



First Light

The Newsletter of the Cape Cod Astronomical Society



April, 2011

Vol.22 No. 4

Editorial

The nuclear crisis in Japan reminds us of the importance of preparedness in areas where low-probability / high-consequence catastrophic events might occur. Who thought about the one in a more than a trillion chance that a tsunami would flood the diesel generators designed to keep reactors and fuel storage tanks in Japan cool in the event of an earthquake- caused power outage?

A major solar storm aimed at earth is another kind of low-probability / high-consequence possibly catastrophic event. You may have seen the story in February's Sky and Telescope about the need for preparedness for backup power transformers to meet needs should a major solar storm affect power generation in this country and / or world-wide. The situation in Japan should raise our awareness of the need for preparedness. If you missed the story on solar storms in S&T, consider these highlights:

- *In 1859, a massive coronal mass ejection (CME) of the sun aimed directly at earth knocked out telegraph communication. Just telegraphy? At that time telegraphy was the almost the only and most sophisticated technology dependent on electricity in existence.*
- *May 15, 1921 - The New York City Railroad Storm - At 7:04 AM on May 15, the entire signal and switching system of the New York Central Railroad below 125th street was put out of operation followed by a fire in the control tower at 57th Street and Park Avenue. Railroad officials formally assigned blame for a fire which destroyed a central New England railroad station," to the aurora". (Ref 5)*
- *130 years after the 1859 event, on March 11, 1989, power in all of Quebec was knocked out for 12 hours by a CME. Fortunately, this CME was less powerful and more tangential to the earth than the 1859 event. (Ref 6)*
- *Were a major CME aimed the earth to occur in our present time of complex technologies, large-scale blackouts affecting more than 130 million Americans would expose more than 350 extra high-voltage transformers to the risk of permanent damage. Effects in many other countries could be equivalent. Because of limited manufacturing capacity (for such transformers), large areas of our nation could be without electricity for months or years..." Imagine the chaos: no computers; no telecommunications... for months or years.*

The S&T article also features the image of an enormous CME at the surface of the sun, captured by SOHO, the Solar and Hemispheric Observatory satellite, which took place on December 2, 2003. Fortunately, this event was not "the big one" for us because it was aimed away from the earth.

1859(telegraph), 1921(railroad signals), 1989(blackout in Canada), 2003 (near miss): shouldn't we address our current state of preparedness?

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- **Next Monthly Meeting:** is Thursday, April 7th at the D-Y Library. Optical engineer Peter Howes will present a program "Evolution of Large Mirror Telescope Systems at the Haleakala Observatory" describing his work at the Maui Optical Station. He will talk about the early days at Maui when the technologies were developmental, and follow the evolution of large mirror systems from huge monoliths to the early days of compensated imaging. (Please see the moving banner and the "tail of the rocket" on our website's home page for more information on future speakers and topics.)
 - **In this issue:** Solar storm preparedness / Lunar occultations / Harwich Astro Programs / Saturn and its Moons and a new "app" for simulating same / "Hawaiian Islands" on the Moon / Mars Setting Times.

Bright New Stars:

We welcome Peter Barr of South Yarmouth to CCAS. Peter has been interested in astronomy for a long time. When he was about six, he was riding in a car with his mother, her friend and her friend's daughter Phyllis. At one point, he announced to everyone in the car that he was going to marry Phyllis and take her to the moon for their honeymoon. It didn't occur to him at that time to worry how they would get there. Nevertheless, Phyllis was agreeable. Several years later, he decided to make a moon rocket. He came up with several ideas and even fantasized about how the trip would be. Alas, the rocket never came to fruition.

Peter always was interested in and excelled in science in school. His interest in science continued into adulthood. He enjoys the Hayden Planetarium in Boston and looks forward to visiting the new one in New York. He reads a lot about Astrophysics and has begun to read "The Hidden Reality" by Brian Greene, an astrophysicist from Columbia. Peter enjoys (as we all do) any program by Neil DeGrasse Tyson, who heads up the Rose Center for Earth and Space in New York. He discovered CCAS several years ago, has participated in several meetings, and decided to join us. Peter looks forward to visiting our Observatory in the near future. Welcome aboard, Peter!

We like to profile new members in our Society in this section of *First Light* each month. If you are a new member and have not yet been so recognized, or have new information for us (background, astro equipment preferred, interests, etc.) on yourself or someone else, please let us know (email info@ccas.ws).

PLEASE CONSIDER SUBMITTING AN ITEM OR ARTICLE FOR PUBLICATION IN *FIRST LIGHT*.

If you are a regular contributor, thank you very much!

CCAS and Related Events:

Many thanks to Bernie Young for his excellent presentation "**Planning and Determining Limits for Moon Occultations**" at our meeting on March 3rd.

An occultation is defined as the passage of one body between the viewer and another astronomical body. Careful viewing of an occultation including careful timing and record keeping allows one to determine new information about both the occulting and the occulted bodies. For example, the first observed occultation of an asteroid was in Sweden in 1958. This helped to determine the size and shape of the asteroid. Grazing occultations and their significance in determining lunar

terrain were discussed. Tools for predicting the events, the common equipment used to make measurements, approaches to corroboration with other astronomers, and tools for reporting data were discussed.

The work of amateur astronomers can be useful when observing occultations to help discover new companion stars. A six-inch telescope is sufficient to make these observations. For more information see reference 7.

At our meeting Bernie announced plans for an evening to view lunar occultations of several stars; one, μ -geminorum, is a bright magnitude 2.9 star in Gemini. Although the weather on the appointed night, March 13, was "borderline" Bernie and your Editor did convene at the WSO and did enjoy observing the winking out and later reappearance of both μ and two other dimmer stars.

Please see the announcement on page 3 on a bright star occultation that will take place in April.

At our meeting on April 7th, optical engineer Peter Howes will present a program "**Evolution of Large Mirror Telescope Systems at the Haleakala Observatory,**" describing his work at the Maui Optical Station, a multi-observatory complex situated at the crest of the dormant Haleakala volcano. The observatory stands at an altitude of 10,000 feet. The Air Force Maui Optical Station (AMOS) started life as the ARPA Maui Optical Station. Starting in 1969, the Avco Everett Research Laboratory won the management contract for the observatory and Peter was responsible for this program for over a decade. He will talk about the early days of AMOS when the technologies were developmental and the evolution of large mirror systems from huge monoliths to the early days of compensated imaging. Because of the remarkable clarity, dryness, and stillness of the air, and its location above one-third of Earth's atmosphere, as well as the limited light pollution, the summit of Haleakala is one of the most sought-after locations in the world for ground-based telescopes.

On May 5th, Dr. Gregory Skomal will present "**Magnetic Navigation Clues in Sharks**". Greg is an accomplished marine biologist, underwater explorer, photographer, aquarist, and author. He has been a senior fisheries biologist with Massachusetts Marine Fisheries since 1987 and currently heads up the Massachusetts Shark Research Program (MSRP). Much of his current research centers on the use of acoustic telemetry, satellite-based technology, and animal-borne imaging to assess the physiological impacts of capture stress on the post-release survivorship and behavior of sharks. As of late, Dr. Skomal has headed a team tagging Great White sharks off Light House Beach and south in Chatham in an effort to understand their migratory patterns and behavior.

On June 2nd, our own Dr. Michael Hunter will present "**Practical Astrophotography Using Digital Single Lens Reflex Cameras.**" Mike is the Director of the

Werner Schmidt Astronomical Observatory in South Yarmouth, MA. He has an extensive background in the use of computer driven "go to" telescopes and understands the pitfalls and application of DSLR cameras with these units. If you ever considered imaging at this scale you should not miss this program.

Thanks again to Tom Leach, who continues to put together great programs of speakers for our meetings. Speakers for the CCAS Lecture Series are now fully scheduled through our August meeting!

Members, **PLEASE** participate in the effort to recruit good speakers to present programs in astronomy and related sciences at our meetings. Please send any ideas or contact information to Tom Leach, our President and Program Chairman. For sure he will follow up.

Or, even better, volunteer to give a talk yourself!

Astronomy Nights at Harwich Conservation Trust's Bank Street Bogs Nature Preserve : Join Harwich Harbormaster, Tom Leach, for a telescopic look at the night sky on the following Tuesday and Thursday evenings: April 5, 21, 26, and 28. The sessions are cancelled by cloudy weather. Bring your own binoculars. *Directions*: From Rt. 39, take Bank St. 0.5 miles south to the Harwich Harbormaster's Workshop on the left at #203 Bank Street. From Rte. 28, take Bank St. 0.7 miles north to the Harwich

Explore the Night Sky at Harwich Elementary School
Join Harwich Harbormaster, Tom Leach, at the Harwich Observatory located at Harwich Elementary School, #263 South Street, Harwich Port, on Tuesday, May 3rd (8:30 pm.) *Directions*: From Harwich Center, go west on Great Western Road 0.4 miles. Turn left onto South Street. Turn left onto School House Drive after the school. Please join us also on May 24th at 9pm.

The **minutes** of our February meeting prepared by Charlie Burke, our Secretary, are on our website; click on the "Minutes" button at www.ccas.ws or go to <http://www.ccas.ws/minutes/ccasminutes030311.pdf>

Executive Corner

Members of The Executive Board exchange ideas by email and phone on a continuous basis and now and then formally convene by conference call. Anyone wishing to offer an item to the agenda please contact Tom, Paul, Peter or Charlie.

From the Foundation... and Dome...

As always, "Private" group or individual observing sessions at the Werner Schmidt Observatory may be scheduled by contacting Observatory Director Mike Hunter at mamhunter@yahoo.com or sending an email to info@ccas.ws

**Our Society exists to promote observing!
Help us promote this objective by asking for time at the Dome!**

CCAS has both 8" and 14" Dobsonian telescopes for loan to members. Currently, Tom Leach is using the 14" for outreach in Harwich. Robert Tobin has the 8". If you wish to borrow one of these 'scopes, contact info@ccas.ws

April Observing: ⁴

Bright Star Occultation

Another Bright Star Occultation for us here on the Cape: This one should be easily visible in small binoculars as well as telescopes, maybe even with the naked eye. *Sky and Telescope* (April issue, page 57) reports that the dark limb of a waxing quarter moon will cover up the mag 3.8 star ζ (zeta)-Geminorum in prime time on Sunday, April 10. Using IOTA's time estimate algorithms and data given online for Falmouth (ref 7), we can estimate the time for "winkout" of the star as observed from the Werner Schmidt Observatory to be 9:28:54pm EDT. An email will be sent out to all members if a star party at the WSO is arranged for this event.

Planets

Magnitude 0.4 **Saturn** reaches its peak in early April, when it's the lone planet visible after darkness falls.



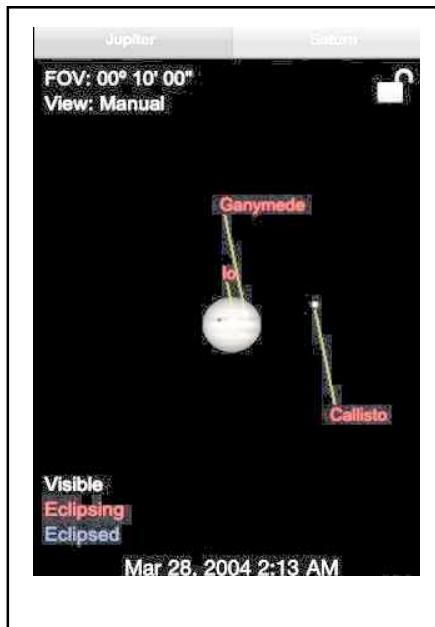
While Saturn's rings were mostly edge-on to us last year, Saturn's rings open wider this year than they have since 2007 allowing good views of the bright A and B rings, and the dark Cassini division. At opposition April 3-4, it

rises in the east at sunset and reaches its highest point above the southern horizon at local midnight. At opposition, Saturn lies 800 million miles from Earth — its closest approach of the year gives us a disk 19" wide in any telescope or binoculars; the rings measure 44" from edge to edge.

April is prime time to study the moons of Saturn. The big moon **Titan**, visible with almost any telescope, is 0.5' south of the planet at inferior conjunction on April 1 and 17 and at superior conjunction north of the planet on April 9 and 25; or as far as 3.3' on either side at widest swings. Titan orbits Saturn every 16 days. The other "big" moons of Saturn, **Enceladus** on the inside track, then **Tethys**, then **Dione** and **Rhea** dance in smaller and faster orbits. Now is the time to study these moons; they are closest and brightest when Saturn is at or near opposition; that means now.

Challenge: There's more. With a low-magnification eyepiece, try to find mag 11 Iapetus. This moon lurks near the outskirts of the main saturnian satellite system. On April 3, it lies 6.4' west-northwest of Saturn, more than double Titan's distance. Iapetus reached greatest western elongation in late March, when it also appeared at its brightest (10th magnitude). It fades throughout April as its darker hemisphere turns toward Earth. On the night of April 12/13, look for Iapetus 1.8' north of Saturn.

Resources for Positions of Saturn's Moons:



New tool: If you have an iPod Touch, iPhone, or iPad, there is a new and very good tool for determining the positions for the moons of either Jupiter or Saturn on any date and time; the price is only \$2.99. "app" is called

"Gas Giants" and is available from iTunes Store. This simulator is especially good in that the graphics are spectacular and show even shadow transits. Your editor has a copy if you'd like to see it in action.

If you don't have "Gas Giants", positions for Saturn's moons are given in graphic diagrams in the April issue of *S&T* (p 47.) Or go to the following web address to access *S&T*'s Java Utility for showing the positions of Saturn's main moons for any date and time. <http://www.skyandtelescope.com/observing/objects/java/script/3308506.html>

Dawn Viewing: While we normally concentrate our focus on evening observing opportunities, a special dawn event takes place this month. **Four planets** line up at dawn below a crescent moon at the end of April. On April 30, bright Venus lies above Mercury with Mars and Jupiter, newly arrived as "morning stars" from time behind the sun, are very close to each other a bit to the north.

Other Observing Highlights

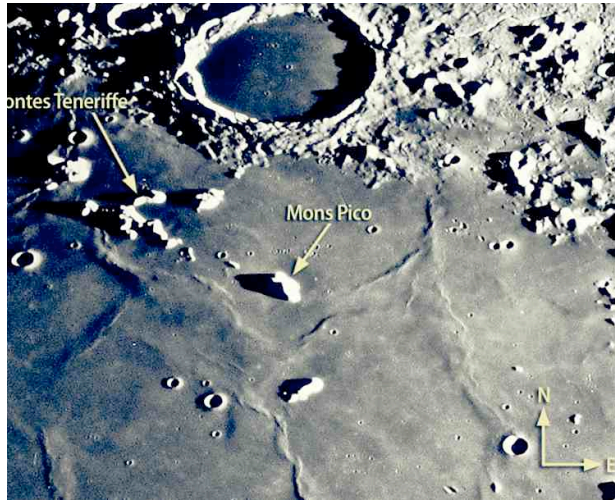
The Lyrid meteor shower peaks the night of April 22/23. Observers under a rural sky could see up to 10 meteors per hour. Unfortunately, 2011 won't be a favorable year: a waning gibbous Moon shines brightly and will drown out fainter meteors during the predawn viewing hours.

Hawaiian Islands on the Moon?

We all know that we can only see the tops of the tall Pacific island volcanic mountains, the parts above sea level. Our Hawaiian Islands are only the tops of much taller mountains which are based deep in the Pacific Ocean floor. Witness the summit of the volcano Haleakala, 10,023 ft above sea level, but about 30,000 ft (6 miles) above the floor of the ocean.

The moon has isolated mountains that stick up out of the maria (seas). If you would like to see some excellent examples, take a look at **Mons Pico and Montes Teneriffe** in Mare Imbrium with a small or large telescope or a good pair of binoculars. Imbrium is the mare whose northern "shore" is just below the large crater Plato. Plato is the most conspicuous crater on the top side of the moon at latitude about 50°. Pico and Teneriffe appear as a bright scramble of ridges and a more isolated single ridge, respectively, sticking out of the "ocean" just below Plato. In a telescope, both appear conspicuous with sunlight on their eastern slopes and shadow on the western slopes (east is "left" in most telescopes) shortly after first Quarter Moon. This month, the best views of these mountains come the evening of April 12. Mons Pico ascends about 1.5 miles above the mare floor from a base "at sea level" that spans 10 by 15 miles. One wonders how tall it was before the mare lava

flooded it. Think of the flat mare floor as the ocean



Arrows denote Montes Teneriffe (left) and Mons Pico (right)

surface; lava bubbled up flooding the lowlands around these mountains leaving only the tops of the peaks, just as with Haleakala. Over the course of a single evening, Pico's triangular shadow grows noticeably shorter. The longer shadows cast by the multiple peaks of Montes Teneriffe retreat even faster because of their more westerly location, where the Sun hangs lower in the early morning sky. Take a peek every 20 minutes or so to get the full effect. Other similar isolated mountain peaks inside Mare Imbrium include Mons Piton on the mare's eastern shore just west of the crater Cassini and the much less conspicuous Mons La Hire on the western side. [Note: This story embellishes an article on the moon appearing in April's *Astronomy* magazine, p 45.]

June

If you didn't find and follow mag 9 Juno last month, give it a try this month. Finder chart from Reference 7.



Anyone having an interest in monthly Libration and Declination Tables for the Moon² or Dates and Times for the Minima of Algol^{1,3} during this month please contact your editor for information or sources.

Note that the setting times for Mars in the following table are very close to constant near 6:01pm during April. It turns out that this is very close to true for Mars all the way from December 2010 through June 2011. The "constant" set times for Mars these many months is explained by the orbital speeds and relative orbital positions of Mars and Earth at and on either side of the date of conjunction which took place February 4th, 2010. We would all welcome an analysis of this phenomenon if someone cares to volunteer same: either as a feature article in *First Light* or a presentation at a CCAS meeting. Volunteers?



Moonusser's Almanac and Monthly Alert¹ By Peter Kurtz April 2011			
Object	Apr. 1 (EDT)	Apr. 15 (EDT)	Apr. 30 (EDT)
Sun	R: 06:23 S: 19:05	06:00 19:21	05:38 19:37
Moon	R: 05:16 S: 17:29	16:41 04:29	04:08 17:20
Mercury (sun, then dawn)	R: 06:36 S: 20:14	05:33 18:28	04:49 17:22
Venus (predawn)	R: 05:08 S: 16:04	04:55 16:34	04:38 17:07
Mars (sun, then dawn)	R: 06:01 S: 18:01	05:30 18:02	04:57 18:01
Jupiter (sun, then dawn)	R: 06:38 S: 19:20	05:50 18:42	05:00 18:02
Saturn (evening)	R: 19:04 S: 06:50	18:04 05:52	16:59 04:50
Uranus (predawn)	R: 06:04 S: 18:09	05:10 17:18	04:13 16:23
Neptune (predawn)	R: 04:49 S: 15:30	03:55 14:37	02:57 13:39
Pluto (late night)	R: 01:39 S: 11:26	00:43 10:31	23:44 09:32

Algol, the variable star in Perseus, displays a minimum brightness on one particular occasion in Prime Time during April for Cape Codders: Take a look before and leading up to the minimum at 7:01pm EDT on Tuesday April 19th. See Note at Reference 3 and Reference 1 for more information on this rapidly changing variable star.

Moon Phases, April, 2011

New Moon Sunday, April 3rd, at 10:32am EDT

First QTR Monday, April 11th, at 8:05am EDT

Full Moon Sunday, April 17th, at 10:44pm EDT

Last QTR Sunday, April 24th at 10:47pm EDT

“Good” Lighting?

Reminder: Please think about the opportunity to take photos documenting light pollution or “good” lighting as requested in last month’s story “Local astronomers Aim to Limit Light Pollution”. Tom Leach, our President, is working on a video portrait on the local light pollution situation⁸. Once again, Tom requests that *All interested persons send him photos which might be useful in this video story; again, local photos of GOOD light situations and, more importantly, BAD light situations. Please notify Tom directly if you have photos or let us know at info@ccas.ws.* Thank you.

**A PORTION OF THIS PAGE IS
INTENTIONALLY LEFT BLANK TO
REMIND ALL MEMBERS THAT THERE IS
ALWAYS PLENTY OF ROOM IN *FIRST
LIGHT* FOR YOUR CONTRIBUTIONS**

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The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month in the library of the Dennis-Yarmouth Regional High School in Yarmouth, Massachusetts. Meetings are open to the public. Membership dues are \$30 for adults, \$15 for students in two year colleges and part year residents, and no charge for spouses or for students in K-12 schools.

References and Notes for this issue:

1) Information for The Mooncussers Almanac and Monthly Observing Alerts was extracted from Sky Events, Astronomy Magazine Online (Astronomy.com), Stargazing.net's Planet Rise/Transit/Set calculator (<http://www.stargazing.net/mas/planet2.htm>), *Astronomy Magazine*, *Sky & Telescope Magazine*, *Sky and Telescope Skywatch 2011*, and other sources. The *Observer's Handbook, 2010 and 2011*, published by The Royal Astronomical Society of Canada is also an important reference, particularly for information on lunar libration and declination and the minima of Algol.

2) Information on how Libration and Declination Maxima and Minima can make visible parts of the moon normally hidden was reviewed in the December2007-January2008 *First Light*. Quick recap: Max Long brings to view extra right side; Min Long, extra left side; Max Lat, extra north side; Min Lat, extra south side. Max Dec puts it high in our sky during its transit; Min Dec puts it low.

3) Algol is an eclipsing variable star in Perseus which has its brighter component eclipsed or covered by its companion once every 2.87 earth days. When the dimmer component is not eclipsing the brighter, Algol appears typically about magnitude 2.1; when eclipsed, magnitude 3.3 The minima usually lasts about two hours with two hours on either side to bring it back to mag 2.1. Good comparison stars are γ -Andromedae to Algol's west, mag 2.1, and ϵ -Persei to its east, mag 2.9.

4) *Astronomy Magazine's* online The Sky This Month online for April is the principal source for most of this month's observing highlights. http://www.astronomy.com/News-Observing/Sky_this_Month/2011/02/Ringed_Saturn_reigns_supreme.aspx

5) *Space Weather*, May 13, 1921 - The New York Railroad Storm, <http://www.solarstorms.org/SSI921.html>

6) an overview of the 1989 event: http://www.nasa.gov/topics/earth/features/sun_darkness.html

7) Iota index page including upcoming bright star events (<http://www.lunar-occultations.com/iota/iotandx.htm>); instructions for estimating time for a given latitude and longitude close to a tabulated city: <http://www.lunar-occultations.com/iota/bstar/abfactor.htm>

8) Tom Leach's draft video on light pollution: <http://www.youtube.com/watch?v=AkwLyD1YKzM>