

Bays Mountain Astronomy Club

👉 *Dinner @ Jack's: Jan. 11* 👈

REFLECTIONS

Greetings Fellow Amateur Astronomers!

I hope each of you had a very merry Christmas and a wonderful new year. December's meeting ended 2013 as a very interesting year.

Due to weather issues that did not afford us many nights of good viewing in 2013, we will look forward to 2014 as a better viewing year.

December's meeting had a little different plan as our keynote speaker got the flu bug and was not able to be with us. Terry Alford presented a completed project he had written about in one of his articles several years ago about a home-made red LED self standing field light. Following his presentation, we saw the planetarium show "A Part of the Sky Called Orion" which was produced here at Bays Mountain and co-written by Heather Fries, a past intern. It was a very interesting show.

The December constellation quest featured Aries, the Ram presented by Nate Wentzel. We were able to use the dome which allowed Nate to show the constellation at different night magnitudes. I knew that they could do that in the

BY WILLIAM TROXEL

theater, but have never seen it done. It makes a very big difference. If you want to learn more about Aries, here are some addition references that you may find useful: "Illustrated Guide to Astronomical Wonders," Robert Bruce Thompson & Barbara Fritchman Thompson, pg 90; "An Observer's Guide to the Universe Beyond the Solar System," Robert Burnham, Jr, Volume One page 245; and software programs such as Sky Safari Pro, or Stellarium. Since Brad Dunn, our very own NASA Solar System Ambassador, was not able to present in December, will be presenting the topic "Shift of the Sun's Magnetic Field" in an upcoming month.

The December meeting focused on the location of the annual dinner. The date of the dinner will be January 11, 2014 with a snow date of January 18, 2014. Thanks to everyone who offered locations for consideration.

The 2014 Annual Dinner will be at Jack's City Grill in Johnson City, TN, at 1805 N Roan St. The room will be open to us at 6 p.m. and we will start ordering dinner at 6:30 p.m. with a goal to start the presentation and meeting at 7:30 p.m. Be sure to

tell the host/hostess you are with the Bays Mountain Astronomy Club.

I want to thank all those members who came out this year in support of the StarWatches at the Park. Saturday night, November 30, ended the 2013 season for StarWatches. It was a great night in that it was clear and we were able to have a good viewing. I hope to see all of you in the spring of 2014 as we start new StarWatches.

Be sure to keep looking at the Park's web site for upcoming events in 2014. We did not have any new visitors at the December meeting.



Calendar

Special Events

Jan. 11 (snow date 18); 6 p.m. Annual Dinner at Jack's City Grille in JC. ETSU professor Dr. Richard Ignace will speak. His title is: "Discerning the Hidden Things In and Around Space Nebulae."

BMAC Meetings

7 p.m., Discovery Theater

Feb. 7 Topic and speaker TBA.

STAR STUFF

BY TERRY ALFORD

Early last summer, I acquired an 80mm f/6 ED refractor. A nice little scope with a retracting dew shield. With a 2-inch diagonal and eyepiece it weighs in at 6 lb. A little too heavy (IMHO) for my Leitz TiltAll tripod. The Leitz tripod works great with my Lunt 35mm Ha scope that weighs about half of the new ED 80. So I used the scope for several months with my Celestron SLT mount. It was tedious to carry the mount and tripod outside, get the 80mm scope and mount it, then go back inside again and get a couple of eyepieces and the battery to power the mount. Then turn the mount on and do the appropriate alignment. This was no problem if I wanted tracking and go to. But with colder weather arriving I really wanted something simpler and lighter for quick looks of the Sun with a white light filter or maybe the planets or even a comet (bye-bye ISON).

Of course, I could have purchased a new or used alt-az mount and lightweight tripod. But I already had a nice lightweight surveyor's tripod from a trade a few years ago. As for the mount I usually do not purchase anything if I can make it, especially if I can make it out of wood. I have done

things like this before so no real challenge. This time though I really wanted to cut down the mass and weight to make the system a one trip deal. Mission: a lightweight and compact pipe mount.

Looking around in my shop bins I found a 3/4-in pipe floor flange that had the threads drilled out. Well, this was not good for a turnable bearing

from a big box hardware store. This would be my altitude movement.

Now for the azimuth situation. Surveyor's tripods have a head on them to fit surveyor's instruments. Duhh. It wasn't too tough to adapt a wooden plate to the head. Then another plate with three pieces of Teflon and two counter sunk 1/4x20 bolts to use for attaching the mount.

I didn't bother with Formica as a bearing surface on this mount as it is so small it doesn't need it.

A re-used piece of 3/4-in oak was used for the vertical part of the mount. The base, also of

wood, was glued

and screwed to the vertical part. I used a couple of long 1/4-in lag bolts (recessed) and an additional glued piece to add extra strength to the mount.

The end result is an inexpensive, lightweight mount that works very well. It is easy to carry it outside in one trip with an extra eyepiece in my pocket. A sharp tap on the diagonal results in vibrations dying out in a little over a second. I like G'nG, especially in the winter time.

This mount begs for a 1/14 or 2-in hole for the extra eyepiece. This will come soon.



surface. But then I found another short piece of 3/4-in pipe that had been cut off leaving a stubby and almost worthless piece of pipe. Immediately I thought that some sanding work and a hammer would

allow a force fit to the flange. The other end of the flange had threads that would fit into a new floor flange

HAPPY BIRTHDAY SPIRIT

BY ROBIN BYRNE

This month we celebrate the “life” of a rover who had a lot of spirit. Launched on June 10, 2003, the Mars Exploration Rover Spirit successfully landed in Gusev Crater on Mars January 3, 2004. Its twin, Opportunity, landed three weeks later on the other side of the red planet.

Both rovers are almost 5 feet tall, 7.5 feet wide, and 5 feet long and weigh almost 400 lb. Running on a six-wheeled rocker-bogie system allowed them to easily traverse rough terrain. The rover was equipped with a logic system, allowing it to choose its own route when traveling. Although the top speed was 2 inches per second, they more typically moved slower - less than half an inch per second. A camera mounted at a height of 5 feet provided views similar to what a person standing on Mars would see, and provided the information needed to plan the rover's route. A robotic arm placed the various instruments up to the samples being studied. Being solar powered, the rovers were designed to operate during the day and rest at night.

With a primary goal of finding evidence for water in the Martian past, the instruments on board helped with that search. The Pancam (Panoramic Camera) takes images of the local terrain to help determine what area to explore in more detail. Mini-TES (Miniature Thermal Emission Spectrometer) would provide initial information about composition to help narrow down which rocks to study in more detail. It was also designed to study the temperatures in the atmosphere layers of Mars. If a rock or soil sample was of interest and contained iron, then they would study it

in more detail with the MB (Mössbauer Spectrometer). For determining other elemental compositions, the APXS (Alpha Particle X-Ray Spectrometer) would take care of the rest. Magnets were used to gather magnetic dust samples. The RAT (Rock Abrasion Tool) could eat away at the surface of a rock to expose the unweathered interior for



further analysis. And, finally, the MI (Microscopic Imager) provided high-resolution up-close images of rock and soil samples.

The evidence for water was the primary objective, so the landing site was chosen because it was expected to have been watery in the past. Gusev Crater was thought to have been a lake at one time. There are features that look like waterways leading into the crater, which adds to the credibility of that hypothesis. After the landing, the site was renamed Columbia Memorial Station in honor of the seven astronauts killed in the Space Shuttle Columbia disaster.

The mission was designed to last 90 days. Spirit went well beyond that goal, and that extra time was well spent,

despite some glitches along the way. Just a little over 2 weeks after landing, the first problem arose. The computer system became stuck in a “reboot loop” that kept encountering an error. It wouldn't shut down and it wouldn't boot up, and the batteries were quickly being drained. The error was found to be in the flash memory. The NASA engineers had found a way to bypass the flash memory, get the system booted up, and send the necessary commands to fix the problem. That's one potential disaster avoided. The first hints at water were found in March, 2004. A rock, nicknamed “Humphrey,” was formed from magma, which in and of itself wasn't that interesting. But what was inside that magma was a different story. Crystallized minerals, most likely deposited by water flowing through the rock, were found throughout the interior. This was the first evidence for water

depositing materials on the surface of Mars. At its next stop, a rock called “Pot of Gold” was found to contain hematite. This mineral typically forms in the presence of water. Near the start of its second year, Spirit found soil that contained salt - another sign that water had been present. Near the end of 2005, a rock formation dubbed “Comanche” revealed the presence of magnesium iron carbonate. Carbonates not only form in water, but in FRESH water. All other previous water finds had indicated acidic water, which would not have been conducive to life. This was the first evidence of life-friendly conditions.

(Continued on page 5)

NASA SPACE PLACE

The Big Picture: GOES-R and the Advanced Baseline Imager**By Kieran Mulvaney**

The ability to watch the development of storm systems – ideally in real time, or as close as possible – has been an invaluable benefit of the Geostationary Operational Environmental Satellites (GOES) system, now entering its fortieth year in service. But it has sometimes come with a trade-off: when the equipment on the satellite is focused on such storms, it isn't always able to monitor weather elsewhere.

“Right now, we have this kind of conflict,” explains Tim Schmit of NOAA's National

Environmental Satellite, Data, and Information Service

(NESDIS). “Should we look at the broad scale, or look at the storm scale?” That should change with the upcoming launch of the first of the latest generation of GOES satellites, dubbed the GOES-R series, which will carry aloft a piece of equipment called the Advanced Baseline Imager (ABI).

According to Schmit, who has been working on its development

since 1999, the ABI will provide images more frequently, at greater resolution and across more spectral bands (16, compared to five on existing GOES satellites).

Perhaps most excitingly, it will also allow simultaneous scanning of both the broader view and not one but two concurrent storm systems or other small-scale patterns, such as wildfires, over areas of 1000km x 1000km.

Although the spatial resolution will not be any

greater in the smaller areas than in the

wider field of view, the significantly greater temporal resolution on the smaller scale (providing one image a minute) will allow meteorologists to see weather events unfold almost as if they were watching a movie.

So, for example, the ABI could be pointed at an area of Oklahoma where conditions seem primed for the formation of tornadoes. “And

now you start getting one-minute data, so you can see small-scale clouds form, the convergence and growth,” says Schmit.

In August, Schmit and colleagues enjoyed a brief taste of how that might look when they turned on the GOES-14 satellite, which serves as an orbiting backup for the existing generation of satellites.

“We were allowed to do some experimental imaging with this one-minute imagery,” Schmit explains. “So we were able to simulate the temporal component of what we will get with ABI when it's launched.”

The result was some imagery of cloud formation that, while not of the same resolution as the upcoming ABI images, unfolded on the same time scale. You can compare the difference between it and the existing GOES-13 imagery here:

http://cimss.ssec.wisc.edu/goes/blog/wp-content/uploads/2013/08/GOES1314_VIS_21AUG2013loop.gif

Learn more about the GOES-R series of satellites here: <http://www.goes-r.gov>.

Kids should be sure to check out a new online game that's all about ABI! It's as exciting as it is educational. Check it out at <http://scijinks.gov/abi>

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



*The Advanced Baseline Imager.
Credit: NOAA/NASA.*

MISCELLANEOUS

**Happy Birthday
by Robin Byrne***(continued from page 3)*

Spirit's mission is often looked upon as being plagued with bad luck, but there was some good luck, as well. Near the beginning of 2005, Spirit's power levels were dropping. The most likely culprit was dust obscuring the solar panels. However, sometime on March 9, 2005, the power suddenly shot up. The best explanation for what happened is that a dust devil passed over the rover, and acting like a vacuum cleaner, cleared the dust off of the solar panels. Spirit was back to its energetic self. Then in 2006, its next problem arose. One of the front wheels stopped working. The NASA team's solution? Drive backwards, dragging the wheel. Much of the next year was spent not moving around much, because of the faulty wheel. But about a year later, in March 2007, the dragging wheel led to an exciting discovery. As it was being dragged, the wheel uncovered ground that was similar to places on Earth where water from a hot spring meets up with volcanic rocks. These places on Earth are perfect havens for microbial life and this location on Mars may have been equally hospitable. Between global dust storms and Martian winter, most of 2008 was a loss due to low power levels. There was concern that the power would not return to useable levels. But again, Spirit got lucky when a series of wind events blew off enough dust to boost the power levels once more.

It seemed inevitable, though, that Spirit's luck would eventually run out. May 1, 2009 saw the beginning of the end. While en route to its next destination, Spirit suddenly found itself trapped in soft soil with not enough traction to break free. NASA engineers tried a variety of tests with mockups of the rover and similar soil conditions.

Meanwhile, a second wheel, now in the rear, stopped working. When 2010 arrived, and Spirit was still stuck, the decision was made to use it in place, rather than continuing to try to move. However, the orientation to the Sun was not allowing the rover to power up fully. When Spirit missed a scheduled communication session, the best guess was that it had lost enough power to go into a preset hibernation mode until the power levels were back up. The last time we heard from Spirit was eight days prior, on March 22, 2010. NASA continued to hold out hope for another cleaning event, and sent signals to Spirit for over a year. On May 24, 2011, it was officially announced that the Spirit mission has ended.

Originally designed to last 90 Martian days (sols), where one sol is roughly equivalent to 24 hours 39 minutes, Spirit kept going for 2208 sols, instead. Expected to drive, at most, 0.4 miles, Spirit, instead, covered 4.8 miles. Not too shabby for a mission with so many problems. Meanwhile, Spirit's twin rover, Opportunity, is still going strong, coming up on its 10th anniversary. And Opportunity is not alone on the planet. Mars Science Laboratory Curiosity has been there for over a year and shows no signs of stopping anytime soon.

Despite all the obstacles it faced, Spirit showed a lot of spirit and determination in its exploration of Mars. It's a story that should inspire us all.

References:

Mars Exploration Rover Mission:
Overview

<http://marsrovers.jpl.nasa.gov/overview/>

Spirit (rover) - Wikipedia
[http://en.wikipedia.org/wiki/Spirit_\(rover\)](http://en.wikipedia.org/wiki/Spirit_(rover))

Missions - Mars Exploration Rover - Spirit - NASA Science

<http://science.nasa.gov/missions/mars-exploration-rover-spirit/>

Regular Contributors**WILLIAM TROXEL**

William is the current chair of the club. He serves as activities coordinator for a local retirement living community.

TERRY ALFORD

Terry is also a founding member since 1980 and has been chair many times, as well. He has worked as an astronomy lab instructor at ETSU since 2001.

ROBIN BYRNE

Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

ADAM THANZ

Adam has been the Editor for almost all of the years since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

The Bays Mountain Astronomy Club



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Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

Rates:

\$16 /person/year

\$6 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Find out more at our website:

<http://www.baysmountain.com/astronomy/astronomy-club/>

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