



Clear Skies

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Greetings!

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

We're back! This is our *Summer Edition* of *Clear Skies* which includes both June and July.

In our May issue I requested responses to your Ten Reasons **Why You Should Join the Cowichan Valley Starfinders**. I have had some responses but would like more of you to come forward. The lists will be posted at the membership table during the star party. Email me with your reasons at newsletter@starfinders.ca.

Thanks to Brian Robilliard who did the May workshop on "Learn How to Collimate Your Scope" which got everyone ready for the July Star Party.

Speaking of "Star Party" the ISP is soon upon us, mark your calendars for **JULY 17-19** and see the "**Upcoming Events**" section for more details.

Also this is your reminder that Annual CVSF memberships are due this month. The new membership form is posted on the website. Please note: CVSF memberships are NOT included as part of your admission to the Island Star Party. We will however, have a CVSF table where you can purchase your memberships, enter draws for prizes buy used Astronomy books and receive FREE astronomy magazines. So make sure to re-new at the ISP. If you are unable to make the ISP then please print the form from the website and send it to us. See our site for more info: <http://www.starfinders.ca/membership.htm>

Thanks to this month's contributors Moe Raven, Bryon Thompson and Paul Randall for their input and enthusiasm.

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Socials

Socials are held on the **4th Wednesday of each month** at the home of Bryon and Freda. See the website for a 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 **7:30 on WEDNESDAY July 22nd**
This social is "**A Night At the Movies**" Where we will provide the movie/documentary and popcorn. Hope to see you all there.

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Highlights - June 22/09

By Paul Randall

This year's summer BBQ and Annual AGM looked like it was going to be hampered by rain, but to our best efforts we were able to hold it off for the day. 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 positions.

CVSF currently has seven electoral positions which make up the club's "Board of Directors". The following are your **elected Directors for 2009/2010**

President - Ed Maxfield (co-ordinates the annual ISP, setup speaker series presenters, host monthly socials)

Vice-President - available (fill-in with Presidential duties if the president is unavailable)

Treasurer - Ed Nicholas (responsible for all financial aspects of the club)

Public Outreach Officer - available (set up sidewalk astronomy session with public, help in promoting ISP)

Secretary - Paul Randall (provide AGM minutes for the club and monthly social highlights to Newsletter Editor)

Newsletter Editors - Bryon Thompson, Freda Eckstein (elicit from club members and edit noteworthy news to be compiled as part of the monthly "clear skies" newsletter)

Webmaster - Brian Robilliard (keep the club website current and resolve any website errors with the host webmaster)

You will notice that we have two openings on our Board of Directors. Vice-President and Public Outreach Officer. If you are interested in joining our Board of Directors, please email us at vice-president@starfinders.ca

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Upcoming Events

Every Monday - Astronomy Café from 7:30pm - 9:00 pm

Get together with local astronomers at the Fairfield Community Centre to discuss the night sky over coffee. On clear nights, there is observing too. Perfect for people interested in starting this hobby. All ages welcome.

Every Thursday till September from 8:00pm - 10:30pm at Butchart Gardens

800 Benvenuto Avenue — Brentwood Bay, BC
Visitors to Butchart Gardens will be welcomed by the Victoria Centre volunteers who will be providing Night Sky Viewing opportunities (weather permitting). All ages welcome.

Island Star Party: July 17 - 19 Victoria Fish and Game Association near the Malahat summit

For the International Year of Astronomy (IYA) CVSF has partnered with the Royal Astronomical Society Centre (RASC) to stage this year's Island Star Party. Our program includes great speakers and Saturday afternoon talks. Aside from our regular admission fee to the Island Star Party, we have also initiated a special fee for visitors wishing an introduction to viewing the night sky. For more information check out the <http://victoria.rasc.ca/events/StarParty/Default.htm>

Table Mountain Star Party: July 23, 24 & 25, 2009 - Washington State. For



NASA Launches:

Date: July 11

Mission: STS-127

Launch Vehicle: Space Shuttle Endeavour

Launch Site: Kennedy Space Center - Launch Pad 39A

Launch Time: 7:39 p.m. EDT

Landing Date: July 27

Landing Time: 12:16 p.m.

Description: The crew of space shuttle Endeavour will deliver and install the final elements of Japan Exploration Agency's Kibo laboratory to the International Space Station.

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This Month In History

Courtesy of: Nick Greene, About.com

July 01 - 1994 - Hubble Space Telescope - USA & Europe Telescope photographed the collision of Comet Shoemaker-Levy 9 with Jupiter.

July 06 - 1997 - Mars Pathfinder's rover, a six-wheel rover named Sojourner, rolled onto the Martian surface at about 05:40 UT

July 16 - 1969 - Apollo 11 launched.

July 20 - 1969 - Apollo 11 (Crew: Neil A. Armstrong, Edwin E. Aldrin, Jr., Michael Collins) landed. Apollo 11 was the first manned lunar landing.

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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".

The Goodies and Arthur C. Clarke – check out this great video sent in by Paul R. <http://www.youtube.com/watch?v=Kl8SRlbbN0>

AstroPhoto Insight Magazine is a bi-monthly digital astrophotography magazine dedicated to exploring and sharing the latest innovations and techniques in the field of cutting-edge amateur astrophotography. While offering enough reading material to keep even the most hard-core astrophotographer interested, AstroPhoto Insight still offers a variety of practical and basic information that can be of great value to a novice as well. Visit <http://www.astrophotoinsight.com>.
Job opening at Astronomy magazine

Astronomy magazine –Job Posting

The world's largest magazine for astronomy enthusiasts - seeks an associate editor. The ideal candidate is a detail-oriented journalist who knows astronomy, can multitask, and meets deadlines. An educational background in astronomy, as well as active experience in and an enthusiasm for the subject, are a big plus. Learn more about the position and apply here <http://www.kalmbach.com/kpc/default.aspx?c=a&id=287>

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

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Featured Articles

World's Largest Solar Telescope Now Operational– May 29/09
credit New Jersey Institute of Technology

The New Jersey Institute of Technology's (NJIT) new 1.6-meter clear aperture solar telescope - the largest of its kind in the world - is now operational. The unveiling of

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this instrument - said to be the pathfinder for all future, large ground-based telescopes - comes as the astronomical community celebrates the 400th anniversary of Galileo using his telescope to demonstrate that sunspots exist.

"With our new big, beautiful white machine, Galileo's work can leap ahead with a capability never before available," said NJIT Distinguished Professor of Physics Philip R. Goode. Goode has been director of Big Bear Solar Observatory (BBSO) in Big Bear Lake, California, since NJIT took over management of BBSO in 1997 from California Institute of Technology. Located high above sea level, the observatory is one of the premier land-based facilities supported by federal funding.

"We are already seeing images offering a better understanding of the Sun," said Goode. "With this instrument, we should be able to have a better understanding of dynamic storms and space weather, which can have dramatic effects on Earth."

Earlier this month, researchers achieved what is called first scientific light. This means the telescope is operational. To achieve its full powers, at least 3 more years of work will be needed to bring online evermore sophisticated hardware for observing the Sun. Nevertheless, Goode and the BBSO research team were able to extract a few unique images. Photos clearly illustrate the before-and-after capabilities of the old versus new telescope. "Our prized first image shows the Sun's ever-present, turbulent granular field with its largest granules being about the size of Alaska," Goode said. Goode adds that the Sun is now in a state of prolonged magnetic inactivity, perhaps the longest such time in a century. "The new telescope is ideal for studying the Sun as it rises from this strange state of quietude," he added.

The new instrument has 3 times the aperture of the old telescope. It represents a significant advance in high-resolution observations of the Sun because it has the largest aperture of any solar telescope in existence, said Goode. Since it is an off-axis telescope, it doesn't block any part of the sunlight. Other positives include its location — high next to a Southern California mountain lake. The new telescope will be used in joint observation campaigns with NASA satellites to optimize the scientific output of all observations of the Sun. BBSO has always operated in such campaigns, but now it can do so with greatly enhanced capabilities. The National Science Foundation (NSF), Air Force Office of Scientific Research (AFOSR) and NASA have provided more than \$5 million in hardware components.

The telescope is filled with new technologies. World-renowned Steward Observatory Mirror Laboratory at the University of Arizona (UA) polished the 1.7-meter (just shy of 6 feet) primary mirror. The extremely precise measurements of the mirror's shape required the application, for the first time, of a computer-generated hologram. The development of this technology will be essential for figuring the next generation of even-larger nighttime telescopes. The final error in the primary mirror is only a few parts in a billion from its desired parabolic shape. "Buddy Martin at the UA Mirror Lab has described the mirror as the pathfinder for large nighttime telescopes that are about to be built," said Goode. Another key design issue for this large-aperture solar telescope was the creation of a thermal control system capable of maintaining the temperature of the mirrors near or below ambient air. To achieve this, the dome employs a wind-gate and exhaust system that controls the airflow from the wind.

The structure maintains the same temperature inside and outside the dome and clears concentrations of heat in and around the optical paths. In addition, BBSO engineers implemented a closed-cycle, chilled-air system as part of the telescope

mount to limit so-called "mirror seeing." This sweeps away turbulent cells and directly cools the primary mirror. After a day of observations, the mirror must be cooled overnight to ensure that it is somewhat cooler than ambient in the morning. DFM Engineering of Longmont, Colorado, built and tested the optical support structure and active-support mirror cell for the enormous mirror. It is supported by 36 actuators that can bend out low-order aberrations, such as those due to gravity and/or thermal effects.

The telescope is now in its commissioning phase, in which more sophisticated observations are made possible with the implementation of advanced hardware. These include adaptive optics to correct for atmospheric distortion and hardware to measure magnetic fields in visible and infrared light.

"It is good at last to have our destiny in our own hands rather than those of our capable partners," said Goode. "Seeing first light was a great moment because the team in BBSO finally knew that its big white machine works as we had planned."

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NASA's Space Shuttle Program Hands Over Launch Pad to Constellation Program— June 2/09 credit NASA

The May 31 transfer of Launch Pad 39B at NASA's Kennedy Space Center in Florida from the Space Shuttle Program to the Constellation Program is the next step in preparing the first flight test of the agency's next-generation spacecraft and launch system. The Constellation Program is developing new spacecraft — including the Ares I and Ares V launch vehicles, the Orion crew capsule, and the Altair lunar lander — to carry humans to the International Space Station, the Moon, and beyond.

Since the late 1960s, pad B has been instrumental in human spaceflight programs, such as Apollo, Skylab, and the space shuttle. The pad originally was built for the Saturn V rockets to launch the Apollo capsules to the Moon. In July 1975, the pad was modified to support space shuttle operations. The first space shuttle to lift off from pad B was Challenger in January 1986.

The handover took place Sunday after space shuttle Endeavour was moved to Launch Pad 39A. The ground operations team will finish modifying pad B for the Ares I-X rocket launch. Modifications will include removing the orbiter access arm and a section of the gaseous oxygen vent arm and installing access platforms and a vehicle stabilization system.

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Betelgeuse Is Shrinking— March 27/09 credit AAS Press Conference

The red supergiant star Betelgeuse, the bright reddish star in the constellation Orion, has steadily shrunk over the past 15 years, according to University of California, Berkeley, researchers.

Long-term monitoring by UC Berkeley's Infrared Spatial Interferometer (ISI) on the top of Mt. Wilson in Southern California shows that Betelgeuse (bet' el juz), which is so big that in our solar system it would reach to the orbit of Jupiter, has shrunk in diameter by more than 15 percent since 1993.

Betelgeuse's radius is about 5 astronomical units, or five times the radius of Earth's orbit, so the recent measurements mean the star's radius has shrunk by a distance equal to the orbit of Venus.

"To see this change is very striking," said Charles Townes at UC Berkeley. "We will be watching it carefully over the next few years to see if it will keep contracting or will go back up in size." Despite Betelgeuse's diminished size, Edward Wishnow pointed out that its visible brightness, or magnitude, which is monitored regularly by members of the American Association of Variable Star Observers, has shown no significant dimming over the past 15 years.

The ISI has been focusing on Betelgeuse for more than 15 years in an attempt to

learn more about these giant massive stars and to discern features on the star's **6** surface, Wishnow said. He speculated that the measurements may be affected by giant convection cells on the star's surface that are like convection granules on the Sun, but so large that they bulge out of the surface. Townes and former graduate student Ken Tatebe observed a bright spot on the surface of Betelgeuse in recent years, although at the moment, the star appears spherically symmetrical. "But we do not know why the star is shrinking," Wishnow said. "Considering all that we know about galaxies and the distant universe, there are still lots of things we don't know about stars, including what happens as red giants near the ends of their lives."

Betelgeuse was the first star to have its size measured, and even today it is one of only a handful of stars that appears through the Hubble Space Telescope as a disk rather than a point of light. In 1921, Francis G. Pease and Albert Michelson used optical interferometry to estimate its diameter was equivalent to the orbit of Mars. Last year, new measurements of the distance to Betelgeuse raised it from 430 light-years to 640, which increased the star's radius from about 3.7 to about 5.5 AU.

"Since the 1921 measurement, its size has been re-measured by many different interferometer systems over a range of wavelengths where the diameter measured varies by about 30 percent," Wishnow said. "At a given wavelength, however, the star has not varied in size much beyond the measurement uncertainties." The measurements cannot be compared anyway, because the star's size depends on the wavelength of light used to measure it, Townes said. This is because the tenuous gas in the outer regions of the star emits light as well as absorbs it, which makes it difficult to determine the edge of the star.

The ISI that Townes and his colleagues built in the early 1990s sidesteps these confounding emission and absorption lines by observing in the mid-infrared with a narrow bandwidth that can be tuned between spectral lines. The ISI consists of three 5.4-foot (1.65-meter) diameter mirrors separated by distances that vary from 12 to 230 feet (4-70 meters), said Townes. Using a laser as a common frequency standard, the ISI interferometer combines signals from telescope pairs in order to determine path length differences between light that originates at the star's center and light that originates at the star's edge.

"We observe around 11 microns, the mid-infrared, where this long wavelength penetrates the dust and the narrow bandwidth avoids any spectral lines, and so we see the star relatively undistorted," said Townes. "We have also had the good fortune to have an instrument that has operated in a very similar manner for some 15 years, providing a long and consistent series of measurements that no one else has. The first measurements showed a size quite close to Michelson's result, but, over 15 years, it has decreased in size about 15 percent, changing smoothly, but faster as the years progressed."

Townes, who turns 94 in July, plans to continue monitoring Betelgeuse in hopes of finding a pattern in the changing diameter, and to improve the ISI's capabilities by adding a spectrometer to the interferometer. "Whenever you look at things with more precision, you are going to find some surprises and uncover very fundamental and important new things," he said.

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Astronomer Finds Universe's Number– June 8/09 Credit *The Australian*
ALMOST 20 years of painstaking intergalactic measuring using pulsating stars to calculate the age of the universe has brought a \$US500,000 (\$630,000) payoff for three astronomers, including Australian Jeremy Mould.

Professor Mould, 59, of Melbourne University, is set to receive about \$200,000 after he and two colleagues in the US and Britain were awarded the US-based Gruber Foundation's cosmology prize.

The award recognises their work in discovering one of the most important numbers in astronomy - the rate at which the universe is expanding.

Using data from the Hubble telescope, which was sent into orbit in 1990, the astronomers discovered over a period of 10 years almost 800 pulsating stars, known as Cepheid variables. They were able to measure the light from these unstable stars to calculate the distance between galaxies, allowing them in 2001 to calculate the current rate of expansion at about 72km per second per megaparsec (a megaparsec is 3.26 million light years).

That means the so-called Big Bang occurred 13.7 billion years ago.

Only last month an observation from the Hubble refined the expansion rate to 74.2km/s/m, well within the 10 per cent range first calculated by the astronomers. The work has allowed scientists to gauge the density of the universe, helping research into so-called "dark energy".

This is the force that scientists believe acts against gravity and explains why the expansion of the universe is actually accelerating, suggesting it will expand endlessly rather than eventually contract under the force of gravity. "That is one of our deepest mysteries, to try to explain why does the universe keep expanding," said Professor Mould. "The age of the universe is integrally tied up with how much dark energy there is."

It was another Australian-based Gruber prize winner, Brian Schmidt, who, along with a rival research team, discovered in 1998 that the expansion was accelerating. It suggests a future where galaxies will continue to fly away from each other, eventually disappearing from view in billions of years' time.

"It is a pretty bleak future if you extrapolate far enough," said Professor Mould, whose laughter suggests he isn't too concerned. While he doesn't yet know what he will do with the money, he does know he will be buying some expensive champagne.

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Mystery of the Missing Sunspots, Solved?—June 17/09 Credit Science@NASA

The sun is in the pits of a century-class solar minimum, and sunspots have been puzzlingly scarce for more than two years. Now, for the first time, solar physicists might understand why.

At an American Astronomical Society press conference today in Boulder, Colorado, researchers announced that a jet stream deep inside the sun is migrating slower than usual through the star's interior, giving rise to the current lack of sunspots.

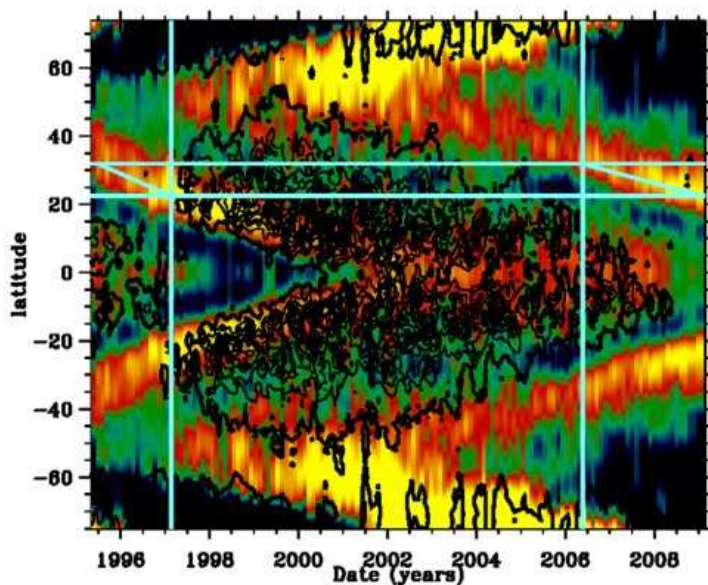
Rachel Howe and Frank Hill of the National Solar Observatory (NSO) in Tucson, Arizona, used a technique called helioseismology to detect and track the jet stream down to depths of 7,000 km below the surface of the sun. The sun generates new jet streams near its poles every 11 years, they explained to a room full of reporters and fellow scientists. The streams migrate slowly from the poles to the equator and when a jet stream reaches the critical latitude of 22 degrees, new-cycle sunspots begin to appear.

Below: A helioseismic map of the solar interior. Tilted red-yellow bands trace solar jet streams. Black contours denote sunspot activity. When the jet streams reach a critical latitude around 22 degrees, sunspot activity intensifies.

Howe and Hill found that the stream associated with the next solar cycle has moved sluggishly, taking three years to cover a 10 degree range in latitude compared to only two years for the previous solar cycle.

The jet stream is now, finally, reaching the critical latitude, heralding a return of solar activity in the months and years ahead. "It is exciting to see", says Hill, "that just as this sluggish stream reaches the usual active latitude of 22 degrees, a year late, we finally begin to see new groups of sunspots emerging."

The current solar minimum has been so long and deep, it prompted some scientists to speculate that the sun might enter a long period with no sunspot activity at all, akin to the Maunder Minimum of the 17th century. This new result dispels those concerns. The sun's internal magnetic dynamo is still operating, and the sunspot cycle is not "broken."



Because it flows beneath the surface of the sun, the jet stream is not directly visible. Hill and Howe tracked its hidden motions via helioseismology. Shifting masses inside the sun send pressure waves rippling through the stellar interior. So-called "p modes" (p for pressure) bounce around the interior and cause the sun to ring like an enormous bell. By studying the vibrations of the sun's surface, it is possible to figure out what is happening inside. Similar techniques are used by geologists to map the interior of our planet.

In this case, researchers combined data from GONG and SOHO. GONG, short for "Global Oscillation Network Group," is an NSO-led network of telescopes that measures solar vibrations from various locations around Earth. SOHO, the Solar and Heliospheric Observatory, makes similar measurements from space.

"This is an important discovery," says Dean Pesnell of NASA's Goddard Space Flight Center. "It shows how flows inside the sun are tied to the creation of sunspots and how jet streams can affect the timing of the solar cycle."

There is, however, much more to learn. "We still don't understand exactly how jet streams trigger sunspot production," says Pesnell. "Nor do we fully understand how the jet streams themselves are generated." To solve these mysteries, and others, NASA plans to launch the Solar Dynamics Observatory (SDO) later this year. SDO is equipped with sophisticated helioseismology sensors that will allow it to probe the solar interior better than ever before.

"The Helioseismic and Magnetic Imager (HMI) on SDO will improve our understanding of these jet streams and other internal flows by providing full disk images at ever-increasing depths in the sun," says Pesnell.

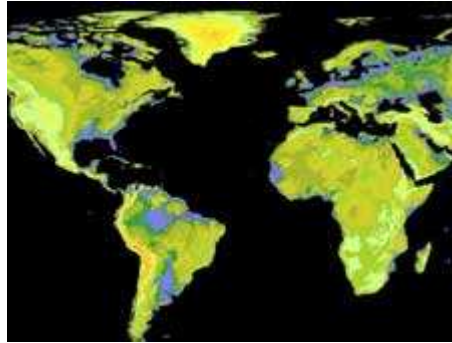
Continued tracking and study of solar jet streams could help researchers do something unprecedented--accurately predict the unfolding of future solar cycles. Stay tuned for that!

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Japan Release Most Complete Topographic Map of Earth— June 29/09 Credit NASA

PASADENA, Calif. - NASA and Japan released a new digital topographic map of Earth Monday that covers more of our planet than ever before. The map was produced with detailed measurements from NASA's Terra spacecraft.

The new global digital elevation model of Earth was created from nearly 1.3 million individual stereo-pair images collected by the Japanese Advanced Spaceborne Thermal Emission and Reflection Radiometer, or Aster, instrument aboard Terra. NASA and Japan's Ministry of Economy, Trade and Industry, known as METI, developed the data set. It is available online to users everywhere at no cost. "This is the most complete, consistent global digital elevation data yet made available to the world," said Woody Turner, Aster program scientist at NASA Headquarters in Washington. "This unique global set of data will serve users and researchers from a wide array of disciplines that need elevation and terrain information."



According to Mike Abrams, Aster science team leader at NASA's Jet Propulsion Laboratory in Pasadena, Calif., the new topographic information will be of value throughout the Earth sciences and has many practical applications. "Aster's accurate topographic data will be used for engineering, energy exploration, conserving natural resources, environmental management, public works design, firefighting, recreation,

geology and city planning, to name just a few areas," Abrams said. Previously, the most complete topographic set of data publicly available was from NASA's Shuttle Radar Topography Mission. That mission mapped 80 percent of Earth's landmass, between 60 degrees north latitude and 57 degrees south. The new Aster data expand coverage to 99 percent, from 83 degrees north latitude and 83 degrees south. Each elevation measurement point in the new data is 30 meters (98 feet) apart.

"The Aster data fill in many of the voids in the shuttle mission's data, such as in very steep terrains and in some deserts," said Michael Kobrick, Shuttle Radar Topography Mission project scientist at JPL. "NASA is working to combine the Aster data with that of the Shuttle Radar Topography Mission and other sources to produce an even better global topographic map."

NASA and METI are jointly contributing the Aster topographic data to the Group on Earth Observations, an international partnership headquartered at the World Meteorological Organization in Geneva, Switzerland, for use in its Global Earth Observation System of Systems. This "system of systems" is a collaborative, international effort to share and integrate Earth observation data from many different instruments and systems to help monitor and forecast global environmental changes. NASA, METI and the U.S. Geological Survey validated the data, with support from the U.S. National Geospatial-Intelligence Agency and other collaborators. The data will be distributed by NASA's Land Processes Distributed Active Archive Center at the U.S. Geological Survey's Earth Resources Observation and Science Data Center in Sioux Falls, S.D., and by METI's Earth Remote Sensing Data Analysis Center in Tokyo.

Aster is one of five Earth-observing instruments launched on Terra in December 1999. Aster acquires images from the visible to the thermal infrared wavelength region, with spatial resolutions ranging from about 15 to 90 meters (50 to 300 feet). A joint science team from the U.S. and Japan validates and calibrates the instrument and data products. The U.S. science team is located at JPL.

For visualizations of the new Aster topographic data, visit: <http://www.nasa.gov/topics/earth/features/20090629.html> .

Data users can download the Aster global digital elevation model at: <https://wist.echo.nasa.gov/~wist/api/imswelcome> and <http://www.gdem.aster.ersdac.or.jp/>

Ulysses: 12 Extra Months of Valuable Science – June 30/09 Credit ESA

In 2008, Ulysses was expected to cease functioning due to weakening power. But solid engineering know-how and on-the-fly innovation have eked out an additional year of important science returns, which came to an end today.

Ulysses, the joint ESA/NASA solar orbiter mission, finally ended today when ground controllers sent commands to shut down the satellite's communications. The event marks the conclusion of one of the longest and most successful space missions ever conducted.

The mission had been predicted to end in July 2008, when the satellite's weakened power supply was expected to fall below the minimum required to keep fuel lines from freezing, without which Ulysses would be uncontrollable. At that time, the ESA/NASA operations team planned to continue operating the spacecraft in a reduced capacity for a few more weeks. However, through smart engineering and realtime innovation, controllers determined they could keep the lines from freezing by briefly firing the thrusters every few hours. In fact, Ulysses has continued gathering valuable scientific data throughout most of the past year - until today, after a decision was taken to end the mission due to continuing weak power and the unavailability of ground station time.

Today's final communication pass via NASA's 70-m Deep Space Network started at 17:35 CEST and the satellite's radio communications switched into receive-only mode at 22:10 CEST. Last telemetry was received as expected at 22:15 CEST. No further contact with Ulysses is planned.

The joint ESA/NASA mission operations team under Nigel Angold, ESA Mission Operations Manager, monitored the final activity from the Ulysses Mission Support Area (MSA) at NASA's Jet Propulsion Laboratory (JPL), California, USA.



Launched by Space Shuttle Discovery on 6 October 1990, the 18-year, 8-month mission has returned a wealth of scientific data on the space environment above and below the poles of the Sun. The spacecraft and its suite of nine instruments had to be highly sensitive yet robust enough to withstand some of the most extreme conditions in the Solar System, including a close fly-by of the giant planet Jupiter.

During today's final activities, ESA and NASA mission controllers radioed up a series of instructions that progressively switched off systems on Ulysses, including:

- Switch off instrument high voltages
- Deschedule the 'Loss of Command' programme
- Perform a last Earth-pointing manoeuvre
- Switch on the redundant receiver
- Switch off the tape recorder
- Switch to the 64-bit-per-second communication rate
- Configure the S-band radio communications
- Switch off the transmitter

At the time of sending the last commands, Ulysses was located approximately 5.4 astronomical units from Earth and the one-way radio signal time was approximately 45 minutes.

"This has been an amazing adventure. Although we have said a sad farewell, Ulysses will remain a unique landmark in the exploration of space, something we can all be incredibly proud of," said Richard Marsden, ESA's Ulysses Project Scientist and Mission Manager.

During its life, Ulysses made nearly three complete orbits of the Sun. The probe revealed for the first time the three-dimensional character of galactic cosmic

radiation, energetic particles produced in solar storms and the solar wind. Not only has Ulysses allowed scientists to map constituents of the heliosphere in space, its longevity enabled the Sun to be observed over a longer period of time than ever before.

"The Sun's activity varies with an 11-year cycle, and now we have measurements covering almost two complete cycles," said Marsden. "This long observation has led to one of the mission's key discoveries, namely that the solar wind has grown progressively weaker during the mission and is currently at its weakest since the start of the Space Age."

Nigel Angold, ESA's Ulysses Mission Operations Manager, said that a lot has changed since the first commands were sent to Ulysses as it orbited the Earth inside Discovery's payload bay back in October 1990.

"But what's remarkable is that many of the people involved then are here today to send the last commands," he added. "A half-dozen of the team have worked on Ulysses for its entire life - this mission has been sufficiently challenging and inspiring for talented people to dedicate significant portions of their careers to it. Also, a number of those who have moved on to other jobs at JPL are joining us to celebrate the end of this unique mission."

Earlier in June, the Ulysses Mission Team received a NASA Group Achievement Award. Another milestone was reached on 10 June when Ulysses, having operated for 18 years and 246 days, became the longest-running ESA-operated spacecraft, overtaking the International Ultraviolet Explorer (IUE).

Following today's shutdown, Ulysses flight data will be archived and available to future ESA and NASA mission teams for reference; the mission's scientific data are already being stored in the Ulysses science data archives at ESTEC, ESA's technical centre, and at NASA's National Space Science Data Center (NSSDC).

During its life, Ulysses was operated by a joint ESA/NASA team at NASA/JPL. ESA managed the mission operations and provided the spacecraft, built by Dornier Systems, Germany (now Astrium). NASA provided the Space Shuttle Discovery for launch and the inertial upper stage and payload-assist module to put Ulysses in its correct orbit. NASA also provided the radioisotope thermoelectric generator which powers the spacecraft and payload, and the NASA Deep Space Network (DSN) was responsible for communicating with the satellite. Teams from universities and research institutes in Europe and the United States provided the nine science instruments.

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Ariane 5 – Largest-ever telecommunications satellite launched– July 1/09 Credit ESA

Earlier this evening, an Ariane 5 ECA launcher lifted off from Europe's Spaceport in French Guiana on its mission to place the heaviest and most powerful telecommunications satellite ever launched, TerreStar 1, into geostationary transfer orbit. Lift-off of flight V189 took place at 19:52 CEST/Paris (17:52 UTC/GMT; 14:52 UTC-3/French Guiana) The target orbit had a perigee altitude of 250 km, an apogee altitude at injection of 35 786 km and an inclination of six degrees. TerreStar 1 was accurately injected into its transfer orbit about 26 minutes after lift-off.

TerreStar 1 will operate in the 2 GHz (S-band) portion of the spectrum to provide voice, data and video communications to satellite/terrestrial mobile devices the size of a typical smart phone. TerreStar 1's coverage is tailored to provide critical services for government, emergency responders, rural communities and commercial users throughout the United States and Canada. The payload mass for this launch was 7055 kg; the satellite's launch mass was 6910 kg and the payload adapter weighed 145 kg.

Arianespace and Europe's Spaceport are planning seven Ariane launches during



launch rates has already been demonstrated – during the 12-month period from August 2007 to August 2008, there were nine launches (V177 to V185, inclusive).

The Ariane 5's cryogenic, liquid fuelled main engine was ignited first. Seven seconds later, the solid fuel rocket boosters were also fired, and a fraction of a second after that, the launch vehicle lifted off.

The solid boosters were jettisoned 2 min: 19 sec after main engine ignition, and the fairing protecting the payload during the climb through the Earth's atmosphere was discarded at 3 min: 10 sec. The launcher's main engine was shut

down at 8 min: 51 sec; six seconds later the main cryogenic stage separated from the upper stage and its payload.

Four seconds after main stage separation, the engine of the launcher's cryogenic upper stage was ignited to continue the journey. The upper stage engine was shut down at 24 min: 35 sec into the flight, at which point the launch vehicle was travelling at 9563 metres per second (just over 34 400 km/h) at an altitude of 417.6 kilometres and the conditions for geostationary transfer orbit injection had been achieved.

At 26 min: 14 sec after main engine ignition, TerreStar 1 separated from the launcher's upper stage. The launch vehicle's flight operations were completed at 39 min: 46 sec after main engine ignition.

Ariane 5 ECA is the latest version of the Ariane 5 launcher. It is designed to place payloads weighing up to 9.6 tonnes into geostationary transfer orbit. With its increased capacity, Ariane 5 ECA can handle dual launches of very large satellites.

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Planck Achieves Ultra-cold State – July 3/09 Credit BBC News

Europe's Planck observatory has reached its operating temperature, making it the coldest object in space. The observatory's detectors have been chilled to a staggering minus 273.05C - just a tenth of a degree above what scientists term "absolute zero."

Launched in May, Planck will survey the "oldest light" in the Universe. Its detectors, or bolometers, should see detail in this radiation that offers new insights into the age, contents and evolution of the cosmos. Although laboratory set-ups have got

closer to absolute zero than Planck, researchers say it is unlikely there is anywhere in space currently that is colder than their astronomical satellite. This frigidty should ensure the bolometers will be at their most sensitive as they scan the sky for the target light.

The remarkable conditions are maintained, in part, by always pointing Planck away from the heat of the Sun. Shields and baffling get the telescope down to about -220C. Three active refrigeration systems then lower the onboard environment at the heart of the observatory extremely close to the state of zero heat energy - when, theoretically, atoms would stop moving.

Planck has been sent to an observation position some 1.5 million km from Earth. Its first data release is expected next year.

The European Space Agency mission was launched along with another telescope called Herschel. This second observatory is sensitive to shorter wavelength radiation than Planck and will be studying the birth of stars and the evolution of galaxies. It, too, carries bolometer technology, but operates at a slightly warmer temperature - just 0.3 of a degree above absolute zero.



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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.

Newtonian for Sale

Good permanent Newtonian scope (not portable) with 13 1/2 inch mirror, 4" Steel Alt Azimuth mount with concrete counter balance. Includes various eyepieces. More info contact John MacArthur at jandlmac@shaw.ca

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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.

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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.

Space Your Face – courtesy of NASA

Be a part of exploration -- one step, one "groove" at a time! Upload your photo and show friends and family your space moves! <http://spaceyourface.nasa.gov/>

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RASC News

Royal Astronomical Society of Canada, Victoria Centre <http://victoria.rasc.ca>

Meetings

Meetings are held on the second Wednesday of each month except July and August downstairs in the Elliot Bldg at U of Vic.

Astronomy Café

The Astronomy Café Meets on Monday evenings at Sir James Douglas School on Fairfield Road.

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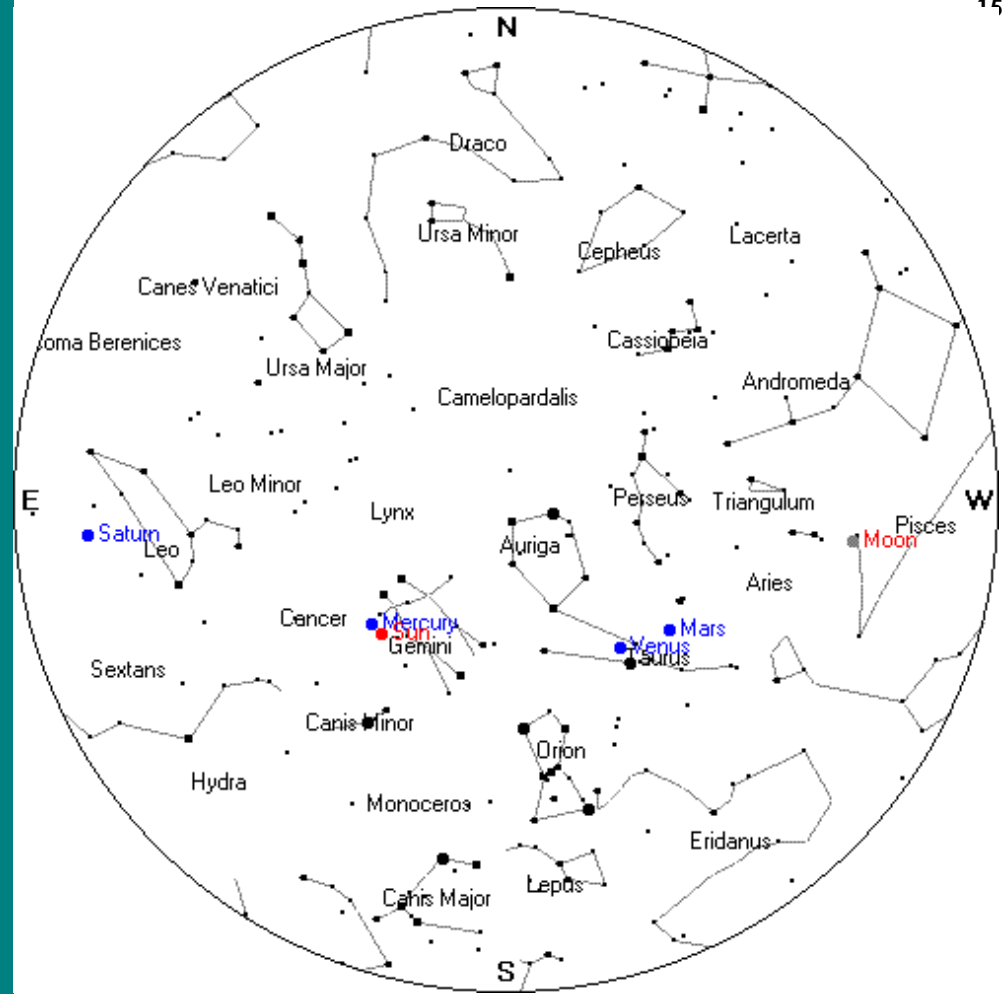
The Sky This Month

By Bryon Thompson

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

Your truly will be presenting "The Sky This Month" as an interactive workshop at the Island Star Party on **July 17th**. The workshop is called "**Astronomy 101**". See you all there.

Sky Chart —Here's your **mid-July** 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.



Sky Chart Courtesy of Heavens-Above

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