CONSTELLATION *addendum . . .*

supplement to the official publication of Bucks-Mont Astronomical Association, Inc

Vol 32, No 1a Winter 2017 Scott Petersen, editor

Recording Your Observations

- by Gary Sprague

There are many reasons for you to record or "log" your celestial sightings and observations, and you don't have to be doing sophisticated observations to benefit from them.

Following are some examples of these benefits:

- Sharpen your observing skills because when you take notes about your observations, you tend to look in more detail.
- Compare your observations with previous ones, to evaluate different "seeing" conditions or telescope or binocular performance.
- Organize your sightings. For example, listing all your planetary or other, like observations together.
- Have a sense of improvement in your observing techniques, with time and experience.

There are many types of observing logs. Galileo, the famous astronomer, recorded his observations in notebooks and this is still an approach used by many amateur astronomers today.

If you use a notebook, the following are recommended entries you should consider.

- Date, time and observing location.
- Observing conditions.
- The target being observed.
- The instrument being used, including eyepiece and filter.
- Drawings can be useful when later comparing your observations with references.

You can also use standard forms, put into a loose-leaf notebook. The following sample forms are available on-line from the Saguaro Astronomy Club: http://saguaroastro.org/content/downloads.htm

- The observing log(for single objects) is useful when you want to include details and a drawing.
- The observing log(for multiple objects) is useful for recording your observations for multiple objects.
- The observation sheet3 is a slightly more detailed example of a form for recording multiple observations.
- Of course, you can also use these examples to design your own form.

Good luck with recording your observations. We believe they can improve your observing experiences and make your time under the stars more enjoyable.

- BMAA co-president Gary Sprague provided this article [-ed]

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Bucks-Mont Astronomical Association, Inc
General Meeting Minutes
January 4, 2017

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Officers present: Gary Sprague (co-president), and Robert Mittel-Carey (secretary)

Meeting called to order by Gary Sprague at 7:30p. In attendance: 16 members and guests

- Gary reviewed upcoming calendar events for January through March
- 2017 officers were announced; all incumbents re-elected.
- A nice assortment of snacks were brought by members for the Holiday Party.

- **Main topic: "Holiday Party" Trivia**

Gary presented a nice assortment of trivia questions; all having to do with solar eclipses.

Respectfully submitted,

Robert Mittel-Carey, secretary

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Bucks-Mont Astronomical Association, Inc
General Meeting Minutes
February 1, 2017

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Officers present: Dwight Dulsky (co-president), and Robert Mittel-Carey (secretary)

Meeting called to order by Dwight Dulsky at 7:30p. In attendance: 22 members and guests

- Dwight reviewed the mostly completed 2017 events calendar and it's posted on website.
- Planned outreach at Warminster Free library and Jarrett Nature Center
- Montco Community Observatory event on Feb. 13th
- Igor shared several astrophotos with some humorous references for speed and distance.

- **Main topic: History of Star Charts**

Ray Harris, a member of the Lehigh Valley Amateur Astronomical Society (LVAAS) gave a very detailed and educational presentation of the history of star charts.

Respectfully submitted,
Robert Mittel-Carey, secretary

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February BMAA Events

– by Dwight Dulsky

February meeting: History of Star Charts

Every amateur astronomer consults star charts to plan and help find their way around the night sky. Today much of this information is right at our fingertips at home and in the field through online sources. But, that is a recent development and for several millennia humans have been recording and documenting celestial events. Our February guest speaker, Ray Harris provided an excellent overview of Star Charts throughout history. Through numerous visuals, he provided great examples of the milestones in recording information about the skies. It was interesting to see how leaps in technology enabled more accurate charting methods. Ray has a fabulous personal collection of star charts to draw upon and is continually adding to his library.

Community Outreach: Exo-Planets

During the month of February BMAA did two outreach events at the Warminster Free Library for students in 1st through 4th grades. There were about twenty students who attended four sessions at the library devoted to the topic of Exo-Planets. This is a timely subject these days as there is lots of exciting Exo-Planet news. On our first meeting, we presented examples of how scientists actually search and learn about these far off worlds. Even though these students were young, they readily grasped the concepts of transiting planets, dropping off light curves and "star-wobble". Using the online app NASA Eyes on Exo-Planets we took a virtual tour of some of the more unusual exo-planets discovered to date. This app is nice in that it overlays the "habitable zone" that varies in distance around the host stars. Finally we wrapped the session by challenging them to design a mission to explore an exo-planet. I provided the librarian with five dramatically different exo-planets for the students to visit, OGLE 2005 – BLG-390L b, an ice world beyond the habitable zone. Kepler 22b, an Earth sized water world. 55 Cancri e, nicknamed "The diamond Planet" for its high carbon content. HD209458 B a hot Jupiter losing it's atmosphere. Finally Kepler 16, a planet embedded in a star system with two host suns that orbit each other. We also explained that their mission is to explore the planet, not necessarily to land or live on the planet.

Over the next two weeks the students used a variety of art and recycled materials to build models of their mission vehicles. They really worked hard on crew quarters, laboratories for science experiments and growing their own food, and vehicles to explore their planets up close. On February22nd, the students took turns presenting their models to the group and explaining how they would function. I was really impressed with their seriousness of thought and inventiveness, even at such a young age. All throughout they asked great questions and had a good time at each session working in teams on their missions.

After their presentations, we donned some 3-D glasses and took them on a "wow" filled trip to Mars using 3-D images from the Mars Rover missions. We parted with invitations for them to join us at some of our local starwatches happening nearby this spring and summer.

- BMAA co-president Dwight Dulsky coordinates BMAA outreach and StarWatches [-ed]

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Exo-Planet Explorers
To Infinity and Beyond!
Wednesday, February 1st-22nd @ 4:30PM
Join us for a fun astronomy program series for children in grades 2-4. Astronomer and outreach coordinator for the Bucks-Mont Astronomical Association, Dwight Dulsky, will join us on February 1st and introduce us to our Exo-Planets. During the next two sessions, children will be placed into "Science Teams" to design a mission to explore their unique planet. Each team will address categories such as transportation, food, and more. They will create or design things that will help them in their explorations of these Exo-Planets such as drawings, posters and models. Science teams will share their unique mission to their Exo-Planets during the final meeting!
Registration is required. We ask that children try to commit to all sessions.
* This is not a publication of the Centennial School District. The District neither approves nor disapproves of the content thereof.

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Space Place

February 2017

Solar Eclipse Provides Coronal Glimpse

-by Marcus Woo

On August 21, 2017, North Americans will enjoy a rare treat: The first total solar eclipse visible from the continent since 1979. The sky will darken and the temperature will drop, in one of the most dramatic cosmic events on Earth. It could be a once-in-a-lifetime show indeed. But it will also be an opportunity to do some science.

Only during an eclipse, when the moon blocks the light from the sun's surface, does the sun's corona fully reveal itself. The corona is the hot and wispy atmosphere of the sun, extending far beyond the solar disk. But it's relatively dim, merely as bright as the full moon at night. The glaring sun, about a million times brighter, renders the corona invisible.

"The beauty of eclipse observations is that they are, at present, the only opportunity where one can observe the corona [in visible light] starting from the solar surface out to several solar radii," says Shadia Habbal, an astronomer at the University of Hawaii. To study the corona, she's traveled the world having experienced 14 total eclipses (she missed only five due to weather). This summer, she and her team will set up identical imaging systems and spectrometers at five locations along the path of totality, collecting data that's normally impossible to get.

Ground-based coronagraphs, instruments designed to study the corona by blocking the sun, can't view the full extent of the corona. Solar space-based telescopes don't have the spectrographs needed to measure how the temperatures vary throughout the corona. These temperature variations show how the sun's chemical composition is distributed—crucial information for solving one of long-standing mysteries about the corona: how it gets so hot.

While the sun's surface is ~9980 Farenheit (~5800 Kelvin), the corona can reach several millions of degrees Farenheit. Researchers have proposed many explanations involving magneto-acoustic waves and the dissipation of magnetic fields, but none can account for the wide-ranging temperature distribution in the corona, Habbal says.

You too can contribute to science through one of several citizen science projects. For example, you can also help study the corona through the Citizen CATE experiment; help produce a high definition, time-expanded video of the eclipse; use your ham radio to probe how an eclipse affects the propagation of radio waves in the ionosphere; or even observe how wildlife responds to such a unique event.

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Otherwise, Habbal still encourages everyone to experience the eclipse. Never look directly at the sun, of course (find more safety guidelines here: https://eclipse2017.nasa.gov/safety). But during the approximately 2.5 minutes of totality, you may remove your safety glasses and watch the eclipse directly—only then can you see the glorious corona. So enjoy the show. The next one visible from North America won't be until 2024.

For more information about the upcoming eclipse, please see:

NASA Eclipse citizen science page

https://eclipse2017.nasa.gov/citizen-science

NASA Eclipse safety guidelines

https://eclipse2017.nasa.gov/safety

Want to teach kids about eclipses? Go to the NASA Space Place and see our article on solar and lunar eclipses! http://spaceplace.nasa.gov/eclipses/

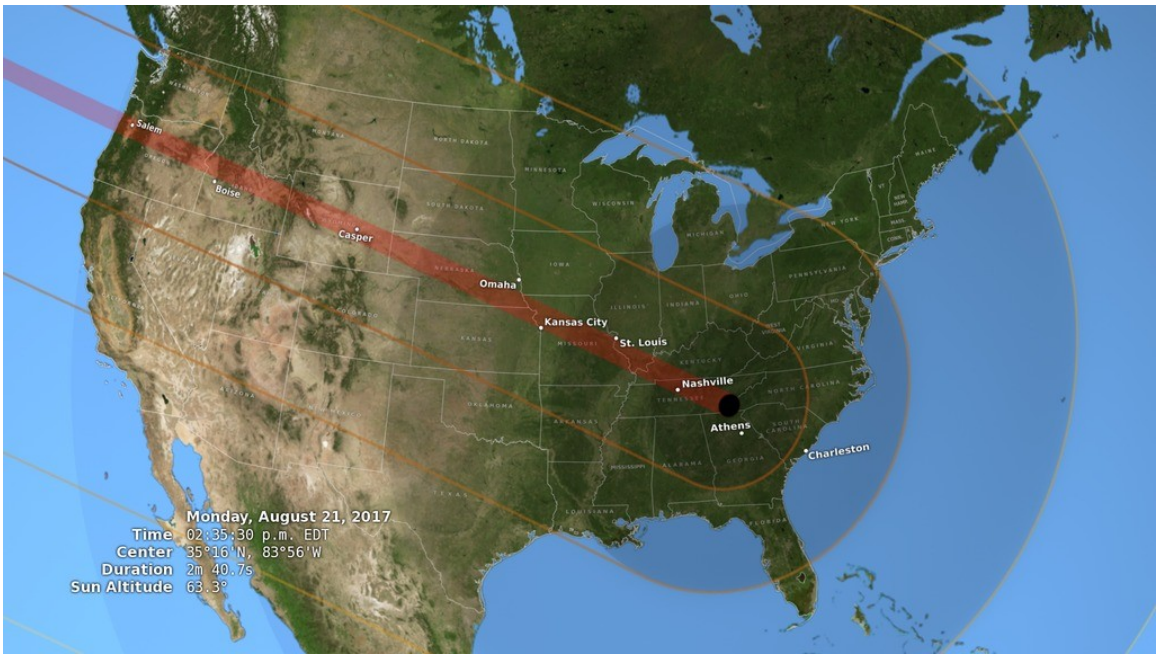

Illustration showing the United States during total solar eclipse of August 21, 2017, with umbra (black oval), penumbra (concentric shaded ovals), and path of totality (red) through or very near several major cities. Credit: Goddard Science Visualization Studio, NASA

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.
*Visit **spaceplace.nasa.gov** to explore space and Earth science!*

- Space Place is provided to local astronomy clubs by NASA [-ed]

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Space Place

March 2017

What It’s Like on a TRAPPIST-1 Planet

- by Marcus Woo

With seven Earth-sized planets that could harbor liquid water on their rocky, solid surfaces, the TRAPPIST-1 planetary system might feel familiar. Yet the system, recently studied by NASA’s Spitzer Space Telescope, is unmistakably alien: compact enough to fit inside Mercury's orbit, and surrounds an ultra-cool dwarf star—not much bigger than Jupiter and much cooler than the sun.

If you stood on one of these worlds, the sky overhead would look quite different from our own. Depending on which planet, the star would appear several times bigger than the sun. You would feel its warmth, but because it shines stronger in the infrared, it would appear disproportionately dim.

"It would be a sort of an orangish-salmon color—basically close to the color of a low-wattage light bulb," says Robert Hurt, a visualization scientist for Caltech/IPAC, a NASA partner. Due to the lack of blue light from the star, the sky would be bathed in a pastel, orange hue.

But that's only if you're on the light side of the planet. Because the worlds are so close to their star, they're tidally locked so that the same side faces the star at all times, like how the Man on the Moon always watches Earth. If you're on the planet's dark side, you'd be enveloped in perpetual darkness—maybe a good thing if you're an avid stargazer.

If you're on some of the farther planets, though, the dark side might be too cold to survive. But on some of the inner planets, the dark side may be the only comfortable place, as the light side might be inhospitably hot.

On any of the middle planets, the light side would offer a dramatic view of the inner planets as crescents, appearing even bigger than the moon on closest approach. The planets only take a few days to orbit TRAPPIST-1, so from most planets, you can enjoy eclipses multiple times a week (they'd be more like transits, though, since they wouldn't cover the whole star).

Looking away from the star on the dark side, you would see the outer-most planets in their full illuminated glory. They would be so close—only a few times the Earth-moon distance—that you could see continents, clouds, and other surface features.

The constellations in the background would appear as if someone had bumped into them, jostling the stars—a perspective skewed by the 40-light-years between TRAPPIST-1 and Earth. Orion's belt is no longer aligned. One of his shoulders is lowered.

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And, with the help of binoculars, you might even spot the sun as an inconspicuous yellow star: far, faint, but familiar.

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, "Searching for other planets like ours": https://spaceplace.nasa.gov/exoplanet-snap/

This artist's concept allows us to imagine what it would be like to stand on the surface of the exoplanet TRAPPIST-1f, located in the TRAPPIST-1 system in the constellation Aquarius.
Credit: NASA/JPL-Caltech/T. Pyle (IPAC)

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.
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