The Skyscraper
Vol. 33 no. 11

The monthly publication of

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 November 15 to Jim Hendrickson, 1 Sunflower Circle, North Providence, RI 02911 or email to jim@distantgalaxy.com

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The Skyscraper

November 2006

November Meeting with Ron Dantowitz

Friday, November 3rd at Seagrave Observatory

Pencils to Rockets: Education and Research at the Clay Center Observatory
The presentation brings together images, techniques and videos from the from the following expeditions: Space Ship One: X-Prize Flights STS-114 Launch and Reentry (travel to Costa Rica) Laser Experiment with NASA and the ISS Stardust Reentry (NASA/Ames, SETI and travel to Nevada) Fourier Transform Spectrometer (with the USNO) Techniques about high -speed video, filtering, stacking, etc. Astronomy with 25" f/9.6 RC at the Clay Center Observatory

Ron Dantowitz is Director of the Clay Center Observatory at the Dexter and Southfield Schools in Brookline. He has worked for NASA, the Charles Hayden Planetarium, and directed the Gilliland Observatory at the Boston Museum of Science. He holds a B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University.

November 2006

3 Friday	7:30PM	**November Meeting** Seagrave Observatory
4 Saturday	7:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
8 Wednesday	2:12PM	**Transit of Mercury** (not visible from Seagrave Observatory)
11 Saturday	7:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
18 Saturday	7:00PM	**Public Observing Night** Seagrave Observatory, weather permitting
24 Friday	6:00PM	**"Postcards from Mars" with Jim Bell** Village at Waterman Lake, details on page 8
25 Saturday	7:00PM	**Public Observing Night** Seagrave Observatory, weather permitting

In This Issue

President's Message

Dave Huestis, President

Superb! AstroAssembly Chairperson Ted Ferneza organized one of the best AstroAssembly events ever held by Skyscrapers. Many of our guests came up to me throughout the day and evening to favorably comment on practically everything, from the quality of the speakers to the banquet buffet. I pointed Ted out and asked them to express their praises to him, for all of it was very well deserved.

Thanks to Roger Rivers of Rivers Camera and Telescope and Tony Costanzo of Astronomy-Shoppe for bringing their astronomical items to sell. We also appreciate their generous donations for the raffles. We also want to thank all the vendors who showed their support by donating astronomical items for our door prizes and raffles.

Many thanks to our Friday evening speakers Dr. Ian Dell' Antonio, Dr. Mario Motta and Dr. Michael D. Stage. The new Friday night format was very well received.

Thank you to Gerry Dyck, Dr. John Delano and Dr. Steven Dubowsky for their Saturday daytime presentations. And a special note of appreciation to our keynote speaker Dr. Sidney Wolff, who was kind enough to give her presentation during her vacation to the East Coast.

A special thank you to Kathy and Steve Siok for organizing and operating the Stardust Grille, as well as the wine and cheese reception! And once again we thank Scott Tracey for performing his master of ceremonies responsibilities so well, and also for his AV technical services. And thank you Rick Lynch for assisting the presenters with their computer needs.

And last, but certainly not least, a well deserved thank you to the Skyscrapers Trustees, all the volunteers who helped prepare the grounds for this event, and all the other Skyscrapers who helped make AstroAssembly 2006 an absolutely tremendous success.

Congratulations to everyone on a job well done.

And a special thank you to everyone in the astronomical community who attended (120 attendees, not including the speakers!!)

A special note of appreciation to master optician Paul Valelli for professionally cleaning the front element of the Clark objective early Friday evening at AstroAssembly. He did not need to remove the lens assembly from the cell. Paul also stated that the crown and flint should not have to be removed from the cell to clean the other surfaces for at least 25 years. Thank you Paul for your expert assessment.

And finally, don't forget to attend our next monthly meeting on Friday, November 3, 2006 at 7:30 pm, when Ron Dantowitz of the Clay Center in Brookline Massachusetts will present a talk entitled "A Satellite Laser Imaging Project."

Hope you can attend.

Transit of Mercury

Dave Huestis

Do you remember the excitement we amateur astronomers experienced back in June 2004 when the planet Venus passed between the Earth and the Sun? That transit was indeed a rare event that we were privileged to observe. Well, on November 8, here in New England we will be able to watch Mercury perform the same feat. Though not as rare (last one occurred on May 7, 2003 and the next will occur on May 9, 2016) as a Venus transit, Mercury's passage will be much more difficult to observe for the casual stargazer.

When the Venus transit was last visible in Rhode Island, the event was already in progress as the Sun rose. Filtered through our dense atmosphere and thick clouds that morning of June 8, Venus, a planet nearly the Earth's twin in size and our nearest neighbor, was easily seen with a careful gaze at the Sun.

Well, Mercury is much smaller than Venus, and much closer to the Sun. Therefore it cannot be seen without binoculars or a telescope, and most importantly, those optics must be equipped with special solar filters. The image of Mercury will be quite small and darker and rounder than any sunspot has ever been. Plus, Mercury's silhouette will not have a lighter penumbra surrounding it as do most sunspots.

Though we will not see the event in its entirety, we will have plenty of time to enjoy a portion of Mercury's passage across the face of the Sun. The transit begins at 2:12 pm when tiny Mercury will "contact" the southeastern edge of the Sun (the edge of the Sun closest to the western horizon). It will take two minutes for Mercury to emerge fully onto the solar disk.

Just before it does so, a portion of the planet will seem to elongate outward toward the blackness of space along the Sun's limb. It will look like an drip about to detach itself from a faucet, or like the shape of a teardrop. The effect can last for several seconds, depending upon atmospheric conditions. Many members of Skyscrapers observed this "black drop" during Venus' transit in 2004. High magnification will be necessary to see this effect because of Mercury's

small size.

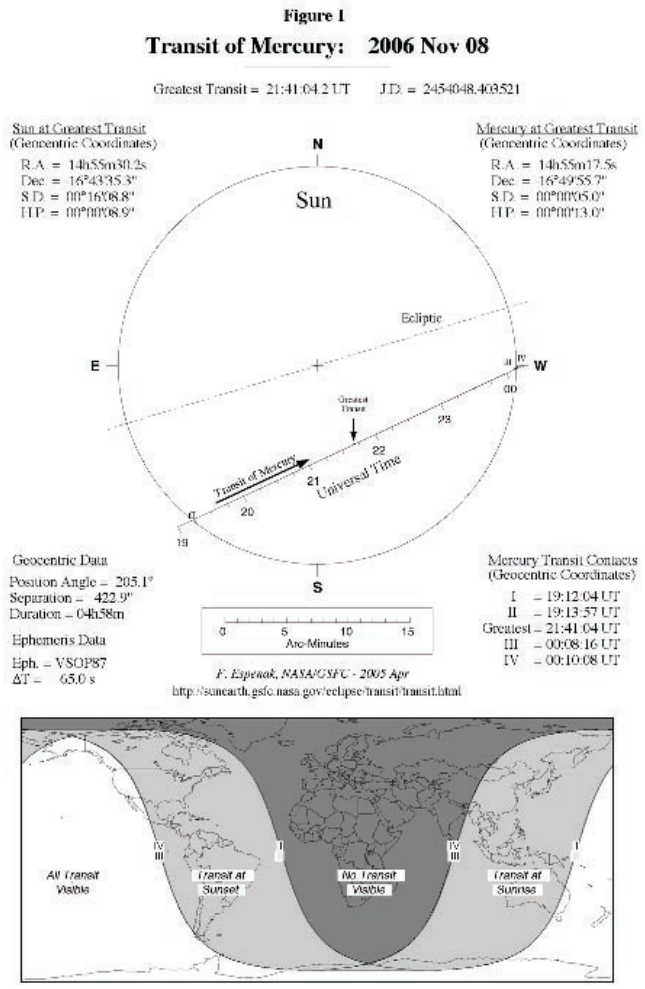
Mercury will continue to move across the face of the Sun (see the following web page for the path Mercury will take: http://sunearth.gsfc.nasa.gov/eclipse/OH/image1/TM2006Nov08-Fig1.GIF - your view may differ, depending upon what type of binocular or telescope you use), and at 4:41 pm the tiny dark spot will be halfway between the Sun's southeastern and western edges. Unfortunately we will be unable to see this maximum, for the Sun sets around 4:30 pm locally. Observers further west will be fortunate to view a longer duration of the event. The west coast states will see the transit from start to finish.

Now, several words of caution are necessary to state here. Do not attempt to observe this transit unless you are an experienced solar observer. Mercury is so tiny that you won't be able to detect it with the unaided eye anyway, so don't be tempted to try. Number 14 welders glass will not show Mercury. DO NOT use exposed film of any kind. This method is not safe under any circumstances. In past columns I have instructed folks on how to build a solar eclipse viewer using a shoe box. This observing method also won't work in this circumstance. The projected solar disk is so tiny that Mercury's silhouette won't be detectable.

If you have never observed the Sun before this event, don't start now! Don't risk your eyesight due to an oversight or an outright mistake. Even if you have one of those department store refractors that often come with small glass or plastic filters, do not be tempted to use them. They have been known to shatter when exposed to the Sun's concentrated image. Many years ago, when I first started out in astronomy, I had one of those glass/plastic filters shatter during a partial solar eclipse. Luckily I wasn't looking through the eyepiece at the time.

If you use the Sun projection method (using a telescope to project the Sun's image on a white screen), remember to be very cautious if other folks, especially children are nearby. You don't want anyone accidentally stepping up to an unguarded eyepiece to take a look. And regarding eyepieces, do not use cemented eyepieces. Use only those that are air-spaced. Eyepieces have been ruined when the cement has melted due to the concentrated light collected by a telescope.

Figure 1



Also, remember to block off your finder scope. I have seen observers singe their hair or clothes by failing to do so!!

(A quick note: Currently there are no plans to open Seagrave Observatory to the public for Mercury's transit. However, should Skyscrapers decide to offer viewing of this event at the observatory or elsewhere, please look to the local media for details. Also, check with other local astronomical facilities to ascertain whether they will be scheduling any public viewing programs.)

I'm sure there will be many web sites providing live images of this event. I found this one in Hawaii that plans on providing near real-time images and time-lapse movies of the entire transit: http://www.astroday.net/MercTransit06.html. San Francisco's Exploratorium (http://www.exploratorium.edu/)will also be offering a live webcast of the event from Kitt Peak in Arizona. Be sure to surf the web ahead of time to see which other web pages plan to feature this great event just in case these sites prove difficult to access.

I agree that watching online sites is not the same as experiencing the transit firsthand, but if you can't observe it safely, don't observe it at all. If all else fails, and I mean the weather, you may have no choice but to pull up a chair in front of your computer screen and watch the progress of the event.

Good luck in observing this interesting astronomical phenomenon, and remember to keep your eyes safe.

Impactors and Their Possible Explosive Effects on the Earth

Article 3: Impactor Examples and Summary

Jerry R Jeffrey

In my previous two articles I have developed the basic science surrounding large, high-speed Earth impacting objects. My first article described the speed and directional elements (i.e., the velocity). Last month's article discussed the composition of supposed impactors and the kinetic energy resulting from the motion of these massive bodies as they near the Earth on their destructive course. This month I will provide a couple of examples and describe further effects of these impacts.

Given all these facts about speed, incoming direction, and composition let's make a few assumptions to sort out the seeming contradictions and then compute the explosive power and resulting crater diameter of our supposed impactor. Let's assume that:

1. It is a composite object where 10% of the volume is subterranean ices, with a stony crust about the same density as the Earth average density and amounting to about 15% of the volume, and lastly it has a Platinum (3% of total volume), Iron (32% of total volume), and Nickel (40% of total volume) core.

2. It is a retrograde object that hits the Earth head-on, thus maximizing all velocity vectors (i.e., it will hit essentially at the eastern night to day terminator). By the way this is actually not the most devastating impact point but it is the one whose effects can be most easily computed. The most devastating effect would come from an impactor that hits the Earth between midnight and daylight (i.e., directly into the Earth's spin) so that the impact would almost instantly slow the rotation of the Earth's crust over the molten mantle and cause many momentum induced events such as cracking the Earth's crust. If the object cracks the Earth's crust huge tsunami, earthquake, and volcanic destruction events would result in addition to the impactor simulation of a nuclear winter that will occur regardless of the point of impact. [25, page 1]

3. Earth's surface has a density about the same as the Earth average density. It is actually less than the Earth average density but is quite irregular so I chose Earth average density to smooth out the computations.

Below is a table that tabulates the effects of our defined composite impactor:

Note the impressive size of both the released kinetic energy and the resulting impact crater diameter.

As mentioned earlier I found an interesting article on the web while researching for this series of articles [see reference 10 in the density table] that said that the bulk density of most asteroids is far less than the above density that I used, being about 1/3 of my assumed density. The article contends that the average bulk density of asteroids in our solar system is about 1/2 Earth's bulk density or about 2,761 kg/m^3. The following table is based on this figure to give you a comparison for our disaster.

As you can see the explosive effects are about 1/3 as bad, but the effects of the larger objects would still be enough to wipe out human civilization. Again note the megatonnage and the impact crater diameter. Even at 1/2 the Earth average density or about 1/3 density of our composite impactor's density the craters are still huge. Given the amount of kinetic energy converted to heat almost all the contents will be blasted into the atmosphere as superheated gas and dust creating an immense dust cloud that would completely darken Earth's sky for months or longer for the larger (i.e., larger than say 5 km) bodies.

An even larger diminution in the effects would be a reduction in the effective speed of the object, say to 1/2 or 1/3 the maximum possible speed. A reduction in the speed would cause an energy reduction proportional to the square of the speed. A further diminution of the effects would occur if the object did not hit straight on (i.e., it impacted at an angle that did not allow it fully bury itself before exploding). I will not delve into the diminishing effects further.

So in summary the devastation we might expect from an impactor depends on a number of factors:

1. Its speed, which is the sum of the speeds due to the Earth's orbital speed, the Earth's gravitational attraction, and the Sun's gravitational attraction.

2. Its composition.

3. Its mass derived from its composition and volume.

4. Its three dimensional angle of attack and the resulting vector summation of speeds along this vector (i.e., its velocity).

These articles are the sole opinion of ht author

and may not reflect the opinion of The Skyscrapers organization. Questions and comments may be directed to the author at jrj01@cox.net.

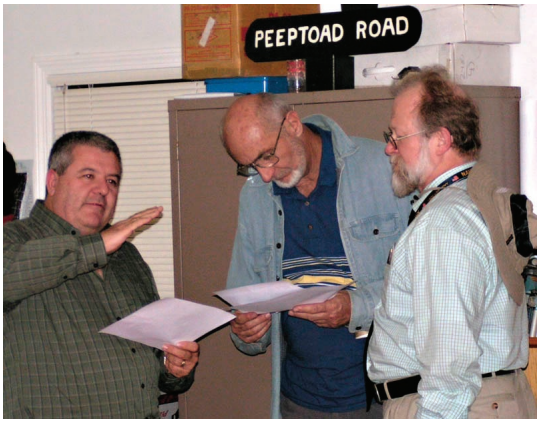
In a series of short and far less technical articles over the next several months I will talk about the what movie makers and book writers do with these and other relevant facts in producing their fictional works.

Composite impactor effects table					
Diameter	0.1 km	1 km	5 km	10 km	25 km
Volume (m3)	5.236E+05	5.236E+08	6.545E+10	5.236E+11	8.181E+12
Mass in kg	4.0036E+09	4.0036E+12	5.0045E+14	4.0036E+15	6.2557E+16
Energy released in joules	1.3779E+19	1.3779E+22	1.7224E+24	1.3779E+25	2.1529E+26
Energy released in Megatons	3,296	3,296,400	412,050,000	3,296,400,000	5.1506E+10
Impact Crater Diameter in Km	4.15	24.99	87.70	150.59	206.62

Asteroid bulk density impactor effects table					
Diameter	0.1 km	1 km	5 km	10 km	25 km
Volume (m3)	5.236E+05	5.236E+08	6.545E+10	5.236E+11	8.181E+12
Mass in kg	1.4457E+09	1.4457E+12	1.8071E+14	1.4457E+15	2.2588E+16
Energy released in joules	4.9754E+18	4.9754E+21	6.2192E+23	4.9754E+24	7.7740E+25
Energy released in Megatons	1,190	1,190,300	148,780,000	1,193,000,000	1.8598E+10
Impact Crater Diameter in Km	2.95	17.79	62.45	107.24	147.13

Clark Objective Gets a Cleaning

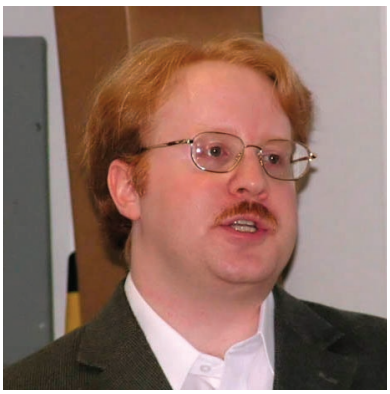
Photos by Tracey Haley



Clockwise from above: Paul Valelli cleans the objective on the 8¼" Clark telescope. Tracey Haley takes a self portrait in the reflection of the Clark objective; After cleaning, the reflection in the objective is clear; Paul mixes his own cleaning solution to clean the objective. Left: During AstroAssembly, Al Hall (left) discusses plans to rebuild the flyball governor drive mechanism of the Clark telescope with Senior Trustee Rick Arnold (center) and Bill Luzader.

AstroAssembly Gallery

September 29th & 30th, 2006



Friday Night speakers (left 3, from top to bottom)**:** Dr. Ian Dell'antonio from Brown University talked about mapping dark matter using gravitational lensing. Dr. Mario Motta of the Amateur Telescope Makers of Boston gave a presentation about the construction of his observatory and 32" Relay Telescope. Dr. Michael D Stage of the University of Massachusetts at Amherst spoke about using X-rays to measure supernova shock waves.

Saturday speakers (middle 3, top to bottom): Gerry Dyck, a 30-year Skyscrapers member, talked about solar observations; Dr. John Delano of the University of Albany gave a presentation on the origin of life in our galaxy,, Dr. Steven Dubowsky from the Massachusetts Institute of Technology talked about using hopping microbots to explore Mars.

Keynote Speaker (bottom left): Dr. Sidney Wolff. Former director of Kitt Peak and the entire National Optical Astronomy Observatories, former president of the American Astronomical Society, and current project scientist for the Large Synoptic Survey Telescope being built in Chile, Dr. Sydney Wolff gave a presentation on New Telescopes for New Challenges.

AstroAssembly Chairperson (top right): Ted Ferneza (standing) and Bob Howe set up the registration desk on Saturday morning.

AstroAssembly Master of Ceremonies (bottom right): Scott Tracy

Possible Leonid Meteor Shower Resurgence

Dave Huestis

Before I talk about the possible one night resurgence of the Leonid meteor shower, let's examine the Earth's encounter with the remnants of Comet 2P/Encke from the 3rd to the 12th of November. Usually this Taurid meteor display produces approximately five to ten shooting stars per hour. However, the Moon will be full on the 5th, so it will severely reduce the number of meteors that can be seen throughout the week.

Fortunately the Taurids are slow meteors, entering our atmosphere at only 17-miles per second. Therefore these shooting stars are also bright. More often than not they are yellow in color. Fairly frequently they become fireballs that fragment into multiple meteors. So even despite the moonlight I would still consider giving this shower a few hours of my time.

Though mid-month's Leonid meteor shower is past its storm level period of activity (2000-2002), researchers suggest on the night of November 18 - 19 this year the Earth will pass through a fairly dense stream of particles left behind by Comet Tempel-Tuttle in 1932. While we will not see several hundreds or even thousands of meteors, most astronomers agree we will see many more than the normal peak rate of from 15 to 20 meteors per hour. The Moon will be a waning crescent and will not interfere with seeing the shower to best advantage.

One of the most consistent estimates I have seen places the peak rate at around 100 meteors per hour. However, peak time is around 11:45 pm on the night of the 18th. Unfortunately Leo, the constellation from where the meteors appear to radiate, will be low on the east-northeast horizon. So the number of meteors we see here will likely be somewhat less than the estimate.

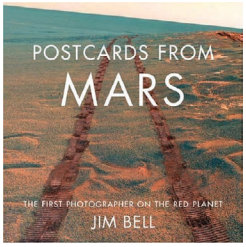
What we may see is quite a few Earth-grazers around the peak time. These meteors will shoot halfway across the sky as they skim our atmosphere. Earth-grazers are fun to watch, so I encourage everyone to go out and take a look.

Leonid meteors are usually very bright since they blaze across the sky at an amazing speed of 44 miles per second. Most appear to be green or blue in color as they disintegrate in our upper atmosphere. About half them leave trains of dust which persist for minutes.

However, a majority of the meteors this year may be fairly faint. So, a key factor will be to get out in the country as far away from city lights as possible. Still, the Leonids often produce fireballs, so keep your eyes to the skies!

Postcards from Mars

Skyscrapers Special Meeting with Jim Bell



Jim Bell of Cornell University (http://marswatch.astro.cornell.edu/) will present "Postcards From Mars" at this special meeting. Jim is the lead scientist on the Pancams that are currently operating on the rovers Spirit and Opportunity. Jim was born and raised in Warwick RI, and attended several meetings at Seagrave Observatory in his early teens. Books will be available at the meeting.

Friday, November 24th, 6:00pm-9:00pm
at The Village at Waterman Lake (http://www.villageretirement.com/)

6:00pm Wine, Cheese and Book signing
7:00pm Postcards From Mars

For more information:
Glenn.Jackson@Cox.net
401-884-1513

NASA's Space Place

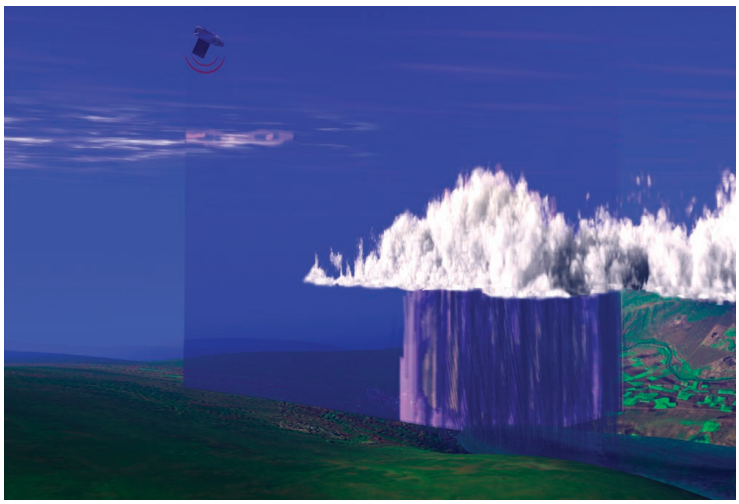
The Planet in the Machine

By Diane K. Fisher and Tony Phillips

The story goes that a butterfly flapping its wings in Brazil can, over time, cause a tornado in Kansas. The "butterfly effect" is a common term to evoke the complexity of interdependent variables affecting weather around the globe. It alludes to the notion that small changes in initial conditions can cause wildly varying outcomes.

Now imagine millions of butterflies flapping their wings. And flies and crickets and birds. Now you understand why weather is so complex.

All kidding aside, insects are not in control. The real "butterfly effect" is driven by, for example, global winds and ocean currents, polar ice (melting and freezing), clouds and rain, and blowing desert dust. All these things interact with one another in bewilderingly complicated ways.



CloudSat is one of the Earth observing satellites collecting data that will help develop and refine atmospheric circulation models and other types of weather and climate models. CloudSat's unique radar system reads the vertical structure of clouds, including liquid water and ice content, and how clouds affect the distribution of the Sun's energy in the atmosphere. See animation of this data simulation at www.nasa.gov/mission_pages/calipso/multimedia/cloud_calip_mm.html.

And then there's the human race. If a butterfly can cause a tornado, what can humans cause with their boundlessly reckless disturbances of initial conditions?

Understanding how it all fits together is a relatively new field called Earth system science. Earth system scientists work on building and fine-tuning mathematical models (computer programs) that describe the complex inter-relationships of Earth's carbon, water, energy, and trace gases as they are exchanged between the terrestrial biosphere and the atmosphere. Ultimately, they hope to understand Earth as an integrated system, and model changes in climate over the next 50-100 years. The better the models, the more accurate and detailed will be the image in the crystal ball.

NASA's Earth System Science program provides real-world data for these models via a swarm of Earth-observing satellites. The satellites, which go by names like Terra and Aqua, keep an eye on Earth's land, biosphere, atmosphere, clouds, ice, and oceans. The data they collect are crucial to the modeling efforts.

Some models aim to predict short-term effects—in other words, weather. They may become part of severe weather warning systems and actually save lives. Other models aim to predict long-term effects—or climate. But, long-term predictions are much more difficult and much less likely to be believed by the general population, since only time can actually prove or disprove their validity. After all, small errors become large errors as the model is left to run into the future. However, as the models are further validated with near- and longer-term data, and as different models converge on a common scenario, they become more and more trustworthy to show us the future while we can still do something about it—we hope.

For a listing and more information on each of NASA's (and their partners') Earth data-gathering missions, visit science.hq.nasa.gov/missions/earth.html. Kids can get an easy introduction to Earth system science and play Earthy word games at spaceplace.nasa.gov/en/kids/earth/wordfind .

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

September Meeting Notes

Mercedes Rivero-Hudec, Secretary
September 1, 2006, Seagrave Observatory

Featured speakers: Skyscrapers Gerald (Gerry) Dyck, John Kocur, Robert (Bob) Horton and Richard (Rick) Lynch were September's featured speakers. The titles of their presentations were, respectively, Astronomy Set to Music, Setting Up a New Telescope, Astrophotography, and Roswell Revisited. We all had the opportunity to learn about topics of particular interest to each of the four Skyscrapers.

Business meeting: Call to order: • The business meeting was called to order by President Huestis at 9:56 p.m. • President Huestis thanked the speakers.

Secretary's report: Approved as posted.

Treasurer's report: Posted in the newsletter.

Trustees' report: Rick Arnold (Rick A.) mentioned that painting of the 12-in telescope's building had taken place, and that tables would be set up for Astro Assembly on September 28. Rick Lynch (Rick L.) inquired about cleaning up the week before Astro Assembly; President Huestis asked Rick L. about pest control. Marian Juskuv talked about files in the anteroom; Marian also submitted a note to the executive board.

Historian's report: Dave Huestis informed us that he has finished going over the minutes posted in newsletters kept on file. Dave found out that Fred Whipple gave his first talk to the Skyscrapers on November 7, 1934.

AstroAssembly: • Theodore (Ted) Ferneza mentioned "everything is coming into place very smoothly." As of September's monthly meeting more than 40 people had registered to attend Astro Assembly. • Robert (Bob) Napier contacted Nova Astronomics and three copies of "Earth Centered Universe" (software) will be donated as raffle prices. • James (Jim) Brenek made a custom telescope pier, "a remarkable piece of equipment" – quoting Ted, and donated it to Astro Assembly. • Ted also requested volunteers to monitor parking during the 2-4 p.m. shift on Saturday, September 30; Daniel (Dan) Warren volunteered. • Dolores Rinaldi mentioned that about six people would be needed around 3:30-4:00 p.m. the same day, to set up tables and chairs for the banquet. • Rick Lynch said he knows somebody interested to give a presentation on Friday evening. • Ted informed the membership that the list of speakers in on our website. • President Huestis mentioned that the first Astro Assembly took place in 1952 and the second one in 1955. Organizers at the time commented on the amount of work involved in AstroAssembly!

Librarian's report: • Nichole Mechnig read a note from Tracey Haley mentioning that most books had been returned and that there were new books in the library. • Dave Huestis reported that Nancy White, a Skyscraper, donated to the library a copy of Alan Hale's "Everybody's Comet: A Layman's Guide to Comet Hale-Bopp" as well as some maps. He also thanked those who helped at the Scituate Library's Centennial; Dave mentioned that most people who stopped by the display asked about Pluto.

Old business: Anthony Salotto was voted in.

New business: The following new applicants were introduced to the membership: Tilo Angiolilli, Peter and Jane Bonacich, Lloyd Merrill, Ray Schmidt and the Shein family. They will be voted in next month under old business.

Good of the organization: • Sam Robbins downloaded several astronomy lectures and donated the CD to Skyscrapers. • Rick A. talked about the streetlight and said that National Grid did not have a record about it; a request will have to be filed again.

President's announcements: • Planning meeting for Skyscrapers' 75th anniversary: October 12, 2006, at the observatory. • Sent a reminder about delinquent memberships and got some responses. • Happy Labor Day weekend to the membership! • Double check latches and locks in preparation for tropical storm Ernesto.

Adjournment: The business meeting was adjourned at 10:26 p.m.

Treasurer's Report

Al Schenck, Treasurer

INFLOWS	
astroincome	
Astroad	90.00
astrobanquet	1,598.00
astrogrille	328.15
astroraffle	1,176.00
astroregistration	1,961.00
TOTAL astroincome	5,153.15
cookoutinc	441.00
donation	77.57
Collationdonation	37.00
TOTAL donation	114.57
dues	1,760.00
Contributing	861.00
Family	850.00
Senior	181.00
TOTAL dues	3,652.00
Interest Inc	35.52
magincome	
Astronomymaginc	233.95
skytelmagincome	395.4
TOTAL magincome	629.35
magsales	11.00
Starparty	350.00
TOTAL INFLOWS	10,386.59
OUTFLOWS	
astroexp	
Astrocater	1,170.00
Astroprinting	136.21
Astroshuttle	25.00
Astrosupplies	148.00
Hallrental	150.00
Raffle	5.00
Tentrental	500.00
TOTAL astroexp	2,134.21
bldgandgrounds	140.00
clubsubscription	60.00
collation	98.02
Cookoutexp	503.13
Corporationfee	20.00
Discretionary	25.00
membersubscriptions	99.90
Astronomymagexp	204.00
Skytelexp	395.40
TOTAL membersubscriptions	699.30
Newsletter	8.58
Portajohn	100.00
Utilities	
Electric	87.96
Propane	49.86
TOTAL Utilities	137.82
TOTAL OUTFLOWS	3,926.06
OVERALL TOTAL	6,460.53
Bank Accounts	
Checking	5,364.80
Savings	15,629.26
TOTAL Bank Accounts	20,994.06
Cash Accounts	
Cash Account	53.86
TOTAL Cash Accounts	53.86
OVERALL TOTAL	21,047.92

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, RI 02857