Star Gazer News

Newsletter of the Delmarva Stargazers
www.delmarvastargazers.org

Mark your calendars

The Delmarva Stargazers are pleased to announce our 13th annual Stargaze **Star Party** from **Friday April 13 to Tuesday 17 2007** at Tuckahoe State Park near Queen Anne, MD. The registration fee includes camping fee for the observing area. **ALL NIGHT STARGAZER COFFEE**, as always, will be free. Sodas and hot dogs will be available at minimal cost. Campers will be permitted to park and set up by their scopes, but there are no hookups or electricity in the observation area.

See below for details
http://www.delmarvastargazers.org/archive/sg2007/index.html

Upcoming Events:

- **Mirror Making Mar. 2-4**
  Mallard Lodge
- **Meeting Mar. 6th**
- **Field observing Mar. 16th**
- **Stargaze XIII Apr. 13th to 17th**

A Select Group of Winter Deep-Sky Objects

Kent Blackwell

The crisp, clear winter skies of January & February offer some interesting deep-sky objects for the amateur astronomer. I'll discuss a couple of dozen in this article. Some are quite bright and easy for small telescopes, while others will require a bit of patience and larger apertures. I'd be interested in hearing descriptions of how any of these objects appear in your telescope.

M 31 Andromeda 00h 43m +41 16' (Uranometria 1st edition p.60, Uranometria 2nd edition p.30L). At a distance of 2.2 million light years M 31 is one of the closest galaxies to our own, yet is also the most distant naked eye object visible from northern latitudes. I'm often amazed when amateurs are surprised to see it naked eye. It surely proves how light polluted our skies have become because M 31 is 4.5 magnitude, and therefore should present little challenge under a dark sky. My finest view of the *Great Andromeda Galaxy* was with a pair of giant 20x120 binoculars. However, it's almost equally as impressive in standard run-of-the-mill10x50s. Large telescopes are not always ideal; the galaxy is so huge the image spills out of the field of view. If you do observe it with such telescopes simply move your scope around, noting the wonderful detail. I often go to the telescope armed with a photograph of the object. Look at the dust lanes, particularly on the SW portion. Also note the two smaller satellite galaxies **M 32 & NGC 205** (aka M 110). M 32 is very small; in fact at low power it's almost stellar. NGC 205, on the other hand, is larger and has low surface brightness. Some purists refuse to call NGC 205 by its more common name of M 110 because there is controversy as to whether Charles Messier ever observed it.

G 1 Andromeda 00h 33m +39 35' (Uranometria 1st edition p.60, Uranometria 2nd edition p.30L). Are you in the mood for something difficult? How about a globular cluster lying in M 31, the Great Andromeda Galaxy? You say there is no globular in that region. Actually there is, and being part of M 31 lies completely outside our own galaxy. Designated as **G 1,** it is the brightest of all globulars in the Andromeda Galaxy. Seldom mentioned, not because of its faintness, but because it lies nearly 2 ½ degrees from M 31. If you'd like to try to find here's the position:
00h 32m 46.5s + 39 35' 03"

NGC 404 Andromeda 01h 09m +35 43' (Uranometria 1st edition p.91, Uranometria 2nd edition p.62R). Many people don't consider looking for the seldom-observed elliptical galaxy NGC 404. It's easy to locate at only 6' NW of the star Mirach, or Beta Andromedae. The galaxy is so close to that star it'll appear in the same field of view. People often don't know about it because M 31 tends to get all the attention. The 11th magnitude galaxy can easily be seen in telescopes as small as 3".

M 44 in **Cancer 08h 40m +19 40' (Uranometria 1st edition p.141, Uranometria 2nd edition p.74R)** is known by several names, including *Praesepe,* or manger. In this case manger means a trough for feeding livestock. From information I've gathered the name predates the invention of the telescope. Hipparchus (130 B.C.) called it *Little Cloud*.

A more modern name is *Beehive,* and certainly describes the object's appearance in a small telescope. I have seen the name *Bee Hive* (note the spelling) mentioned in "A High School Astronomy", an 1854 book by Lewis Rutherfurd. Visible to the naked eye

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the cluster contains several hundred stars. A low power, wide-field telescope will give the best view, but moderate-to-large apertures will show no fewer than 7 galaxies embedded within M 44, all quite faint. Are you up to the challenge? Can you see any of them in an 8" telescope? Let me know if you have any luck.

PB 1, aka PK 226-3.1, aka Sanduleak 2-2, Canis Major 07h 03m -13 42' (Uranometria 1st edition p.273, Uranometria 2nd edition p.163L). An obscure planetary nebula, it is seldom listed in star atlases, including Sky & Telescope's *Millennium.* I was glad, however, to see it has been included in the 2nd Edition of the new *Uranometria Atlas 2000*. You'll also find reference to it in Stephen Hynes' book, *Planetary Nebulae.* At 14th magnitude PB 1 is only 6" in size. Use an OIII filter, and "blink" the filter quickly between your eye and the eye lens. The object will seem to outshine similar faint stars when doing so. Because of the small size use at least 150-200x.

NGC 2359 Canis Major 07h 18m -13 14' (Uranometria 1st edition p.274, Uranometria 2nd edition p.136L). This is one of my favorite deep-sky objects, yet is often ignored in observing manuals. Sometimes called *Thor's Helmet* as well as the *Duck Nebula* NGC 2359 is associated with a Wolf-Rayet star, a class of hot stars exceptional for their large stellar winds. The object responds very well to nebula filters. No matter what telescope you're using don't miss it. With a nebula filter I was able to see it in a 10x40 finder-scope so don't be intimated thinking it might be too faint for your telescope.

NGC 2362 Canis Major 07h 19m -24 57' (Uranometria 1st edition p.319, Uranometria 2nd edition p.154L). Some often refer to this as the *Mexican Jumping Bean* cluster. Containing 30-40 stars it's easily found surrounding 4h magnitude Tau Canis Majoris. Only one million years old, NGC 2362 is one of the youngest clusters known. Tau is strongly suspected of being associated with the cluster. If so it is one of the most brilliant stars in our entire galaxy.

Stock 2 Cassiopeia 02h 15m +58 25' (Uranometria 1st edition p.37, Uranometria 2nd edition p.29L). Here's one you won't find on many star charts. It's an interesting open cluster visible only in low power instruments, preferably binoculars. What's remarkable about this little cluster is the fact it is shaped like a headless stick figure drawing of a man flexing his muscles. To find it move about 1 ½ degrees NNW of the famous *Double Cluster* in Perseus. Just scan the area with 7-10x binoculars. When you see it you'll agree it's a really a neat cluster. I seldom see it mentioned in observer's handbooks, but certainly is worthy of viewing.

M 77 Cetus 02h 43m -00 00' (Uranometria 1st edition p.220, Uranometria 2nd edition p.119L). At 81 million light-years M 77 is the most distant of all the Messier objects. It's also the brightest member of the Seyfert galaxies. I've seen it in a mere 10x40 finder. If you have a small telescope don't miss this beautiful galaxy.

M 35 & NGC 2158 Gemini 06h 09m +24 21' (Uranometria 1st edition p.137, Uranometria 2nd edition p.76R). There are many beautiful open clusters in this region, but one of those my favorite is M 35 in Gemini. Containing over 100 stars, M 35 lies at a distance of 2300 light years. While best at low power, higher magnifications shows even fainter stars, as well as the smaller open cluster NGC 2158. Quite ghostly, it is so tightly compacted that it resembles a globular cluster. NGC 2158 is one of the richest open clusters in our galaxy, and at 16,800 light years is one of the most distant.

NGC 2392 Gemini 07h 29m +20 55' (Uranometria 1st edition p.139, Uranometria 2nd edition p.75R). Known as the *Eskimo* and *Clown Face* nebula, it is certainly one of the finest examples of a planetary nebula. When viewed at 500x in telescopes larger than 12' you'll certainly see where its name originated. Another common name is the *Blinking Planetary*. To see the blinking effect stare directly at the 10.5 magnitude central star. Do you see the nebula disappear? Now try the opposite, use averted vision. Do you now see the nebula outshine the central star? This unusual illusion is often seen in planetary nebulae, and generally occurs when the magnitude of a planetary's central star closely matches that of the nebula itself.

NGC 3242 Hydra (10h 25m -18 38'). While in this area of the sky don't miss another great planetary nebula. This rather large object has high surface brightness, making it an easy target. In a dark sky with large aperture it is simply awesome. At high power the view resembles a human eye. Even moderate magnifications show it looking much like its namesake, the *Ghost of Jupiter.* Another nickname aptly suited is the *Eye Nebula*, and highly resembles a human eye. My best view of NGC 3242 was with a 12" Newtonian telescope using a 4.8mm Nagler eyepiece and a 2x Barlow lens (800x). Look carefully to see if you can detect the central star. Curiously, a nebula filter doesn't help this nebula, but with such a high surface brightness you won't need it anyway.

NGC 2261 Monoceros 06h 39m +08 45' (Uranometria 1st edition p.182, Uranometria 2nd edition p.95R). If ever a deep-sky object looked like a comet the famous *Hubble's Variable Nebula* is surely it. This object gets its name for its peculiar changes in brightness and shape, which might be caused by moving clouds of dark, cold dust. These changes have been noticed on photographs taken over the last century, so it isn't something you'll see change from night to night. The rather small object is shaped much like a miniature comet, and also highly resembles a badminton shuttlecock.

M 76 Perseus 01h 42m +51 34' (Uranometria 1st edition p.37, Uranometria 2nd edition p.29R). Known as the *Little Dumbbell,* M 76 lives up to its namesake, though is much smaller than M 27, the real Dumbbell Nebula. At 12th magnitude M 76 is quite faint, but has relatively high surface brightness. If you'd like to see an unusual sight look at M 76 in large apertures at 300x power or higher. To me, it looks remarkably like a barred-spiral galaxy. Remember, planetary nebulae generally hold magnification well, so don't be afraid to push the power.

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How to Join the Delmarva Stargazers: Anyone with an interest in any aspect of astronomy is welcome

NAME_____

ADDRESS_____

CITY, STATE & ZIP_____

E-MAIL ADDRESS (If any)_____

Do you need the newsletter snail mailed to you (Y/N)?_____

Please attach a check for $15 made payable to Delmarva Stargazers and mail to Kathy Sheldon, 20985 Fleatown Rd, Lincoln, DE 19960. Call club President Jerry Truitt at 410-885-3327 for more information.

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M 46 & NGC 2438 Puppis 07h 42m -14 48' (Uranometria 1st edition p.274, Uranometria 2nd edition p.135R). If you enjoy viewing open clusters you'll love 6th magnitude M 46 containing 150 stars. Look closer and you'll see a 10th magnitude planetary nebula embedded within the lovely cluster. At least a 4" telescope is required to see it, and a nebula filter helps immensely. Sir William Herschel was the first to notice the planetary in 1827. The two objects are probably not related. M 46 is the more distant of the two, lying about 5,000 light-years distant.

NGC 2440 Puppis 07h 42m -18 12' Uranometria 1st edition p.319, Uranometria 2nd edition p.153R). Another planetary nebula is just 3 ½ degrees south of M 46. The twin-lobed NGC 2440 shines brightly at just under 11th magnitude. It should be visible even in moderately light polluted areas, but for best results view it in a dark sky. Under such conditions the planetary surely belongs near the top of anyone's observing list. Try using a nebula filter. I find the Lumicon UHC works best with apertures under 10"; the Lumicon OIII and Orion Ultra-Block are best with larger aperture telescopes

M 1 Taurus 05h 34m +22 01' (Uranometria 1st edition p.135, Uranometria 2nd edition p.77L). The *Crab Nebula* was the first object cataloged in Charles Messer's list of objects. At 9th it's not difficult for modern telescopes but does tend to have low surface brightness. I've seen it in 10x30 binoculars, but one has to know exactly where to look with such small instruments. M 1, a supernova remnant, first burst into view on July 4, 1054. Try using a nebula filter, especially if observing in light polluted skies.

NGC 1514 Taurus 04h 09m +30 46' (Uranometria 1st edition p.95, Uranometria 2nd edition p.60L) is a fine planetary nebula, though very low in surface brightness. The 9th magnitude central star outshines the nebula. To see it best use a nebula filter, and I found the Lumicon UHC to be more effective on this object than the OIII filter. Though NGC 1514 is quite large (1.9') use moderate-to-high power to bring out details.

M 33 Triangulum 01 34m +30 40' (Uranometria 1st edition p.91, Uranometria 2nd edition p.62L). Under a very dark sky M 33 is just barely visible to the naked eye, but is perhaps best in binoculars. Because of low surface brightness it can be difficult in a telescope. If the sky is clear, however, M 33 can be fascinating. Under such skies look use 100x or so and look at some of the beautiful HII regions, appearing as bright knots. One such bright region has its own designation, NGC 604.

I've only touched on a few deep-sky objects gracing the winter sky, omitting the *Great Orion Nebula,* the *Pleiades* and the like since much has already been written about these. The purpose here has been to touch on a few lesser-known objects, though I couldn't resist throwing in a few warhorses. If you have a favorite please let me know. *Kent Blackwell* (kent@exis.net)

The Delmarva Stargazers Announces a Writing Contest.

The DMSG will raffle away astronomy gifts to members who submit articles to the Star Gazer News.
How to enter:

1 Open to DMSG members.
2 Members may submit original articles at least 500 words (1/2 page) for publication in the Star Gazer News.
3 Articles **must** be authored by the member.
4 Pictures can be included, but they do not count towards word count (1 picture = 1000 words).
5 Must be astronomy related. Each article = one chance in the raffle. The drawing will be made at the star parties based on the previous 6 issues – need not attend to win (but it would be nice to see you there). *The editor of the Star Gazer News qualifies articles submitted.*

The Solar System in March

Pj Riley

Mercury☿ will be at greatest elongation west on the 22nd. Look in the early morning' twilight. Venus ♀ is a nice evening object. Mars ♂ will rise just before Sol ☉ in the SE. Jupiter ♃ rises after 1AM this month. Saturn ♄ is at opposition on the 10th, so this month will give you good views. Uranus ♅ is still in Aquarius , but so is Sol ☉. You can get a glimpse just after sundown if you hunt. Neptune ♆ is near Sol ☉ on the 8th, so you will have a hard time looking. You can find the minor planet Pluto ♇ to the right of Scutum. (As always, you can always find Terra ⊕ by looking down).

Special Events: There will be a **Lunar Eclipse** at Moonrise on the night of the 3rd. This will be the best lunar eclipse for us for awhile, so get out and look. **Zodiacal Light** is visible in the W after sunset for 2 weeks starting on the 6th (I don't think it will be as bad as what Paul Gray deals with, see his bit on pg. 4). **Daylight Savings Time** starts on the 11th with the **Equinox** on the 21st.

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Hunting for Supernovae

Paul Gray

On January 26th, 2007 I was to have an evening that would be one of those to remember. With my first supernova back in 1995 the last two were part of a new search with my good friend David Lane. After a slow start we picked up the two in 2005, one in January and again in September. The following spring, however, we had decided to join forces with other amateurs and become part of the Puckett Observatory Supernovae Search. A group of over 20 people, using 5 telescopes, we would image and scan the northern sky roughly every 4 days!

To me, I thought my chances of discovery would increase. Instead of just having data on the clear nights in Nova Scotia, I could have data most every night from somewhere in North America. However, I welcomed the lesser work load. Dave Lane, on long winter nights, could provide me with some 500 images! That meant a few hours of checking and with a young family and work it was just not possible to keep up on more then a few occasions. Now I could let some of those images go elsewhere and take a smaller load. More nights but less per night should average out.....Not!

Call it a jinx, bad luck, or just the random draw of the groups of images I had but it would be 8 months of searching with the new team before I would find my 1st supernovae with Tim Puckett. Now in the year 2006 the team found 29 supernovae and missed 10! I should mention that Dave Lane too had the same drought. In November 2006 I would actually miss a supernova in an image taken by Dave's telescope! However, in a comedy of errors, another scanner would miss it as well, and when one finds it, the ball was dropped again without a follow up being done. Strange things do happen.

So, it was Friday night, when after the kids were put to bed, I was checking images that were taken on Thursday night and came across the image below of UGC4008. At first glance the image looked good, stars were nice and round with good focus, and a nice dark background and good depth of magnitude, most likely as faint as 19th magnitude! As you can see from the discovery image though the core of the galaxy was not round but more elongated at an angle away from the plane of the galaxy. The comparison image (not shown here) shows a galaxy with a nice round core! What was wrong with the new image? The "noise" was not very prominent but was large enough to appear round like a bump on the core of the galaxy.

Not yet convinced, I checked the usual places to confirm what is was not. A check of the current Supernova on the IAU website showed no known supernovae in that galaxy. A check of the minor planet center's asteroid data base showed no minor planets close to the galaxy at the time the image was taken. A check of the Palomar Sky Survey showed no fainter stars that could be a variable that has brightened. Gut check time.....It was time to send a email to Tim Puckett and call him. After a short chat the galaxy was to be re-imaged. Now I had nothing to do but wait.

Being a little excited I needed to relax before going to sleep. All the above, plus finishing checking the rest of the images, meant it was now 11pm, I should have been down at 9:30pm! So I looked for a book that I have not read in a long time. I found David Levy's, "More Things in Heaven and Earth" and only managed to read the Foreword and Introduction due to sleep. However, I did flip to the inside of the front cover to read the poem found there before closing the book. The last stanza sat with me as I fell asleep.

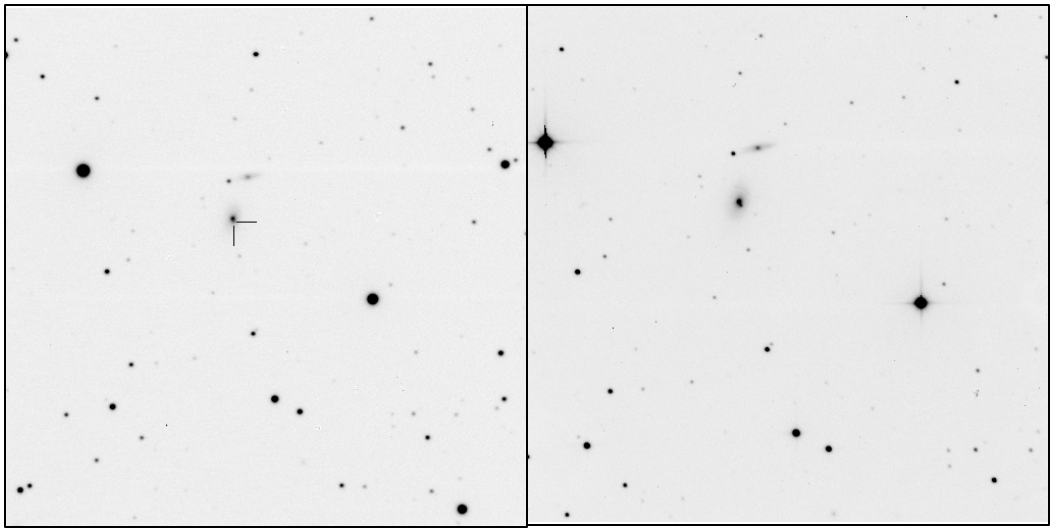
"'Tis your bright and tiny spark,
Lights the trav'ller in the dark:
Tho' I know not what you are,
Twinkle, twinkle, little star."

With a quick glance of the inside leaf I recalled this book was one I had autographed by the author and two of his friends. One signed it, " Paul and Sue find a good one! Gene Shoemaker".

The next morning, I was cooking our usual Saturday pancake breakfast with the kids while the email downloaded. A quick glance at the headers and there was one forwarded to me of an IAU Circular. In it was an announcement of SN2007R with Tim and my name attached to it! It was real! Another email had a copy of the confirmation image (see image) which showed the supernova much brighter and easier to see! Catching this one was very rewarding simply due to it being so tough to see and being faint and on the climb. Finally, after 8 months on the Puckett team, I got the monkey off my back in a most gratifying way.

(Editor's Note: Susan and Paul Gray were members of the Delmarva Stargazers who relocated back home to Canada. Their daughter Kathryn is now 6! She is in 1st Grade and doing great. Their son Nathan is now 3 and all boy. Both kids got to see the comet a few weeks ago. The Grays are going to Calgary, Alberta in June/July for the RASC General Assembly. It's part of the Astronomy Roundup, a single assembly for the RASC, ALPO and AAVSO! From Paul: "We moved to an area 15 minutes outside Fredericton, New Brunswick. Puts us only about 13 hours from Smyrna (road trip someday?). Might be about 50 homes out our way and that is it! The next big city is an hour away. East and West of me is nothing for about 60 miles, North it's about 120 miles of nothing but woodlot. Needless to say my back yard is dark! An average night my limiting magnitude naked eye is 6.2 to 6.4, occasionally going to 6.9 and 7.1. One night, me and my buddy saw M81 naked eye! The Milky Way is just amazing with dark lanes everywhere. The zodiacal light is a ***nuisance*** *in March and late September. We've seen the Horsehead with my 4 inch refractor on a couple occasions and it's easy with the 12.5. Yes, I am now spoiled! Clear skies, Paul Gray.)*

After this was written, on Monday night 2/19 Paul discovered two more SN, just 45 minutes apart.



Discovery Image Confirmation Image

Pj's Pick – Asteroid 2006 VV2

2006 VV2 was discovered by LINEAR (MIT) on November 11, 2006. Though this asteroid will only get as close as 8 LDs (LD=distance from earth to the moon), it will get as bright as mag 9. It will be moving pretty fast in the sky (~62 arcseconds/minute). If you look every hour or so, you may be able to pick it up easier. On the 31st, it will be the closest, fastest, and brightest. Look towards Leo, and follow the chart. I look forward to hearing if you do see it. I'll print the best picture a club member takes of it. This should be doable in medium to large amateur telescopes.

What experiments are planned for this flyby? If scheduling permits, they intend to turn the VLBA towards 2006 VV2.

From NASA; *"The VLBA is a system of ten radio-telescope antennas, each with a dish 25 meters (82 feet) in diameter and weighing 240 tons. From Mauna Kea on the Big Island of Hawaii to St. Croix in the U.S. Virgin Islands, the VLBA spans more than 5,000 miles, providing astronomers with the sharpest vision of any telescope on Earth or in space. Dedicated in 1993, the VLBA has an ability to see fine detail equivalent to being able to stand in New York and read a newspaper in Los Angeles."*

Do they expect this 2 Km rock to emit radio signals? No, not really. They intend to beam a 2.4 GHz, 1MW signal from the Arecibo 305 M antenna to the asteroid. They also hope to beam a 8.6 GHz, 500 KW signal from the 70 M fully steerable Goldstone antenna in CA. (*The Goldstone is the world's most powerful X-band transmitter).*

Hopefully, the reflected signals picked up by the VLBA will give insight to the composition and characteristics of 2006 VV2.

One question I have is how fast does a goose cook if it flies in front of the Goldstone antenna when it is transmitting?

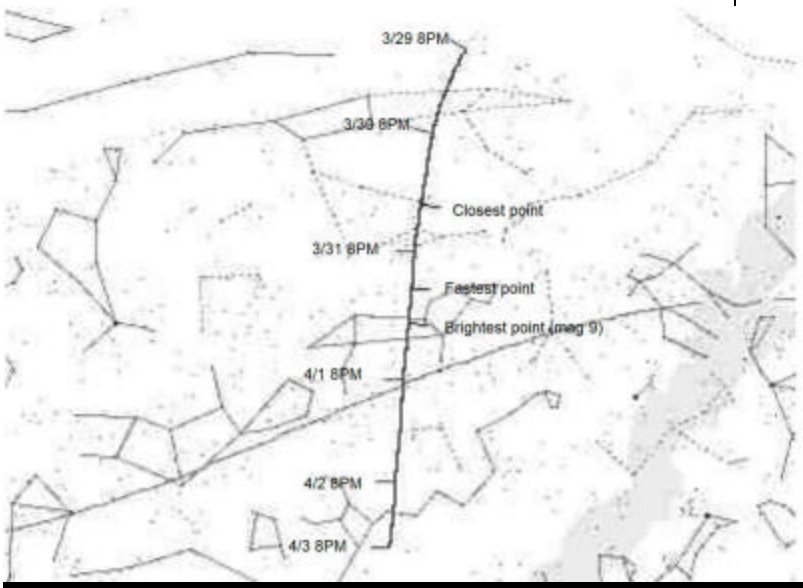
The Particulars:
Picture was taken the (cold) night of Feb 10th.

Telescope: Meade 10" LX200 (f/10)
Mount: Orion Atlas, polar aligned, tracking but unguided
Barlow: Celestron 2X (effective focal length 5080mm)
Camera: Logitech Q5000 webcam ($80 at Staples)
~30 sec wmv video converted to avi format
Processing: Registax 3 (free download), best 400 frames
Adobe Photoshop levels, contrast, saturation, HP filtered.

I can probably do better by collimating scope, taking more frames, take when Saturn is directly overhead, etc. I might try getting Saturn's moons next time too (capturing moons overexposes planet).

By the way, I bought both the 10" Meade and the Atlas mount from our friend Don. Thanks Don.

Clear skies, Cal



When the Sun shrinks to a dull red dwarf, it will not be dying. It will just be starting to live and everything that has gone before will merely be a prelude to its real history.
- Arthur C. Clarke

Magazine Subscriptions

As a paid member of DMSG, you can sign up -or- renew your S&T or Astronomy magazines through the club for a discount over private rate. S&T, reg. $42.95, is $32.95 thru DMSG, Astronomy, reg. $44, is $34 thru DMSG. See Tony Codella for details.

Even Solar Sails Need a Mast

Patrick L. Barry

Like the explorers of centuries past who set sail for new lands, humans may someday sail across deep space to visit other stars. Only it won't be wind pushing their sails, but the slight pressure of sunlight.

Solar sails, as they're called, hold great promise for providing propulsion in space without the need for heavy propellant. But building a solar sail will be hard; to make the most of sunlight's tiny push, the sail must be as large as several football fields, yet weigh next to nothing. Creating a super-lightweight material for the sail itself is tricky enough, but how do you build a "mast" for that sail that's equally light and strong?

Enter SAILMAST, a program to build and test-fly a mast light enough for future solar sails. With support from NASA's In-Space Propulsion Program to mature the technology and perform ground demonstrator tests, SAILMAST's engineers were ready to produce a truss suitable for validation in space that's 40 meters (about 130 feet) long, yet weighs only 1.4 kilograms (about 3 pounds)!

In spite of its light weight, this truss is surprisingly rigid. "It's a revelation when people come in and actually play with one of the demo versions—it's like, whoa, this is really strong!" says Michael McEachen, principal investigator for SAILMAST at ATK Space Systems in Goleta, California.

SAILMAST will fly aboard NASA's Space Technology 8 (ST8) mission, scheduled to launch in February 2009. The mission is part of NASA's New Millennium Program, which flight tests cutting-edge technologies so that they can be used reliably for future space exploration. While actually flying to nearby stars is probably decades away, solar sails may come in handy close to home. Engineers are eyeing this technology for "solar sentinels," spacecraft that orbit the Sun to provide early warning of solar flares.

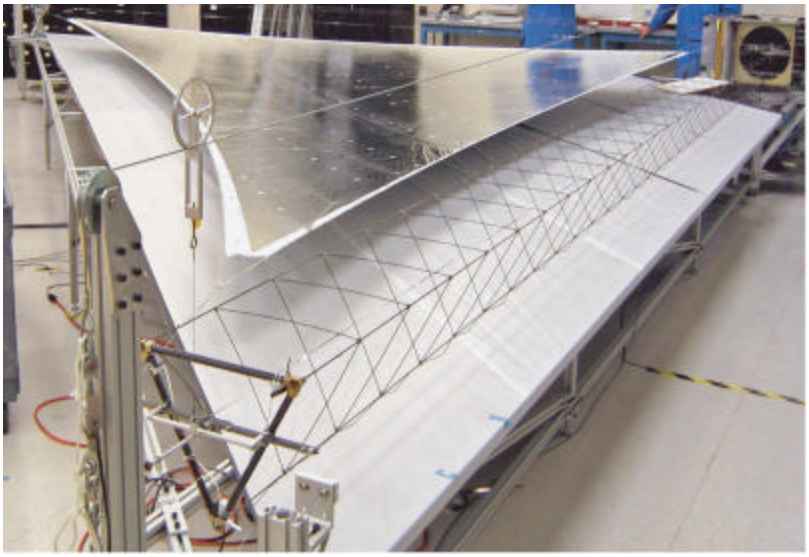
Once in space, ST8 will slowly deploy SAILMAST by uncoiling it. The truss consists of three very thin, 40-meter-long rods connected by short cross-members. The engineers used high-strength graphite for these structural members so that they could make them very thin and light.

The key question is how straight SAILMAST will be after it deploys in space. The smaller the curve of the mast the more load it can support. "That's really why we need to fly it in space, to see how straight it is when it's floating weightlessly," McEachen says.

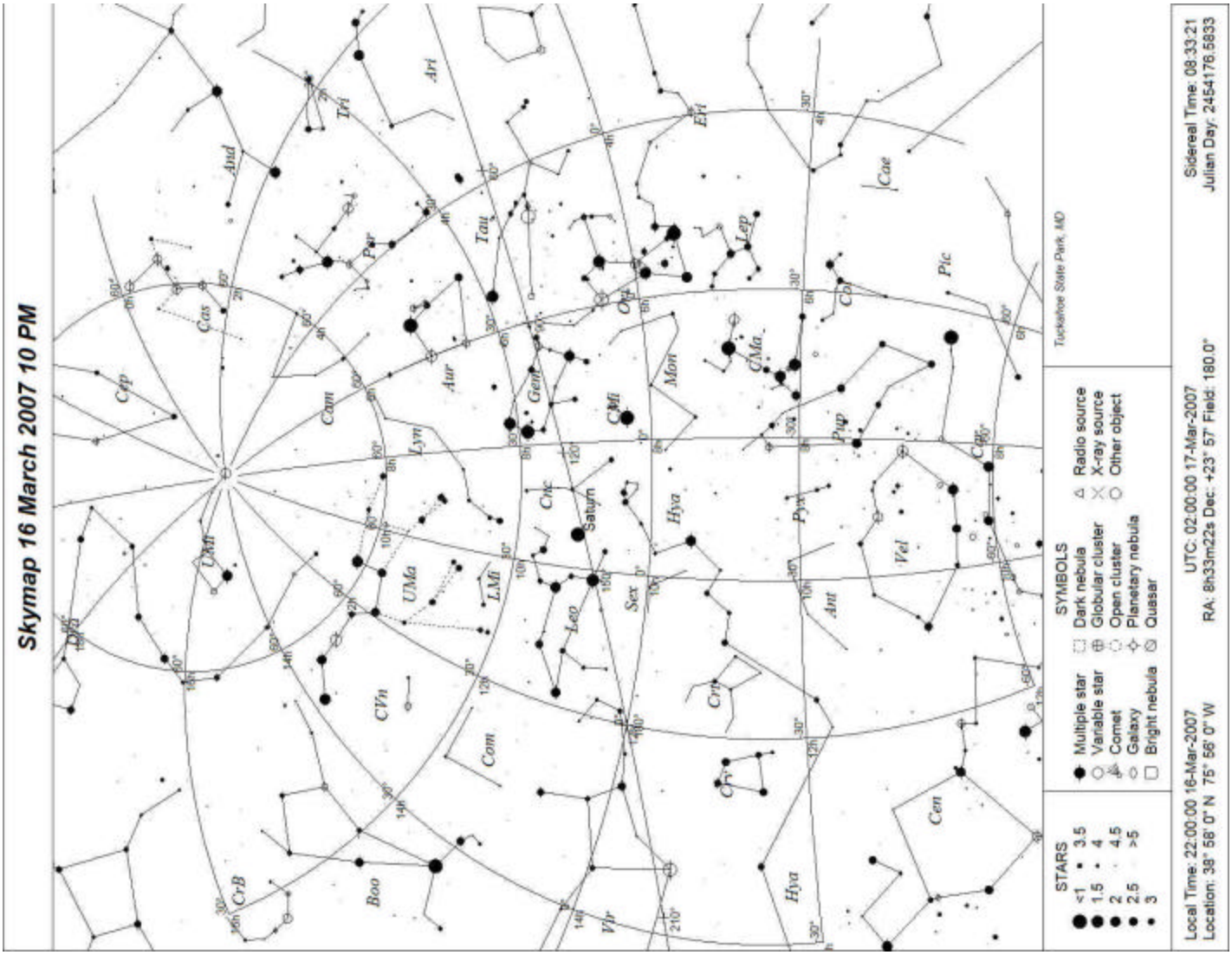
It's an important step toward building a sail for the space-mariners of the future.

Find out more about SAILMAST at nmp.nasa.gov/st8. Kids can visit spaceplace.nasa.gov/en/kids/st8/sailmast to see how SAILMAST is like a Slinky® toy in space.

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

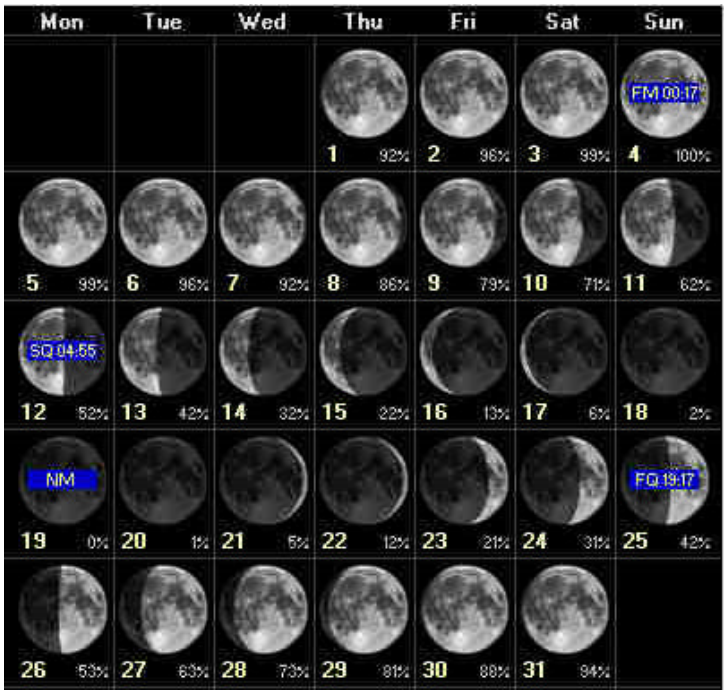


SAILMAST is the thin triangular truss in front of the picture. It is attached to a section of a silver foil solar sail section shown here in a laboratory test. The mast in the picture is 2m (6 ft) long. The Space Technology 8 mission will test the SAILMAST, which is 20 times longer.



Sun and Moon Data for March 2007
Tuckahoe MD
38.97°N 75.93°W 5hrW
Standard Time Civil Twilight

Date	Twilight	Rise	Sun Transit	Set	Twilight	Rise	Moon Transit	Set	%
3/1/2007	6:10a	6:37a	12:16p	5:56p	6:23p	3:48p	11:02p	5:38a	95
3/2/2007	6:08a	6:35a	12:16p	5:57p	6:24p	4:52p	11:45p	6:05a	98
3/3/2007	6:07a	6:34a	12:16p	5:58p	6:25p	5:53p	*****	6:28a	100
3/4/2007	6:06a	6:32a	12:15p	5:59p	6:26p	6:52p	12:26a	6:49a	99
3/5/2007	6:04a	6:31a	12:15p	6:00p	6:27p	7:51p	1:05a	7:09a	97
3/6/2007	6:03a	6:29a	12:15p	6:01p	6:28p	8:50p	1:45a	7:29a	93
3/7/2007	6:01a	6:28a	12:15p	6:02p	6:29p	9:50p	2:24a	7:50a	88
3/8/2007	6:00a	6:26a	12:15p	6:03p	6:30p	10:52p	3:06a	8:14a	81
3/9/2007	5:58a	6:25a	12:14p	6:04p	6:31p	11:55p	3:50a	8:42a	73
3/10/2007	5:57a	6:23a	12:14p	6:05p	6:32p	*****	4:37a	9:15a	64
3/11/2007	5:55a	6:22a	12:14p	6:06p	6:33p	12:57a	5:28a	9:56a	55
3/12/2007	5:54a	6:20a	12:14p	6:07p	6:34p	1:58a	6:23a	10:47a	44
3/13/2007	5:52a	6:19a	12:13p	6:08p	6:35p	2:53a	7:19a	11:48a	34
3/14/2007	5:51a	6:17a	12:13p	6:09p	6:36p	3:41a	8:16a	12:56p	25
3/15/2007	5:49a	6:16a	12:13p	6:10p	6:37p	4:21a	9:12a	2:10p	16
3/16/2007	5:47a	6:14a	12:12p	6:11p	6:38p	4:56a	10:06a	3:26p	8
3/17/2007	5:46a	6:12a	12:12p	6:12p	6:39p	5:26a	10:58a	4:42p	3
3/18/2007	5:44a	6:11a	12:12p	6:13p	6:40p	5:53a	11:50a	5:59p	0
3/19/2007	5:43a	6:09a	12:12p	6:14p	6:41p	6:20a	12:41p	7:16p	1
3/20/2007	5:41a	6:08a	12:11p	6:15p	6:42p	6:47a	1:33p	8:34p	4
3/21/2007	5:40a	6:06a	12:11p	6:16p	6:43p	7:17a	2:28p	9:53p	10
3/22/2007	5:38a	6:05a	12:11p	6:17p	6:44p	7:52a	3:26p	11:11p	18
3/23/2007	5:36a	6:03a	12:10p	6:18p	6:45p	8:34a	4:26p	*****	28
3/24/2007	5:35a	6:01a	12:10p	6:19p	6:46p	9:25a	5:26p	12:25a	39
3/25/2007	5:33a	6:00a	12:10p	6:20p	6:47p	10:24a	6:26p	1:30a	49
3/26/2007	5:32a	5:58a	12:09p	6:21p	6:48p	11:28a	7:22p	2:23a	60
3/27/2007	5:30a	5:57a	12:09p	6:22p	6:49p	12:35p	8:13p	3:07a	70
3/28/2007	5:28a	5:55a	12:09p	6:23p	6:50p	1:41p	9:01p	3:41a	79
3/29/2007	5:27a	5:54a	12:09p	6:24p	6:51p	2:45p	9:44p	4:09a	86
3/30/2007	5:25a	5:52a	12:08p	6:25p	6:52p	3:46p	10:25p	4:33a	92
3/31/2007	5:24a	5:50a	12:08p	6:26p	6:53p	4:45p	11:05p	4:55a	96



Moondark for March: Luck of the Comet

Doug Miller

Ask anyone: there is a large element of luck in star gazing. Equipment, accessories, charts and preparation all help, but the sky must be clear, the atmosphere steady, and the observer prepared for seeking celestial challenges. But being in the right place at the right time undoubtedly helps when events are ephemeral or unpredictable.

Comet McNaught was one such recent celestial headliner, and for the best part of the show in January, I was fortunate to be in New Zealand. While co-directing a study abroad program of field geology and marine biology courses for the University of Delaware, I was able to observe this comet at its brightest in the western twilight and even take several snapshots. Although there were many highlights among the adventures and excursions of our group of 29, sharing the view, the story of discovery and significance of the apparition with students and locals certainly represent a most memorable part of the trip.

Unlike the last two bright comets, the August 7th discovery by Robert H. McNaught of Siding Spring Observatory in Coonabarabran, Australia, was decidedly not accidental. On his website, McNaught describes his discovery was "routine" for their Catalina Sky Survey project. In fact, McNaught and his colleagues in Arizona account for over half of the near-Earth asteroid discoveries over the past year. In typically modest Aussie fashion, McNaught makes no mention of the over 400 asteroids and two dozen of comets credited to him. Little wonder then, asteroid 3137 was named in his honor.

For latter half of January, Comet McNaught was easily visible in the evening twilight. I looked for it half a dozen times (even in daylight, but with no luck), catching good views and photos on four occasions. Over the week, it noticeably drew away from the Sun and moved to the south along the horizon, and the comet's tail grew to over 20 degrees high, even as seen from less than dark surroundings. Comet McNaught remained visible two hours after sunset, and after the coma set, the tail gradually followed but remained observable for some time. Wisps and streamers were faintly visible in the gigantic tail (they are barely visible in these photos), and the luminous arc gave the whole scene—our inner solar system, with Venus and Mercury just to the right—a very 3-D impression.

Many better photos of the comet have been uploaded to the web, and the extensive coverage (before and after perihelion) provided by APOD is a great place to start. Despite its brief appearance, Comet McNaught was definitely the most impressive and brightest comet I have been fortunate enough to see. In 1976, I missed Comet West entirely, though that wasn't bad luck, being out of astro-loop in college and well before the invention of the Internet.

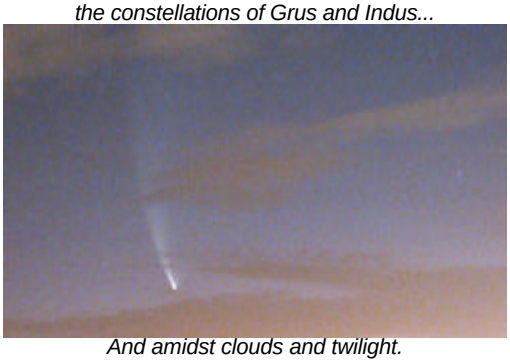
No complaints about our recent comet fortunes: in the past decade or so, star gazers have been enchanted by a trio of bright comets. No one who saw it will forget Hyakutake's aqua tail stretched across the sky, nor the bright and contrasting dust and ion tails of Hale-Bopp. And while we cannot always predict where we'll be or whether the clouds will cooperate, here's hoping for another—the 4th comet of a lifetime—before another dozen orbits of the Sun.

Moondark is written by Doug Miller, published at the Moondark web site, and printed in the Delmarva Star Gazers' Star Gazer News. This document was last revised on 25 February 2007.

Just visible behind the clouds? ...

Comet McNaught over Waiheke Island ...

Several days later from Hamilton among the stars of the constellations of Grus and Indus...



And amidst clouds and twilight.
All are15 sec exposures with a Canon A540 6-megapixel pocket camera and approximate the views with the unaided eye.