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Categories

1. [GREETINGS](#)
2. [SOCIAL HIGHLIGHTS](#)
3. [UPCOMING EVENTS](#)
4. [THIS MONTH IN HISTORY](#)
5. [COOL PICS/VIDEOS](#)
6. [FEATURED ARTICLES](#)
7. [BUY AND SELL](#)
8. [ASK AN EXPERT](#)
9. [KIDS KORNER](#)
10. [THE SKY THIS MONTH](#)

Quick Links

[ABOUT THE CLUB](#)

[NEWSLETTER ARCHIVES](#)

[MONTHLY SOCIALS](#)

[BECOME A MEMBER](#)

[NEWSLETTER SUBMISSIONS & SUGGESTIONS](#)

1. Greetings!

Welcome to the Cowichan Valley StarFinders Astronomy club's "Clear Skies" monthly newsletter.

Well you would think with all this rain that we've had you're editors would have had loads of time to get this issue onto the wires. Let me tell you we have had our share of many other adventures. Regardless, we have a good one in store for you.

In the May issue we missed mentioning our newest member Dan Posey. It turns out that Dan is Uli's stepson and has inherited Uli's scope. How cool is that, so please take the time to welcome Dan at one of our socials.

Speaking of Socials; our next one is on **June 23rd** and it is our **Summer BBQ and Annual General Meeting**. Please email us ASAP if you plan to attend so that we may have enough food for all. Our email is newsletter@starfinders.ca For more info on the BBQ AGM Social go to the Socials category below.

On **June 21** - The Summer Solstice occurs in the northern hemisphere at 11:28 UT. The Sun is at its highest point in the sky and it will be the longest day of the year. This is also the first day of summer and International Aboriginal Day.

Also mark your calendars for **June 26** the first lunar eclipse of 2010. This is a partial eclipse occurring at the Moon's ascending node in western Sagittarius about 3° east of the Lagoon Nebula (M8). For more tasty celestial events this month check out "The Sky This Month" section.

Many thanks to this month's contributors Moe R, and Bryon T.

By Freda Eckstein

"Astronomers, like burglars and jazz musicians, operate best at night" - Miles Kington

[back](#)

2. Socials

Our next Social is our Annual **Summer BBQ and AGM** on **WEDNESDAY June 23rd** Please email us ASAP if you plan to attend so that we may have enough food for all. Our email is newsletter@starfinders.ca

The event is hosted by CVSF so all the food and soft drinks are supplied. Just come out and have a hot dog or hamburger with all the fixin's and do a bit of hob knobbing and socializing with other club members.

Time: the **BBQ begins at 6:30 pm**

New Place: Brian & Joanne Robilliards home in Mill Bay at **2429 Bidston (off of Frayne Rd)**

Phone: **250-743-6997**

Look for the sign.

As a registered Society, we must hold one meeting a year that is considered an

AGM. There are three parts to the AGM, the Report of the Directors, the Financial Statement and election of Directors (which take effect in September). The CVSF Board of Directors positions are as follows:

President - Chairs the Annual AGM, directs the Society in all matters of its business, co-signs financial and business transactions of the Society, co-ordinates the annual ISP, Sets up annual speaker series features and, Hosts monthly socials.

Vice-President - Fills-in with Presidential duties if the President is unavailable

Treasurer - Keeps the official seal of the Society, shall co-sign any financial and business transactions of the Society, maintains financial accounts, and prepares an audit of the Society's books for the Annual General Meeting. In addition, the Treasurer shall have responsibility for all financial and administrative matters concerning membership and, co-ordinates new memberships with Editors.

Secretary- Responsible for the official correspondence of the Society, record minutes of all annual AGM, and provides monthly social highlights to Newsletter Editors.

Public Outreach Officer - Sets up sidewalk astronomy sessions with the public, Helps in promoting the ISP and, maintains the "Reach For the Stars" school telescope loner program.

Webmaster- Keeps the club website current, Administers CVSF Listserv members, and Resolves any website errors with the host webmaster.

Newsletter Editor - Elicits from club members and Web noteworthy news, Compiles and edits information, Produces monthly "clear skies" newsletter and, Notifies club members of newsletter postings and Social events

If you would like more information on the above Director positions, please contact us at newsletter@starfinders.ca Please think hard about helping out the club by becoming a director, it is with your help that we continue into our 22 year. New ideas and enthusiam are always welcome.

Nominations shall be made by voting members in good standing and only voting members in good standing may be nominated. An individual may be nominated for more than one office. Members of the Board may stand for re-election. In all cases, consent of nominees must be obtained in advance. Nominations may be made at the Annual General Meeting or may be conveyed in writing to any member of the Board before the Annual General Meeting. Nominations for all offices shall be completed before balloting occurs.

[back](#)

Highlights – May 26/10

By Freda Eckstein

Feature: "**Living and Working on the International Space Station**" with guest speaker Dr. Robert Gifford. Dr. Gifford provided us with some wonderful insights into not only the ISS module itself but into some of the critical factors into physio environmental factors as well. Did you know the ISS is only 2 or 3 school buses in size? That the residents sleep up against the wall? That the astronauts see 16 sunrises per day? That there have been over 500 people in space since the program began?

More than ever it is critical to get the right astronauts for the job and selection is based on the Personality Big 5.

1. Neuroticism
2. Conscientious
3. Agreeable (price for being nice)
4. Openess
5. Extraversion

With more density there usually is added intensity. A study funded by the Canadian Space Agency looked into the aspects of habitability. How to best manage the physical environment and living

space. Is it liveable? What are the psycho environmental factors? Once selected astronauts are sent to "Star City" in Russia for simulation testing prior to their flight. After the discussion we saw the only completed tour of the ISS that is available today. The film was 16 minutes in duration and afterward we were asked to fill out a survey on how we felt about certain aspects of the ISS and if we could what would we change about the ISS. All in all a very interesting night, I was just sad to see that we did not produce a bigger crowd for Dr. Gifford. But who knows maybe we can have him come back again to give his talk....it was definitely one that should not be missed.

[back](#)

3. Upcoming Events



June 19 Crystal Journey "Summer Solstice Celebration" 7:30 PM to 10:00 PM Alix Goolden Hall
907 Pandora Ave, Victoria

With Special Guest "Lee Simmons" from the Secret World of Crystals, who will project images of photos taken of the inside of Crystals, an amazing and beautiful addition to the music. With over 700 concerts to date this is one of the most amazing and mystical journeys through sound today. All acoustic and improvised. Over 15 Quartz Crystal Bowls, 10 Paiste Planetary Gongs, Vibraphone and Santoor. Every gong features a strong fundamental note tuned to represent a natural harmonic series based on the orbital properties of the Sun, the Earth, the Moon and the other planets. It's like having a full orchestra. The intent of the performance is to create soothing, meditative and healing music. Cost \$20.00

June 20 Crystal Bowl & Planet Gong Concert "Sounds of the Solar System" at 7:30

Bhakti Vedanta Temple 123 Station St, Duncan

Duncan is the last stop on David Hickey's amazing tour, it is also Solstice, Father's Day, & Aboriginal Day so don't miss this one of a kind experience... Transform your body, mind & spirit on a cellular level by experiencing David Hickey's many crystal bowls & gongs! A concert like no other, bring your yoga mat & blanket, & be prepared to journey beyond our solar system. Cost: \$20

At the Door More Info: Natasha Hutchinson rainbowlovegoddess@hotmail.com 250.715.8325

Now Playing at the National Geographic IMAX Theatre, Victoria

Dinosaurs Alive

A global adventure of science and discovery -- featuring the earliest dinosaurs of the Triassic Period to the monsters of the Cretaceous "reincarnated" life-sized for the giant IMAX® screen.

For show times see website: http://www.imaxvictoria.com/showtimes-rates/index.cfm?movieid=MO_20100415154232685499&publicschool=P

Hubble, Change How You View Our Universe!

Narrated by Leonardo DiCaprio and vividly captured with IMAX technology, HUBBLE recounts the amazing journey of the most important scientific instrument since Galileo's original telescope and the greatest success in space since the Moon Landing. For show times see website:

<http://www.imaxvictoria.com/index.cfm>

AVATAR: The IMAX Experience (2D) Extended until June 24

James Cameron, the director of Titanic, takes us to a spectacular new world beyond our imagination, where a reluctant hero embarks on a journey of redemption, discovery and unexpected love — as he leads a heroic battle to save a civilization in this epic action adventure fantasy. <http://www.imaxvictoria.com/now-playing/index.cfm>

NASA Launches credit NASA.Com:

No Launches for June

[back](#)

4. This Month In History

Courtesy of: Windows to the Universe

June 8 - 1625 - Birthday of Giovanni Cassini

Giovanni Cassini was Italian-French astronomer who lived between 1625-1712. He discovered that Saturn's Rings are split into two parts, and today the gap between them is called the "Cassini Division". He also discovered four of Saturn's moons.

June 10 - 1895 - Birthday of Immanuel Velikovsky

Immanuel Velikovsky was a writer born in 1895 in Vitebsk, Russia. After traveling and working in many places throughout the world, he moved to the United States. Immanuel Velikovsky wrote many books regarding history, religion and science. His most famous work is *Worlds in Collision*.

June 13 - 1831 - James Maxwell's birthday

James Clerk Maxwell was a Scottish physicist who lived between 1831-1879. Maxwell is most famous for his equations linking electricity and magnetism. His revolutionary work led to the development of quantum physics in the early 1900's and to Einstein's theory of relativity.

June 16 - 1977 - Death of Wernher von Braun

Wernher von Braun was a German engineer who lived between 1912-1977. He is considered the father of the space age for his work in rocketry.

June 18 - 1945 - Florence Bascom's death

Florence Bascom was one of the first female geologists in the United States and her fellow scientists thought she was one of the nation's most important geologists. She lived from 1862 until 1945.

June 25 - 1894 - Hermann Oberth's birthday

Hermann Oberth, born in Transylvania, Romania, was a physicist who lived between 1894-1989. Oberth studied rockets and wrote books on how they could be used to launch objects into space. He originated the idea of rocket stages.

June 28 - 1889 - Death of Maria Mitchell

Maria Mitchell was an American astronomer who lived from 1818-1889. She was the first female professor of astronomy in the United States. She discovered the comet of 1847. In 1848, she was the first woman appointed to the Academy of Arts and Sciences.

June 29 - 1868 - Birthday of George Hale

George Hale was an American astronomer. Hale invented an instrument called the spectrohelioscope, which is used to measure the chemicals that make up the stars. He is also known for developing the field of Astrophysics.

June 30 - 1905 - Einstein introduces special Theory of Relativity

Albert Einstein introduced special Theory of Relativity in paper *Electrodynamics of Moving Bodies*.

[back](#)

5. Cool Pics/Videos

Want to show off your latest pics? Well here's your chance; email the editor at [My Cool Pics](#) and we will try to post them in the next edition of "Clear Skies".

Check out our Photo gallery on the website where you can find pics from past and current Island Star Parties (ISP). Quick link is <http://starfinders.ca/photogallery.htm>

[back](#)

6. Featured Articles

Articles

[RETURN TO CATEGORIES](#)

1. [Big Mystery: Jupiter Loses a Stripe](#)
2. [SOHO Catches Comet Diving into Sun](#)
3. [Hatch Closed: 18 Month Mission has Begun](#)
4. [Old Moon Rover Beams](#)

Big Mystery: Jupiter Loses a Stripe – May 20/10 credit Science@NASA

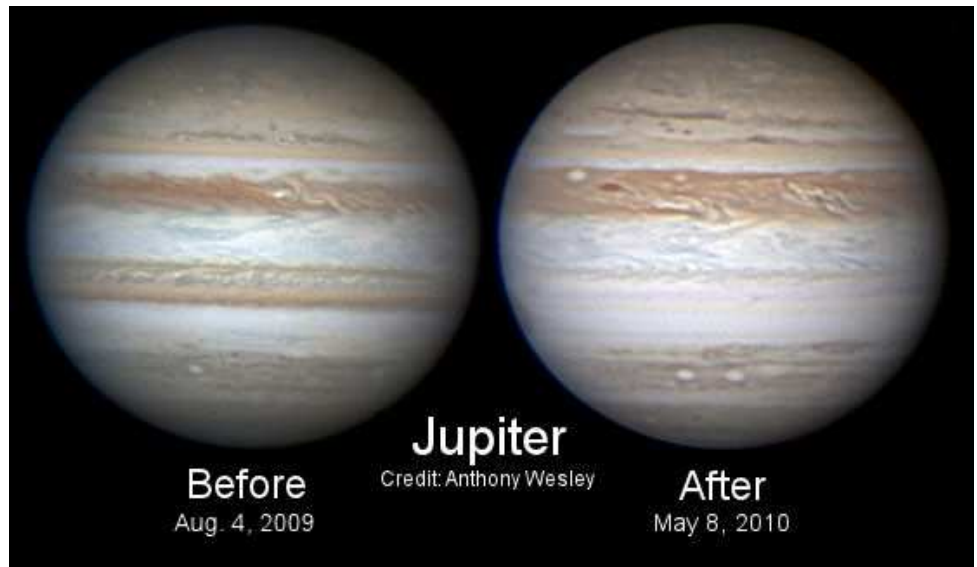
In a development that has transformed the appearance of the solar system's largest planet, one of Jupiter's two main cloud belts has completely disappeared.

"This is a big event," says planetary scientist Glenn Orton of NASA's Jet Propulsion Lab. "We're monitoring the situation closely and do not yet fully understand what's going on."

These side by side images of Jupiter taken by Australian astrophotographer Anthony Wesley show the SEB in August 2009, but not in May 2010. Individual images: Aug. 4, 2009; May 8, 2010.

Surprising Laser Flashes to Earth

5. NRC Drives Strategy to Commercialize Biofuel From Algae
6. A Comet Flies Through June's Sky



Known as the South Equatorial Belt (SEB), the brown cloudy band is twice as wide as Earth and more than twenty times as long. The loss of such an enormous "stripe" can be seen with ease halfway across the solar system. "In any size telescope, or even in large binoculars, Jupiter's signature appearance has always included two broad equatorial belts," says amateur astronomer Anthony Wesley of Australia. "I remember as a child seeing them through my small backyard refractor and it was unmistakable. Anyone who turns their telescope on Jupiter at the moment, however, will see a planet with only one belt—a very strange sight." Wesley is a veteran observer of Jupiter, famous for his discovery of a comet hitting the planet in 2009. Like many other astronomers, he noticed the belt fading late last year, "but I certainly didn't expect to see it completely disappear," he says. "Jupiter continues to surprise."

Orton thinks the belt is not actually gone, but may be just hiding underneath some higher clouds. "It's possible," he hypothesizes, "that some 'ammonia cirrus' has formed on top of the SEB, hiding the SEB from view." On Earth, white wispy cirrus clouds are made of ice crystals. On Jupiter, the same sort of clouds can form, but the crystals are made of ammonia (NH₃) instead of water (H₂O).

What would trigger such a broad outbreak of "ammonia cirrus"? Orton suspects that changes in global wind patterns have brought ammonia-rich material into the clear, cold zone above the SEB, setting the stage for formation of the high-altitude, icy clouds. "I'd love to send a probe in there to find out what's really going on."



Jupiter Loses a Stripe (Jupiter on May 18, 2010, 200px) Without the SEB present, Jupiter's Great Red Spot is surrounded by almost uninterrupted white. Anthony Wesley took this picture on May 18, 2010.

Indeed, Jupiter's atmosphere is a mysterious place which would benefit from exploration. No one knows, for instance, why the Great Red Spot is red—or what has sustained the raging storm for so many years. Neither does theory explain why the twin equatorial belts are

brown, nor why one should vanish while the other remains. "We have a long list of questions," says Orton.

This isn't the first time the SEB has faded out. "The SEB fades at irregular intervals, most recently in 1973-75, 1989-90, 1993, 2007, 2010," says John Rogers, director of the British Astronomical Association's Jupiter Section. "The 2007 fading was terminated rather early, but in the other years the SEB was almost absent, as at present." "We can look forward to a spectacular outburst of storms and vortices

when the 'SEB Revival' begins," says Rogers. "It always begins at a single point, and a disturbance spreads out rapidly around the planet from there, often becoming spectacular even for amateurs eyeballing the planet through medium-sized telescopes. However we can't predict when or where it will start. On historical precedent it could be any time in the next 2 years. We hope it will be in the next few months so that everyone can get a good view.

"I'll be watching every chance I get," says Wesley. "The revival will likely be sudden and dramatic, with planet-circling groups of storms appearing over the space of just a week or so."

Indeed, says Orton, "anyone could be the first to spot the return of the SEB."

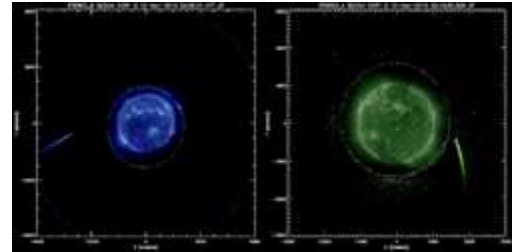
Jupiter shines in the eastern sky before dawn. Point your optics at the "morning star" and ... is that really Jupiter? Happy hunting!

[back](#)

STEREO, SOHO Spacecraft Catch Comet Diving into the Sun— May 25/10 credit *University of California, Berkeley*

Solar physicists at the University of California, Berkeley, have captured for the first time the collision of a comet with the Sun.

Right: NASA's twin STEREO spacecraft caught this image of a comet diving into the Sun. The comet survived the intense heat of the Sun's corona and disappeared in the chromosphere.



Using instruments aboard NASA's twin Solar TERrestrial RELations Observatory (STEREO) spacecraft, four postdoctoral fellows at UC Berkeley's Space Sciences Laboratory were able to track the comet as it approached the Sun and estimate an approximate time and place of impact. STEREO, launched in 2006, consists of identical spacecraft orbiting the Sun, one ahead of Earth and one behind the Earth, providing a stereo view of the Sun. The postdoctoral fellows then looked at data from the ground-based Mauna Loa Solar Observatory in Hawaii and found images in the predicted spot of what appears to be a comet approaching the limb of the Sun from behind the solar disk. "We believe this is the first time a comet has been tracked in 3-D space this low down in the solar corona," said Claire Raftery, a postdoctoral fellow newly arrived from Dublin's Trinity College.

Sun-grazing comets, composed of dust, rock and ice, are seldom tracked close to the Sun because their brightness is overwhelmed by the solar disk. This comet apparently survived the heat of the corona and disappeared in the chromosphere, evaporating in the 100,000 kelvin heat.

Raftery and her colleagues, Juan Carlos Martinez-Oliveros, Samuel Krucker, and Pascal Saint-Hilaire, concluded that the comet was probably one of the Kreutz family of comets, a swarm of Trojan or Greek comets ejected from their orbit in 2004 by Jupiter, and making its first and only loop by the Sun. The swarm probably resulted from the disintegration of a larger comet. The team presented its data and images Monday at the Miami, Florida, meeting of the American Astronomical Society.

Martinez-Oliveros' attention was first drawn to the comet after seeing it mentioned in a summary of March 12, 2010, observations by STEREO and by the Solar and Heliospheric Observatory (SOHO). The comet's long, bright tail of dust and ions tagged it as a Sun-grazing comet seen often by solar astronomers and observatories such as STEREO. Assuming it was a going to loop around the Sun, they decided to see whether the STEREO data were good enough to let them calculate its trajectory. In fact, the data were good enough to chart the comet's approach for 2 days before impact.

With an estimate of the impact zone within a circle about 620 miles (1,000 kilometers) in diameter, they searched online data from the Mauna Loa Solar Observatory in Hawaii to see if they could see the comet next to the Sun's edge in the ultraviolet region of the spectrum. They found a short track, lasting about 6 minutes, just a few thousand kilometers above the Sun's surface in the million-degree corona and 100,000-degree chromosphere.

Based on the comet's relatively short tail, about 2 million miles (3 million km) in length, they believe that it contained heavier elements that do not evaporate readily. This would also explain how it penetrated so deeply into the chromosphere, surviving the strong solar wind as well as the extreme temperatures, before evaporating.

For their study, the team used the two coronagraphs on STEREO A and B and multiple instruments on SOHO, "demonstrat[ing] the importance of multi-view observations of non-solar phenomena," they wrote in their poster. All members of the team study explosive events on the Sun, such as coronal mass ejections, and the hot ionized plasmas they throw into space. Their detour into cometary physics was purely accidental, they said. "It was supposed to be an exercise, but it took over our lives," Raftery said

[back](#)

Hatch Closed: 18-Month Mars500 Mission has begun – June 3/10 credit ESA News



Mars500, the first full-length simulated mission to Mars, started today in Moscow at 13:49 local time (11:49 CET), when the six-man crew entered their 'spacecraft' and the hatch was closed. The experiment will run until November next year.

The mood was serious and very determined in the Mars500 facility at the Institute of Biomedical Problems in Moscow this afternoon, as the crew talked to the press and then walked into the modules that will be their home for the next 520 days.

Left: Crew just before ingress. Diego Urbina and Romain Charles from Europe, Sukhrob Kamolov, Alexey Sitev, Alexandr Smoleevskiy and Mikhail Sinelnikov from Russia and Wang Yue from China face a mission that is as close as possible to a real space voyage without leaving the ground. They will live and

work like astronauts, eat special food and exercise in the same way as crews aboard the International Space Station.



work like astronauts, eat special food and exercise in the same way as crews aboard the International Space Station. Their mission is to 'fly to Mars' in 250 days, 'land on and explore Mars' for a month and 'return to Earth' in 230 days, using their imitation interplanetary spacecraft, lander and martian surface. Left: Diego testing the computer

The hatch will remain closed until November 2011 and the crew must manage using the food and equipment stored in the facility. Only electricity, water and some air will be fed into the compartments from outside.

Problems ahead

In addition to testing many novel technologies, Mars500 is an extreme test of human endurance. Staying almost 18 months inside the metallic containers will be hard, even after being trained and briefed by astronauts and submariners. The crew will no doubt have their ups and downs during the long mission, and these psychological changes are a key part of the experiment. The 'astronauts' will normally divide their weekdays equally between work, free time and rest, with the weekends usually free. They have taken plenty of films, books, games, musical instruments and entertainment with them. Right: Romain in his cabin



Their bodies will start to adapt to the new conditions – a closed environment with restricted space can quickly lead to poor physical condition. The crew needs to exercise up to two hours a day, but they



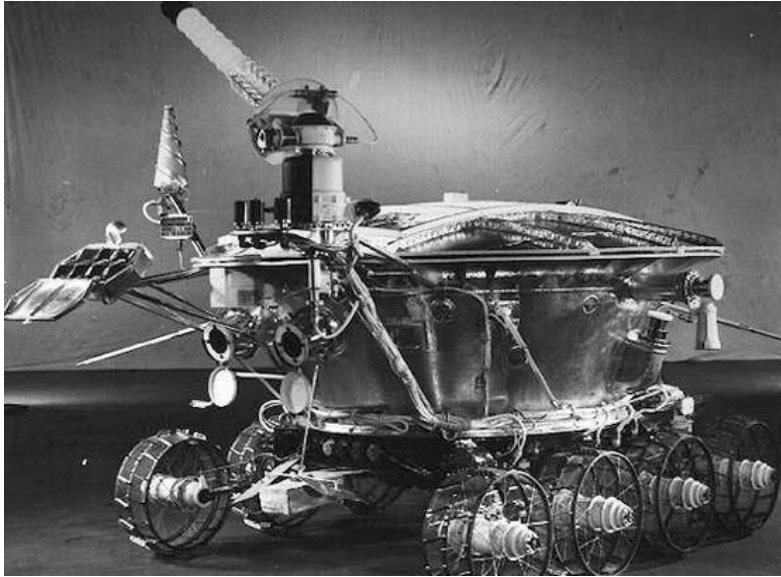
can shower only once a week. What have I forgotten? Preparing everything from soap and clothing to food and spare camera batteries for a self-contained 18-month mission is a critical and complex task. And finally the technology: the facility is not a spacecraft, but it uses many systems that will be found on a real Mars craft. Testing these in realistic conditions is important. The crew has been trained to repair every single bolt of their 'craft' and outside help will be given only in extreme situations.

Left: Sukhrob signalling that he's 'go' See you in 520 days

Throughout their mission, Diego Urbina and Romain Charles, the ESA crewmembers, will send diary updates and videos to ESA's Mars500 site. The first diary entry has been published today: "**Goodbye Sun, goodbye Earth, we are leaving for Mars!**"

[back](#)

Old Moon Rover Beams Surprising Laser Flashes to Earth – June 3/10 credit Science@NASA



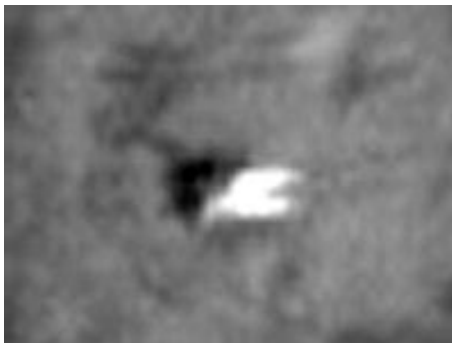
A Soviet robot lost on the dusty plains of the Moon for the past 40 years has been found again, and it is returning surprisingly strong laser pulses to Earth.

"We shined a laser on Lunokhod 1's position, and we were stunned by the power of the reflection," says Tom Murphy of UC San Diego, who leads the research team that's putting the old robot back to work. "Lunokhod 1 is talking to us loudly and clearly."

Left: It looks like a creature from science fiction, but Lunokhod 1 is real. Photo Credit: Lavochkin Association.

Almost forgotten in the lore of the Apollo-era space race, Lunokhod 1 was one of the greatest successes of the old Soviet lunar exploration program. In 1970, Time magazine described the robot's historic landing:

"Three hours after reaching the Moon aboard the latest unmanned Russian Moon probe, Luna 17, Lunokhod 1 (literally "moonwalker") lumbered down one of two ramps extended by the mother ship and moved forward ... thus taking the first giant step for robotkind on another celestial body."



The remote-controlled rover traveled almost 7 miles during its 11 month lunar tour, relaying thousands of TV images and hundreds of high-resolution panoramas of the Moon back to Earth. It also sampled and analyzed lunar soil at 500 locations.

Then Lunokhod-1 was lost – until last month when NASA's Lunar Reconnaissance Orbiter found it again. The recovery is described in an earlier NASA press release. Left: An LRO photo of the Luna 17 lander. Note the Lunokhod 1 tracks circling the lander.

On April 22, Murphy and his team sent pulses of laser light from the 3.5 meter telescope at the Apache Point Observatory in New Mexico, zeroing in on the target coordinates provided by Lunar Reconnaissance Orbiter. A laser retroreflector on Lunokhod 1 intercepted the pulses and sent a clear signal back to Earth.

"We got about 2,000 photons from Lunokhod 1 on our first try. After almost 40 years of silence, this rover a lot to say," notes Murphy.

Back in the late 1960s and early 1970s, Apollo astronauts placed three other retroreflectors on the Moon to allow laser ranging of the Moon's orbit. Assisted by a fourth reflector on Lunokhod 2, a twin of Lunokhod 1 that landed in 1973, these mirrors constitute the only Apollo science experiment still operating.

Right: Lunar laser ranging from the McDonald Observatory.



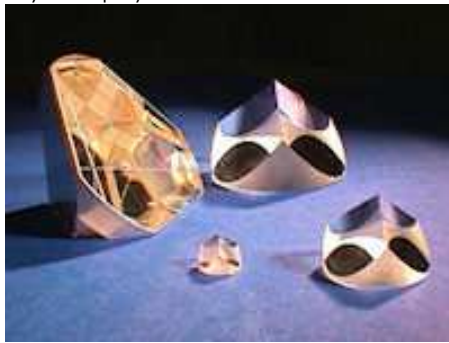
Eric Silverberg, now retired from the University of Texas, was in charge of the lunar laser ranging activities at the McDonald Observatory from 1969 until 1982. "During that time," he recalls, "we successfully ranged all three of the Apollo corner reflectors and the Lunakhod 2 reflector. We also tried to range on the first lunar rover but had only one possible (but not definite) detection on Dec 31, 1970. Our lack of knowledge of the location of the rover and the pressures of keeping up with the Apollo program caused us eventually to lose interest in Lunakhod 1."

"When I read that Tom Murphy had discovered returns from the lost rover I was very surprised and elated," says Silverberg.

Murphy's initial reaction was disbelief: "The signal was so strong; my first thought was that our detector was acting up! I expected the rover's reflector to be degraded and dull after all this time, so I thought, 'this couldn't possibly be it.' But it was."

"This reflector is even strong enough to let us get measurements in lunar daylight – a first for this experiment!" Silverberg continues: "The fact that Lunokhod 1's reflection is now stronger than that of its twin is a mystery. This may yield important clues as to why all of the reflectors are weaker than in the first decade after landing." With Lunokhod 1 back in the fold, the laser ranging study can get up to full throttle for the first time.

The scientists are using laser ranging to push hard on Einstein's gravity theory "to see if we can break it," says Murphy.



Left: Corner-cube prisms return any incident light back in exactly the direction from which it came.

"Our telescope shoots out laser pulses that travel from Earth to the Moon and ping the reflectors. Because these are all 'corner-cube reflectors,' they send the pulse straight back where it came from. We scoop up as many of the returning photons as possible." The round-trip travel time pinpoints the Earth-Moon distance. With repeated measurements, over months and years, the scientists can trace the Moon's orbit with millimeter precision.

Einstein's theory of gravity (the Theory of General Relativity) holds that the mass and energy in massive objects like the sun make space curve, and this curving tells objects around the massive body how to move. The curvature actually makes the Earth and Moon fall toward the sun.

By measuring the Moon's fall through curved spacetime, the Apache Point Observatory Lunar Laser-ranging Operation--APOLLO for short--may yet find a crack in Einstein's great edifice of General Relativity. That's how science moves forward. So far, lunar ranging results support Einstein. But a funny looking old rover may shine, or at least reflect, new light on the subject.

[back](#)

NRC Drives Strategy to Commercialize Mass Production of Biofuel from Algae– June 4/10 credit NRC



Canadians could soon see renewable fuels produced on a large scale from algae grown in Nova Scotia. Speaking in Halifax, the Honourable Gary Goodyear, Minister of State (Science and Technology), made the announcement at the launch of the algal biofuel project at the National Research Council Institute for Marine Biosciences (NRC-IMB).

"Our government is investing in science and technology to create jobs, improve the quality of life of Canadians and strengthen the economy," said Minister Goodyear. "These new fuels have the potential to deliver clean air, clean energy, clean water, and economic benefits for Nova Scotians and all Canadians."

Biofuels produced from renewable resources such as algae are key to future energy sustainability and have the highest potential for carbon capture. Some species of microalgae are expected to yield as much as twenty times more oil than traditional agricultural crops. As a renewable resource, algae are a clear winner — they don't require arable land, nor do they compete with food production.

The project received approximately \$5 million through the National Bioproducts Program and NRC-IMB. Preliminary work and engineering plans have been drawn up to build a 50,000 litre cultivation pilot plant at the Ketch Harbour facility. A main component to help the algae grow will be carbon dioxide emissions from fossil fuel combustion. Carbon2Algae, an industrial partner in the effort, eventually plans to operate algae photobioreactors that will capture carbon dioxide from facilities like the Alberta oil sands or coal-fired power plants, and use these emissions to allow local strains of algae to thrive.

Researchers at the Marine Research Station in Ketch Harbour, Nova Scotia, have been growing algae for over 50 years. In assessing how best to grow algae for biofuel, NRC has joined forces with the United States Department of Energy, the National Renewable Energy Laboratory in Colorado and Sandia National Laboratories in New Mexico.

Dr. Stephen O'Leary, an NRC researcher working on the project, forecasts that commercial production of algal biofuels is likely in another five to 10 years. The project will ultimately join forces with NRC aerospace expertise to work toward commercializing algal biofuel, among other projects.

"We're asking plants to do what they do best," explained Dr. O'Leary. "With little more than water and carbon dioxide, algae can harvest sunlight and turn it into energy that could eventually be used to create jet fuel."

A key component distinguishing the National Research Council algal biofuel project from other international efforts is the focus on identifying local strains of algae that are suitable for biofuel production from specific sites in North America. The local species are already acclimatized to the environment, making them easier to grow, and avoiding the risks of importing foreign species that might accidentally be released into the environment.

[back](#)

A Comet Flies Through June's Sky— June 4/10 credit Astronomy.com

Northern Hemisphere observers have waited a long time to see a naked-eye comet with a distinct tail. With any luck, the wait will end this month. For Comet C/2009 R1 (McNaught), observers can look for it with unaided eyes, follow up with a view through binoculars, and finish with a close-up observation through a telescope. Through even a medium-sized scope, the comet's tail should look like a celestial sword angling upward into the northern sky.



Watch a naked-eye comet, C/2009 R1 (McNaught), glide through Perseus in mid-June. Comet McNaught's brightness should peak above naked-eye visibility from a dark site. It also will sport a lengthy tail that points north.

Australian astronomer Robert H. McNaught discovered this comet September 9, 2009. He was using the 19.7-inch (0.5 meter) Uppsala Schmidt Telescope as part of the Siding Spring Observatory Survey, which searches for near-Earth objects. At the time of discovery, Comet McNaught glowed faintly with a light 25,000 times fainter than the human eye can detect.

The comet will be a treat for both viewing and photography after midnight. If predictions hold, Comet McNaught should glow around 5th magnitude as it floats across the sparkling stars of the constellation Perseus the Hero in mid-June. (5th magnitude means that the comet's light output will be about 4 times as bright as the faintest stars the eye can perceive from a dark site.)

Two of Perseus' deep-sky objects — open star cluster M34 and the Alpha Persei Association — will frame this solar system interloper nicely. The prize shot comes the morning of June 8, when the comet's tail sweeps a veil of solar system dust in front of the edge-on spiral galaxy NGC 891.

The weekend of Friday, June 11, through Sunday, June 13, offers the darkest sky. New Moon occurs at 7:15 a.m. EDT on the 12th. Astronomy magazine Senior Editor Richard Talcott said, "A comet this bright isn't something that happens all the time, so go have a look. It's easy to find because of all the bright stars around it."

Comet McNaught will move northward during June. On the 21st, it passes less than 2° above the star

Capella in the constellation Auriga the Charioteer. Capella is a yellow star that ranks as the night sky's sixth-brightest luminary.

The 21st also marks the morning of the June solstice, the start of summer north of the equator. Unfortunately, observers living far north can't benefit from McNaught's higher position because of twilight that lasts all night and because of potential interference from noctilucent clouds, which glow high in our atmosphere long after the Sun has set.

[back](#)

7. Buy and Sell

Here's your chance to clean out the closet and find a home for your slightly used treasures. Post your buy and sell items by emailing the [Editor](#) with your details.

For Sale : Telescope and mount package "offers on \$1800 Cdn "
Please contact [Gail Roberson 250-715-1116](#)

DETAILS:

Telescope Optical Tube

- Celestron 8" Schmidt Cassigrain Telescope with XLT coating model year 2002?)
 - Tube rings and vixen style dovetail bar to fit scope
 - Celestron 25mm Modified Achromat eyepiece
 - Celestron 10mm Modified Achromat eyepiece Antares 8x50mm - Finder scope with illuminated reticule and quick release bracket
 - Celestron Radial Guider (off axis), model 94176
 - Celestron f/6.3 Reducer/Corrector (focal reducer)
 - 12.5mm Illuminated Reticule eyepiece (Skywatcher ?)
- * Some scratches on scope, but overall in good condition.

EQ6 Mount

- Sky Watch EQ-6 Heavy Duty Mount, (black) with EQ-6 SynScan GOTO Upgrade kit
 - Steel tripod with 2" legs.
 - Two counterweights
 - Home made wheel cart (mount sits on top, not attached)
 - All cables, chargers and adapters
- * Some paint chips, ran well as of last use. Used for astrophotography

Software and Manuals

- The Sky Level 1, v.5
- NextStar Observer List, v.2.0.2c
- Imaginovia
- Starry Night Skytheater (DVD)
- Starry Night v. 6 Users Guide
- Starry Night v.6 Companion

Additional

- USB to Serial adapter (Hap Griffin) for Nikon T-adapter for Nikon
- The Backyard Astronomer, Dickinson and Dyer
- A Guide to the Night Sky, Burnham, Dyer et tel
- Voyages to the Stars and Galaxies, Fraknoi, Morrison, Wolff

We also want to bring your attention to a FREE Telescope! You read it right; Alex Haddad at the Science Department at the Cowichan Secondary has this to offer.

"please pass around to any and all who may be interested in this behemoth. Our offer still stands: **FREE TO A GOOD HOME**" If you are interested in owning this scope, contact Alex at ahaddad@sd79.bc.ca



George Ball Observatory is looking for a new home
 The RASC Society is offering this astronomical observatory at NO COST to a good home.



The building will require a proper concrete foundation and slab. Due to its size and weight a commercial crane and trailer assembly will be required to lift and deliver it to a new site at the new owners expense. Crane costs and construction work are estimated to be in the \$2,500 to \$3,000 range. Serious inquiries are welcomed.

For an appointment to view please contact : Bruno Quenneville at (250) 477-2257

[back](#)

8. Ask an Expert

Have you been thumbing through the Astronomy or Sky and Telescope magazine and have some questions on the latest and greatest in astronomy gear? Or maybe you're narrowing down your search for just the right telescope and want to know the difference between Dobsonians, Schmidt-Cassegrains, Reflector and Refractors. Well wonder no more, email [Brian Robilliard](#) our resident expert to get the "inside scoop" on what's hot or not in astronomy gear.

Are you seeing double or unable to focus? Chances are you need to collimate your scope. Are you looking for a good eyepiece? Why do you need to know the focal length of your telescope's mirror and how do you determine the focal length? For answers to these and other telescope questions email [Ed Maxfield](#) our expert on telescope tips, hints and suggestions.

Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email [Bryon Thompson](#) our Public Outreach Officer and master of Astronomy 101 basics.

[back](#)

9. Kids Korner

For the younger astronomers. We want your input on what you would like to see happening at the club. Tell us a bit about yourself and why you love astronomy. Email the [Editor](#) with your submissions. For the older folks, if you have any ideas that might spark the interest of a young upcoming astronomer, please send your submissions to the editor.

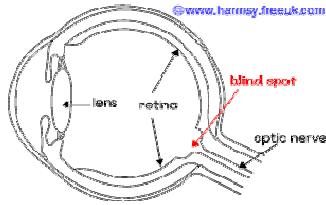
Find Your Blind Spot

Courtesy of Eyemagic

- * Close your right eye, or cover it with your hand
- * Stare at the black circle (below)
- * While looking at the circle, use 'side' (peripheral) vision to see the cross
- * Slowly move your head towards the screen
- * The cross should completely disappear
- * Move closer, and it will re-appear!



The eyes relay the image that forms on the retina to the brain via the Optic Nerves. These nerves connect to the retina from the inside, a quirk of evolution. Thus there is a blind spot at the back of each of our eyes where no rods or cones can interpret the image formed there. Human eye showing location of blind spot



We do not normally notice this effect as the brain merges together the two images from each eye, obliterating the missing information.

[back](#)

10. The Sky This Month

By Bryon Thompson

Observing Site: Duncan, 48.783°N, 123.700°W

Well, summer is on its merry way coming up this June 21st, or so they say it is. Once we get through all this rain and cloud we should be ready for fall! At least then I can take the webbed feet off my Dob mount!

Venus is still visible on the western horizon. It slowly moves eastward this month and increases in apparent brightness as it gets closer to the Earth. Venus starts the month in Gemini between Castor and Pollux but slowly throughout the month it moves into Cancer the crab and on into Leo by months end when it shines its brightest at magnitude 4.1. On **June 19th** Venus passes just north of the Beehive cluster and provides us with a nice picture opportunity; at least a nice show to officially end Spring and welcome Summer.

Mars too can be found in Leo this month. Look for the colour contrast between our ruddy neighbour and Leo's bright white star Regulus. If you use binoculars instead of your telescope you will be able to see the colour contrast more vividly. Mars appears closest to Regulus on **June 6th** but is close enough to see the difference in colour throughout the middle of the month. Mars is fairly dim at magnitude 1.2 and relatively small, only 6" at the eyepiece, due to its increasing distance. The little red planet lies 155 million miles distant at this time.

Saturn is a good telescope target this month both for observing its moons and its faint almost edge-on rings. The large planet can be found at magnitude 1.1 in Virgo, 2° from magnitude 4 Beta Virginis. The rings now tilt 1.7° to our line of sight and will continue to "grow" throughout the rest of the year. When Saturn appears in the morning October sky they will have increased to 8° in width. We will be able to see Saturn occult two of its moons this month. On **June 9/10** watch for the big planet to occult Rhea at 9:45pm PDT, and Titan at 11:40pm PDT.

If your observing takes you into the wee hours, try to see Neptune in the eastern sky. It rises around midnight local time but is almost a third of the way across the sky by 3:00am. The distant planet can be found glowing at magnitude 7.9 in Aquarius. Grab your star chart and look halfway between Mu Capricornii at magnitude 5.1 and 38 Aquarii at magnitude 5.4 to find this blue/green telescopic dot just 2.4" across. This is almost the same spot in the sky that Johann Galle looked at 164 years ago when he discovered Neptune.

This month a spotlight points your way to distant Uranus. In the early morning hours you can't miss Jupiter shining at magnitude -2.4. It is by far the brightest thing in the morning sky. Easily seen through binoculars and shining at magnitude 5.9, Uranus is only 1° away from this beacon. On **June 6** it lies only 26' North of Jupiter.

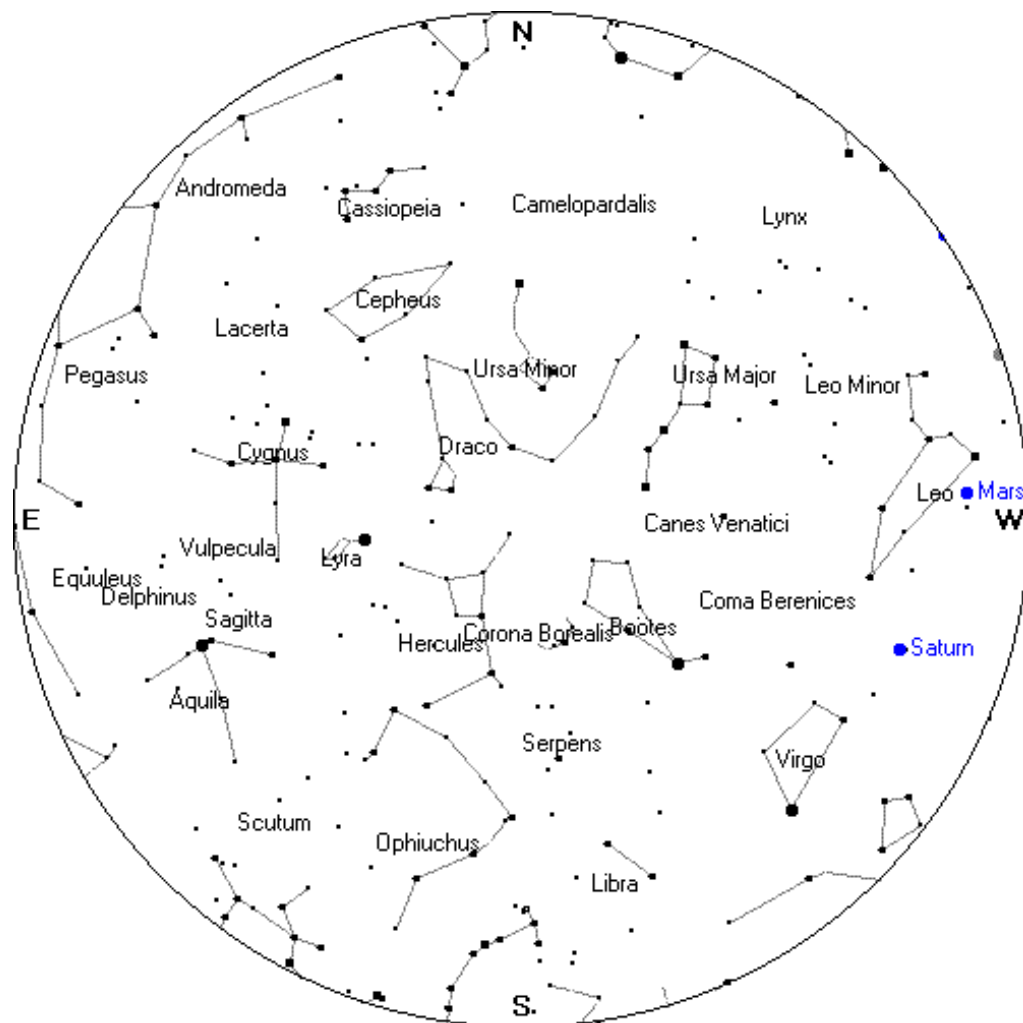
Jupiter itself is a great target for your last early morning peak before going to your pillow. Try to see if you can spot the disappearing band. I suppose if it has disappeared then looking for it is Well you know!

We have an opportunity to see the first lunar eclipse since 2008 this month. On **June 26th** the partial eclipse starts at 3:17am PDT and by 4:38am PDT almost half of the moon is eclipsed. It's not a full eclipse by any means but it is still something to behold.

The Meteor show this month is usually quite a dud, if you're looking for a lot of them. But the Bóótid Meteor shower has surprised us before with up to 100 per hour back in 1998. Look up on the night of **June 23/24** and you may be treated to a nice show. The radiant is high in the sky in Bóótes and with the debris from comet Pons-Winnecke hitting us at approx. 40,000 mph the light show could just be worth a cramp in your neck. Till next time remember, Astronomy is looking up!

June 4	03:13 PM PDT	Last Quarter Moon
June 6	08:00 AM PDT	Mars 0.9° North of Regulus
June 6	12:00 PM PDT	Uranus 0.5° North of Jupiter
June 9	9:45 PM PDT 11:40 PM PDT	Saturn occults Rhea Saturn occults Titan
June 12	04:15 AM PDT	New Moon
June 18	09:29 PM PDT	First Quarter Moon
June 19	Evening	Venus passes North of the Beehive cluster
June 21	04:28 AM PDT	Summer Solstice
June 24	01:00 AM PDT	Bóótid Meteor shower Peaks
June 26	04:30 AM PDT	Full Moon
June 26	03:17 AM PDT	Partial Lunar Eclipse

Sky Chart —Here's your mid-June midnight sky chart. In order to use the sky chart properly remember the centre of the chart is the sky directly above your head (or the Zenith). Turn the chart so that the direction you are facing is at the bottom of the chart (or pointed toward your toes). The star field directly in front of you will be between the bottom of the chart and the centre.



SkyChart Courtesy of Heavens-Above

[back](#)