Houston Astronomical Society

April, 2012

GuideStar

April, 2012

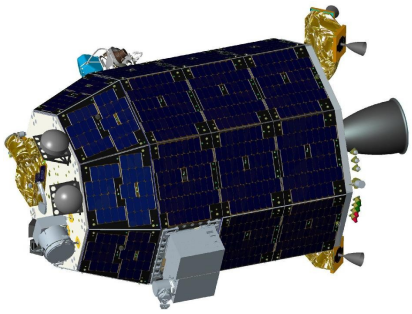
Volume 30, #4

At the April 6 Meeting

The New Moon

Brian H. Day

A new generation of robotic lunar explorers is revolutionizing our understanding of the Moon.



Ladee Spacecraft

We will look ahead to NASA's upcoming Lunar Atmosphere and Dust Environment Explorer (LADEE) mission, scheduled to launch in 2013, and explore how amateurs can directly participate in and contribute to the science of these missions.

LADEE Mission E/PO Lead
NASA Lunar Science Institute
Planners Collaborative

The Houston Astronomical Society is a member of the Astronomical League.

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HAS Web Page:

http://www.AstronomyHouston.org

See the *GuideStar's* Monthly Calendar of Events to confirm dates and times of all events for the month, and check the Web Page for any last minute changes.

Schedule of meeting activities:

All meetings are at the University of Houston Science and Research building. See the inside back page for directions to the location.

Novice meeting: ..... 7:00 p.m.

Introduction to Astronomical League Observing Programs — Amelia Goldberg

General meeting: ..... 8:00 p.m

See last page for directions and more information.

The Houston Astronomical Society

The Houston Astronomical Society is a non-profit corporation organized under section 501 (C) 3 of the Internal Revenue Code. The Society was formed for education and scientific purposes. All contributions and gifts are deductible for federal income tax purposes. General membership meetings are open to the public and attendance is encouraged.

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Dues and Membership Information

Annual Dues:Regular $36
Associate $6
Sustaining $50
Student $12
Honorary ..... N/C

All members have the right to participate in Society functions and to use the Observatory Site. Regular and Student Members receive a subscription to *The Reflector*. *The GuideStar,* the monthly publication of the Houston Astronomical Society is available on the web site. Associate Members, immediate family members of a Regular Member, have all membership rights, but do not receive publications. Sustaining members have the same rights as regular members with the additional dues treated as a donation to the Society. *Sky & Telescope* and *Astronomy* magazines are available to members at a discount.

Membership Application: Send funds to address shown on last page of *GuideStar*. Attention - Treasurer, along with the following information: Name, Address, Phone Number, Special Interests in Astronomy, Do you own a Telescope? (If so, what kind?), and where you first heard of H.A.S.

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Other Meetings...

Johnson Space Center Astronomical Society meets in the the Lunar and Planetary Institute on the 2nd Friday of each month. Web site: www.jscas.net

Fort Bend Astronomy Club meets the third Friday of the month at 8:00 p.m. at the First Colony conference Center. Novice meeting begins at 7:00, regular meeting begins at 8:00. Web site: http://www.fbac.org

North Houston Astronomy Club meets at 7:30 p.m. on the 4th Friday of each month in the Teaching Theatre of the Student Center at Kingwood College.Call 281-312-1650 or E-mailbill.leach@nhmccd.edu. Web site: www.astronomyclub.org

Brazosport Astronomy Club meets the third Tuesday of each month at the Brazosport planetarium at 7:45 p.m. The Brazosport planetarium is located at 400 College Boulevard, Clute, TX, 77531. For more information call 979-265-3376

President's Message

by Gordon Houston, President

Hello HAS,

As a group, we are generally in a photon deprived environment these past few months. If you haven't had a chance, read Bill Pellerin's excellent article, **"Cold, Cloudy Nights," posted on the Astronomical League website**. There are some excellent pointers and the concept of 'continuous improvement' is a great way to look at our endeavor. As Ed Malewitz pointed out, in commenting on Bill's article several weeks ago, he indicated that my mantra 'nothing replaces time at the eyepiece' works well with Bill's concept. I made this statement at the basic observational astronomy course on a number of occasions and as I have thought about that, it certainly a fact. The skill of observing is learned in two capacities, first, as Bill put it, observing is a mental exercise as much as a visual exercise, so he recommends reading books and other learning material about the class of objects being observed and astronomy in general. This coupled with the 'time at the eyepiece' will make you a better observer.

To this, I would like to add one idea to the mix and that is the **science of astronomy is cumulative**. What astronomers know today, is based on all that has been discovered in the past, enabling research to open up new areas of the universe. This cumulative effect is evident in becoming an experienced observer. One other secret I let the class in on was setting up next to larger telescopes helps, as larger telescopes share photons with smaller telescopes. This is especially true for novice observers. To observe an object in a larger telescope and the ability to see without averted vision allows the visual part to catch up with the mental. **A good example of how novice observers with no experience can be involves observing the Great Orion Nebula.** Now, this nebula, even in small telescopes is quite apparent, but I can't count the number of times I have shown people the Great Orion Nebula and their initial response was that they did not see anything. After describing to them, (the mental part) and after several attempts, you hear the light bulb go off and they see the nebula. The first time this happened, I thought to myself, 'how could this person not see the nebula?' This example proves the points, that observing is a skill, acquired by mental, visual, and the cumulative effect.

Many times, the hobby of amateur astronomy is a singular, lonely, endeavor, but **experienced observers can help novice observers improve in every area described above**. It has been my experience that most amateur astronomers jump at the chance to help the novice observer. Most of you may have a person you consider your mentor, who guided you through the first phases of becoming an experienced observer. Remember that fact and to that end, I ask each of you to **look for any opportunity to mentor a new member**. Finally, does anyone remember what the night sky looks like, if so, could you describe it for me? Clear Skies!!

Ad astra,

..Gordon Houston

President HAS

April/May

Calendar

Date	Time	Event
April		
6	2:19 p.m.	Full Moon
	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
11	7:30 p.m.	HAS Board Meeting HEB Community Meeting Room I-10W @ Bunker Hill
13	5:50 a.m.	Moon at last quarter
15	2:00 p.m.	Saturn at opposition
18	1:00 p.m.	Mercury at greatest elongation west
21	2:19 a.m.	New Moon Prime Night, Columbus Site
22		Lyrid meteors peak
29	4:57 a.m.	Moon at first quarter
May		
4	7:00 p.m.	HAS Novice Meeting, U of H
	8:00 p.m.	HAS General Meeting, U of H
5	10:35 p.m.	Full Moon Eta Aquarid meteors peak
7	7:30 p.m.	Basic Observational Astronomy Course Day One HEB Community Meeting Room I-10W @ Bunker Hill
9	7:30 p.m.	HAS Board Meeting HEB Community Meeting Room I-10W @ Bunker Hill
12	4:47 p.m.	Moon at last quarter
14	7:30 p.m.	Basic Observational Astronomy Course Day Two HEB Community Meeting Room I-10W @ Bunker Hill
19		Prime Night, Columbus Site
20	6:47p.m.	New Moon
38	3:15 p.m.	Moon at first quarter

Send calendar events to Doug McCormick - skygazer10@sbcglobal.net

For the latest information on club events, go to http://www.astronomyhouston.org/

Check the web site: www.astronomyhouston.org

The HAS website not only has news and information about our society, but also a variety of features to manage your membership and connect with other club members. Current members can post photos, trade gear, pay dues, manage discount magazine subscriptions, swap stories in the forum, and more.

Questions about the site? Need a hand to get your account set up?
Contact webmaster@astronomyhouston.org.

Follow the *GuideStar* on Twitter at:

GuideStar_HAS

Join Facebook and look for:

Houston Astronomical Society

Starline

Call 832-go4-HAS0 (**832-464-4270**) for the latest information on the meeting and other information about activities within the HAS.

HAS Board Meeting

HAS Board meetings are scheduled monthly (see the calendar, above). All members are invited to attend these meetings, but only board members can vote on issues brought before the board.

Observations... of the editor

by Bill Pellerin, GuideStar Editor

Texas Star Party This Month

It's here!! The Texas Star Party begins this month. Sunday, April 15 is the first day of the TSP and the event ends the following Sunday.

It's not to late to sign up for the TSP and some Prude Ranch (site of the TSP) accommodations are still, or will become, available.

At the Texas Star Party you'll spend a week, or less, on the Prude Ranch very near the town of Fort Davis, Texas. As Steve Goldberg says, to get there drive 550 miles west on I-10, and turn left. Yes, it's a long way from here, and gasoline prices are a bit higher than last year but the clear, dark west Texas skies are the best in the country. You owe it to yourself to get some dark sky time.

Check the web site for more details: www.texasstarparty.org

Staying Home?

If you're not going to west Texas this year, don't let that stop you from getting out under the stars. New moon weekend is April 21/22, and it's prime night at the observing site. This means that the site is available to you to get some work done on your observing program. Take advantage of this, and come out.

If you don't have an observing program in progress, check out the Astronomical League web site (www.astroleague.org) and get one. There's nothing like having a goal to get you motivated.

Amelia Goldberg will be at the April novice meeting to tell us about the Astronomical League observing programs and to answer your questions about these programs. Amelia, the creator of her own program, the 'Universe Sampler' is the HAS coordinator with the Astronomical League on this program and generally awards several observing certificates at each HAS meeting. She is an AL Master Observer (certificate # 55).

Really Staying Home?

If you're not going to west Texas and you're not leaving your urban environment there is still plenty of observing to do. The Astronomical League has several programs that you can do from your back yard. The Urban Program involves observing objects that you can see from (guess what?) an urban environment, the Analemma Program involves observing the position of the Sun at various times of the year, and the Lunar Program is for observers of the Moon. There's a special award for this year's Venus transit (June 5/6 depending on which side of the date line you're on).

This Venus transit is literally a once-in-a-lifetime event. If you don't see this one, you won't see another one in your lifetime. It's over 100 years until the next one. I'm going to make a special effort to see this one.

Clear Skies, Now!

I'm finishing the *GuideStar* on March 24th, a Saturday, and as I write this we have beautifully clear skies, and the Moon is only two days old so it'll be out of the sky. I sincerely hope that you'll be getting out to enjoy this evening.

I'll be participating in one of the public star parties planned for tonight. It's rare that we have two public events scheduled for the same day, but it happens. Both of these are in town, so the skies may be clear, but they won't be dark. We'll still have plenty to show, tonight. Venus and Jupiter are in the west and Mars is in the east. The Pleiades will be high in the sky as will M44, the Beehive (if we can find it).

One of the things I plan to do is to promote the Houston Astronomical Society to the event participants.

Our president, and the board has a goal of increasing our membership this year. It's up to you and me to let interested people know about the HAS and to encourage them to join us.

I strongly encourage you to participate in future public star parties. It's fun, it attracts new people to astronomy, and it increases awareness of the need for dark skies. You'll learn something as well. When you show an object in the sky you need to have something to say about it. Researching the object will help you learn more about it.

Until next time...

clear skies and new moons!

..Bill

SN1987A Twenty Five Years of Discovery

by Don Selle

It was a cold dark night in the Chilean high desert. The wind blew hard, cutting through the astronomer's coat chilling him to the bone, slamming shut the roof of the telescope shed where he was working .

Unbeknownst to the astronomer, the first of a massive flood of elementary particles spead toward earth at light speed, carrying with them from their source, a tremendous wash of energy. For the first brief seconds after their creation, these particles radiated more energy than the output of all of the suns in our vast universe combined. They would slam into earth's fragile atmosphere, penetrating the earth to its core. The astronomer shut down early that night, frustrated that his observations were cut short. As he reviewed what work he had completed, he was intrigued by something he had seen on his photographic plates. As he left the shed, he looked up, and saw a new star shining in the heavens. In that instant, he began to understand.

Sounds like science fiction, doesn't it – but It's not. Oh, I'll admit that I've made presentation of the facts much more dramatic sounding than the way the story of the discovery of supernova SN1987A is usually told. The truth is perhaps not as dramatic, but twenty five years ago, the discovery of SN1987A was a very exciting and important astronomical event, one that still continues to enlighten astronomers.

SN1987A, discovered in the early morning hours of Feb. 24, 1987, was the first new supernova detected that year. Its location, about 168,000 light years away in the Large Magellanic Cloud, (LMC) a small irregular galaxy in our local group, would make it the brightest supernova in almost 400 years. It is also the supernova closest to the earth that exploded in the age of modern astronomy. Subsequent observations over the last 25 years in radio, optical and high energy spectra have led to an increased understanding of how massive stars end their lives, and has improved our ability to measure the vast distances of our universe.

SN1987A was discovered by astronomer Ian Shelton, a researcher working at the Las Campanas observatory in Chile's Atacama high dessert. Shelton was using a 10-inch Schmidt camera to take survey photos of the LMC. Early in the cold morning of the 24th, when a gust of wind closed the roll-off roof of the shed the telescope was mounted in, Shelton decided to end his observations early. As Shelton developed his plates, he saw a bright new star in his photographs located in the Tarantula Nebula, which had not been there before. Shelton immediately went outside, looked up and confirmed the new star sighting. He then hurried to tell other astronomers at the facility.

It turned out that an amateur astronomer also was observing the LMC. At about the same time as Shelton's discovery, New Zealand amateur Albert Jones observed the new SN1987A. His report was received later than Shelton's and therefore he is mentioned, but does not receive official credit for the discovery.

More important to the advancement of astronomical knowledge, Jones had been observing the same area of the LMC the night before, on Feb. 23, about 21 hours before the discovery of the supernova. At that time, however, he saw nothing.

An hour later, Australian astronomer Robert McNaught actually photographed SN1987A, just as it was beginning to brighten. Had McNaught checked his photographs and seen the brightening SN, he would have been credited with the discovery, but it was not until after news of the discovery was announced that he recognized that he had captured the star in the very earliest stage of its self-destruction.

The elementary particles in our science fiction story are real, but hardly as menacing as they sounded. The supernova generated unbelievably huge numbers of neutrinos which are massless (or nearly massless) particles that travel at the speed of light. They were created when the iron core of SN1987A, a Type II supernova, collapsed.

The collapse occurs as the core runs low on fuel and energy released in fusion reactions in the core slow down. As the energy output of the core

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is diminished, the outward pressure generated by the release of that energy, is also dwindling. The pressure trying to collapse the core, caused by the weight of the layers above it begins to win the battle.

Gravity is finally able to collapse the core very quickly into a volume a small fraction of its original size. Electrons in the core are forced to combine with protons, forming neutrons and a huge number of neutrinos. As the core collapses, material above it streams toward the stars center only to rebound outward again, causing the star to die in a violent explosion.

Since neutrinos interact with normal matter very weakly, they stream out of the star at light speed before the explosion can become organized. In the first few seconds after the core collapse, the neutrinos carry away over 99 percent of the energy created by the dying star. For a few brief seconds the star radiates more than the total energy released by all of the other stars in the known universe combined.

Less than 1 percent of the energy created in a supernova is released by the fury of the explosion, and the heat and light created. Over the next several days as the star tears itself apart, this release of energy will cause the supernova to brighten, until it outshines all of the stars in its own galaxy.

On Feb. 23 about three hours before McNaught took his image of the birth of SN1987A, 25 neutrinos were detected in three separate neutrino experiments around the globe. This was the first time that such an observation could be directly attributed to the collapse of a stellar core, verifying the theory that astrophysicists had developed to explain type II supernova explosions.

The fact that SN1987A, so close by as compared with other SNs observed previously, had practically every observatory in the southern hemisphere studying it, intensively within hours after the explosion was detected. The progenitor star of SN1987A was identified to be a blue supergiant star. This was a big surprise at the time since prior to SN1987A, it was believed that only red supergiant stars would end their lives as supernovae. Here was clear evidence that, under certain circumstances, even blue giant stars can violently explode.

The data collected, spectra and light curves, were of such high quality that they allowed models of type II SNs to be tightly calibrated. With this detailed knowledge, and because supernovae are so bright, astronomers could use similar stellar explosions in far off galaxies as "standard candles" allowing better distance measurement across vast galactic distances.

Accurately determining the distance to the LMC is a key step in the measurement of the distance to other nearby galaxies. Certain types of bright stars such as Cepheid variables, first resolved in the LMC, can also be resolved in other galaxies such as M33. If the distance to the LMC could be accurately determined, the difference in the apparent brightness of these stars could be used to establish the distance to the in the more remote galaxy.

SN1987A provided two direct measurements of this distance to a high degree of accuracy. One of these involved a ring of material that had been ejected from the progenitor star, puffed off at some point thousands of years before the star blew up.

When the supernova exploded, it emitted a

powerful flash of ultraviolet light which was recorded immediately after the supernova occurred. This light took several months to catch up to the slower moving ring material. The ultraviolet light caused the ring material to heat up and glow, which was observed by astronomers. The time it took for the ring to "light up", the known speed of light, and the measurable angular extent of the ring

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Just Looking

A *GuideStar* Interview by Clayton L. Jeter

Dave Kriege—Obsession Telescopes

Dave Kriege is and has been a recognized name in the astronomy communities throughout the world. Dave is the maker of the fine "Obsession" Dobsonian telescope. I have always thought that John Dobson was the person that had the idea, "Coulter" telescopes got the revolution started, but it was Dave's "Obsession" scopes that perfected this design and are now at star parties around the country (world). There are thousands!

He makes two designs; the Classic and the newer Ultra Compact (UC). Both versions have beautiful design and built in quality. Stunning to use on the field is an understatement.

I know you guys have been waiting on me to finally interview this well-known telescope maker. The time has come… here's Dave

The Dave Kriege bio…

I'm 58 years old from Lake Mills Wisconsin. I'm married with two grown daughters. I've been a dentist the last 33 years and a telescope maker the last 46 years. I started Obsession Telescopes in 1991 and have over 2000 Classic and Ultra Compact scopes under the stars. I credit my wife for the name Obsession. When I was building my first Dob, a 20 incher, she screamed down the basement stairs "Are you working on that damn telescope again. You're obsessed with it." I've built scopes from 4 inches to 36'ers. In 1997 I released "THE DOBSONIAN TELESCOPE, A Manual to Build Larger Aperture Telescopes" by Kriege and Berry. My scopes are the most copied Dobs on the market by ATMs and professional TMs. I spend as much time as I can in the "House of Obsession", my 26' x 27' roll off roof observatory near my home with my 25" inside. My favorite star party is Okie-Tex. And my favorite observing is deep sky objects. Of course my favorite telescope is my 25" Classic that I built in 1989. My future plan is to retire from dentistry so I can cut back to full time work making scopes… my Obsession!

The Dave Kriege interview…

Clayton: How did you first become interested in astronomy?

Dave: When I was in the 8th grade, my father and I made a 4 inch reflector for a science project. One look at the stars and I was hooked.

Clayton: Do you think that by becoming involved in astronomy and building your own line of scopes, it has somehow changed a direction in your life?

Dave: Hmmm, I'm a dentist by education. I've been doing teeth for 33 years. Dentistry is all negatives. Patients don't like to go to the dentist, they don't like the expense, and it's an inconvenience. Telescopes and astronomy are the opposite. People love deep sky views thru a big Dob. They want to spend the money and they enjoy the wonder and beauty of the universe. The two careers balance each other.

Clayton: Have you ever dabbled in astrophotography?

Dave: Yes, with film. I never understood the appeal though. There are so many awesome astrophotos taken by major observatories, the Hubble, and people with advanced equipment. Why try to copy their work. It's like everyone standing on the exact same spot taking photos of the Washington monument. I agree with John Dobson who said "astrophotography is a disease". I prefer aperture fever and real time photons on my retina.

Clayton: You seem to be very proactive in making better scopes.... what's new on the horizon for "Obsession Telescopes", or is this top secret?

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Dave: Adaptive optics, real time CCD eyepieces (no camera or laptop needed), and large aperture telescopes that can be folded up and taken on airplanes.

Clayton: Do you own different telescope designs other than Dobsonians?

Dave: No. Nothing beats a Dob when it comes to aperture per dollar. The whole reason to have a telescope is to see the universe better. Nothing else does this better for the money than a Dobsonian.

Clayton: Tell us about a typical observing session for yourself.

Dave: A typical night warms up with a few celestial celebrities. For example M35 and neighboring cluster, the Dog bone, Medusa, M42, Thors helmet, the trio in Leo, etc. Then when my eye/brain is up to speed I go for obscure objects featured in the magazines, news, field books.

I try to find at least one really new cool object each time I go out.

Clayton: What is so special about the Okie Tex star party for you?

Dave: It's very dark, a relaxed laid back crowd, wifi is on the field, a perfect time of year with perfect observing and climate, only 1000 miles from home, and plenty of space to spread out my rig, scope, and party tent.

Clayton: What other star parties do you attend?

Dave: The Two Hearted River Star party in the UP of Michigan, Astrofest occasionally. TSP is a great one but it's too far for me.

Clayton: Do you have any helpful advice to pass on to observers just starting out in astronomy? What do you tell ATM'ers?

Dave: Come on over and I'll give you a tour of the universe. Beginners need to find an enthusiastic "big brother". Someone that can help them get started and out under the stars.

Make the biggest scope you can afford and are comfortable using. Nobody ever regrets aperture.

Clayton: I'd like to know a little more about your telescope(s).

Dave: My personal scope is a 25 f/5. I built it in 1989. It was Obsession #2. Obsession #1 was a 20" I brought to Astrofest in 1987 that appeared on the cover of the old "Telescope Making" Magazine. My 25" has over 50000 miles on it to star parties around North America, a billion of light years worth of photons, and thousands of hours of astronomy enjoyment. Nebulae, globulars, galaxies come screaming out of the eyepiece. After 23 years I still get excited every time I use it.My Classic production line of Dobs is identical in design but have much better fabrication. My "House of Obsession" is a 26 x 27 foot roll off roof observatory in my yard. It has a warm room and enough space for my scope and gear. The roof can be opened or closed with only one hand. I love it out there.

Clayton: It seems in recent years that the younger people are not that interested in amateur astronomy, or any of the sciences. How can we turn this around?

Dave: Good question. Young people prefer to interact with the world thru electronic displays like cell phones, I-Pads, computers, video games, etc.

They will only be interested in astronomy on a display. Observing on a display (tv, laptop) from remote telescopes on mountain tops would be a good start. World class equipment, observations from pristine dark sites, all streamed to your living room on your TV or laptop. Wouldn't that be cool?

Clayton: How would you like to see your astronomy grow?

Dave: After I cut back to full time work (instead of 80 hours per week now) I want to go to more dark sites, more star parties, and actually try to do the M objects and Herschel lists. I've seen many thousands of objects and my Uranometria volumes are chock full of notes. But I want to systematically do the lists. I also plan on taking some astronomy courses at UW Madison.

Clayton: Is there an email address that you have that a Houston Astronomical Society member could contact you for an additional question or two?

Dave: telescopes@netwurx.net

Clayton: Thanks Dave for taking the time to share your interest and thoughts within our HAS newsletter, 'The Guide Star'. We wish you luck with all of your astronomy interests. Please come visit our society when in the Houston area, we'd love to see you.

Clear skies always.

Dave: My pleasure, Dave K.

Clayton L. Jeter is an avid visual observer and a longtime member of the Houston Astronomical Society. Contact him at: stonebloke@gmail.com

The Planet in the Machine

By Diane K. Fisher and Tony Phillips

NASA Space Place

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.

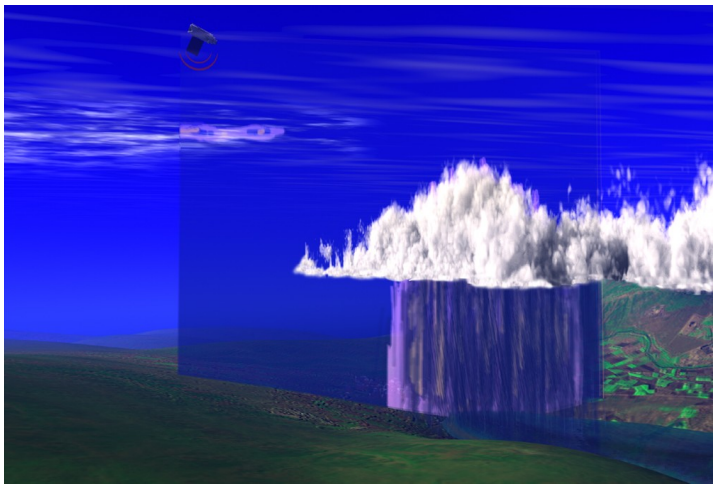
And then there's the human race. If a butterfly can cause a tornado, what can humans cause with their boundlessly reckless disturbances of initial conditions?

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.nasa.gov/missions/earth.html. Kids can get an easy introduction to Earth system science and play Earthy word games at http://spaceplace.nasa.gov/ecosphere.



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.

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

Ancient Great Eruption Echoes Reach Astronomers

By Jennifer Oullette, Discovery Space— http://news.discovery.com/contributors/jennifer-ouellette/

When the binary star system Eta Carinae experienced a spectacular outburst in 1837 -- dubbed the "Great Eruption" -- there were no cameras or other sophisticated scientific instruments around to record the event for posterity.

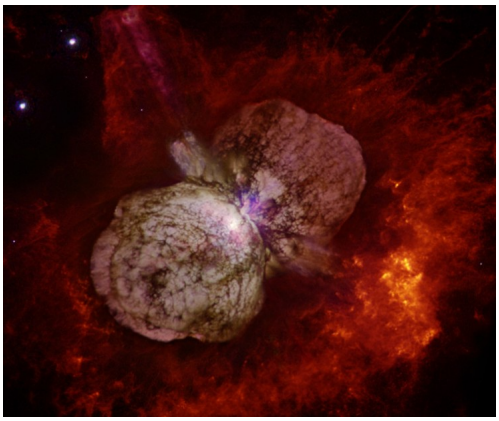
But now, 170 years later, remnants of light from the Great Eruption are finally reaching Earth, providing new insight into how massive stars behave when they are on the brink of exploding.

Astrophysicists at the University of California, Santa Barbara and the Las Cumbres Observatory Global Telescope Network, announced the detection of this "light echo" in a Feb. 16 letter to the journal *Nature*.

UCSB Postdoc Federica Bianco, who compared the light echo to eyewitness reports from the 1800s, phrased the phenomenon best: "You are at the stadium, watching the game, and your team scores. But you do not have modern instruments, detectors and spectrographs to study it," she said in a press release.

NEWS: Detecting Light Echoes from Ancient Star Eruption

"Now we are getting a replay -- an up-close detailed view of our cosmic eruption," she continued. "And just like with the replay, we get to see the outburst from a different point of view, as the light that we see now was originally traveling in a different direction than the light seen in the 1840s."



Eta Carinae is a rare, massive binary star, and the dominant partner in this cosmic coupling belongs to the class of luminous blue variable stars. When it erupted 170 years ago, it became one of the brightest stars in the sky for a time. So why are we suddenly seeing light from that event again?

The astrophysicists explain that originally, the light traveled away from Earth, and then bounced off dust clouds, which rerouted it to Earth -- just like an echo. The longer path means we are only now seeing that echo.

There might not be photographs, but there are a few historical eyewitness accounts on record to help astrophysicists determine that what they are seeing really is a "light echo" from Eta Carinae's 19th century outburst.

In the 1830s, astronomer Sir John Herschel noticed an especially bright star in the southern sky while conducting a survey from Cape Town, South Africa. He dutifully sketched the region where the star appeared, particularly noting a dark ring in the upper part of the Carina Nebula that resembled a keyhole (see image, left).

Within a few years, however, that star had so faded in brightness that Herschel's telltale keyhole was barely visible.

Today we know that Herschel's bright star was Eta Carinae, experiencing a sudden burst of brightness thanks to a "supernova imposter" event, in which the star system shed a whopping 20 solar masses worth of outer shell.

You can still see the remnant of this stellar explosion in the Homunculus Nebula. It's called that because Argentine astronomer Ernest Gaviola, who first observed it in 1950, thought it looked like a human figure, with a head, legs and folded arms.

There is even evidence that Australian aborigines may have spotted the Great Eruption around the same time, according to a paper that appeared last year in the *Journal for Astronomical History and Heritage*. Co-author Duane Hamacher maintains that the Boorong people of northwestern Victoria were aware of celestial objects and cast them as characters in their oral stories of the Dreaming -- including the eruption of Eta Carinae.

ANALYSIS: 2012 Mayan Calendar 'Doomsday' Date Might Be Wrong

The evidence can be found in a paper by

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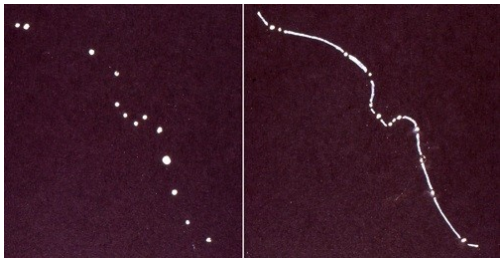
William Edward Stanbridge, a 19th century Australian astronomer who did a bit of star-gazing with two men of the Boorong clan, who recited those stories to him while pointing out the relevant stars overhead. Stanbridge dutifully recorded this information, matching the Boorong stars with their Western counterparts using a star atlas.

Alpha Centauri, for instance, was *Berm-berm-gle*, while Antares was *Djuit*, and Canopus was known to them as *War* (pronounced "Wahh", meaning "Crow"). But when they pointed out *Collowgullouric War* ("Wife of Crow"), Stanbridge was stumped. He couldn't identify the star on his chart. So he simply wrote, "Large red star in Robur Carol, marked 966. All the small stars around her are her children."

In 1996, astronomer John Morieson came across Stanbridge's work and re-analyzed it. You can see the constellation Carina to the left in the image below. (Eta Carinae is the brightest dot in the lower right corner.) On the right, Morieson "connected the dots" into something resembling a bird in flight -- what he believes the Boorong would have pictured as the "wife of Crow."



Morieson never published his thesis, but Hamacher and his collaborator, David Frew, came across it as they were rifling through historical records to build their case.

Hamacher figured folks would be skeptical of their claim that the Boorong story was a direct reference to Eta Carinae's Great Eruption. That's why he proffered an explanation on the Aboriginal Astronomy blog last year as to their reasoning process:

> *During the early 1840s, when Eta went through its great outburst and the time that Stanbridge was learning firsthand about Boorong astronomy, it was one of the brightest stars in the night sky ("large star"), it had a reddish color, was located in the now-defunct constellation of Robur Carol....*
>
> *Star charts from the period refereed to the Carinae Nebula (surrounding Eta Carina) as '966'. Eta Carinae itself was designated '968', but was labeled as a 4th magnitude star. This was probably a simple transcription error by Stanbridge, who did not recognize the bright star where his star charts claimed was a fairly mundane 4th magnitude star. Finally, this region of the sky is rich in 4th and 5th magnitude stars, which would have been the "small" stars representing the children of the female Crow.*

ANALYSIS: Black Hole Outburst Accompanied the Renaissance

Armin Rest of the Space Telescope Science Institute in Baltimore led the latest study, and spotted the echoes of Eta Carinae's Great Eruption while comparing visible light images he'd taken of the star in

2010 and 2011.

That's when he noted light "that seemed to dart through and illuminate a canyon of dust surrounding the doomed star system." He concluded that it couldn't just be material moving through space, which would only show up over decades of observation, not a single year.

It had to a light echo, giving the illusion of moving through time because each flash was reaching Earth at a different time after bouncing off dusty clouds. Comparison with historical records showed it was a remnant from Eta Carinae's Great Eruption.

The color image at left shows the Carina Nebula, a star-forming region located 7,500 light-years from Earth. (Eta Carinae is near the top.)

The three black-and-white images pictured here show light from the eruption illuminating dust clouds as it moves through them. The images were taken over an eight-year span by the U.S. National Optical Astronomy Observatory's Blanco 4-meter telescope at the CTIO.

This new study has already found some intriguing anomalies in Eta Carinae's behavior compared to its fellow luminous blue variables, using spectroscopy, which gives a detailed "fingerprint" of stars telling astrono-

(Continued on page 13)

(Continued from page 12)

mers the temperature and speed of ejected material.

For instance, the temperature of its outflow is much cooler that usual, around 8500 degrees Fahrenheit (5,000 Kelvin). Rest and his colleagues are revisiting their models for such stars to determine how this behavior might have occurred. They will continue to monitor Eta Carinae, and expect to see more brightening in six months or so, matching a similar period outburst in 1844.

"It's as if nature has left behind a surveillance tape of the event, which we are now just beginning to watch," said Rest. "We can trace it year by year to see how the outburst changed.

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(Continued from page 7)

allowed astronomers to accurately estimate the distance to the ring to better than 5 percent accuracy.

This result allowed the recalibration of the distance measurements to many galaxies around us. When coupled with measurements of the speed at which the galaxies are receding from us, a more accurate estimate of the Hubble constant emerges, narrowing our estimates of the size and age of the universe.

SN1987A helped advance our understanding of supernova explosions, and excited a generation of astronomers to research these most dramatic of astronomical events. Several would go on to become members of SN research teams. These teams used our more accurate understanding of supernovae to measure the expansion of the universe. In the process, they made the unexpected discovery that the expansion of the universe is accelerating due to some still unknown “dark energy.” In my book, that’s a story every bit as engaging as a good science fiction story.

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Observatory Corner

By Bob Rogers, Observatory Chairman

Hello everyone.

After a very rainy start on Saturday, February 18th, quite a few volunteers showed up to help remove the old collapsed Lawn mower shed. The only use that the shed had been providing for the last year was a home to some rats which quickly vacated when everyone started removing all the pieces. The whole process took about 2 hours to complete and afterwards, Mike Edstrom cooked hamburgers for everyone. I would like to thank Mike Edstrom, Allen Wilkerson, Scott Mitchell, Marty Levine, David Masera and new HAS Member Zhenglu (Allen) Wang. Thanks guys for all your help.

On another note, I want to thank Allen Wilkerson for fixing the leak on the East wall of the Observatory Chart room. This has been a 2 year issue that has finally been resolved. Over the last few months, Allen Wilkerson, John Haynes, Clayton Jeter and I have been doing some upgrades to the Observatory such as cleaning out the Chart room, adding red lights in the Telescope room, fixing the focuser for the F/7 finder scope, taking the clutch assemblies for the F/5 and F/7 apart and cleaning them. Both telescopes are moving and guiding much better now. We took pictures of both clutch assemblies while they were apart for future reference and yearly maintenance. Allen and I also have been working on the roof system maintenance. The last thing I want to add is that we cleaned the desk that is in the Chart room. For those who use the Observatory, you know what I'm talking about.

And the work goes on ….

I **do** **need** to remind everyone that we need to start filling out Log Reports at the site so I can give this information to the Fondren Foundation. The property is on a 99 year lease and part of the Lease agreement is that HAS needs to report every year to the Fondren Foundation that the Property is being used. The Log Reports are located in the box in the middle of the field. Just open the cover, fill out the report and then slide it into the slot that is in the inside of the cover and then close the box. It is very important that everyone fill out a Log Report so that we are showing that the Observing site is being used. Your help on this is very much appreciated.

If you have a Randalls card, and have not done so, please have it coded for the Houston Astronomical Society. Our number is #6618. The Society gets 1% of the gross sales that members spend at Randalls. Randalls totals up the amount spent each quarter and will send us a check if the amount goes over $2,500.00, otherwise the total roles over to the next quarter or zeros out at the end of the calendar year. So please link your Randalls card to the Houston Astronomical Society so that the society can benefit from this Randalls program. Our number is #6618. This is very easy to do, just go to the Courtesy Booth and tell the person there what you want to do.

If you have any suggestions or thoughts for the site, let me know.

Thanks,

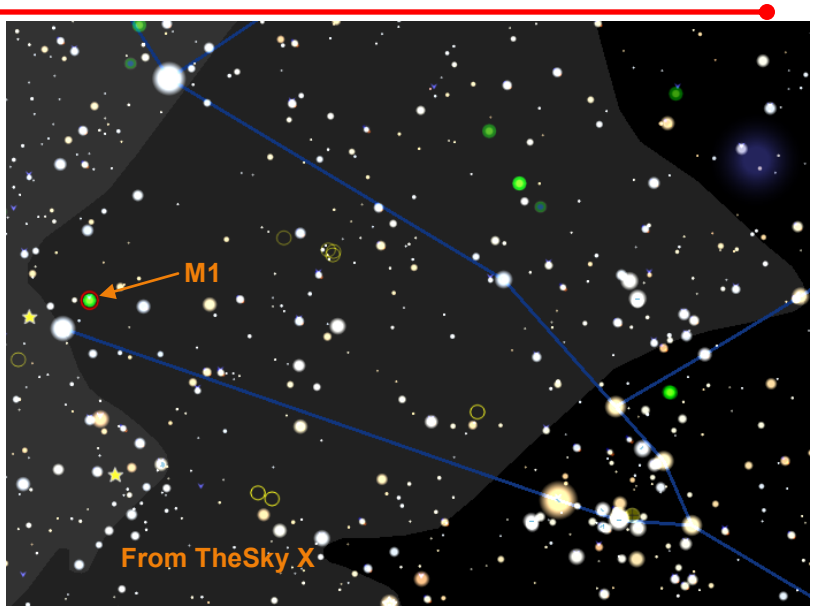
Bob Rogers

Observatory Chairman
281-460-1573
siteworkerbob@hotmail.com

Trailer/RV spots available free for weekend use at the site.
Contact the Observatory Chairman, Bob Rogers siteworkerbob@hotmail.com for more information

Shallow Sky Object of the Month

M1—The Crab Nebula



Object: M1– The Crab Nebula
Class: Supernova Remnant
Constallation: Taurus
Magnitude: 8.4
R.A.: 05 h 34 m 32 s
Dec: 22 deg 00 min 52 sec
Size/Spectral: 6' x 4'
Distance: 6500 ly
Optics needed: A small telescope will allow you to see this object, but for this one, the more aperture the better!

Why this is interesting:

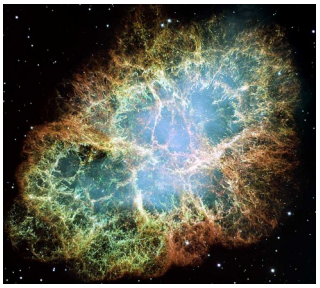
M1, the first object In Charles Messier's list of objects (added in 1758) is the remnant of a star that went supernova in the year 1054. Based on what we now know about the nebula, it is believed that the supernova may have been as bright as –7 magnitude, much brighter than Venus at its brightest (-5 mag). While the Messier list includes many objects of many kinds, M1 is the only supernova remnant in the list. So, while you may see other nebulous (cloud-like) objects when you observe the Messier list, all the others represent star forming regions — areas in which new stars are being born.

M1 represents a star that has ended its life by exploding into the beautiful remnant that we now see. Objects in the sky acquire names that describe how they looked to early observers. So it is with the Crab Nebula — the Earl of Rosse applied the name 'Crab' as a result of his observation with a large telescope in 1848.

If we turn the clock back on this object, to before it went supernova, we discover that the progenitor was about a 10 solar mass star (as massive as 10 Suns) and stars more than 8 solar masses are considered high mass. Where did all that mass go? Some of it is in the nebulous area and some of it is in the neutron star that is the final remains of the original star. These two do not account for all of the original mass, however and it is thought that some of the original mass was carried from the star by the solar wind. Astronomers don't know where the missing mass is.

The leftover star is now a neutron pulsar, a very unusual object emitting radiation at radio frequencies, but this radiation is leaving the star as a beam of radiation, more like a lighthouse beam than like a standard radio transmission. And, like a lighthouse, the pulsar is rotating in such a way that the beam of radiation points at the earth every 33 milliseconds (.033 seconds). So we observe pulses of radiation and not a steady stream of radiation.

Until astronomers figured out the physics for this neutron star pulsar some thought that the radiation was a signal from another intelligent civilization.



M1—Credit NASA

So, what's a neutron star? When a supernova goes off the driving force is the gravitational collapse of the star. The neutrons are as compressed as physics will allow (the old physics notion that two objects can't occupy the same space applies).

The neutron star is less than two solar masses. Why didn't the supernova create a black hole? The answer is that the progenitor star wasn't massive enough to do that. The creation of a black hole requires that a very high mass star reach the end-of-life.

Houston Astronomical Society

P.O. Box 20332

Houston, TX 77225-0332

General Membership Meeting

The Houston Astronomical Society holds its regular monthly General Membership Meeting on the first Friday of each month, unless rescheduled due to a holiday or a conflict with other events at the University of Houston.

Board of Directors Meeting

The Board of Directors Meeting is held on dates and at locations scheduled by the board. Information provided to *GuideStar* will be published. The meetings are open to all members of the Society in good standing. Attendance is encouraged.

***GuideStar* Information**

The H.A.S. *GuideStar* is published monthly by the Houston Astronomical Society. All opinions expressed herein are those of the contributor and not necessarily of Houston Astronomical Society. The monthly Meeting Notice is included herein. *GuideStar* is available on the HAS web site to all members of H.A.S., and to persons interested in the organization's activities. Contributions to *GuideStar* by members are encouraged. Electronic submission is helpful. Submit the article in text, MS-Word format via email BillPellerin@sbcglobal.net. Copy must be received by the 15th of the month for inclusion in the issue to be available near the end of the same month. Or, bring copy to the General Membership Meeting and give it to the Editor, or phone to make special arrangements.

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The Houston Astronomical Society welcomes you to our organization. The HAS is a group of dedicated amateur astronomers, most of whom are observers, but some are armchair astronomers.

The benefits of membership are:

- Access to our 18 acre observing site west of Houston -- a great place to observe the universe!
- A telescope loaner program -- borrow a HAS telescope and try observing for yourself!
- A monthly novice meeting, site orientation meeting, and general meeting with speakers of interest.
- Opportunities to participate in programs that promote astronomy to the general public (such as Star Parties at schools)
- A yearly all-clubs meeting for Houston area organizations
- Meet other amateurs and share experiences, learn techniques, and swap stories

You're invited to attend our next meeting.

You'll have a great time.

Houston Astronomical Society

Meeting on Friday, April 6, 2012

7:00 Novice Meeting, room 116 Science & Research 1 Bldg

8:00 General Meeting, room 117 Science & Research 1 Bldg

University of Houston

Directions to meeting:

From I-45 going south (from downtown)

- exit at Cullen Boulevard
- turn right on Cullen
- turn right into the parking lot (by the stadium)
- Science and Research is across the street (2nd building back)

From I-45 going north (from NASA/Galveston)

- exit at Cullen Boulevard
- turn left on Cullen
- turn right into the parking lot (by the stadium)
- Science and Research is across the street (2nd building back)

Parking:

There is Free Parking, **BUT DO NOT PARK IN ANY RESERVED PARKING SPACES AT ANY TIME.**
U of H parking enforcement will ticket your vehicle.

UPDATE — Due to construction in the stadium parking lot, use entrances 15D and 15F. You can park in this area, but NOT in a RESERVED space.