A word from your editor by Sapavith ‘Ort’ Vanapruks

Cloudy Nights (and Days)
As an amateur astronomer, I have faced many nights (and days) that were cloudy. So, what can I do during those time beside sleeping? Many things. Here are some of those things I can do.

1. Clean your gears—If it started to rain the previous while you have you gear setup at the star party, you probably would want to take all your gears out and dry them. This way you will avoid growing fungus on your lens and mirror.

2. Adjust and test your equipment—If you have a polar scope, you could calibrate your scope in the day using a tip of a telephone pole. In some Alt/Az telescope that you can use a wedge mount for polar align, you will need to re-train your telescope when you switch your telescope alignment type.

3. Plan and research about next viewing—There is a chance the weather in your area may clear up in next few days or weeks. You can check astronomy website to find out what would be in the sky later. There could be a comet or meteor shower visible in your area.

4. Read up some procedures—There may be things that you did not get it right like polar alignment or astrophotography (light, dark, flat, & bias). There are many videos on YouTube that teach you how to do it. Put in a correct key word and you get it.

5. Sleep & Rest

Upcoming Events:
- The next Board meeting is Sun., Sep 29th 3:30 PM in POST building at UH.
- The next meeting is on Tuesday, Oct 1st at the Bishop Museum 7:30 PM.
- Bishop Museum’s planetarium shows are every 1st Saturday of the month at 8:00 PM www.bishopmuseum.org/calendar
President’s Message
October 2019

I attended two star parties in August that had excellent seeing, at Helemano Elementary School and at Dillingham Air Field. It was the first time in a long time that I had pulled out my barlow and pushed the magnification above 200 power. Now I know why I need to get my RA motor replaced! Planets only stay in the field of view for about half a minute before sliding out.

The seeing at the public star party at Dillingham was good, but not that good, in September. It was also the most cloud-free night I remember in a long time. All week long the forecast called for passing showers that night, but the rain remained offshore. WAY offshore. We could see flashes of lightning to the northwest. When I checked the radar, I was surprised to see that the thunderstorms were something like 100 miles away.

That seemed like a long way to be seeing lightning, so I used the Pythagorean theorem \((A^2 + B^2 = C^2)\) for a right triangle to calculate how close to the ground one can see at that distance. Using a rough diameter of 4000 miles for the Earth, it turns out that at 100 miles one can see a point roughly 1.2 miles above the surface. Even at 200 miles distant you can see a point about 5 miles above the surface. The towering thunderheads that produce lightning can reach that high, so it’s not so surprising that we could see those flashes.

If it seems like spaceflight has become routine, we’re being reminded that it’s not. Earlier this year, the privately-funded Israeli Beresheet mission crashed into the Moon. Recently India’s Chandrayaan 2 mission suffered a similar fate when its lander (and rover) crashed after nearly reaching the surface. Initial reports claimed that the orbiter had seen the lander on the surface, but I have seen no images. The Lunar Reconnaissance Orbiter will use opportunities when it passes nearly overhead to attempt to image the lander. No contact has been made by radio, and it seems unlikely that anything functional survived the hard landing.

The orbiter is still in good shape, though. India can be proud of the successes it has had in exploring the Moon. Space travel is still hard!
Planets in October

**Neptune**
- is also in the sky most of the night, setting at about 4:00 A.M. It is in Aquarius and shines at a magnitude of +7.8.

**Venus**
- is close to Mercury in the evening twilight and even with its brightness at magnitude -3.8 is hard to spot so close to the horizon.

**Mars**
- can be seen low in the eastern sky before sunrise shining at magnitude +1.8.

**Mercury**
- is very close to the southwest horizon in the evening twilight, reaching greatest elongation on Oct. 19. This is a poor appearance of the closest planet to the sun, but you may be able to spot it with binoculars very close to the crescent moon and Venus on the last couple of days of the month.

**Jupiter**
- shines brightly in the southwest sky as the sun sets and can be viewed for two or three hours after sunset during early October. Toward the end of the month it sets earlier.

**Saturn**
- follows Jupiter by about an hour and a half in the southwestern sky after sunset at a magnitude of +0.5.

**Uranus**
- reaches opposition on Oct. 29 and so is in the sky all night. This is the best month to view this faint planet which shines at magnitude +5.7. Best to view near midnight.

**Pluto (Dwarf Planet)**
- Extremely difficult to find because it is so dim (mag +14.3), but still well placed for viewing near Saturn.

**4 Vesta (Asteroid)**
- The brightest asteroid is approaching opposition in the middle of next month and shines at magnitude +7.0 near the border of Aries and Taurus.

---

### Observer’s Notebook—October 2019 by Jay Wrathall

**Planets Close To The Moon**

**Times are Hawaii Standard Time**

3 Oct, 12h, Moon 1.9° NNE of Jupiter (69° from sun in evening sky)
10 Oct, 16h, Moon 3.4° SE of Neptune (149° from sun in evening sky)
14 Oct, 18h, Moon 4.1° SE of Uranus (166° from sun in evening sky)
26 Oct, 11h, Moon 4.2° NE of Mars (19° from sun in morning sky)
29 Oct, 06h, Moon 3.7° NNE of Venus (21° from sun in morning sky)
29 Oct, 09h, Moon 6.4° NNE of Mercury (22° from sun in evening sky)
31 Oct, 05h, Moon 1.3° NNE of Jupiter (46° from sun in evening sky)

**Other Events of Interest**

**Times are Hawaii Standard Time**

13 Oct, 11:10h, Full Moon
19 Oct, 18h, Mercury at greatest elongation (24.6° east of sun in evening sky)
31 Oct, Orionid meteors
27 Oct, 17:39h, New Moon
29 Oct, 32h, Uranus at opposition
30 Oct, 19h, Mercury 2.55° SSW of Venus (22° from sun in evening sky)

---

3 Oct, 12h, Moon 1.9° NNE of Jupiter (69° from sun in evening sky)
10 Oct, 16h, Moon 3.4° SE of Neptune (149° from sun in evening sky)
14 Oct, 18h, Moon 4.1° SE of Uranus (166° from sun in evening sky)
26 Oct, 11h, Moon 4.2° NE of Mars (19° from sun in morning sky)
29 Oct, 06h, Moon 3.7° NNE of Venus (21° from sun in morning sky)
29 Oct, 09h, Moon 6.4° NNE of Mercury (22° from sun in evening sky)
31 Oct, 05h, Moon 1.3° NNE of Jupiter (46° from sun in evening sky)

---

13 Oct, 11:10h, Full Moon
19 Oct, 18h, Mercury at greatest elongation (24.6° east of sun in evening sky)
31 Oct, Orionid meteors
27 Oct, 17:39h, New Moon
29 Oct, 32h, Uranus at opposition
30 Oct, 19h, Mercury 2.55° SSW of Venus (22° from sun in evening sky)
Chris Peterson opened the meeting.

August’s meeting minutes were approved.

Special election for secretary was held. Tammy Weese was unanimously elected as secretary for the remainder of the year.

Lacy Veach Day is coming up on October 26 at Kamehameha Schools not Punahou. Ort reached out and hasn’t heard anything back yet.

Chris Peterson received a message from Tony Smith and Bishop Museum has a new Director of Education - Brandon Bunag. Chris asked Mr. Bunag if he would like to come speak to the club but he hasn’t heard back from him yet.

On January 7, 2020 the Planetarium is being used by the Royal Astronomical Society who is holding a screening to preview a movie they assisted in filming. HAWSOC will meet in one of the Paki Rooms that day. Chris Peterson will see if someone from the American Astronomical Society to come speak at the HAWSOC meeting.

Two excellent nights of seeing at Helemano School and the Dillingham Club Star Party.

Mark Watanabe reported on School Star Parties and passed around a sign up sheet:

- September 6 - Hawai’i Baptist Academy
- October 5 - Girl Scouts will be at the regular Geiger Public Star Party
- October 8 - Punahou
- October 18 - Pearl Harbor Elementary
- October 19 - Pearl Harbor Elementary
- TBD - Pearl City Highlands Elementary

Small turnout at Dillingham for Club Star Party - contrast wasn’t great, but transparency was excellent. It started to cloud up about 10:00 pm and everyone left by about 10:30 pm.

Planetary missions - Chandrion scheduled for September 7 landing
NASA James Webb space telescope has been assembled for the first time.

The latest information on TMT: Chris Peterson isn’t hearing much from the government about it. TMT is running PSAs on television but there isn’t much change on the narrative. Chris recommended listening to the editorial by Rick Blangiardi from KGMB and KHNL news. It addresses the issues surrounding the TMT and how everything was done correctly and within the law and the protestors are not allowing TMT work to begin construction:


In Chris’ opinion, this issue will never end and won’t solve on-going issues surrounding the Hawai’ian people. TMT has accommodated issues addressed by the Department of Hawai’ian Homelands surrounding the lease of property on Mauna Kea and this was part of the negotiation process. Additionally, the University of Hawai’i agreed during negotiations that they would remove five existing telescopes on Mauna Kea after TMT was built.

(Continued on page 6)
Hawaiian Astronomical Society
Event Calendar

<<Upcoming Star Parties>>

Public Party Geiger/Kahala October 5
Public Party Dillingham October 19
Club Party-Dillingham October 26

Upcoming School Star Parties

<table>
<thead>
<tr>
<th>Time</th>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:15 PM</td>
<td>Tue, Oct. 8</td>
<td>Punahou School Star Party</td>
</tr>
<tr>
<td>5:30 PM</td>
<td>Fri, Oct. 18</td>
<td>Pearl Harbor ES Science Night</td>
</tr>
</tbody>
</table>
Peter Besenbruch showed pictures of the Tolemei Cluster, Lagoon, Jupiter, Scorpius, Saturn. Taken at Dillingham taken with a Canon Rebel T6i w/30 second exposure and the Veil Nebula which was a stack of 30 shots at 30s exposure.

There is a star catalog, The Gaia Catalogue, has been published over the last couple of years and is done largely by satellite imagery. Stars are shown down to the 21st magnitude and Peter showed Barnard 86 as an example. The Catalogue contains positions and brightness for 1.7 billion stars.

Cartes du Ciel (ap-i.net) is a free and open source planetarium program.

Peter finished with a video of the destruction caused by Hurricane Dorian over the Abaco Island in the Bahamas.

JoAnn presented sky tonight.

The meeting was adjourned at 9 pm.
Refreshments were served in the rotunda and furnished by Hirohito and Andy Stroble.

Sincerely,
Secretary Tammy Weese

Layers in Mars' Danielson Crater
This image shows sedimentary rock and sand within Danielson Crater, an impact crater about 42 miles or 67 kilometers in diameter, located in the southwest Arabia Terra region of Mars.

This image taken by the Mars Reconnaissance Orbiter spacecraft shows sedimentary rock and sand within Danielson Crater, an impact crater about 42 miles or 67 kilometers in diameter, located in the southwest Arabia Terra region of Mars.

Image Credit: NASA/JPL-Caltech/University of Arizona
Most of the planets in our solar system are bright and easily spotted in our night skies. The exceptions are the ice giant planets: Uranus and Neptune. These worlds are so distant and dim that binoculars or telescopes are almost always needed to see them. A great time to search for Uranus is during its opposition on October 28, since the planet is up almost the entire night and at its brightest for the year.

Search for Uranus in the space beneath the stars of Aries the Ram and above Cetus the Whale. These constellations are found west of more prominent Taurus the Bull and Pleiades star cluster. You can also use the Moon as a guide! Uranus will be just a few degrees north of the Moon the night of October 14, close enough to fit both objects into the same binocular field of view. However, it will be much easier to see dim Uranus by moving the bright Moon just out of sight. If you’re using a telescope, zoom in as much as possible once you find Uranus; 100x magnification and greater will reveal its small greenish disc, while background stars will remain points.

Try this observing trick from a dark sky location. Find Uranus with your telescope or binoculars, then look with your unaided eyes at the patch of sky where your equipment is aimed. Do you see a faint star where Uranus should be? That’s not a star; you’re actually seeing Uranus with your naked eye! The ice giant is just bright enough near opposition - magnitude 5.7 - to be visible to observers under clear dark skies. It’s easier to see this ghostly planet unaided after first using an instrument to spot it, sort of like “training wheels” for your eyes. Try this technique with other objects as you observe, and you’ll be amazed at what your eyes can pick out.

By the way, you’ve spotted the first planet discovered in the modern era! William Herschel discovered Uranus via telescope in 1781, and Johan Bode confirmed its status as a planet two years later. NASA’s Voyager 2 is the only spacecraft to visit this strange world, with a brief flyby in 1986. It revealed a strange, severely tilted planetary system possessing faint dark rings, dozens of moons, and eerily featureless cloud tops. Subsequent observations of Uranus from powerful telescopes like Hubble and Keck showed its blank face was temporary, as powerful storms were spotted, caused by dramatic seasonal changes during its 84-year orbit. Uranus’s wildly variable seasons result from a massive collision billions of years ago that tipped the planet to its side.

Discover more about NASA’s current and future missions of exploration of the distant solar system and beyond at nasa.gov

(Continued on page 10)
October meteor showers present observing challenges this year. The Draconids (009 DRA), zenith hourly rate = 5, are affected by the waxing gibbous Moon, which illuminates the evening hours with a high radiant position (high altitude). For mid-northern latitudes, the radiant is below 20° elevation after local midnight. The “big” October shower peaking on October 22 may be viewed for a few hours before moonrise. These Orionids exhibit ~20 meteors per hour and is considered a "medium strength" shower. Shower members hit our atmosphere at a speed of 148,000 mph (238,000 kph). The Leonis Minorids (022 LMI) peak on October 25 and provide more dark hours to observe. At 2 meteors per hour this shower remains challenging.

<table>
<thead>
<tr>
<th>Shower</th>
<th>Activity</th>
<th>Maximum Date</th>
<th>Maximum λ⊙</th>
<th>Maximum α</th>
<th>Maximum δ</th>
<th>V∞</th>
<th>r</th>
<th>ZHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draconids (009 DRA)</td>
<td>Oct 06 - Oct 10</td>
<td>Oct 09</td>
<td>195.4°</td>
<td>262°</td>
<td>+54°</td>
<td>20</td>
<td>2.6</td>
<td>5</td>
</tr>
<tr>
<td>Southern Taurids</td>
<td>Sep 10 - Nov 20</td>
<td>Oct 10</td>
<td>197°</td>
<td>32°</td>
<td>+09°</td>
<td>27</td>
<td>2.3</td>
<td>5</td>
</tr>
<tr>
<td>δ-Aurigids (224 DAU)</td>
<td>Oct 10 - Oct 18</td>
<td>Oct 11</td>
<td>198°</td>
<td>84°</td>
<td>+44°</td>
<td>64</td>
<td>3.0</td>
<td>2</td>
</tr>
<tr>
<td>ε-Geminids (023 EGE)</td>
<td>Oct 14 - Oct 27</td>
<td>Oct 19</td>
<td>205°</td>
<td>102°</td>
<td>+27°</td>
<td>70</td>
<td>3.0</td>
<td>3</td>
</tr>
<tr>
<td>Orionids (008 ORI)</td>
<td>Oct 02 - Nov 07</td>
<td>Oct 22</td>
<td>208°</td>
<td>95°</td>
<td>+16°</td>
<td>66</td>
<td>2.5</td>
<td>20</td>
</tr>
<tr>
<td>Leo Minorids (022 LMI)</td>
<td>Oct 19 - Oct 27</td>
<td>Oct 25</td>
<td>211°</td>
<td>162°</td>
<td>+37°</td>
<td>62</td>
<td>3.0</td>
<td>2</td>
</tr>
</tbody>
</table>

Can’t get more minor than the Leo Minorids. This shower is close to the New Moon! For more info contact: Tom Giguere, 808-782-1408, Thomas.giguere@yahoo.com; Mike Morrow, PO Box 6692, Ocean View, HI 96737.
In this month’s report, note the bank charges in both the “money out” and “money in” sections. American savings decided to eliminate the type of business account we had, and moved us to a different one. The chief difference involved charging $5 for each monthly statement, unless we elected to receive it electronically. Setting up an HAS login to the bank account was no problem. It required giving them my e-mail address for access codes, and the like. American savings refused to accept the same e-mail address for notifications that the statement was ready, because it did not end in “.com” or “.org”. I opened a trouble ticket, and a week later I could log in, because the system administrator overrode the system once for little old me. I then went back and asked them to remove the bank charge they assessed us.

**Star Party Reports**

We have had a series of good star parties lately. The late August club star party offered some clouds, but exceptional seeing. The seeing continued at at least the Geiger star party, and on into the sparsely attended September public star party at Dillingham. It’s been a good season for Saturn and Jupiter, of course, but the public party also demonstrated the value of high magnifications when viewing globular star clusters.

Attendance was down at the public star party, in part because of the predictions for clouds and rain. Naturally, the sky was clear when the sun set, and stayed clear throughout the night.
Caption: The path of Uranus in October is indicated by an arrow; its position on October 14 is circled. The wide dashed circle approximates the field of view from binoculars or a finderscope. Image created with assistance from Stellarium.

Located in the northern constellation of Ursa Major, which also includes the Big Dipper, nearby galaxy Messier 81 is easily visible through binoculars or a small telescope. M81 is located at a distance of 12 million light-years.

*Image Credit: NASA/JPL-Caltech*

On Sept. 4, 2019, a loose chain of tropical cyclones lined up across the Western Hemisphere. At the time of this image (1:10 p.m. EDT) Hurricane Juliette in the East Pacific and Hurricane Dorian in the Atlantic were both category 2 storms. Meanwhile, Tropical Storm Fernand packed sustained winds of 45 mph and had just recently made landfall over northeastern Mexico. Gabrielle strengthened into a tropical storm on September 4 over the eastern Atlantic, and had sustained winds of 50 mph around the time of this image.

Like a drop of dew hanging on a leaf, Tethys appears to be stuck to Saturn's A and F rings from this perspective in this 2014 image from the Cassini mission. This view looks toward the Saturn-facing hemisphere of Tethys. North on Tethys is up and rotated 43 degrees to the right. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on July 14, 2014. Image Credit: NASA/JPL-Caltech/Space Science Institute