

AstroNotes

Newsletter of the Ottawa Centre, RASC



Comet Hyakutake photographed in 1996
by Peter Ceravolo

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Editor.....Debra Ceravolo

Membership and Addresses.....Art Fraser

The Ottawa Centre is one of 29 centres of the Royal Astronomical Society of Canada – an organization dedicated to the advancement of astronomy and allied sciences.



The Ottawa Centre, formed in 1906, has approximately 400 members. Centre facilities include the Fred P. Lossing Observatory, near Almonte. The Centre also operates an astronomical book library and a telescope loan library. Membership in the Ottawa Centre is \$67 per year for regular members (outside Canada, US \$112) and \$41 for junior members. Members receive the annual Observer’s Handbook, the bimonthly electronic RASC Journal, the Canadian

bimonthly magazine SkyNews, and 10 issues of the Ottawa Centre’s newsletter, AstroNotes. The Centre can be contacted at P.O. Box 33012, 1363 Woodroffe Avenue, Ottawa ON K2C 3Y9; Internet at www.ottawa.rasc.ca

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Got a Minute?

By Debra Ceravolo AstroNotes Editor

Recently an Ottawa member emailed me and offered his extensive resource of astronomically related articles to be published in Astronotes. I was delighted as these quick and easy to read articles offer much to learn about a variety of astronomical subjects in bite-sized morsels. I was also delighted because this member is Dr. Brian Ventrudo also known as The One Minute Astronomer. Brian's website: <http://www.oneminuteastronomer.com/> is a must see if you haven't already been there. There are very few people who have the talent to both learn a science and possess the ability to teach it to the rest of us. Brian does this with humour and ease. Read Brian's article on 'Comet Hartley 2 Approaches Earth' in this issue. And if possible try to get out there and see if you can spot the comet during its closest approach this month. Perhaps our astro-imagers can capture Comet Hartley 2 and give us a show at the Centre meeting in November. I might even give it a shot. Peter Ceravolo captured the last comet to come as close back in 1996. Comet Hyakutake, however, was much bigger and very dramatic as can be seen in the cover photo.

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Cover Photo: Comet Hyakutake approached the Earth in 1996 at only 15,000,000 kms away. Comet Hartley 2 will be even closer this month. Photo courtesy Peter Ceravolo

News around the Ottawa Centre

Star Party - Saturday, Oct 9

6 pm - 1 am.

All star parties are held in the parking lot of the Carp branch of the Ottawa Public Library, weather permitting. This is in Carp, Ontario, adjacent to the famous Diefenbunker.



The 2011 RASC Calendars are here!



These beautiful glossy calendars full of spectacular images produced by RASC members across the country are a must have. They make great gifts too. They will be on sale during the Ottawa Centre meetings and at the Ottawa Centre Annual dinner on November 12th.

Ottawa Centre Prices:
\$15 each
2 for \$25

Get them while you can!



News around the Ottawa Centre

RASC Ottawa Centre Annual Dinner - November 12, 2010

At the Algonquin College, Salon D. with Cash bar at 6pm, and dinner at 7pm. Tickets are \$40 each. To reserve a seat you can mail a cheque to Al Scott, Al Scott, 169 Charles St., Arnprior ON, K7S 3V5, and made out to the Royal Astronomical Society of Canada, Ottawa. Tickets will also be available at the meeting on October 1st, and again on November 5th.

Our speaker this year is Galileo Lecturer, Dr. Luc Simard, speaking on 'Galaxies like grains of sand':

Early in the 20th century, cosmology underwent a stunning revolution with the realization that galaxies were "Island Universes" of their own set in the expanding fabric of space and time. We can now peer through the Universe almost all the way back to the Big Bang. Everywhere we look, we see myriads of galaxies of all shapes and forms like grains of sand on the shore of our cosmic ocean. Many mysteries surround these majestic structures as massive as 1000 billion suns. How did they form and evolve? What is the "dark matter" they contain? What is the fate of our Milky Way? Astronomers are now deploying an impressive array of giant telescopes and powerful supercomputers in the hope of answering these basic questions. This talk is the story of our ongoing quest.



Luc Simard is an astronomer at the National Research Council of Canada's Herzberg Institute of Astrophysics. He obtained his B.Sc. from Queen's University in 1990 and his Ph.D. from the University of Victoria in 1996. From 1996 to 2002, he held postdoctoral fellowships at the University of California - Santa Cruz and the University of Arizona. His research interests include galaxy formation and evolution, image processing and astronomical

instrumentation. He is currently working on developing instruments for the Thirty Meter Telescope.

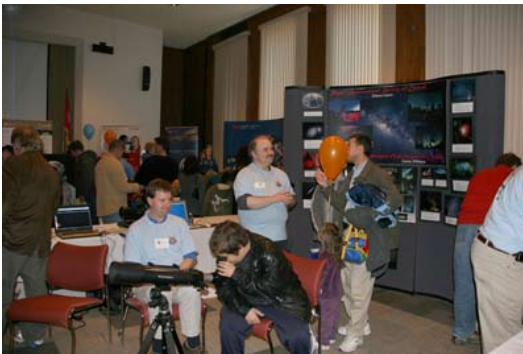
Science Funfest: October 17th, 2010 11:00 a.m.-4:00 p.m. A National Science & Technology Week Premiere Event by Mike Moghadam

Large Ottawa Centre outreach presence planned

Mark your calendars and set your Blackberries. Science Funfest is almost upon us again and it promises to be as much of a blockbuster as last's year successful event. The Ottawa Centre of the RASC had a prominent role in last year's Funfest and plans are underway to raise the bar even higher this year with more exhibits to entice & engage the public.

Science Funfest is one of a series of events held across Canada during National Science and Technology Week to recognize the importance of science & technology in our world and especially Canada's role as a leader in innovation.

Funfest is all about families and, well, fun. Through a series of hands-on exhibits, Funfest showcases the importance of science to youth in a fun and interactive way. At last year's Funfest there were over 70 exhibits covering a wide range of science interests. There were exhibits on insects, fossils, wind tunnels, earthquakes, food safety and more. The Canadian Space Agency and the Ottawa Centre of the RASC were on hand with impressive displays.



Science Funfest is a large open house event takes place at Natural Resources Canada's Booth Street Complex at the corner of Carling Avenue and Booth Street in Ottawa (just north of Dow's Lake). It will be held on Sunday October 17th from 11 am to 4pm.

In 2009 over 5,000 people attended Science Funfest.

News around the Ottawa Centre

What is the RASC planning to do at Science Funfest?

Last year the Ottawa Centre had 18 volunteers on hand at Funfest supporting over a dozen exhibits. There was a large indoor RASC display area along with a solar observing area outside.

This year, we are planning the same number of volunteers and an indoor and outdoor site again. Our plan for the indoor area will include the traditional outreach displays: telescope set-ups, astrophoto displays, astronomy arts & crafts tables, meteorite displays, an impact crater display, a Moon display and a light pollution display and more. The outdoor exhibit will include a number of solar telescopes with informative displays and several hands-on events (make a sundial, make a star clock).

Best of all – and new this year - we are bringing a large (21 feet in diameter, 10 feet tall) high-definition portable planetarium to Funfest that will run mini-star shows. It will be perfect for families!!

If you are interested in volunteering at Science Funfest, there are many things you can do.

Whatever your interest, there's lots to do at Funfest. If you like organizing events, there is an opening for someone to help plan the displays (set-up, facility needs, layouts) and organize the volunteers. If you like to share your passion of astronomy with the public, there are many tables with displays that require support. Perhaps you have your own display and wish to share it? This is a perfect opportunity to showcase your display.

Contact Mike Moghadam (Moghadam@rogers.com) for information on volunteering at Science Funfest.



News across the RASC

Hamilton Centre Member Receives McNeil Medal from RSC

Dr. Doug Welch, a member of the Hamilton Centre and astronomy professor at McMaster University, has been awarded the McNeil Medal by the Royal Society of Canada.

The McNeil Medal is awarded to a candidate who has demonstrated outstanding ability to promote and communicate science to students and the public within Canada. Previous winners include David Suzuki, Jay Ingram, and Bob McDonald.

“The award is a great honour,” said Welch who enjoys introducing the sky to everyone he meets. “There are so many people who have mentored me and shared my journey that I realize this is an award for them, too.”

Welch’s love of astronomy began in the mid-1960s, and he has been a professional astronomer for more than two decades. In that time, he has revived and directed the largest planetarium program in southern Ontario, which educates both the public and trains generations of new scientific explorers. He is the author of the successful children’s book *Amazing Facts about Australia’s Southern Skies*, now in its sixth printing, and is co-host of the popular *Slacker Astronomy* podcast.

A popular speaker at many RASC Centres, Dr. Welch is well-known in the amateur community as the co-creator of the Sky Quality Meter which allows astronomers to make accurate measurements of sky brightness.

Welch will receive the Medal at an Induction and Awards Ceremony Nov. 27 at the National Gallery in Ottawa.



The Sky this Month - October 2010

Highlights in the October 2010 Skies

Planets:

- * Jupiter is the best planet to see ESE in evening at Mag. -2.9
- * Saturn is not visible this month
- * Venus sets less than an hour after sunset
- * Mars is low in western sky after sunset
- * Mercury rises in the morning before the Sun

October 7- New Moon

October 11 - Thanksgiving

October 17 - Funfest- See details this issue

October 20 - Comet Hartley's closest approach

October 21 - Orionids Meteor Shower

October 22 - Full Moon

October 31 - Hallowe'en



Observing Challenges of the Month

September 2010 Challenges:

Paul Klauninger's Picks

Lunar:

Can you find the weird shadows in crater Hommel C? This 50 kilometer diameter crater is located in the southern lunar highlands. The shadows are actually an illusion: they are caused by objects on the crater floor. There would be a very narrow window for this observation. Monday September 27 at 00:33 EDT would be the best time to try. You would need at least a 6 inch scope at 250 power.

Solar System:

Can you see the Little Red Spot, the Red spot on Jupiter?

Deep Sky:

Observe the Goldilocks variable star (V xxx Vul) in M27.

Ottawa Centre meeting report- September 10, 2010

By Estelle Rother Recorder

Bill Wagstaff welcomed everyone to the September meeting. Al Scott was the first speaker with a 10 minute astronomy news update. He began with a controversial observation. Astronomy with the huge energies found in stars, the vacuum and huge distances has provided a laboratory for physicists. Before it was discovered on Earth, Helium was discovered in emission spectral lines from the sun. Emission spectra from stars and nearby galaxies show us that the laws of physics are constant out to millions of light years away. And these laws have been constant for the last billion years. A number called alpha, the fine structure constant, governs the interaction between electrons and protons. It has been constant over billions of years. If alpha were different, then the universe would be different. A change of only 4% would make the universe uninhabitable to life as we know it. Nuclear fusion could not occur in such a universe. The accepted standard model does not provide any guidance on what this number should be. There is no mechanism for change over time. Physicist Richard Feynman said it was one of the greatest mysteries of physics: a magic number that comes to us with no understanding by man.

On September 7, Australian astronomers announced the most precise measurements to date of distant quasars. Radiation from these objects has travelled for billions of years to reach Earth. On the way it passed through ancient gas clouds to provide absorption lines in the spectra. The wavelength of the absorbed light tells us the resonances of the atoms in these distant gas clouds. We see a systematic shift in the spacing of these absorption lines. In the standard model this spacing is fixed. These results are highly controversial. The scientists found a negative shift in the northern hemisphere and a positive shift in the southern hemisphere. A closer look at the data showed a smooth variation between quasars in the north, up to the equator, and then to the south. This suggests that alpha was 1 part in 100,000 larger in the southern direction over 10 billion years ago. It was smaller by a similar amount in the northern hemisphere. It suggests that the laws of physics may not be the same everywhere in the universe. These changes are very small but if correct, new physics will be needed to explain this. Grand unified theories suggest that the value of alpha will change over the universe. So this may determine which laws in the universe are appropriate and may help us to move beyond the standard model.

Al next showed a movie of 30 years of asteroid discoveries. Beginning in 1989, we watched the rate of discovery increase with time. There are now over 130,000 known asteroids.

And finally, Al talked about the amazing recurring Mars apparition. This began as an informational e-mail that mutated to a virus, saying that Mars and the moon would appear the same size in the sky. The original closest approach message occurred in August 2003. Someone wrote that if you looked with 75 power magnification Mars would appear the same size as the full moon with the naked eye. The 75 times magnification part has disappeared and then the date was lost. So this e-mail will never die unless we can inoculate the public with sufficient intelligence to kill this virus. Al has received this e-mail every year since 2003.

Alain Denhez and Carmen Nadeau invited us to attend a conference in the Outaouais on September 23 to 26. It will take place at the Holiday Inn in Hull. The RAAOQ is a group of almost 50 members that share a passion for astronomy. Every year the FAAQ sponsors a conference. It is a French conference, usually attended by between 100 and 200 amateur astronomers from the province of Quebec. This year the conference is organized by the RAAOQ. There would be both amateur and professional astronomer speakers. More information could be found at www.faaq.org/congres/

Mike Maghadam followed with a public outreach update. There will be a public star party on October 9 at the Carp branch of the Ottawa Public Library. Check the Centre website if the weather is questionable. Mike is looking for 2 volunteers for a presentation and star party at the Linden Lee community center on Friday October 15. The Ottawa Centre will again participate in the Science Funfest on Sunday October 17 between 11 am and 4 pm. This event is designed to interest youth in science. Mike is looking for 18 volunteers as well as an additional 2 volunteers to help plan the event. The Oak Park Retirement Community has requested a presentation and star party. Mike is looking for 1 volunteer. The Centre will also be supporting the winter solstice event at the Museum of Science and Technology on December 21. The National Gallery wants to know more about the myths and lore with a gibbous moon. Brian McCullough is providing support.

Chuck O'Dale presented a trivia question. He showed us an image with a dome on a hill. He told us the object was located within 20 kilometers of the museum. No one had the answer. After the break Chuck told us the object was located at the airport. It was designed as an observatory for a theodolite and is still functional. This was a typical government project: it stopped when the money ran out. The dome is still in prime condition but the building will fall. Next time you are at the terminal, look to the southwest for the dome.

Bill Wagstaff discussed the benefits of RASC membership. One of the benefits is the observing certificates offered by the society. It has now decided to also issue pins for certain certificates. Bill noted that few Ottawa Centre members have earned these certificates and he encouraged us to try. Explore the Universe is the introductory program. To receive this certificate, observe and document 55 of the 110 astronomical object listed. To earn the Messier certificate, observe the 110 Messier objects. There is also the Isabel Williamson Lunar Observing Program. An 8 inch scope or larger is recommended to observe the 110 objects of the Finest NGC program. A minimum 12 inch scope is recommended for the 45 objects in the Deep Sky Challenge. There is also David Levy's Deep Sky Gems program. Steven Gaudet has completed the Explore the Universe program. Pins for completion of the Finest NGC program have been issued to Cathy Hall, Rick Wagner, John Douglas, Goeff Meek and Pat Browne.

Chuck O'Dale and Eric Kujala presented some aerial observations. Using Chuck's plane and Eric's canoe, they have been exploring for the last 5 years to learn more about impact craters here on Earth. They recently flew over Algonquin Park. The first objective was the Brent Crater. It was discovered in the 1950's. Chuck and Eric first explored the crater by canoe in 2007. Two lakes are what is left of the crater. When they explored 1 lake, the water level was very low and they found a piece of breccia in the lake. They then flew south to a different site. It looked similar but it has not yet been proven to be in impact crater. Chuck and Eric want to find shatter cones to prove it is a crater. We also saw a view of Nirvana from the air.

Members' observation reports followed. Paul Comision first showed an image of NGC 6853 (M27 or the Dumbbell Nebula) with a hot O7 central star. NGC 7048 is in Cygnus. Stephan's Quintet is located in Pegasus. Some of these galaxies are just line of sight. Gary Boyle first showed an image of the crescent moon with Venus, Mars and Saturn. He also showed a Milky Way image, lunar craters Postidonius and Theopolis and Jupiter with the shadow of Europa. Rolf Meier showed us an image of fireflies, followed by 2 images of Jupiter. He noted that the jet stream causes problems for Ottawa. The interface between tropical and arctic air causes poor seeing. Ron St. Martin is still using film and he showed images of the Double Cluster, Jupiter and Iridium flares. He showed the Perseids. He aimed the camera and took 10 minute exposures all night.

Last month's challenge was to find strange features on the moon. Bob Olson found a hook. In 2003 Brian McCullough looked in the area of Maurolycus crater to find Little Bonhomme in a stocking cap. This year on July 30 he found the face of the screaming rabbi from the craters Zagut, Rabi Levi and Lindenau.

Jonathan had a brief story about how visual astronomy often surprises you and catches you unprepared. A group had decided to watch meteors at Phinney's Point. He decided to arrive earlier with just his binoculars to see the sunset. Within 1 hour before dark he watched the sun, the moon, Venus, Saturn and Mars set. Venus was a surprise. It went from a bright blue-white to bright yellow above the horizon. As it hit the horizon it changed to a bright yellow-orange. Saturn also changed color but that change was not as dramatic. Mars was the most interesting as it set. Through his binoculars, as Mars approached the horizon it started flashing a bright deep red. After seeing that color, it was easy to understand why the ancients associated Mars with war and bloodshed. When it got dark the group did a count of the number of meteors. And by midnight (way past their bedtime) the 2 kids in the group had counted 35 meteors. Jonathan stayed a little longer (way past his bedtime too) and enjoyed a very pleasant evening.

Thanks to Ann and Art Fraser for the after meeting refreshments.

Rideau Ferry Observatory – October 29 Weekend

By Rob Dick (rdick@robertdick.ca)

This Fall's star weekend will be at the end of October on the weekend of 29-31. The Observatory has a 24-inch Newtonian/Cassigrain telescope with plenty of space to set up your own scope if you like. I should be there by 7 p.m. on Friday evening for a night of observing, and throughout the weekend.

It gets dark around 6 p.m. and there will be a last quarter Moon rising after 10:30 on Friday giving us several hours of dark sky for observing.

The Observatory is about 1 1/4 hour south of Ottawa near the hamlet of Rideau Ferry. You may Google it. If you need a map to the building, just ask (via email) and I will send it out to you. (rdick@robertdick.ca)

For those wishing to camp, there are 38 acres available - and one outhouse.

We usually go for dinner in Perth late Saturday afternoon. If you would like to join us, let me know so I can get a head count for the restaurant or you will be sitting on the floor. We return to the Observatory before 8 p.m. for another night of observing – until moonrise at midnight.

If it's cloudy on either night there will be a gabfest instead of observing. Sorry, there is no rain date.



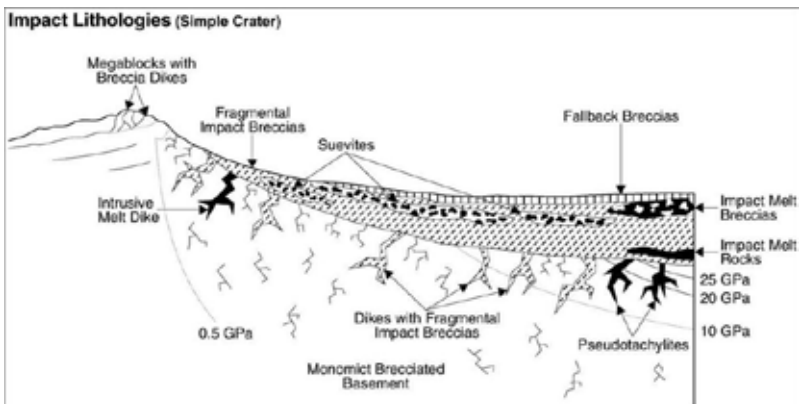
Identifying Impact Structures, Part VII

By Chuck O'Dale

SHOCK METAMORPHISM

INTRODUCTION

An obvious craterform is an excellent indicator of a possible impact origin; particularly, if it has the appropriate morphometry as illustrated in Part II of this series. But as noted, such features are rare and short-lived in the terrestrial environment. The burden of proof for an impact origin generally lies with the documentation of the occurrence of shock-metamorphic effects. Impacts produce distinctive “shock-metamorphic” effects that are found in situ within the crater and allow impact sites to be distinctively identified. Such shock-metamorphic effects, in addition to the shatter cones (documented in Parts V & VI), include brecciated rocks, suevites, impact melts and pseudotachylites. They attest to the destructive power of the impact event.



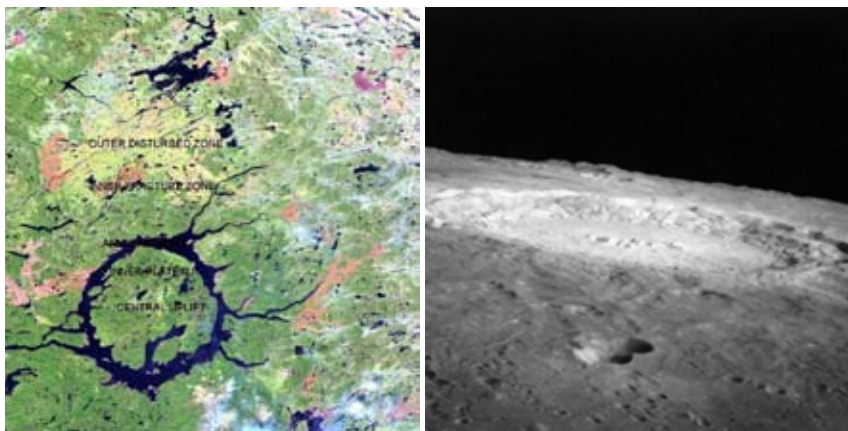
Schematic radial cross-section through one-half of a simple impact structure, showing locations of different impact-produced lithologies. Curved lines show isobars of shock pressures (in GPa) produced in the basement rocks by the impact.

The rocks at the target site are melted, shattered, and mixed during the impact explosion. When the site finally settles and cools, a new composite rock, impact breccia in bodies tens to hundreds of meters in size, is the result. Lithologies showing these unique diagnostic shock effects, formed at pressures ≥ 10 GPa, tend to be restricted to two locations: (1) crater-fill materials (suevites, melt breccias, and fragmental impact breccias) deposited in the crater; and (2) brecciated basement rocks, often containing shatter cones, near the center of the structure. The magnitudes of the impact shock relative to the point of impact that form the shock metamorphic effects were quantified for reference in Part V.

Manicouagan

Approximately 214 million years ago an estimated 10 kilometre wide hypervelocity meteorite impacted at between 12 and 30 kilometres per second and formed the Manicouagan Impact Structure.

The resultant 100 kilometre diameter crater (image below left- Courtesy NASA/LPI) is one of the largest impact craters still preserved on the surface of our planet. The Copernicus crater on the moon (image below right- Courtesy NASA - A12) has a diameter of 93 kilometres. For comparison, the Manicouagan's annular moat would fit comfortably within the rim of the Copernicus Crater.



Morphological elements of the Manicouagan structure are based on topographical expression and are:

1. outer circumferential depression - ~150-km outer diameter;
2. outer disturbed zone - ~150 km diameter;
3. inner fractured zone - ~100 km outer diameter;
4. annular moat - ~65 km outer diameter;
5. inner plateau - ~55 km outer diameter;
6. central region - ~25 km outer diameter. (Grieve, Head 1983)

In the summer of 2006, Eric Kujala and I explored the interior of the Manicouagan impact structure by canoe and on foot. We entered the structure from the east, crossing the all these morphological elements and concluding in the Memory Bay inlet. This inlet is on the east portion of the island forming the central peak of the structure. To read about our harrowing experience while in the crater please see my web site about the trip (O'Dale 2006).

Identifying Impact Structures, Part VII

At the point of impact, the country rocks were instantaneously evaporated/melted/shattered by the energy released leaving a 200 to 600 cubic kilometre sheet of impact melt directly on basement rocks. We observed changes in these impactite textures as a progressively increasing proportion of superheated melt and a decreasing fraction of cold fragmented country rock material toward the interior of the crater (Simonds 1976). The following images will illustrate these observations.

Outer Circumferential Depression, Outer Disturbed Zone and Inner Fractured Zone

In Part IV of this series I documented the shattered rock we encountered at approximately 40km from the central peak as we entered the outskirts of the crater. We did not identify the outer circumferential depression.

Peripheral Trough

The water filled circular annular moat that is prominent in space images is only one third of the size of the original crater. The water in the annular moat fills a ring where impact-brecciated rock was eroded away by glaciation. Before flooding of the reservoir, isolated outcrops of tilted and deformed limestone, siltstone and shale were found on the inner edges of the moat (Murtaugh, 1975).

This rock formation is found at the extreme eastern portion of the annular moat on one of the small islands. Note the rock structure is breccia free gneiss. The central peak of the structure is visible over 10 km in the distance.



Inner Plateau

The Inner Plateau of the Manicouagan structure is bounded by the annular moat, overlain by melt sheet, underlain by shocked basement rock (Orphal, Schultz 1978). We found a “lunar landscape” here containing various breccia types. The astronauts exploring the moon found that impact-melt breccias, similar to what we found here, were the most common rock types at the Apollo highland sites (Apollos 14, 15, 16 and 17) (Haskin 1998). We documented impact breccias formed by similar and very different country rocks like those found on the moon!

Identifying Impact Structures, Part VII

Impact breccias were melted, mixed, crushed and compressed by shock waves at various stages in the cratering process: (1) during the initial shock-wave expansion and transient crater formation; (2) during the subsequent modification of the transient crater. Even within the brief formation time of an impact crater, it is possible for the multiple generations of breccia to develop and to produce distinctive differences, even though the time between one breccia generation and the next may be measured in seconds or minutes (French 1998). The extremely small size of the grains within the matrix between the country rock fragments were formed by the very high pressure of the gas generated when the bolide impacted.



The photo at top illustrates a breccia outcrop found within the inner plateau area of the Manicouagan Impact Structure. Note the different types of rock fragments forming the breccia within the fine grained matrix impact melt.



This photo top right is a breccia outcrop found within the inner plateau area of the Manicouagan Impact Structure. Note the different types of rock fragments forming the breccia within the fine grained matrix impact melt.

The Central Region

The Central Region of the Manicouagan Structure is a complex zone of uplifted, shocked and metamorphosed basement rocks with small tabular bodies of impact melt and pseudotachylite veins (Orphal, Schultz 1978). Recent U-Pb zircon dating of the impact melt gave an age of 214 ± 1 million years.

Identifying Impact Structures, Part VII

The illustrated impact melt cliff and talus (debris at the base of the cliff) is found in the central region area of the Manicouagan Impact Structure. It is composed of target rock that was made temporarily molten from the energy released during impact. There are not any detectable meteorite components in the Manicouagan structure melt rock (Palme et al., 1978).

I tried to climb the talus slope up to the cliff face but it became very unstable the higher I climbed. I got to the point that I was creating dangerous rock slides without making any progress. I stopped to take this picture; looked down and found the “Manicouagan shatter cone” I documented in Part VI of this series. Serendipity at its best!



While we explored the impact melt cliffs on the north shore of Memory Bay we noticed an odd feature in one of the cliffs. Eric took this image of the feature. It shows a 10 m block of mafic gneiss (indicated in the image) suspended about 20 m above the base of the melt sheet. Such a block is 0.3g/cm^3 denser than the melt and should settle at a minimum of 5 cm/sec (Stokes Law) through a Manicouagan composition melt with 2% H₂O (water) if it were still liquid at 1000°C. In order for that block to remain suspended, the melt must have begun to crystallize rapidly enough to trap the block before it settled to the bottom of the sheet (Simonds 1976).



Conclusion

Documented in this article were impact metamorphic rocks found in the Manicouagan impact structure to illustrate shock metamorphism in an impact crater. Separately, each of these shock metamorphic features could be explained by naturalistic means (other than impact), but taken together they strongly suggest evidence for an impact. Similar rock formations found in other craters and will be documented in future articles.

Comet Hartley 2 Approaches Earth

By Brian Ventrudo, Ph.D

Yet another respectably-bright comet is nearing Earth and will put on a good show for binocular observers. Comet Hartley 2 will be visible in Cassiopeia and Perseus over the next few weeks, and may grow bright enough to see with the unaided eye as it comes within 11 million miles of Earth, one of the closest approaches of any comet in the past century.

Comet Hartley 2 is a periodic comet, returning to its closest approach with the sun every six years. It was first detected by Malcolm Hartley in March of 1986 at the U.K. Schmidt Telescope in Siding Spring, Australia. This is Hartley's second comet discovery, hence the name "Hartley 2"

But it's strange for a such a bright comet to go undetected until 1986. Why didn't astronomers find it earlier? A little number crunching revealed the comet took up its current orbit only recently, after three gravitational interactions with Jupiter in 1947, 1971, and 1982. Before that, the comet was in a longer-period orbit which never brought it close enough to the sun to make it visible. It was quickly picked up by Hartley after it settled into its new orbit.

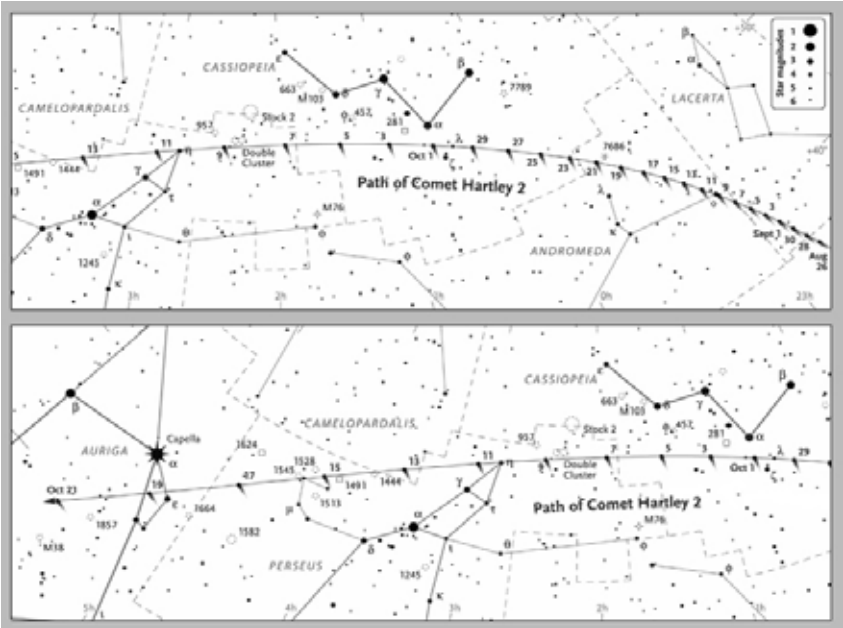
Because of its unusually close approach this year, Comet Hartley 2 will put on its best showing since its discovery. Over the next week, the comet speeds through the constellation Andromeda, then into Cassiopeia through the first week of October when the Moon is waning and casts less glow.

In dark sky, you might spot the comet with your unaided eye in early October, when it reaches 6th magnitude. But because the comet is close to Earth and apparently large, its light is diffuse and harder to see. Binoculars will give you a better view, as will a telescope at low magnification. The comet may grow as bright at 5th magnitude by mid-October.

The image (right) was taken on September 20 by Michael Jäger in Austria.



Comet Hartley 2 Approaches Earth



The location of Comet Hartley 2 through late October (from Sky and Telescope)

On October 1, the comet is just 1.5 degrees south of the star Shedir (alpha Cassiopei). A week later, the comet is in Perseus where it passes just below the magnificent Double Cluster on October 7-8.

I am sorry to tell our southern-hemisphere readers that Comet Hartley 2 will be visible only in northern hemisphere through mid-October, when it's at its brightest. Though if you're north of 30 S latitude, you might glimpse the comet in Perseus on the northern horizon (see map above).

But if you can't see it for yourself, don't worry. The comet will be met by the NASA Deep Impact spacecraft on November 4. The craft, now on an extended mission called EPOXI, will take images and other measurements of the comet's 1-km-wide nucleus. Check out NASA's website as the day approaches. You may get to see live mission updates as they come in.

From the One Minute Astronomer: <http://www.oneminuteastronomer.com/>

The Veil nebula by Sanjeev Sivarulrasa

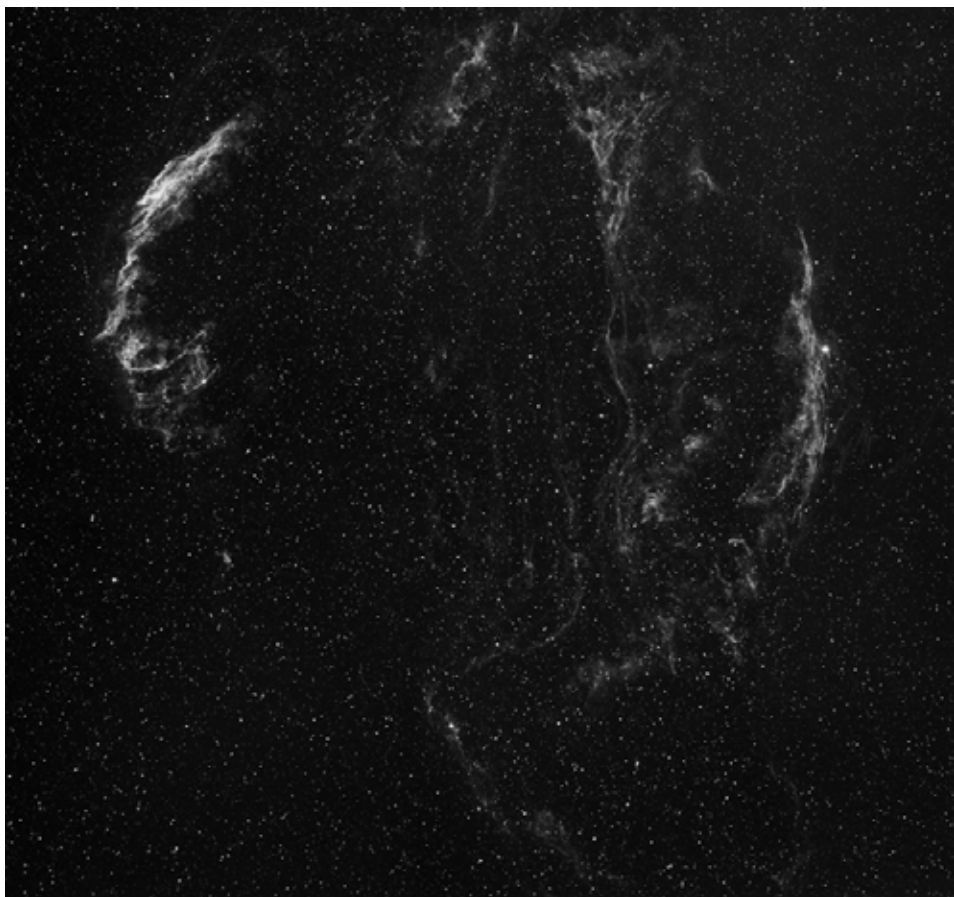


Image Details:

Scope: Televue 85 refractor at 480mm f5.6

Mount: Takahashi EM400 (autoguided)

Camera: QSI 583ws with Astrodon 3 nm H-alpha filter

Exposure: 6 panel mosaic, total exposure = 6 hours over 2 nights

Each panel = 1 hour (10 minutes x 6, binned 2x2).

Processing: Nebulosity and Photoshop CS4

Date: August 27 and 28 under moonlit skies near Almonte, Ontario

Astro Goodies for Sale

Use this space if you have anything you would like to sell to other members.
Send submissions to the editor:
astronotes@ottawa-rasc.ca

Meteorites and Tektites For Sale

This is your opportunity to acquire genuine rocks from space. A good assortment of stone and nickel-iron meteorites are available.

Also available: impact specimens from Sudbury shattercones, breccia, etc. Contact: Ron at 842-9125 evenings after 6:30pm or email any time at spacerocks@rogers.com.

Starlight Theatre

Are you on the road to learning the night Sky? You will find our Celestial Sphere videotape and Star Maps perfect for people starting in astronomy. See us after the monthly meetings to talk astronomy or about reducing light pollution. (Yes, I do that too.) We also have products for educators and more advanced observers. You may also contact us at: www.starlight-theatre.ca, 1-800-278-2032, slt@starlight-theatre.ca

Astro Quote of the Month

I had watched a dozen comets,
hitherto unknown,
slowly creep across the sky
as each one signed its sweeping flourish
in the guess book of the Sun.—

Leslie C. Peltier,
American Amateur-Astronomer (1900-1980)

Next Ottawa Centre Meeting

Friday November 5, 2010, 8 PM
Canada Science and Technology Museum
Public Welcome



M8-The Lagoon nebula by Tom Butterworth

Clear Skies!