Highlights of the February Sky. . .

- - - 4th - - -
AM: Spica about 4° to the upper left of the Moon low in ESE. Look for Saturn above.

- - - 5th - - -
Last Quarter Moon

- - - 7th - - -
Dawn: Antares is about 3° to lower left of the Waning Crescent Moon.

- - - 11th - - -
Dawn: Mercury is 7° to the lower *left* of a thin Waning Crescent Moon.

- - - 12th - - -
Dawn: Mercury is 4° to the *right* of an even thinner Waning Crescent Moon.

- - - 13th - - -
AM: Asteroid Vesta and the star HD 89930 are less than 1 arcminute apart; forming a double star.

New Moon

- - - 14th - - -
Dusk: Look for a very thin crescent Moon just 5° to the right of Venus and Jupiter after sunset.

- - - 16th - - -
PM: Jupiter and Venus are separated by only ½°; look low in the WSW.

PM: Vesta passes between Gamma Leonis and 40 Leonis.

- - - 21st - - -
First Quarter Moon

- - - 25th - - -
PM: Mars is about 5.5° from the Waxing Gibbous Moon.

- - - 28th - - -
Full Moon

Prime Focus

A Publication of the Kalamazoo Astronomical Society

☆ ☆ ☆ February 2010 ☆ ☆ ☆

This Months KAS Events

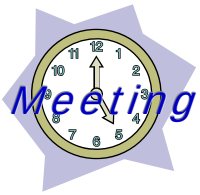
General Meeting: Friday, February 5 @ 7:00 pm
Kalamazoo Area Math & Science Center - See Page 12 for Details

Observing Session: Saturday, February 13 @ 7:00 pm
February Freeze Out - Kalamazoo Nature Center

Board Meeting: Sunday, February 14 @ 5:00 pm
Sunnyside Church - 2800 Gull Road - All Members Welcome

Inside the Newsletter. . .

January Meeting Minutes



The general meeting of the Kalamazoo Astronomical Society was brought to order by President Jack Price on Friday, January 8, 2010 at 7:14 pm EST. Approximately 32 members and guests were in attendance at the Kalamazoo Area Math & Science Center.

Long-time KAS member Bill Nigg gave the featured presentation, which was entitled *Mars is Coming...Again*. The latest opposition of Mars occurs on January 29th (with closest approach on the 27th). Conditions will be *much* colder than the historic opposition in August 2003, so Bill gave some advice on dressing warm and eating right (Dinty Moore beef stew came highly recommended).

Due to the elliptical nature of Mars' orbit, this opposition isn't as favorable as the one in 2003. Back then Mars was just over 25 arcseconds in angular diameter. At its best, Mars will only swell to 14 arcseconds this year. However, Mars will be much higher in the sky than in 2003; increasing the chances of good seeing conditions. Some observing tips included using the colored planetary filters available from a variety of astro-vendors. A red filter (such as #23A) accentuates dark surface markings. A light blue filter (#80A) emphasizes high clouds and hazy features. A #58 green filter is helpful for revealing detail around Mars' polar ice caps.

Bill also recommended the freeware program *Mars Profiler II*, available for download from *Sky & Telescope's* web site. It displays the central meridian and angular size of the red planet for any date and time. The really ambitious Mars observer can travel south to Florida or Mexico! The seeing is much better at lower latitudes not to mention the increase in clear nights. Mars is worth observing as its surface is constantly changing with time. Observers can look for the latest images and sketches from the Association of Lunar & Planetary Observers (ALPO) web site. Lecture notes were provided, so let Bill know if you'd like a copy.

Jack gave his President's Report after the snack break. He announced that Mike Cook received a certificate and pin from the Astronomical League for completing the Messier Club. Mike is unable to regularly attend general meetings due to his work schedule. Congratulations, Mike. Jack also reminded everyone to submit an entry in the Observatory Naming Contest (see page 11 for details).

Jean DeMott observed the New Year's Eve "Blue Moon" rising over Caribou Lake during her holiday vacation. Several members reported an abundance of sunspots; leading to speculation that the deep solar minimum is finally over (we've been fooled before though). Two bits of astronomical news discussed was the discovery of five new extrasolar planets by the Kepler Space Telescope. These were Kepler's first discoveries announced and *many, many* more are expected in the future. The Wide-Field Infrared Survey Explorer (WISE) recently released its first light image. After discussing upcoming events, the meeting concluded at 8:40 pm.

Board Meeting Minutes

The KAS Board met at Sunnyside Church on January 10, 2010. President Jack Price called the meeting to order at 5:15 pm. Other board members present include Richard Bell, Jean DeMott, Dick Gillespie, Jason Hanflik, Rich Mather, Don Stilwell, and Roger Williams.

Rich presented the Treasurer's report, which showed as the major expense during the month the bill for Galileoscopes. Some of this will be reimbursed with grant money, but KAS is left with about $500 expense for the project. The other activity in the account was routine, and Rich mentioned that some of the CD's had automatically rolled over after maturing.

Under Old Business, details were discussed of the plans for awarding the Galileoscopes won in the writing contest. Richard suggested having a ceremony starting at 6:30 pm directly before the February meeting. The winners had already been notified by postcard, except for one who left no address and had not so far been identified. The ceremony will be emceed by Mike Sinclair and possibly a video presentation from Galileo portrayer Michael Francis (the latter may be vetoed by union rules).

Progress on the robotic telescope project was also discussed. Ten people had signed up for the committee so far, and Richard said that meetings would probably be held on Friday evening or Saturday morning. The first item expected to be considered is the agreement between KAS and Mike Patton that will secure the interests of all parties. Fundraising ideas will follow, as this is a major effort for our group. Few suggestions have been received so far for an observatory name.

Some future events were summarized, including Full Moon Theater on January 30th, where the program will be 2010*: The Year We Make Contact*. Richard will give the featured presentation at the general meeting on February 5th. The topic will entail a tour of the stars and deep sky objects in the Winter Hexagon (see page 12 for details). February Freeze Out is still fighting the clear sky odds on February 13th at the Nature Center and Messier Marathon is set for March 13th at the Marshall Kiwanis area. A March Full Moon Theater is being considered at the Grand Rapids IMAX facility, where a movie on the Hubble Space Telescope is being presented.

Other events in early planning are a talk on getting started in amateur astronomy at the Parchment Community Library on April 17th and Astronomy Day on April 24th. In regard to the latter, Jean requested that everyone **begin saving 4-oz tomato sauce cans** (with a squat shape, as distinguished from tomato paste cans) for model Hubble telescope construction.

The next board meeting was set for February 14th at 5:00 pm, and the meeting was adjourned at 6:30 pm.

Respectfully submitted by Roger Williams

A Winter Blast of Fun!

by Tom Koonce

The weather is often keeping us inside at this time of year. The only stars we get to see are those as we are dashing from the car to the house in the evenings. For a few seconds we may glance up at Orion's Belt or perhaps a bright planet through bitterly cold, but alluringly steady, clear skies. You might briefly think about going inside and grabbing your telescope and coming back out for a few minutes of observing, but then the choice between the bitter cold and the Siren's song of the warmth of the house becomes clear as you retreat inside. It's frustrating, surely, but while amateur astronomy is a hobby that teaches patience and perseverance we don't want to sit idly by all winter.

Perhaps we should treat the winter months as an "opportunity". We could use these few months to explore our creativity, get our equipment finely tuned and ready, or even expand our horizons online by conducting real science for professional astronomers. With that in mind, here are a few ideas for the winter months. Maybe you'll like to try a few. These could count as New Year's Resolutions. All count as fun!

- ★ Clean all of your eyepieces.
- ★ Clean your telescope.
- ★ Change the batteries in your Telrad, red light flashlights and other powered accessories.
- ★ Inventory all of your astronomy gear. Take pictures of all of it for insurance purposes.
- ★ Organize your eyepiece case and/or make a new eyepiece case.
- ★ Image process all of those great shots that you've been meaning to get to.
- ★ Accomplish real science on your home computer – help scientists classify galaxy types.
- ★ Build a model of the *Cassini* spacecraft (or many others!)
- ★ Establish an "astronomy fun fund" for yourself and put $5/week into it.
- ★ Write a few letters to your town in favor of lighting control.
- ★ Review the Astronomical League list of observing clubs. There are a few new ones you might like try.
- ★ Repaint your old telescope with a cool pattern.
- ★ Update your Go-To software on-line to the latest version.
- ★ Build your own Dobsonian telescope.
- ★ Create a list of community outreach activities that you think your club might be able to do this year.
- ★ Sketch out what your backyard observatory will look like one day.
- ★ Survey your club members about what was their best astronomy-related experience this past year. Try to have more of those this next year.
- ★ Make a glare shield for your telescope from black foam craft sheet.
- ★ Listen to an astronomy related podcast on your computer.
- ★ Write a letter to your state congressmen and senators in favor of the space program.
- ★ Explore Google Moon and Google Mars
- ★ Make a cover for your telescope when not in use.

I hope that you find this short list inspirational on the cold, dark, days of winter and that it prepares you for the upcoming warmer weather and "Messier Marathon" in March.

Tom Koonce is a member of the Antelope Valley Astronomy Club in Lancaster, California.

Update

ROBOTIC TELESCOPE

The Robotic Telescope Task Force held its first meeting on Saturday, January 16th at the Kalamazoo Public Library. There's no major news to report, but several members were given research projects to tackle before our next meeting. We hope to meet at least once-a-month for the foreseeable future. This month's issue of *Prime Focus* focuses on roll-off roof observatories, so I thought it would be appropriate to share a picture of Mike Patton's evolving facility. It was taken early in January. Don't forget, the Observatory Naming Contest is currently underway (see page 11). Put your noggin to work and come up with a wining name!

Open Sesame

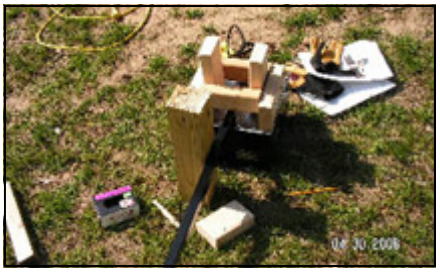
(or Observatory Roof Automation on the Cheap)

by Alan D. Otterson

The roof on my roll-off roof observatory is pretty heavy and having a bad back I needed a way to open it by some sort of automation. It had to be inexpensive and easy to adapt to the observatory. After a lot of searching on the internet and looking through several internet observatory groups I belong to I decided on an inexpensive garage door motor.

The motor I chose is a Chamberland ½-horsepower motor and chain drive. Not having enough room in the observatory to mount the motor I decided to mount it outside the observatory. First I had to figure out how long to mount the arm and motor back from the observatory. It would have to be the length of the roof when it was opened.

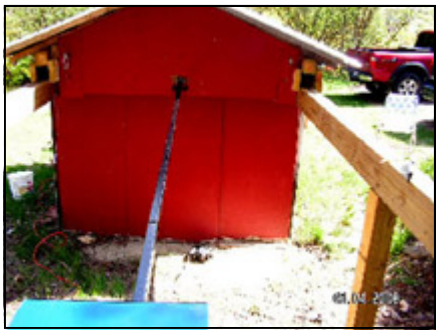
I started to assemble the motor mount. I found out in the Cloudy Nights Forums that the motor can be mounted upside down without any operating problems.



After making the motor mount bracket I then placed it on a 4" × 4" treated wood post.

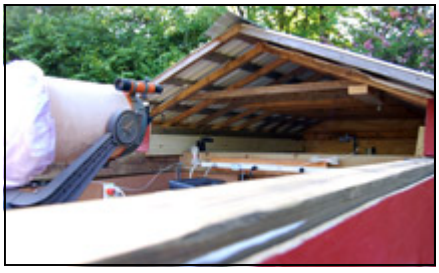
I made a cover for the motor to protect it from the elements.

With the motor mounted and the arm track in place I attached it to the back roof gable.



Then the chain was threaded on top the motor and track.

Now it was time to position the electronic eyes that is the safety stop feature of the system. I mounted them on the back wall as this is where the roof would be fully opened and where the roof would be when it was closed.



So now when ever I want to use the observatory all I have to do is use the handy dandy remote controller and with a press of the button "Open Sesame" and presto the roof rolls back without me lifting a finger, well I have to use a finger to press the remote button.

For more information on Alan's Windy Ridge Observatory, check out the article in the September 2008 issue of *Prime Focus*. Alan also has an open invitation to anyone interested in observing at his place. Contact him any clear night at: alancath@earthlink.net

Automating a Roll-Off Observatory

by Russ Durkee

Since 2004, I have been conducting astronomical research from my personal observatory. I have measured dozens of asteroid light curves and assisted in the identification of 10 binary asteroids, and authored or co-authored 25 publications. Not bad, considering I am running on less than a quarter of the clear nights. To observe more often than that, I would need to automate my operations in some way. But automation takes careful design, testing, and significant expense. Thanks to my record for doing good asteroid research, I have been a recipient of a 2009 Gene Shoemaker Near-Earth Object (NEO) grant from the Planetary Society to fund these upgrades. The purpose of this article is to outline my approach to automating a roll-off observatory so that others can increase their imaging productivity. And maybe a few of you will join me in studying NEOs.

Background

I remember seeing an article announcing the first Planetary Society Shoemaker NEO Grant recipient in *Sky & Telescope* magazine in 1997. I started doing research in 2004, but missed the chance to apply in 2005 because I was working out of the country. So when I heard about the latest calls for proposals in summer of 2008, I was ready. I submitted a proposal for automating my observatory as it would dramatically increase my ability to measure asteroid light curves and contribute to the body of knowledge about NEOs. I am happy to say I was one of three observers this time round who were funded. It is an honor to receive the grant from the Planetary Society. But along with this grant comes with an expectation that I will be successful in my endeavor. So I am working hard to keep my promise.

Automation or not, I am a pretty devoted observer. My goal is to get out on every clear night to take asteroid photometry data or refine my operations in some way. I consider a "clear night" to be any evening window where there are four hours or more of cloudless sky. I estimate that there are between 100 and 150 nights a year where this is the case. But in the last several years I have acquired data on less than 20 nights a year. Even though I complain about cloudy skies in Minnesota, my limiting factor is a lack of spare time and sleep, not the weather. And like a lot of people, I have a very demanding day job and a busy family life. So if I can carve out four nights a month for my hobby, I am doing pretty well.

A Typical Night of Imaging

Taking images all night long is hard work. Even though my mount tracks well, there can be a lot of manual intervention throughout the night. But before imaging can begin, I set up my laptop, open the observatory roof, power up the mount and camera and then wait at least 30 minutes for the camera to cool down. Then I sync the mount to a bright star before finally slewing to the asteroid under study. On some nights, I also need to get an auto-guider going to keep the scope pointed at the exact location of the asteroid. If all goes well, I am up and running in about 40 minutes.

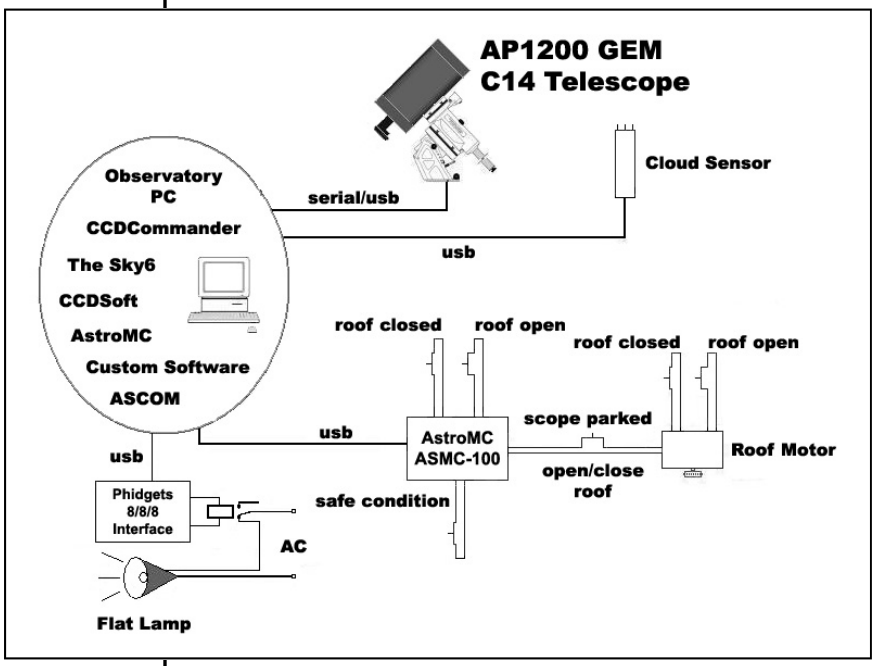
Half-way through the night, my equatorially-mounted telescope must flip to the other side of the mount. Since my scope is not precisely aligned with my mount, I need to re-sync to the asteroid and restart the auto-guider. Sometimes nights I also get up to check for cloudy conditions or rain. Once the run is complete, typically at 4 or 5am, I get up to manually park the scope. Once parked, I take flat frames and dark frames. This entire procedure takes an hour or two of intervention throughout the night. I may only get four hours of sleep. My body can only do this once or twice a week before I get too tired to function during the day no matter how many pots of coffee I drink.

What is "Automated" Operation?

What do I mean by and an "automated" observatory? My long term goal is to enter the object I would like to study for the night into software, and the observatory automatically takes care of the rest so that the next morning I have the images waiting on my computer. It is unlikely I will get to that level of automation with this project. But I will get most of the way there. With improvements over time, I plan to achieve this goal. Figure 1 (pictured below) shows a schematic of my observatory control system.

Control Software

There are a few automation packages out there that can do



the job at the level I need. And after a lot of review and testing, I found CCDCommander (CCDC) to be the most reliable product for my situation. CCDC uses The Sky6 Pro to control the telescope and CCDSoft or MaximDL/CCD for camera control. It communicates with these programs to find objects, perform plate solves and take images.

CCDC operates using a sequential "action list" structure. The action list uses commands such as "Open dome" and "Move to: M31", and takes images. But the most helpful feature is the ability to "plate solve" images, or compare the image from the camera to the star pattern in The Sky6 Pro. With this feature, the mount can verify it is pointing at exactly the correct place all night long and make corrections when necessary. CCDC also has simple logic commands that allow the observer to plan more complex multi-object imaging sessions. In addition to controlling the telescope and camera, CCDC monitors the weather sensor output and controls the observatory roof. See Figure 2 for an example action list that can run my observatory all night long. This software ties everything in the observatory together as the backbone of my automation system.

Roof Control and Building Monitoring

The observatory roof is controlled using a modified garage door opener that I dug out of a neighbor's trash can. It needed repair, but I was able to fix it for $25 in parts. Garage door openers are perfect for controlling an observatory roof. They contain inputs for limit switches and collision avoidance which can be easily adapted for observatory use. The roof is activated via a relay in a device called a master control hub (AstroMC AMC-100) by Foster Systems Inc. This device ties all the building and weather monitor circuitry together so that it can be controlled by CCDCommander via standard ASCOM drivers. Figure 3 shows the status of the AMC-100. The AMC-100 can activate the roof and monitors its position using magnetic proximity sensors and reports them to CCDC. The AMC-100 also incorporates a safety

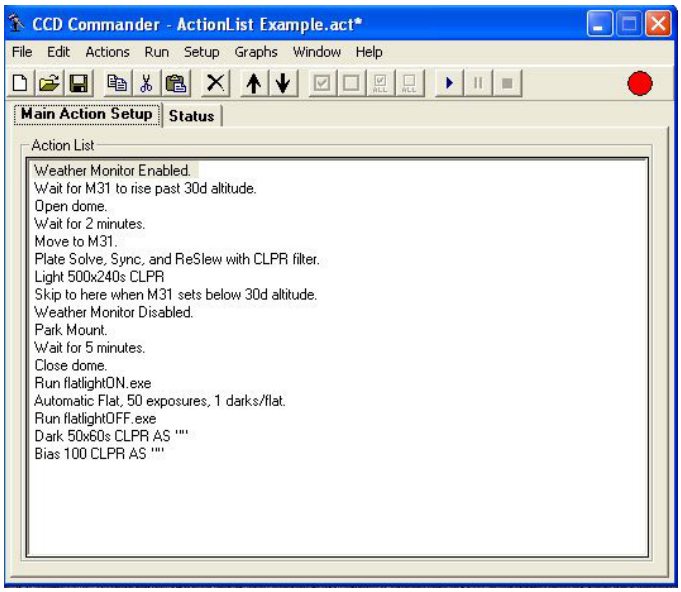


Figure 2: A CCDCommander action list example that could run the observatory all night long.

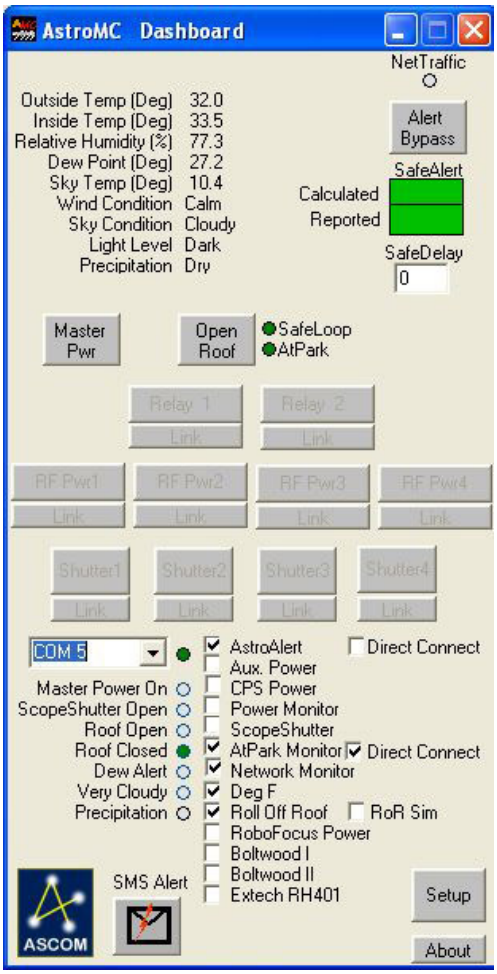


Figure 3: The AMC-100 status window showing weather conditions and building status.

loop that must have continuity before the roof is moved. This option can be utilized a number of ways to protect the telescope. The "Open dome" action in Figure 2 sends a signal to this device.

Although the commands are sent from software to open and close the roof. It still functions on its own. The roof decides when it is open and closed and has its own collision avoidance circuit. So I have outfitted the telescope with several proximity switches that allow open and close signals to the roof motor only when the software has properly parked the telescope. These switches are visible mounted on the flat screen in Figure 4.

Automating Flats

Taking good flats is a necessity for photometry and high quality imaging. Flats are images taken of an evenly illuminated surface. They are used to smooth out uneven illumination from the telescope and to remove shadows from dust on the CCD itself. I am using a home built flat panel for this purpose. To automate the flat taking process, I have mounted the flat panel on the wall of the observatory so that the scope is pointed directly at it when it parks. Figure 4 shows

the telescope in the parked position. Once the scope is parked, CCDCommander executes a program I wrote in Visual Basic (flatlightON.exe in Figure 2) that activates a relay on a Phidgets Inc. 8/8/8 Interface board turning on the flat panel. CCDCommander then automatically finds the correct exposure for the flat images and takes as many as I need. When complete, CCDC activates another program that turns off the flat panel, (flatlightOFF.exe) in Figure 2.

Weather Monitoring

If an observatory is run unattended, it is a necessity to have some sort of weather monitoring device that can shutdown operations when the sky is cloudy or if it begins to rain. When "Weather Monitor Enabled" is called in the action list in Figure 2, the roof will only open if the sky is clear. And it will signal CCDC to park the scope and close the roof if clouds move in. When the skies clear for a specified time, CCDC re-opens the roof and re-acquires the object automatically. This feature is especially helpful on partly cloudy nights, or at times when it becomes cloudy in the middle of the night.

Remote Monitoring and Control

It is helpful to have the ability to remotely monitor and also control an automated observatory. I utilize either Microsoft Remote Desktop, or free VNC to gain access to the observatory computer via my home network. Access from the internet is also possible using any number of remote access applications. I find it useful to have an IP camera positioned in the observatory so that I can get a rough idea what direction my telescope is pointing at any given time. Figure 5 shows a view of the telescope through the network camera.

Remote Power Control

When the observatory is not in operation almost everything is powered down. For complete automation control it is helpful to have the ability to toggle power on the mount, camera, or any other accessory. I use the "Web Power Switch II" from Digital Loggers Inc. Think of this device as a 9 outlet power bar with a built-in web server. At this point all operations on this device are manually but I hope to write some software that will automate useful power sequences as well.

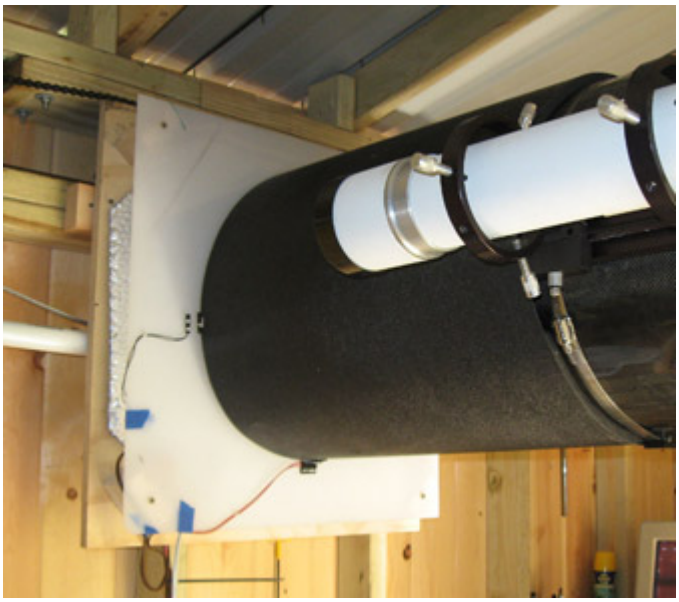


Figure 4: Telescope in its parked position pointed at the flat panel showing proximity sensors.

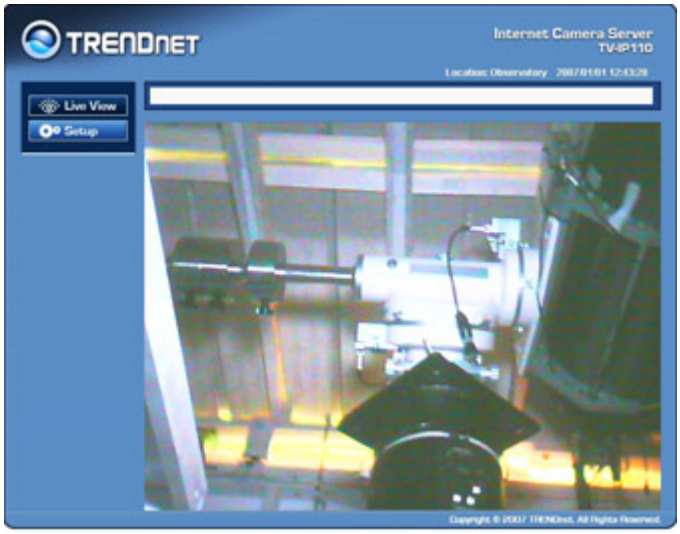


Figure 5: View of telescope from a network camera.

Conclusion

Putting together an automated observatory is a complex task. And there is always something that can be improved. But the tools I describe here can get you most of the way there. Although there are more products available now than ever to create an automation system, there are a lot things that have to be built, wired, or invented to fit your situation. And no matter how well you design and test your system, there will be many situations where human intervention will still be required. It may seem ironic, but automated observatories really do need someone nearby to tend them and deal with unexpected situations.

Is all this worth the effort? Of course! I have been running my observatory about 90% hands off now for the last three months. Last year during June - September I took data on 7 nights. This year, with automation in place, I took data on 40 nights over the same period. With automation, new problems arise such as finding more time to process the images. My next project is to work on custom software to help with the task of calibrating and processing all the new data. It is a good problem to have.

I would like to thank Planetary Society Members for their support of NEO research and projects like the Shoemaker Grant Program. If you are not already a member of the Planetary Society, please consider joining!

Russ Durkee is a member of the Minnesota Astronomical Society in Minneapolis. Learn more about his work on his Shed of Science Observatory web site.

Building a Case Against Ozone

by Patrick Barry

When it comes to notorious greenhouse gases, carbon dioxide is like Al Capone — always in the headlines. Meanwhile, ozone is more like Carlo Gambino — not as famous or as powerful, but still a big player.

After tracking this lesser-known climate culprit for years, NASA's Tropospheric Emission Spectrometer (TES) has found that ozone is indeed a shifty character. Data from TES show that the amount of ozone — and thus its contribution to the greenhouse effect — varies greatly from place to place and over time.

"Ozone tends to be localized near cities where ozone precursors, such as car exhaust and power plant exhaust, are emitted," says Kevin Bowman, a senior member of the TES technical staff at the Jet Propulsion Laboratory. But the ozone doesn't necessarily stay in one place. Winds can stretch the ozone into long plumes. "Looking out over the ocean we can see ozone being transported long distances over open water."

Unlike CO_2, ozone is highly reactive. It survives in the atmosphere for only a few hours or a few days before it degrades and effectively disappears. So ozone doesn't have time to spread out evenly in the atmosphere the way that CO_2 does. The amount of ozone in one place depends on where ozone-creating chemicals, such as the nitrogen oxides in car exhaust. are being released and which way the wind blows.

This short lifespan also means that ozone could be easier than CO_2 to knock off.

"If you reduce emissions of things that generate ozone, then you can have a quicker climate effect than you would with CO_2," Bowman says. "From a policy standpoint, there's been a lot of conversation lately about regulating short-lived species like ozone."

To be clear, Bowman isn't talking about the famous "ozone layer." Ozone in this high-altitude layer shields us from harmful ultraviolet light, so protecting that layer is crucial. Bowman is talking about ozone closer to the ground, so-called tropospheric ozone. This "other" ozone at lower altitudes poses health risks for people and acts as a potent greenhouse gas.

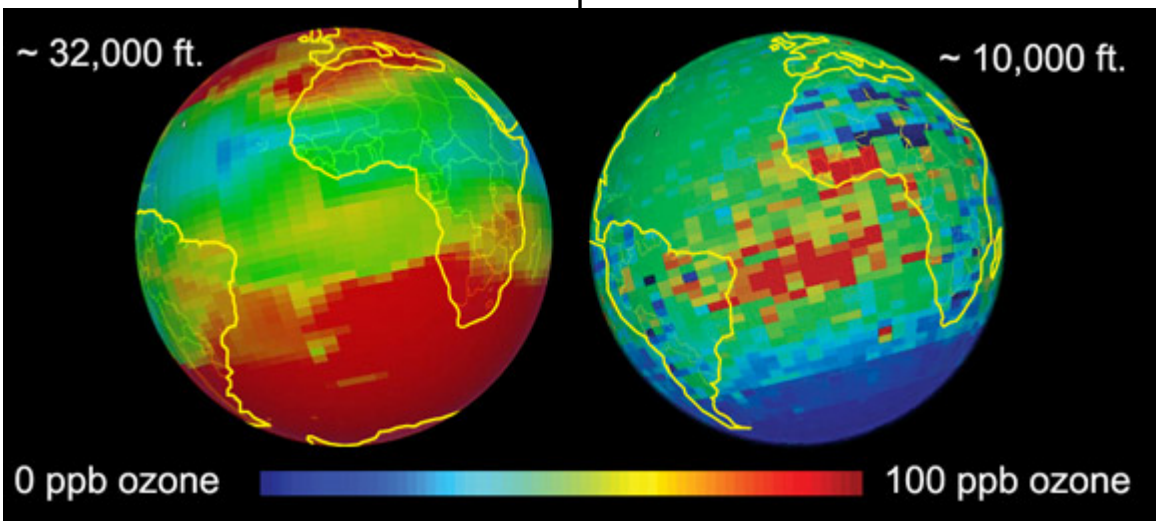
TES is helping scientists track the creation and movement of low-altitude ozone over the whole planet each day. "We can see it clearly in our data," Bowman says. Countries will need this kind of data if they decide to go after the heat-trapping gas.

Ozone has been caught red-handed, and TES is giving authorities the hard evidence they need to prosecute the case.

Learn more about TES and its atmospheric science mission at tes.jpl.nasa.gov. The Space Place has a fun "Gummy Greenhouse Gases" activity for kids that will introduce them to the idea of atoms and molecules. Check it out at:

http://spaceplace.nasa.gov/en/kids/tes/gumdrops/

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



These images are TES ozone plots viewed with Google Earth. Colors map to tropospheric ozone concentrations. The image on the left shows ozone concentrations at an altitude of approximately 32,000 feet, while the one on the right shows ozone at approximately 10,000 feet. The measurements are monthly averages over each grid segment for December 2004.

Star Parties in 2010

Pack your bags, collimate your scope, and clean those eyepieces! It's time to hit the road and attend a star party (or two). Listed below are all the major star parties (that we know of) that have already announced their dates for 2010. Registration deadlines for each star party may be different (or even passed), so please visit their web sites for the latest information.

If you plan to attend any of the events listed (or not listed) here then let us know. Maybe other KAS members would like to attend. Plus, if you do attend any star parties this year, please consider writing a report for *Prime Focus*. Clear Skies!

Winter Star Party
February 8 – 13
http://www.scas.org/wsp.html

Northeast Astronomy Forum & Telescope Show
April 17 – 18
http://www.rocklandastronomy.com/neaf.htm

Texas Star Party
May 9 – 16
http://www.texasstarparty.org/

RTMC Astronomy Expo
May 12 – 16
http://www.rtmcastronomyexpo.org/

South Pacific Star Party
May 14 – 16
http://www.asnsw.com/spsp/index.asp

Grand Canyon Star Party
June 5 – 12
http://www.tucsonastronomy.org/gcsp.html

Southern Skies Star Party
June 5 – 12
http://www.sssp.org/

Rocky Mountain Star Stare
June 9 – 13
http://www.rmss.org/

Cherry Springs Star Party
June 10 – 13
http://www.cherrysprings.org/

Stargazing Manitoulin
July 9 – 12
http://www.gordonspark.com/astronomy.html

Stellafane
August 5 – 8
http://stellafane.org/

Weekend Under the Stars
August 5 – 7
http://home.bresnan.net/~curranm/wuts.html

Manitoulin Star Party
August 6 – 9
http://www.gordonspark.com/astronomy.html

Nebraska Star Party
August 8 – 13
http://www.nebraskastarparty.org/

Oregon Star Party
August 11 – 15
http://www.oregonstarparty.org/

Starfest
August 12 – 15
http://www.nyaa.ca/starfest.htm

Table Mountain Star Party
August 12 – 14
http://www.tmspa.com/

Almost Heaven Star Party
September 3 – 7
http://www.ahsp.org/

Illinois Dark Skies Star Party
September 9 – 12
http://www.sas-sky.org/

Prairie Skies Star Party
September 30 – October 3
http://www.prairieskies.org/

Okie-Tex Star Party
October 2 – 10
http://www.okie-tex.com/

Enchanted Skies Star Party
October 6 – 10
http://enchantedskies.org/

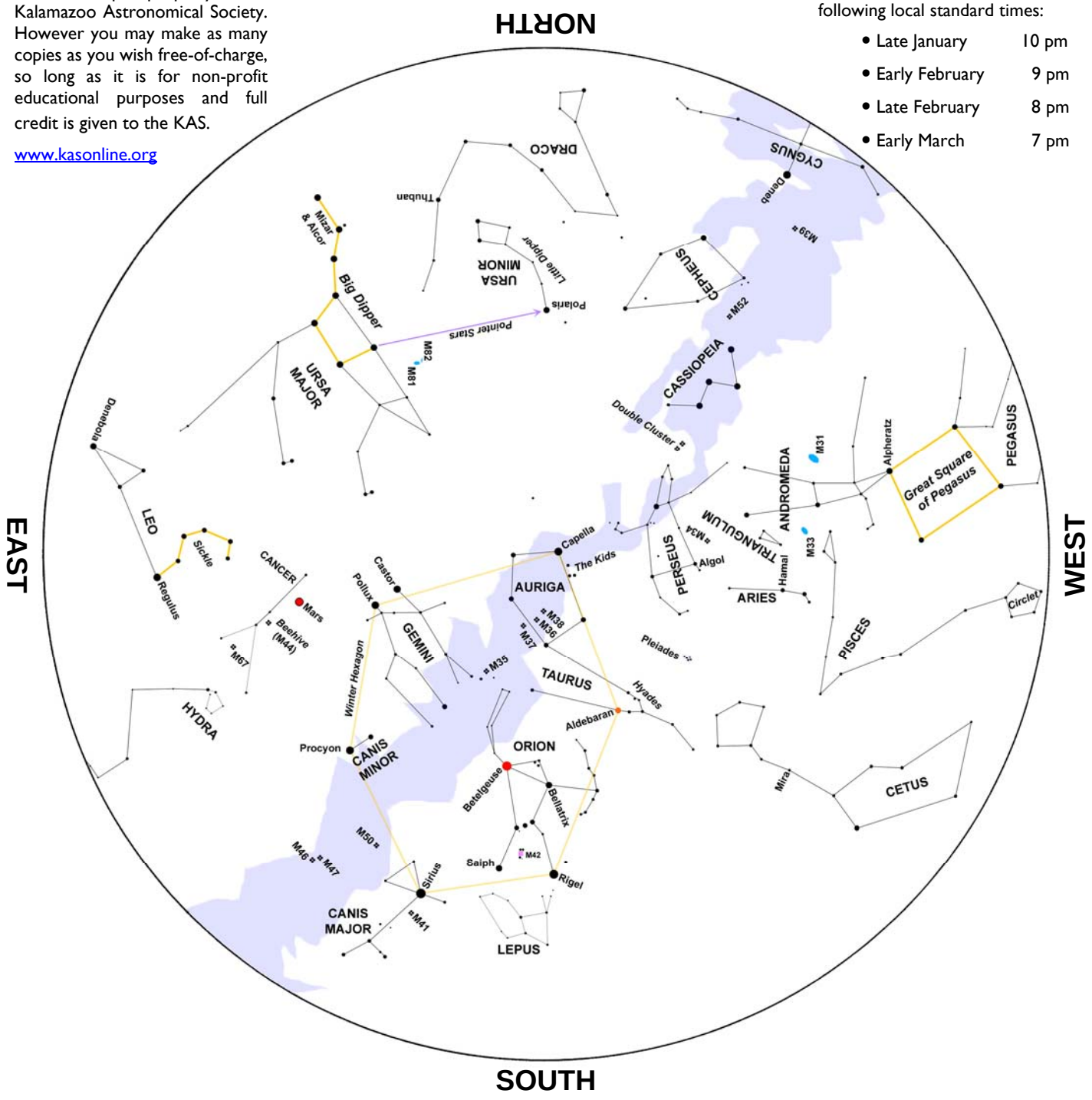
Hidden Hallow Star Party
October 8 – 10
http://www.wro.org/hiddenhollowinfo.html

Eldorado Star Party
November 1 – 7
http://www.texasstarparty.org/eldorado.html

February Night Sky.....

This map represents the sky at the following local standard times:

- Late January 10 pm
- Early February 9 pm
- Late February 8 pm
- Early March 7 pm



Spica, the brightest star in the constellation Virgo, can be seen about 4º to the upper left of the Waning Gibbous Moon on February 4th beginning about 90 minutes after midnight. Saturn is visible above the pair in Virgo's outstretched arms.

Jupiter and Venus, the two brightest planets in the night sky, will be within 2º of one another between February 15th & 18th. You'll need a clear view in the west -southwest as the pairing will take place just above the horizon. Start searching about 15 minutes after sunset. The peak of the conjunction takes place on February 16th. They'll only be ½º apart!

A Waxing Crescent Moon passes within 5º of Mars, which is still a bright red beacon in the constellation Cancer, on February 25th.

February Freeze Out

Winter nights can be ideal for observing. When it's actually clear during a winter night in Michigan, the sky can be unbelievably transparent. So, why don't amateur astronomers turn out in droves to winter observing sessions? It's because it gets *REALLY, REALLY COLD* on a clear winter night! Now comes the time of year when the hardcore members of the KAS brave the frigid temperatures to enjoy the deep sky delights that most people probably miss because of the frigid conditions.

Saturday, February 13 @ 7:00 pm

Kalamazoo Nature Center

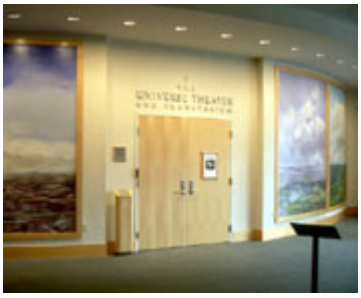
Kalamazoo Valley Museum

Planetarium Show Schedule

Sky Legends of the Three Fires
Weekdays, 11am; Saturdays; 1pm Sundays, 2pm

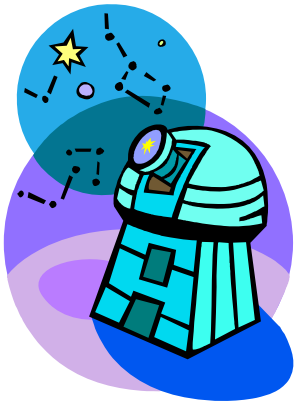
Winter Nights
Saturdays, 2:00 pm

Invaders of Mars
Everyday at 3:00 pm



Planetarium admission is $3.00 per person. The Kalamazoo Valley Museum is located at 230 North Rose Street in downtown Kalamazoo. For more information please call (269) 373-7990 or visit us on the web at www.kalamazoomuseum.org

Observatory Naming Contest



Mike Patton is looking for suggestions on what to call his 20' × 20' roll-off roof observatory at Arizona Sky Village.

Therefore, we've decided to hold a "Name Mike's Observatory" Contest!

Please submit your suggestion (along with a brief explanation) using the Contact Form on KAS Online. We'll submit a list of names to Mike and he'll pick his favorite suggestion.

General Meeting Preview

Orion Always Comes Up Sideways

presented by **Richard Bell**

Nestled inside the Winter Hexagon - an asterism of six bright stars - is Orion the mighty mythological hunter. One of the most recognizable patterns in the sky, Orion has encouraged generous of stargazers to venture out on a cold, clear winter night. Indeed, the winter sky has a lot to offer. Join us as Richard Bell takes us on a colorfully illustrated celestial tour of the stars, constellations, and deep sky objects contained within the Winter Hexagon. Learning to navigate the winter skies will be covered as well as the best targets for binoculars and telescopes. Maps will be provided.

Friday, February 5 @ 7:00 pm

Kalamazoo Area Math & Science Center

600 West Vine, Suite 400 • Use Dutton St. Entrance

Kalamazoo Astronomical Society
c/o KAMSC
600 West Vine, Suite 400
Kalamazoo, MI 49008

STAMP