The Mason-Dixon Astronomer

Westminster Astronomical Society of Maryland

November, 1999 — Vol. 15 No. 11

Table of Contents

Activity Calendar

11/05	Planetarium Night at BBNC 07:30P
11/10	Meeting: Telescope Buyers Workshop **(Please bring telescope!)**
11/15	Transit of Mercury
11/18	Leonids

Regular monthly WAS meetings are held the second Wednesday of each month (except December) at the Bear Branch Nature Center (BNC) at 7:30 p.m.
Phone 410-848-2517 for directions.

From the Pier in Potomac

By: Steve Robinson

Hi folks, this is the first article I have written for our newsletter. If it goes well, I'll write a few more. I live in Potomac, Maryland, and for those of you who don't know where that it, It is northwest of Washington DC about at the 16 mile radius from the heart of downtown. Around me I have Rockville, Bethesda, Gaithersburg, and further to the north, I have Germantown. All in all, I have a almost urban setting.

I enjoy observing from home. I get to observe a lot from here. My wife doesn't seem to mind so much if I'm right outside the door, and the cat just loves having something big and dangerous to stalk. So, there is a big plus next to the negative of being illuminated with all that wattage. But just how big a minus is it? And what can actually be done from such a setting? That's the subject I'm going to write for this and for possibly future newsletters.

A few weeks ago, I took an image of M27 and passed it around to the folks on our Little Bennett Regional Park (LBRP) Horse lot observing site folks. And then the following Sunday evening, I visually observed M27. I could see it at zenith without filters just barely standing out against the sky glow in my C8.

For the past couple years, I have been working on a software program that computes the visibility of an extended object given the object's magnitude and size. The software also wants to know the visual limiting magnitude, which Sunday night was about 3.5.

When I entered the size and brightness data for M27 into my program, I was informed that M27 should not be visible. In fact, the software predicted that a limiting magnitude of 4.3 would be needed before M27 could be seen. This clearly did not jive with my observation of our sky conditions.

This launched me on an little exploration. My atlas indicates the size of M27 as 430 by 320 arc seconds, TheSky says it is about 15 minutes of arc. When I measured the image I took by superimposing the image onto the computed image generated by TheSky, the size of M27 was only about 360 by 180 arc seconds, a significant reduction in size.

I used the new numbers for size, and re-calculated the visibility of M27. The estimate was still off. The new visual limiting magnitude was computed to be 4.0 and not 3.5 which by looking at the sky, I was pretty sure of.

Then I took a careful look at the distribution of the glow from the image of M27. It was clear that most of the illumination coming from M27 occupies only about half of the surface area of the object I photographed.

The visual magnitude of extended objects like M27 is estimated by capturing the total light from across the extended area and expressing it as if it came from a stellar point. Thus a 5th magnitude object whose brightness comes from a star

can be seen given ok sky conditions, but an extended object of 5th magnitude whose light is spread across a few arc-minutes of sky can be seen only if sufficient aperture is applied. If the light from the extended object is not distributed evenly across the area suggested by the size dimensions, then the calculations will not be very accurate. In the case of M27, much of the brightness comes from roughly half of the area of the object.

Again, since my software only accepts three pieces of information, visual limiting magnitude, object size, and visual magnitude, I chose to represent the uneven light distribution by halving the size dimensions.

When I entered my new approximation of 220 by 180, software finally indicated that M27 was at the threshold of visibility at limiting magnitude 3.5.

I began to suspect the sizes of many astronomical objects are incorrectly specified in our atlases. I took a cut at determining how bad the atlases were one rainy Sunday. I took a slice of sky and found every object brighter than 11th magnitude in my atlas that was above -6 degrees dec.

I then located those objects using my planetarium program TheSky. I superimposed an image of the corresponding area from my RealSky CDs. I did this for galaxies and globulars. My results indicated that so far as the sizes recorded in TheSky were concerned, RealSky showed that the real measurements were frequently much smaller.

A dark sky observer may very well wonder why someone should care about these things, and I guess if I had a good dark sky, I might not. But if I could calculate what objects were up at any given time, and then compute whether I would be rewarded with a view given the evenings sky conditions, I may decide not to take the time to go hunt for something I probably couldn't see anyway.

With those thoughts in mind, I constructed the Visibility software, and I have calibrated a large number of size estimates from my atlas (incidentally the atlas I use comes from SAC) with RealSky. I now have a pretty good data set, and my estimates of visibility have become very good.

My software runs on an oddball little computer called a Psion Sienna which is just perfect for what I need it for. I am in the process of converting it to run under Windows a little at a time.

If anyone is interested in a less sophisticated version of the visibility software, drop me an e-mail, and I'll try to get a copy of the software back to you by return e-mail. It's truly interesting stuff. A couple years ago, I ran across an eye-opening article in the Deep Sky Observer pub from the Webb Society. I e-mailed the author of the article and found him at a university in Belgium, or maybe France, I don't remember. Anyway, he sent me a copy of his software, and I have used it to calibrate mine. This is the software I will send if you want it.

Let me see if I can figure out some way to sum all this up for you readers who need to have articles end neatly. My calculations involving M27 pretty much indicated to me that if it is at the threshold of visibility, then the limiting magnitude of the sky was in fact 3.5, at least on the night of the measurement. Given that, and the likelihood that if sky pollution were not present, the night would probably have been at least between 5.5 and 6, we can put the impact of light pollution here in Potomac at between 2.0 and 2.5 magnitudes.

With luck, we can continue from this point next time. What does it mean to lose 2 to 2.5 magnitudes? Is the sky worth observing under an urban dome? We'll explore ways to make the sky a bit darker, and then we'll see what some of the impact might be.

For my part, I think the answer is yes. I have invested in a pier and some other things I'll share with you next time that will give you a sense of what can be done with skies like ours. Until then, clear skies.

From the Pier in Potomac II

It is fall, and with it comes heavy dewing. I use two systems to combat dew. The first is a hard dew shield, and, and the second is one of those heat tape dew zappers that Orion sells. Both seem to work just fine. The one I trust a bit more is the dew zapper, and when it is really a bad night, that's the one I use. If I am at a remote location, for portability, I also take the zapper. It is small and easy to pack.

When I travel away from the pier, I also carry along a heavy 90 amp-hour deep cycle lead-acid battery to power the various accessories. With this battery, I can power all accessories for about 9 hours. The accessories I use are a JMI Mototrack IV, my CCD Camera, a 486 laptop to drive the camera, and of course the dew zapper. The heavy sippers are the CCD Camera, the laptop, and the dew zapper. The three

drive the current requirement up to right between 9 and 10 amps. The dew zapper drinks up two of them.
If I didn't have to use the dew zapper for 9 hours, the current savings is 18 amp-hours. That's enough to keep everything going almost an additional 2 hours. It's worth knowing when to use the zapper, and when not to.
It's also clear that if dew forms on the optics, it's difficult to recover the situation. One of those little hair dryers might help, but short of that, it has ended a number of my sessions right there in my tracks. If I am in a remote location, I might use the hair dryer, but that takes up a lot of juice to do that, and I am constrained to my battery.

So what is there to do? The answer lies in knowing when conditions are approaching the dew point. That is the point at which air temperature drops to the point of water saturation, and the vapor condenses on the colder items, like scopes, eyepieces, and whatever else. If I could estimate the dew-point well enough, when the temperature approached that point, I could start up the zapper, and save those precious electrons for other things.
I did a little internet skimming and found the following formula that gets me in the right ballpark. It is as follows:

```
e=(rh/100)*0.611*exp(17.27*t/(t+237.3))
td=(116.9+237.3*ln(e))/(16.78-ln(e))
```

This formula is easy enough to put into a programmable calculator or into a basic program for that matter.
The formula must be fed two values, the first is a value for t in degrees Celsius.
The second is the relative humidity rh expressed as a percent.

Td is the dew-point temperature in degrees Celsius.

The following Psion OPL program shows a program requesting temps in degrees Fahrenheit, and returning dew-point temperature in degrees Fahrenheit. If you know basic, you can easily follow the logic.

```
PROC dew:
global t,rh,e,td
font 8,1
while 1
        print "enter temp in F:"

        input t
        t=(t-32)*5/9
        print "enter RH:"
        input rh
        e=(rh/100)*0.611*exp(17.27*t/(t+237.3))
        td=(116.9+237.3*ln(e))/(16.78-ln(e))
        print "dp:";gen$(32+td*9/5,4)
        get
        endwh
ENDP
```

A typical scenario is to take the temperature and relative humidity measurements before starting the observing session, and computing the dew point temperature from those two values. If the temperature is not expected to drop to that temperature during the observing session, consider myself home free. If the temperature is expected to drop below that temperature, I keep a thermometer with me and keep an eye on the temp. When I am within 5 degrees or so of dew-point, I turn on the zapper, or take other precautions.

Radio Shack sells a nice little indoor-outdoor thermometer that reads out Temp and Relative Humidity with enough accuracy for the purposes here. It's at a fairly reasonable price as well.
I cooked up this program almost a year ago, and I'll say that from my experience it seems to work pretty well with the Radio shack data as input. Until next time, clear skies and fog-free apertures

Star Points for November, 1999

by Curtis Roelle

Black Drop of Mercury Visible Against Sun

Two rare celestial events have astronomers looking forward to mid-November. The most anticipated is a possible Leonid meteor "storm" somewhere in the world. The only time a Leonid storm has been observed this century was in 1966. The other subtler event is a transit of the planet Mercury across the face of the Sun. Since it occurs first we will begin with a discussion of the transit.

Mercury, the closest major planet to the Sun, completes one solar orbit in 88 days compared to 365 days for Earth. If Mercury and Earth orbited the Sun in the same plane we could see Mercury "transit", or pass in front of the Sun, once during each orbit or nearly four times a year. But Mercury's orbital plane is inclined seven degrees to Earth's orbit meaning that transits of Mercury are relatively rare events occurring on average 13 times per century.

The last transit of Mercury visible in the continental U.S. was on November 10, 1973. From my location back then it had started while the Sun was still below the horizon

and was to end just minutes after sunrise. Together with a friend we frantically searched for any hill with a good vantage point. Anyone who has traveled through the great plains region of the country will appreciate how difficult finding a hill there can be. By the time the telescope was ready the Sun was up and the transit was over!

The next transit of Mercury, on Monday afternoon November 15, has shades of the 1973 event. In 1973 the Sun rose while the tiny black dot of Mercury was projected against its face like a beauty mark on Cindy Crawford and on the 15th will set in the same way. Mercury will appear to barely prick the edge of the Sun. In fact the width of the gap that separates Mercury's tiny black disc and the outer edge (or "limb") of the Sun will be less than the apparent diameter of Mercury itself.

In a way a transit of the Sun is similar to a partial solar eclipse. During the transit Mercury passes in front of the Sun and the Moon passes in front of the Sun during a solar eclipse.

However, the apparent size of Mercury is much smaller than the Moon because of Mercury's greater distance. Mercury's apparent diameter

will only be about 1% of the apparent diameter of the Sun.

Thus the same precautions used to observe a partial solar eclipse must be employed for making transit observations. One must never look directly through a telescope at the Sun without using a safe and approved solar filter. Visual safety and selection of safe filters for observing the Sun was discussed in the August Star Points column. Eyepiece projection from a telescope or one half of a binocular (with the other half capped) onto a white card or screen is another good method for generating a magnified image of the Sun. Unfortunately, because of Mercury's small size the use of a pinhole projector (see February 1998 Star Points) will probably not render an image large enough for Mercury to be observed.

Here is a nutshell timetable for the transit of Mercury on November 15 as given in Guy Ottwell's "Astronomical Calendar 1999".

Mercury's black disk first nicks the edge of the Sun during "1st contact" at 6:14 p.m. EST. In Westminster the Sun will be just about six degrees above the horizon. The complete drop-like disc of Mercury will be visible against the Sun starting at "2nd contact" at 6:29 p.m. By then the Sun's altitude will have decreased to three degrees. When the edges of Mercury's dark disk and Sun meet again at "3rd contact" at 06:52 p.m. the Sun has already set. However the Sun will remain visible for an additional minute due to refraction caused by Earth's atmosphere.

In the space remaining let us now turn to the 1999 Leonid meteor shower. Astronomers are expecting a good probability of a "meteor storm" with thousands of meteors visible per hour somewhere in the world. The question is, "where?" Opinions vary but several expeditions are being planned. One such expedition by a private Washington astronomy research organization is planned for the island of Cyprus in the Mediterranean.

Westminster Astronomical Society Vice President, Brian Eney, will be travelling to the Canary Islands in hopes of seeing the once in a lifetime meteor storm. If the storm doesn't occur as predicted Brian won't be disappointed since the prospects of observing in a dark moonless sky from a remote island is a grand consolation for sky lovers such as him.

In central Maryland the best time to observe the Leonid meteor shower should be between midnight and dawn on the morning of Thursday, November 18 (late Wednesday night). An observing site away from artificial outdoor lights or "skyglow" is best so that the faint as well as bright meteors can be seen. It's important to dress warmly, and find a comfortable place to relax. A lawn chair with a pillow and sleeping bag or blanket works well. Don't observe near buildings or trees which may block your view of the sky.

Meteor storms are notoriously hard to predict. Last year predictions for the shower peak were off by 18 hours so that the true peak occurred over some completely different terrestrial region. Thus, even though a meteor storm is not predicted for Maryland you should observe anyway because the experts could always be wrong again.

This month marks the start of Star Points' fourth year. A web archive containing the previous installments of Star Points referenced above is now available at "http://www.erols.com/roelle/starpoints/".

An error converting Coordinated Universal Time in the November Star Points caused some of the times listed for the November 15 transit of the sun to be incorrect. This was in or about paragraph 7:

Published Time	Corrected Time
6:14 p.m. EST	4:14 p.m. EST
6:29 p.m.	4:29 p.m.
6:52 p.m.	4:52 p.m.

Mercury Transit

(Captured from local astronomy e-mail list)

Some of us have been talking about trying to see Mercury transit the limb of the sun on Monday, November 15, 1999. The challenge is that in our area the event will occur just before sunset. This means that we need to do it some place with an unobstructed horizon.

The event will occur between about 1600 to 1645 starting about 8 degrees above the refracted horizon. My planetarium software (TheSky) calculates that the local Sun azimuth during those times will be between 230 and 240 degrees. So we don't need a completely unobstructed horizon, just ten degrees worth.

This past weekend I drove up and surveyed the "Scenic Overlook" just outside Fredrick, Maryland. Ding, I think we have a winner. About thirty yards out into the field there is a clear view for those bearings (I used a compass). I also looked in Black Hills park. There is a spot there too, but not quite as good as the "Scenic Overlook".

The "Scenic Overlook" is just past mile 28 of route 270 going toward Fredrick. You can only get to it from the side of the road that goes TO Fredrick from Rockville. You will have to drive a few miles to Fredrick to turn around.

OCTOBER MEMBERSHIP

We would like to extend a warm welcome to the following re**new**ing members:

Newsletter Renewal
Kenneth Lum

New Single Memberships
Cassie Clapp

Single Membership Renewals
Vince Pearman
Logan Chaney
Richard Orr
John O. Kratz
James F. McConkey, III
Michael Schmitz

New Family Memberships
Charles & Joanne Specht
Judith & Howard Bohm
Melissa Jan & Daniel Lemberg
Laura and Stephanie Mooney

Family Membership Renewals
John & Rachel Kasianowicz
Blaine & Nancy Roelke

[We apologize if anyone was left out but we can only include information provided by the 20th of the month prior to publication.]

Poetry Corner

HALLEY CAME TO JACKSON

WRITTEN BY MARY CHAPIN CARPENTER

Copied by skip bird

Late one night
When the wind was still,
Daddy brought the baby
To the windowsill

To see a bit of heaven
Shot across the sky,
The one and only time
Daddy saw it fly.

It came from the east
Just as bright as a torch.
The neighbors had a party
On their porch.

Daddy rocked the baby,
Mother said amen
When Halley came to visit
In 1910.

Now back then
Jackson was a real small town.
And its not every night
A comet comes around.

It was almost eighty years
Since its last time through.
So I bet your mother
Would have said amen too.

As its tail stretched out
Like a stardust streak,

The papers wrote about it
Every day for a week.

You wonder where its going
And where it's been
When Halley came to Jackson
In 1910.

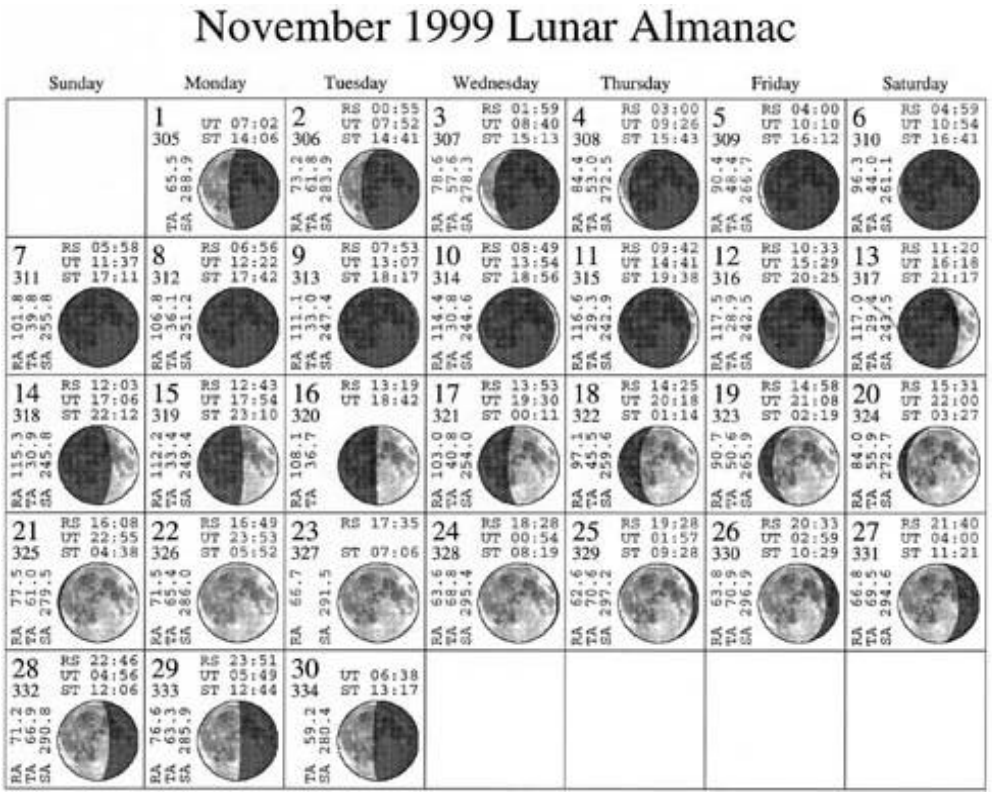
Now Daddy told the baby
Sleeping in his arms
To dream a little dream
Of a comet's charms.

And he made a little wish
As she slept so sound.
In 1986
That wish came'round.

It came from the east
Just as bright as a torch.
She saw it in the sky
From her daddy's porch.

As heavenly sent
As it was back then
When Halley came to Jackson
In 1910.

Late one night
When the wind was still….



November 1999 Solar Almanac

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 305 RA 108.0 TA 36.0 SA 251.8 MA 05:05 MN 05:36 MC 06:08 RS 06:36 UT 11:52 ST 17:07 EC 17:35 EN 18:06 EA 18:38	2 306 RA 108.5 TA 35.7 SA 251.3 MA 05:06 MN 05:37 MC 06:09 RS 06:37 UT 11:52 ST 17:06 EC 17:34 EN 18:05 EA 18:37	3 307 RA 108.9 TA 35.4 SA 250.9 MA 05:07 MN 05:38 MC 06:10 RS 06:38 UT 11:52 ST 17:04 EC 17:32 EN 18:04 EA 18:36	4 308 RA 109.3 TA 35.1 SA 250.5 MA 05:08 MN 05:39 MC 06:11 RS 06:39 UT 11:52 ST 17:03 EC 17:31 EN 18:03 EA 18:35	5 309 RA 109.7 TA 34.8 SA 250.1 MA 05:09 MN 05:40 MC 06:12 RS 06:40 UT 11:52 ST 17:02 EC 17:30 EN 18:02 EA 18:34	6 310 RA 110.1 TA 34.5 SA 249.7 MA 05:10 MN 05:41 MC 06:13 RS 06:42 UT 11:52 ST 17:01 EC 17:29 EN 18:01 EA 18:33
7 311 RA 110.5 TA 34.2 SA 249.3 MA 05:11 MN 05:42 MC 06:14 RS 06:43 UT 11:52 ST 17:00 EC 17:28 EN 18:00 EA 18:32	8 312 RA 110.9 TA 33.9 SA 248.9 MA 05:12 MN 05:43 MC 06:15 RS 06:44 UT 11:52 ST 16:59 EC 17:27 EN 18:00 EA 18:31	9 313 RA 111.3 TA 33.6 SA 248.6 MA 05:13 MN 05:44 MC 06:17 RS 06:45 UT 11:52 ST 16:58 EC 17:27 EN 17:59 EA 18:30	10 314 RA 111.7 TA 33.3 SA 248.2 MA 05:14 MN 05:45 MC 06:18 RS 06:46 UT 11:52 ST 16:57 EC 17:26 EN 17:58 EA 18:30	11 315 RA 112.0 TA 33.0 SA 247.8 MA 05:15 MN 05:46 MC 06:19 RS 06:47 UT 11:52 ST 16:56 EC 17:25 EN 17:57 EA 18:29	12 316 RA 112.4 TA 32.7 SA 247.4 MA 05:16 MN 05:47 MC 06:20 RS 06:48 UT 11:52 ST 16:55 EC 17:24 EN 17:56 EA 18:28	13 317 RA 112.8 TA 32.5 SA 247.1 MA 05:17 MN 05:48 MC 06:21 RS 06:49 UT 11:52 ST 16:55 EC 17:23 EN 17:56 EA 18:27
14 318 RA 113.1 TA 32.2 SA 246.7 MA 05:18 MN 05:49 MC 06:22 RS 06:51 UT 11:52 ST 16:54 EC 17:22 EN 17:55 EA 18:27	15 319 RA 113.5 TA 32.0 SA 246.4 MA 05:19 MN 05:50 MC 06:23 RS 06:52 UT 11:53 ST 16:53 EC 17:22 EN 17:54 EA 18:26	16 320 RA 113.8 TA 31.7 SA 246.1 MA 05:20 MN 05:51 MC 06:24 RS 06:53 UT 11:53 ST 16:52 EC 17:21 EN 17:54 EA 18:25	17 321 RA 114.1 TA 31.5 SA 245.7 MA 05:21 MN 05:52 MC 06:25 RS 06:54 UT 11:53 ST 16:51 EC 17:20 EN 17:53 EA 18:25	18 322 RA 114.5 TA 31.2 SA 245.4 MA 05:22 MN 05:53 MC 06:26 RS 06:55 UT 11:53 ST 16:51 EC 17:20 EN 17:52 EA 18:24	19 323 RA 114.8 TA 31.0 SA 245.1 MA 05:23 MN 05:54 MC 06:27 RS 06:56 UT 11:53 ST 16:50 EC 17:19 EN 17:52 EA 18:24	20 324 RA 115.1 TA 30.8 SA 244.8 MA 05:23 MN 05:55 MC 06:28 RS 06:57 UT 11:54 ST 16:49 EC 17:18 EN 17:51 EA 18:23
21 325 RA 115.4 TA 30.5 SA 244.5 MA 05:24 MN 05:56 MC 06:29 RS 06:58 UT 11:54 ST 16:49 EC 17:18 EN 17:51 EA 18:23	22 326 RA 115.7 TA 30.3 SA 244.2 MA 05:25 MN 05:57 MC 06:30 RS 07:00 UT 11:54 ST 16:48 EC 17:17 EN 17:50 EA 18:22	23 327 RA 116.0 TA 30.1 SA 243.9 MA 05:26 MN 05:58 MC 06:31 RS 07:01 UT 11:54 ST 16:48 EC 17:17 EN 17:50 EA 18:22	24 328 RA 116.3 TA 29.9 SA 243.6 MA 05:27 MN 05:59 MC 06:32 RS 07:02 UT 11:55 ST 16:47 EC 17:16 EN 17:50 EA 18:22	25 329 RA 116.5 TA 29.7 SA 243.4 MA 05:28 MN 06:00 MC 06:33 RS 07:03 UT 11:55 ST 16:47 EC 17:16 EN 17:49 EA 18:21	26 330 RA 116.8 TA 29.5 SA 243.1 MA 05:29 MN 06:01 MC 06:34 RS 07:04 UT 11:55 ST 16:46 EC 17:16 EN 17:49 EA 18:21	27 331 RA 117.1 TA 29.3 SA 242.8 MA 05:30 MN 06:02 MC 06:35 RS 07:05 UT 11:56 ST 16:46 EC 17:15 EN 17:49 EA 18:21
28 332 RA 117.3 TA 29.1 SA 242.6 MA 05:31 MN 06:03 MC 06:36 RS 07:06 UT 11:56 ST 16:46 EC 17:15 EN 17:48 EA 18:21	29 333 RA 117.5 TA 29.0 SA 242.4 MA 05:32 MN 06:04 MC 06:37 RS 07:07 UT 11:56 ST 16:45 EC 17:15 EN 17:48 EA 18:20	30 334 RA 117.8 TA 28.8 SA 242.1 MA 05:33 MN 06:05 MC 06:38 RS 07:08 UT 11:57 ST 16:45 EC 17:15 EN 17:48 EA 18:20				

Westminster, MD
Time Zone: EST (5)
Latitude: 39.58 N
Longitude: 77.00 W

MA = Morning astronomical twilight, sun is at -18 degrees altitude.
MN = Morning nautical twilight, sun is at -12 degrees altitude.
MC = Morning civil twilight, sun is at -6 degrees altitude.
RS = Sunrise, upper limb on horizon.
UT = Upper Transit, highest in sky.
ST = Sunset, upper limb on horizon.
EC = Evening civil twilight, sun is at -6 degrees altitude.
EN = Evening nautical twilight, sun is at -12 degrees altitude.
EA = Evening astronomical twilight, sun is at -18 degrees altitude.
Times are rounded to nearest minute.

RA = Azimuth of rising sun.
TA = Altitude of sun at transit.
SA = Azimuth of setting sun.
Altitudes and azimuths are in degrees.

The times listed are for standard refraction (34.5') and an observer at sea level. If these conditions do not hold, then actual rise and set times may differ.

Calendar by Ray Sterner
Johns Hopkins Applied Physics Lab.
Laurel, MD 20723

Editor's Eyepiece

By Mrs. Cynthia Hunter-Shupe

Communications

WEB SITE

We are happy to announce that WAS and WAS-MDA now has a new domain name - westminsterastro.org. Although we have not started the site yet, we are ready to accept articles and resource reviews, etc. for the site towards its development. Please send web site content and design ideas to myself via postal mail - 10316 Lewis Drive, Damascus, MD 20872 or email astro@contingent.com.

E-MAIL

The newsletter's first email edition will be sent out to all that have email the first week of November and the paper edition should arrive before the first monthly meeting for those that do not have email/internet. Please ignore prior email list invitations as I am using contact management software rather than a 'list service'. This change is the result of too few signing up with the list service and some voicing concern about their email information being thought 'public' as a result of subscribing to the list service. The list will be deleted as a result and prior invitations should be ignored.

DISCUSSION GROUP

An on-line public discussion group has been created for those that are interested. A link to this resource will be created on the web site this month along with the WAS-MDA email version of the newsletter.

The Mason-Dixon Astronomer (MDA) is the monthly newsletter of the Westminster Astronomical Society (WAS) of Maryland and is mailed free of charge to members. Club officers are Skip Bird, President; Brian Eney, Vice President; Phil Schmitz, Secretary; Paul Henze, Director at Large. Membership rates are $15 Family and $13 Single. Forward remittance to Treasurer Carl Koch, 16 Hiughstream Court, Germantown, MD 20874. Use of material published herein is permitted if credit is given to the author and MDA. The MDA is edited by Mrs. Cynthia Hunter-Shupe (301-482-1384). Written contributions are always encouraged by the 20th of the month prior to the month of publication as text file email attachments or postal mailed to 10316 Lewis Drive, Damascus, MD 209872. The WAS web site can be viewed at www.erols.com/roelle/was.

The Mason-Dixon Astronomer

Westminster Astronomical Society
10316 Lewis Drive, Damascus, MD 20872

MEMBER BENEFITS

Monthly Club Newsletter

Astronomical League Membership & Newsletter

Discount on Astronomy Sky & Telescope

Group Membership in International Dark Sky Association