The Skyscraper

October 2006

AstroAssembly 2006

FRIDAY & SATURDAY, SEPTEMBER 29TH & 30TH AT SEAGRAVE OBSERVATORY, SATURDAY BANQUET & KEYNOTE AT ST. PHILIPS PARISH CENTER

Friday night speakers include: Dr. Ian Dell'antonio of Brown University, Dr. Mario Motta of the Amateur Telescope Makers of Boston, Dr. Michael D. Stage of UMass. Saturday speakers include: Gerry Dyck of AAVSO and Skyscrapers, Dr. John Delano of the University of Albany, Dr. Steven Dubowsky of MIT, and keynote speaker Dr. Sidney Wolff of the National Optical Astronomy Observatory.

Key Note Lecture – Dr. Sidney Wolff "New Telescopes for New Challenges"

Dr. Wolff spent 17 years at the Institute for Astronomy in Hawaii and helped develop Mauna Kea into the world class facility it is today. A researcher of stellar atmospheres Dr. Wolff became the first female to head a major observatory when she was named director of Kitt Peak and the entire National Optical Astronomy Observatories in 1987. A former president of the AAS she has written over 70 professional articles and textbooks on astronomy. Recipient of the AAS's education prize in 2006, Dr. Wolff is currently serving as project scientist for the Large Synoptic Survey Telescope being built in Chile.

SEPT/OCT 2006

29 FRIDAY	6:30PM	**AstroAssembly Friday Night Talks** Seagrave Observatory
30 SATURDAY	ALL DAY	**AstroAssembly 2006** Seagrave Observatory
7 SATURDAY	8:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
14 SATURDAY	8:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
21 SATURDAY	8:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
28 SATURDAY	8:00PM	**Public Observing Night** Seagrave Observatory, weather permitting

IN THIS ISSUE

The Skyscraper
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The monthly publication of

Skyscrapers Inc.

Amateur Astronomical Society of Rhode Island

47 Peeptoad Road
North Scituate, RI 02857

www.theskyscrapers.org

See back page for directions to Seagrave Observatory.

Submissions
Please submit items for the newsletter by October 15 to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or email to jim@distantgalaxy.com

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

President's Message

Dave Huestis, President

Many thanks to our quartet of speakers during our September meeting ... Gerry Dyck, John Kocur, Bob Horton, and Rick Lynch.

I also want to thank Jerry Jeffrey for his continuing series on impactors. Great research and writing Jerry. And thank you for your "How I Became an Amateur Astronomer" contribution last month.

Please note: There is no October regular monthly business meeting. Our annual convention, Astro Assembly, replaces that meeting. We had to schedule it for Sept 29 & 30 due to the Scituate Art Festival being the next weekend.

If you haven't already signed up for our annual Astro Assembly convention (September 29 & 30) there is still time to do so. Please review the details in the September issue of The Skyscraper, online, or contact Ted Ferneza tpfstars@msn.com for info. Ted's got a great line-up of speakers for this year's event.

Everyone has lots of fun, so hopefully you can attend.

See you at Astro Assembly 2006!

Shooting Stars of October

Dave Huestis

Seen any shooting stars lately? If you haven't, then October is your next opportunity to observe both a minor and a major meteor shower. With any luck the weather will cooperate and you'll see many meteors blaze across the sky as the Earth sweeps through these streams of particles left behind by comets.

The minor shower, the Draconids, peaks on the night of October 8-9. Unfortunately the Full Harvest Moon is on the 6th, so moonlight will interfere somewhat with seeing this shower to best advantage. Only the brightest of the meteors will be observable. The Draconids are fairly slow moving meteors, hitting our atmosphere at only 12.5 miles per second. Observing hint: face north (look for Ursa Major, the Big Dipper). Expect a maximum of 10 meteors per hour during the peak.

Be sure to look up at the waning gibbous Moon on the night of October 9-10. Our desolate neighbor will slowly glide in front of the Pleiades star cluster, covering and then uncovering many of the stars of this little asterism over the course of several hours. The stars will disappear along the bright limb (edge) of the Moon and will reappear some time later along the dark limb. It's a pretty sight in binoculars or with a telescope at low magnification. For us in the northeast the event begins just around midnight.

For instance, the brightest and westernmost star of the cluster, Electra, will be covered by the Moon's bright edge at around 12:04 am, EDT on the 10th for us here in southern New England. Electra will reappear at the Moon's dark edge around 1:10 am, EDT. Observing hint: if the weather permits, please note the position of both the Moon and the cluster a day before and a day after the event.

Fortunately our major meteor shower during mid-month will occur at New Moon. The Orionids are at their best on the night of October 20-21 with about 15-20 yellow and green meteors per hour during peak. These remnants of Halley's Comet intercept the Earth's orbit nearly head-on at 41.6 miles per second, so they are bright and are also noted for producing fireballs that create persistent dust trains high in the atmosphere. You may get lucky and see a few of the brighter meteors as they disintegrate.

Observing hint: as the night progresses, the constellation Orion, and the point in the sky from which the meteors will appear to radiate, will rise higher and higher in the eastern sky, allowing more meteors to be observed. Maximize your chances of seeing them by observing from a dark sky location. The optimum time to see the greatest number of meteors will be during the pre-dawn hours on the morning of the 21st.

And lastly, don't forget to turn your clocks back one hour on Sunday, October 29 at 2:00 am. We then return to Eastern Standard Time.

Remember, Seagrave Observatory is open to the public every clear Saturday night (except September 30). Check our web site at http://www.theskyscrapers.org for further information, and always keep your eyes to the skies.

AstroAssembly 2006

Friday Evening September 29

6:00pm Registration/Refreshments

7:00pm Dr. Ian Dell'antonio
"Mapping Dark Matter with Gravitational Lensing"
A member of the Brown faculty since 1999, Dr. Dell'Antonio is the leader of two international projects (The Deep Lens Survey & JEDI) that use gravitational lensing to measure the distribution and nature of dark matter & dark energy that permeate the universe.

8:00pm Dr. Mario Motta
Dr. Motta will present his Stellafane talk on how he built a 32" Relay Telescope and the Observatory that houses it. A Cardiologist and long time member of the Amateur Telescope Makers of Boston, Dr. Motta can often be found traveling the globe with his wife chasing Total Solar Eclipses.

9:00pm Dr. Michael D. Stage
"Superman's View of Exploded Stars: X-Ray astronomy of supernova remnants"
Dr. Stage's area of research is the study of supernova remnants, using X-ray telescopes such as the Chandra X-Ray Observatory to map their composition and probe the acceleration processes in the supernova blast wave. Dr. Stage is a Five College Astronomy Department Postdoctoral Fellow at the University of Massachusetts Amherst, where he also conducts educational research to improve the methods used in introductory astronomy courses

10:00pm Observing through observatory instruments, Weather Permitting

Saturday September 30

9:00am Registration at Seagrave Observatory
Refreshments • Exhibits and Swap Tables • Raffle Tickets available • Solar Observing • On Site Vendor sales by Roger Rivers of Rivers Telescope and Camera

11:00am Gerry Dyck
"Making Your Solar Observations Count"
Mr. Dyck, a long time member of the AAVSO, logged his 150,000 variable star observation last year. Gerry will have with him a Dual Solar Telescope (white light and H-Alpha), homemade Solar Spectroscope, Pinhole Camera, & 2 projection designs. A 30 year veteran of Skyscrapers, Mr. Dyck can often be found looking skyward from his 2 observatories in Assonet, Mass.

12:15pm - 1:15pm Lunch at the "Stardust Grille"

1:30pm Dr. John Delano
"NASA's search for the origin and distribution of life in our galaxy"
Dr. Delano holds the rank of Distinguished Teaching Professor at the University at Albany. His research dealing with the origin of sustainable life is funded by NASA. Dr. Delano is the Associate Director of the New York Center for Studies on the Origins of Life. Professor Delano has served on many scientific advisory panels to NASA, gave testimony in 2004 to a Presidential Commission dealing with Space Exploration, and has authored 55 professional papers.

3:30pm Dr. Steven Dubowsky
"A New Paradigm for Robotic Space Explorers: Hopping Microbots"
Dr. Dubowsky is the professor/director of the Mechanical Engineering Field and Space Robotics Laboratory at MIT. A recipient of numerous awards in engineering and research Dr. Dubowsky and his team at MIT are currently working on robots and manipulator systems for field and space environments, design and control of high performance terrestrial machines, and innovative medical devises and systems.

5:30pm Wine and Cheese Reception
St. Philip's Parish Center; see directions, page 7.

6:30pm Banquet

7:30pm Words of Welcome/Raffle winners

8:00pm Key Note Lecture – Dr. Sidney Wolff "New Telescopes for New Challenges"
Dr. Wolff spent 17 years at the Institute for Astronomy in Hawaii and helped develop Mauna Kea into the world class facility it is today. A researcher of stellar atmospheres Dr. Wolff became the first female to head a major observatory when she was named director of Kitt Peak and the entire National Optical Astronomy Observatories in 1987. A former president of the AAS she has written over 70 professional articles and textbooks on astronomy. Recipient of the AAS's education prize in 2006, Dr. Wolff is currently serving as project scientist for the Large Synoptic Survey Telescope being built in Chile.

Impactors and Their Possible Explosive Effects on the Earth

Article 2: Composition and Kinetic Energy

Jerry R Jeffrey

In last month's article I discussed speed and direction. In this month's article I will talk about composition and kinetic energy.

Since the effective kinetic energy imparted by an impacting body or any body in motion for that matter is given by the equation E = 1/2 mv2 [7, page 130] we need to know the mass and the resultant velocity of the impactor. A small table of masses based on the volume of the impacting body and its hypothetical composition is provided below:

Material	Density [7] [8] [9] [10]	Diameter 0.1 km [8] ++	Diameter 1 km [8] ++	Diameter 5 km [8] ++	Diameter 10 km [8] ++	Diameter 25 km [8] ++
Approximate relative size information	kg/m^3	Length of a football field Mass in kg +	1/3 the length of the Jamestown Bridge Mass in kg +	Twice the length of Peeptoad Rd Mass in kg +	Distance from Greenville to Chepachet Mass in kg +	Distance from CT line to route 116/ route 6 Mass in kg +
Water Ice	917	4.8014E+08	4.8014E+11	6.0018E+13	4.8014E+14	7.5022E+15
Water	1,000	5.2360E+08	5.2360E+11	6.5450E+13	5.2360E+14	8.1812E+15
Earth Avg.	5,522	2.8913E+09	2.8913E+12	3.6141E+14	2.8913E+15	4.5177E+16
Platinum	21,450	1.1231E+10	1.1231E+13	1.4039E+15	1.1231E+16	1.7549E+17
Nickel	8,908	4.6642E+09	4.6642E+12	5.8303E+14	4.6642E+15	7.2878E+16
Iron	7,874	4.1228E+09	4.1228E+12	5.1535E+14	4.1228E+15	6.4419E+16
Asteroid Avg. Bulk	2,761	1.4457E+09	1.4457E+12	1.8071E+14	1.4457E+15	2.2588E+16

[7, page 216] [8, pages B-117, B-123, F-1, F-135, F-136] [9, Website] [10, Website] Density is taken from several sources.

[8, page A-258] I have assumed a perfect sphere of volume = (4/3) π r^3 as the impactor shape because it's easy to calculate.

+ Masses in kg – to get to pounds at the Earth's surface multiply by 2.205 (e.g., an iron asteroid with a football field length diameter has a mass of roughly 4,122,800,000 kg (i.e., 4.1228E+09 kg) thus weighing in at about 9.09 billion pounds or 4.55 million tons at the Earth's surface).

++ Numbers in these columns are in scientific notation because they are too big to display otherwise, being followed by between 4 and 12 zeros. See mass of iron asteroid in note above for an example.

Notice that the masses are in the billions of pounds even for a small object.

Most comets are composed almost entirely of ices of various kinds with small amounts of stone and metal. Most asteroids appear to be made of some combination of relatively heavy metals such as nickel and iron with some stone and carbonaceous material thrown in. [11, pages 113, 119, 131, 200, 204] Some theorists maintain that many if not most asteroids are what is left when all the ices in a comet sublimate to space and become part of the Solar System's zodiacal lights. [11, pages 252-253] [12, page 250] So if a modest sized comet doesn't hit dead-on much if not most of it will ablate due to the heat of entry into our atmosphere. It must be noted here that an object striking our atmosphere at an angle of less than about two to six degrees (depending on its composition and surface roughness) will probably skip like a flat stone on a pond on our atmosphere and head back out to space. At an angle greater than 6% up to vertical the object will enter the atmosphere and burn up or impact depending on its composition, size, and speed, with size, direction, and speed being the most important. [13] [14] [15] [16] [17] A true impactor will come to a dead-stop at some depth under the Earth's surface and its entire effective kinetic energy store will be converted to heat energy causing quite an impressive explosion. Above a diameter of about 5 km we can expect impact winter and possible mass extinctions. [11, page 262-298] [12 pages 204-206]. Somewhere around a diameter of 15 to 25 km we might expect all life on Earth to be wiped out [18]. The complex formula at reference 19 gives you some means of determining crater size.

The column for a 10 km (about 6 miles) object in the table above is appropriate for the object that supposedly wiped out the dinosaurs. An Earth average density object, which has about the same mass as an average gram of the Earth's material, 10 km in diameter weighs about 3.1877x10^12 tons (3,187,700,000,000 tons) at the Earth's surface. Given these exhilarating facts, of course the next thing we want to do is to calculate the explosive potential and crater producing effects of these objects. I will give you the explosive potential in joules for the effective kinetic energy, a metric unit shown in kg m^2/sec^2, which for a car weighing 2,205 pounds, traveling 62.137 mph (i.e., 1,000 kg at 100 kph) is about 385,802 joules. A megaton is equal to about 4.18 x 10^15 joules. [20] So the car's kinetic energy is only about 0.000000000092297 megatons (9.2297x10^-11 megatons), a miniscule part of 1% of a megaton. A hypothetical 0.1 km iron asteroid, however, is another story altogether, delivering about 3,394 megatons of kinetic energy. That's right, almost 3,400 megatons of kinetic energy. The largest weapon ever exploded on the planet was around 50 megatons. [21] The Hiroshima bomb "Little Boy" was 13-16 kilotons occurring about 1500 feet above the surface [22] and the Tunguska event was about 12.5 megatons and occurred about 8.5 km above the Earth [23, page 74]. The Tunguska object flattened 2,150 square km of trees, that's a circle with a radius of about 26 kilometers. [23, page 1] A 150 kiloton nuclear weapon delivered at ground level at the base of the Empire State building would destroy virtually everything from NYU in the South to the South (2.5 mile radius) end of Central Park in the North with about 750,000 people killed or injured mostly from the blast effects. [24, page 8] So, even a modest impactor, say one of football stadium size, would virtually completely destroy a city the size of New York out to several miles into New Jersey.

So, you can see from the above discussion of our puny weaponry that for even a small object of average Earth density the effects would be incredible. Given this background I will proceed on to an example or two using some stated assumptions about the incoming impactor. These examples will be the subject of next month's article, Impactor Examples.

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11. Comet @ 1985 by Carl Sagan and Ann Druyan, Random House, pages 113, 119, 131, 200, 204 and many other pages as well infer icy and carbonaceous composition of comets. Pages 252 and 253 discuss the components of the material (comet ices) that cause the Zodiacal light. Pages 262-298 discuss impact effects. [TOC 28]
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21. Wikipedia – Nuclear Testing @ 08/13/06, http://en.wikipedia.org/wiki/Nuclear_test. The largest nuclear weapon ever tested was the "Tsar Bomba" of the Soviet Union at Novaya Zemlya, with an estimated yield of around 50 megatons. [TOC 58]
22. Wikipedia – Hiroshima Bomb @ 08/17/06, http://en.wikipedia.org/wiki/Little_Boy. "The bomb was armed in flight 9600 m (31,000 feet) above the city, then dropped at approximately 8:15 a.m. (JST). The detonation happened at an altitude of 580 m, with a power of 13 to 16 kilotons (estimations vary)." [TOC 59]
23. The Mystery of the Tunguska Fireball @ 2005 by Verma, Iconbooks, page 1 (2150 sq km flattened), page 74 (12.5 MT at 8.5 km altitude). [TOC 29]
24. New York City Example (of Nuclear Explosion) @ 5/25/06 from page 8 of http://atomicarchive.com/example. [TOC 2]
25. The Mystery of the Great Cataclysm @ 5/20/06 by Dale Rippke from http://rehupa.com/rippke_cataclysm. Page 1. [TOC 9]

Left: M27, August 27, 2006. 2 images at took prime focus, with Canon Rebel XT DSLR my 8"LX200 F/6.3 SCT, one at 50 seconds and the other at 40 seconds, stacked using DeepSkyStacker. Right: M42, Sept 21, 2006, 20 second exposure 1600 ISO with Canon Rebel XT, imaged through Meade 8' LX200 f/6.3 SCT prime focus. Photos by Tracey Haley.

NASA's Space Place

Staggering Distance

By Dr. Tony Phillips

Tonight, when the sun sets and the twilight fades to black, go outside and look southwest. There's mighty Jupiter, gleaming brightly. It looks so nearby, yet Jupiter is 830 million km away. Light from the sun takes 43 minutes to reach the giant planet, and for Earth's fastest spaceship, New Horizons, it's a trip of 13 months.

That's nothing.

Not far to the left of Jupiter is Pluto. Oh, you won't be able to see it. Tiny Pluto is almost 5 billion km away. Sunlight takes more than 4 hours to get there, and New Horizons 9 years. From Pluto, the sun is merely the brightest star in a cold, jet-black sky.

That's nothing.

A smidgen to the right of Pluto, among the stars of the constellation Ophiuchus, is Voyager 1. Launched from Florida 29 years ago, the spacecraft is a staggering 15 billion km away. It has traveled beyond all the known planets, beyond the warmth of the sun, almost beyond the edge of the solar system itself.

Now that's something.

"On August 15, 2006, Voyager 1 reached the 100 AU mark—in other words, it is 100 times farther from the Sun than Earth," says Ed Stone, Voyager project scientist and the former director of NASA's Jet Propulsion Laboratory. "This is an important milestone in our exploration of the Solar System. No other spacecraft has gone so far."

At 100 AU (astronomical units), Voyager 1 is in a strange realm called "the heliosheath."

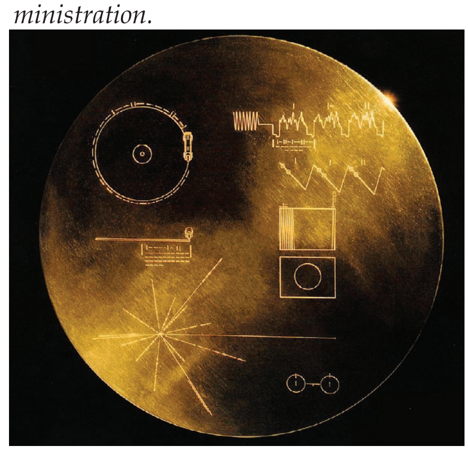
As Stone explains, our entire solar system—planets and all—sits inside a giant bubble of gas called the heliosphere. The sun is responsible; it blows the bubble by means of the solar wind. Voyager 1 has traveled all the way from the bubble's heart to its outer edge, a gassy membrane dividing the solar system from interstellar space. This "membrane" is the heliosheath.

Before Voyager 1 reached its present location, researchers had calculated what the heliosheath might be like. "Many of our predictions were wrong," says Stone. In situ, Voyager 1 has encountered unexpected magnetic anomalies and a surprising increase in low-energy cosmic rays, among other things. It's all very strange—"and we're not even out of the Solar System yet."

To report new developments, Voyager radios Earth almost every day. At the speed of light, the messages take 14 hours to arrive. Says Stone, "it's worth the wait."

Keep up with the Voyager mission at voyager.jpl.nasa.gov. To learn the language of Voyager's messages, kids (of all ages) can check out spaceplace.nasa.gov/en/kids/vgr_fact1.shtml .

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



In case it is ever found by intelligent beings elsewhere in the galaxy, Voyager carries a recording of images and sounds of Earth and its inhabitants. The diagrams on the cover of the recording symbolize Earth's location in the galaxy and how to play the record.

On Saturday, August 26, Skyscrapers participated in the Scituate library centennial, answering questions about astronomy, Skyscrapers, and offering solar viewing under partly cloudy skies. Photos by Tracey Haley.

Treasurer's Report

Al Schenck, Treasurer

INFLOWS	
astroincome	
astrobanquet	525.00
astroregistration	668.00
TOTAL astroincome	1,193.00
cookoutinc	441.00
donation	77.57
Collationdonation	37.00
TOTAL donation	114.57
dues	1,640.00
Contributing	861.00
Family	750.00
Senior	171.00
TOTAL dues	3,422.00
Interest Inc	28.93
magincome	
Astronomymaginc	233.95
skytelmagincome	395.40
TOTAL magincome	629.35
Starparty	350.00
TOTAL INFLOWS	6,178.85
OUTFLOWS	
astroexp	18.61
Astroprinting	27.31
Hallrental	150.00
Raffle	5.00
Tentrental	500.00
TOTAL astroexp	700.92
bldgandgrounds	90.00
clubsubscription	60.00
collation	98.02
Cookoutexp	503.13
Corporationfee	20.00
Discretionary	25.00
membersubscriptions	
Astronomymagexp	204.00
Skytelexp	395.40
TOTAL membersubscriptions	599.40
Portajohn	100.00
Utilities	
Electric	77.57
Propane	49.86
TOTAL Utilities	127.43
TOTAL OUTFLOWS	2,323.90

OVERALL TOTAL	3,854.95
Bank Accounts	
Checking	2,765.81
Savings	15,622.67
TOTAL Bank Accounts	18,388.48
Cash Accounts	
Cash Account	53.86
TOTAL Cash Accounts	53.86
OVERALL TOTAL	18,442.34

Directions to St. Philip's Parish Center;

From Seagrave Observatory: Take left out of observatory parking lot onto Peeptoad Road. At the junction of Peeptoad and Rt. 116 take a left onto Rt. 116 North. At Knight's Farm intersection (4-way Stop) bear right, continuing on Rt. 116 into Greenville Center. At the traffic light bear left onto Rt. 44 West. St. Philip's is on the left about .3 miles from the intersection. The Parish Center is just behind the school and across from the church. Parking is behind the Center and the church.

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.

SKYSCRAPERS INC.

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