

## **First Light Lite**

March, 2020 Edition

Jim Lynch – Editor

### **Clear Skies Initiative**

Now that we have our nice new 12 ½” telescope up and running at WSO, one nagging problem remains: the Cape’s very often cloudy skies. Looking on the Web, South Yarmouth has “199 sunny days per year.” But Mid-Cape is also described on the Web as “partly cloudy all year.” As a result/example, three of the last four star parties at WSO have been cancelled due to cloudy/bad weather. Thus it has become obvious that we have to do something in addition to our scheduled star parties (which will of course continue as free, publicly open events) in order to take advantage of our “weather windows.” (This should sound familiar to all the sailors on the Cape.)

A solution was put on the table (almost literally) at our most recent H&K pre-talk dinner with the speaker. Specifically, it was proposed to have our “scope qualified” members (and we do need to train up a few more) agree to open up the dome for at least one clear night of opportunity per month, and invite, via our FLL email list, all members and non-members on that mailing list to use the dome and WSO facilities. Members, guests and family would be free, and non-members would be asked to make a small contribution or, better yet, join if they wish to participate on these nights. Photographic targets for each month/season would be designated to help us get a library of FITS files, and any participants would get a flash drive to copy and use the images. (We have both free and club software available for post-processing.)

Doing this would give our new scope a lot more usage, and also help us create a library of photographic image files. Also, learning to use the dome scope

should appeal to many of our members, beyond just going to talks or attending our scheduled star parties.

I should note that the CCAF board (the part of the Society's governance, which deals with the Observatory) approved of this initiative during the board conference call on February 19<sup>th</sup>. As mentioned, we will need to train up more "dome scope users" before we start, and Charlie Burke said that he would soon be working on this.

## **Web Site**

We've talked about this issue for a while now, and finally things are again happening. The first, most recent step was Joel Burnett working with Jim and Chris Lynch to give them access to, and a brief training lesson on, the CCAS website. They now can post calendar events (as can Joel), so hopefully our events (meetings, star parties, miscellaneous other happenings) will be posted there in a timely fashion.

Second, CCAS member David Donahue has agreed to help with web site mechanics, which he is fairly expert in, having his own site. David has also agreed to work as acting Secretary for CCAS, until the next election in July. Given that CCAS VP Ashish Dutta had agreed to help with the web site a few months back, we now have a good (if small) group to handle this task.

We also have an outline of a process to upgrade the site, so you should see changes in the near future.

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## **Dome Repair and Automation Project**

As previously mentioned, initial repairs by Pappas Company (lubrication, dome movement limits, shutter door) were made on January 6<sup>th</sup>. Further work on the dry rotted weather stripping will occur soon, completing the repair phase. Regarding the automation project, our fundraising drive is now up to \$3900, more than a third of the way to the \$10,000 goal. The technical committee for the dome automation should be formed and meeting soon, as we have enough funds now to start work. It

is currently envisioned to be done in three phases: dome rotation, shutter opening, and (lastly) internet connection.

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## **Upcoming STEM Events**

Two STEM events are also coming up that we plan to have a part in: ) “STEM Journey 2020” at Sandwich HS, which we participated in last year and was quite successful and 2) the “Joy of Learning” series of four public lectures at the Falmouth Public Library, which I will give in April on astronomy topics. If anyone would like to help me with demonstrations for those events, please just let me know via email.

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## **March Talks**

This March will feature two CCAS lectures – one on our usual “first Thursday” and one mid-month on the 16<sup>th</sup>. Both lectures will be given at different venues from our usual DYHS Library spot. The first lecture, by Dr. Glen Gawarkiewicz of WHOI, will be held at the Falmouth Public Library at 730 PM. We used that facility once before, in January, and that talk attracted a good-sized crowd. (The center of mass of our CCAS membership is actually closer to Falmouth than to South Yarmouth.) Glen’s talk (given together with CCAS member Paul Fucile) is on CubeSats and their uses, a space technology topic that should be of wide interest. The abstract for that talk is to be found below.

The second talk, which was discussed last month, will be by Dr. Sylvester James (“Jim”) Gates of Brown University on “Proving Einstein Right”, which is the title of his recent book. As mentioned, Dr. Gates is very interested in STEM and in exciting students about it. He will be meeting with students from five different schools before his talk, and then will be signing his books (which will be raffled off free to HS students attending the talk) afterward. Jim’s schedule is as follows:

645 – 725 Talk to students from various Cape HS’s and the YMCA Achievers

725 – 730 Introduction to Jim’s talk

730 – 830 Talk

830 – 900 Book signing

The meetings with the students, talk, and book signing all will be in Barnstable HS's Knight Auditorium. There is no charge for attendance.

NOTE: We will not have our usual open dinner for this speaker, but rather are just inviting the school teachers who helped organize the event to join the speaker. We hope people understand that this is a special event and circumstances. Our First Thursday speaker dinner is open as usual.

### **Upcoming Speakers**

**Note:** We currently have CCAS First Thursday speakers lined up through April. We now are looking for further speakers for the 2020 schedule. If you are interested in giving a talk, or know someone who would be a good speaker, please contact Jim Lynch at [jlynch@who.edu](mailto:jlynch@who.edu). Thanks!

**March 5<sup>th</sup>, 2020 (At Falmouth Public Library)**

**Dr. Glen Gawarkiewicz, WHOI and Mr. Paul Fucile, CCAS and WHOI**

### **CubeSat and the Coastal Ocean: Upcoming Missions with MIT/WHOI Collaboration**

The development of small satellite technology offers exciting opportunities for earth and ocean sciences. A recent collaboration between MIT and the Woods Hole Oceanographic Institution will lead, in the near future, to two separate CubeSat launches, one focusing on the New England continental shelf and the second on the Amazon River plume. This talk will briefly describe CubeSatm technology, define the science missions and underlying technical and scientific challenges, and highlight recent changes in the two regions that will be examined by the CubeSat sensors.

NOTE: Our dinner for the speakers will be at Simply DaVine, 271 Main Street, Falmouth at our usual 5:45 PM time. We had a good crowd last time – feel free to join!

**April 2<sup>nd</sup>, 2020**

**DYHS Projects**

**DYHS Mentors and Students**

**Last Month's Speaker**

**February 6<sup>th</sup>, 2020**

**Dr. Ken Brink, CCAS, WHOI**

**Topic: Extraterrestrial Oceans**

**Abstract.** We are all familiar with Earth's oceans and their importance for life on this planet. In order to understand where else similar oceans might be found in the cosmos, we begin by considering what makes Earth-like oceans possible. These factors include the right solar heating, a magnetic field and plate tectonics. There are, within our own solar system, at least two other types of oceans. One, typified by Jupiter's moon Europa, exists because of tidal stresses which cause friction and thus warm up an otherwise frigid ice-covered body. The apparent resulting ocean lies beneath 10-30 km of solid water ice, but it has potential as a locale for life. A second type of liquid feature occurs on the very cold Saturnian moon Titan, the only moon in our solar system with an atmosphere. In this case, methane lakes occur as part of an evaporation/precipitation cycle not unlike the water cycle on Earth. These three types of "oceans" are what we know to exist: other forms are possible.

**Dicsussion:** Ken's talk started out with the obvious question: what, exactly, is an ocean? In brief terms, it is a planetary scale body of liquid (that is not molten rock

or metal) that is relatively deep, with 4 km being an average number on earth as an example. That definition established, he then proceeded to the three ways you can generate an ocean in the Solar System – Earth’s way, Europa’s way, and Titan’s way. Each is a bit different, and of astronomical (and possibly biological) interest.

To do things Earth’s way, Ken asked: what does it take? The ingredients are only a few, but not trivial to come by. They are: the right temperature range, which means the right distance from the parent star, plate tectonics to remove CO<sub>2</sub>, available water (not ice-covered), an atmosphere, and a magnetic field to protect it. Life can play an important role in the atmosphere as well. So, despite the list of ingredients being relatively small, the system is complex.

An example of a Solar System planet that tried to maintain oceans using Earth’s way is our neighbor Mars. Mars, by our latest reckoning, had a fairly extensive ocean some 4 billion years ago – our measurements are seeing more and more traces of it. However, Mars has no significant magnetic field, so it only has a very thin atmosphere. It is also cold, being distant from the parent star (on the far edge of the “Goldilocks Zone”), and having no appreciable atmosphere has no greenhouse effect to warm it. So finally, whatever started out as the Martian Ocean has now either evaporated into space or is tied up as ice on Mars. Marvin the Martian’s Illudium Q-36 Explosive Space Modulator never really had much chance of being a threat, it seems.

Then there is the question of whether earth-like open-water oceans can exist around other stars. There are a number of exoplanets that have been detected in water’s Goldilocks Zones, and even detections of water vapor. But much more research needs to be done before we can see such oceans, and perhaps even life.

Ken next came to “Europa’s Way” of keeping water liquid – tidal friction! The surface of Europa is frigid, with a water ice crust, which makes sense, given an ambient surface temperature of ~100 Kelvin. But due to the orbital resonance of Europa with its fellow Galilean moons Io and Ganymede, Europa is “squeezed” internally by tides, creating heat. This heat is enough to keep water liquid beneath a surface ice layer. It appears that Europa has 100 km depth of water under 10-30 km depth of ice cover. Moreover, this subsurface ocean is probably salty, and

moreover it occasionally vents to surface plumes which have resurfaced Europa (it is quite smooth) and been detected directly by the Hubble Space Telescope. An interesting discussion occurred during the talk about how one might probe these oceans, which is not surprising given that CCAS has a number of oceanographers for members!

Finally, we come to Titan's way of maintaining an ocean – but not a water ocean. Titan has a molecular nitrogen ( $N_2$  97%) and methane ( $CH_4$  2.8%) atmosphere at about  $1.5\times$  earth pressure, with a surface temperature of about  $100^\circ K$ . As regards oceans, there are pools of liquid methane and propane on its surface, which are about 200 km in size, and up to 200m deep. There is even a “hydrological cycle” of evaporation and rainfall for these oceans. A fun question Ken addresses was: what about life being possible for a non-water based chemistry? Is life possible here? The answer was that  $CH_4$  chemistry is not as favorable as  $H_2O$  chemistry, as there is not much energy available. But it is possible if you inhale  $H_2$ , not  $O_2$ , and use acetylene, not glucose for your energy source. And of course, you would exhale  $CH_4$ , not  $CO_2$ .

As to life outside the Solar System, with possible different chemistries? Ken's “There's always the unexpected” summed it up nicely!

## **February Meeting Minutes and CCAS Business**

Our 2/6/20 meeting discussed details of many of the items listed above (web site update, dome repairs, the new camera status (working!), our current membership status, and STEM activities. Re the web site, Jim Lynch asked if one of CCAS senior members would write up an article on Bernie Young and Bob Cole, who we lost last year. Charlie Burke discussed the STEM and the “clear skies” initiative, as well as the Observatory status. Mike Hunter discussed tracking the distribution of WSO keys.

## **Star Parties**

After August until mid-June, we will (generally) have two regularly scheduled Star Parties each month taking place at 7:30 -10:30pm on the *Saturday* closest to the date of First Quarter Moon (about 7 days old). This is an increase from our old schedule of one per month in the fall, winter, and spring.

From June through August, we have three regularly scheduled Star Parties each month taking place on *Thursdays* at 8:30-10:30pm.

When the moon is near its First Quarter, the terminator (the line dividing light from dark) is favorable for viewing sunlight or shadow on the sides of craters. This time is also favorable for observing the dark side of the moon occult (visually cover) stars in the sky as the moon moves in its orbit. Depending upon the calendar, we may also be able to observe planets and other celestial objects.

Here is the schedule for “Star Parties” up to May, 2020; **the public is cordially invited!**

March 21<sup>st</sup>, 28<sup>th</sup>

April 18<sup>th</sup>, 25<sup>th</sup>

**POSSIBLE CANCELLATIONS for Star Parties:** Cancellations will be very rare since we have lots to do "inside" as well as outside. Even if the forecast is "iffy"; the Staff Leader for the night may elect not to cancel in case of possible clouds. If clouds arrive after staff and guests have convened, a virtual Star Party will usually take place indoors to include overviews of the sky for that night using computer simulations with our big screen TV, videos of interesting sky events recorded previously, demonstrations and/or training on the use of scopes and other equipment, and consultation/discussions on things astronomical, etc.

However, sometimes a solid forecast for overcast or rain or a storm will result in cancellation of a given Star Party. **IF IN DOUBT ABOUT THE WEATHER AND THE STATUS OF A STAR PARTY, CALL THE OBSERVATORY AT 508-398-4765 AFTER 7:45 pm.** No answer means the event has been cancelled.

### **Directions to Dennis Yarmouth HS and Schmidt Observatory**

For information on the location of our Dome behind Dennis-Yarmouth High School, click on the purple button "Old Website" and once there, click on "Meeting Location" viewing the two maps that are there: external for the Dome, and internal to locate the high school library where meetings are held.



For meetings, drive in the south entrance road and go around behind the main building. Park in the lot about halfway down the building and go in the back door and turn down the hall to your left to find the library.

For Star Parties at the Dome, drive in the north entrance road all the way past the north side of the main high school building, through a gate, and on to park near our Dome.

### **H&K directions (note March 2020 exception!)**

Please be reminded that Gus Romano or his delegate host a dinner gathering for members and friends each CCAS meeting night (before the meeting) at the South Yarmouth Hearth & Kettle restaurant at 5:45pm; (the meetings begin at 7:30 at D-Y.) The speaker for each meeting is always invited. Please join the group to dine and talk about all things interesting, including astronomy, each month before our meeting. The H&K is at 1196 Rt 28, South Yarmouth, about a half mile west of the Station Avenue/Main Street intersection with Rt 28 (stop light).

### **Falmouth Library directions (for March 5<sup>th</sup> talk)**

The library address is 300 Main Street Falmouth. You go in the “meeting room entrance” across from Mullen Hall School, next to the Municipal Parking Lot (which gives us PLENTY of parking, similar to the DYHS lot). The library is right on Route 28 (which is called Main Street in Falmouth), so it is not very hard to find. Our usual pre-meeting dinner will be at Simply Divine, 271 Main Street (across from Library) at 545 PM. Talk, as usual, starts at 730 PM.

### **Barnstable HS directions (for March 16<sup>th</sup> event) courtesy Mike Gyra**

Entrance to the Knight Auditorium at Barnstable High School is easily accessed from 744 West Main Street, across from Dunkin Donuts. The only thing that separates the Knight Lecture Hall entrance and Dunkin Donuts is West Main Street and the Parking lot in front of the school. Park wherever there is a space. If full, one can park in one of the other lots on each side of the school. Also, if confused, as you face the building from West Main Street, the Knight Lecture Hall entrance is to the left of the Main Entrance where the Performing Arts Center is located. Another landmark near the Knight Hall entrance is the small playground for the daycare program at our school--it is fenced and to the left of the Knight entrance.

Since most students and parents use GPS to get around, I do not think people will have problems finding BHS. If coming from Sandwich, I like to get off at exit 5, take the service road to Old Stage Road which will take you to Route 28 in Centerville. Bang a right on 28, proceed through a set of lights, and take a right at the fork which is West Main Street. Go by Lamberts on your left, the Honda dealership on your left, and the next left will be BHS. You will see Dunkin Donuts. Coming from DY, take route 28 through Bearse's Way and a quarter mile down the road take a left onto Lincoln. Lincoln will dead end into West Main Street. Take a right, travel by Star Market on your left and the Daily Newspaper (great place for breakfast) on your right. The next right is the big parking lot at BHS.