1981.04.12	1983.04.04	1984.08.30	1985.10.03	1992.05.07
Total Flights	28	10	39	33	25
ISS Flights	0	-	13	12	12
HST Flights	1	-	3*	1	1
Mir Flights	0	-	2*	7	1
SpaceLab Flights	10	3	1	0	1
Final Flight	2003.01.16	1986.01.28	2011.02.24	2011.07.08	2011.05.16
Time in Orbit	300.7d	62.3d	365.5d	307d	296.1d
Total Orbits	4,808	995	5,830	4,848	4,677
Total Distance (millions of miles)	125.2	25.8	148.2	125.9	122.9

*Includes the first Shuttle-Mir flight, which rendezvoused, but did not dock with Mir.

complete 360 degrees while Earth passes by beneath was always one of the key events I was sure to watch, along with launch and landing. The maneuver took place about 20-30 minutes before finally docking to the ISS.

The post-undocking flyaround was also a key event. This maneuver involved the Space Shuttle flying a complete loop around the ISS in order to document the construction progress as well as to check the condition of exterior components. From the station's perspective, however, this provided another opportunity to see a Space Shuttle in "free flight," again with amazing background scenery.

During the last few missions, NASA TV had finally upgraded the quality of their broadcast to a high definition stream. This was a vast improvement to the previous stream, which had been sub-standard definition. NASA also began sharing a lot of "behind the scenes" segments via their YouTube channel (NASATelevision). Learning more about the processing, procedures, and the people who put it all together gave me even more appreciation and enthusiasm for the Space Shuttle program, even knowing now that the program was nearing its premature end.

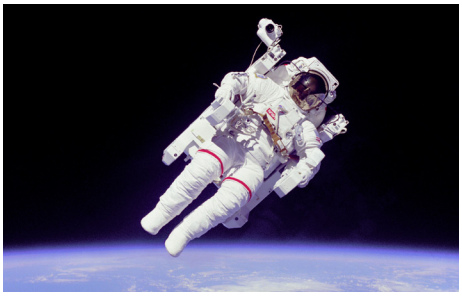
Atlantis' STS-125 flight was the first Space Shuttle flight that I followed continuously. This ambitious flight would become one of my favorites, as this would be the final time the Space Shuttle would be sent to upgrade and repair the Hubble Space Telescope. This mission was scratched after the loss of Columbia due to the requirement for all flights to dock with the ISS.

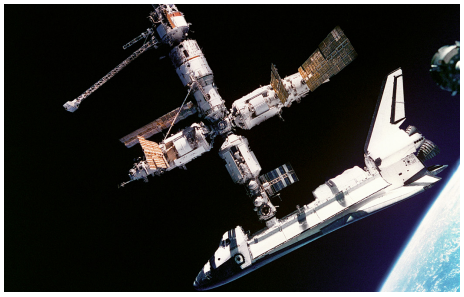
Astronauts performed five spacewalks and accomplished all of their tasks to send Hubble off for another several years of service. As part of this mission, the wide-field planetary camera 2 (WFPC2) which was installed during the STS-61 mission, and famous for many of Hubble's most well known images, was returned to Earth and will be displayed at the Smithsonian Air & Space Museum. This is the most significant piece of Hubble that future generations will be able to see as there are no plans to retrieve the entire telescope at the end of its service life. If there could be just one more Space Shuttle flight, I would like to have seen a HST retrieval mission, as I regard the orbiting telescope as the most significant hardware serviced by the entire Space Shuttle program. No other satellite or space probe has generated as much public interest in space and astronomy than the venerable Hubble Space Telescope.

The second-to-last flight of the Space Shuttle, STS-134, saw Endeavour deliver the Alpha Magnetic Spectrometer to mount to the space stations' truss. This particle physics experiment will investigate the basic building blocks of the Universe.

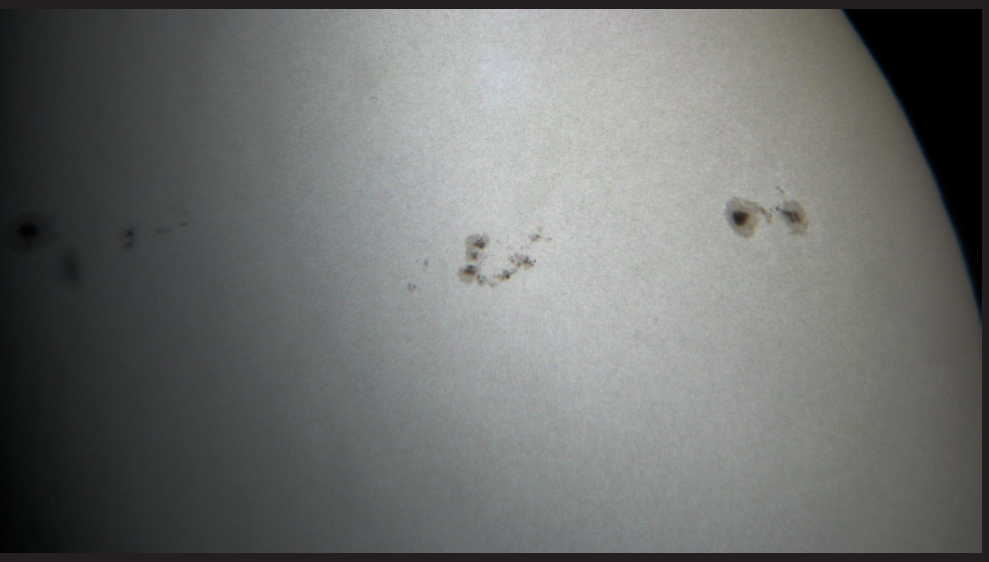
The final flight, STS-125, would bear no special payloads or mission objectives other than a fairly large space station resupply. However, the public attention given to Atlantis during this flight would suggest otherwise. Other than the nine tons of supplies for the International Space Station, this final flight carried with it, as all flights had done for a generation, the hopes, dreams, and inspirations of all who appreciate the efforts of exploring the Universe.

Thinking back on something that had been a part of my life as long as I can remember, it becomes apparent that the Space Shuttle was far ahead of its time. We asked it to do a lot, and in its 135 flights it accomplished everything we asked of it and more. It certainly could have done a great deal more if the program were to continue. But unfortunately its story is how history and it saddens me to think of it as such. The orbiters are being dismantled so that they can be made safe for permanent static display in museums. Perhaps I will get the chance to see Atlantis, Discovery, or Endeavour in person someday, but like seeing an old airplane in a museum that you know will never fly again, it just won't have the same feeling as watching them perform their duties in space via NASA TV, or even watching its starlike presence floating silently across the sky. One thing is for certain, the Space Shuttle program will receive its due respect in the history of great spaceflight achievements just as Mercury, Gemini, and Apollo have.





Dan Lorraine took this photo Sunday, July 31 after returning from Stellafane using a 4" Celestron refractor with an Orion glass filter and a Nikon Coolpix hand holding it to the eyepiece.



Jim Hendrickson took this photo on July 30 of the Sun projected onto a screen in the Porter Turret Telescope at Stellafane.

Skyscrapers, Inc. Presents

AstroAssembly 2011

Friday September 30 & Saturday October 1 Commemorating 50 Years of Space Exploration

Friday Evening Program: Informal talks: Contact Kathy Siok (kathys5@cox.net) if you would like to give a talk.

Saturday Morning Program
All day Saturday: H-alpha solar observing, swap tables

John Briggs HUT Observatory

Then and now: Adventures in Colorado Astrophotography, 1985-2011

Skyscrapers member John W. Briggs moved to Colorado in late 1984 and soon began assisting master astrophotographer Professor Edgar Everhart of the University of Denver. A particle physicist turned telescope maker and astronomer, Everhart discovered two comets from Connecticut before his own move to Colorado circa 1970. Everhart went on to pioneer optimum techniques for hypersensitizing the remarkable Kodak 2415 Tech Pan emulsion. Applying Everhart's methods, including the use of custom tracking hardware, Briggs performed cometary astrometry and recorded an image of Comet Halley that made the cover of Sky & Telescope. All this was just before the CCD revolution. In 2010, after many intervening projects, Briggs returned to Colorado to operate another 16-inch telescope optimized for astrophotography. Now at the HUT Observatory in Eagle, Colorado, John is exploring modern CCD astrophotography and moving-body astrometry. The technical advances are amazing and are especially wonderful to anyone familiar with the common limitations of the old days. John will relate some of the interesting things he's now learning and will share recent results. He will also wax a bit nostalgic regarding the old days of films, plates, and dark rooms -- a photographic technology of which Briggs was once a proud practitioner, but now near totally obsolete!

Saturday Afternoon Program
Lunch Grill

Dr. Sergei Khrushchev Watson Institute, Brown University

To the Stars: Yuri Gagarin and the Launch of Manned Space Exploration

Sergei Khrushchev, the son of the former Soviet Premier Nikita Khrushchev, is a Senior Fellow at Brown University's Watson Institute for International Studies. Working in the Soviet's space program Design Bureau, Dr. Khrushchev has a very unique perspective on the efforts to launch cosmonauts into Earth orbit and then eventually to the Moon. Dr. Khrushchev' will focus his talk on the legacy of Yuri Gagarin's historic flight aboard Vostok 1.

Dr. John Mustard Brown University

What's Next for Mars Exploration

The most technologically advanced and ambitious rover ever built will be launched to go the surface of Mars in late November of this year. The goal of the mission is to assess the habitability of the landing site (to be announced this week!) using the rover's sophisticated instruments designed to measure the chemistry and mineralogy of the surface. The rover also includes an instrument to determine if there are organic molecules and compounds. Dr. Mustard will provide an overview of the current state of Mars exploration for habitability, and some key aspects of the rover mission.

Prof. David Latham Harvard College Observatory

Super-Earths and Life

Transiting planets are special. The amount of light blocked by the planet as it passes in front of its host star sets the size of the planet (relative to the star). If an orbit can be derived from Doppler spectroscopy of the host star, the light curve also provides the orientation of the orbit, leading to the mass of the planet (again relative to the star). The resulting density for the planet can be used to constrain models for its structure and bulk properties. We are on the verge of using these techniques to characterize a population of Super Earths, planets in the range 1 to 10 Earth masses that may prove to be rocky or water worlds. Space missions such as Kepler, Plato, and TESS promise to play key roles in the discovery and characterization of Super Earths. Transiting planets also provide remarkable opportunities for spectroscopy of planetary atmospheres: transmission spectra during transit events and thermal emission throughout the orbit, calibrated during secondary eclipse. Spectroscopy of Super Earths will not be easy, but is not out of the question for the James Webb Space Telescope. Our long-range vision is to attack big questions, such as "Does the diversity of planetary environments map onto a diversity of biochemistries, or is there only one chemistry for life?" A giant first step would be to study the diversity of global geochemistries on super-Earths and Earth analogs.

Saturday Evening Program
Held at North Scituate Community Center
Catered Banquet Dinner

Dr. Peter Schultz Planetary Data Center, Brown University

Two Comet Tails: Results from the DIXI and Stardust-NExT Missions

On November 4, 2010 and February 14, 2011, two separate but related missions made close encounters with the nuclei of one new (109P/Hartley 2) and familiar comet (9P/Tempel 1). These two missions established a new perspective on how comets evolve with time. The recommissioned Deep Impact Flyby Spacecraft visited Comet Hartley, which is termed a hyperactive comet because of its extraordinary activity for such a small nucleus. The recommissioned Stardust-Next mission returned to Comet Tempel and imaged not just the other side of the nucleus but also the crater produced by the Deep Impact collision in 2005. We'll look in more detail at the results from both missions and what it may mean for our general understanding of how comets evolve. DIXI revealed a new paradigm for the release of water into the coma. Stardust-NExT documented changes in the nucleus and evidence for surface activity leading to widespread deposits.

Name _____

Address _____

_____

Email _____

x **Registrations at $17.00 each**
Registration cost is $17 per person through September 15. After September 15, registration cost is $20. Total $ _____

x **Banquet tickets at $17.00 each**
Banquet tickets must be pre-ordered. No tickets will be sold the day of the event. Total $ _____

Total $ _____

I would like to give a short 20-minute talk on Friday evening:
Indicate the title of your talk below. Kathy Siok (kathys5@cox.net) will contact you via email to confirm your talk.

_____

Send completed form and check (made payable to Skyscrapers Inc.) to:

Linda Bergemann
41 Ross Hill Road
Charlestown, RI 02813-2605

lbergemann@aol.com

Directions to Seagrave Memorial Observatory

From the Providence area:
Take Rt. 6 West to Interstate 295 in Johnston and proceed west on Rt. 6 to Scituate. In Scituate bear right off Rt. 6 onto Rt. 101. Turn right onto Rt. 116 North. Peeptoad Road is the first left off Rt. 116.

From Coventry/West Warwick area:
Take Rt. 116 North. Peeptoad Road is the first left after crossing Rt. 101.

From Southern Rhode Island:
Take Interstate 95 North. Exit onto Interstate 295 North in Warwick (left exit.) Exit to Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

From Northern Rhode Island:
Take Rt. 116 South. Follow Rt. 116 thru Greenville. Turn left at Knight's Farm intersection (Rt. 116 turns left) and follow Rt. 116. Watch for Peeptoad Road on the right.

From Connecticut:
• Take Rt. 44 East to Greenville and turn right on Rt. 116 South. Turn left at Knight's Farm intersection (Rt. 116 turn left) and follow Rt. 116. Watch for Peeptoad Road on the right.

• Take Rt. 6 East toward Rhode Island; bear left on Rt. 101 East and continue to intersection with Rt. 116. Turn left; Peeptoad Road is the first left off Rt. 116.

From Massachusetts:
Take Interstate 295 South (off Interstate 95 in Attleboro). Exit onto Rt. 6 West in Johnston. Bear right off Rt. 6 onto Rt. 101. Turn right on Rt. 116. Peeptoad Road is the first left off Rt. 116.

47 Peeptoad Road
North Scituate, Rhode Island 02857