



Clear Skies

Volume 16 Issue 9

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1. Greetings!

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

Happy new year everyone! I hope you and yours a healthy and prosperous year ahead. I'm hoping some of you have had time between the breaks in rain to go out and look up. As you know the winter sky is much more interesting than the summer sky and it is also the prime testing ground for all our new Christmas gifts. If you don't believe me, check out Chris Saunderson's photo of the *Nebula in Orion* in the Cool Pics/Videos section.

The folks at the Sloan Digital Sky Survey teams have been busy combining the new SDSS-III data release, along with the previous data releases, to give astronomers the most comprehensive view of the night sky ever made. Check out the article "Astronomers Release the Largest Color Image of the Sky Ever Made" in the Featured Article section.

When Bryon or I mention that we are "amateur Astronomers" we usually get the response that they are either too old to learn about Astronomy or not smart enough. As you know neither one of those excuses are true. You are never too old to learn nor too young as in the recent case of the 10-year-old Canadian girl who has become the youngest person to discover a supernova. Check it out.

Also, don't forget our **January 26th Social "The Theory of Chaos"** presented by **Dr. Florin Diacu**. Mathematical models have been used to try to explain and predict complex and destructive natural phenomena, including asteroid collisions, earthquakes, tsunamis, volcanoes, hurricanes, pandemics and climate change. The Presentation is based on the presenter's book, *Celestial Encounters, the Origins of Chaos and Stability*. For more information on the social refer to the Social & Highlights section of this issue.

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

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2. Socials

Socials are held on the 4th Wednesday of each month at the home of Bryon and Freda. Click on the [Map](#) or follow these directions.

Island Hwy, Mill Bay

Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)

Turn right on Huckleberry Rd

3rd house on the left across from Springbank road and Mail boxes.

Look for the STAR sign

Please park on Huckleberry or Springbank Rd's.

Call Brian 743-6633 if you need directions

Our next Social will be held at **7:30pm** on **WEDNESDAY January 26th**

Feature: ""**The Theory of Chaos**" presented by **Dr. Florin Diacu**

Chaos theory studies the behavior of dynamical systems that are highly sensitive to initial conditions; an effect which is popularly referred to as the butterfly effect.

Florin Diacu is the Professor of Mathematics at UVic. His research interests involve celestial mechanics, dynamical systems, chaos, mathematical physics, history and philosophy of mathematics, mathematical, statistical, and astronomical methods in the study of historical chronology

He is the author of three popular science books: *Celestial Encounters – the Origins of Chaos and Stability*, a history of ideas in the field of chaos theory; *The Lost Millennium*, an exploration of the history of chronology; and *Megadisasters: Predicting the Next Catastrophe*, a history of the struggle to understand the destructive forces of nature. Other books include: *Classical and Celestial Mechanics*, *An Introduction to Differential Equations-Order and Chaos and Singularities of the N-Body Problem*.

I came across an interview that UVic did with Dr. Diacu in April 2010. Click on the link to read [Predicting the Unpredictable](#). Also, check out Dr. Florin's [homepage](#) to find out more about his research and hobbies. See you at the social.

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3. Social Highlights – December 15th, 2010

By Nancy Kirshfelt

Was held at the "Good Company Steakhouse" in Duncan.

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4. Upcoming Events



Every Wednesday from 8-10 In The Sky Above, at UVic (until April 2011)

The University of Victoria's newest stellar acquisition is the largest telescope on a university campus in Canada; members of the public are invited to take in the view every Wed. night at UVic. The telescope is on the roof of UVic's new science building and is the country's fifth largest overall. Visitors can expect to observe visible planets, double stars, open clusters, nebulae and even the Andromeda Galaxy.

Weekly viewings continue through April 2011, except last two Wed. in Dec.

Bob Wright Centre, fifth floor (use main lobby elevator on east side of building)

Admission is free. All ages and levels of cosmological knowledge are welcome.

Evening parking is \$2.

Campus maps are available at www.uvic.ca/visitors/explore/maps.

For event info, contact the astronomy department at the numbers below.

Contacts: Russell Robb (Senior Lab Instructor, Department of Physics & Astronomy) at 250-721-7750
250-721-7750 or robb@uvic.ca

Jan 11 - 6:30 pm Café Scientifique "**A Walk on the Dark Side - Dark Energy and the Mystery of the Accelerating Universe**" by Dr. Chris Pritchett at the Strathcona Hotel - Maple Room 919 Douglas Street, Victoria BC. Admission is complimentary and light appetizers and beverages are provided.

Café Scientifique is an informal seminar series sponsored by the Centre for Biomedical Research that provides insight into health and science-related issues of popular interest to the general public. These seminars are opportunities for the public to meet local researchers and discuss some of the most interesting and sometimes contentious research currently underway in Canada.

NASA Launches credit NASA.Com:

No launches for January

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5. This Month In History

Courtesy of: Windowstotheuniverse.com

January 1

1801 - Piazzi discovers first asteroid.

Italian astronomer Giuseppe Piazzi discovered the first asteroid, which he named Ceres after the Greek

goddess of grain.

January 4

1643 - Isaac Newton's birthday

Isaac Newton was an English scientist and mathematician who lived between 1642-1727. Newton's contributions to science include the universal law of gravitation, the development of a whole new field in mathematics called calculus, and his famous three laws of motion.

January 7

1610 - Galileo discovered three Jovian moons

The Galilean satellites are the 4 major moons of Jupiter, Io, Europa, Ganymede, and Callisto. Their discovery by Galileo was a key piece of evidence that the Earth was not the center of the Universe.

January 8

1642 - Death of Galileo Galilei

Galileo Galilei was an Italian astronomer and physicist who lived between 1564-1642. Galileo was the first person to use a telescope to look at the heavens. He discovered sunspots, and craters and peaks in the moon.

1942 - Stephen Hawking's birthday

Stephen Hawking is an English astrophysicist who was born in 1942. He is a leader in the fields of theoretical physics and cosmology. Hawking is most famous for his work on black holes.

January 9

1848 - Death of Caroline Herschel

Caroline Lucretia Herschel was a German astronomer who lived between 1750-1848. She worked in England most of her life along side her brother, William Herschel, helping him make astronomical observations and then making her own.

January 10

1573 - Birthday of Simon Marius

Simon Marius was a German astronomer who lived between 1573-1624. He made observations of the heavens using a telescope and published yearly astronomical tables.

January 14

1742 - Death of Edmond Halley

Edmond Halley was an English astronomer who lived between 1656-1742. He reasoned that the comets which had appeared in 1456, 1531, 1607, and 1682, were one and the same. He then correctly predicted the comet's return about every 76 years, and today it bears his name.

2005 - Huygens probe landed on Titan

The Huygens probe made measurements of Titan's thick atmosphere and took pictures of the moon's surface. The probe was built by the European Space Agency. Huygens hitched a ride to Saturn on the back of NASA's Cassini spacecraft. Cassini "let go" of Huygens on December 24, 2004. Huygens landed on Titan on January 14, 2005.

January 16

2006 - Stardust mission return

NASA's Stardust mission was the first spacecraft to collect samples of material directly from a comet and return them to Earth. Stardust was launched on February 7, 1999. On January 2, 2004, the spacecraft flew within 240 kilometers (149 miles) of Comet Wild 2. It used an ultra-lightweight material called aerogel to capture many tiny (10 to 300 microns in diameter) particles of cometary material as they whizzed by the spacecraft at the tremendous speed of 21,960 kilometers (13,650 miles) per hour. The comet samples were stowed in a capsule that was later returned to Earth, parachuting to a landing in the Utah desert in January 2006.

January 31

1958 - Explorer 1 launched.

Explorer 1, launched on Jan. 31, 1958, was the first U.S. satellite to orbit the Earth. Its successful flight made the United States the second nation in space.

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6. 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".

On January 3, Chris Saunderson took this fantastic shot of the Nebula in Orion. He took 40 lights at 30 seconds each, 20 darks, 20 bias and 20 flats. He used his Canon T1i mounted to a Celestron travel scope on his CG-5 mount. Looks like we have a budding Astrophotographer on our hands! Good work Chris we hope to see more shots from you in the future.



Here is a video with various scientists discussing whether electrons are still active at absolute zero; a little bit of "coool" entertainment! <http://www.wimp.com/absolutezero/> There are many other fascinating short videos here and a few of them touch on various topics in astronomy. Best videos on the Web. Suitable for all ages [WIMP.com](http://www.wimp.com) Enjoy!

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7. Featured Articles

Articles

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SOHO Spots 2000th Comet— Dec 29/10 credit Goddard Space Flight Center

As people on Earth celebrate the holidays and prepare to ring in the New Year, a European Space Agency (ESA)/NASA spacecraft has quietly reached its own milestone. On December 26, the Solar and Heliospheric Observatory (SOHO) discovered its 2000th comet. Drawing on help from citizen scientists around the world, SOHO has become the single greatest comet finder of all time. This is very impressive since SOHO was not specifically designed to find comets, but to monitor the Sun. "Since it launched on December 2, 1995, to observe the Sun, SOHO has more than doubled the number of comets for which orbits have been determined over the last 300 years," said Joe Gurman from NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Of course, it is not SOHO itself that discovers the comets -- that is the province of dozens of amateur astronomer volunteers who daily pore over the fuzzy lights dancing across the pictures produced by SOHO's Large Angle and Spectrometric Coronagraph (LASCO) cameras. Over 70 people representing 18 different countries have helped spot comets over the past 15 years by searching through the publicly available SOHO images online. The 1999th and 2000th comet were

both discovered December 26 by Michal Kusiak from Jagiellonian University in Krakow, Poland. Kusiak found his first SOHO comet in November 2007 and has since found more than 100. "There are a lot of people who do it," said Karl Battams who has been in charge of running the SOHO comet-sighting web site since 2003 for the Naval Research Lab in Washington, D.C., where he also does computer processing for LASCO. "They do it for free, they're extremely thorough, and if it wasn't for these people, most of this stuff would never see the light of day." Battams receives reports from people who think that one of the spots in SOHO's LASCO images looks to be the correct size and brightness and headed for the Sun — characteristics typical of the comets SOHO finds. He confirms the finding, gives each comet an unofficial number, and then sends the information off to the Minor Planet Center in Cambridge, Massachusetts, which categorizes small astronomical bodies and their orbits.

It took SOHO 10 years to spot its first thousand comets, but only 5 more to find the next thousand. That's due partly to increased participation from comet hunters and work done to optimize the images for comet sighting, but also due to an unexplained systematic increase in the number of comets around the Sun. Indeed, December alone has seen an unprecedented 37 new comets spotted so far, a number high enough to qualify as a "comet storm."

LASCO was not designed primarily to spot comets. The LASCO camera blocks out the brightest part of the Sun in order to better watch emissions in the Sun's much fainter outer atmosphere, or corona. LASCO's comet-finding skills are a natural side effect — with the Sun blocked, it's also much easier to see dimmer objects such as comets.

"But there is definitely a lot of science that comes with these comets," said Battams. "First, now we know there are far more comets in the inner solar system than we were previously aware of, and that can tell us a lot about where such things come from and how they're formed originally and break up. We can tell that a lot of these comets all have a common origin." Indeed, says Battams, 85 percent of the comets discovered with LASCO are thought to come from a single group known as the Kreutz family, believed to be the remnants of a single large comet that broke up several hundred years ago.

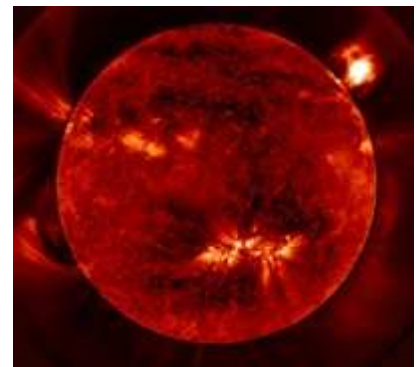
The Kreutz family comets are "sungrazers" — bodies whose orbits approach so close to the Sun that most are vaporized within hours of discovery — but many of the other LASCO comets boomerang around the Sun and return periodically. One frequent visitor is Comet 96P Machholz. Orbiting the Sun approximately every 6 years, this comet has now been seen by SOHO three times Saturn's northern and southern hemisphere and that fact that Voyager did not see the same asymmetry raise a very important question: Does Saturn's internal heat vary with time?" says Li. "The answer will significantly deepen our understanding of the weather, internal structure and evolution of Saturn and the other giant planets."

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Smithsonian Instrument Views the Sun's Innermost Corona— Jan 4/11 Credit Harvard-Smithsonian Center for Astrophysics

During a total eclipse of the Sun, skywatchers are awed by the shimmering corona — a faint glow that surrounds the Sun. This outer layer of the Sun's atmosphere is, paradoxically, hotter than the Sun's surface, but so tenuous that the brighter solar disk overwhelms its light. The corona becomes visible only when the Sun is blocked, which happens for just a few minutes during an eclipse.

Now, an instrument on board NASA's Solar Dynamics Observatory (SDO), developed by Smithsonian scientists, is giving unprecedented views of the innermost corona 24 hours a day, 7 days a week. "We can follow the corona all the way down to the Sun's surface," said Leon Golub from the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts.



This photograph of the Sun, taken by the Atmospheric Imaging Assembly instrument on NASA's Solar Dynamics Observatory, shows how image processing techniques developed at SAO can reveal the faint, inner corona. At the Sun's limb, prominences larger than Earth arc into space. Bright active regions like the one on the Sun's face at lower center are often the source of huge eruptions known as coronal mass ejections

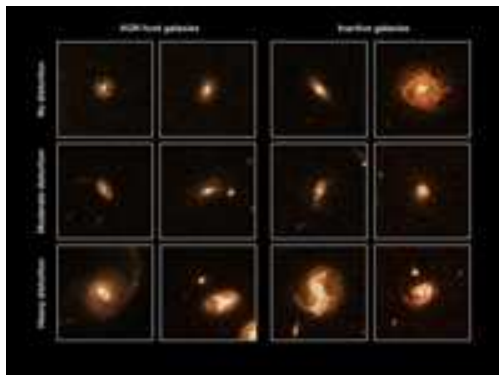
Previously, solar astronomers could only observe the corona by physically blocking the solar disk with a coronagraph, much like holding your hand in front of your face while driving into the setting Sun. However, a coronagraph also blocks the area immediately surrounding the Sun, leaving only the outer corona visible.

The Atmospheric Imaging Assembly (AIA) instrument on SDO can "fill" this gap, allowing astronomers to study the corona all the way down to the Sun's surface. The resulting images highlight the ever-changing connections between gas captured by the Sun's magnetic field and gas escaping into interplanetary space.

The Sun's magnetic field molds and shapes the corona. Hot solar plasma streams outward in vast loops larger than Earth before plunging back onto the Sun's surface. Some of the loops expand and stretch bigger and bigger until they break, belching plasma outward. "The AIA solar images, with better-than-HD quality views, show magnetic structures and dynamics that we've never seen before on the Sun," said Steven Cranmer from CfA. "This is a whole new area of study that's just beginning." Cranmer and Alec Engell, also from CfA, developed a computer program for processing the AIA images above the Sun's edge. These processed images imitate the blocking-out of the Sun that occurs during a total solar eclipse, revealing the highly dynamic nature of the inner corona. They will be used to study the initial eruption phase of coronal mass ejections as they leave the Sun and to test theories of solar wind acceleration based on magnetic reconnection.

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Cosmic Collisions No Longer Suspected of Promoting Black Hole Growth—Jan 5/11 credit Hubble ESA



What happens when galaxies crash together? For years, these cosmic collisions have been blamed for triggering violent outbursts at the hearts of galaxies. Now, a remarkable piece of detective work has given a verdict: galactic mergers do not usually whet the appetite of the black holes that power these active galactic nuclei, meaning other, less dramatic phenomena are responsible. Left: Selected galaxies from the COSMOS survey.

Most galaxies, including our own, have a huge but well-behaved black hole at their heart, while some have messy eaters that suck in vast amounts of matter that then shines brightly as it falls towards oblivion. This cause the telltale bright spots at the center of galaxies known as active galactic nuclei (AGN). Why are the two types so different? Until now, the leading theory has been that mergers between galaxies are instrumental in driving matter into the black holes, making them grow.

In a new study, the largest of its kind so far, astronomers set up an identity parade of galaxies to test this theory. Comparing 140 active galaxies with a control group of over 1,200 comparable inactive galaxies, they found that there has been no significant link between AGN activity and galactic mergers for at least the past 8 billion years. Therefore, other phenomena, such as instabilities within galaxies, collisions of molecular clouds, or tidal disruption by other galaxies flying by, must be to blame. The emission of radiation from AGNs is driven by the behavior of matter, such as gas clouds and even stars, as it heats up and falls into the galaxy's supermassive central black hole. But an open question in the physics of active galaxies is precisely how matter crosses the final few hundreds of light-years to reach the immediate neighborhood of the black hole before being swallowed. "A study of this scope has become possible only recently, as the large surveys undertaken using the Hubble Space Telescope have become available," said Mauricio Cisternas from the Max Planck Institute in Germany. "These have given us a huge sample of galaxies, both active and inactive, meaning that we can now study many distant galaxies in exquisite detail. Before these surveys, we hadn't examined many active galaxies at large cosmic distances in sufficient detail."

Cisternas and his team chose 140 active galaxies from the COSMOS survey. The COSMOS field is an area of sky roughly ten times the area covered by the Moon in the constellation Sextans the Sextant that has been comprehensively mapped by Hubble and other telescopes at different wavelengths. It contains several hundred thousand distant galaxies of all types. The team was able to identify active galaxies from among these using X-ray observations from the European Space Agency's (ESA)

XMM-Newton space telescope. They then studied the more detailed optical images of them taken by the NASA/ESA Hubble Space Telescope. For each of the active galaxies in the study, they selected nine non-active galaxies at roughly the same distances and roughly in the same stage of cosmic evolution from the same Hubble images. This gives a total of just over 1,400 galaxies that the team could then test for the telltale signs of mergers.

"You can usually tell when galaxies have been involved in a merger," said Knud Jahnke from the Max Planck Institute in Germany. "Instead of the neat, geometric spiral or smooth elliptical shapes you usually see in Hubble images, colliding galaxies typically look distorted and warped. We planned to find out whether these misshapen galaxies were more likely than regular ones to host active nuclei." Identifying whether or not a galaxy is distorted is a matter of judgment for which the expert eye of a trained astronomer is far better than any computerized assessment. To harness this human expertise without introducing the risk of unwitting bias, Cisternas set up a kind of identity parade of galaxies in which he had modeled and removed the bright spot that reveals the AGN. Ten galaxy experts, based at eight different institutions, independently assessed whether each of the galaxies was distorted or not, without being told which had an AGN. None of the experts found a significant correlation between a galaxy's activity and its distortion — that is between its black hole being well fed and its involvement in a major merger. While mergers are a common phenomenon and are thought to play a role at least for some AGN, the study shows that they provide neither a universal nor a dominant mechanism for feeding black holes. By the study's statistics, at least 75%, and possibly all, of AGN activity over the last 8 billion years must have a different explanation. Possible ways of transporting matter toward a central black hole include instabilities of structures like a spiral galaxy's bar, the collisions of giant molecular clouds within the galaxy, or the fly-by of another galaxy that does not lead to a merger — known as galactic harassment.

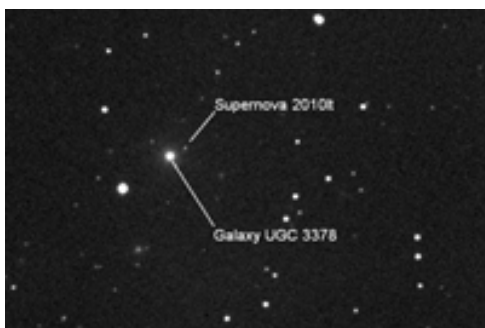
Could there still be a causal connection between mergers and activity in the more distant past? That is the next question the group is gearing up to address. Suitable data is bound to come from two ongoing observational programs — Multi-Cycle Treasury Programs — with the Hubble Space Telescope as well as from observations by its successor, the James Webb Space Telescope, which is scheduled for launch after 2014.

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Ten-year-old Canadian Girl Discovers Exploding Star—Jan 6/11 credit Royal Astronomical Society of Canada

A 10-year-old Canadian girl has become the youngest person to discover a supernova. Kathryn Aurora Gray of Fredericton, New Brunswick, along with longtime astronomy enthusiasts Paul Gray (Kathryn's father) and David Lane, found a magnitude 17 supernova, dubbed supernova 2010lt, in the galaxy UGC 3378 in the constellation Camelopardalis, as reported on the International Astronomical Union Electronic Telegram 2618. Lane imaged the galaxy on New Year's Eve 2010, and Kathryn and Paul discovered the signs of the supernova in the image January 2, 2011.

Kathryn Aurora Gray, age 10, spotted the new supernova on this image taken on New Year's Eve.



Supernovae are stellar explosions that signal the violent deaths of stars several times more massive than our Sun. They are interesting to astronomers because they manufacture most of the chemical elements that went into making Earth and other planets, and also because scientists can use distant supernovae to estimate the size and age of our universe.

Supernovae are rare events. The last one in our galaxy occurred several hundred years ago, before the invention of the telescope. The odds of discovery can be increased by repeatedly checking many other galaxies.

A new supernova reveals itself as a bright point of light that wasn't there the last time the galaxy was checked. Because a supernova can outshine millions of ordinary stars, it is easy to spot with a modest telescope, even in a distant galaxy like UGC 3378, which is about 240 million light-years away.

The discovery was soon verified by Illinois-based amateur astronomer Brian Tieman and Arizona-based Canadian amateur astronomer Jack Newton. It was then reported to the International Astronomical Union's Central Bureau for Astronomical Telegrams. This is Lane's fourth supernova discovery, Mr. Gray's seventh, and Kathryn's first.

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Astronomers Release the Largest Color Image of the Sky Ever Made—Jan 11/10

credit Sloan Digital Sky Survey Press Office

Today, the Sloan Digital Sky Survey-III (SDSS-III) released the largest digital color image of the sky ever made, and it's free to all. The image has been put together over the past decade from millions of 2.8-megapixel images, creating a color image of more than a trillion pixels. This terapixel image is so big and detailed that one would need 500,000 high-definition TVs to view it at its full resolution. "This image provides opportunities for many new scientific discoveries in the years to come," said Bob Nichol from the University of Portsmouth in the United Kingdom.

The new image is at the heart of new data being released by the SDSS-III collaboration at the 217th American Astronomical Society meeting in Seattle, Washington. This new SDSS-III data release, along with the previous data releases that it builds upon, gives astronomers the most comprehensive view of the night sky ever made. SDSS data have already been used to discover nearly half a billion astronomical objects, including asteroids, stars, galaxies, and distant quasars. The latest, most precise positions, colors, and shapes for all these objects are also being released today. "This is one of the biggest bounties in the history of science," said Mike Blanton from New York University. Blanton and many other scientists have been working for months preparing the release of this data. "This data will be a legacy for the ages as previous ambitious sky surveys like the Palomar Sky Survey of the 1950s are still being used today," said Blanton. "We expect the SDSS data to have that sort of shelf life."

The image was started in 1998 using what was then the world's largest digital camera — a 138-megapixel imaging detector on the back of a dedicated 2.5-meter telescope at the Apache Point Observatory in New Mexico. Over the past decade, the Sloan Digital Sky Survey has scanned a third of the whole sky. Now, this imaging camera is being retired, and it will be part of the permanent collection at the Smithsonian in recognition of its contributions to astronomy. "It's been wonderful to see the science results that have come from this camera," said Connie Rockosi from the University of California, Santa Cruz, who started working on the camera in the 1990s. Rockosi's entire career so far has paralleled the history of the SDSS camera. "It's a bittersweet feeling to see this camera retired because I've been working with it for nearly 20 years," Rockosi said.

But what next? This enormous image has formed the basis for new surveys of the universe using the SDSS telescope. These surveys rely on spectra, an astronomical technique that uses instruments to spread the light from a star or galaxy into its component wavelengths. Spectra can be used to find the distances to distant galaxies, and the properties (such as temperature and chemical composition) of different types of stars and galaxies.

"We have upgraded the existing SDSS instruments, and we are using them to measure distances to over a million galaxies detected in this image," said David Schlegel from Lawrence Berkeley National Laboratory in California. Schlegel explains that measuring distances to galaxies is more time-consuming than simply taking their pictures, but in return, it provides a detailed three-dimensional map of the galaxies' distribution in space.

BOSS started taking data in 2009 and will continue until 2014, said Schlegel. Once finished, BOSS will be the largest 3-D map of galaxies ever made, extending the original SDSS galaxy survey to a much larger volume of the universe. The goal of BOSS is to precisely measure how dark energy has changed over the recent history of the universe. These measurements will help astronomers understand the nature of this mysterious substance. "Dark energy is the biggest conundrum facing science today," said Schlegel, "and the SDSS continues to lead the way in trying to figure out what the heck it is!" In addition to BOSS, the SDSS-III collaboration has been studying the properties and motions of hundreds of thousands of stars in the outer parts of our Milky Way Galaxy. The survey, known as the Sloan Extension for Galactic Understanding and Exploration (SEGUE) started several years ago, but has now been completed as part of the first year of SDSS-III.

In conjunction with the image being released today, astronomers from SEGUE are also releasing the largest map of the outer galaxy. "This map has been used to study the distribution of stars in our galaxy," said Rockosi. "We have found many streams of stars that originally belonged to other galaxies that were torn apart by the gravity of our Milky Way. We've long thought that galaxies evolve by merging with others, and the SEGUE observations confirm this basic picture."

SDSS-III is also undertaking two other surveys of our galaxy through 2014. The first, called MARVELS, will use a new instrument to repeatedly measure spectra for approximately 8,500 nearby stars like our own Sun, looking for the telltale wobbles caused by large Jupiter-like planets orbiting them. MARVELS is predicted to discover around a hundred new giant planets as well as potentially finding a similar

number of brown dwarfs that are intermediate between the most massive planets and the smallest stars.

The second survey is the APO Galactic Evolution Experiment (APOGEE), which is using one of the largest infrared spectrographs ever built to undertake the first systematic study of stars in all parts of our galaxy — even stars on the other side of our galaxy beyond the central bulge. Such stars are traditionally difficult to study as their visible light is obscured by large amounts of dust in the disk of our galaxy. However, by working at longer, infrared wavelengths, APOGEE can study them in great detail, thus revealing their properties and motions to explore how the different components of our galaxy were put together. "The SDSS-III is an amazingly diverse project built on the legacy of the original SDSS and SDSS-II surveys," said Nichol. "This image is the culmination of decades of work by hundreds of people, and has already produced many incredible discoveries. Astronomy has a rich tradition of making all such data freely available to the public, and we hope everyone will enjoy it as much as we have."

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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.

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. *FREE TO A GOOD HOME* If you are interested in owning this scope, contact Alex at ahaddad@sd79.bc.ca



DEAL PENDING



Quenneville at (250) 477-2257

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 owner's 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

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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](mailto:Brian.Robilliard) our resident expert to get the "inside scoop" on what's hot or not in astronomy gear.

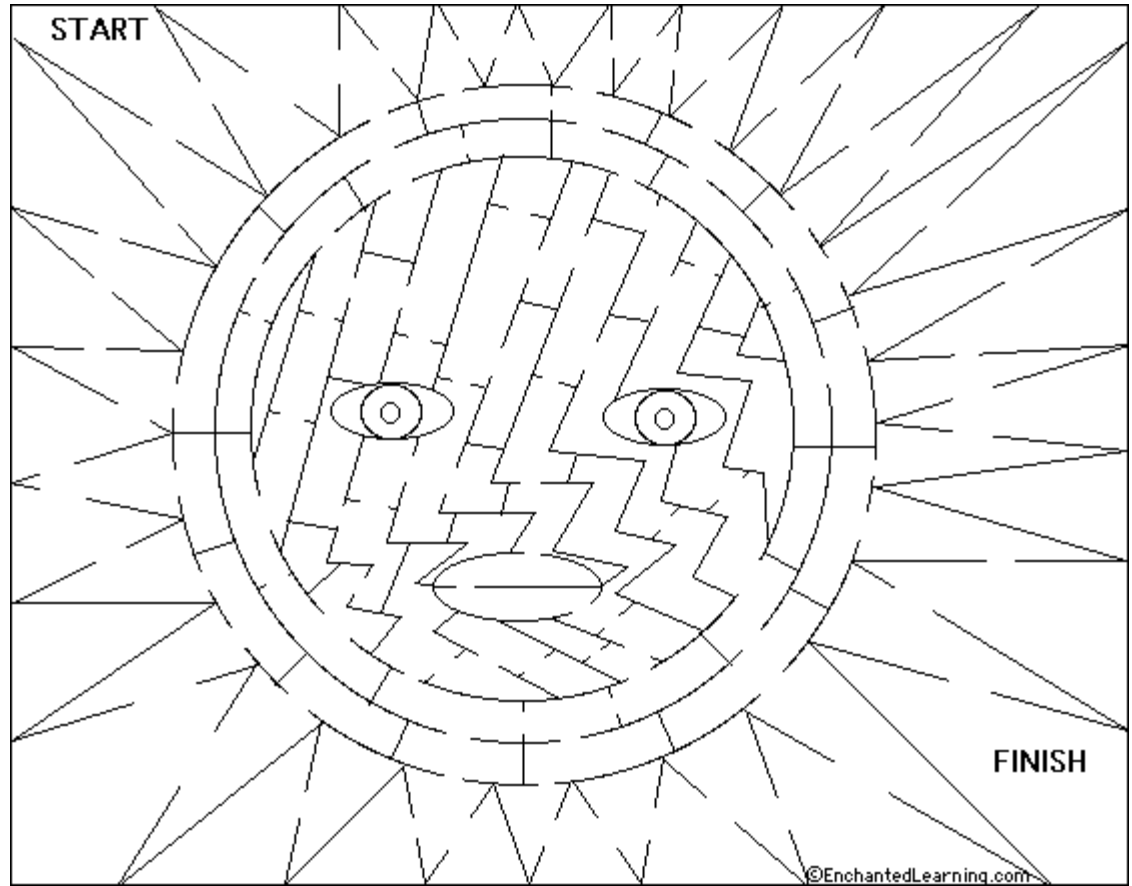
Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email [Bryon Thompson](mailto:Bryon.Thompson) our Editor and master of Astronomy 101 basics.

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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.

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10. The Sky This Month

By Bryon Thompson

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

Welcome to the clear cold skies of 2011. January opens up with some bright performers. Jupiter dominates the evening sky at magnitude -2.3 in the southwest. The big planet can be found about 30° above the horizon. Be sure to look for detail on its surface this month as it gets lower and lower in February. The elusive south equatorial belt is a good target to watch for as it could return at any time. Of course the four big moons around Jupiter always gather attention. Three of these moons, Io, Europa and Ganymede can be seen to cast a shadow on the big planet's surface when they transit, or move in front of the planet. Callisto the furthest moon out is distant enough in its orbit that it passes above and below the planets disc as seen from Earth. If you are visiting back east, the best date to see shadow transits this month happens on **January 17th** when you may glimpse two at the same time. Both the shadows start and finish so early that they are sadly only visible to viewers in the east. Io's shadow finishes by **05:15pm PST** much too late for west coast viewers. Ganymede's shadow transit begins at **04:42pm PST** a little later than Io's and ends at **07:26pm** and as such may be visible if you get out early enough. If the skies are clear in Ontario see if you can tell which shadow appears larger. (Hint - it should be Ganymede's, as the moon is much closer to Jupiter than Io). The same two moons team up again in the early evening hours of **January 24th** but once again the events are best seen from the east.

Uranus is visible in January and you can use Jupiter as a guide to find this distant blue/green giant. On the **2nd of January** Uranus can be seen just over one half a degree north of Jupiter. This distance increases † 4° by the end of the month because Jupiter's orbit is near the sun and hence it moves faster.

Saturn can be found high in the south at twilight within 2° of 4th magnitude Theta Virginis in Virgo. At

magnitude 0.7 Saturn proudly displays its rings at a 10° angle of view from our line of sight. Can you see the Cassini division; a 2900 mile wide gap, between the outer 'A' ring and the 'B' ring? Titan, Saturn's largest moon, presents a nice picture shining at magnitude 8 when it shows up for telescope viewers south of Saturn on the **12th** and on the **28th** and again in the north this time on the **4th** and the **20th**. Titan may be Saturn's largest but a number of other smaller moons are visible even through a 6" telescope. Tethys Dion and Rhea are all 10th magnitude dots that are available for a good look. Iapetus is also visible but it depends whether it is showing its bright 10th magnitude side or its dark side to us. Look for it on **January 4th** when it reaches greatest western elongation and can be found 13 ring widths or 9 minutes from its giant gas parent. Later in the month this little moon moves closer to Saturn, within 2 minutes north of the ringed planet and dims to 11th magnitude. By February the little ball of mystery will show us it's darker face and dim another full magnitude making it very hard to see in all but the largest of backyard scopes.

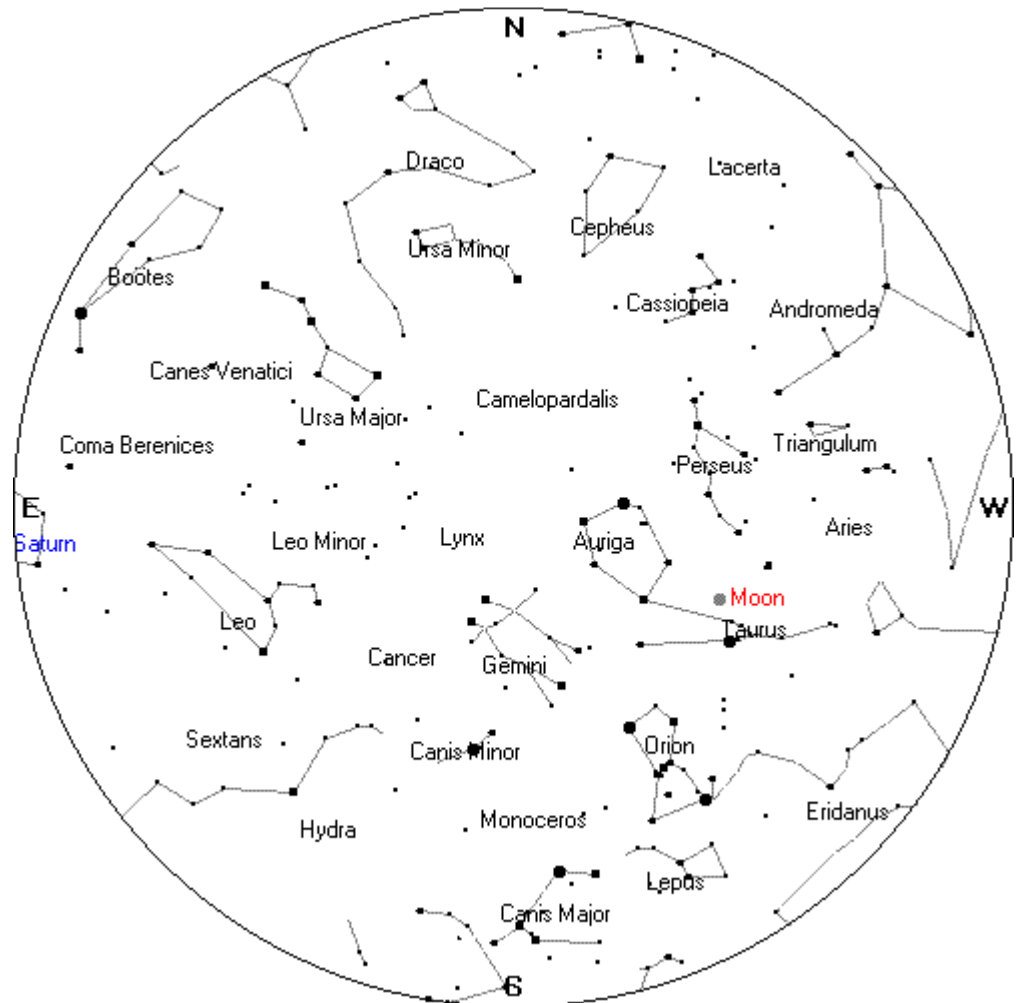
Rising 3 hours before the sun, Venus is back in its welcome position as our quintessential 'morning star'. Venus shares the sky with Libra for the first week of the year reaching greatest elongation on the morning of the **8th** at 47° . The next day Venus crosses in to Scorpius moving to Ophiuchus a few days later on **January 14th**. Our morning beacon shines at magnitude -4.6 the brightest thing in the dark sky save the moon.

The same day that Venus moves into Scorpius on **January 9th** our innermost planet, Mercury, reaches greatest western elongation as well at 23° . Mercury shines at magnitude -0.3 much dimmer than Venus but still bright enough to stand out low in the south east an hour before sunrise. Spanning a mere 8" its disc will shrink to 5" as its phase increases from 34% to 64% by months end.

A good telescope object is still comet 103P/Hartley. You can find it east of the bright star Sirius in Canis Major. A scope at least 8 inches in diameter will be necessary if you are anywhere near the suburbs. But a smaller scope will work fine from darker sites. The comet is speeding away from the Sun and also moving away from the earth now and as such it is out-gassing less and fades from 8th to 9th magnitude throughout the month. Comet 103P/Hartley has an orbital path that spans from just outside Earth's orbit out to Jupiter's. As the earth rotates around the sun it will make the comet appear to have a retrograde motion similar to the outer planets. To close out the month, watch for 103P/Hartley to pass very near the star cluster M50 for the last couple of nights of January. I hope that 2011 brings great views to you and a renewed interest in the night sky. Please make it a point to share your experiences with friends and maybe you can introduce someone else to the wonders of the space around us. Have fun and remember that astronomy is looking up!

Jan 2	06:00 AM PST	Uranus one half degree North of Jupiter
Jan 4	01:03 AM PST	New Moon
Jan 4	Evening	Iapetus best view magnitude 10
Jan 4	Evening	Titan seen North of Saturn
Jan 8	08:00 AM PST	Venus at greatest Western Elongation (47°)
Jan 9	07:00 AM PST	Mercury at greatest Western Elongation (23°)
Jan 12	03:31 AM PST	First Quarter Moon
Jan 12	Evening	Titan seen South of Saturn
Jan 14	Early Morning	Venus in Ophiuchus
Jan 17	Evening EST	Io, Ganymede shadow transits (Eastern Viewers)
Jan 19	01:21 PM PST	Full Moon
Jan 20	Evening	Titan seen North of Saturn
Jan 24	Evening EST	Io, Ganymede shadow transits (Eastern Viewers)
Jan 24	Evening	Titan seen South of Saturn
Jan 26	04:57 AM PST	Last Quarter Moon

Sky Chart —Here's your mid-January 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

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