Winter 2010/11
Issue 92

Battle Point Astronomical Association BPAA

Quarterly

www.bpastro.org Bainbridge Island, WA

Events Calendar

(unless otherwise noted, all events are at the Edwin Ritchie Observatory, Battle Point Park)

DECEMBER

December 1
7 p.m. BPAA Board Meeting

December 2
8 p.m. Open Mic Science, Treehouse Café, Lynwood Center

December 4
7 p.m. Planetarium Show and Star Party "Strange Times in the Solar System"

December 5 ●

December 13 ◐
Geminids Meteor Shower Peak

December 20-21 ○
Total Lunar Eclipse

December 21
Winter Solstice (3:38 p.m. PST)

December 22
Ursids Meteor Shower Peak

December 27 ◑

JANUARY

January 3
Earth at Perihelon (0.983AU from Sun)

January 4 ●

January 9-13
Annual Meeting of American Astronomical Association, Seattle

January 12 ◐
7 p.m. BPAA Annual Meeting & board election; open to all members

January 19 ○

January 26 ◑

January 29
7 p.m. Planetarium Show and Star Party

FEBRUARY

February 2
7 p.m. BPAA Board Meeting

February 2 ●

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New Telescope Pads at the Ritchie

Nels Johansen
Facilities Officer

About a decade ago, on one very beautiful Saturday night, I set up my 10-inch telescope, the Star Shooter, on the grass by Ritchie Observatory. All went according to plan—except for the telescope feet sinking in the mud. As the wet crept into my socks I began to feel there had to be a better way to observe the heavens.

I approached the BPAA Board about hard-surfaced telescope pads. The Board was also tired of wet feet and sinking telescopes. We decided that the north berm 150 feet from the building would be a perfect location. But first we needed the Bainbridge Island Metropolitan Park and Recreation District's approval.

Meetings, Meetings, Meetings

At the time my son, Clifford Johansen was looking for an Eagle Scout project, and he took on the telescope pads. To begin the approval process, he met several times with Kent Scott, Park's go-to man for projects. He had more meetings with the Park District supervisor and selected Park board members, then a final meeting with the Park District's Governing Board, where he asked for and received approval for four concrete pads, two of ten-foot diameter and two of eight-foot diameter, level with the ground so that mowers could go over them.

In June Clifford contacted Al Boman of Island Concrete, who agreed to help with the pads. Al provided technical assistance for making the forms, metal stakes, two employees to pour the cement and create the compass roses, and worked out a deal for us with Fred Hill, so we got the cement for free.

Work began in September. On the first workday ten boys 15–19 years old dug for four hours. The ground was hard clay

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From left, Pad builders Jake Fetterman, Clifford Johansen, Alex Lemon, and Andrew Holzer

February 10
Deadline for Spring issue of BPAA Newsletter

February 11 ◐

February 18 ○

February 24 ◑

February 26
7 p.m. Planetarium Show and Star Party

Any member who is planning to observe can invite others to join in by sending an email to *bpaa@yahoogroups.com*. To join our email group, send an email with your name to *bpaa-owner@yahoogroups.com* and we can enroll you. If you want to have web access to the messages and files, you can join the Yahoogroups by clicking the register link for new users on *http://groups.yahoo.com/*. Request to join at *http://groups.yahoo.com/group/bpaa/*. The system will send us a message, and we'll approve your request after we verify your membership.

Orion Total Lunar Eclipse AAS

CALENDAR NOTES: It's time to view the winter sky as best we can, given the reality of Pacific Northwest winters. The constellation Orion is a prime attraction. Orion has more bright stars than any other star grouping. Orion even looks like the hunter he was named for, with three stars marking his belt, two his shoulders and two more his knees. Just below Orion's belt is the Orion nebula, a cloud of gas and dust that is a nursery for newborn stars.

We recently took a trip through a stellar nursery, via the IMAX film "Hubble 3D." The images of emerging star systems are astounding. The film also gives viewers an appreciation of the repairs made to Hubble by the shuttle astronauts. Using tools that look like they came from Home Depot, the astronauts somehow manage to turn screws and replace bolts while wearing gear apparently designed to impair movement of any kind.

An easier task for us mere mortals: viewing the total lunar eclipse on December 20–21. A lunar eclipse happens at Full Moon, when the Moon's tilted orbit brings it into the Earth's shadow, which is then cast onto the Moon, illuminating it with a dark red color. Depending on atmospheric conditions, the actual color may vary from black to orange. Observers in North America are well placed for viewing the eclipse. Totality will begin at 11:40:47 p.m. PST on the 20th. The time of greatest eclipse is just after midnight on the 21st at 12:16:57 a.m. PST, with totality ending at 12:53:08 a.m. PST. Let's hope there will be a break in the clouds for this event. Getting visibility for the meteors showers on December 13 and 22, the Geminids and the Ursids, is probably too much to hope for.

In January, the American Astronomical Society offers amateur astronomers in the Seattle area an interesting volunteer opportunity. The Society holds its annual meeting in Seattle every four years. I've volunteered twice before and have found it rewarding. There are a variety of jobs available: my assigned tasks have been mainly to monitor lectures and go fetch someone competent if technical difficulties should arise. If you work a minimum of 16 hours you receive complimentary meeting registration, a T-shirt, access to the Exhibit Hall and all the sessions, and, yes, even a free lunch on the days you work. The dates are January 9–13, 2011. For more information go to *http://aas.org/meetings/aas217* . Click on Volunteer Information and fill out the Volunteer Availability Form.

Please note that the planetarium shows will start at 7:00 p.m. in December, January, and February. The shows continue to draw large crowds, thanks to the hard work of volunteers who publicize, present and assist at the showings.

And don't forget BPAA's Annual Meeting on January 12. This meeting is for all members and includes election of officers.

—Diane Colvin, BPAA Events Manager

New Education Director

PRESIDENT'S MESSAGE: It is with great pleasure that I welcome our new Education Director, David Fong, to the BPAA board. Dave has been teaching Astronomy at Olympic College for several years, and is vastly over-qualified for this position. A PhD astronomer, he is looking for new professional opportunities. Until then, he is willing to share his expertise with BPAA and the community.

I have held Dave's new job for the past few years and will continue to be deeply involved in the education aspects of the BPAA. I believe that education is the most important thing we do.

Science Education Feeds Technology

We live in exponential times. Technology is growing so fast no individual can keep up. If you search for "Did You Know" on

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Dome Needs Help

Malcolm Saunders
Chief Astronomer

The iconic feature of the BPAA observatory building is the dome on the roof. But the dome is in trouble. The shell of the dome is light weight plywood. It's exposed to the weather and it has many joints. Some of the joints are failing. Some of the plywood shell is rotting. The dome leaks. We have made repairs but new leaks develop and small leaks grow. It is fortunate that, just by chance, none of the leaks, so far, have reached the telescope. We repair the leaks, but the repairs are never perfect and more leaks appear. Bit by bit the dome is degrading. At some point we are going to have to replace the dome.

The founders and those who worked to build the BPAA facility did a remarkable job with few resources. However they had never built an observatory before and they designed some problems into the dome. There is too little floor space for the number of visitors we have. It is difficult to enter the dome in the dark. It is difficult to reach the eyepiece. With the current dome, we will never be able to operate the telescope remotely because the small dome introduces obstructions into the path the telescope follows when it tracks stars, so an operator has to be in the dome. And these are only the most pressing problems. The most inadequate part of the telescope is the dome that holds it.

We will have to replace the dome, and we should improve it. One option is to buy a commercially-

Typical commercial roll-off roof.

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President's Message *con't from page 2*

YouTube, you'll find a series of videos that provide perspective on our rapid change.

The world is becoming a smaller place. Americans have enjoyed technological leadership and a high standard of living. Many countries have used technology created here to pull their countries up to First World status. One need look no further than the history of development of the automobile and the television to find industries where this country was the dominant manufacturing power and then allowed competitive advantages to slip away.

Our constant advantage is our ability to innovate, see what others cannot, and develop new technology. To me, the principle reasons for this are a strong education infrastructure, the low barriers to entry for development of new technologies, protection of these technologies, and the economic rewards of technology.

The laws of physics, chemistry and biology are pretty uniform: there is nothing to prevent others from doing the same to drive their economies and create their own competitive advantages. Indeed, China and India are taking this innovation model and tailoring it for themselves using their greatest competitive advantage, population. In 2006, the number of college graduates for these countries were 1.3 million US, 3.1 million India (100% speak English), and 3.3 million China. I do not have statistics but I am sure the percentage of science and technology degrees is higher in India and China than the US.

The successive dominance of the United Kingdom followed by the United States has made English the lingua franca of the world economy. Because of the number of dialects in India, English has become their common language, with more than 90 million speakers. And it is estimated that within ten years, the country with the most English speakers will be China.

Both India and China have more honor students than the US has students. Additionally, the governments of these countries have made a concerted effort to develop a technological base. Indeed, the thirteenth individual to set foot on the moon will likely be from China.

So where do we go from here? The social advantages the US currently enjoys likely will remain. The open society we treasure allows creative ideas to flow freely. Indeed, the political structures that drive science education in places like India and China, combined with social structures that create rigid expectations, may become a disadvantage.

Our great advantage is our diversity of thought and culture, which results in a multitude of insights on the problems of the day. But a scientifically ignorant population cannot produce innovative technology. Science education is crucial.—*Stephen Ruhl*

What Use is Astronomy?

Seeing Stars Astronomy 0.001

Anna Edmonds

How can looking at the stars be useful? To tell a bedtime story about a hero so courageous he was placed among the stars, or to know when to start spring planting? Then, what would you add to stories and time-keeping? Would you name the stars so you could remember them? (Even the most learned astronomers today say they've been studying Mizar rather than the magnitude 2.24 star located at right ascension 13h23m .5s declination 54º 55' 31.") And would you then proclaim that's everything there is to know about astronomy?

Would you think that what you saw in the stars would appall all your teachers? Maybe astound them, yes, but horrify them? Of course we know that's what happened four hundred years ago when astronomers showed that the Earth was not the center of all creation. There's no evidence that Galileo or the others started with that intention. But before Galileo turned his telescope toward the solar system, he offered it to Venetian government officials: they used it to identify distant merchant ships and get a jump on the market. Its strategic value in warfare was unquestionable—and has been ceaselessly smartened up ever since. Such uses are Earth-bound, but Galileo's astronomy helped open the far reaches of the sky to us.

Newton's ideas about motion were based in part on the eccentric ways the planets wandered around the sky. Perhaps it was a worry about what trouble his laws of gravity would cause that made him delay publishing them. But engineers today use those laws for Earthbound purposes, such as designing tires to hold our cars on the road. Would Newton be surprised?

Our new GPS devices for navigating strange neighborhoods depend on information they get from satellites, that in turn depend on the accuracy of atomic clocks to help locate them and us in relation to the Sun. While we keep our calendars more or less in agreement with the movement of the Earth around the Sun, many other people – Muslims, Chinese, Israelis – are more in time with the Moon. And when astronomers monitor sunspots they aren't just looking for magnificent fireworks displays. They're keeping track of possible ultraviolet and soft x-ray showers that could interfere with the emergency broadcasts on our radios.

The mathematical precision of astronomy has enabled us to explore the Moon and bring back samples. We are still considering how to use this knowledge, but among the possibilities are mining it for its water resources and minerals. While there is talk of colonizing it and Mars, I wonder if anyone has thought of using it for a penal colony…

Perhaps for you the uses of astronomy also go beyond immediate practicality. A clear night sky is prodigal in grandeur: it's a great joy that the sky is there for everyone who will look up at it. Could it be that some back yard observer will come upon some insight sooner or later that no one before has understood or questioned? Something inconceivable today? I'm sure our great, great… grandchildren will find that new insight astronomically, surprisingly, obviously, useful.

Dome *con't from page 3*

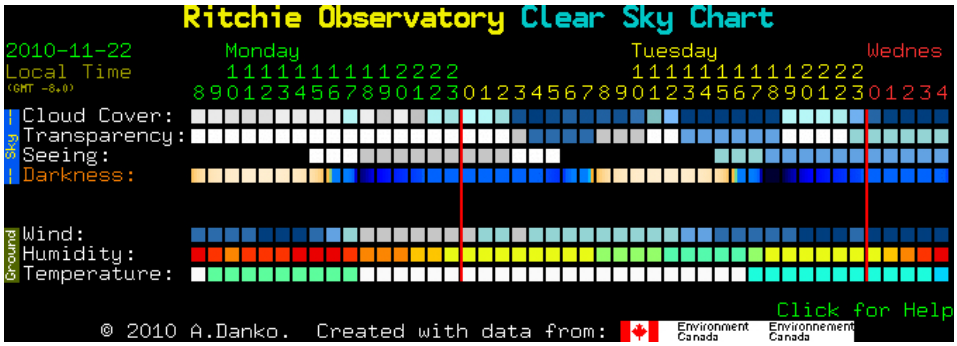
made steel observatory dome. We explored that option in preparing a capital plan for overall improvements to the observatory facility. An alternative option would be to build what is known as a roll-off roof or shed roof observatory. They both have their advantages and disadvantages. Either could be better than the dome we have now. A dome of the size we need would cost about two to two and a half times as much as the roll-off alternative. This would be something in the range of $75,000 to $95,000, delivered and installed. Installing a new, larger dome would also involve substantial changes to some other parts of the building. On the other hand, a dome would preserve the building's iconic appearance. A dome also protects users from the weather. If we were to choose a roll-off roof shelter, we could build it ourselves from readily available materials for roughly $35,000. Most of the cost-savings comes from building it ourselves.

A roll-off gives an unobstructed view of the entire sky, and would accommodate a larger number of visitors. Access to the roof would not have to be changed. Also, unlike a dome, a roll-off roof shelter does not need to rotate, because the entire sky is exposed whenever the shelter is open.

Beyond 'Cloud Cover' and 'Darkness'

Using 'Seeing' and 'Transparency' in the Clear Sky Chart

Doug Tanaka



Ritchie Observatory Clear Sky Clock located at http://www.bpastro.org/index.php?page=current-weather

On the BPAA Web site there's a handy observing tool called the Clear Sky Chart, a weather forecasting application designed specifically for amateur astronomers. The program uses data created by meteorologist Allan Rahill of the Canadian Meteorological Centre and is the is the brainchild of Attilla Danko, computer programmer and amateur astronomer. It should be on every observer's "must have" list, especially since it's free!

The Clear Sky Chart gives you a quick and intuitive way to know what the weather conditions will be in your area for the next 48 hours, both in the sky and on the ground. For the sky you'll get information on cloud cover, transparency, seeing and darkness. On the ground you'll find out how windy it's expected to be, the humidity and the temperature. The information is represented by rows of boxes, one box equal to one hour of time, with varying shades of color representing the weather conditions forecast for that particular hour. For example, in the row of boxes representing cloud cover, a white box would mean total cloud cover and the deepest blue would represent clear skies. Varying shades of blue would represent cloud conditions between the two extremes. The boxes representing humidity and temperature use a different color scheme but the idea is the same and very easy to understand.

Casual observers probably use the rows representing cloud cover and darkness the most. If you're planning on setting up your telescope tomorrow night, it would be good to know when it will be dark enough to observe and also whether you'll even be able to see the stars at all. Or, if it's cloudy during the day, it's nice to know when and if the clouds are likely to break up that evening. These are very basic and obvious uses for the chart, and for the novice astronomer who's just learning about the various objects in the sky, it's probably enough. But, once you get past a certain level of observing it becomes more important to pay attention to the other two sky conditions, transparency and seeing. For the experienced observer they are valuable tools in planning an observing session.

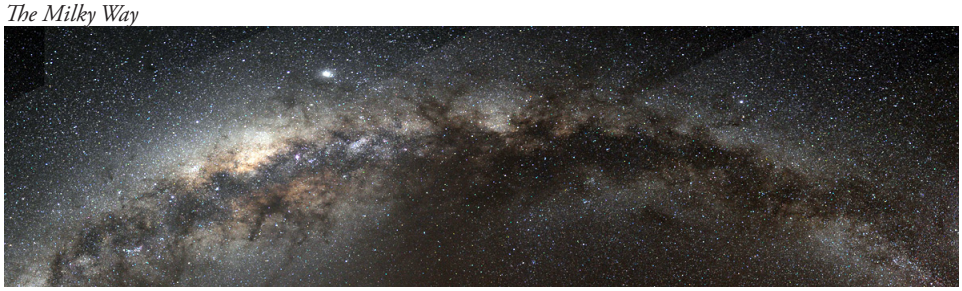
Transparency is basically a measurement of how much particulate matter is floating in the upper atmosphere. Usually this is in the form of water vapor but it can also be affected by things like dust or smoke particles. It should be noted that transparency is different than cloud cover. For example, you can have very poor transparency on a totally cloudless day. It's best to think of transparency related to hazy conditions, or the lack thereof.

At night it's hard to judge the level of transparency by just looking at the sky, although experienced observers can deduce this from the visible stars. When transparency is low only the brighter stars will be visible to the naked eye and when transparency is high many more stars will be visible. Here on Bainbridge Island the difference between high and low transparency can roughly be measured by whether the Milky Way is visible or not.

During the day transparency is much easier to judge based on how blue the sky is, just like the boxes on the Clear Sky Chart. On days with low transparency the sky will appear baby blue and if it's very hazy, almost white, while high transparency will reveal a sky color verging on navy blue, just like the Clear Sky Chart. So, how do you use this information to plan an observing session?

The level of transparency directly affects how diffuse objects appear in the sky. Diffuse objects are those with "fuzzy" edges or boundaries, like galaxies or gas clouds. Before it was known exactly what these objects were they were collectively called nebulae, or nebulous objects, for just that reason. Diffuse objects are easiest to see against a black background because contrast is increased— imagine pulling apart a ball of cotton and looking at it against a black background versus a white one and you'll get the idea. But as transparency decreases so does contrast and those same objects become washed out and

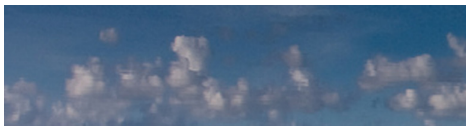
The Milky Way



harder to see, and not just through a telescope. The Milky Way is the largest diffuse object in the sky, easily visible to the naked eye under skies that are reasonably dark and transparent, but as noted above, it becomes increasingly harder to see as transparency decreases. If you've set aside some observing time for a particular evening and learn ahead of time that the transparency is expected to be low you'll know you shouldn't waste your time trying to find faint and low magnitude galaxies. Instead settle for the brighter diffuse objects or, better yet, change your plans to include discrete objects, like planets or the moon, that have sharp, distinct borders and surface detail. The brightness and built-in contrast in these objects makes them much less affected by low transparency.

Seeing refers to the level of atmospheric turbulence, usually caused by the jet stream, a westerly flow of air caused by the rotation of the earth combined with atmospheric heating. Complex boundaries develop in the atmosphere as different air masses moving at different speeds slip against each other. The friction between air masses creates turbulence in the form of eddies and cells that contain different air pressures and densities. The difference in densities creates numerous small lenses that combine to distort an image.

My favorite analogy to explain what's happening is to imagine you're in a swimming pool, just below the surface of the water, looking up and trying to read a newspaper. If there is no wind and the surface of the water is very still you'll be able to read the print. If the wind blows, creating ripples on the water's surface, the print will become difficult, if not impossible, to read. But if you were to look at the clouds in the sky you would see that their appearance was not as affected by the ripples. That's because the clouds are more or less diffuse objects, like galaxies and nebulae, and don't require sharp detail to see, unlike the print on the newspaper. Seeing conditions are impossible to evaluate during the day, but at night you can get a very good idea by looking at bright stars: if the stars are twinkling it's a good indication that seeing conditions are poor, as the twinkling is caused by the turbulence and air cells passing overhead.



If you've made plans to do some planetary viewing and find out ahead of time that the seeing conditions will be poor you'll have time to adjust and include more diffuse objects in your plans. And if you were planning on spending the evening hunting down faint galaxies but find out seeing conditions will be excellent you might consider keeping a few high-powered eyepieces ready for planetary viewing.

I'm not sure about other areas of the country, but here in Western Washington it's often the case that atmospheric conditions will favor either seeing or transparency but not both. For example, during the dog days of summer high pressure systems can cap the upper atmosphere, trapping humidity and other particulates (i.e. smog), and the pale blue skies during the day will tell you that transparency is very low, but at the same time the jet stream is being nudged away by the higher pressure overhead, making for very good seeing conditions.

I also find that there are more days of high transparency during the winter, especially just after an arctic storm has passed through. Temperatures will be below freezing, leaving very little water vapor, and the daytime skies will be a very deep blue, the kind of skies usually reserved for crisp winter days. Seeing conditions are usually poor because of the winds overhead but transparency will be excellent.

I should also mention that it's a mistake to assume there's too much light pollution from Seattle to do any serious observing of diffuse objects. Light pollution is definitely a factor, but if transparency is high it means there are fewer particles in the air to reflect the light. When the Space Shuttle is in full sun, astronauts on board, looking in the opposite direction will see a black sky because they're looking through a vacuum containing almost no light reflecting particles. *The Observing Handbook and Catalogue of Deep-Sky Objects*, written by Christian B. Luginbuhl and Brian Skiff, contains descriptions of over 2,000 deep sky objects, many of the observations made from the Northern Arizona University campus in Flagstaff, Arizona. Telescopes were set up on the fifth floor Rooftop Observing Platform atop the Chemistry building. Despite the light pollution

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Clear Sky Chart, *con't from page 6*

from the campus and Flagstaff itself, transparency was usually excellent because of the clear desert air. I also remember several years ago being in Bremerton for a concert and when we came out of the auditorium I was amazed how many stars were visible from the center of a well-lit city. The humidity was very low and the skies very transparent.

As you can see, the Clear Sky Chart is a handy tool for astronomers planning an observing session. If you already know about it but have only used the parts relating to cloud cover and darkness I hope this article will help you also use the information on transparency and seeing conditions.

The Clear Sky Chart on our Web site covers the area immediately surrounding Bainbridge Island, but there are similar charts for thousands of other locations (at last count 2,409) covering Canada, the United States and parts of Mexico. If you observe in an area that is more than 15 miles from a covered area you can request a chart for your own location here: *http://cleardarksky.com/csk/index.html#clock_list*

Telescope Pads, *con't from page 1*

and rock, and they excavated two inches on each hole. The next week rain fell for three days. The next Saturday another six boys dug, and we got one hole finished and two half dug. More rain followed. The next weekend, we finished all the holes.

Clifford called Al. Astronomers need to orient their telescopes, and Al said he had a cement stamp of a compass rose that he had used at Camp Yoemalt. We liked it and used it. Al came and inspected the holes and said he could pour cement sometime the following week.

The following weekend it rained three inches and turned the holes into ponds. On Monday morning we dug a drainage ditch, bailed out the mud and water, and set the forms.

Al and his men poured the cement and stamped an oriented compass rose on each pad. On the following Saturday, we removed the forms and began regrading the site.

The telescope pads are ready for use: walk up the east side of the ridge to the top of the berm to avoid the wet and the swamp grass.

Draining rain water out of holes

Al Boman and Nels Johansen cutting plastic

Plastic liner to keep water and mud out of cement

Pouring and smoothing cement

Making a compass rose

Al Boman inspecting telescope pad hole and form

Victor Gazarian regrading pad

Finished telescope pads on the berm

Yet More Adventures in Astrophotography

Stephen Ruhl,
BPAA President

As the last newsletter was going out, I was just getting back from the Oregon Star Party. I had great intentions to photograph everything in sight but Murphy got the better of me. My computer and my mount were arguing about where they were. Now, maybe I could have fixed the issue in the dark but experience has taught me that getting flustered while fixing things in the dark tends to break them. So I walk away and solve the problem later, when I can see what I am doing. This occurred the first few nights and as I came to my last night at OSP, I did not have any pictures and needed a backup plan. I decided to manually locate several objects that I wanted and photograph them (as opposed to finding them with the goto feature of the mount.) The first three photographs are the results of those efforts.

In the never ending quest for truth, justice and better astrophotos, I have decided to back off a little on the focal length. There is a rule of thumb among astrophotographers that about 2 arc-seconds/pixel is a good match between camera and telescope. The C8 with the focus reducer yields a focal length of about 1260mm. My camera has 5.4 micron pixels in it. At this focal length, if I bin my pixels 1x1 I get a resolution of 0.88 arc-seconds/ pixel. If I bin them at 2x2, I get 1.7 arc-seconds/pixel. This is why the above photos are binned 2x2. It also means that my photos are 2 megapixels instead of the 8 megapixels of my camera. So I now have a refractor with a 690mm focal length. This yields at 1x1 binning a resolution of 1.6 arc-seconds/pixel.

M8—The Lagoon Nebula
August 14, 2010
Celestron C8 @f6.3
SBIG ST8300M Camera
16–60 sec Luminance
7–60 sec Red, Green, Blue
37 minutes total exposure (all binned 2x2)

M17—The Omega Nebula
August 14, 2010
Celestron C8 @f6.3
SBIG ST8300M Camera
5–120 sec Luminance
5–120 sec Red, Green, Blue
40 minutes total exposure (all binned 2x2)

M20—The Trifid Nebula
August 14, 2010
Celestron C8 @f6.3
SBIG ST8300M Camera
12–60 sec Luminance
6–60 sec Red, Green, Blue
30 minutes total exposure (all binned 2x2)

The following photos are with this new telescope taken from my backyard. I am very pleased with these last three photographs. The C8 has some vignetting issues with this camera and the field is not flat in spite of the Celestron f6.3 field reducer/"field flattener." The new telescope is giving me pictures that are 8 megapixels and sharp corner to corner. Very nice.

IC5070—Pelican Nebula

October 29, 2010

AT 106 LE

SBIG ST8300M Camera

12–300 sec Luminance

8–300 sec Red, Green, Blue

180 minutes total exposure (all binned 1x1) brightness in upper right is glare from the star Deneb.

M31 (M32 & M110)—The Great Galaxy in Andromeda, November 2, 2010

AT 106 LE, SBIG ST8300M Camera, 9–300 sec Luminance.

(binned 1x1)

4–300 sec Red, Blue (binned 2x2)

1–300 sec Green (binned 2x2)

70 minutes total exposure

Note: 3 of green exposures were not even due to clouds, and were unused.

M33—Triangulum Galaxy

November 3, 2010

AT 106 LE

SBIG ST8300M Camera

12–300 sec Luminance

6 –300 sec Red, Green, Blue

150 minutes total exposure (all binned 1x1)

Open Mic Science

There's a new public forum for science on Bainbridge Island. Open Mic Science explores science and technology at the Treehouse Café in Lynwood Center every first Thursday at 8:00 p.m.—events are free and open to everyone. Open Mic is modeled on Café Scientifique, a forum "for debating science issues, ..., committed to promoting public engagement with science and to making science accountable."

The first Open Mic was held October 7. Four BPAA members were on hand for their second offering, Nov. 4: "Climate Science in the Space Age." Gary S. E. Lagerloef, principle investigator of NASA's Aquarius Mission, gave us an overview of the many Earth observing satellite systems before discussing Aquarius, a satellite to be launched in 2011 to study interactions between Earth's water cycle, ocean circulation, and climate by measuring ocean salinity. A lively crowd asked many questions as Dr. Lagerloef went over the data produced by Earth observing satellites in a series of Power Point slides. Global warming was on everyone's mind.

Although there was no full-fledged discussion, the Treehouse had hot food and drinks available, and we spent a relaxed and enriching evening.

Their next forum, Thursday December 2, features Clem Furlong, Professor in Genome Sciences at the University of Washington, who examines " What Are You Breathing at 30,000 Feet?"—the quality and content of airplane cabin air. Find out more on their Facebook page, Open Mic Science. —*Vicki Saunders*

BPAA Quarterly

10–Winter 2010/11

In this Issue

BPAA Quarterly is a publication of the Battle Point Astronomical Association. Submissions due on the 10th of the month before the quarter begins: quarters begin December, March, June, and September. Query newsletter@bpastro.org. Send graphics as separate files. Newsletter Editor **Vicki Saunders**.

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