

CONSTELLATION *addendum...*

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Scott Petersen, editor

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Observing with Binoculars

- by *Cathy Ebert*

Ed Radomski's father used to take his children to Ocean City on their 26' boat, sometimes 15 to 20 miles out in the Atlantic, and he would bring along a World War 11 Navy issue binocular. Years later Ed began using the same binocular for astronomy and was hooked. With many more types of binoculars picked up at auctions and flea markets, Ed continued the vision with his four children. With a star chart, and after a succession of nightly tries, they found M31 to their delight.

On January 5th of this year, BMAA's first Wednesday night of the month meeting, Ed brought in many types of binoculars to show. His lecture ranged from why, what, use, evolution of brands and sizes of binoculars. Ed's information on terminology, how to purchase, right size according to exit pupil, bluish coatings are better than reddish for night use were insightful. His pointed discussion aimed at why binoculars versus telescope. Think, two eyes viewing an object, portability, no setup/breakdown required, less expensive, multiple uses...like birding, hunting, boating, traveling, sports as well as astronomy.

Ed showed his "homemade" solar filter and then on screen with pictures of his wife, Joan, at the eclipse in Africa, where he put the filter on before totality seeing the "diamond ring," and removing them for three or four minutes of totality showing corona and prominences. Other filters help with a moon glare. He detailed the anti-reflective coatings...if no-coating, we get only 66% light pass through whereas multi-layered, Magnesium Fluoride, increases transmission to 95%. He warned us that companies have specific "coding" understanding. If it reads coated Optics, there are one or more coatings; fully coated, all surfaces are coated; multicoated, some surfaces are multicoated; fully multicoated, meaning all surfaces are multicoated. You must go by the reputations of manufacturers like Pentax and Nikon to be sure.

Did you realize that with binoculars, your field of view is wider, you can see the neighborhood when scanning; maybe not a double star, like Mizar & Alcor, as clearly as with a telescope. He demonstrated his lay-back position on a chair, keeping his binoculars from shaking. This is where lighter weight helps.

Ed explained the powers, i.e. 6x30 signal corps bino, bigger prism and full view; 7x50 Navy standard, excellent B & L; 16x70 Fujinon isn't so practical for hand holding; 7x35 have larger objectives; Celestron Sky-watcher 8x56 \$160; Steiner 12/56 Night hunter \$1000; Nikon 8.5x56; Pentax 7x50 Compass & Rangefinder. He then had us guess which size he used to earn a certificate from a Binocular Club locating and logging Messier objects? It was with his 8x30 binoculars.

Ed offered one year membership to any member in our BMAA club if we can observe and record on log at least 50 Messier objects.

He informed us about the 30 or 35 Astronomical League Observing Clubs; like the Binocular Messier Club, Binocular Double Star Club, Deep Sky Binocular Club, Southern Skies Binocular Club, all found on the internet.

When Galileo started pointing his telescope up towards the skies 400 years ago, it showed everything right-side up. Early binoculars used the same design. Not until 250 years later, circa 1853, Porro Prism's came out. He showed illustrations on screen, the differences and how the Porro Prism works. Ed boasts of owning two very special binoculars, Zeiss opera glasses nearly 100 years old and 7x50 B&L Zephyr. He also reported how Bosch & Lomb helped the Army signal core in the 1940s with coated optics. The French-made 8x30 binoculars in WW 11 had better rotatable range finder, whereas our US government had 6x30 fixed radical rangefinder binoculars, our government used both types in WW 1.

Prices can range from \$200 to \$3000, sizes from 6x30 to 12x56. In purchasing, be aware of spherical and chromatic aberrations, coma, distortion which can create convex or concave on edges. Also pay attention to the eye relief, the rubber cuff, can you turn it down or up; and diopter adjustment, check for proper culmination by looking through with one eye closed, then open the other to notice any eyestrain caused by two images. Ed said if you purchase binoculars at the mall, go out into the mall to judge all those details mentioned above, looking at the closest and furthest objects. Thanks, Ed, for sharing your expertise with binoculars.

- BMAA member Cathy Ebert is the previous club secretary [-ed]

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Binocular Observing Basics

- by Fran Quinn

Observing the night skies with binoculars is good start for beginners and they are used by experienced astronomers as well. This summary will list briefly the following topics: a brief history, binocular terminology, advantages of binoculars over telescopes, some comparisons of each, physical parts of binoculars and choosing a binocular.

Binoculars have been around for 400 years. Recently, the military has been involved in binocular design. Binoculars have two objective lenses (front), a focusing knob, and an adjustable eyepiece. The quality depends on a number of factors including: number of coatings on the lenses, prism type such as porro or roof (which determines how much light is received), field of view (wider image field), the aperture size which determines how much light enters the lens and distortions due to improper collimation and spherical aberration.

Binocular quality defined by lens magnification as for example 7X50. The 7X tells the user that field of view is magnified 7 times. The second number is the lens diameter.

Aperture and magnification determine the size of the exit pupil. The size of the exit pupil (mm) equals aperture (mm) divided by magnification. The larger the exit pupil, the more light reaches your eye. The exit pupil for 7X50 is $50/7 = 7.1$.

Some advantages of binoculars over telescopes are:

- low in cost
- very portable
- easy to break down
- not awkward (some very deep sky binoculars may require a tripod)
- equivalent to two telescopes
- able to perform multiple tasks
- able to visually improve viewing because you are using two eyes
- able to show sharper background images compared to fuzzy images for telescopes (assuming the same optics)
- have wider viewing field (field of view)

In summary things, when selecting binoculars consider range, lens type, power and focus.

- *BMAA member Fran Quinn is current club secretary [-ed]*

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DIARY OF THE ANONYMOUS STARGAZER

JANUARY 2012

It's been while since my last report; I've been busy, but haven't we all. Seems I don't have enough time to set up my equipment, and when I do, by the time I'm set up, the clouds come in, no matter what the predictors say! If that isn't enough, my portable power supply just died; the one I use to power my scope and heaters, and I haven't had time to go out and get a new one. Maybe I need to try something different? Maybe I need to try a "quickie!"

What started me thinking about this was an article I read in *Sky and Telescope* a few years ago. I forget the author's name, but he described how he started to get into the habit of going out on his patio whenever he could spare a few minutes. Why not try that?

It has been fairly mild so far this winter, at least not bitterly cold for this time of year, and Venus and Jupiter are tempting targets in the southwestern sky. So my wife is busy in the sewing room, the dog has been out and I grab my little 105mm Maksutov. I always leave it in the garage so it is close to the outdoor temperature. I'm not even going to take the tripod; just set it on the picnic table and check out Venus.

But I waited a little too long. Venus is too low in the sky, and it's hidden in the trees. But wait, there's Jupiter looking mighty fine in an almost perfect location. It's relatively high in the southwestern sky.

I align my finder, there it is. Wow, what a clear view; one of the clearest I have ever seen from my suburban location. With my 25mm eyepiece, the outline of the planet is extremely sharp with little air movement. The major bands are quite discernible, no evidence of a great red spot at this magnification. What's very intriguing are three Jovian moons. It looks like one of the moons nearest Jupiter shows some interference. But I don't think it is my scope because the other two, outer moons appear to be sharp. Could it be two of the moons are nearly aligned to my sight that they appear as one? I continue watching a few more minutes until my light jacket and the night air tells me to go inside.

I checked the January issue of *S&T* and sure enough, Ganymede and Europa were predicted to be very closely aligned tonight. My quickie observing session was quite rewarding. I saw an interesting phenomenon with Jupiter's moons and enjoyed some very clear if not brief skies.

If you haven't tried a quickie observing session, I highly recommend it!

- *the Anonymous Stargazer is a BMAA member who provides occasional articles [-ed]*

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The Hidden Power of Sea Salt, Revealed

- by *Dauna Coulter*

Last year, when NASA launched the Aquarius/SAC-D satellite carrying the first sensor for measuring sea salt from space, scientists expected the measurements to have unparalleled sensitivity. Yet the fine details it's revealing about ocean saltiness are surprising even the Aquarius team.

"We have just four months of data, but we're already seeing very rich detail in surface salinity patterns," says principal investigator Gary Lagerloef of Earth & Space Research in Seattle. "We're finding that Aquarius can monitor even small scale changes such as specific river outflow and its influence on the ocean."

Using one of the most sensitive microwave radiometers ever built, Aquarius can sense as little as 0.2 parts salt to 1,000 parts water. That's about like a dash of salt in a gallon jug of water.

"You wouldn't even taste it," says Lagerloef. "Yet Aquarius can detect that amount from 408 miles above the Earth. And it's working even better than expected."

Salinity is critical because it changes the density of surface seawater, and density controls the ocean currents that move heat around our planet. A good example is the Gulf Stream, which carries heat to higher latitudes and moderates the climate.

"When variations in density divert ocean currents, weather patterns like temperature and rainfall are affected. In turn, precipitation and evaporation, and fresh water from river outflow and melt ice determine salinity. It's an intricately connected cycle."

The atmosphere is the ocean's partner. The freshwater exchange between the atmosphere and the ocean dominates the global water cycle. Seventy-eight percent of global rainfall occurs over the ocean, and 85 percent of global evaporation is from the ocean. An accurate picture of the ocean's salinity will help scientists better understand the profound ocean/atmosphere coupling that determines climate variability.

"Ocean salinity has been changing," says Lagerloef. "Decades of data from ships and buoys tell us so. Some ocean regions are seeing an increase in salinity, which means more fresh water is being lost through evaporation. Other areas are getting more rainfall and therefore lower salinity. We don't know why. We just know something fundamental is going on in the water cycle."

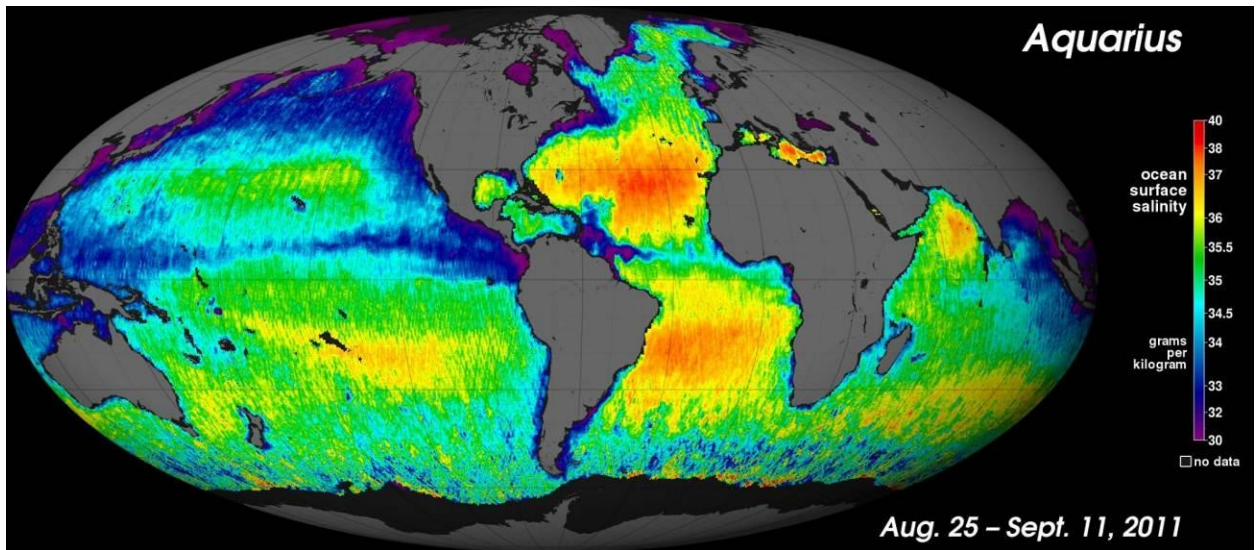
With Aquarius's comprehensive look at global salinity, scientists will have more clues to put it all together. Aquarius has collected as many sea surface salinity measurements in the first few months as the entire 125-year historical record from ships and buoys.

"By this time next year, we'll have met two of our goals: a new global map of annual average salinity and a better understanding of the seasonal cycles that determine climate."

Stay tuned for the salty results. Read more about Aquarius mission at aquarius.nasa.gov.

Other NASA oceanography missions are Jason-1 (studying ocean surface topography), Jason-2 (follow-on to Jason-1), Jason-3 (follow-on to Jason-2, planned for launch in 2014), and Seawinds on the QuikSCAT satellite (measures wind speeds over the entire ocean). The GRACE mission (Gravity Recovery and Climate Experiment), among its other gravitational field studies, monitors fresh water supplies underground. All these missions, including Aquarius, are sponsors of a fun and educational ocean game for kids called “Go with the Flow” at spaceplace.nasa.gov/ocean-currents.

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



Aquarius produced this map of global ocean salinity. It is a composite of the first two and a half weeks of data. Yellow and red represent areas of higher salinity, with blues and purples indicating areas of lower salinity.

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the Space Place

January - February 2012, Vol. 5, Issue 1

NEWS AND NOTES FOR FORMAL AND INFORMAL EDUCATORS

The Space Place is a NASA website for elementary school-aged kids, their teachers, and their parents.

It's colorful!
It's dynamic!
It's fun!

It's rich with science, technology, engineering, and math content!

It's informal.
It's meaty.
It's easy to read and understand.
It's also in Spanish.
And it's free!

It has over 150 separate modules for kids, including hands-on projects, interactive games, animated cartoons, and amazing facts about space and Earth science and technology.

Science and technology permeate all our activities from driving a car to cooking to writing poetry. So when we study science and technology, why not incorporate some of those other activities? Why not use interests like art and music to think about and express our understanding of nature? The Space Place has lots of cross-disciplinary opportunities to help make nature unforgettable.

New at spaceplace.nasa.gov

Get the key to the treasure chest! The new "Go with the Flow" game at spaceplace.nasa.gov/ocean-currents has you playing with salinity and heat, which have opposing effects on vertical water movement. Using heat and salt as "tools," as well as horizontal currents and walls, you set up flow patterns that your little submarine can follow in order to reach the key that will open the treasure chest and get the gold.



After playing "Flow," students are not likely to forget the roles that heat and salinity play on ocean currents. These are important principles to learn in order to understand the potential effects of climate change.

Space Place en español

¡Haz un mapa topográfico! But first, make a clay sculpture of a mountain. This hands-on arts and crafts activity shows how 3-D topography can be represented very accurately on a 2-D map. Using clay (or our recipe for modeling dough), dental floss, paper, pencil, ruler, and toothpicks, students make a mountain of any shape, slice it horizontally using dental floss, and outline the slices on a piece of paper. It could be an art project or a geography project. Either way, it's lots of fun, and clearly explains the mystery of topo maps, which many people never understand. Go to spaceplace.nasa.gov/sp/topomap-clay.



Spotlight on music

Music is science and technology in the service of art. At least that's one way to look at it. See (and hear) an example at spaceplace.nasa.gov/violins.

Musical instruments are technologies. The most exquisite-sounding instruments represent technological excellence. But what makes the best instrument sound better than the second best instrument? In the case of Stradivarius violins, it's believed to be the unique density of the wood, which grew only during a certain period of history. Why? Because of a lack of sunspots!

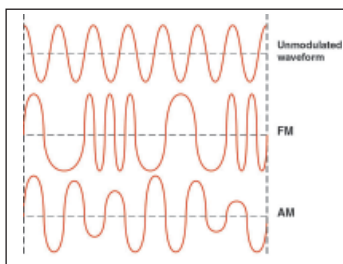


Another example of technology as a delivery mechanism for art is the Golden Records on each of the two Voyager spacecraft, now nearing interstellar space. These records are meant as messages from Earth in the event that intelligent alien beings someday encounter the probes. Students can see some of the photos of Earth and try to guess the identity of some of the sounds on the records at spaceplace.nasa.gov/voyager-to-stars.

For the classroom

Drumming is a form of music. But it can also be a form of precise verbal communication.

When people figured out how to add meaning to an electromagnetic wave, which is essentially a rhythm, a universe of possibilities opened up. "Speaking in Phases" is a classroom activity that demonstrates the difference between amplitude modulated (AM), frequency modulated (FM), and phase modulated signals. It's not as hard as you might think. In this case, all that's required is something to beat on—like drums or desks—and maybe a metronome or electronic keyboard that can make a steady beat.



Students learn the basics of how information is added to a carrier signal. Then they add their own meaning to the signal and communicate with each other using only the timing of beats. It truly teaches the most basic concept underlying all electronic communication, including radio, TV, phones, satellites, and spacecraft far away in deep space. See spaceplace.nasa.gov/classroom-activities/#phases.

For out of school time

Almost everyone loves to eat. Why not make it even more fun by combining snack preparation with space exploration? The Space Place has several projects you can make, then eat.



One project is Asteroid Potatoes, spaceplace.nasa.gov/asteroid-potatoes. To cut down on mess, you can make the mashed potatoes up ahead of time, and let the kids do the sculpting, baking (with supervision) and eating.

Another creative activity is making edible spacecraft or rockets. Tortillas make a wonderful base. You can even paint them (or paint small, cut-out pieces) with food coloring. Also provide colorful vegetables and fruits of many kinds, olives, cream cheese (for glue), chips, and anything else you can think of that's good to eat. Take pictures before they're gobbled up. See some examples and "recipes" at spaceplace.nasa.gov/tortilla-spacecraft.



Special Days

January is National Whale Watching Month.

Some species are endangered. See how satellites can help, and play Migration Concentration at spaceplace.nasa.gov/migration.

January 6: Take a Poet to Lunch Day.

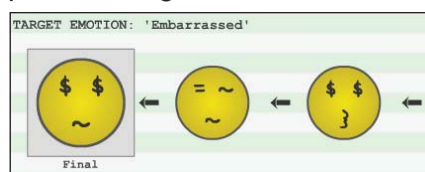
Try writing some cosmic poetry such as the poems at spaceplace.nasa.gov/art.

January 17, 1706: Benjamin Franklin's birthday.

He learned a lot about electricity flying a kite during a lightning storm. You can learn about electricity using a balloon (and without risking your life) at spaceplace.nasa.gov/ion-balloons.

February 12, 1809: Charles Darwin's birthday.

Darwin is known for his theory of the evolution of species. Play with the "Emoticonstructor" and see one way evolution works at spaceplace.nasa.gov/emoticonstructor.



February 22: Thinking Day.

Exercise your brain by going "Vec→Touring" at spaceplace.nasa.gov/vec-touring.

February 25: Quiet Day.

Even the most violent events in space make no sound. Make a Sound Cone to hear even very quiet sounds. See how at spaceplace.nasa.gov/sound-cone.

From us to you . . .

Have a wonderful and productive 2012. We hope you continue to find The Space Place helpful in your important work.