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Learning from SETI: Overcoming the roadblocks to discovery

By John Rachlin, Data-Mining for Astronomy, http://astrodatamining.net/

Imagine you're a scientist looking to make a discovery – not merely an insight, a profound earth shattering once-in-a-lifetime kind of discovery; a discovery so significant, it will change the course of history, and man's perceived place in the universe. You believe it's out there waiting to be revealed. Logic alone tells you it must be so. You start collecting data. And you collect and analyze, collect, and analyze. And you do this for fifty years, and still you find nothing! Unbelievable!

What do you do? Well, you have several options. First, you can try to increase the amount of data you are collecting. Perhaps your signal is very weak and merely hiding amidst the cosmic noise. Secondly, you can change your data. Maybe you've been collecting the wrong type of data. Maybe you've been looking in the wrong places, or at the wrong time. Perhaps you simply need to be a bit more clever about where and when and how you gather your raw observations. Your third and final option is to try to look at your data with a fresh perspective – to change your analysis. Maybe the signal is there all along, but you just aren't sifting through it in the right way. You're looking for the wrong patterns. Maybe the pattern your looking for is really quite alien.

By now, you've probably guessed that what I'm talking about, of course, is that most profound and potentially history-making career-risking data-mining effort of all time: The Search for Extraterrestrial Intelligence (SETI). And which of the above strategies is the SETI Institute (http://www.seti.org/) currently pursuing to address the fact that after all these years, it has yet to detect a signal from an alien intelligence? Answer: All of the Above!

Increasing SETI's data receiving capacity. SETI is pursuing a major technological upgrade to its receivers via the development of the Allen Telescope Array (http://www.seti.org/ata). Amir Alexander offers a brief history of the SETI project (http://www.planetary.org/explore/topics/seti/seti_history_00.html) in which he describes the Allen Array as "one of the best funded and most promising projects for the future of SETI." He goes on to write:

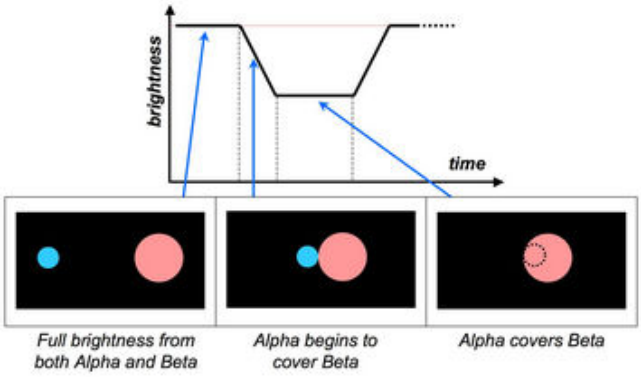
> *The Allen Array represents a true breakthrough for radio SETI. As a dedicated observatory, SETI researchers will be using it year-round to search for alien signals, as compared to the several weeks every year, which are allotted to Project Phoenix at Arecibo. In addition, since it is composed of hundreds of separate dishes, the array can be pointed at several points in the sky at the same time, and therefore listen to signals from several stars simultaneously. The latest technology will enable the Array to cover a frequency band 9 gigahertz wide, more than 3 times wider than project Phoenix, which scans the widest band of any of today's searches. All of this represents a qualitative leap in the capacity of SETI searches, and increases the chances of detecting a "real" signal several-fold.*

(Continued on next page)

Inside this issue:

Learning from SETI (Cont'd)

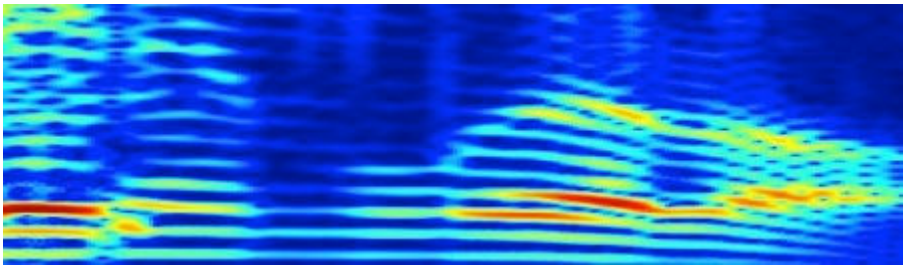
New sources of data. Dr. Seth Shostak (http://www.seti.org/Page.aspx?pid=455) gave a talk earlier this year at Foothill College as part of the Silicon Valley Lecture Series entitled: "The Search for Intelligent Life Among the Stars: New Strategies (http://www.astrosociety.org/education/podcast/shostak.mp3)." In his talk, he presents a wonderful range of novel and clever ideas aimed at trying to use the detection resources available in new and smarter ways. One of my favorite ideas: Theoretical modeling suggests that planets can in fact form in binary systems, and some such planets have already been discovered. An intelligent alien race in such a system would likely try to colonize planets in the companion star system. If the orbital plane of the binary system is in the line of sight of our own solar system, we will observe the star system as an eclipsing variable star. Many such stars are known. Now imagine this alien civilization communicating back and forth with its colony. At times when we would observe the eclipse, the communications beam will be focused right in our direction! So why not point our receivers at eclipsing variables specifically when they are undergoing the eclipse! As with all good strategies, this approach tells you "when to look and where."



Cosmos – The SAO Encyclopedia of Astronomy, http://astronomy.swin.edu.au/cosmos/

New analytical methods. Here, the SETI Institute as done something truly interesting. Jill Tarter (http://www.seti.org/Page.aspx?pid=462), director of the Center for SETI Research recently announced a new initiative by the SETI institute to enlist the help of researchers and programmers to see if the signal process and pattern detection algorithms can be improved.

> *We'd like to take the next step and invite all of the smart people in the world who don't work for Berkeley or for the SETI Institute to use the new Allen Telescope. To look for signals that nobody's been able to look for before because we haven't had our own telescope; because we haven't had the computing power…For people who don't have black belts in digital signal processing, we want to take regions of the spectrum that are overloaded with signals and get those out and have them visualized in different ways against different basis vectors. We'd like to see if people can use their pattern recognition capabilities to look or maybe listen; to tease out patterns in the noise that we don't know about (Source: O'Reilly Radar, http://radar.oreilly.com/2010/07/crowdsourcing-the-search-for-a.html*



So remember: the next time you're stuck in your own efforts at scientific enlightenment and discovery, think about the challenge of SETI and its strategy: more data, more data sources, and better analysis.

This content distributed by the AAVSO Writer's Bureau (http://aavsowritersbureau.blogspot.com/)

Correction: The September 2010 Prime Focus article "The Stories Behind the August Perseids" by Mike Simonsen should have been cited as content distributed by the **AAVSO Writer's Bureau**.

Touring the Skies

By Jim Bonser, jbonser@usa.net

October already! I can scarcely believe that it is the tenth month and 2010 will soon be just a memory. 2010 has produced some very memorable evenings under the stars for me so far, and although the fat lady may be warming up, she isn't singing yet, and there are still many good nights of observing left in the last months of this year. Last month we talked about Jupiter being about as close to Earth as it ever gets and therefore being very bright and also appearing very large in telescopes. That moment happened on the 21st of last month and we are again moving away from Jupiter, but that does not mean we should not continue watching the king of the planets. Jupiter will continue to look impressive all month. You should not have any difficulty locating Jupiter. It will be the brightest object rising in the East after sunset. If you are not sure, then the moon will help out around midmonth. On October 19th, a waxing gibbous moon will be just a few degrees above and slightly to the left of Jupiter. The moon will be very bright, almost full – about 91% lit which will pretty much make all the stars in the area invisible allowing Jupiter to stand out clearly. If it happens to be cloudy on the 19th, try again on the 20th when the moon will be brighter but now has moved to the left of Jupiter.

Normally I would be excited about the Orionid Meteor Shower on October 21 but as I mentioned above, the moon will be very bright around that time and will make all but the very brightest meteors invisible. Fortunately the moon will be out of the way for the Leonid Meteor Shower in November so that will be something to look forward to! The moon will be full on October 22 and this full moon is known as the Hunter's Moon.

Saturn will be visible in the early morning from the middle of the month on. Keep an eye on those slender rings! The rest of the bright planets will be lost in the twilight or behind the sun this month.

Jim's image of Comet P103/Hartley (slightly above center) taken with is AT102ED refractor on September 19, 2010.

There is one very interesting visitor for us to observe this month and that is a comet that may get as bright as 5th magnitude. It should be visible in dark skies. As I write this in the last half of September, I have been able to photograph the comet, but I could not see it in either my 10X50 binoculars or my 4" refractor. Clouds moved in before I could try pointing my 8" Schmidt-Cassegrain at it. In the pictures it is very small and slightly greenish looking. The comet is called P103/Hartley 2. On October 20th it will come to within 11 million miles of the Earth – very close for a comet. Perhaps the best night to view the comet will be around the night of October 7th. It should be about 5th or 6th magnitude by then and it will be very close to the Double Cluster in Perseus. This comet will be visited by NASA's EPOXI spacecraft so we should see some spectacular pictures from that mission. On November 4th, EPOXI is supposed to pass within 600 miles of the comet! Get out your binoculars and scan at the sky between Cassiopeia and the Double cluster and see if you can catch a comet around Oct.6-8! For more information about the comet and a finder chart, please go to http://www.skyandtelescope.com/observing/highlights/102632669.html or search for comet Hartley.

That's it for this month. I hope you can find some time to get outside and enjoy the cool crisp mosquito free nights of October. Winter is coming along with snow and cold winds, so enjoy the beautiful fall evenings while you can – if possible share them with a friend!

Clear skies!

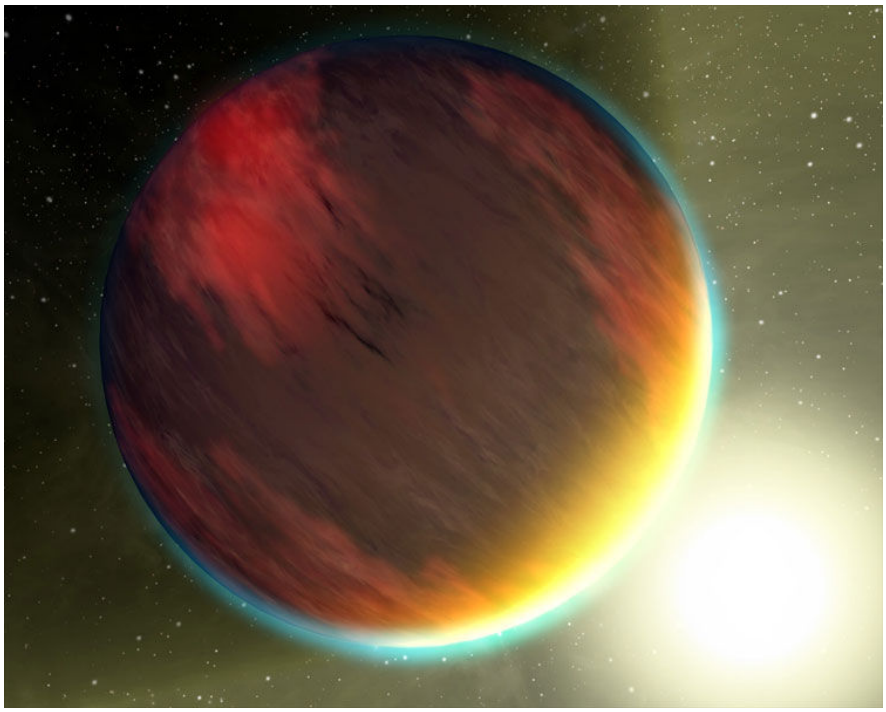
The Hunt is On!

By Carolyn Brinkworth

The world of astronomy was given new direction on August 13, 2010, with the publication of the Astro2010 Decadal Survey. Astro2010 is the latest in a series of surveys produced every 10 years by the National Research Council (NRC) of the National Academy of Sciences. This council is a team of senior astronomers who recommend priorities for the most important topics and missions for the next decade.

Up near the top of their list this decade is the search for Earth-like planets around other stars—called "extrasolar planets" or "exoplanets" —which has become one of the hottest topics in astronomy.

The first planet to be found orbiting a star like our Sun was discovered in 1995. The planet, called "51 Peg b," is a "Hot Jupiter." It is about 160 times the mass of Earth and orbits so close to its parent star that its gaseous "surface" is seared by its blazing sun. With no solid surface, and temperatures of about 1000 degrees Celsius (1700 Fahrenheit), there was no chance of finding life on this distant world. Since that discovery, astronomers have been on the hunt for smaller and more Earth-like planets, and today we know of around 470 extrasolar planets, ranging from about 4 times to 8000 times the mass of Earth.



Artist's rendering of hot gas planet HD209458b. Both the Hubble and Spitzer Space Telescopes have detected carbon dioxide, methane, and water vapor—in other words, the basic chemistry for life—in the atmosphere of this planet, although since it is a hot ball of gas, it would be unlikely to harbor life.

This explosion in extrasolar planet discoveries is only set to get bigger, with a NASA mission called Kepler that was launched last year. After staring at a single small patch of sky for 43 days, Kepler has detected the definite signatures of seven new exoplanets, plus 706 "planetary candidates" that are unconfirmed and in need of further investigation. Kepler is likely to revolutionize our understanding of Earth's place in the Universe.

We don't yet have the technology to search for life on exoplanets. However, the infrared Spitzer Space Telescope has detected molecules that are the basic building blocks of life in two exoplanet atmospheres. Most extrasolar planets appear unsuitable for supporting life, but at least two lie within the "habitable zone" of their stars, where conditions are theoretically right for life to gain a foothold.

We are still a long way from detecting life on other worlds, but in the last 20 years, the number of known planets in our Universe has gone from the 8 in our own Solar System to almost 500. It's clear to everyone, including the Astro2010 decadal survey team, that the hunt for exoplanets is only just beginning, and the search for life is finally underway in earnest.

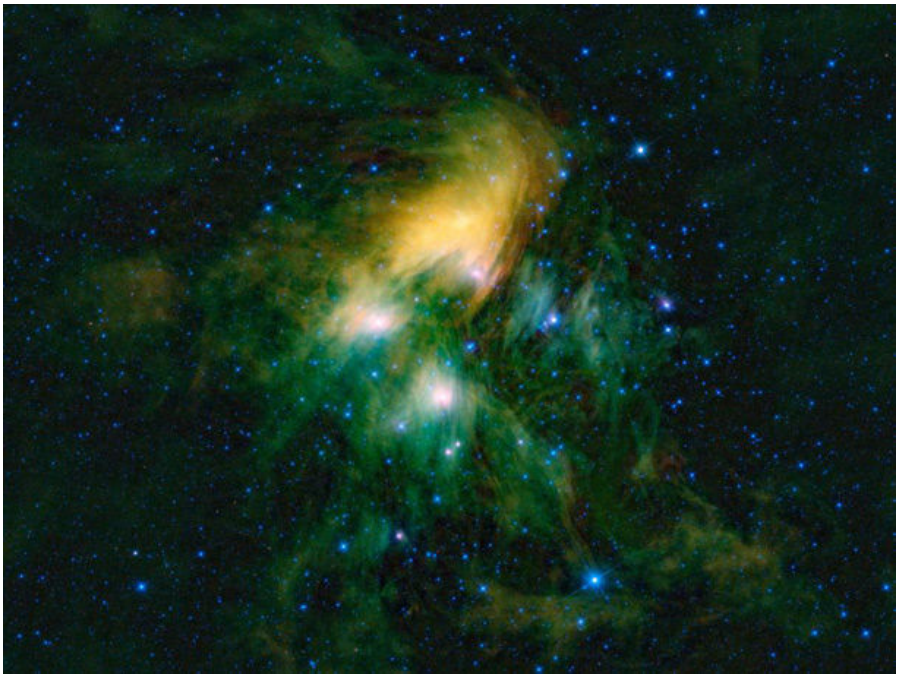
Explore Spitzer's latest findings at http://www.spitzer.caltech.edu. Kids can dream about finding other Earths as they read "Lucy's Planet Hunt" at http://spaceplace.nasa.gov/en/kids/storybooks/#lucy.

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

The Seven WISE Sisters

By Phil Plait, Bad Astronomy, http://blogs.discovermagazine.com/badastronomy/

If you live in the northern hemisphere and go outside in the winter, hanging not too far from Orion's left shoulder is a small, tight, configuration of stars. A lot of people mistake them for the Little Dipper — I get asked about it all the time — but really it's the Pleiades (pronounced PLEE-uh-dees), an actual cluster of stars about 400 light years away. To the eye you can usually spot six of the stars (the seventh, seen in ancient times, may have faded a bit since then), and in binoculars you can see dozens.



http://wise.ssl.berkeley.edu/gallery_Pleiades.html

But when NASA's Wide Field Infrared Survey Explorer (WISE) looked at it in February, this is what it saw (right).

Coooool. Literally! WISE looks in the infrared, and can see cool objects that are invisible to our eyes. The Pleiades stars are bound together in a cluster by their own gravity, and are currently plowing through a dense cloud of dust and gas in the galaxy. The material has been warmed up by the hot stars, and glows in the infrared. Deep images in visible light also show the material, but it looks blue as it reflects the optical light from the stars. In the WISE images, we're seeing the matter actually glowing on its own, emitting infrared light.

When I was younger it was thought that this material was the leftover stuff from which the stars formed. But it was later found that the stars are older than first thought; about 100 million years old. While still quite young — the Sun is 4.5 billion years old! — that's long enough for the original cocoon of material that made up these stars' nursery to have dispersed. So it's a cosmic coincidence that we happen to see the cluster as it's ramming through this material. On the other hand, the Milky Way galaxy is loaded with lots of junk floating out there, and the Pleiades are in an area of high traffic. It's not too surprising we'd see something like this happening, and it's nice that it's going on close enough that we get a good view of it.

WISE doesn't just get pointed wherever astronomers see something interesting: it's an all-sky survey, spinning on its axis and taking snapshots continuously. These are stored, and astronomers on the ground can then put them together in a mosaic. This image is actually pretty big, covering 2×3° of the sky. That's about the size of a postage stamp held at arm's length, and is a fair bit bigger than the full Moon on the sky. This image was released to celebrate the fact that as of July 17, WISE has now scanned the entire sky, and its primary mission has been fulfilled. Yay!

Funny, too: I've observed the Pleiades a lot, and seen lots of pictures too, yet it's difficult to identify the stars in the WISE image — I had to rotate the visible image to match the one from WISE, but even then it's not entirely obvious how they line up. In the IR, stars are bright that might be dim in optical, and vice-versa! But I'd recognize the sheets and filaments of the disturbed dust anywhere. One of my favorite things in astronomy is seeing a familiar object in an unfamiliar way. It reminds me that there's still plenty to learn about the Universe.

Image credits: NASA/JPL-Caltech/UCLA and NASA, ESA and AURA/Caltech

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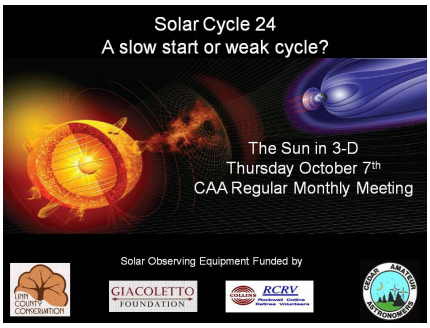
CAA Monthly Meeting Agenda – October 7, 2010

Program: Carl Bracken – Solar Cycle 24



Solar Cycle 24 is currently underway with very little evidence so far. Please join our Thursday, October 7th meeting for a review of the 2010 day time solar presentation given in July highlighting the current cycle and showcasing current ground based and space based solar observing platforms. Solar science has advanced significantly in the last 20 years along with advances in computer power. Our ability to view the sun with amazing detail is unrivaled in history. This presentation will include amazing archival solar detail in full 3-D. Red / Blue 3-D glasses will be provided for this show!

- Section reports
- October refreshments: Carl Bracken – drinks, Corely Washburn and Nathan Welch – food.
- Post reports
- Old Business
- New Business

This month's CAA meeting will be held at the St. Luke's Hospital Resource Center in the Formal Lounge, at 7pm.

Upcoming Public Night Programs at Palisades-Dows Observatory

All the events below are at Palisades-Dows Observatory at 1365 Ivanhoe Rd., located just south of the Cedar River, a short drive SW of Mt. Vernon, IA. The observatory is just 2 miles west on Ivanhoe Rd. from IA Highway 1.

October 9, 2010
at 7:30 p.m.

Astronomy in the Hawkeye State

Presenters: Doug Slauson and Brent Studer

Many people are familiar with the name of James Van Allen, but Iowa's astronomical heritage goes back long before the pioneering space physicist helped usher in the Space Age. Tonight, Brent and Doug will talk about astronomical events in Iowa's history, provide a brief history of astronomy at The University of Iowa and around the state, and describe upcoming events that will be interest to tonight's audience and their descendants. Weather permitting, observing through CAA telescopes—including the 24-inch Boller & Chivens formerly owned by The University of Iowa—will follow the presentation.

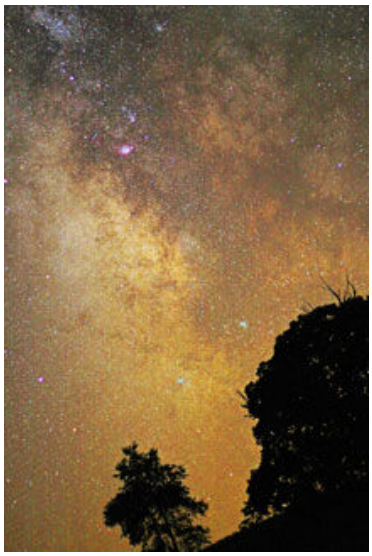
November 6, 2010
at 7:30 p.m.

Einstein vs. Galileo: Eppur Si Muove?

Presenter: Professor Kenneth Gayley, The University of Iowa

A fascinating characteristic of physics is that the answers it provides for certain eternal questions get reprised with each fundamentally new physical theory. An excellent example is provided by that most basic question of the cosmic motion of our own home, the Earth. Most interested people are aware of the progress of astronomical inquiry into this question up until the time of Galileo and Newton, but the ways this question has further evolved, and may continue to evolve, receive less general attention. For example, it is not widely appreciated that certain aspects of Einstein's approach to motion, inspired by Mach, are not consistent with the Galilean doctrine of "eppur si muove." Dr. Gayley will explore what we can, and cannot, say about the motion of the Earth, and in the process attempt to explore the very meaning of astronomical knowledge. Weather permitting, observing through CAA telescopes will follow.

Member Photos



CAA member Lynn Reihman captured these spectacular views of the late summer night sky at the Iowa Star Party.

Deep sky images from CAA member Jim Bonser. Upper left: Messier 27, upper right: Messier 14 and left Messier 11.

CAA Meeting Minutes September 2, 2010

By Corely Washburn

Meeting was called to order at 7pm with 22 members present.
Correction to the minutes: Corely is not resigning as secretary.

Section reports:
Meteor and Aurora: Sept 9, September Perseids
We then watched Basil's DVD on Quantum Theory

Computer: Nothing new to report

Imaging: No Report

Equipment: Sky and Telescope magazine is now available on DVD, it includes all back issues, Keith Erickson shared his Bader Collimator that he uses for his closed tube Dob.

Deep Sky: No Report

Stellar: Mark Ewart is doing photography using an "off the shelf" SLR camera.

Solar/ Lunar/ Planetary: Mark Ewart shared his lunar pictures .
Break: Thank you Wendell for pulling something together. October refreshments drinks will be provided by Carl Bracken and Food will be provided by Nathan Welch. Thank you volunteers!

Carl gave us a program about the Perseid meteor shower from Pal-Dows, and an overview of next month's solar presentation for our business meeting.

Astronomical League: No report

Observatory Committee: No report

EIOLC Committee: Getting a new cartridge for our laser printer, there is a new lamp in the projector. We are going to try a makeshift outdoor planetarium using the picnic tables and portable PA system on public night. We have some projects that need done and we will be meeting early on member night to work on them, the biggest ones being running a phone line to the dome or the roll off and install another security camera. The idea of getting walkie-talkies for the educational programs was brought up and John Leeson and Steve Brunner both have sets they would be willing to donate.

Robotic: The auto focus is now "trained" but needs tested. We do have a new dome driver as the previous one was not tracking the scope. It was discovered also that the periodic error correction was not set.
Swap meet and Potluck: there was a decent turn out but no real swap meet got started.

NOTICE: The NEW 2011 Calendars will be available for purchase at the October Business meeting, members, this is your chance to get them while they are hot and before they get sent out to the observatory for public sale.

Adjourn: 9:59pm

In Attendance: Carl Bracken, Steve Brunner, John Centala, Wendell Clifton, Keith Erickson, Mark Ewart, Greg Frohner, Lloyd Holocek, Vern Jackson, Caleb Kanneberg, John Leeson, Kevin Litten, Helen Pottoff, Doug Slauson, Basil tilley, Forrest Tomes, John Varn, Corely Washburn, Nathan Welch, The Scruggs Family, Karl Taylor, Steve Lensink.

Treasurer's Report:

Funds	8/1/2010	8/31/2010	net gain(loss)
Robotic Telescope	$ 310.48	$ 310.48	$ -
Internet Connectivity	$ 991.72	$ 937.54	$ (54.18)
Jim Rutten Memorial	$ 652.70	$ 652.70	$ -
Keith Sippy Memorial	$ 769.00	$ 769.00	$ -
Equatorial Mount	$ 535.24	$ 535.24	$ -
Endowment	$ 6,184.99	$ 6,184.99	$ -
General	$ 1,447.63	$ 1,282.50	$ (165.13)
E.I.O.L.C Facility	$ 1,629.59	$ 1,378.42	$ (251.17)
RCRV	$ 510.52	$ 510.52	$ -
Lady Astronomers	$ 250.00	$ 210.03	$ (39.97)
AEGON Transportation Fund	$ 4,958.00	$ 4,958.00	$ -
			$ -
Totals	$ 18,239.87	$ 17,729.42	$ (510.45)

Calendar of Events

November Prime Focus Deadline

October 20th

2nd — CAA Members Night
7th — CAA Monthly Meeting.
9th — Public Program at Palisades-Dows Observatory starting at 7:30p.m.
Doug Slauson and Brent Studer
Present: ***Astronomy in the Hawkeye State***

October 2010

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2 **Members Night** at Palisades-Dows.
3	4	5	6	7 **CAA Monthly Meeting.**	8 Draconid Meteors peak	9 **Public Night** at Palisades-Dows.
From very dark skies location beginning on the 4th, try observing Zodiacal Light in east before morning twilight during these two weeks.						
10 Mars 4° North of the Moon.	11	12	13	14	15	16
17	18	19	20 Jupiter 7° South of Moon.	21 Orionid Meteors peak	22	23
24	25	26 Moon 1.2° South of Pleiades (M45).	27	28 Moon 0.7° South of M35.	29	30
31						

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