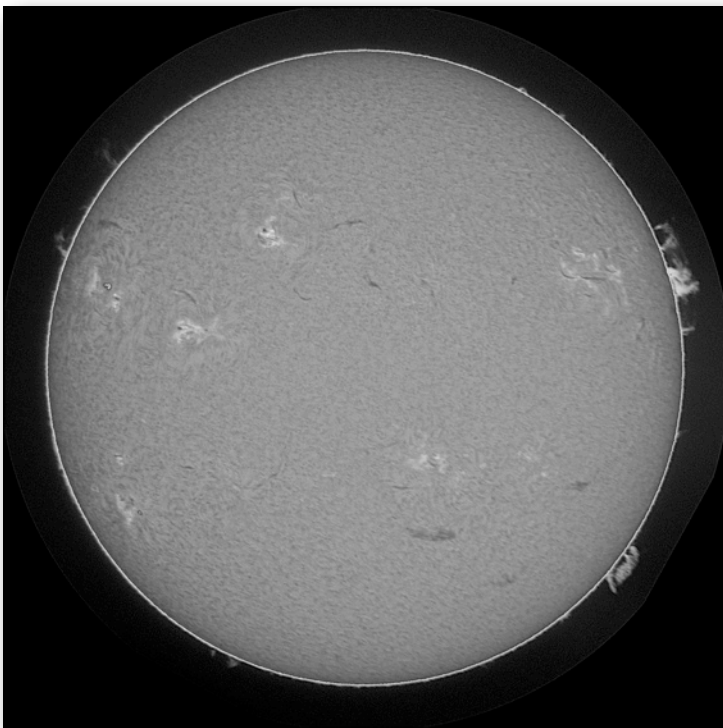




Astronomy News for Bluewater Stargazers
Vol 7 No. 6 June 2013

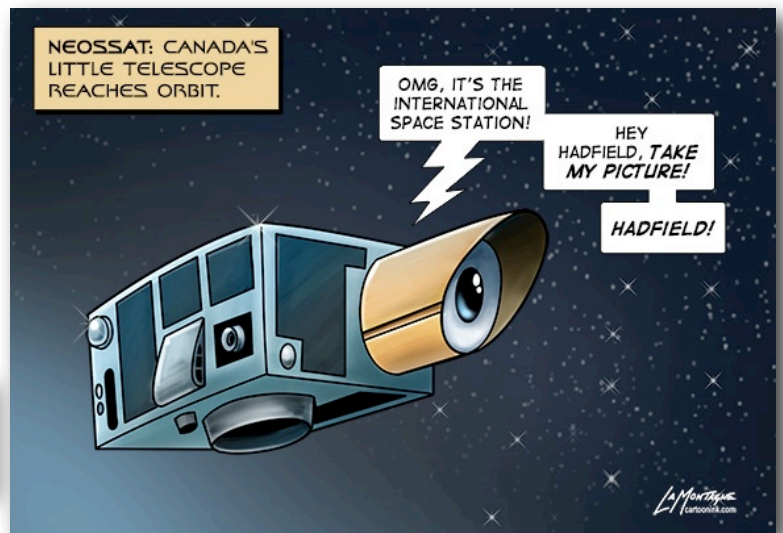
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May 11, 2013 Solar Image

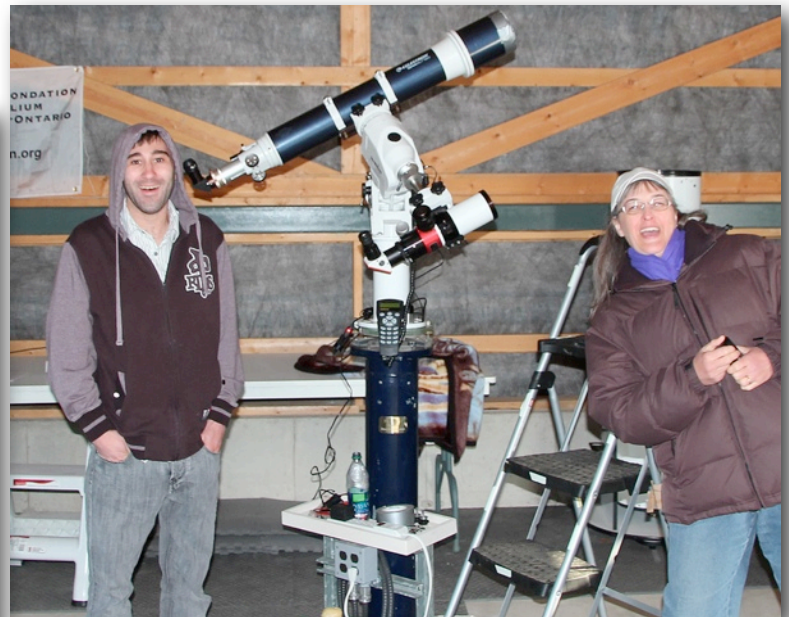
The H-alpha view through the 60 mm Lunt Solar Scope was much like this image taken at the **Mauna Loa Solar Observatory** on the island of Hawaii. A 60 mm Meade Solarmax H-alpha scope is the smallest used at the High Altitude Observatroy (HAO) by the National Center for Atmospheric Research (NCAR). More images and information about the facility can be found at <http://mlso.hao.ucar.edu/index.php>



NEOSSat

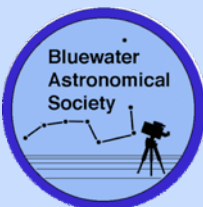
The Near-Earth Object Surveillance Satellite (NEOSSat) was successfully launched by an Indian rocket Feb 25, 2013. See page 4 for the serious info. PS: Col. Hadfield is back on Earth. More on Hadfield on pg 5 and 6.

Weather co-operates for BOEC 40th Reunion May 11, 2013



Why the BIG smiles? Ans: a new mount to try out, a sunny day (clouds cleared away about noon) and THREE giant prominences visible on the limb of the sun! [See image left at 2:30 o'clock]. The AZ-EQ6 did double duty with a 5-inch refractor and a 60 mm solar scope. With a 20 kg capacity, it was not even straining while it performed its first task for BAS. In the words of Lorraine R: "...today was great! The solar set-up worked well. It was good to compare two very different views of the sun. Watching the prominences change was my favourite part. I'm glad you guys [Aaron and John] were able to get the new mount set up for today. I believe it made the good impression that [we] were hoping for. It seemed that the RASC representative was impressed as well". Dan Taylor on the LPA committee of RASC mentioned to me (at least three times) how impressed he was by what we have accomplished -I'd say he was "bowled over" by what this small club has done in partnership with the BOEC and BEF. He also mentioned the fact that cooperation with a group (BOEC) that has similar environmental aims is the way to make progress in the light pollution battle.

Disclaimer: StarGazer News reports the activities of the Bluewater Astronomical Society (formerly Bruce County Astronomical Society) but any opinions presented herein are not necessarily endorsed by BAS. See the BAS website at www.bluewaterastronomy.info for up-to-date details relating to BAS events. The BAS "blog" is temporarily not available. StarGazer News is produced and edited by John Hlynialuk. I am solely responsible for its content. Your opinions, comments, observing reports, etc., are welcome. I reserve the right to edit for brevity or clarity. Errors or omissions are entirely mine although I strive for accuracy in star events, etc. I will not publish your emails or other materials without your specific permission to do so. No part of this publication June be reproduced in any form whatsoever without the editor's consent. However, the Sky Calendar and Feature Constellation pages are free for you to copy. Feel free to forward this issue in its entirety to your friends. Email comments or submissions to stargazer@wightman.ca



BAS Executive 2013-2015

| | | |
|-------------------------|------------------|------------------------|
| President: | Aaron Top | aarontop@hotmail.com |
| Vice-President: | John Hlynialuk | stargazer@wightman.ca |
| Secretary: | Lorraine Rodgers | lrodgers@bmts.com |
| Treasurer: | Cheryl Dawson | cheryl.dawson@bell.net |
| Past-President: | Brett Tatton | brettatton@gmail.com |
| Membership: | David Skelton | dskel@golden.net |
| Public Outreach: | TBA | |



The Bluewater Education Foundation

BAS Events for June 2013

- June 1 Huron Fringe Birders** annual ESFox visit 9:00 pm (LQ+1) Contact: John H.
- June 5 BAS meeting** at ES Fox Observatory NOT Grey Roots Museum 7 pm **Videos Night**
- June 8 BAS viewing @Fox** ES Fox@dark (NM) backup June 30 (LQ moon)
- June 14 Public viewing at GR** Grey Roots Museum 9 pm (Members with scopes please)
- June 17 CFUW** star talk (Hanover) John H.
- June 21 Summer Solstice** Keppel Henge 11 am (Members with solar scopes please)
- June 16 to 21** Venus and Mercury close approach in western sky, minimum separation on June 19 less than 2° (FQ moon)
- June 28 Meaford Market** displays, Joan S. and John H.

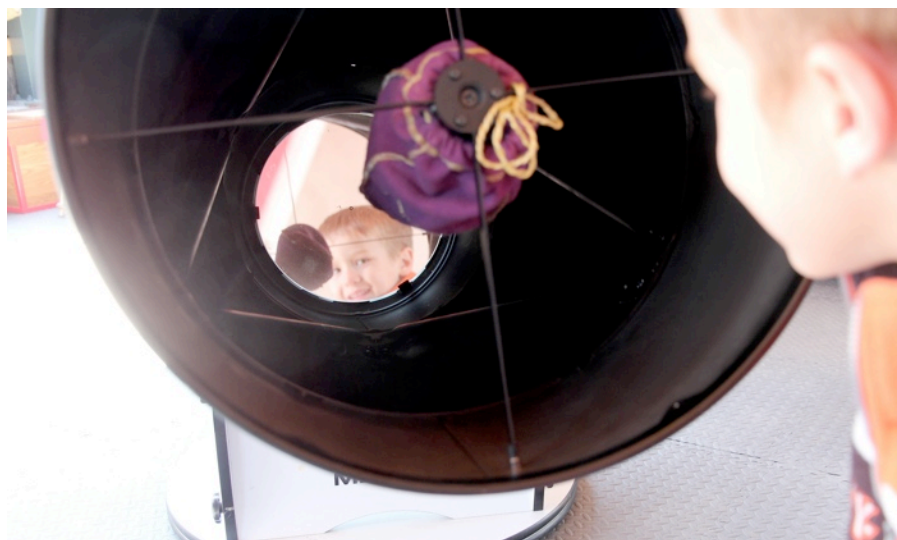
New BAS executive for 2013 to 2015 is:

- President:** Aaron Top
- Vice-President:** John Hlynialuk
- Secretary:** Lorraine Rodgers
- Treasurer:** Cheryl Dawson
- Past-President:** Brett Tatton
- Past-Past President:** Dan Gieruszak
- Membership Chair:** Dave Skelton
- Welcome to the new members on exec and Thank You to those who served in the past!

From the "Top": by Aaron Top pres. BAS Rising of the Milky Way

Every spring as the winter stars fade into the western horizon, an awesome spectacle takes place above the eastern horizon--the rising of the northern hemisphere's summer Milky Way. This is a sight that most people have never seen due to the increasing amount of light pollution. Most people can't even see the Milky Way let alone watch it rise out of the horizon from a dark location. I have never watched the entire event, but that was different this year. This year I carefully planned out an evening during which not only would I be able to watch the beautiful Milky Way begin to arch into the sky, but I would also be using my fisheye lens to take a time lapse series to record the event. The night I chose was Friday, May 5/6, the night of the eta-Aquarid meteor shower. By the time the Milky Way extended from horizon to horizon with the Summer Triangle near the zenith, a last crescent moon was rising at the same time as the twilight began to brighten the sky. A number of club members joined me for the show at the Fox Observatory and the night stayed clear from dusk to dawn. This was followed by an equally clear night for the scheduled Fox observing night Saturday. Here's hoping we get more clear skies in the coming weeks of spring! This has to be one of my favourite times of the year for observing.

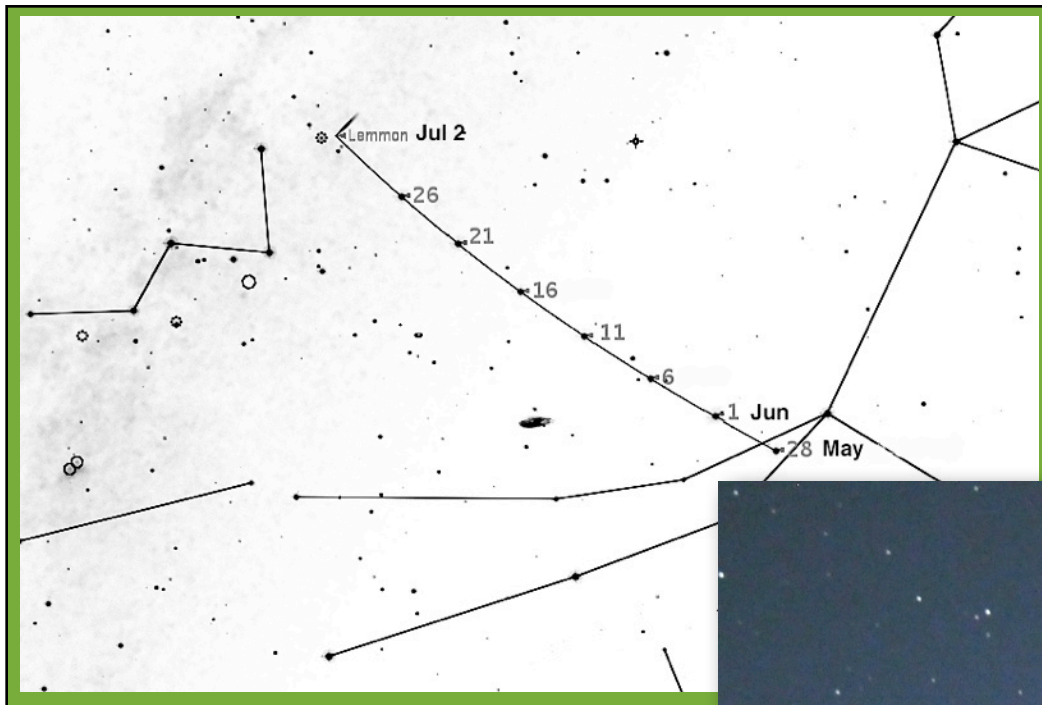
[Videos from both Aaron and John's efforts will be displayed at the June 5 BAS meeting at the Fox Obs. -ed]



Sixteen-inch smile: A young visitor to the **BOEC Reunion and Open House** gazes down the tube of the 16-inch dob and likes what he sees. Views of the three large prominences on the limb of the sun through the Lunt Solar Scope were equally enthralling. The new AZ-EQ6 did a nice job tracking the sun even with two telescopes mounted on it. Aaron's 5-inch Celestron refractor provided sunspot views in the visual range, while the Lunt gave a side-by-side comparison in H-alpha wavelengths. Besides the solar viewing, the wall-to-wall collection of telescopes was impressive. There were 10 in the observatory (one 16, three 12s, two 10s, two 8s and two 6s). Another half dozen were also stored in the warmup room. Note: all but two are working telescopes and can be used for student programs or by BAS members observing at the Fox (or for loan -see pg 12).

The attendees included youngsters, oldsters, former OEC teachers, students and even a politician or three. Members of BEF were present as well. The turnout of BAS members was again impressive. I counted 15, many helping out with various tasks that needed to be done from directing parking to bartending to manning the scopes at the Fox Observatory. Once again, BAS volunteers have come through!

Finder Chart for Comet Lemmon to July 2/13



Comet #2 of 2013 (Lemmon, C/2012 F6) is now visible in our morning sky rising just after midnight near the star Alpheratz in Andromeda. It is not bright but in the third week of May, when the image below was taken, it was around magnitude 7. The brightness is dropping as it moves away from the Sun. Still you **need** to see it in order to say that you saw all three of the comets in 2013. Image below shows a tail about 0.4° long and both the ion tail (up to the right and straight) and a broad barely-detectable dust tail to the right of the nucleus. The enlargement below is about a half degree across. Although not detected in binos, the greenish colour shows well in the 60Da image.

This single image right was taken with a Canon 60Da, exp. 60 s, ISO 2000, through a TV NP101 which is an f/5.4 system with 545 mm focal length. The smaller chip on the 60Da gives a 1.6 X factor so the effective focal length is actually 872 mm. This image was manually guided with a crosshair reticle (old school). I can hardly wait until the new mount at the Fox is set up and the auto-guider is working.



My image pales by comparison with the shot taken by Gerald Rhemann with a 12 inch astrograph from Namibia. Rhemann's Apr 21 image was featured on APOD May 6. See more incredible images on his website here: <http://www.astrostudio.at>



Comet Lemmon May 6, 2013

image by Gerald Rhemann
 Date: May 06 2013 UT 03h00m
 Location: Farm Tivoli, Namibia
 Scope: ASA Astrograph 12" f 3.6
 Camera: FLI ML8300 Exposure
 time: LRGB 8/8/8/8 minutes (Image
 used with permission)

Canada's NEOSSat is the technological offspring of the MOST astero-seismology microsatellite, which began its mission in 2003 (launched June 30th and still operating as of this writing).

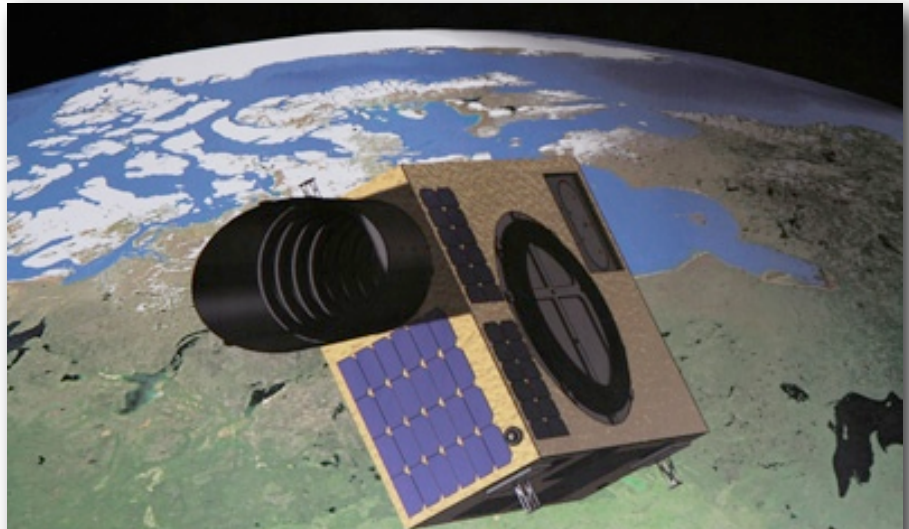
NEOSSat is a 74 kg suitcase-sized microsatellite powered by solar panels and stabilised/slewed by a system of miniature reaction wheels. It has high precision attitude control required because the telescope must point at precisely the same patch of sky for intervals up to 100 seconds long.

Millions of rocky objects orbit between the planets Mars and Jupiter in what researchers call the Main Asteroid Belt. These bodies are leftover from the accretion and formation of the planets 4.5 billion years ago. Their current orbital distribution is sculpted by effects of Jupiter's gravity (and to a lesser extent those of other planets – primarily Saturn and Mars). Some of these objects are always "leaking" out of the main belt due to various "perturbations" – a perturbing force is something that affects their orbits. These perturbations do essentially two things – they add energy to the orbit until Jupiter throws it out of the Solar System, or they remove energy from the orbit so that the asteroid eventually plunges into the Sun. When these asteroids are in the vicinity of the Earth's orbit, we call them the near-Earth asteroid (NEA) population. This population is transient on geological/ astronomical timescales but on their journey to the Sun, a few percent will collide with the Earth, Earth's Moon or the other inner planets.

The good news is that space is so big these asteroids only rarely impact the Earth and the statistical rate of impacts is relatively well known. (The size distribution of the NEA's is also relatively well known.) This has been happening since the Earth first formed and will continue for the life of the Solar System. The first Earth-crossing asteroid (ECA), Apollo, was only discovered in 1932. With the growth of our observing technologies, particularly the development of charge-coupled device (CCD) sensors, and computer programs that can search for asteroids in images of the night sky, the number of known asteroids has skyrocketed over the last twenty years.

NEA's are relatively small (largest is typically ~10 km diameter), rocky bodies that don't reflect much sunlight, (the percentage ranges from ~3% to ~60% depending upon their composition) making them dim and somewhat difficult to detect even with CCDs. Being relatively close to the Earth, they also move relatively quickly across the sky, which adds to the challenge of finding them. Ground-based telescopes can only search for asteroids at night, so are in large part limited to looking only on one side of the Earth at any given time. Telescopes are also limited by how low to the horizon they can look by the Earth's atmosphere.

Asteroids appear as fuzzy little dots of light in CCD images that don't look any different than stars except that the asteroid can be seen to move. That is why asteroid searches are often referred to as "moving object" surveys. Several telescopes are dedicated to this search at this time. Naturally, the available search

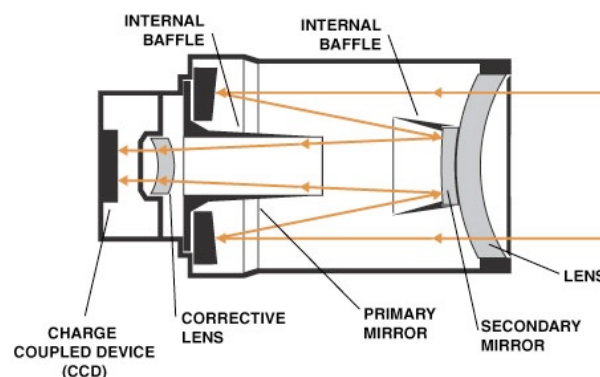


An artist rendition of NEOSSat in orbit above Canada NEOSSat is the successor to the successful MOST satellite and uses technology developed for it.

intervals are constrained by weather and the phases of the Moon. What about the asteroids going by on the daylight side of the planet, or the north or south pole, or when the Moon is full? What about all the NEA's that are far from the Earth – as far as on the other side of the Sun? What about the asteroids that are too far away when they go by to be seen because they are too faint? The current searches are doing what can be done with available resources, and the asteroids that are far from the Earth are found by continuing the search for years .

Good news of the hazard front. Over the last twenty years, ~80 – 90% of the impact hazard from NEA's has been "retired." The majority of large NEAs (~>1 km diameter that could cause global destruction of Earth's ecosystems) have been found, had their orbits determined, and are now known to not be going to impact the Earth any time soon. This certainly isn't to say that all hazard has been removed plus our civilization is interested in discovering and knowing the orbits of all NEA's for other reasons. They are the nearest solid bodies to us in the Solar System and are natural targets for exploration and eventual exploitation.

Where does NEOSSat fit into all of this? NEOSSat comes into this mix of current and planned search telescopes as a relatively modest priced space telescope that is nonetheless able to make a significant contribution to discovery of a fraction of the NEA population by searching for the asteroids that orbit near the Sun. These two orbital classes are known as the Atiras – asteroids that orbit entirely inside Earth's orbit – and Atens – asteroids that orbit mostly inside Earth's orbit but that sometimes cross it. The ability to search near the Sun continuously is one of the big advantages of a space-based platform so NEOSSat will be used by the NESS project to fill in this knowledge gap for the NEA population. Over its lifetime, NEOSSat's observations are expected to reduce the current impact hazard by another few percent, but its main contribution will probably be constraining the Atira asteroid population size and orbital distribution. If the project is lucky it may discover a relatively large asteroid (or two) somewhat close to the Earth dynamically, that would be natural exploration targets.



Canadian astronaut Chris Hadfield gestures after the Russian Soyuz space capsule landed some 150 km southeast of the town of Zhezkazgan in central Kazakhstan May 14, 2013. Hadfield, the first Canadian astronaut to command the International Space Station (ISS) landed safely in Kazakhstan with two crewmates on Tuesday, wrapping up a five-month mission aboard the ISS. (REUTERS/Sergei Remezov)

From **Universe Today** (www.universetoday.com)

by Nancy Atkinson

Coming home to clear blue skies, green grass and warm weather, the Expedition 35 crew of Canadian astronaut Chris Hadfield, NASA's Tom Marshburn and Russia's Roman Romanenko has returned after spending just over five months on the International Space Station. "It's beautiful!" one of the crew radioed in Russian just before landing. "It's morning here."



The Soyuz TMA-07M spacecraft landed right on target on the steppe of Kazakhstan, southeast of Dzhezkazgan at 10:31 pm EDT on May 13 (02:31 UTC and 8:31 am local time, May 14, 2013.) The crew undocked from the ISS on Monday.

Keeping with his Expedition-long constant updates via Twitter (updated by his son Evan during the return flight and landing) Hadfield's location changed appropriately to "In a Soyuz" to "In a field in Kazakhstan."

A few hours later, Hadfield tweeted, "Safely home – back on Earth, happily readapting to the heavy pull of gravity. Wonderful to smell and feel Spring."

The crew smiled and gave thumbs up after being extracted from the Soyuz craft, which appeared to land upright and then tipped on its side. Hadfield and Marshburn will soon head back to Johnson Space Center in Houston, with Romanenko going to Star City, Russia.

The Expedition 35 crew has now wrapped up 146 days in space, 144 days on the ISS. While on board they completed 2,336 orbits around the planet and clocked almost 100 million kilometers (62 million miles) In total, Marshburn has spent 162 days in space, 166 days for Hadfield, and 334 days for Romanenko.

With their return to Earth, Hadfield and his expedition 35 colleagues will have spent 146 days in space on their mission. [Hadfield has accumulated 166 days in space with two previous Shuttle missions]. The Canadian Space Agency tweeted that they completed 2,336 orbits around the planet and clocked almost 62 million miles – or about 99.8 million kilometres.





Hadfield tweets: "Weightless water. This picture is fun no matter what direction you spin it". Commander Chris Hadfield looks through a drop of water as they both float on board the International Space Station. NASA photo

Hadfield has done a number of remarkable videos from ISS including this one just posted: <http://www.youtube.com/watch?v=KaOC9danxNo> where he does a version of David Bowie's "Space Oddity". I am not sure it matches "ISS: Is Somebody Singing" he did with Ed Robertson, but Space Oddity makes a nice parting statement for his mission. I still like the concert he did from space that involved the BNL and the high school choir. Have a look at "Is Somebody Singing" at <http://music.cbc.ca/#/concerts/Chris-Hadfield-and-Barenaked-Ladies-ISS-Is-Somebody-Singing-2013-02-05>



St. Lawrence and Manicouagan Crater

From Phil Plait, the "Bad Astronomer":

Hadfield posted the image right on Apr 20/13. His caption was, simply, "St Lawrence's mouth, where the Great Lakes pour into the sea." Stunning, especially the sunlight reflected off the mighty river. To give you a sense of scale, the area where the river widens suddenly in the picture, to the right of the cloud bank, is about 80 kilometers across. It's big.

But look again. To the right, see that big circle, like a giant Q stamped into the land? It looks like a circular lake, or, to be more accurate, an annular (ringlike) one. But that's no ordinary lake. That's the Manicouagan impact crater.

A little over 200 million years ago, an asteroid or comet the size of a small mountain (maybe five or so kilometers across) slammed into the ground about 200 kilometers north of where the St. Lawrence is now. The impact was massive, and left a complex, multi-ringed crater over 100 km across. The lake is actually filling the inner ring, which is about 70 km across.



ASTRO-CATS 2013

“When you come to a fork in the road, take it !”
Yogi Berra

Where does the time go? I have been retired for coming up on 13 years and my life, instead of getting simpler, seems to be becoming busier, with many competing demands for my time. My wife, Paula, is a wonderful life partner, and we have been together almost half a century. She keeps my life in balance with her solid, common sense perspective on life and her sense of humour keeps me from taking myself too seriously. We also share a common interest in this fascinating astronomy hobby. She owns 5 telescopes, her own observatory, and usually has the astronomy magazines and journals read before I can get to reading them! During my teaching career, I also had many demands on my time. Paula would say to me, when I got too busy, “You know, when you leave this world, it will not say on your tombstone, “Beloved by the Bluewater Board of Education”! I would smile, maybe even laugh, but continue being busy! Yogi Berra’s quote above would describe my reaction.

This brings me to last Friday night. Two of our astronomy friends were planning on travelling to Oakville to attend ASTRO-CATS, the first annual Canadian Astronomy Telescope Show. They called and wanted us to join them. Paula thought it might be a very nice, and fun, way to spend a Saturday. We would see old friends, check out the new equipment, and take in the workshops and talks. But, I hesitated. You see, earlier this spring, I had agreed to be a Beta-tester for a revolutionary hand controller created for a major telescope manufacturer. I can’t even tell you who that might be because of the non-disclosure agreement I signed before they sent me the prototype. Well, I have agreed to finish the testing by mid-June and wanted to continue with my testing this past May 25th - 26th weekend. However, one thing I have learned during my life’s journey so far is that for me, taking a break from my busy schedule, is actually beneficial and improves my efficiency when I return to my scheduled tasks. I decided that a break from my busy routine was definitely in order. I didn’t regret it at all!

We left Lion’s Head for Oakville at 6:30 AM and, after picking up two friends, made it to the Athletics Centre, of Sheridan College by 10:00 AM. As we walked the campus toward the Athletics Centre Paula and I were impressed with the beautiful natural ambience of Sheridan College. No sooner had we registered than we were embraced by Normand Fullum, the optician who built our 4-Elements Observatory telescopes. Normand was showcasing his innovative telescope and mirror making business. He makes telescope mirrors having apertures up to 65 inches! Terry Dickinson saw us and joined our group for a lovely, informal talk. Terry is Canada’s leading amateur astronomer, author of 15 books, and editor of Sky News magazine. Terry was scheduled to be the Saturday Keynote Speaker and had chosen for his talk the title : “21st Century Trends in Backyard Astronomy”. More about his talk at the end of this Article.

ASTRO-CATS had about 25 exhibitors and sponsors. Paula and I walked around, checking out the exhibits and meeting/talking with many old friends. There was over \$300,000 in astronomy merchandise on display and over \$13,000 in door prizes. Among the many exhibitors were Starizona, Starlight Express, MallinCam, OPT, Meade, Celestron, iOptron, PodMax, Normand Fullum Telescopes, Kendrick Astro Instruments, Sky-Watcher, Vixen Optics, Khan Scope, Sky and Telescope Magazine, Astronomy Magazine, SkyNews Magazine, Astro-Gizmos, and Astronomy Simulation Curriculum for Educators. If you were interested in purchasing any astronomy equipment then this was the place to check out value and prices. Indeed, most vendors had special pricing in effect for ASTRO-CATS. To cite just one example, Rock Mallin, owner and creator of the MallinCam, offered \$300 off the Extreme Model pricing package, and gave the new owner a MallinCam shirt and ball cap. One of our friends took advantage of this offer and is now looking forward to his next astro-imaging adventure.



Was it well-attended? Well, it was hard to get a handle on the total attendance because the ASTRO-CATS workshops were held in another building, separated from the exhibitors. I would estimate that the attendance, not counting the exhibitors, was about 250. I do know that Jim Kendrick, an exhibitor, was very pleased with the response. As we walked around, four products caught our attention. First, there were the new, light-weight, quick cool-down-time pyrex mirrors from Normand Fullum. When you held the new, light weight, 20 inch mirror, it was hard to resist ordering one of his telescopes made with these mirrors. Secondly, the images taken with Starizona’s Hyperstar cameras were stunning. These cameras attach to the secondary holder of a Schmidt Cassegrain telescope, replacing the diagonal mirror. The telescope is then configured from an f/10 optical system to a wide-field fast f/2 optical system. The images taken with this system were a knock-out! Our ASV friend, Jack Newton, uses a Hyperstar camera and he raves about its images. Thirdly, we spoke with Wayne Parker, developer of the new Pod Max observatory, and I must say that, if you are contemplating building an observatory, you owe it to yourself to check out this new product. Lastly, we were impressed with Rock Mallin and his MallinCam exhibit. Many people were talking with him and checking out his images.

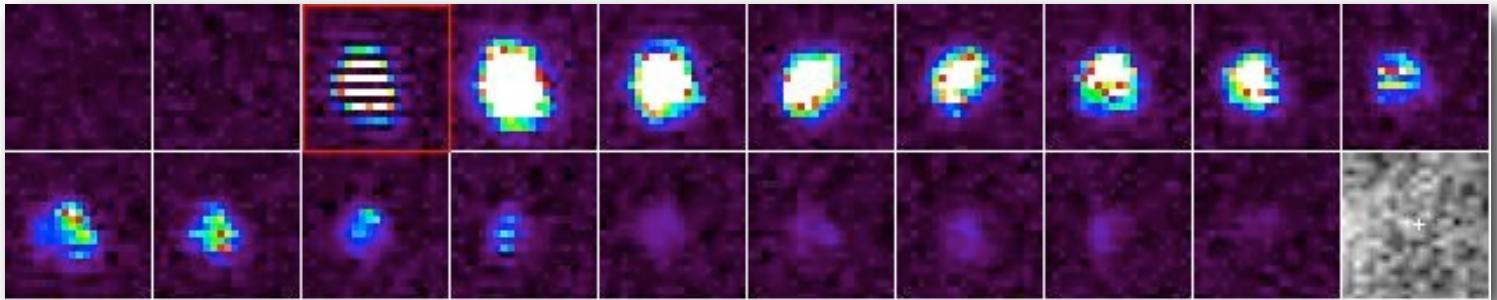
At 2:30 PM, Terry Dickenson gave the keynote talk to an overflow audience. He touched on two themes. First, the revolution in astronomy equipment has put research grade equipment into the hands of amateur astronomers. Secondly, the growth of light pollution and the active pursuit of dark skies by amateur astronomers, is now a political fact of life. Accompanying the continued growth of light pollution is an increase in the number of Dark Sky Preserves. Terry then noted a new concept called a public “Dark-Sky Viewing Area”. He was instrumental in convincing Lennox and Addington County to provide the land and create the infrastructure necessary for this project. This Dark-Sky area features a large, flat, concrete pad suitable for camera tripods and telescopes, a parking lot, and toilets... all at no charge! Sort of similar to our Bayside Astronomy POD. There is room for portable chairs so naked eye astronomers can also enjoy the stars. I found this development fascinating and would like to see a similar structure built on the Northern Bruce Peninsula. The L&A Dark-Sky Viewing Area has received accolades from visiting astronomers and the county was awarded a 2012 Provincial Marketing Award from the Economic Developers Council of Ontario. According to L&A Development Manager, Stephen Paul, this Dark-Sky Viewing Area has leveraged the tourism potential of the area. The area is open every night of the year!

Did I enjoy the ASTRO-CATS? I had a wonderful day! By taking the time away from my to-do list, I actually became more efficient at the work I had rescheduled for Sunday. Really, to paraphrase the Yogi Berra quote, in my case

“I came to a fork in the road, and took it !”



Bright Explosion on the Moon



Still frames from a video made by a NASA meteoroid monitoring network recorded a massive explosion on the surface of the moon on March 17, 2013. A 40 kg meteoroid impacted with the equivalent of 5 tons of TNT, producing a 4th magnitude glow for about a second.

May 17, 2013: For the past 8 years, NASA astronomers have been monitoring the Moon for signs of explosions caused by meteoroids hitting the lunar surface. "Lunar meteor showers" have turned out to be more common than anyone expected, with 300 impacts detected since monitoring began in 2005.

They've just seen the biggest explosion in the program's history.

"On March 17, 2013, an object about the size of a small boulder hit the lunar surface in Mare Imbrium," says Bill Cooke of NASA's Meteoroid Environment Office. "It exploded in a flash nearly 10 times as bright as anything we've ever seen before." Anyone looking at the Moon at the moment of impact could have seen the explosion--no telescope required. For about one second, the impact site was glowing like a 4th magnitude star.

Ron Suggs, an analyst at the Marshall Space Flight Center, was the first to notice the impact in a digital video recorded by one of the monitoring program's 14-inch telescopes. "It jumped right out at me, it was so bright," he recalls. The 40 kg meteoroid measuring 0.3 to 0.4 meters wide hit the Moon traveling 90,000 km/h. The resulting explosion packed as much punch as 5 tons of TNT.

Cooke believes the lunar impact might have been part of a much larger event. "On the night of March 17, NASA and University of Western Ontario all-sky cameras (see article below) picked up an unusual number of deep-penetrating meteors right here on Earth," he says. "These fireballs were traveling along nearly identical orbits between Earth and the asteroid belt." This means Earth and the Moon were pelted by meteoroids at about the same time. "My working hypothesis is that the two events are related, and that this constitutes a short duration cluster of material encountered by the Earth-Moon system," says Cooke.

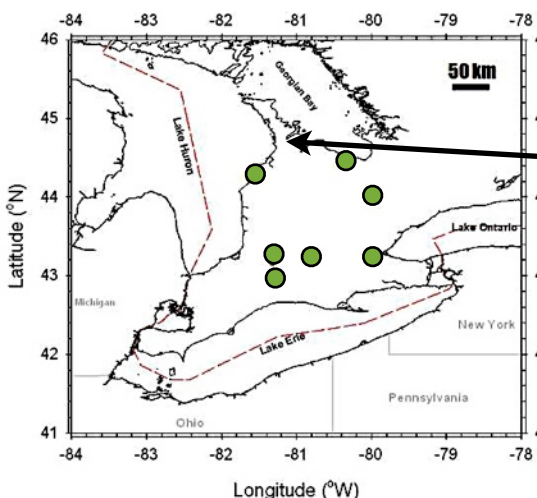
One of the goals of the lunar monitoring program is to identify new streams of space debris that pose a potential threat to the Earth-Moon system. The March 17th event seems to be a good candidate. NASA's lunar monitoring program has detected [hundreds of meteoroid impacts](#). Unlike Earth, which has an atmosphere to protect it, the Moon is airless and exposed. "Lunar meteors" crash into the ground with fair frequency. Statistically speaking, more than half of all lunar meteors come from known meteoroid streams such as the Perseids and Leonids. The rest are sporadic meteors--random bits of comet and asteroid debris of unknown parentage.

U.S. Space Exploration Policy eventually calls for extended astronaut stays on the lunar surface. Identifying the sources of lunar meteors and measuring their impact rates gives future lunar explorers an idea of what to expect. Is it safe to go on a moonwalk, or not? The middle of March might be a good time to stay inside. "We'll be keeping an eye out for signs of a repeat performance next year when the Earth-Moon system passes through the same region of space," says Cooke. "Meanwhile, our analysis of the March 17th event continues."

Footnote: (1) The Moon has no oxygen atmosphere, so how can something explode? Lunar meteors don't require oxygen or combustion to make themselves visible. They hit the ground with so much kinetic energy that even a pebble can make a crater several feet wide. The flash of light comes not from combustion but rather from the thermal glow of molten rock and hot vapors at the impact site.

Footnote: (2) Controllers of NASA's Lunar Reconnaissance Orbiter have been notified and will be imaging the impact site the next time the spacecraft passes over. The crater could be as wide as 20 meters.

Credits: Author: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)



UWO Meteor Camera Station coming to Fox Obs

● Add ES Fox Meteor Station here:



The UWO Meteor Group headed by Peter Brown have agreed to set up an ASGAR all-sky meteor camera on a site to be provided by BOEC/BAS near the ES Fox Observatory. Discussions over the last year had resulted in this new station at the Fox that should be operational by the end of June, 2013.

The current version of all-sky camera (left) is smaller than previous versions and operates autonomously turning itself on at night and off at dawn. Data is processed by an included computer (and special software designed for the purpose) and sent via internet to UWO. The camera is equipped with a heater for the winter and fan to keep dew off the lenses. There is a live image every 15 minutes or so, so BAS members can have a peek at the sky at the observatory before making a decision to drive any distance to observe. Neat!

Comet ISON May Produce Noctilucent Clouds

April 19, 2013: Anticipation is building as Comet ISON plunges into the inner solar system for a close encounter with the sun in November 2013. Blasted at point-blank range by solar radiation, the sungrazer will likely become one of the finest comets in many years.

When NASA's Swift spacecraft observed the comet in January 2013, it was still near the orbit of Jupiter, but already very active. More than 112,000 pounds of dust were spewing from the comet's nucleus *every minute*.

It turns out, some of that dust might end up on Earth. Veteran meteor researcher **Paul Wiegert of the University of Western Ontario** has been using a computer to model the trajectory of dust ejected by Comet ISON, and his findings suggest that an unusual meteor shower could be in the offing.

"For several days around January 12, 2014, Earth will pass through a stream of fine-grained debris from Comet ISON," says Wiegert. "The resulting shower could have some interesting properties.

According to Wiegert's computer models, the debris stream is populated with extremely tiny grains of dust, no more than a

few microns wide, pushed toward Earth by the gentle radiation pressure of the sun. They will be hitting at a speed of 56 km/s or 125,000 mph. Because the particles are so small, Earth's upper atmosphere will rapidly slow them to a stop. "Instead of burning up in a flash of light, they will drift gently down to the Earth below," he says.

Don't expect to notice. The invisible rain of comet dust, if it occurs, would be very slow. It can take months or even years for fine dust to settle out of the high atmosphere.

While the dust is "up there," it could produce noctilucent clouds (NLCs).

NLCs are icy clouds that glow electric-blue as they float more than 80 km above Earth's poles. Recent data from NASA's AIM spacecraft suggests that NLCs are seeded by space dust. Tiny meteoroids act as nucleating points where water molecules gather; the resulting ice crystals assemble into clouds at the edge of space itself. This is still speculative, but Comet ISON could provide the seeds for a noctilucent display. Electric-blue ripples over Earth's polar regions might be the only visible sign that a shower is underway.

Wiegert notes another curiosity: "The

shower is going to hit our planet from two directions at once."

When Earth passes through the debris stream, we will encounter two populations of comet dust. One swarm of dust will be following the Comet ISON into the sun. Another swarm will be moving in the opposite direction, pushed away from the sun by solar radiation pressure. The streams will pepper opposite sides of Earth simultaneously.

"In my experience, this kind of double whammy is unprecedented," says Wiegert.

Bill Cooke, lead scientist at NASA's Meteoroid Environment Office, says there's little danger to Earth-orbiting spacecraft. "These particles are just too small to penetrate the walls of our satellites, and they don't stand a chance against the heavy shielding of the ISS." However, he adds, mission operators will be alert around January 12th for possible anomalies.

Sky watchers should probably be alert, too. The odds of seeing anything are low, but Comet ISON could prove full of surprises.

Credits:

Author: [Dr. Tony Phillips](#) | Production editor: [Dr. Tony Phillips](#) | Credit: [Science@NASA](#)

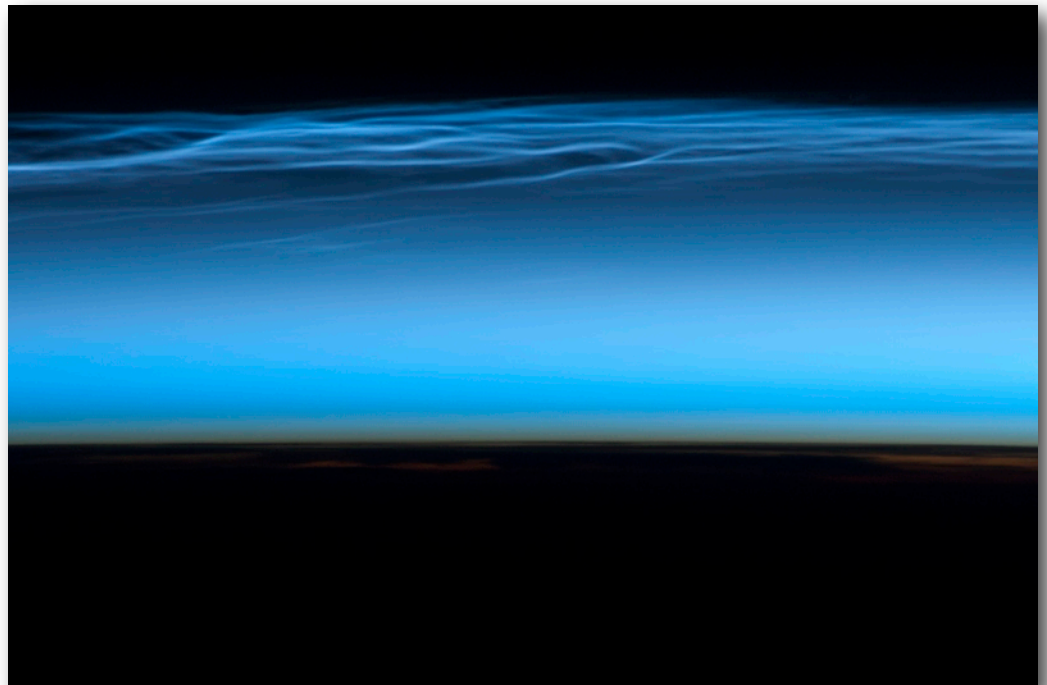
NLC Observing tips:

Look west 30 to 60 minutes after sunset when the Sun has dipped 60 to 160 below the horizon. If you see luminous blue-white tendrils spreading across the sky, you've probably spotted a noctilucent cloud. Although noctilucent clouds appear most often at arctic latitudes, they have been sighted in recent years as far south as Colorado, Utah and Nebraska. NLCs are seasonal, appearing most often in late spring and summer. In the northern hemisphere, the best time to look would be between mid-May and the end of August.

[More about Comet ISON is coming in the July SGN issue. By all accounts it should be a spectacular comet. One prediction gives a peak magnitude of -9! This is comparable to the light given off by a quarter moon. Keep in mind that it will reach that magnitude only near the sun so the comet will be in bright twilight. -ed]

NLCs imaged from ISS

Astronauts on board the ISS took this picture of noctilucent clouds near the top of Earth's atmosphere on July 13, 2012. **NASA photo**



Draco (Dra)

α-Dracōnis - Thuban β- Draconis - Rastaban γ-Dracōnis - Eltanin
 δ-Dracōnis - Tais ε- Draconis - Aldhibain ι-Dracōnis - Ed Asich
 λ-Dracōnis - Gianasar μ- Draconis - As Rakis ξ-Dracōnis - Grumium

Draco is composed for the most part of fairly faint stars that take a long winding path beginning with the tail between the Big and Little Dippers, curving northeast around the bowl of the Little Dipper, then curving sharply southwest and terminating in a clearly recognizable quadrilateral of stars (the Dragon's Head) pointing directly at the constellation of Hercules. β and γ-Dracōnis were considered by the ancients to depict the dragon's eyes. ν-Dracōnis is a beautiful binocular double.

DOUBLE STARS

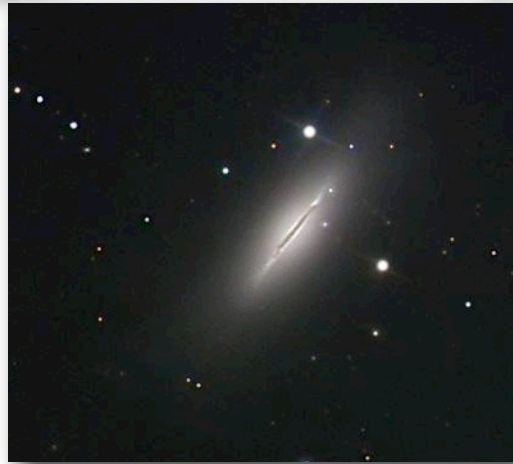
| Mag. | Sep (s) | Location | Remarks |
|-------|----------|----------|---------------------------------|
| β | 2.8-11.5 | 4 | 173052 |
| η | 2.7-8.7 | 6 | 162362 |
| ε | 4.0-7.6 | 3 | 194970 Yellow-Blue. |
| μ | 5.8-5.8 | 2 | 170455 Both White. |
| ν | 5.0-5.0 | 62 | 173255 Both Pale Yellow; beaut. |
| ο | 4.8-7.6 | 32 | 185159 Orange-Green. |
| ψ | 4.9-6.1 | 31 | 174272 |
| 17 | 5.6-6.6 | 4 | 163553 |
| 40,41 | 5.8-6.2 | 20 | 180480 A beautiful pair. |
| Σ1984 | 6.2-8.5 | 7 | 152454 |
| Σ2348 | 5.4-8.0 | 26 | 183252 Yellow-Blue. |
| Σ2573 | 6.2-8.5 | 18 | 194060 Striking. |
| Σ2604 | 6.5-8.7 | 28 | 200464 |

MESSIER OBJECTS

| Mag | Location | Remarks |
|------|-------------|----------------|
| M102 | 10.8 150556 | Spiral Galaxy. |

Other Objects of Interest in Draco

NGC 6543 - Planetary Nebula. Magnitude 9, Location 175967
R Draconis - Long period (245 days) variable, maximum magnitude 7.6. Location 163267.



This image of the almost exactly edge-on disk galaxy M102/NGC 5866 was obtained by [Chris & Dawn Schur](#) from Payson, Arizona at 5150 ft elevation. They used their 12.5" f/5 homemade Newtonian and SBIG ST7E CCD Camera with Enhanced Cooling, to create this LRGB composite exposed 70:20:20:20 minutes.

Messier 102 is a galaxy listed in the Messier Catalogue that has not been identified unambiguously. Its original discoverer Pierre Méchain later said that it was a duplicate observation of Messier 101, but there are historical and observational reasons to believe that it could be NGC 5866, although other galaxies have been suggested as possible identities. NGC5866 is shown in the image above. [From [Wikipedia](#), the free encyclopedia]

[In any case it has a beautiful narrow dust lane through its middle and no nuclear bulge, well worth observing -ed].



HST image of **NGC6543** or the **Cat's Eye Nebula**, in Draco.

NGC6543 or the **Cat's Eye Nebula**, is the other object worth observing in Draco if for no other reason than to compare the

telescopic view with the HST photograph above. Compare it to the other famous planetary nebulae that most amateurs have seen, the Ring Nebula (M57) and the Dumbbell Nebula (M27), the first planetary to be discovered by Messier.

The Cat's Eye is 5 ly in diameter and 3000 ly distant. The central star is probably 11th magnitude but I have not been able to confirm this. Different sources disagree on the overall magnitude also varying from 8.1 to 9.8 in magnitude. A 12-inch will reveal some detail at high power.

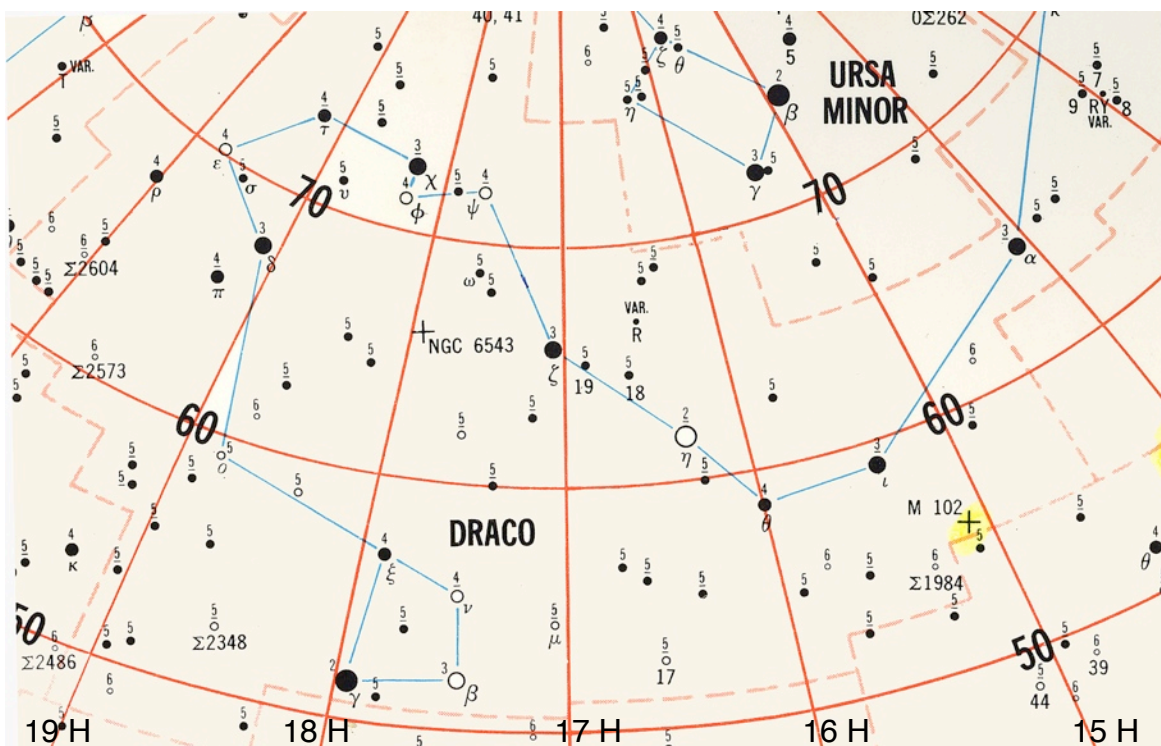


Chart Legend

- Star Location
- Double Stars
- + Nebulae
- ★ Clusters
- Variable Stars
- Var

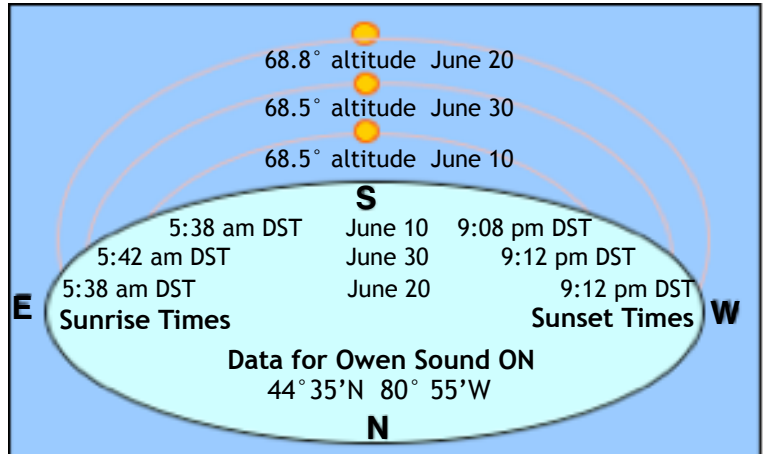
- June 1 **Mercury** 1.3° N of **M35** in **Gemini**
- June 4 **Venus** traverses **M35** (starts 3 pm, ends 10:30 pm when **Venus** sets)
- June 8 **New Moon** rises locally at 5:47 am DST
- June 9 Moon at apogee (406 486 km)
- June 10 **Venus** 5° N of Moon, **Mercury** 6° N of Moon (crescent Moon nearby - a nice grouping)
- June 12 **Mercury** greatest elongation E (24°)
- June 15 Mars 6° N of Aldebaran
- June 16 **First Quarter Moon** rises at 1:29 pm DST
- June 18 **Spica** 0.1° S of Moon, occultation (not vis. here)
- June 19 Saturn 4° N of Moon
- June 20 **Mercury** 1.9° S of **Venus** (min. sep. June 19)
- June 21 **Summer Solstice** (1:04 am)
- June 22 Venus 5° S of Pollux
- June 23 **Moon** at perigee (356 991 km)
Full Moon (Strawberry Moon) rises 9:19 DST (Largest FM of 2013)
- June 30 **Last Quarter Moon** rises at 1:21 am DST

Planets

MERCURY, Jupiter and Venus are nicely lined up in the western sky at the start of June but by mid-June, Jupiter is lost in the sun's glare. By month-end, Mercury also drops towards the horizon. **VENUS**, (-3.8), takes over in the western sky as the Evening Star. **MARS** (1.4) is still near the Sun and only 5° above the dawn horizon by the end of June. **JUPITER**, (-1.9) drops quickly towards the Sun and on June 19 is in conjunction and unobservable. **SATURN**, (mag 0.4) crosses the meridian before midnight (35° high) and sets around 2 am by June 30. Ring tilt decreases to 17.2° in June and then starts to increase. **URANUS**, (5.7) rises at 3 am by mid month preceded by **NEPTUNE**, (7.8) at 2 am, and both are in darkness for about 2h before the sun comes up. Finder charts for the asteroid, **Vesta** (7.8) and dwarf planet, **Ceres** (8.1) can now be found on the BAS website under the MAPS/CHARTS tab. **PLUTO** (mag. 14) is in dark sky for much of the night and well-placed for viewing in June especially at month-end. The September BAS@Fox viewing night will target Pluto. The diagram below gives the sunrise/sunset times and the sun's altitude on three dates this month. **Note the Sun is highest on June 21 at Summer Solstice.** The moon calendar lower right shows June lunar phases. Times of moonrise for NM (Jun 8), FQ (Jun 16), FM (Jun 23) and LQ (Jun 29) are given in the Sky Calendar at left. Note the largest FM of 2013 is on Jun 23.

BAS Events

- June 1 **Huron Fringe Birders** annual ESFox visit 9:00 pm (LQ+1) Contact: John H.
- June 5 **BAS meeting** at ES Fox Observatory NOT Grey Roots Museum 7 pm **Videos Night**
- June 8 **BAS viewing @Fox** ES Fox@dark (NM) backup June 30 (LQ moon)
- June 14 **Public viewing at GR** Grey Roots Museum 9 pm (Members with scopes please)
- June 17 **Can Fed Univ Women** star talk (Hanover).
- June 21 **Summer Solstice** Keppel Henge 11 am (Members with solar scopes please)
- June 16 to 21 **Venus and Mercury** close approach in western sky, minimum separation on June 19 less than 2° (FQ moon)
- June 28 **Meaford Market** displays, Joan S. and John H.



Special Events

Mercury & Venus

This month Mercury and Venus put on a show in the western sky. On two occasions, we get to see the two interior planets (Mars and the others are the exterior planets) in a nice grouping. First on June 10, the duo are joined by a nice crescent moon as show in the Starry Night rendition below. Venus and Mercury are about 5° apart and the moon is about twice that distance to the East. A nice group that should be easy to capture with a 100 mm focal length lens on a digital camera.

Later in June, on the evening of the 19th, Venus and Mercury are the closest they will get during this apparition - a mere 2° separation as Mercury drops back down towards the horizon while Venus continues tracking eastwards. The event takes place near Wasat shown on the Starry Night diagram at right. Both planets have phases that should be visible at medium power: Mercury, a thin crescent and Venus a fat gibbous phase. It will be interesting to see the contrasting phases. Take pictures! Send them to SGN! Thank you!



June 2013

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-------|-----|-----|-----|-----|-----|--|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 NM |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 FQ | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 FM | 24 | 25 | 26 | 27 | 28 | 29 LQ |
| 30 | | | | | | By permission University of Texas McDonald Observatory |

BAS Member Loaner Scopes

Solar H-alpha scope now available!

Our Lunt solar scope is now available for loan by BAS members! You need to provide a mount like a heavy-duty tripod, or a regular equatorial or azimuth mount). A short training session will be provided on pickup. This scope will be used by BAS for the June 21 Solstice at Keppel Henge but is available at other times for a month or so.

One 12-inch Dob still available.

One 12-inch telescopes has been spoken for but the other is still available for the summer. We have two **8-inch dobsonians** for free member loan as well. Contact Brett T. or Aaron T. Scopes come in and out periodically so keep checking with Brett or Aaron if you are interested in a loaner.



SGN Classified Ads Section

(Now also on our website)



FOR SALE: Canon EOS 50D DSLR (body only)

New Lower Price!

15.1 Mp Excellent noise reduction features for night photos. Includes spare battery and charger, strap, software and manual.

Asking \$ 500. John H. 519 371-0670 stargazer@wightman.ca

Information about the 50D can be found here:

http://en.wikipedia.org/wiki/Canon_EOS_50D

and here: <http://www.imaging-resource.com/PRODS/E50D/E50DA.HTM>

FOR SALE: Televue Pronto

2 element E.D. Refractor, 2.7" / 70mm diameter. f.l. 480mm, f/6.8. with 1-1/4" Star Diagonal, with 45 degree Prism diagonal (for terrestrial viewing), with TeleVue Red dot finder, complete with TeleVue Soft Case. Asking \$ 700.-- Firm Anton VanDijk 519 376-9912 ravand@rogers.com



FOR SALE: Apple iPod 4th Gen. 32 G

Belkin Case, stylus. Screen protected cover from day 1. Will do everything an iPad or iPad mini does. Note, iPods can be used for email and web access but they are **NOT** an iPhone. Asking \$ 180. John H. 519 371-0670 stargazer@wightman.ca

WANTED: Old-style slide projector table with AC outlets -collapsible.

Something like image below. Glad to take a donation but will pay nominal amount to take this item off your hands. Contact John at stargazer@wightman.ca



Don't let these cute little tykes fool you...

Horoscope for May-June : Gemini

Everyone loves a Gemini because everyone loves a schizophrenic. You like to think that you are a half-and-half mixture of Socrates and Michelangelo, but in reality it's more like Prince and Bea Arthur. You are progressive, outgoing, and one of the most popular rides at Cedar Point. However, you can and will negate all of this

by the time you're finished reading this sentence. Geminis drive funny cars. They often drive them into trees or buildings. Geminis are pushy and overbearing. They pick fights with small children and moon people at weddings. They like to use Libras as punching bags. A bisexual Gemini is a walking double date. The rest are hermaphrodites. Geminis vandalize their own houses. Geminis use far-fetched analogies to describe philosophical concepts. Geminis rarely compete in the Olympics. When they do, it is usually pool or air hockey. Frogger turns up as well. Geminis are always on some sort of medication. This medication is not always legal. Gemini is Latin for "I'm okay, I'm okay." Geminis speak very loudly in order to be heard. This is unfortunate as they are nearly always talking to themselves. In fact, they often pick animated arguments with themselves in the bathtub. The most famous Gemini in history is Orville and Wilbur Wright. Geminis are frequently ambidextrous, which means that they can pick both sides of their noses at the same time. The Gemini is essentially nothing more than a paranoid Aquarius.