



The Mason-Dixon Astronomer

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Star Points for December 1999

by Curtis Roelle

The End of the World As We Know It

With any luck, it will all be over soon. The daily dose of "millennium madness" and Y2K "doomsday cult" scenarios in the news media that is. Numerous mythologies and religions both ancient and contemporary have grappled with the question of how the world meets its end. Science has also considered this issue and constructed theories that are amazing and humbling at the same time. One might say they inspire a sense of awe and wonder not unlike traditional mythologies that have marveled people in ages past.

In the current widely accepted theory the sun is about 4.5 billion years old. In his book "The Sun Our Star" Robert W. Noyes writes about the future of the sun. The sun continues increasing in brightness and 1.5 billion years from now its temperature will have increased by 15%. The age of ice on Earth comes to an end. The ice caps will melt and sea levels will have risen several hundred feet.

At an age of 10 billion years the sun's supply of hydrogen will be nearing exhaustion. As the supply runs out the sun swells turning noticeably red. In the daytime sky the red sun is about three times larger than the full moon. On Earth the oceans have boiled away and the surface has become uninhabitable. To maintain human life mankind will have to leave this world and recede from the expanding sun.

The sun continues enlarging until it engulfs the orbit of Mercury incinerating that planet. The surface of the earth is turned into molten sea of lava. Eventually the distended surface of the sun may extend all the way to the earth. The increased drag causes the earth to spiral in toward the center of the sun and is vaporized. Thus the planet which once was blue and teeming with life and human civilization reaches its unequivocal end. Meanwhile our sun is enjoying its red giant phase but this will last an astronomically brief period of some 250 million years.

All this time the sun has been exhausting its supply of hydrogen. But when the hydrogen runs out it begins consuming helium. The sun shrinks once more but will still be 10 times its current diameter. As the helium runs out the sun consumes other elements, including oxygen, which are byproducts of nuclear fusion.

As each element is consumed in turn the temperature of the sun increases. Eventually the outer layers of the sun's atmosphere are driven away by an intense solar wind exposing its very core. The discharged solar atmosphere forms a huge cloud that may expand to more than one light year across. Our present day sky is peppered with these so-called "planetary nebulae" the end product of sun-like stars. Many such nebulae are visible in amateur-sized telescopes.

The remaining core of the sun is an object called a white dwarf star. It has most of the original mass of the sun but is only the size of Earth. A sugar cube of this material would weigh as much as several automobiles. The material

is in what physicists call an "electron degenerative" state meaning that its atoms are compressed so much that the electrons are liberated thus allowing the protons to be squeezed even tighter together.

Although a white dwarf is hot it does not radiate much energy due to its small size and surface area. Any remaining human life would need to come ever closer to the sun to keep warm. The white dwarf sun will continue cooling and growing dimmer. Billions of years later the sun ceases to glow entirely having become a black dwarf, a cinder of a star that was once the center of all known life which it nourished with its free outflow of energy.

Any humans still in existence would have since left a long time before in search of a newer, younger star with planets to seed. This process might repeat from star to star as long as there are stars in the universe.

Next month: The end of the universe as we know it.

OBSERVATIONS

Leonids, 11/17-18/99

John J. Kasianowicz

About a dozen folks from the Westminster Astronomical Society assembled at the club's dark site in WV (elevation = 2,800', no significant light domes) to view the Leonids last night (11/17-18/99). The skies were suitable for top-shelf telescopic observing. The limiting magnitude was about 6.3 to 6.5, the transparency was excellent and the seeing (as evidenced by starlight twinkling and details visible in the Milky Way) was excellent. The winter Milky Way was really awesome. It was visible from Cassiopeia to just east of Puppis and many dark fenestrations were easy to spot. A large bulge in the Milky Way (which extended virtually to the border between Auriga and Ursa Major) was so prominent that it looked like light pollution near the zenith! The weather was pretty cooperative (T ~ 21 F, no clouds, very slight wind).

As Leo started its ascent from the eastern horizon and with the moon still barely up (between 12:30am to 1am), two of us (Matt Orsie and I) casually logged 7 Leonids. Between 1am - 2am, we logged 20. However, between 2am-5am, we observed an additional 229 (~ 76/hour). On the way home, a very bright Leonid lit up the dawn sky somewhat near the eastern horizon (it was nearly as bright as Venus).

Unfortunately, none of the Leonids we observed were in the Bolide or Fireball classes. Nevertheless, some left trains that persisted up to 3-5 seconds (one train was curved), several Leonids were about magnitude -2, and a few trails ran nearly 90 degrees.

Jim Cook

We had a disappointing turnout the first night (my guess is the directions the park gave out could probably have been better), but the next two nights were good, with people turning out with sleeping bags and their own equipment. All three nights were clear. That first evening, just after the program got underway, about 7:05PM, brought a nice string of blazing fireballs, passing slowly NW to NE, maybe 15 degrees above the horizon. For any who also saw that, it made the news on CNN and elsewhere, having been seen along a stretch running from Wisconsin to Connecticut. From what veterans on the satellite observers' list seemed to feel, based on the time it took to travel from central North America, to the East Coast, it was probably a classified military payload or booster rocket (perhaps Russian) reentering the atmosphere and breaking up. "Classified" in the sense that it was not found among any of the known 8000 objects orbiting the Earth that these veteran satellite observers regularly follow.

For those who saw it (and I was one), it was really quite a sight. If you've ever seen that clip of a meteor passing over a college football game in Pittsburgh (on meteor-related TV shows on TLC or NOVA), which appeared as a large, slowly moving fireball breaking up as it passed overhead, a large piece of which eventually landed on a woman's car in Peekskill, NY, well that's sort of what this thing looked like.

Unfortunately, the Leonids themselves didn't quite live up to that. The best period seemed to be between 11:30 PM and 12:30 AM (Nov. 17-18), where we saw eight really nice meteors that left bright, long-lasting trains behind. David, Glen, Shirley and a few others in the group joined me, but I found myself alone as 5AM arrived. I had stayed that long solely because of that report in the NY Times that some unnamed "experts" had predicted a second possible peak occurring over the NE US at about 4 AM. I did see a little increase shortly after 4 AM, a short burst of activity lasting maybe 10 minutes, but nothing spectacular.

The next night Jay Miller helped out, along with Michael Pennington. I'm still taken by how long lasting some the Leonids were. Jay and I were talking, when I saw one appear over his shoulder. Normally, by the time you can say "Oh-look!" -- they're long gone. But not this one, I not only was able to say "Oh, look!" but even paused a moment and added "Quick, turn around, behind you" and it was still there for Jay to catch a glimpse of!

In all, it was a typical one of Glen's meteor programs (the switch to the horse trailer lot was probably a good idea, in terms of giving people a chance to see fainter meteors) - I think everyone who turned out got to see at least one Leonid, and perhaps a couple more or a few Taurids along the way. We also got good looks at Saturn, the Moon and Jupiter, too.

Mercury Transit

Gene Dolphin

Last Monday, I took my 5" C-5 to work in San Diego. By 1:05 pm I had the scope set up in front of the work place. I used a Thousand Oaks Solar Filter and a 24mm Konig eyepiece. The transit of Mercury began close to 1:10 when I noticed a circular indentation on the "top" edge of the sun. I was able to follow the transit until close to 2pm when the planet exited the sphere of the sun. There were three huge magnificent sunspot clusters and over 40 lesser spots of varying sizes. Lots of folks came by to take in this historical event ... 50 to 60 folks.

Gary Freiburger

I had a great view of the Mercury transit on Monday afternoon. I had the Yak set up in a local grocery store parking lot. I had determined that I had the best horizon there - fewer trees, etc. It was spectacular, like someone had taken a hole punch and punched a perfect black circle in the disk of the sun. Of course being in such a public place I had about 12 people come up to see what was going on, including two who ran home and brought their kids back! It was a lot of fun.

Dave Kratz

Several friends of mine and I gathered around one of my small refractors, and we watched the transit by projecting the image on a sheet of white cardboard. Since Mercury never strayed far from the limb, this was a very disappointing event, nowhere near as good as the transit of November 10, 1973. Tonight is the alleged peak of the Leonid Meteor Storm. The weather forecasts look good except for the temperatures, brrrr!

Curt Roelle

I observed the transit from the hill in my back yard. It has a clear west view of the Frederick Co. hills. I used an 8" Coulter f4.5 Odyssey stopped down to 4" with a glass Thousand Oaks type II solar filter. Also had the club 8" f6 Celestron Starhopper for eyepiece projection.

The sky was cloudy but patience paid off. The sun dipped below the cloud deck at 4:46 p.m. EST. 5 minutes past maximum transit. The sun was only 1.25 degrees above the horizon. Mercury could be discerned until the sun was almost touching the horizon at 4:51. Watched as the sun's upper limb vanished below the horizon at 4:53.

Judi Clark

One of the Carroll County Public Library workers reports seeing a very bright streak across the sky around 7:00 pm either Tuesday or Wed. evening...her daughter saw it also, both while en-route somewhere in a car.

There was a very bright bolide seen across much of the central U.S. all the way to PA. Here's a news article: http://www.space-science.com/newhome/headlines/ast17nov99_1.htm

I was in NY--clouds. Did you see anything?

Richard Schoen and I observed from the hill in my back yard starting at 12:30. When we spoke by phone at about 9:00 that evening, NASA's web site was reporting ZHR for the previous hour in Europe at 1600+!!! When we went out things were back to normal.

My unofficial count had almost as many sporadics as Leonids. Quite a few of the sporadics traveled south to north. Here's a story from the Baltimore Sun, "Leonid meteor storm dazzles Europe, disappoints in U.S.": <http://www.sunspot.net/cgi-bin/editorial/story.cgi?section=news&storyid=1150160223923>

Michael Hubbard

After reading in S&T that "high magnification" would be required, I was pleasantly surprised that the Mercury transit was visible at 50x in my 80mm f/5 refractor. I noted that the Sun set slightly after 1700 at the Scenic Overlook location. Since the local sunset should have been at 1655, I think the site has better than level horizon in the direction we were looking. In attendance were Wayne Mowatt, Ken Schmedding, John Kaisanowicz and companion whose name I didn't get, Michael Crisp, A fellow from Jefferson, MD whose name I've forgotten, and Myself - Michael Hubbard. It was a special moment in astronomy for me. Hopefully, we will all be around for the next one in about thirty years.

Jim Cook

Sadly, of all those who managed to get out to try to observe Mercury's transit a few weeks ago, I may have been the only one who failed to actually see it. Two of us were at Black Hill Park (Steve and I) and we shared the same problems with that cloudbank others saw from the I-270 scenic overlook. Fortunately, Steve had spotted Mercury before the cloudbank hid them. I didn't get set up in time. But my real problem was that I also ran into mechanical problems as they emerged from behind the cloudbank, where they appeared just above the horizon.

It seems while waiting for the two to peak through the clouds, I must have not properly locked my C-8's RA clamp, and a nice blast of wind caused the tube to rotate, with the protruding solar filter hitting something with an unsettling "clank." Thankfully, no damage was done, but the impact, unknown to me at the time, wound up knocking the finder scope out of alignment. So as Mercury and the Sun finally emerged, frustratingly, I could not get the Sun centered in my C-8. Then I realized what had happened. So I frantically un-taped the solar filter from the C-8, removed it from the tube, found a target on the horizon I could use to realign the finder and the C-8, re-taped the filter back on, swung everything around to once again find the Sun and Mercury in the C-8 but by then, they had dropped so low to the horizon that all I could see was a mottled orange colored ball, with the atmosphere at that elevation obliterating any sign of Mercury whatsoever.

Sigh. :(oh well. There's Venus in 2004.

November 10, 1999 minutes

Phil Schmitz, WAS Secretary

- Curt talked about the different telescopes being displayed; the November 15th transit of Mercury; the possible Comet Linear meteor shower; the Leonid meteor shower; the door prizes; and using plani-spheres, atlases, finder scopes and eyepieces.
- Paul Henze talked about the benefits of using binoculars (he has seen over 100 of the Messier objects with binoculars). They are lightweight and easy to take on airplanes, etc.
- Brian Eney talked about reflectors and the benefits of using a battery pack in the field to drive the scope. Brian also had some slides (30 second exposures) comparing the sky from Mt. Meadows with downtown Baltimore.

- Ron Smith talked about finders, collimating tools (sight tube, Cheshire eyepiece and the laser collimator), eyepieces and filters, etc.
- Dr. Richard Schoen talked about SCT's (Schmidt-Cassigrain Telescopes), their compactness, photography capability, etc.
- Tom Renn showed some of his incredible nighttime astrophotography, including Comet Hale-Bopp over Sideling Hill in Western Md.

The door prize winners:

Youth

1. Stephanie Mooney won 365 Starry Nights (book)
2. Jessica Nove won The Stars: A New Way To See Them (book)
3. Clementine Martinez won a planisphere

Adult

1. Joel Rosen won The Messier Objects (book) by O'Meara
2. Dan Jordan won the Sky 2000 Field Edition Atlas
3. John Mooney won Turn Left At Orion (book)
4. Gary Frishkorn won a planisphere
5. Bob Jones won a planisphere

Tid Bits

The club telescope has been floating around for some time and recently wound up in my possession. Upon inspection it was discovered that its optics were filthy as the telescope was delivered without any form of dust caps and none were added before it was released to members. Thankfully the last person to have it had the presence of mind to purchase some shower caps to cap the ends with. It needs a good cleaning before it goes out again. When time permits I would like to write a manual with guidelines for its use, care, and storage. Once these items have been completed we'll probably start loaning it out for a couple weeks at a time or so, depending on demand.

We can always use help with our planetarium mission. It's part of our public outreach program. We try to present new material at our quarterly shows and one way you or anyone can help would be to volunteer to put together a 45-minute presentation (planetarium and slides). Sound like something you'd like to take on? Our Planetarium Coordinator is Scott Diegel and his e-mail address is diegel@erols.com.

Although the park is officially closed to the public after dark, WAS members are issued I.D. cards. When approached by the security staff, and you probably will be, a member presents the card and is then permitted to go about their business. If you don't have a card, you will probably be asked to leave. Letting WAS members in after dark is a special exception we have worked out -- a privilege of membership.

Editor's Eyepiece

Dave Kratz wrote - I believe that the WAS/MDA editor and WAS president switched to the e-newsletter prematurely. By the way, do you know why there was a big rush to switch over to an e-newsletter? Did you not get a letter vial snail mail for November? I believe that by default the editors are going to use snail mail only if there is not an e-mail address available. Hopefully it will soon be available on the web page. For me at least this would be more convenient than receiving a 5 MB download in my in-basket.

Curt's reply - The decision was one of cost. Either raise dues or encourage electronic membership. The executive committee opted for the latter as a first measure. If electronic availability does not reduce cost, then a dues hike might be necessary. Did I get this right, Skip and Brian?

Editor's reply - The newsletter WEBSITE has had technical difficulties and I have been sending it as a TEXT ONLY file after the initial .rtf file test which proved to be 'over load' for all but three or four people's email system

or computer system. I have just started to create the site at a temporary location with some additions and updates. The site's new/temporary location is – www.contingent.com/wasmda. Check it out. I always invite/appreciate both negative and positive feed back towards its improvement to serve members.